PROTECTING LOW-INCOME RATEPAYERS AS THE ELECTRICITY SYSTEM EVOLVES

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Synopsis: From distributed energy resources to smart meters, we are witnessing one of the most significant economic and physical transitions in the history of our electricity sector. As utilities, regulators, and stakeholders grapple with transforming our aging grid, one under-examined issue is how these changes will impact low-income ratepayers. Specifically: as reformers begin to align utility pricing structures with true system costs, what will happen to the rate-based subsidies helping to provide electricity to these financially vulnerable consumers? With millions of Americans otherwise unable to afford utility service, the answer to that question has real-world implications. This article analyzes the intersection of grid modernization efforts and low-income ratepayer assistance programs. It discusses the unique problems facing low-income customers, and explores norms like "universal service" that underpin utility regulation in general, and ratepayer assistance in particular. Ultimately, this article proposes policy solutions to facilitate the goals of both grid modernization and low-income ratepayer assistance. Only by tackling this issue head-on can policymakers ensure that tomorrow's energy future will look bright for all ratepayers—regardless of their income.

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I. INTRODUCTION

Electric utilities in the United States can no longer rely solely on producing and selling kilowatts to generate revenue. The challenges facing these companies today include: flattening electricity consumption, pressing resiliency and security concerns, and rising demand for distributed energy resources (DER). In addition to implementing standard system upgrades, utilities are being called to integrate decentralized assets, facilitate customer generation and energy use options, and invest in smarter grid technology—all while operating more efficiently and with less carbon output.

These realities are fundamentally changing the way that utilities will be operated and regulated in the near future. Several states, like New York, Minnesota, Massachusetts, California, and Hawaii, are investigating how to prepare for and guide this evolution. At the forefront of these discussions are important questions over how utility business models and rate structures must change, as well as how tomorrow's electricity system will continue to deliver affordable, reliable, and universal service.

Under-examined throughout this process, however, is the concern of how this grid evolution will impact the most vulnerable in our communities: low-income ratepayers. Indeed, these changes raise a host of low-income consumer protection issues from addressing stringent distributed energy financing rules[1] and the landlord-tenant impediment to energy upgrades,[2] to ensuring cost containment as

1. Third-party financing, and more recently utility-led financing, is how the majority of residential customers install distributed energy resources (DER) on their properties. These arrangements, though, can be both complicated and nearly out of reach for customers without good credit scores – a group that often includes low-income customers. *See, e.g.,* Patrick Sabol, *From Power to Empowerment: Plugging Low Income Communities into the Clean Energy Economy*, GROUNDSWELL (April 2016), groundswell.org/frompower_to_empowerment_wp.pdf.

2. As is common in the United States, because renters typically pay utility costs, landlords have little incentive to pay for the property and weatherization upgrades necessary to make a rental unit more energy efficient. Likewise, few renters see the long-term value in improving property that they do not own. This dilemma is particularly acute for households qualifying for federal energy assistance, nearly 79% of which live in rental

smart metering enables new pricing structures.[3] This article analyzes just one aspect of this multifaceted conundrum: how modern rate structure reforms will likely impact low-income ratepayer assistance programs. The goal is to explain this problem and provide a preliminary set of policy solutions for industry members, stakeholders, and regulators. No single policy will provide the answer for most states. However, using some of the suggestions outlined in this article, in combination with an inclusive dialogue, we can better ensure a more just and equitable outcome for low-income consumers in the electricity system of tomorrow.

To that end, this article proceeds as follows: Part II describes the chronic "energy burden" weighing down low-income households, and explores the various federal and state policies in place to lighten this load. Part III follows with a brief discussion of the current set of challenges prompting grid modernization efforts, and describes what implications those efforts present for low-income ratepayers. With this background as context, Part IV lays out a series of policy approaches that can help regulators and reformers address these concerns and meet their intended objective: modernizing the electricity system while ensuring affordable service, universal access, and equal participation for all ratepayers.

II. THE ENERGY BURDEN FACING LOW-INCOME HOUSEHOLDS AND THE CURRENT STATE OF ASSISTANCE PROGRAMS

To better understand the proposed grid reforms outlined in Part IV, it is necessary to first set out the status quo for low-income households in the United States today. This Part discusses the primary metric by which "affordability" is often measured by utilities and regulators: the energy burden. The second subsection addresses federal and state-level policies and programs to help alleviate this burden.

A. What Is the Energy Burden?

According to the most recent data from the U.S. Census Bureau, 46.7 million people were in poverty in the United States in 2014—nearly 14.8% of the population.[4] But those numbers tell only part of the story. Generally, although each state and utility-run energy assistance program defines "low-income" differently, most peg eligibility to certain thresholds at or up to 200% of the federal poverty level

units and pay their own utility bills. Diana Hernández & Stephen Bird, *Energy Burden and the Need for Integrated Low-Income Housing and Energy Policy*, 2 POVERTY PUB. POL'Y 5 (Nov. 2010), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4819257/pdf/nihms-763053.pdf.

3. *See, e.g.*, Ralph Cavanagh & John Howat, *Finding Common Ground Between Consumer and Environmental Advocates*, ELECTRICITYPOLICY.COM 5 (May 2012), https://www.nclc.org/images/pdf/energy_utility_telecom/additional_resources/decoupling-common-ground.pdf.

4. Carmen DeNavas-Walt & Bernadette D. Proctor, *Income and Poverty in the United States: 2014,* U.S. CENSUS BUREAU 12 (Sept. 16, 2015), https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-252.pdf. Whether a person is living in poverty depends on average annual income level and family size. According to the most recent data from the U.S. Census Bureau, the poverty threshold for a single person is $12,071 annually, $15,379 for a two-person home, $18,850 for three member families, $ 24,230 for four-member families, and so on. *Id.* at 43.

(FPL)—which brings the total of people potentially eligible for low-income assistance programs in the United States to around 106 million.[5]

In the context of energy assistance, many programs look to not only a person's income in relation to the FPL but also his or her total "energy burden"—that is, the percentage of a customer's income spent on energy.[6] According to various sources, including the federal Energy Information Administration,[7] middle-income and high-income ratepayers have a 1-5% energy burden, whereas low-income customers face burdens from 6-30% or more depending on the state.[8]

Sample State Comparison of Energy Burden and Number of Households in 2015 Broken down in Relation to the Federal Poverty Level

Fed. Pov. Level	Ohio		Arkansas		California		Texas	
	Burden | People		Burden | People		Burden | People		Burden | People	
Below 50%	30%	340,907	38%	90,651	25%	889,088	31%	652,395
50-100%	16%	391,315	20%	127,775	13%	1.16 mil.	16%	919,249
100-125%	11%	207,370	13%	69,004	9%	658,115	11%	494,789
125-150%	9%	208,736	11%	69,711	7%	648,586	9%	486,728
150-185%	7%	300,805	9%	93,978	6%	862,381	7%	650,634
185-200%	6%	125,281	8%	36,055	5%	335,906	6%	258,823
Total households		**1,574,414**		**487,174**		**4,557,152**		**3,462,609**

Although the above table highlights only four states, it is clear that millions of Americans struggle to pay their energy bills. Indeed, by some estimates, the number of low-income households represents 28% of the $159 billion residential energy market.[9] And the closer a household is to the FPL, the more onerous that

5. HENRY J. KAISER FAMILY FOUNDATION, DISTRIBUTION OF THE TOTAL POPULATION BY FEDERAL POVERTY LEVEL (ABOVE AND BELOW 200% FPL) (2015), kff.org/other/state-indicator/population-up-to-200-fpl/ (using U.S. Census bureau information from 2014 to set out how many people nationally and in each state live under 200% of the federal poverty level). Of the 313.3 million people living in the U.S. by the end of 2013, over 106.4 million were living under 200% of the federal poverty level. *Id.* This number likely represents the upper-end of additional potential aid recipients because only a few states extend eligibility to 200% of the FPL.

6. Staff Report, Proceeding of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers, No. 14-M-0565, 5 (N.Y. Pub. Serv. Comm'n June 1, 2015) [hereinafter NYPSC Low-Income Staff Report].

7. *Residential Energy Consumption Survey*, U.S. ENERGY INFO. ADMIN., www.eia.gov/consumption/residential/. For a state-by-state breakdown of energy burdens, see *Home Energy Affordability Gap*, FISHER, SHEEHAN, & COLTON, www.homeenergyaffordabilitygap.com/03a_affordabilityData.html (last visited Oct.6, 2016).

8. NYPSC Low-Income Staff Report, *supra* note 6, at 5; *Home Energy Affordability Gap*, *supra* note 7.

9. Fisher Sheehan & Colton, *Home Energy Affordability Gap 2015* (April 2016), www.homeenergyaffordabilitygap.com/03a_affordabilityData.html (click on individual states in the map to download factsheets); KEVIN MONTE DE RAMOS, POVERTY & THE PUBLIC UTILITY 50 (2005).

monthly energy bill is. As this problem is studied further, the harsh realities facing low-income households come into clearer focus.

1. The Majority of Low-income Households Include Vulnerable Members.

According to the National Energy Assistance Directors' Association (NEADA), a significant number of low-income households have at least one member who is particularly reliant on electricity for temperature control or other necessities. Based on a NEADA survey of 1,800 recipients of Low-Income Energy Assistance Program (LIHEAP)[10] funding, 40% had someone age sixty or older, 72% had a family member with a serious medical condition, 41% had a child under eighteen and 21% with young children under five, and 42% were disabled.[11]

2. High Energy Burdens are Strongly Associated with Negative Health Impacts

Numerous studies have established the link between energy unaffordability and poor health outcomes. In particular, utility shutoffs, bill debt, and inefficient weatherization have been linked to increased cases of pneumonia, bronchitis, other illnesses, and hunger among low-income communities.[12] 23% of the NEADA survey respondents reported keeping their homes at unhealthy temperatures in response to unaffordable utility bills; 33% used the kitchen stove or oven for supplementary heat; and 24% stated they had gone without food for at least one day.[13] Children are particularly at risk for a host of health complications associated with high energy burdens, including carbon monoxide poisoning, malnutrition, and cognitive and behavioral underdevelopment.[14]

3. Energy Insecure Households are Predominantly Southern and African American.

The racial and geographic disparities associated with high energy burdens are also significant. Of the households facing high energy burdens, 18% are Hispanic, 28% are white, and 49% are African American.[15] Likewise, 46% of families with high energy burdens reside in the South, followed by the Midwest at 22%, the Northeast with 17%, and the Northwest with 15%.[16]

10. LIHEAP is a federal grant program that provides the most assistance to low-income ratepayers. *See infra* Section II.B.1.

11. JO-ANN CHOATE & MARK WOLFE, NAT'L ENERGY ASSIST. DIRECTORS' ASS'N, NATIONAL ENERGY ASSISTANCE SURVEY 3 (Nov. 2011), neada.org/wp-content/uploads/2013/05/NEA_Survey_Nov11.pdf.

12. *See, e.g., Id.*; Hernández & Bird, *supra* note 2; John Cook & Ingrid Weiss, *The Impacts of Increasing Household Energy Prices on Health and Health Care Costs in New York State* 12-18 (May 2013), www.childrenshealthwatch.org/wp-content/uploads/Final_Entergyfoundationreport-Nov-4-2013-w-changes-Accptd.pdf; MONTE DE RAMOS, *supra* note 9, at xvii.

13. CHOATE & WOLFE, *supra* note 11, at 5.

14. Cook & Weiss, *supra* note 12, at 9; Hernández & Bird, *supra* note, 2 at 3.

15. Diana Hernández et al., *Energy Insecurity Among Families with Children*, NAT'L CENTER FOR CHILDREN IN POVERTY 7 (Jan. 2014), www.nccp.org/publications/pdf/text_1086.pdf.

16. *Id.*

B. Current Policies and Programs to Assist Low-Income Households

States and the federal government have various tools available to help reduce the energy burden on low-income households. At the federal level, two important initiatives are the Low Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP)—both of which are federally-funded grant programs administered in every state, the District of Columbia, as well as most tribal reservations and U.S. territories.[17] At the state level, as a result of a series of common law principles and regulatory norms, a primary mechanism for assisting low-income ratepayers has become the utility rate structure itself. As explored further in Part III, a likely consequence of the grid modernization efforts underway today will be rate design reforms—a prospect with negative financial implications for low-income ratepayers.

1. Federal Level: LIHEAP and WAP

In response to the steep increase in home heating oil following the oil industry's decontrol and the 1979 Iranian Crisis, Congress passed the Home Energy Assistance Act in 1980, and reauthorized it as the Low Income Home Energy Assistance Program (LIHEAP) that next year.[18] In essence, LIHEAP is a state-administered federal grant program providing targeted assistance to the most vulnerable households. Although states have flexibility to allocate some funds for weatherization and energy-related repairs, the bulk of the funds are used to offset heating and cooling bills for qualifying households.[19] States are allowed to set household income eligibility to the greater of either 150% of the federal poverty level or 60% of the state median income.[20]

Since funding began, LIHEAP has become a critical lifeline for those with "the lowest incomes and highest energy costs or needs in relation to income"— a group of people that disproportionately includes young children, the elderly, and individuals with disabilities.[21] However, since LIHEAP is not a mandatory federal spending program like Social Security or Medicare, it is under constant threat of underfunding.

Due to budgetary constraints, LIHEAP funding has been cut considerably—from $4.7 billion in 2011 to just over $3 billion for 2016—which directly impacts the number of recipients who can receive funding.[22] According to a December 2015 report by the Congressional Research Service, only about 22% of eligible

17. *LIHEAP Frequently Asked Questions*, U.S. DEP'T HEALTH & HUMAN SERV. (Jan. 9, 2016), http://www.acf.hhs.gov/ocs/resource/consumer-frquently-asked-questions#Q11; *Weatherization Assistance Program*, U.S. DEP'T ENERGY, energy.gov/eere/wipo/weatherization-assistance-program (last visited Oct. 6, 2016).

18. CHARLES HARAK ET AL., ACCESS TO UTILITY SERVICE, § 8.1.2 (Nat'l Consumer Law Center 2011) (describing the history of the LIHEAP grant program).

19. *Id.* § 8.1.1.

20. LIHEAP CLEARINGHOUSE, LIHEAP 101: WHAT YOU NEED TO KNOW 7 (March 2014), https://liheapch.acf.hhs.gov/pubs/LCIssueBriefs/FinalLIHEAPPrimer.pdf.

21. 42 U.S.C. § 8624(b)(5) (2012).

22. *LIHEAP and WAP Funding*, LIHEAP CLEARINGHOUSE, www.liheapch.acf.hhs.gov/Funding/funding.htm (last visited Oct. 7, 2016) (noting that the total amount of Congressionally-allocated LIHEAP funds for 2016 will be $3.35 billion by the end of that year).

households in 2012 actually received LIHEAP assistance that year.[23] This is not an anomaly. Historically, the program has only served about 15-20% of eligible households in the United States, and only served 36% of eligible households when funding first began in 1981.[24]

Second to LIHEAP, the next major source of federal dollars for low-income ratepayers is the Weatherization Assistance Program (WAP). First created in 1976, WAP is a grant program derived from annual Congressional appropriations and administered by the Department of Energy (DOE).[25] The DOE distributes this grant funding to each state, territory, a number of tribes, and the District of Columbia. These funds are then allocated to the respective recipient's local weatherization agency to put toward weatherizing the homes of eligible individuals—those with an income within 200% of the FPL.[26]

Aside from 2009-2013, which saw an unprecedented infusion of $5 billion in funding through the American Recovery and Reinvestment Act,[27] since 2002, the total WAP allocation has ranged between $204-242 million;[28] the total allocation for 2016 is $213.8 million. States are allowed to allocate a small portion of their LIHEAP grants toward WAP as well.[29] In addition, grant recipients are also able to leverage DOE's allocations to acquire additional funding from local utilities, state general funds, and public benefits funds.[30]

In addition to improved health outcomes, the other benefits of home weatherization include reduced utility bills for ratepayers, lower arrearages for utilities, reduced reliance on LIHEAP and other subsidies, and improved housing stock within the community.[31] Although the benefits to home weatherization are significant, so is the extent of the weatherization problem among the low-income community. Indeed, although WAP funding has allowed for over 6 million homes to

23. GENE FALK ET AL., CONG. RESEARCH SERV., R44327, NEED-TESTED BENEFITS: ESTIMATED ELIGIBILITY AND BENEFIT RECEIPT BY FAMILIES AND INDIVIDUALS 39 (2015), https://www.fas.org/sgp/crs/misc/R44327.pdf. For further discussion of the wide gap between who is eligible and who receives benefits from LIHEAP see *Home Energy Affordability Gap*, *supra* note 7.

24. HARAK ET AL., *supra* note 18, § 8.1.1.

25. BRUCE TONN ET AL., OAK RIDGE NAT'L LAB., WEATHERIZATION WORKS - SUMMARY OF FINDINGS FROM THE RETROSPECTIVE EVALUATION OF THE U.S. DEPARTMENT OF ENERGY'S WEATHERIZATION ASSISTANCE PROGRAM 3 (Sept. 2014), weatherization.ornl.gov/Retrospectivepdfs/ORNL_TM-2014_338.pdf [hereinafter WEATHERIZATION WORKS].

26. 42 U.S.C. § 6862 (2009); WEATHERIZATION WORKS *supra* note 25, at 3. The National Association of State Community Services Programs (NASCSP) is the national organization that provides the latest news on WAP, as well as technical support, guidance, and other assistance to grant recipients and their weatherization agencies. The American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5 § 407, 123 Stat. 115, 145 (revised the eligibility criteria from 150% to 200% of the FPL).

27. *See generally* The American Recovery and Reinvestment Act of 2009.

28. U.S. DEP'T ENERGY, WEATHERIZATION ASSISTANCE PROGRAM FUNDING II-1 (2008), www.waptac.org/data/files/website_docs/briefing_book/2_programfunding_final.pdf.

29. Weatherization Program Notice 16-2A, *Program Year 2016 Grantee Allocations – Revised*, U.S. DEP'T ENERGY (Jan. 8, 2016); WEATHERIZATION WORKS, *supra* note 25, at 4.

30. WEATHERIZATION WORKS, *supra* note 25, at 4-5; NAT'L ASS'N FOR STATE CMTY. SERV. PROGRAMS, WEATHERIZATION ASSISTANCE PROGRAM: PY 2014 FUNDING SURVEY 2 (2014), www.nascsp.org/data/files/weatherization/publications/nascsp2014_wap_funding_survey_final062015_print508.pdf [hereinafter WAP PROGRAM SURVEY].

31. WEATHERIZATION WORKS, *supra* note 22, at xvi (analyzing the benefits-to-costs ratio WAP, and concluding that it is nearly 4-1 — an analysis that has been challenged by other economists, see *infra* note 150).

be weatherized since the program was created,[32] there are over 40 million homes eligible for program funding.[33]

2. State Level: Underlying Principles Supporting Low-Income Ratepayer Assistance

State low-income assistance programs pick up where LIHEAP and WAP leave off. The primary means through which low-income ratepayers receive financial help is through favorable rate structures that provide below-cost rates through various types of discount programs. These programs, explained further in the next subsection, are grounded in principles that underpin both utility regulation in general as well as public assistance programs in the United States.

The philosophical and political roots of poverty assistance in the United States stretch back to the English Poor Laws of the 1580s, but the concept became a more formalized government policy in the years during and following the Great Depression.[34] The idea of "public interest" regulation of electric utilities has a much more recent history—one that is grounded in both the belief that electricity is an essential service, and the traditional assumption that such service can only be economically delivered by a single entity.[35] The rationale for low-income ratepayer assistance, therefore, draws from both of these histories, and in particular, from four subsidiary principles. These principles form the basis of current low-income assistance programs and are the animating forces behind the policy suggestions in Part IV of this article.

a. Duty to Serve

The duty to serve is one of the fundamental principles underpinning utility regulation and dates back to English common law.[36] In essence, it operates as a check on a monopoly utility's market control and ability to favor certain customers. The duty obligates utilities to provide service to any member of the public who resides in the utility's service area who has applied, and is willing to pay, for

32. WEATHERIZATION WORKS, *supra* note 25, at 6.

33. U.S. DEP'T ENERGY, WEATHERIZATION AND INTERGOVERNMENTAL PROGRAM: FACT SHEET (May 2009), www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf.

34. DUNCAN M. MACINTYRE, PUBLIC ASSISTANCE: TOO MUCH OR TOO LITTLE? 8-10 (1964); MONTE DE RAMOS, *supra* note 9, at 29-31 (briefly outlining the origins of Poor Law in England, and tracing its influence on American law and the New Deal).

35. *See* REG. ASSISTANCE PROJECT, ELECTRICITY REGULATION IN THE U.S.: A GUIDE 3, 7 (Mar. 2011) [hereinafter RAP GUIDE]. Although the early electric companies of the late 19th century were initially allowed to compete openly with coal, peat, and other energy providers subject to only loose city regulations, eventually, they soon became viewed like other businesses similarly "affected with a public interest." Munn v. Illinois, 94 U.S. 113 (1877). That is, like grain terminals, warehouses, railroads and other industries at the time, electric companies were soon recognized as providing essential services to society. Furthermore, in light of the technical and infrastructure complexities inherent in the industry, it became clear that it could not fully support competition, and that electric companies were in fact, "natural monopolies." Although later electric-sector restructuring of the 1990s and early 2000s would prove that the generation sector could be subject to market forces, such competition is not possible for the transmission and distribution components of utility service.

36. Tripp v. Frank (1792) 100 Eng. Rep. 1234 (extending the duty of service to ferries and laying the groundwork for later including utilities); Jim Rossi, *The Common Law "Duty to Serve" and Protection of Consumers in an Age of Competitive Retail Public Utility Restructuring*, 51 VAND. L. REV. 1233, 1236-37 (1998) (providing background information on the historical development of the common law duty to serve).

service.[37] In contrast with other business enterprises, utilities are obligated to serve both profitable and unprofitable clients within their service territory.[38] Indeed, in some cases, utilities have been ordered to extend their services to remote areas regardless of the fact that such a requirement may result in a financial loss to the utility in the short-term.[39]

b. Duty of Non-Discrimination

A common law outgrowth of the "duty to serve" is the utility's duty to provide such service without undue discrimination.[40] According to this duty, public utilities must treat all those within its franchise without arbitrary discrimination and "to [the] extent of its capacity, serve all who apply, on equal terms, as far as they are in [the] same class and similarly situated."[41] Low-income rate discounts—sometimes termed "lifeline" rates—have largely withstood challenges under this common law duty.[42] This is due in part because price differentiation does not necessarily amount to *undue* discrimination,[43] especially for customers that are often, although not exclusively, low users of electricity services.[44] Other grounds have included broad recognition of regulators' abilities to consider non-cost factors in approving rates.[45]

c. Universal Service/Access Requirement

The concept of universal access has its roots in the equity principles central to public assistance programs generally as well as in New Deal-era notions of economic opportunity.[46] By the early twentieth century, electricity had spread through most of America's cities, leaving much of the rural countryside without the modern conveniences or industrial advancements attendant to electrification. As the electricity gap widened so did the economic gap between urban and rural

37. HARAK ET AL., *supra* note 18, § 2.1.2; 64 AM. JUR. 2d *Public Utilities* § 21 (2016); 73B C.J.S. *Public Utilities* § 8 (2016).

38. HARAK ET AL., *supra* note 18, § 2.1.2; Rossi, *supra* note 36, at 1255-56.

39. *See, e.g.* New York v. McCall, 245 U.S. 345, 350-51 (1917) (upholding, as non-arbitrary or capricious, an order from the New York Public Service Commission requiring a natural gas utility to extend distribution lines to a community within its service territory, regardless that such an extension would not be very profitable); Elk Run Tel. Co. v. General Tel. Co. of Iowa, 160 N.W.2d 311 (Iowa 1968) (considering the common law "duty to serve" in interpreting a state statute and holding that the state Commerce Commission is authorized to require a telephone utility to extend its service to new customers who are inside the utility's franchise area); Rossi, *supra* note 36, at 1255-56.

40. JAMES C. BONBRIGHT, PRINCIPLES OF PUBLIC UTILITY RATES 33-35, 136-41, 369-85 (1961).

41. 73B C.J.S. *Public Utilities* § 9 (Service to the public—Duty to provide service without discrimination); HARAK ET AL., *supra* note 18, § 2.3.

42. *See infra* notes 56, 122 (discussing "lifeline" rates).

43. BONBRIGHT, *supra* note 40, at 372-83.

44. HARAK ET AL., *supra* note 18, § 2.3.4; *see infra* note 108 (discussing how low-income customers are not necessarily low-users of electricity).

45. HARAK ET AL., *supra* note 18, § 2.3.4.

46. *See generally* DEWARD CLAYTON BROWN, ELECTRICITY FOR RURAL AMERICA: THE FIGHT FOR THE REA (1980); Richard P. Keck, *Reevaluating the Rural Electrification Administration: A New Deal for the Taxpayer*, 16 ENVT'L L. 39, 42- 62 (1985).

America.[47] The federal government responded by establishing the Rural Electrification Administration and authorizing the new agency to make loans to local governments, nonprofits, and farming cooperatives for purposes of developing electricity infrastructure.[48] By the 1950s, electricity could be delivered to almost any farm in the country.[49] Thanks in large part to the success of rural electrification, the concept of affordable and universal access to electricity has become a fundamental tenant of utility regulation and a guiding principle for regulators.[50]

d. Ability-to-Pay Principle

The ability-to-pay principle—a concept borrowed from tax policy—has also influenced how utility rates are structured to assist low-income customers.[51] In the context of utility ratemaking, the principle is grounded in the notion that electricity service is a necessity that should not be denied to low-income individuals simply because they cannot pay the full cost of service.[52]

The four core ideas outlined above have endured through past evolutions of the electricity sector.[53] Indeed, even as we enter a new phase of this transition, at a time of reimagining old business models and regulatory structures, regulators and stakeholders are invoking these principles as they consider grid reforms.[54] The challenge, of course, will be to put words into meaningful action, so that these principles can matter as much tomorrow as they do today.

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47. BROWN, *supra* note 46 at xiii - xvi; Keck, *supra* note 46.

48. Keck, *supra* note 46, at 44. President Franklin Delano Roosevelt issued an executive order establishing the Rural Electrification Administration, Exec. Order No. 7037 (May 11, 1935). Congress later endorsed this action with passage of the Rural Electrification Act the following year. Ch. 432, 49 Stat. 1363 (1936) (codified as amended at 7 U.S.C. §§ 901-950b (2012)).

49. BROWN, *supra* note 46.

50. *See, e.g.,* Order Adopting Low Income Program Modification and Directing Utility Filings, No. 14-M-0565, 7, 45 (New York Pub. Serv. Comm'n May 20, 2016) [hereinafter NYPSC Low-Income Order] (listing examples of invocations of this and other core utility regulatory principles); *see also infra* Section IV.D.2.a (discussing the emergency of urban electrification cooperatives modeled off of the early history of rural electric cooperatives).

51. BONBRIGHT, *supra* note 40, at 111-112.

52. *Id.* at 111; *see also* NYPSC Low-Income Order, *supra* note 50, at 45.

53. For example, as retail competition arrived in some parts of the country in the 1990s and early 2000s, regulators ensured distribution utilities maintained their "duty to serve" utilities by requiring them to provide back-stop "basic service options" to any customer within their service territory. *See, e.g.,* Rossi, *supra* note 36, at 1294.

54. For example, regulators in New York and stakeholders in Minnesota and elsewhere have voiced their support for continued universal service in the midst of their respective electric grid reform discussions. Order Adopting Regulatory Policy Framework and Implementation Plan for a Reformed Retail Electric Industry, No. 14-M-0101, 85 (N.Y. Pub. Serv. Comm'n Feb. 26, 2015) [hereinafter REV Track One Order] ("Our statutory responsibility to maintain universal, affordable service is a critical driver of the REV initiative"); E21 INITIATIVE, PHASE I REPORT: CHARTING A PATH TO A 21ST CENTURY ENERGY SYSTEM IN MINNESOTA 2 (Dec. 2014), http://www.betterenergy.org/sites/www.betterenergy.org/files/e21_Initiative_Phase_I_Report_2014.pdf (listing universal access for low-income customers in particular as a "guiding principle" for their reform process); Jim Lazar & Wilson Gonzalez, *Smart Rate Design for a Smart Future*, REG. ASSISTANCE PROJECT 6 (Jul. 2015), http://www.raponline.org/document/download/id/7680 (setting out the three principles of modern ratemaking, and noting that the first is at-cost grid access); David Littell, Principal, Reg. Assistance Project, Presentation to the National Conference of State Legislators: Regulatory Structures and Market Transformation 8 (Dec. 8, 2015), www.ncsl.org/Portals/1/Documents/energy/Littell-present.pdf (reiterating the principles of modern ratemaking and making the right of universal access explicit at the first principle).

3. State Level: Rate-Based Low-Income Ratepayer Discount Programs

In the context of low-income ratepayer assistance, the preceding principles and policies are implemented in the utility rate structure through the state-level utility ratemaking process. That process, and how it may be impacted by current grid reform efforts, is discussed in Part III.B. What follows below is a brief summary of the common types of low-income ratepayer discount programs,[55] which along with low consumption-based rates, are sometimes referred to collectively as "lifeline rates."[56] As explained in Subsection B, the costs for these programs are funded through higher rates imposed on non-low-income ratepayers, as well as through LIHEAP and any applicable state grants.[57]

a. Straight/Percentage of Bill Discount

In a straight discount program, a certain percentage of the bill is cut from the customer's total amount due.[58] For example, under a 20% straight discount program, a low-income customer with a $40 monthly bill would see it reduced by $8 to be a total of $32. In 1989, California's legislature enacted the California Alternative Rate for Energy (CARE) program, which currently provides a 30-35% electricity bill discount and 20% natural gas bill discount for low-income customers.[59] Other states with straight discount programs include Massachusetts, Alabama, Arizona, Georgia, Illinois, Kansas, Kentucky, Maine, Maryland, and Rhode Island.[60] As of this writing, Texas is phasing-out its "Lite-up Texas" straight discount program, with the process to finish by the end of 2016.[61]

b. Percentage of Income Payment Plan (PIPP)

Unlike the straight discount, which is applied equally to low-income customers' bills regardless of the energy burden severity, the PIPP provides more targeted

55. According to one study, there are around ten different kinds of rate-based discount programs to assist low-income ratepayers – the most common of which are discussed in the main text. For a general discussion of the ten different rate program types, such as the "flat rate discount", "marginal cost based rate," and "block rate approach," see MAREN MAHONEY & MICHAEL O'BOYLE, ASU ENERGY POL'Y INNOVATION COUNCIL, A NATIONAL SURVEY OF ELECTRIC AND GAS UTILITY RATE STRUCTURES FOR LOW-INCOME CUSTOMERS 2 (Sept. 2013), https://energypolicy.asu.edu/wp-content/uploads/2013/12/National-Survey-of-Low-Income-Utility-Rates.pdf; *and* HARAK ET AL., *supra* note 18, § 7 (describing various utility affordability programs).

56. The term "lifeline" rate is primarily associated with the telecommunications sector, but is also used in the context of electricity service. *See, e.g.*, HARAK ET AL., *supra* note 18, § 11.3.2.2; RAP GUIDE, *supra* note 35, at 94. *See infra* note 122 for a brief summary of how lifeline rates are funded through "Universal Service Fund" surcharges on non-low-income customers.

57. *See infra* Part IV.B (discussing public benefit charges and public benefit funds, through which many states fund their low-income ratepayer assistance programs); RAP GUIDE, *supra* note 35, at 49; Joseph P. Tomain, *'Steel in the Ground': Greening the Grid with the iUtility*, 39 ENVT'L L. 931, 946-47 (2009).

58. HARAK ET AL., *supra* note 18, § 7.2.2.2. (discussing straight discount programs).

59. *CARE/FERA Programs*, CAL. PUB. UTIL. COMM'N, www.cpuc.ca.gov/General.aspx?id=976 (last visited Oct. 8, 2016); HARAK ET AL., *supra* note 18, § 7.2.2.2.2.

60. HARAK ET AL., *supra* note 18, § 7.2.2.2.3; MAHONEY & O'BOYLE, *supra* note 55, at 3 (listing the states that use a "flat rate" discount).

61. *Paying Your Bill*, PUB. UTIL. COMM'N OF TEX. (last visited Oct. 8, 2016), https://www.puc.texas.gov/consumer/lowincome/assistance.aspx; Jim Malewitz, *Texas Stops Helping Poor Families Pay Their Electric Bills*, TEX. TRIB. (Sept. 2, 2016), https://www.texastribune.org/2016/09/02/texas-stops-helping-poor-families-pay-their-electr/.

assistance. The first PIPPs were instituted by Ohio, followed by Pennsylvania,[62] and Illinois.[63] Under this discount scheme regulators set an affordable energy burden and program administrators look at a household's annual income to calculate the monthly bill. For example, if regulators set a 5% energy burden, and a household earns $15,000 annually, the total energy bill would be $750 for the year or $62.50 per month. Energy costs beyond that $750 yearly total are covered by available state or LIHEAP funds first, then other ratepayers—although some states apply those arrears once the customer leaves the PIPP.[64]

c. Fixed Credit Model

This is a PIPP variation that is utilized by New Jersey and Maine.[65] First, a PIPP is determined the same way as above, but in order for the discount to apply, the household's actual utility bill must be over a certain threshold. The discount only applies to cover any amount that exceeds that threshold.[66]

d. Tiered Discount

Tiered discount models, like those implemented in Indiana and New Hampshire, offer varying percentage discounts depending on the low-income customer's income level. Thus, the closer a ratepayer is to the federal poverty line, the deeper the discount into their utility bill.[67] The advantage of this method is that it attempts to arrive at an affordable rate for each "tier" of low-income users. In its May 2016 Order on low-income affordability programs, the New York Public Service Commission rejected a straight discount approach in favor of a tiered approach in which low-income ratepayer discounts vary based on income level (as demonstrated by the ratepayer's receipt of certain public assistance benefits).[68]

e. Consumption-Based Discounts

This type of model works in a similar fashion to an inclining block rate.[69] Under a consumption-based discount, as a low-income customer's use increases, the discount is reduced.[70] Unlike the tiered discount approach, however, consumption-based discounts are pegged to usage, not affordability. Thus, a low-

62. HARAK ET AL., *supra* note 18, § 7.2.3.2.3.

63. MAHONEY & O'BOYLE, *supra* note 55, at 6.

64. HARAK ET AL., *supra* note 18, at §§ 7.2.3.2.1-2 (discussing Ohio's PIPP, and its requirement that customers remain liable for PIPP arrears).

65. *Id.* § 7.2.3.3.

66. *Id.*

67. *Id.*

68. NYPSC Low-Income Order, *supra* note 50, at 19-20. Although the Commission allowed for other methods to be considered to better target assistance, it approved using ratepayer receipt of any state Home Energy Assistance Program (HEAP) benefits as a means by which to determine the discount level. *Id.* at 20. See *infra* Section II.B.4 for further discussion of this order.

69. *See infra* Part III.B (explaining the inclining block rate structure).

70. HARAK ET AL., *supra* note 18, § 7.2.2.4.

income ratepayer could be a lower user, garnering a significant discount as a result, but it may not be enough to bring that ratepayer to an affordable energy burden.[71]

f. Other Program Types

In addition to rate designs, this encourages conservation and rewards low-usage, and the discount programs mentioned above, there are also several other kinds of ratepayer-funded low-income assistance programs. Every state, for instance, has a weatherization program to receive and distribute WAP grants (and often supplement with additional ratepayer funding).[72] States like Maryland, New Jersey, Ohio, Wisconsin, Pennsylvania, Connecticut, and Missouri offer varieties of arrearage forgiveness to low-income ratepayers.[73] In addition, many states institute set bill amounts ("budget billing") during severe fuel hikes or extreme weather.[74] Like the above rate discounts and any below-cost rates offered to low-income/low-using customers, these programs are primarily funded by other ratepayers through their rates or other bill surcharges.

4. State-Level Example: New York Public Service Commission's May 2016 Order

One state leading the way on improving ratepayer-funded low-income customer assistance programs is New York. In January 2015, the New York Public Service Commission (NYPSC) opened a docket "to standardize utility low income programs to reflect best practices where appropriate, streamline the regulatory process, and ensure consistency with the Commission's statutory and policy objectives."[75] After input from numerous stakeholders, utilities, academics, as well as Commission staff, the Commission issued a final Order on May 20, 2016.[76] While the Order is an excellent first step toward fully funding low-income assistance programs, it does not address how rate structure reforms could impact this effort and what could be done in response—an inquiry that the Commission may be reserving for its Reforming the Energy Vision (REV) proceeding.

NYPSC's low-income order is notable for several reasons. First, the Commission established an "affordability block" rate for low-income customers aimed at reducing the energy burden for low-income ratepayers to a 6% target—a vast improvement from the 9%-41% burden currently weighing down most low-income New Yorkers.[77] Second, to reach that goal the Commission committed to allocating an additional $248 million to low-income discount program budgets in future rate cases, an increase of around 87%.[78] Third, the Commission adopted a proposal pushed by consumer advocates and directed staff to work with other state

71. *Id*.

72. *Id*. § 9.

73. *Id*. at § 7.2.5 (noting that arrearage programs come in many varieties, including, up-front forgiveness, "crisis" forgiveness to stave-off disconnections, bill multipliers corresponding with what the ratepayer pays, etc.).

74. *Id*. § 7.2.4.

75. NYPSC Low-Income Order, *supra* note 50, at 1.

76. *Id.* at 2.

77. *Id.* at 4-5; 23-26.

78. *Id.* at 4.

agencies to create an inter-agency task force to synthesize the various policies, programs, and agency agendas related to low-income assistance.[79] Fourth, and relatedly, the Commission recognized the need to consider these issues, and revise its Order as necessary, as its REV and other related dockets progress.[80]

The NYPSC low-income order is a significant development in the intersection of low-income and grid reform efforts. However, the order fails to break new ground in that it seeks to meet the 6% low-income energy burden target primarily, but not exclusively, through rate-based subsidies.[81] In response to suggestions for alternate funding sources, such as some of those outlined in Part IV of this article, the Commission dismissed them as "'one-shot' solution[s], where continual funding for these programs is needed."[82] Left unaddressed, though, was a discussion of how the rate structure reforms contemplated in the Commission's REV proceeding might impact the additional program funding established in the low-income order.

Regulators in New York and elsewhere have not yet addressed the problem that rate structure modernization poses to low-income ratepayer assistance programs. The remainder of this article directly addresses this question and sets out some policy solutions that can indeed help ensure the "continual funding" of these important programs.

III. THE EVOLVING ELECTRICITY SYSTEM AND ITS IMPLICATIONS FOR LOW-INCOME RATEPAYERS

Despite federal and state funding for low-income assistance, there are still many overburdened households in the United States—a reality that makes its own case for why more funding avenues are needed. This issue becomes yet more urgent when considering the fundamental changes underway in the U.S. electricity system today and the additional system costs they may impose. This Part summarizes these changes and explains their implications for low-income ratepayers, setting the stage for the next Part's discussion of potential policy solutions.

A. Challenges Facing the U.S. Electricity System

Generally speaking, the drivers for change can be broken down into at least four broad, but often interrelated, categories: flattening electricity demand; older generator retirements; environmental constraints; and disruptive technologies.[83]

79. *Id.* at 3, 42.

80. NYPSC Low-Income Order, *supra* note 50, at 10-12 (detailing the Commission's recent efforts "to promote affordability of utility service and provide opportunities to offer benefits to low and moderate income customers to participate in DER").

81. *Id.* at 30 ("this Order establishes that low income programs will be funded in utility rates on a continuing basis"); *but see Id*. at 28 ("Reducing the energy burden of low income households to the 6% level will require a range of initiatives, and cannot be accomplished through rate discounts alone.").

82. *Id.* at 30. Among the possible funding sources mentioned were system benefit charge funds (SBC) and funds generated from cap-and-trade auctions through the Regional Greenhouse Gas Initiative (RGGI), of which New York state is a member. *Id.* at 10, 29. These potential funding solutions are discussed in Sections IV.B and IV.C.1, respectively.

83. Regulators and industry members also share reliability, resiliency, and security concerns related to increasing renewables integration, climate change-related weather events, and vulnerability to cyber and physical

1. Flattening Electricity Demand

Compared to the near 10% annual electricity growth in the 1950s, the past decade has seen a much reduced 0.5% annual growth rate.[84] Indeed, for the fifth time in the last eight years and in spite of growth in the residential and commercial sectors—total U.S. electricity sales have *declined*.[85] This has major implications for traditionally-regulated electric utilities which derive their revenues from electricity sales and large-scale investments in centrally-located power production facilities and related transmission infrastructure.[86]

2. Retirements of Older, Less Competitive, Generation Units

Over the course of 2015, 18 GW of electric generator capacity was retired—80% of which was coal-fired.[87] The EIA projects that from 2012 to 2020 there will be upwards of 60 GW of coal-plat retirements,[88] roughly equivalent to thirty Hoover Dams.[89] Many nuclear energy generators are also struggling to stay open—and at least four plants have closed since 2013.[90] The majority of these coal and nuclear facility closures are due to low-cost competition from natural gas in restructured wholesale markets,[91] although, as discussed below, coal plants also face additional economic constraints due to environmental regulatory costs.[92]

attacks. These concerns relate less to whether the utility can carry on with business as usual than to whether that can still be said about the electricity system — a topic outside the scope of this article.

84. U.S. ENERGY INFO. ADMIN., DOE/EIA-0383(2015), ANNUAL ENERGY OUTLOOK 2015, at ES-7, ES-8 (Apr. 2015), http://www.eia.gov/forecasts/AEO/pdf/0383(2015).pdf; RON BINZ ET AL., CERES, PRACTICING RISK-AWARE ELECTRICITY REGULATION: WHAT EVERY STATE REGULATOR NEEDS TO KNOW 5 (Apr. 2012), www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation (noting the general decline of electricity, among other factors challenging the U.S. electric utility sector).

85. Kimberly Klaiman, *Total Electricity Sales Fell in 2015 for 5th Time in Past 8 Years*, U.S. ENERGY INFO. ADMIN. (Mar. 14, 2016), www.eia.gov/todayinenergy/detail.cfm?id=25352. The steepest drops were primarily due to the 2008-2009 recession, according to the U.S. Energy Information Administration, and while economic factors likely also play a role in the more recent sales declines, they are also likely driven by energy efficiency improvements across the residential, commercial, and industrial sectors. *Id.*; Stephen Lacey, *Even as America Constructs More Buildings, Electricity Use Continues to Drop*, GREENTECH MEDIA (Mar. 16, 2016), https://www.greentechmedia.com/articles/read/electricity-sales-keep-falling-in-the-us.

86. AMORY LOVINS, REINVENTING FIRE 172-74 (2011) (discussing the typical utility business model, and how it is negatively impacted by declining electricity demand).

87. Owen Comstock, *Coal Made Up More Than 80% of Retired Electricity Generating Capacity in 2015*, U.S. ENERGY INFO. ADMIN. (Mar. 8, 2016), https://www.eia.gov/todayinenergy/detail.cfm?id=25272.

88. Elias Johnson, *Planned Coal-fired Power Plant Retirements Continue to Increase*, U.S. ENERGY INFO. ADMIN. (Mar. 20, 2014), https://www.eia.gov/todayinenergy/detail.cfm?id=15491.

89. *Hoover Dam: Frequently Asked Questions and Answers*, U.S. BUREAU OF RECLAMATION, www.usbr.gov/lc/hooverdam/faqs/powerfaq.html (last updated Mar. 12, 2015) (noting that the nameplate capacity of the Hoover Dam is 2,080 megawatts, i.e. 2.08 GW).

90. NUCLEAR ENERGY INST., STATUS AND OUTLOOK FOR NUCLEAR ENERGY IN THE UNITED STATES 3 (Nov. 2015), www.nei.org/CorporateSite/media/filefolder/Policy/Papers/statusandoutlook.pdf?ext=.pdf.

91. *Id.*

92. *See, e.g.* Tyson Brown & Mike Leff, *AEO2014 Projects More Coal-fired Power Plant Retirements by 2016 Than Have Been Scheduled*, U.S. ENERGY INFO. ADMIN. (Feb. 14, 2014) www.eia.gov/todayinenergy/detail.cfm?id=15031.

3. Increasing Environmental Compliance Costs

To illustrate how environmental regulations impact the coal-fired power sector: about 30% of the total coal-fired power plant closures in 2015 occurred in April the same month that the U.S. Environmental Protection Agency's (EPA) Mercury and Air Toxics Standards (MATS) rule came into force.[93] The EPA's Clean Power Plan—as of this writing, temporarily stayed by the Supreme Court, pending judicial review—is also expected to lead to more plant closures, if it goes into effect.[94] While these closures mean that the grid's overall fuel mix is getting cleaner, they also spell financial trouble for many U.S. utilities with extensive coal-fired generation fleets.

4. Disruptive New Technologies

Facilitated by declining costs, assistance from third-party servicers, and favorable state policies, customers are more empowered than ever to take control of their energy consumption and grid interaction.[95] However, not everyone comes out a winner in this new world of customer choice. When middle and upper-income ratepayers install rooftop solar, they may unwittingly shift their share of fixed system costs onto those unable to self-generate.[96] Furthermore, this combination of efficiency measures and disruptive technology is chipping away at utilities' revenues, with a potential to create a $48 billion shortfall by 2025.[97]

In light of the above shifts taking place in the electric sector, some regulators, utilities, and stakeholders in various states have begun considering reforms. A few of the leading efforts are New York state with its commission-led REV docket,[98] Minnesota's stakeholder-driven e21 initiative,[99] various dockets open

93. *Id*.; Comstock, *supra* note 87.

94. U.S. ENERGY INFO. ADMIN., PROPOSED CLEAN POWER PLAN WOULD ACCELERATE RENEWABLE ADDITIONS AND COAL PLANT RETIREMENTS (June 5, 2015), https://www.eia.gov/todayinenergy/detail.cfm?id=21532.

95. For a deeper discussion of some technology-related challenges see Lazar & Gonzalez, *supra* note 54.

96. *See, e.g.,* MASS. INST. TECH., THE FUTURE OF THE ELECTRIC GRID 183 (2011), https://mitei.mit.edu/system/files/Electric_Grid_Full_Report.pdf (noting the questions of horizontal and vertical equity raised by net metering policies); *but see* Mark Muro & Devashree Saha, *Rooftop Solar: Net Metering is a Net Benefit*, BROOKINGS INST. (May 23, 2016), www.brookings.edu/research/papers/2016/05/23-rooftop-solar-net-metering-muro-saha (noting recent studies that suggest that net metering policies benefit all ratepayers, when taking all system costs and benefits into account).

97. ACCENTURE, UTILITIES FACE SIGNIFICANT REVENUE LOSSES FROM GROWTH OF SOLAR, STORAGE AND ENERGY EFFICIENCY, ACCENTURE RESEARCH SHOWS (Dec. 8, 2014), https://newsroom.accenture.com/news/utilities-face-significant-revenue-losses-from-growth-of-solar-storage-and-energy-efficiency-accenture-research-shows.htm; 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, 154 (2014-2015).

98. Order Adopting Regulatory Policy Framework and Implementation Plan, No. 14-M-0101 (N.Y. Pub. Serv. Comm'n Feb. 26, 2015). For a list of key documents in the docket see *Key Documents*, N.Y. ST. DEP'T PUB. SERV., www3.dps.ny.gov/W/PSCWeb.nsf/All/C12C0A18F55877E785257E6F005D533E?OpenDocument (last updated Apr. 27, 2016).

99. E21 INITIATIVE, *supra* note 54. In May 2015, the Minnesota Public Utility Commission opened a proceeding on grid modernization and is considering many of the issues addressed in the stakeholder-led e21 Initiative process. MINN. PUB. UTIL. COMM'N, STAFF REPORT ON GRID MODERNIZATION (Mar. 2016), morethansmart.org/wp-content/uploads/2015/06/MNPUC_Staff_Report_on_Grid_Modernization_March2016.pdf.

before the California Public Utility Commission,[100] Commissions in Hawaii,[101] and Massachusetts.[102] These efforts emphasize various policy solutions from innovative utility business model like in New York's REV proceeding or California's recent foray into distribution-level planning. One common thread connecting all these reform efforts, however, is a fundamental reexamination of the utility rate structure—which is the primary vehicle through which low-income ratepayers receive subsidies for their electricity use.

B. Implications for Low-Income Ratepayers: Reduced Financial Assistance

To understand how reforms to utility rate structures may adversely impact low-income ratepayers, it is important to first briefly summarize the ratemaking process itself. It begins with setting the utility's revenue requirement—the amount of money from ratepayers that the utility needs to collect to cover its costs and make an adequate return on investment.[103] Next, that revenue requirement is allocated among the various customer classes, which is often done based on factors including: how many customers are in a particular class, their usage of the system during peak demand times (when energy is most expensive), and the total amount of energy each class uses. Common class breakdowns are along the lines of residential, commercial, and industrial users, but states have many other types of designations.[104] After each customer class is allocated its portion of the utility's total revenue requirement, the final ratemaking question becomes how to collect that money from ratepayers—an inquiry known as rate design. For residential customers, the answer to this last question is manifested in their monthly bill, which typically sets out fixed charges and energy charges (usually on a per kilowatt-hour basis).[105] However, beyond using the ratemaking process solely as a means to keep utilities financially viable, regulators also use this process to effectuate certain policy goals.[106]

100. California has been addressing many grid reform issues through separate dockets on subjects ranging from distribution-level resource planning, to transitioning, to time-of-use rates. *See, e.g.,* Coley Girouard, *Top 10 Public Utility Commission Issues to Watch in 2016*, ADVANCED ENERGY PERSP. (Feb. 4, 2016), blog.aee.net/top-10-public-utility-commission-issues-to-watch-in-2016 (summarizing the open dockets).

101. Hawaii has been particularly concerned with how to integrate increasing levels of distributed energy resources (DER), largely solar PV. *See, e.g.,* HAW. PUB. UTIL. COMM'N, COMMISSION'S INCLINATIONS ON THE FUTURE OF HAWAII'S ELECTRIC UTILITIES (April 28, 2014), puc.hawaii.gov/wp-content/uploads/2014/04/Commissions-Inclinations.pdf (setting out the broad technical, economic, and policy issues implicated in the continued integration of DER); Order No. 33258, In re Public Utilities Commission Instituting a Proceeding to Investigate Distributed Energy Resource Policies, Docket No. 2014-0192 (Hawaii Pub. Util. Comm'n Oct. 12, 2015) (replacing the existing net metering program with two new tariff options).

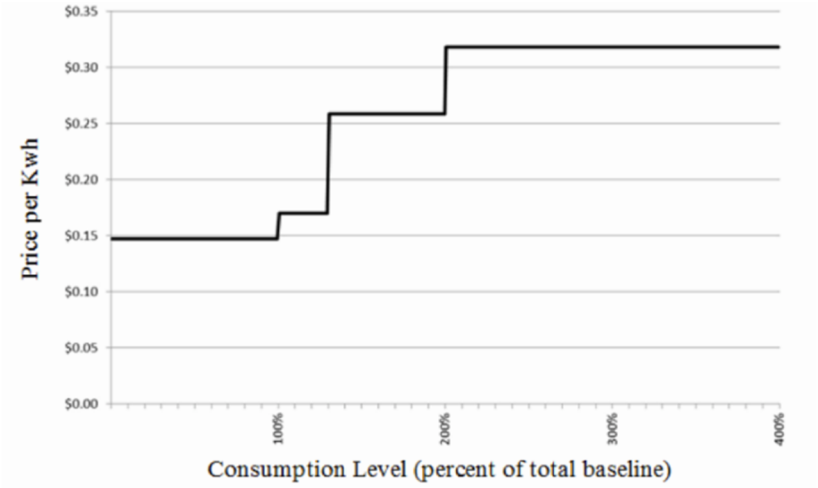
102. *See, e.g.*, *Grid Modernization*, MASS. DEP'T PUB. UTIL.'s, www.mass.gov/eea/energy-utilities-clean-tech/electric-power/grid-mod/grid-modernization.html (last visited Oct. 8, 2016).

103. RAP GUIDE, *supra* note 35, at 6.

104. *Id.* at 47, 50-54; BONBRIGHT, *supra* note 40, at 398-99.

105. RAP GUIDE, *supra* note 35, at 51.

106. BONBRIGHT, *supra* note 40, at 121-34.



Without the ability to implement widespread residential time-sensitive pricing until more recently, the inclining block rate design has been seen as the next best rate structure to promote the dual social goals of energy conservation and low-income ratepayer assistance.[107] Through this structure, energy becomes more expensive once a customer's usage passes a certain threshold. In comparison to flat rates and declining block rates, in which, respectively, energy costs stay the same or become cheaper beyond a certain threshold, an inclining block rate encourages consumers to be prudent in their energy use.

From the perspective of rate reform advocates, the inclining block structure raises two problems. First, it may not be the most ideal policy for targeting low-income customers so much as *low-usage* customers, many of whom may not necessarily be low-income.[108] As such, usage-based rates may be over-inclusive, thereby diverting resources away from low-income customers who are not low energy users—because of poor home weatherization, large household size, or other factors—and applying them to low-usage customers who do not require subsidization. As smart metering technology improves, however, it may be possible to better identify low-income customers in other higher-use residential classes and target assistance accordingly.

107. *See, e.g.,* Proposed Decision, Decision on Residential Rate reform for Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company and Transition to Time-Of-Use Rates, R.12-06-013, 308 (Cal. Pub. Util. Comm'n Jul. 3, 2015), http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M153/K024/153024891.PDF [hereinafter CPUC Tier-Flattening Order] (finding that "[o]ne purpose of the inclining block rate structure is to encourage residential customers to reduce aggregate electricity consumption"); Tom Karier, *Utility Pricing and Public Policy*, 28 ELEC. J. 12, 15 (2015).

108. *See, e.g.* Karier, *supra* note 107; CHARLES F. PHILLIPS JR., THE REGULATION OF PUBLIC UTILITIES: THEORY AND PRACTICE § 10 (1988) (noting that one of a long-standing concerns about "lifeline rates" was whether "high-usage but low-income consumers would face significant rate increases"). A helpful illustration of this can be found in the results of a recent utility study in Oregon. As part of the study, an analysis of the utility's residential customer class found low-income ratepayers at various usage levels, not just solely at lowest level. With only ten percent of the utility's total residential class being low-income that meant that the utility's block rate structure "was helping about nine times as many customers as intended." Karier, *supra* note 107, at 15.

A second concern raised by rate reform advocates regarding the inclining block structure is that it does not adhere to principles of modern rate design.[109] In particular, this rate structure neither represents the true costs of serving customers nor the benefits that customers may provide to the grid in return.[110] By increasing non-low-income rates to accommodate low-income subsidies, the cost of energy for non-low-income customers is artificially high. Thus, as grid reformers seek to better align rates with true system costs, the cross-subsidies that provide low-income customers with cheap power and other assistance will be reduced.

One example of this reality playing out in real time is in California. In July 2015, after three years of evidentiary hearings and deliberations, the California Public Utility Commission (CPUC) issued a landmark order transitioning residential customers from a four-tier to a two-tier rate structure and setting out a path toward default time-of-use (TOU) retail rates by 2019.[111] According to the Commission and the state's three main utilities, California's original four-tiered structure was over-charging higher using residential consumers to make lower-usage residential customers' bills less expensive.[112] The Commission determined that the Order was necessary not only to reduce this inequity but also to better align rates with true system use for all customers—the *sine qua non* of modern rate design.[113] Although the CPUC deferred a decision on raising fixed monthly charges, practically speaking, as a result of this "tier-flattening," all residential customers will likely see their electricity bills increase in California. As illustrated in the graphic on this page, this increase will include low-income customers who qualify for lower CARE rates.[114]

109. *See, e.g.,* Lazar & Gonzalez, *supra* note 54, at 6, 23-24 (discussing core rate design principles and setting out three principles through which regulators can modernize the rate structure and accommodate the changes taking place in the electricity system).

110. *Id*.

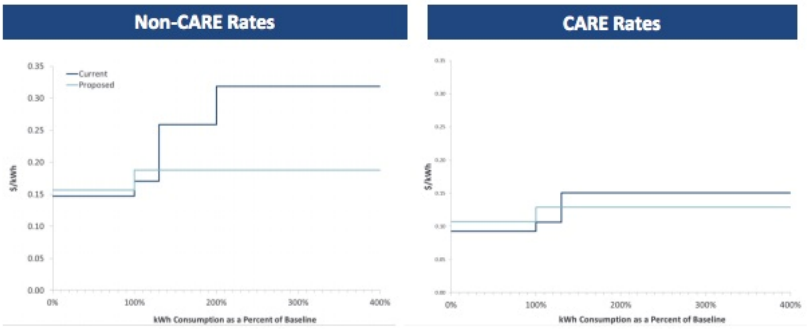
111. CPUC Tier-Flattening Order, *supra* note 107.

112. *Id.* at 13; Herman K. Trabish, *Inside California's Rate Restructuring Plan and the Battle for Fixed Charges Looming Over It*, UTILITY DIVE (Jul. 13, 2015), www.utilitydive.com/news/inside-californias-rate-restructuring-plan-and-the-battle-for-fixed-charge/402117.

113. *See* CPUC Tier-Flattening Order, *supra* note 107, at 27-28 (setting out the rate design principles adopted by the Commission).

114. Testimony of Dr. Ahmad Faruqui on Demand Elasticity and Conservation Impacts of Investor-Owned Utility Proposals, R. 12-06-013, at 12 fig. 1 (Pub. Util.'s Comm'n of Cal. Oct. 17, 2014) (used with permission from Dr. Faruqui). With some modifications, the CPUC adopted the proposed rates of PG&E and the other two investor-owned utilities in its final July 2015 Order.

Illustration of PG&E's former 4-Tier and proposed 2-Tier Rate Structure (volumetric component)



Notes:
Proposed fixed charges are $10.42 for Non-CARE and $5.21 for CARE.
Rates are revenue neutral to 2014 revenue requirement.

California is just the beginning. As other states modernize their rate structures—bringing rates into alignment with the true costs of utility service—ratepayer-subsidized low-income assistance programs will face revenue shortfalls. For a society that cleaves to the common law duties of service and non-discrimination as well as the ability-to-pay and universal service principles, this prospect creates a dilemma.

IV. PROTECTING LOW-INCOME RATEPAYERS AS THE ELECTRICITY SYSTEM EVOLVES

As the electricity system evolves, separate consideration must be made for how to help low-income customers with this transition. Because these ratepayers already carry a significantly higher energy burden than other customers, they are particularly vulnerable to rising costs and to the rate structure reforms contemplated in most grid modernization processes active today. The question becomes, then: as these electricity system reforms proceed, what policies can be implemented to complement the overarching goals of these reforms, while also protecting low-income customers? As with many public policy problems, the solution primarily boils down to money. Thus, the following sections discuss alternative revenue sources and other policy solutions to address funding shortfalls that may occur as rate structure redesigns reduce cross-subsidies for low-income assistance programs.

A. Expanding the Budgets or Mandates of Existing Grant-Based Programs

One relatively straightforward way to offer stronger protections for low-income customers is to expand existing state or federal grant-based programs.[115] As

115. RICHARD W. CAPERTON & MARI HERNANDEZ, CTR. FOR AM. PROGRESS, THE ELECTRICAL DIVIDE-NEW ENERGY TECHNOLOGIES AND AVOIDING AN ELECTRIC SERVICE GAP 9-10 (Jul. 15, 2013), https://cdn.americanprogress.org/wp-content/uploads/2013/07/DistributedGenerationBrief-3.pdf.

noted previously, federal programs like LIHEAP and the Weatherization Assistance Program already exist to assist low-income ratepayers. Some states also have grant programs, or public benefit funds (discussed below) to provide direct ratepayer assistance to low-income communities.[116] Despite the need across the country for more home energy assistance funding, these programs are chronically underfunded, so one analytically simple, albeit politically difficult, solution would be for Congress or the states to expand their budgets. Likewise, budgets could be expanded for existing energy-related loan-guarantee and grant programs administered by the U.S. Departments of Energy and Agriculture. These programs can already be used to benefit low-income ratepayers with little to no modification.[117]

In addition to budgets, the mandates of LIHEAP, WAP, and other federal and state programs could also be broadened to facilitate greater low-income ratepayer participation in DER and energy efficiency measures.[118] For example, the Department of Agriculture Rural Development Office has several grant programs relating to energy-development or health and safety-related home-retrofit projects. But these energy-development programs do not target low-income customers, nor do the health and safety-related programs recognize the link between energy affordability and health outcomes.[119] By making slight adjustments to these program mandates, their core purposes could be preserved while providing greater assistance to low-income individuals.

B. Increasing or Modifying the Use of Public Benefit Funds

In the early to mid-1990s, when some states considered whether to open their electricity sectors to retail competition, organized wholesale markets, or both, questions arose about what effect these actions might have on in-state low-income ratepayers.[120] The animating concern at the time was that certain "public benefits" programs traditionally paid for through the ratemaking process would either be

116. *See, e.g.,* HARAK ET AL., *supra* note 18, § 7.2.3.4 (detailing states, like Maryland and Washington, that provide supplemental funding for their respective LIHEAP implementation programs).

117. *See, e.g.*, *Energy Efficiency & Renewable Energy: EERE Funding Opportunity Exchange* U.S. DEP'T ENERGY, https://eere-exchange.energy.gov (last visited Oct. 10, 2016) (listing all of the current EERE funding opportunities — many of which relate to the sort of technological investments, such as advanced metering infrastructure, that would be necessary for low-income customers to participate in the new electricity system being shaped by Utility 2.0); *All Programs*, U.S. DEP'T AGRIC., RURAL DEV. OFF., www.rd.usda.gov/programs-services/all-programs (last visited Oct. 10, 2016) (setting out the rural-community-specific programs available, many of which, such as distributed generation project development and USDA's energy efficiency and conservation loan program, could benefit low-income ratepayers without much modification).

118. For more information on other federal programs for financing energy efficiency and clean energy development see U.S. DEP'T ENERGY ET AL., GUIDE TO FEDERAL FINANCING FOR ENERGY EFFICIENCY AND CLEAN ENERGY DEPLOYMENT (Sept. 2015), http://www.energy.gov/sites/prod/files/2014/10/f18/Federal%20Financing%20Guide%2009%2026%2014.pdf.

119. *See, e.g.*, *Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants*, U.S. DEP'T AGRIC., RURAL DEV. OFF., http://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency (last visited Oct. 10, 2016); *Single Family Housing Repair Loans & Grants*, U.S. DEP'T AGRIC., RURAL DEV. OFF., http://www.rd.usda.gov/programs-services/single-family-housing-repair-loans-grants (last visited Oct. 10, 2016); *see also supra* notes 149, 150 (listing sources that address the link between unaffordable energy bills and adverse health outcomes).

120. ANNIE GILLEO ET AL., AM. COUNCIL FOR ENERGY EFFICIENT ECON., THE 2015 STATE ENERGY EFFICIENCY SCORECARD 21-23 (Oct. 2015), aceee.org/sites/default/files/publications/researchreports/u1509.pdf.

left unaddressed or insufficiently funded as wholesale and retail competition became more common. As a result, many of these states established Public Benefit Funds (PBFs),[121] and funded them primarily through monthly surcharges on non-low-income customer bills. This is similar to how telephone bills for low-income households are subsidized through a "Universal Service Fund" surcharge on non-low-income telephone customers.[122] Typically, PBF surcharges are set on a mills per kilowatt hour (kWh), with 1.0 mill being the equivalent of $0.001, or one tenth of one cent.[123] The funds generated from this surcharge are then allocated to various "public benefits" programs, which can include renewable energy development, energy efficiency investments, and low-income ratepayer assistance.[124]

Currently, thirty states and the District of Columbia have some form of a PBF.[125] This mechanism, however, is not necessarily restricted to states with restructured electricity markets, nor is it primarily funded solely by utility surcharges.[126] Several states at least partially fund their PBFs through previous settlement agreements with local utilities[127] or through other market-based sources like Regional Greenhouse Gas Initiative carbon emission auction revenues.[128]

The versatility of Public Benefits Funds, and ease at which they can be incorporated into the existing regulatory scheme through a surcharge are appealing features of this policy. Furthermore, even though PBF surcharges technically represent the sort of rate-based cross-subsidization eschewed by modern rate design advocates, they are only a very small portion of a ratepayer's bill, such as $0.000361/kWh in the case of Washington D.C.'s Residential Aid Discount surcharge.[129] Although many PBFs are earmarked for renewable energy development

121. PBF surcharges go by several names including, "public benefits charges," "system benefits charges," and "utility service riders." MONTE DE RAMOS, *supra* note 9, at 101.

122. Pursuant to the Communications Act of 1934 and the Telecommunications Act of 1996, telephone service discounts for low-income households ("lifeline rates") are paid for by the Universal Service Fund (USF) — which itself is funded through quarterly fees charged to the nation's telecommunications companies and, ultimately, to their customers. The USF is managed by the Universal Service Administrative Company (USAC), a private nonprofit corporation that administers the lifeline rates program in addition to other USF-funded programs designed to increase access to high speed broadband to the nation's schools, libraries, and rural healthcare facilities. HARAK ET AL., *supra* note 18, §11.3.2.1.2; *Universal Service*, FED. COMMC'N COMM'N, https://www.fcc.gov/general/universal-service (last updated Sept. 7, 2016).

123. SANDY GLATT, U.S. DEP'T ENERGY, PUBLIC BENEFIT FUNDS: INCREASING RENEWABLE ENERGY & INDUSTRIAL ENERGY EFFICIENCY OPPORTUNITIES ii (Mar. 2010), www1.eere.energy.gov/manufacturing/states/pdfs/publicbenefitfunds.pdf [hereinafter DOE: PUBLIC BENEFIT FUNDS]. For example, if a state's PBC charged one mill per kilowatt hour, it would take one million kWh to equal $1,000. *Id*. at 4.

124. *See, e.g.,* Michael Dworkin et. al., *Revisiting the Environmental Duties for Public Utility Commissions (2006)*, 7 VT. J. ENVT'L L. 1, 5-6 (2006); STEVEN FERREY, 2 LAW OF INDEPENDENT POWER § 10:114 (2016) (describing how system benefits charges have been used as a policy mechanism to support renewable resources).

125. DOE: PUBLIC BENEFIT FUNDS, *supra* note 123, at ii, 1.

126. *Id.;* David Nichols, *The Role of Regulators: Energy Efficiency*, 18 PACE ENVT'L L. REV. 295, 306 (2001) ("Although the PBC concept arose in the context of restructuring debates, there is no necessary linkage between a PBC and deregulation.").

127. DOE: PUBLIC BENEFIT FUNDS, *supra* note 123, at 13, 15 (detailing Minnesota and Pennsylvania's approach to, at least partial, PBF funding).

128. *Id.* at 11-16 (noting that the RGGI participating states, CT, DE, ME, MD, MA, NH, NJ, NY, RI, VT, can allocate some of the revenues generated from cap and trade auctions toward their individual state PBFs).

129. *State PBF/USF History, Legislation, Implementation: District of Columbia*, LIHEAP CLEARINGHOUSE, https://liheapch.acf.hhs.gov/dereg/states/dc.htm (last updated Dec. 2015) (noting that effective

and efficiency policies,[130] several state PBFs allocate funds to low-income assistance programs, including California, the District of Columbia, Maine, New York, Oregon, Texas, and Vermont, among others.[131]

Using a PBF surcharge as a substitutionary funding tool for lost cross-subsidies would bring benefits and challenges. On the plus side, most states are already familiar with this kind of surcharge, so it would be administratively straightforward to set up and increase as needed. On the down-side, even though PBF surcharges are a relatively small line-item on a utility customer's bill, they nonetheless have the potential to distort price signals and discourage distributed generation or conservation the more they are exclusively relied upon to fund assistance programs. A further challenge would be the near-certain pushback from other ratepayers, especially high-users. However, a PBF surcharge could be creatively established to lessen the burden on any one class of rate payers. For example, Illinois levies lower PBF surcharges on residential customers than larger commercial and industrial accounts.[132] Michigan funds its low-income assistance programs through a PBF surcharge as well as through savings associated with securitization bonds associated with paying off stranded utility assets.[133]

C. Carve-out Proceeds from Different Markets

As rate structure reforms potentially threaten rate-based subsidies for low-income customers, regulators could turn to other market-based opportunities to replace or supplement these funds. This subsection explores some current examples of this kind of action, as well as sets out some other emerging market opportunities that regulators can consider tapping into.

March 2015, the RAD surcharge was adjusted from 0.294 mills per kWh to 0.361 mills per kWh, which equates to $0.000361 per kWh).

130. *Public Benefit Funds*, CTR. FOR CLIMATE & ENERGY, www.c2es.org/us-states-regions/policy-maps/public-benefit-funds (last visited Sep. 27, 2016) (setting out a map of the four categories of public benefit funds: (1) funds for energy efficiency (3 states); (2) funds for renewables (3 states); (3) funds for renewables and efficiency (16 states plus DC); and (4) Quasi-PBF (5 states)); *see also* CTR. FOR ENERGY & ENV'T, PUBLIC BENEFIT FUNDS, www.c2es.org/sites/default/modules/usmap/pdf.php?file=5893 (last updated May 20, 2013) (describing each state's PBF program in more detail).

131. DOE: PUBLIC BENEFIT FUNDS, *supra* note 123, at 11-16 (setting out all of the state PBF programs).

132. *Id.* at 1.

133. *State PBV/USF History, Legislation, Implementation: Michigan* LIHEAP CLEARINGHOUSE, www.liheapch.acf.hhs.gov/dereg/states/michigan.htm (last updated Sept. 2015); JOHN D. QUACKENBUCH ET AL., MICH. PUB. SERV. COMM'N, REPORT ON THE LOW-INCOME AND ENERGY EFFICIENCY FUND FISCAL YEAR 2011 1 (Oct. 28, 2011), www.michigan.gov/documents/mpsc/2011_LIEEF_report_368715_7.pdf. Utility securitization bonds are variants of asset-backed securities. Through this method, a utility would earmark a portion of future revenue (from rates) and sell that as an asset in a financial market. The value of that asset would depend on various "credit enhancement" factors, like assurance from the legislature or PUC that it would not be retroactively modified. Funds collected from the sale would be used to pay off any outstanding debts for capital investments no longer in use (i.e. stranded). Any funds left over can be repurposed for other expenses or refunded to ratepayers. REG. ASSISTANCE PROJECT, SECURITIZATION: IN SEARCH OF THE PROVERBIAL FREE LUNCH, ISSUES LETTER (1997), http://www.raponline.org/docs/RAP_IssuesLetter-Securitization.pdf. To the extent that other states already utilize, or are considering utilizing, a securitization method to offset utility stranded costs (especially retiring coal plants), a portion of the savings could likewise be repurposed for low-income ratepayers.

1. Cap-and-Trade Auction or Carbon Tax Revenues

Two of the most commonly-cited methods for reducing greenhouse gases, especially carbon dioxide (CO_2), are cap-and-trade schemes and carbon taxes. Although both policies operate differently, they both essentially put a price tag on carbon emissions—the revenue from which can be earmarked for certain uses. Two notable examples of this method are the Northeast's Regional Greenhouse Gas Initiative (RGGI) and California's cap-and-trade program. Since RGGI began in 2003, it has appropriated over $1 billion toward energy improvements in its nine member states, including low-income weatherization and efficiency projects.[134] In California, since CO_2 permit auctions began in 2012, over $912 million in auction revenues have been allocated to communities in need.[135] Indeed, by law, at least 25% of total climate fund investments must be spent on projects that benefit disadvantaged communities.[136] Provided that the EPA's Clean Power Plan survives legal challenge, the cap-and-trade model of carbon regulation may find favor among states looking to meet their emission limits, thereby opening another continual funding source for low-income ratepayer assistance.

2. Electric Vehicle Infrastructure Development

As America's vehicle fleet becomes more electrified, supportive infrastructure will need to come online to accommodate this new demand. Seeing a new revenue opportunity, utilities have grown eager to get into the electric vehicle (EV) infrastructure space,[137] with regulators reluctant to go along at the expense of fostering competition with third-parties. Although the EV market is still nascent, state legislatures and public utility commissions in Oregon, Washington, Illinois, Kansas, and Kentucky are strongly considering the utility's role in EV infrastructure development.[138] Another notable example is California, whose PUC in 2014 reversed a multi-year ban on utility EV infrastructure ownership to allow such projects on a case-by-case basis.[139] Rather than stifling this market opportunity, regulators could approve utility EV infrastructure ownership on the condition that a portion of the revenues generated from such projects go to fund low-income assistance programs.

134. REG'L GREENHOUSE GAS INITIATIVE, INVESTMENT OF RGGI PROCEEDS THROUGH 2012 3, 23 (Apr. 2015), https://www.rggi.org/docs/ProceedsReport/Investment-RGGI-Proceeds-Through-2013.pdf (noting that RGGI proceeds have helped to make electricity improvements to 20,000 low-income and multi-family households throughout the RGGI states). As of this writing, the most current revenue proceed figures provided by RGGI are from 2013.

135. CAL. CLIMATE INVESTMENTS, USING CAP-AND-TRADE AUCTION PROCEEDS 6 (March 2016), arb.ca.gov/cc/capandtrade/auctionproceeds/cci_annual_report_2016_final.pdf.

136. *Id.*; California Global Warming Solutions Act of 2006: Greenhouse Gas Reduction Fund (2012), S.B. 535, 2012 Gen. Assemb., Reg. Sess. (Cal. 2012).

137. EDISON ELEC. INST., TRANSPORTATION ELECTRIFICATION: UTILITY FLEETS LEADING THE CHARGE 1 (June 2014), www.eei.org/issuesandpolicy/electrictransportation/fleetvehicles/documents/eei_utilityfleetsleadingthecharge.pdf (calling the electrification of the transportation sector "our biggest opportunity").

138. *See, e.g.*, Michelle Melton, *Utility Involvement in Electric Vehicle Charging Infrastructure: California at the Vanguard*, CTR. FOR STRATEGIC & INT'L STUD. (Apr. 6, 2016), https://www.csis.org/analysis/utility-involvement-electric-vehicle-charging-infrastructure-california-vanguard.

139. Phase I Decision Establishing Policy to Expand the Utilities' Role in Development of Electric Vehicle Infrastructure, R. 13-11-007, 1-2 (Cal. Pub. Util.'s Comm'n Dec. 22, 2014).

3. Highway Right of Way Development

Highway rights of way present additional opportunities for siting renewable energy projects. These areas tend to be located close to existing energy infrastructure and encompass otherwise-undeveloped or underutilized sidewalks, corridors, shoulders, and rest areas adjacent to highway traffic lanes.[140] Roadside solar PV projects have been used more extensively in Europe and Canada, but several states are beginning to tap into this potential as well.[141] In 2008, the state of Oregon partnered with Portland General Electric to develop the nation's first roadside solar project: a 594-panel, ground-mounted 104-kW solar array system, with a second, 1.75MW, solar roadside system completed in 2012.[142] States like Colorado, Ohio, Texas, Massachusetts, Utah, and North Carolina are either developing or conducting feasibility studies on solar, wind, and bioenergy projects along highway rights of way.[143] As renewable energy technologies mature, and electricity systems and rate structures evolve to accommodate and appropriately value these new systems, the potential for roadside applications will likely become more attractive to utilities and third-parties. As with the other market opportunities in this subsection, regulators can leverage this interest for the public's benefit by allowing access to these new market opportunities according to certain conditions. For instance, project developers could carve-out funds from power sales or ancillary services revenue to go toward low-income assistance programs; developers could provide direct service to low-income communities around such projects (if cost-effective); or the state could essentially charge the developers rent to use the right of way. Those rental fees could then be allocated to aid low-income ratepayers.

4. Leveraging Utility and Third-Party Interest in DER Project Development

There is already considerable interest from utilities and third-parties with regard to DER development. In an evolved electricity system that values the grid-benefits of DER, the current untapped potential for such resource development within low-income communities will also become a promising opportunity. Indeed, with an estimated 48% of U.S. businesses and 49% of households unable to support PV infrastructure, there is tremendous potential in, for example, shared renewables projects to equalize access and deepen market growth for this sector.[144] According to a report from the National Renewable Energy Laboratory, with supportive state and federal policies, community solar projects could represent 35%-49% of the residential PV market by 2020, which would translate to 5.5-11.0GW

140. *Future Uses of Highway Rights of Way*, U.S. DEP'T TRANSP. (Apr. 2012), https://www.fhwa.dot.gov/policy/otps/rowstudyproj.cfm.

141. Carson Poe & Gina Filosa, *Alternative Uses of Highway Rights-of-Way: Accommodating Renewable Energy Technologies*, 2270 TRANSP. RES. REC. 23, 24 (2012), ntl.bts.gov/lib/51000/51800/51866/Alternative_Uses_Rights_Way.pdf.

142. Poe & Filosa, supra note 141, at 24; *Oregon's Solar Highways: All About the Oregon Solar Highway*, OR. DEP'T TRANSP., www.oregon.gov/odot/hwy/oipp/pages/inn_solarhighway.aspx (last updated Jan. 2016); *Innovative Partnership Program*, OR. DEP'T TRANSP., https://www.oregon.gov/ODOT/HWY/OIPP/pages/slr_baldock.aspx (last updated Jan. 2016).

143. Poe & Filosa, *supra* note 141, at 24 Table 1.

144. NAT'L RENEWABLE ENERGY LAB., SHARED SOLAR: CURRENT LANDSCAPE, MARKET POTENTIAL, AND THE IMPACT OF FEDERAL SECURITIES REGULATION v (Apr. 2015), www.nrel.gov/docs/fy15osti/63892.pdf.

of cumulative deployment by 2020 and represent $8.2-$16.3 billion in investments.[145]

Regulators can leverage current interest in DER development in two ways. First, they can condition access to desirable markets on the interested party's promise to either directly serve low-income communities or offset their low-income customers' bills according to revenue generated from the project. Colorado and California have taken similar approaches with their community solar laws, which, respectively, require utilities to reserve a percentage of project shares for low-income subscribers and locate a portion of such projects within "disadvantaged communities" including those "with socioeconomic vulnerability."[146]

Second, regulators can restrict ownership of DER to only those projects located in under-served communities. The NYPSC took this latter approach with regard to incumbent utilities in its Track One REV Order. Concerned about the market power implications of utility ownership of DER resources, the NYPSC largely restricted such access to four exceptions: (1) if "procurement of DER has been solicited to meet a system need, and a utility has demonstrated that competitive alternatives proposed by nonutility parties are clearly inadequate or more costly than a traditional utility infrastructure alternative;" (2) if the project consists of distribution-level energy storage; (3) if the project "will enable low or moderate income residential customers to benefit from DER where markets are not likely to satisfy the need;" and (4) if the DER project is for demonstration purposes.[147]

5. As-Yet Unrealized Market Opportunities

The above-mentioned opportunities are only a sample of what may be available. Indeed, as the NYPSC staff noted in an April 2014 report at the early stages of REV, there are numerous currently non-monetized benefits that distributed resources provide to electricity systems and the public. These include: certain ancillary services; reliability (in the absence of performance contracts); resource diversity; certain environmental impacts; economic development opportunities; community development; and housing improvements.[148] Outside DER, weatherization programs also generate a number of non-energy benefits for ratepayers, their households, and society at large. These include fewer doctor and emergency

145. *Id.*

146. Electricity: Green Tariff Shared Renewables Program, S.B. 43, 2013 Gen. Assemb., Reg. Sess., § 2833(d)(1)(A)(ii) (Cal. 2013) (requiring 100 MW of the program's total 600MW be located in "disadvantaged communities," including those areas with "socioeconomic vulnerability."). Pursuant to Colorado's 2010 Community Solar Gardens Act (House Bill 10-1342), and subsequent PUC regulations, require that community solar developers reserve at least 5% of subscriber shares to low-income participants if the demand is present. Recommended Decision of the Administrative Law Judge G. Harris Adams Adopting Rules, No. R 11-0784, 229-32 (Colo. Pub. Util.'s Comm'n Jul. 25, 2011) (discussing the Low-income set aside provision of the Community Solar Gardens Act); *see also* LOTUS ENG'G & SUSTAINABILITY, ANALYSIS OF THE FULFILLMENT OF THE LOW-INCOME CARVE-OUT FOR COMMUNITY SOLAR SUBSCRIBER ORGANIZATIONS 4-6 (Nov. 2015), https://www.colorado.gov/pacific/sites/default/files/atoms/files/CEO%20Low-Income%20Community%20Solar%20Report.pdf.

147. REV Track One Order, *supra* note 54, at 70.

148. Staff Report and Proposal, Reforming the Energy Vision, No. 14-M-0101, 17 (N.Y. Dep't of Pub. Serv. Apr. 24, 2014).

room visits, and hospitalizations, and improved physical and mental health outcomes generally.[149] To the extent that policy and rate structures evolve to value these currently un-monetized benefits, new revenue streams can be opened and partially diverted to assist low-income ratepayers.[150]

D. Advancing DER Development and Weatherization in Low-Income Communities

DER development and weatherization programs within low-income households are useful tools for both offsetting energy bills and also facilitating greater involvement in today's evolving electricity system.[151] Low-income ratepayers face numerous barriers to DER participation, including: high up-front costs to ownership, strict credit rating requirements for leasing arrangements,[152] and in the case of rooftop solar, either no rooftop access (such as with rentals), or insufficient structural integrity to support rooftop installations.[153] Absent rate and regulatory reforms to make low-income DER installations profitable outright for utilities or third-party providers, other options must become available to finance, or otherwise ensure, this development.

1. Financing and Other Mechanisms for Low-Income DER and Home Weatherization

This subsection notes some of the actions taken by states, private institutions, and individuals to address DER access and energy cost disparities within low-income communities. Such actions are all in addition to other federal initiatives through the EPA and Department of Housing and Urban Development to boost

149. *See, e.g.*, BRUCE TONN ET AL., OAK RIDGE NAT'L LAB., HEALTH AND HOUSEHOLD-RELATED BENEFITS ATTRIBUTABLE TO THE WEATHERIZATION ASSISTANCE PROGRAM xvi (Sept. 2014), weatherization.ornl.gov/Retrospectivepdfs/ORNL_TM-2014_345.pdf; Kate Kuholski et al., *Healthy Energy-Efficient Housing: Using a One-Touch Approach to Maximize Public Health, Energy, and Housing Programs and Policies*, 16 J. PUB. HEALTH MGMT. PRAC. S73 (2010), www.greenandhealthyhomes.org/sites/default/files/3Healthy_Energy_Efficient_Housing.pdf (advocating for a "one-touch" approach that combines public health and energy efficiency home interventions so as to maximize direct and indirect benefits to homeowners from these programs).

150. Monetization proposals already exist in some cases. *See, e.g.* BRUCE TONN, *supra* note 149, at 104-105 Table 4.49 (summarizing the study's monetization estimates, and noting that total value of these benefits amounts to over $1.1 billion); *but see* Eduardo Porter*, For Government that Works, Call in the Auditors*, N.Y. TIMES (Oct. 6, 2015), www.nytimes.com/2015/10/07/business/for-government-that-works-call-in-the-auditors.html (criticizing the Oak Ridge report for relying on faulty assumptions, invalid extrapolations and untested measuring formulae).

151. *See, e.g.,* NYPSC Low-Income Order, *supra* note 50, at 10 ("Greater access and support for low income and underserved communities to DER is the best way to narrow the affordability gap that needs to be filled with direct financial assistance for customers with low incomes.").

152. GROUNDSWELL, FROM POWER TO EMPOWERMENT: PLUGGING LOW INCOME COMMUNITIES INTO THE CLEAN ENERGY ECONOMY 4 (Apr. 2016), groundswell.org/frompower_to_empowerment_wp.pdf.

153. *Id*. This is an especially expensive problem in public housing units, which consume 38% more energy than comparably-sized private housing. COREY BARNES ET AL., ROCKY MOUNTAIN INST., SUPEREFFICIENT AFFORDABLE HOUSING: SOLUTIONS TO HURDLES 4 (2013), www.rmi.org/Knowledge-Center/Library/2013-03_SHISolutionsToHurdles.

wind and solar development in low-income communities.[154] The EPA is also developing a detailed summary of initiatives by states, local agencies, non-profits, and utilities to help low-income communities improve their energy efficiency and access to renewable energy resources.[155]

a. Public-Private Partnerships.

At a time of constrained government resources, the public-private partnership (P3) model is gaining renewed interest among those concerned about addressing the needs of America's electricity system in particular, and infrastructure in general.[156] These contractual arrangements allow governments and private actors to combine their resources and expertise to finance, develop, construct, operate, or own infrastructure assets.[157] From expanding affordable housing access,[158] and improving municipal recycling and waste management,[159] to working on next-generation batteries and other technology,[160] public-private partnerships have become a common tool for governments to leverage public funds and capitalize on the experience and skills of the private sector.

The P3 model has already proven effective as a state and federally led policy to drive distributed generation integration in low-income communities. For example, as part of California's Go Solar initiative, the California Energy Commission's New Solar Homes Partnership, which provides incentives for solar installations on new home constructions, has already provided $23 million in incentives

154. U.S. ENVT'L PROT. AGENCY, THE CLEAN POWER PLAN: CLEAN ENERGY INCENTIVE PROGRAM, https://www.epa.gov/sites/production/files/2015-08/documents/fs-cpp-ceip.pdf (last accessed Oct. 14, 2016) (allowing states to earn Emission Reduction Credits toward their Clean Power Plan compliance by making early investments in renewable energy projects, and provides yet-more incentives for projects in low-income communities); News Release, U.S. Dep't Hous. & Urban Dev., HUD Announces New Renewable Energy Partners (May 9, 2014), portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2014/HUDNo_14-04 (announcing the commitment of 27 affordable housing and service providers to install over 15 MW of on-site renewable energy capacity).

155. *Bringing the Benefits of Energy Efficiency and Renewable Energy to Low-Income Communities*, U.S. ENVT'L PROT. AGENCY, https://www.epa.gov/statelocalclimate/bringing-benefits-energy-efficiency-and-renewable-energy-low-income-communities (last updated Sept. 8, 2016). As of this writing, the EPA website had case studies on programs in California and Colorado.

156. *See, e.g.*, *2013 Report Card for America's Infrastructure: About America's Infrastructure*, AM. SOC'Y CIVIL ENG'RS., www.infrastructurereportcard.org/executive-summary/ (last visited Oct. 14, 2016) (giving the U.S. an overall grade of D+ for the state of its infrastructure as part of its most recent quadrennial report).

157. MONTE DE RAMOS, *supra* note 9, at 33 fig. 2-2 (setting out six common types of public-private partnerships).

158. *See generally,* U.S. DEP'T HOUS. & URBAN DEV., THE EVOLUTION OF HUD'S PUBLIC-PRIVATE PARTNERSHIPS (Oct. 2015), https://www.huduser.gov/hud50th/HUD2-048-Public-Private_Partnership_508.pdf.

159. Mike Hower, *5 Public-private Partnerships Pushing the Sustainability Envelope*, GREENBIZ (Mar. 4, 2015), https://www.greenbiz.com/article/5-public-private-partnerships-pushing-sustainability-envelope.

160. PEW CHARITABLE TRUSTS, DISTRIBUTED GENERATION: CLEANER, CHEAPER, STRONGER 5 (Feb. 2016), www.pewtrusts.org/~/media/assets/2016/02/energy_storage-backs_up_power_supply.pdf; *Latest ARPA-E News*, U.S. DEP'T ENERGY, ADVANCED RES. PROJECTS AGENCY — ENERGY, https://arpa-e.energy.gov/?q=media/latest-arpa-e-news (last visited Oct. 14, 2016) (listing all the most recent recipients for grants to develop high-potential energy technologies).

for 883 low-income homes.[161] This also translates to 7.69 MW of electricity back to the grid.[162] More recently, public housing developments have become the target of DER projects. In December 2015, Goldman Sachs partnered with the Housing Authority of the City of Newark to provide $84 million to finance energy efficiency projects in over 6,000 rental homes—the largest such project to date, with the potential to impact 10,000 low-income Newark residents.[163] The Burbank California Housing Authority and non-profit solar installer PV4All, partnered to install rooftop solar, storage, inverters, and other smart technology in several of the Authority's housing units.[164] These resources are networked together through an intelligent energy management system and controllable by PV4All. As the owner and aggregator of all these resources, PV4All is able to provide distribution and transmission services like curtailment, ramping, and voltage control—all of which redound to the benefit of the Burbank Housing residents who receive reduced energy bills as a result.[165]

b. Tax Incentives, Tax-Based Financing, and On-Bill Financing

There are a number of incentives and financing mechanisms to help spur project development. These include state and local tax policies like Property Assessed Clean Energy (PACE), Tax Increment Financing (TIF), and the federal New Market Tax Credit (NMTC). Under a PACE model, up-front costs for certain energy-related projects are provided by state or local governments and are paid back through an increased property tax assessment over the course of fifteen to twenty years.[166] Through the TIF model, state and local governments can attract economic developers by earmarking future property tax increases that are the result of economic and community development in a particular area. For its part, the NMTC provides federal tax credits to individuals and businesses that invest in "Community Development Entities"—which in turn make investments in low-income communities, much like a community development financial institution (CDFI).[167] In addition to tax-based incentives and financing structures, customer-sited DER (or energy efficiency) projects can get a boost through on-bill financing, in which the upfront costs are provided by the utility and then gradually paid

161. Zacharay Shahan, *Solar Power For Low- & Moderate-Income Americans — Obama's New Solar Initiative*, CLEANTECHNICA (July 11, 2015), cleantechnica.com/2015/07/11/solar-power-for-low-moderate-income-americans-obamas-new-solar-initiative/.

162. *Id*. This is in addition to two other low-income ratepayer-focused programs through the California Solar Initiative: Single-family Affordable Solar Housing (SASH) and Multi-family Affordable Solar Housing (MASH). *Solar for Affordable Housing*, GO SOLAR CAL., www.gosolarcalifornia.ca.gov/affordable/index.php (last visited Sept. 10, 2016).

163. *Impact Investing: Newark Housing Authority Energy Efficiency, Newark, NJ*, GOLDMAN SACHS, www.goldmansachs.com/what-we-do/investing-and-lending/impact-investing/case-studies/newark-housing-authority.html (last visited Oct. 14, 2016).

164. ADVANCED ENERGY ECON. INST. ET AL., TOWARD A 21ST CENTURY ELECTRICITY SYSTEM IN CALIFORNIA 10 (Aug. 11, 2015), http://info.aee.net/hubfs/PDF/aeei-toward-21ces-ca.pdf?t=1439494418628.

165. *Id*.

166. *See* Bethany Speer & Ron Koenig, *Property-Assessed Clean Energy (PACE) Financing of Renewables and Efficiency,* NAT. RENEWABLE ENERGY LAB (July 2010), www.nrel.gov/docs/fy10osti/47097.pdf.

167. U.S. DEP'T ENERGY, GUIDE TO FEDERAL FINANCING FOR ENERGY EFFICIENCY AND CLEAN ENERGY DEPLOYMENT 21 (Sept. 2014), http://energy.gov/sites/prod/files/2014/10/f18/Federal%20Financing%20Guide%2009%2026%2014.pdf.

back by the customer through their bill.[168] These are just some of the state and federal policies available to use individually or in tandem with other solutions mentioned here to spur economic and energy development in financially struggling communities and help reduce the energy burden of lower-income customers.

c. Green Banks, CDFIs, and Impact Investors

States are helping to finance renewable resource project developments through grants or through quasi-public and non-profit institutions like Green Banks and Community Development Financial Institutions (CDFIs). These institutions are then able to provide low-interest loans to targeted communities—like low-income ratepayers—who might not qualify for traditional financial assistance.[169] Funds for these programs can come from numerous sources, such as general tax funds, PBF surcharges on utility customers, or even through some of the other revenue sources suggested throughout this Part. Similarly, private institutions, families, or individual investors interested in advancing low-income DER development can often get directly involved as impact investors for such projects.[170]

2. Non-Profit or Government Development DER Within Low-income Communities

Much like with the urban and rural electrification disparity of the early twentieth century, the "electrical divide" in the United States between lower-income and higher-income households, with regard to DER and clean tech access, is becoming ever more apparent.[171] Beyond concerns of universal service, though, low-income communities suffer financially when they are denied equitable access to DER when these resources can provide cost-effective power or otherwise offset their utility bills. Where utilities or third-party providers fail to address the need for cost-effective DER development within low-income communities, a backstop option could be establishing a separate non-profit or government entity to undertake such projects.

168. *See, e.g., On-Bill Recovery Financing Program*, N.Y. ENERGY RES. & DEV. AUTH., https://www.nyserda.ny.gov/All-Programs/Programs/On-Bill-Recovery-Financing-Program (last visited Sept. 10, 2016).

169. States that have utilized the Green Bank method of financing energy improvements include Connecticut, New York, Pennsylvania, Kentucky, Iowa, and Massachusetts. *Financing Clean Energy: Cost-Effective Tools for State Compliance with the Clean Power Plan (2015)*, UNION CONCERNED SCIENTISTS, www.ucsusa.org/clean-energy/increase-renewable-energy/green-banks-financing-clean-energy#.VwZVaTYrLk (last visited Oct. 14, 2016) (setting out examples).

170. *See, e.g.*, *Environmental Market Opportunities: Green Bonds and Impact Investing*, GOLDMAN SACHS, www.goldmansachs.com/citizenship/environmental-stewardship/market-opportunities/green-bonds-impact-investing/ (last visited Oct. 14, 2016); Sarah Kearney et al*., Impact Investing in the Energy Sector*, PRIME COALITION 5 (Oct. 2014), primecoalition.org/wp-content/uploads/2015/02/Impact_Investing_in_the_Energy-Sector.pdf (noting that energy-related impact investments within low-income communities have largely focused on efficiency improvements, but arguing for broader consideration of other energy-related solutions).

171. *See generally* CAPERTON & HERNANDEZ, *supra* note 115.

a. Non-Profit Development: Urban Electric Cooperatives

In areas where DER development within low-income communities fails to entice profit-motivated utilities and third party providers, such development could be undertaken by non-profit entities. One emerging model in this vein is the urban electric cooperative. Patterned off the cooperatives that electrified rural America in the early twentieth century,[172] the urban electric cooperative model emerged as a twenty-first century response to cost concerns stemming from electric sector deregulation in the late 1990s and early 2000s.[173] In 1997, a group of New York City housing cooperatives formed the first urban electric cooperative, 1st Rochdale Cooperative Group Ltd.[174] Initially imagined as a comprehensive energy demand aggregator and manager, the 1st Rochdale Cooperative eventually recognized other cost-savings opportunities through distributed generation development in addition to taking on more conservation and efficiency measures.[175] Despite the innovative approach taken by 1st Rochdale, the urban electric cooperative model failed to find popularity, possibly due to the then-high cost of distribution-side resources.

As the economics of demand response and distributed generation technologies continue to improve, however, urban electric cooperatives are emerging again as potential solutions for underserved communities. Indeed, such a model was the centerpiece of a recent proposal to "NY Prize"—a New York state initiative to spur grid modernization and resiliency through microgrid development. The proposal, "Beyond the Grid Community Microgrid," seeks to establish a non-profit urban microgrid that uses a variety of generation, storage, and other DER to serve three public schools, a community center, pharmacy, supermarket, and several apartment buildings in parts of Manhattan's East Village that were adversely affected by Hurricane Sandy.[176]

Much like how rural cooperatives were initially financed through REA loans, their urban counterparts could likewise seek funding through grant programs or revenues generated from power purchase agreements or selling other grid services. For example, the Beyond the Grid Community Microgrid would rely in part on NY Prize grant money and PPAs with the New York City Housing Authority.[177] In addition, because its distributed generation assets would be "qualifying facilities" under the federal Public Utility Regulatory Policies Act, the microgrid would also be able to sell power to ConEdison under the utility's Buy-Back Service.[178]

172. *Supra* Section II.B.2.c.

173. Shannon Terrell-Ernest, *Let There Be Light (and Heat, and Telecommunications): A Closer Look at the 1st Rochdale Cooperative,* COOPERATOR N.Y. (Oct. 2001), http://cooperator.com/article/let-there-be-light-and-heat-and-telecommunica/full#cut.

174. Edward Yaker et al., *The Cooperative Alternative Case Study: The First Electric Coop*., 5 DEREGULATION OF THE UTIL. INDUS. & ROLE ENERGY SERVS. COS. (ESCOS) 381, 381 (2000), aceee.org/files/proceedings/2000/data/papers/SS00_Panel5_Paper32.pdf.

175. *Id*. at 384.

176. *What's New: Beyond The Grid Completes NY Prize Stage-One Feasibility Study*, TWO BRIDGES NEIGHBORHOOD COUNCIL, twobridges.org/blog/what-s-new/226-beyond-the-grid-feasibility (last visited Sept. 10, 2016).

177. Two Bridges Neighborhood Council, Why a Smartgrid in Manhattan's East Village? Presentation to NY Prize, at 7 (May 4, 2016), https://www.scribd.com/doc/311441932/NY-Prize-Presented-May-4-2016.

178. *Id*.

By securing such funding sources, this reemerging model could serve as a useful tool in the broader effort to bring equitable and cost-effective DER solutions to low-income communities.[179]

b. Government Development

Just as the federal government prioritized electrification to foster rural economic development, so too could the federal or state governments directly intervene to develop energy resources in help low-income communities. As seen in past efforts to develop certain natural resources or business opportunities, such government intervention could be done on either a permanent or transitionary basis.

Examples of the first approach include the Tennessee Valley Authority (TVA) and the Bonneville Power Administration (BPA). Although they each have different mandates—TVA as a vertically-integrated generator, transmitter and distributor of electricity,[180] BPA as a federal power marketer[181]—they each operate as self-sustaining businesses.[182] Like other similar federal agencies, they also prioritize their power sales to non-profit publicly-owned utilities, such as municipally-owned utilities and cooperatives.[183] A state-level example of government resource development is the New York Power Authority's Niagara Power Project, which was authorized by Congress in 1957 to develop and distribute power from the Niagara River, and which also gives preference to publicly-owned utilities and cooperatives.[184]

The second government-led approach would be for the state or federal government to initially develop the DER potential within certain low-income communities and then transition project ownership and maintenance to the local utility or other third-parties once those assets become profitable and the market has ma-

179. Aside from funding issues, other questions are raised by the prospect of urban electric cooperatives that are beyond the scope of this brief introduction here, such as whether they might conflict with a state's particular utility franchise laws.

180. *Our Customers*, TENN. VALLEY AUTH., https://www.tva.com/Energy/Our-Customers (last visited Sept. 10, 2016).

181. BONNEVILLE POWER ADMIN, PATH TO SUCCESS: 2015 ANNUAL REPORT 62 (Nov. 2015), https://www.bpa.gov/Finance/FinancialInformation/AnnualReports/Documents/AR2015.pdf ("BPA is the power marketing administration that purchases, transmits, and markets power for the FCRPS [Federal Columbia River Power System]").

182. *Id.* (noting that BPA covers its costs by selling its products and services); *Our History*, TENN. VALLEY AUTH., https://www.tva.com/About-TVA/Our-History (last visited Sept. 10, 2016) (noting that legislation in 1959 paved the way for self-financing through selling electricity services); *but see* Joel Yudken, *If It Ain't Broke, Don't Fix It!,* 402 ECON. POL'Y INST. 3 (June 4, 2015), www.epi.org/publication/potential-impacts-of-privatizing-the-tennessee-valley-authority/ (noting that TVA stopped having to rely on tax-payer funds as recently as 1999).

183. *See, e.g.,* U.S. GEN. ACCT. OFF., GAO-01-373, FEDERAL POWER: THE EVOLUTION OF PREFERENCE IN MARKETING FEDERAL POWER 12-15 (Feb. 2001), www.gao.gov/assets/240/231087.pdf (setting out all the federal statutes that relate to energy resource development and have power preference provisions). In addition, both TVA and BPA advance other important objectives like environmental stewardship, energy conservation, and regional jobs-creation.

184. Niagara Redevelopment Act (1957), 16 U.S.C. § 836 (2012). For other examples of federal preference power requirements from energy resource development projects see U.S. GEN. ACCOUNT. OFF, *supra* note 183, at 12-15.

tured. An example of this model at the federal level is the Consolidated Rail Corporation (Conrail), which was created by Congress in 1974 to rehabilitate Northeast and Midwest freight and passenger rail traffic following the bankruptcies of six major northeastern railroad companies from 1967-1972.[185] After nearly $8 billion in federal dollars, and following railroad deregulation through the 1980 Staggers Rail Act,[186] Conrail became profitable again in 1981, and by 1983 had become the fourth largest freight hauler in the United States.[187] Although the government only received around $2 billion from Conrail's initial public offering in 1987, the venture's achievement lies primarily in the fact that the Northeast's rail system, and its economy to a large degree, were preserved.[188]

Implementing either of the two government-led models would involve similar considerations. First, because the Federal Power Act (FPA) restricts the federal government's authority to only wholesale sales of electricity and interstate transmission,[189] the best approach for establishing a federal agency to develop distribution-level resources would be for Congress to pass separate statutory authority with a broader Commerce Clause finding, similar to the approach taken by the Public Utility Regulatory Policies Act of 1978.[190] States could more easily establish a separate government entity since the FPA places distribution-level development and retail sales under their jurisdiction.[191]

The second consideration is the matter of under what "mandates" this new state or federal agency would operate. Just as natural waterways create the potential to harvest hydroelectric power, so too is there energy potential on residential and commercial rooftops, brownfield sites, and other locations predominately located in low-income areas. As a result, the primary mandate of a newly-created

185. KEVIN R. KOSAR, CONG. RESEARCH SERV., RL30365, FEDERAL GOVERNMENT CORPORATIONS: AN OVERVIEW 12 (2011), https://fas.org/sgp/crs/misc/RL30365.pdf; *see also Brief History of Consolidated Rail Corporation*, CONRAIL, www.conrail.com/history/ (last visited Sept. 10, 2016) [hereinafter *Conrail History*].

186. Staggers Rail Act of 1980, Pub. L. No. 96-448, 94 Stat. 1895 (codified as amended at 49 U.S.C. § 10101).

187. *Conrail History*, *supra* note 185.

188. *Id*.

189. Federal Power Act, 16 U.S.C. § 824(b)(1) (2012) (preserving state authority over "facilities used for the generation of electric energy," "facilities used in local distribution," facilities for the "transmission of electric energy in intrastate commerce," and "facilities for the transmission of electric energy consumed wholly by the transmitter").

190. Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117 (codified as amended at 16 U.S.C. § 2601). PURPA's constitutional basis is found in 16 U.S.C. § 2601 ("The Congress finds that the protection of the public health, safety, and welfare, the preservation of national security, and the proper exercise of congressional authority under the Constitution to regulate interstate commerce require."). This constitutional basis was upheld by the Supreme Court under a rational basis framework. FERC v. Mississippi, 456 U.S. 742, 755-56 (1982) ("The Court heretofore has indicated that federal regulation of intrastate power transmission may be proper because of the interstate nature of the generation and supply of electric power. FPC v. Florida Power & Light Co., 404 U.S. 453 (1972). Our inquiry, then, is whether the congressional findings have a rational basis. [citations omitted] The legislative history provides a simple answer: there is ample support for Congress' conclusions.").

191. 16 U.S.C. § 824(b)(1).

government agency could be to directly serve low-income customers if cost-effective,[192] or otherwise ensure that they receive the financial benefit of any power or grid services sold to utilities or into wholesale markets.

E. The Role of Charitable Donations

Another avenue for supplementing low-income ratepayer assistance programs is through donations from other ratepayers, utilities, or businesses. Many utilities today offer their customers the ability to make one-time or recurring donations on their utility bills.[193] Others have online forms that customers can fill out to donate.[194] A few utilities make it even easier: for example, texting "SHARE" to 27722 will automatically donate $5 to a needy New York state customer through ConEdison's EnergyShare fuel fund,[195] while texting "LIGHT" to 20222 will send that same amount to someone in California through SoCal Edison's Energy Assistance Fund.[196]

These donation programs reap multiple benefits: first and foremost, to the low-income recipients, but also to the individuals and businesses in the form of tax-deductible donations, sometimes matched dollar-for-dollar by the utility.[197] A utility can leverage its own charitable donations and increase its profile within a community by raising awareness on social media or publicizing additional matching-fund challenges. Such was the approach of Columbia Gas of Pennsylvania, which pledged a donation for every new "like" or "follow" on the company's social media throughout February 2015—a campaign that raised $7,000 for the Red Cross, while also giving the utility a dedicated audience for the emergency preparedness tips it shared online.[198]

By giving to local fuel funds in particular—non-profits that assist with bill-paying—utilities can write-off their contributions as charitable donations and see that same money flow back as cash payments at times when bills are most difficult to collect from low-income households: peak summer and peak winter periods.[199] Although no money is made in this transaction, the utility and its shareholders benefit when the number of outstanding accounts receivables is reduced.[200] With

192. Such an arrangement would be conceptually similar to how publicly-owned entities are "preference power" customers of TVA, Bonneville, and Niagara.

193. *See, e.g.*, CONEDISON, HELP FOR THOSE IN NEED (Dec. 2014), www.coned.com/customercentral/brochures/Help_For_Those_In_Need(Eng)_SCREEN.pdf; *Give to HeartShare*, HEARTSHARE, https://www.heartshare.org/take-action/donate/ (last visited Oct. 14, 2016) (noting how National Grid customers can donate to help low-income customers in New York state).

194. *See, e.g.*, *Gift of Energy*, PEPCO, https://www.pepco.com/forms/pepco/other/giftofenergy.aspx (last visited Oct. 14, 2016); *Project SHARE*, GA. POWER, https://customerservice.southerncompany.com/ProjectShare/ProjectShare.aspx?mnuOpco=gpc&mnuType=res (last visited Oct. 14, 2016).

195. CONEDISON, *supra* note 193.

196. *Energy Assistance Fund — What is it?,* S. CAL. EDISON, https://www.sce.com/wps/portal/home/residential/assistance/energy-assistance-fund (last visited Sept. 10, 2016).

197. *See, e.g.*, CONEDISON, *supra* note 193; *Give to HeartShare*, *supra* note 193.

198. Daniel Moore, *Plugging in to Charity: Energy Utilities See Unique Business Case for Philanthropy*, PITTSBURGH POST-GAZETTE (July 28, 2015), powersource.post-gazette.com/powersource/companies/2015/07/28/Energy-utilities-charitable-giving-unique-business-case/stories/201507280002.

199. MONTE DE RAMOS, *supra* note 9, at 349.

200. *Id*. at 347-50.

corporations able to expense up to 10% of their taxable income as charitable gifts, this could be a powerful, if intermittent, funding mechanism for the most vulnerable ratepayers.

With more products and services coming online and billing practices becoming more sophisticated as the grid evolves, additional avenues open for tapping into customers' charitable dispositions. For instance, customers in some places can already donate their solar energy net metering credits to institutions like churches and schools.[201] With smart technologies to accurately quantify customer-side generation, modern rate designs to appropriately value those services, and the right organizations to connect with needy customers, donating to low-income ratepayers could become even more streamlined and impactful.

F. Preserving Protections Within Rate-Structures, Even as they Evolve

As seen in the California Public Utility Commission's Order on tier-flattening and TOU rates, a major grid reform goal is changing rate structures to better align costs and benefits of serving individual customers. Even states committed to rate-based low-income assistance, like New York,[202] are nonetheless considering such rate modifications. As regulators move forward with utility reforms, it will take creative collaboration among multiple parties to ensure the sustainability of the electricity system, while remaining faithful to the fundamental principles of universal and non-discriminatory electricity access to low-income ratepayers. This final section, then, discusses some of the rate-related policies to achieve those ends.

1. The Emerging Rate Structures and Policies: PBR and Time-of-Use

Transitioning to an advanced electricity system will require turning toward modern rate designs and away from the traditional and "unenlightened" rate structure that has been standard throughout the utility industry for decades.[203] Although grid reforms underway are each approaching this question in different ways, there is general agreement that the solution will involve time-varying rates and performance-based ratemaking (PBR).[204] These policies raise implementation and measurement concerns, but with the proper safeguards in place, all customers—especially vulnerable low-income customers—can be protected from significant cost increases and empowered to participate in tomorrow's reformed electricity system.

201. *See, e.g.*, Nora Caley, *Drop a SREC Into the Collection Plate*, SOLAR INDUS. (Dec. 5, 2013), solarindustrymag.com/drop-a-srec-into-the-collection-plate (noting a program in Massachusetts).

202. NYPSC Low-Income Order, *supra* note 50, at 30 ("this Order establishes that low income programs will be funded in utility rates on a continuing basis.").

203. RAP GUIDE, *supra* note 35, at 5; *Id*. at 14 fig. ES-1 (illustrating that the flat rate design is the typical default across all customer classes).

204. *See, e.g.* E21 INITIATIVE, *supra* note 54, at 8-11; REV Track One Order, *supra* note 54, at 120 (noting that the metrics to evaluate REV will be similar to those used for utility PBR — an issue that will be largely addressed in later REV proceedings).

a. Performance-Based Ratemaking

As a regulatory approach, PBR replaces the consumption and capital-expenditure-based incentives in traditional cost-of-service ratemaking with other financial incentives to lower costs, improve service, or otherwise achieve different system, social, economic, or environmental goals.[205] This ratemaking tool is already widely used in parts of Australia, New Zealand, Canada, South America, in addition to U.S. states like Illinois and Massachusetts.[206]

Seen as a way to shore-up utility revenues in an era of declining demand and as an avenue to advance other objectives, PBR has been embraced by utility reformers.[207] In its Phase I report, the e21 Initiative called on Minnesota to develop and allow utilities to "opt into a multi-year, performance-based [regulatory] framework."[208] Such a framework would measure and provide revenue based upon utility performance in areas like total system efficiency, reliability, customer service, environmental sustainability, affordability, and competitiveness.[209] The state's public utility commission is taking these recommendations under advisement, and according to a March 2016 staff report, the Commission acknowledges PBR's role as part of a larger long-term vision for the state's grid modernization efforts.[210]

Although a PBR framework has yet to be formally adopted in the New York REV proceeding, earlier Commission Orders and staff reports in the REV proceeding indicate a central role for performance incentives as not only a revenue stabilizer for utilities but as a way to earn additional profits.[211] Through so-called Earnings Impact Mechanisms (EIMs), utilities can supplement their revenue streams by taking action on areas like peak reduction, energy efficiency, customer engagement and information access, interconnection, and affordability.[212] The "affordability" EIM is particularly noteworthy because it targets low-income ratepayers for special assistance by incentivizing utility support for DER integration in low-income communities and reducing the numbers of service terminations and uncollectible expenses.[213] According to the broad strokes of the staff report, utilities would earn EIM credit if they can show certain levels of low-income DER

205. *See, e.g.*, REG. ASSISTANCE PROJECT, PERFORMANCE-BASED REGULATION FOR DISTRIBUTION COMPANIES 11 (Dec. 2000), http://www.raponline.org/wp-content/uploads/2016/05/rap-performancebasedregulationfordistributionutilities-2000-12.pdf.

206. Staff White Paper on Ratemaking and Utility Business Models, *In re* Reforming the Energy Vision, No. 14-M-0101, at 51 (N.Y. Pub. Serv. Comm'n Jul. 28, 2015) [hereinafter REV Staff Paper on Business Models].

207. *Id*.

208. E21INITIATIVE, *supra* note 54, at 9.

209. *Id*. at 8.

210. MINN. PUB. UTIL. COMM'N, *supra* note 99, at 33-34.

211. REV Track One Order, *supra* note 54, at 130; REV Staff Paper on Business Models, *supra* note 206, at 51.

212. REV Staff Paper on Business Models, *supra* note 206, at 51-63.

213. *Id.* at 57-58. Eventually, as retail markets mature and additional service and revenue-generating opportunities become available, EIMs will be phased out in favor of Market-Based Earnings (MBEs), which utilities and other market participants will compete for. *Id.* at 63.

participation and per-customer savings, as well as below-average numbers of service terminations.[214] Further explanation and detail of the REV PBR model will be provided by the NYPSC in its forthcoming Track Two Order.

The primary question with PBR schemes that is often raised by low-income and other consumer advocates, is how to craft incentives that force meaningful utility action in exchange for reasonable, but not excessive, revenues.[215] Both the e21 Phase I report and, to a lesser extent, the NYPSC Track Two staff report leave the details to be ferreted out later. Indeed, the NPYSC staff report acknowledges a number of outstanding implementation issues to be addressed, including "ratepayer impacts (of both the incentives and the desired outcomes)," as well as "the degree of utility control over the outcomes."[216] Another question to address is the consequence for the utility's failure to meet a PBR benchmark—an issue that may be less relevant to the NYPSC Track Two staff proposal—since EIMs supplement existing utility service obligations. Nonetheless, it remains to be seen how rigorous the e21 and NYPSC performance-based schemes will be in their design and implementation.

b. Time-Varying Rates

Time-differentiated electricity pricing, facilitated by smart technologies, will be an integral part of modernizing the electricity system.[217] There are four subsets of time-varying rates—Critical Peak Pricing (CPP), Peak Time Rebates (PTR), Time of Use (TOU), and Variable Peak Pricing (VPP)—but they all essentially seek to give price signals tied to current market or demand conditions.[218] With some limited exceptions, residential time-varying rates have mostly been implemented in the United States through pilot programs.[219]

Many consumer advocates have expressed concern that time-varying rates negatively impact low-income customers, especially those who are not equipped with the necessary metering infrastructure or are unable to alter their consumption during high-use times.[220] Others argue, however, that low-income customers tend

214. *Id.* at 57-58.

215. Lazar & Gonzalez, *supra* note 54, at 72 ("The challenge in PBR is to set the objectives for the utility to be achievable but challenging, and to set the rewards to be ample but not excessive.").

216. REV Staff Paper on Business Models, *supra* note 206, at 59; *see also* AARP Comments on Staff Track 2 Whitepaper, *In re* Reforming the Energy Vision, No. 14-M-0101, at 6 (N.Y. Pub. Serv. Comm'n Oct. 26, 2015) (voicing strong concerns about the Staff's proposed EIM "affordability" metric).

217. Lazar & Gonzalez, *supra* note 54, at 44; *see generally* AHMAD FARUQUI ET AL., REG. ASSISTANCE PROJECT, TIME-VARYING AND DYNAMIC RATE DESIGN (July 2012), www.raponline.org/document/download/id/5131; Ahmad Faruqui, et al., *Smart by Default*, PUB. UTIL. FORTNIGHTLY (Aug. 2014), mag.fortnightly.com/article/Smart_by_Default/1778777/220143/article.html [hereinafter *Smart by Default*]; Karier, *supra* note 107, at 18 (advocating for better aligning rates and customer costs based on location and time. "Customers can't avoid costly power if they don't know when it occurs.").

218. *Smart by Default*, *supra* note 217; Lazar & Gonzalez, *supra* note 54, at 44.

219. *Smart by Default*, *supra* note 217; FARUQUI ET AL., *supra* note 217, at 27. Those pilot programs mostly used the TOU or CPP structures, which vary prices depending on, respectively, the time of day and annual critical peak periods. *Smart by Default*, *supra* note 217.

220. AARP ET AL., THE NEED FOR ESSENTIAL CONSUMER PROTECTIONS: SMART METERING PROPOSALS AND THE MOVE TO TIME-BASED PRICING (2010), https://www.nclc.org/images/pdf/energy_utility_telecom/additional_resources/adv_meter_protection_report.pdf.

to be responsive to price signals,[221] and that they tend to be low-usage customers to begin with—although not always.[222]

Notwithstanding the potential system and cost-savings benefits from using time-varying rates, regulators should nonetheless take extra precautions to ensure that low-income customers are especially protected due to their vulnerability to rate increases. Such precautions could include: ensuring adequate access to energy information, providing bill protection to ease with the transition, and offering a two-tiered rate option in which low-income customers pay the lesser of their historical usage (individual or class) or the time-varying rate.[223]

2. Rate Designs and Policies that Can Harm Low-Income Customers

There are many goals regulators seek to accomplish through the utility rate structure—goals that, depending on the needs of the particular state, may outweigh the "affordability" concerns that are the sole focus for low-income ratepayer advocates. These can include, for instance, promoting energy efficiency and environmental objectives, ensuring continued utility revenue, facilitating distributed generation development as well as empowering customer choice.[224] Nonetheless, experience has shown that certain rate designs have a negative impact on low-income ratepayers. Regulators and reformers concerned about maintaining universal and equitable grid access while transitioning to a modern regulatory model should therefore either avoid entirely, or mitigate the effects of, the following rate designs and rate-related policies.

a. High Fixed Charges

Fixed costs are set monthly charges designed to help utilities recoup distribution system costs.[225] Although useful for restoring utility revenue lost through demand reductions, they can discourage efficiency measures and distributed generation, and could contribute to grid defection if storage technologies mature.[226] In addition, they also penalize low-use customers and contribute to the overall energy burden of low-income ratepayers.[227] The same disincentives could be said to apply to public benefit fund surcharges—with the exception of negative low-

221. FARUQUI ET AL., *supra* note 217, at 8.

222. *Id*. at 25, 29 ("empirical evaluation has indicated that most low-income customers would immediately save money on their electricity bills from time-varying rates"); *but see* CPUC Tier-Flattening order, *sup*ra note 107, at 76 (finding that "low-income and moderate-income ratepayers are not universally low or high users of energy.").

223. FARUQUI ET AL., *supra* note 217, at 25, 42; *see also* AARP ET AL., *supra* note 220, at 15 ("Not all customers must participate in dynamic pricing programs to get system wide benefits.").

224. Lazar & Gonzalez, *supra* note 54, at 11, 23-24 (discussing core rate design principles and setting out three principles through which regulators can modernize the rate structure and accommodate the changes taking place in the electricity system); *see also* BONBRIGHT ET AL., *supra* note 40, at 48-62 (setting out the four primary functions of public utility rates: (1) the producer-motivation or capital-attraction function; (2) the efficiency-incentive function; (3) the demand-control or consumer-rationing function; and (4) the compensatory income-transfer function).

225. Lazar & Gonzalez, *supra* note 51, at 9.

226. *Id*. at 9, 19.

227. *Id*. at 40; ELEC. INNOVATION, LAB, ROCKY MOUNTAIN INST., NEW BUSINESS MODELS FOR THE DISTRIBUTION EDGE: THE TRANSITION FROM VALUE CHAIN TO VALUE CONSTELLATION 10 (Apr. 2013), http://www.rmi.org/New_Business_Models.

income customer impacts. However, public benefit charges tend to be much smaller than utility fixed charges, and in any event, the negative effects of these disincentives could be avoided by instead implementing strong volumetric, time-varying prices combined with otherwise low distribution-related fixed charges.

b. Decoupling That is Not Tied to Added Efficiency Measures and Other Benefits

Through traditional cost-of-service rate regulation, utilities lack incentive to promote energy efficiency or customer-side generation because they secure revenue through their earned rate of return on large capital investments and selling kilowatts.[228] However, under a revenue regulation scheme, regulators "decouple" revenue from electricity sales and set it as a fixed amount.[229] Although there is no longer the disincentive to promote energy efficiency, consumer advocates warn that without careful regulatory guidance these schemes could end up "blindly reward[ing] companies for reductions in sales for reasons that have nothing to do with utility-sponsored energy efficiency."[230] Over time, the regulator-approved revenue amounts increase slightly—another point of contention among consumer advocates.[231] There are numerous policy arguments in favor of revenue regulation,[232] but suffice to say, the above-identified criticisms can be addressed through such additional consumer protections as: conditioning "decoupling" on new energy efficiency programs; closer scrutiny and adjustment of utility cost structure assumptions; or applying a decoupling charge on higher-usage customers, which is then used to offset costs for lower-usage customers.[233]

V. CONCLUSION

As utilities and regulators endeavor to adapt to the new realities bearing down on the electricity grid, they will have big problems to solve: How will utilities earn revenue despite falling demand and customer-side generation, and what regulatory policies will be required to ensure sustainable, equitable, and forward-thinking development? As new policies and regulatory models emerge from these discussions, it is also important to remember that this evolution will especially impact some of the most vulnerable members of our community.

Each of the grid modernization processes underway today envision new rate structures that would likely reduce the cross-subsidization upon which most low-income assistance programs rely. Thus, the question for low-income consumer

228. *See, e.g.*, Stephen Bird & Diana Hernandez, *Policy Options for the Split Incentive: Increasing Energy Efficiency for Low-Income Renters*, 48 ENERGY POL'Y 506, 508 (2012).

229. Lazar & Gonzalez, *supra* note 54, at 73; Cavanagh & Howat, *supra* note 3.

230. Cavanagh & Howat, *supra* note 3, at 5 (comments of John Howat of the National Consumer Law Council).

231. Lazar & Gonzalez, *supra* note 54, at 73.

232. *See generally Id.;* REGULATORY ASSISTANCE PROJECT, REVENUE REGULATION AND DECOUPLING: A GUIDE TO THEORY AND APPLICATION (June 2011), http://www.raponline.org/wp-content/uploads/2016/05/rap-revenueregulationanddecoupling-2011-06.pdf.

233. Cavanagh & Howat, *supra* note 3, at 5-6. This last policy — of applying a decoupling surcharge to higher-usage blocks and distributing it to lower blocks — is sometimes referred to as the "Tucson Model" after program implemented by Tucson Electric. *Id.*

advocates becomes: what tools remain available to fund these programs that will not conflict with the overarching goals of the wider reform efforts underway? This article raised just some of the options available to regulators and stakeholders. Creative application of these and other solutions can help sustain energy assistance programs while also empowering low-income ratepayers by leveraging the electricity system benefits they can provide.

Ultimately, however, the money to sustain low-income ratepayer programs cannot be created from whole cloth. Each of the options outlined in Part IV will require appropriating funds that could also go to other worthy projects, programs, or stakeholder groups. Addressing the growing electrical divide and ever-present affordability problems for low-income households will therefore require not only resourcefulness, but also conviction and follow-through.

We have already seen what this kind of dedication looks like through past experiences with rural electrification and other New Deal era public works projects. Likewise, we have a long history of providing public assistance in general, and through utility regulation in particular. These principles should be the lodestars that guide policy discussions around low-income ratepayer issues. Indeed, regardless of how thoughtful the design or good the intentions, there is no solution to this problem that will not require a recommitment to the fundamental equity ideals underpinning utility regulation and universal access.