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GRID MODERNIZATION AND ENERGY POVERTY

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Grid modernization holds the alluring promise of rationalizing electricity pricing, saving consumers money, and improving environmental quality all at the same time. Yet, we have seen only limited and patchwork regulatory initiatives towards significant grid modernization in the United States. Outside of a few leading states, state energy regulators appear loath to embrace full-throated versions of the project. This article argues that the under-discussed problem of energy poverty in the United States is a critical contributing factor in the gap between grid modernization's possibilities and our regulatory reality. Only by explicitly understanding how the issues of grid modernization and energy poverty intersect, and by coming up with creative ways to address the challenges created, can regulators gain the comfort they need to move forward with grid modernization reforms in the face of rising inequality and substantial energy poverty. To get at these connections, this Article utilizes a case study of New York State's grid modernization efforts. As part of these efforts, regulators there have pursued an inclusive inquiry into how best to manage the ways in which grid modernization might have disparate impacts on lower-income consumers, producing some important early-stage lessons for emerging modernization efforts in other states.

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INTRODUCTION

For those who care about efficiency and rationality, there is much to want to fix in U.S. electricity law. Aging infrastructure, nonsensical pricing structures, and worries over whether the grid and its markets—as currently designed—can facilitate necessary levels of renewable or carbon-free generation, are all pressing concerns.[1] Fortunately, technological solutions to these problems abound, and companies peddling these wares are eager to engage in the project of "grid modernization."[2] This modernization effort may introduce into the grid a "smart meter" for every house, capable of providing real-time information on electricity consumption; a host of "smart appliances" to respond to this information; storage systems capable of saving excess renewable energy generation to be released at times of under-production, including electric vehicles to act as grid batteries when not in use; and a shift to "dynamic" pricing to incentivize consumers to utilize

[1] *See, e.g.*, Emily Hammond & David B. Spence, *The Regulatory Contract in the Marketplace*, 69 VAND. L. REV. 141 (2016).

[2] Some also use the term "smart grid" to describe a similar set of reforms. *See* Joel B. Eisen, *Smart Regulation and Federalism for the Smart Grid*, 37 HARV. ENVTL. L. REV. 1, 3 (2013). MIT's thorough study on the future of the electric grid eschews any particular definition of "smart grid" in favor of defining the project of grid modernization as "making the grid of the future more resilient, secure, efficient and reliable amid a variety of emerging challenges." MASS. INST. TECH. (MIT), THE FUTURE OF THE GRID: AN INTERDISCIPLINARY MIT STUDY 20 (2011).

technologies to better manage the timing of their electricity demand.[3]

For those who care about justice, current electricity governance also leaves much to be desired. In 2015, fourteen million U.S. households had unpaid utility bills, and 2.2 million had service disconnected.[4] That means around 14% of U.S. households are either actively without energy services, or in danger of losing them imminently.[5] Many of these families, and many others who manage to pay their bills on time but sacrifice other basic necessities to do so, spend an exorbitant and unsustainable portion of their monthly earnings on obtaining energy supplies, causing them to experience "energy poverty."[6] To add insult to injury, many of these same families are likely to be more severely harmed than wealthier Americans by the effects of climate change—another inconvenient byproduct of our current energy infrastructure.[7]

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[3] *See* Eisen, *supra* note 2, at 19. Grid modernization also involves many larger-scale solutions, typically implemented or constructed by utilities. *See infra* Part I.

[4] Tony Gerard Reames, *Targeting Energy Justice: Exploring Spatial, Racial/Ethnic and Socioeconomic Disparities in Urban Residential Heating Energy Efficiency*, 97 ENERGY POL'Y 549, 549 (2016).

[5] This number was obtained by dividing Reames' figures on households without energy services or behind on their utility bills, 16.2 million, by the U.S. Census total number of U.S. households, 117 million. *See QuickFacts*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/table/HSD410215/00 (last visited Feb. 23, 2017).

[6] *See infra* Part III.

[7] *See* U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT 12 (Jerry M. Melillo et al. eds., 2014), http://nca2014.globalchange.gov/report ("Certain groups of people are more vulnerable to the range of climate change related health impacts, including the elderly, children, the poor, and the sick."); *see also* GEO. MASON U. CTR. CLIMATE CHANGE COMMC'N, RACE, ETHNICITY AND PUBLIC RESPONSES TO CLIMATE CHANGE 4 (2010).

Descriptions of Americans opening their ovens to stay warm in the winter[8] appear a far cry from the cornucopia of technological wonders described in the first paragraph of this Article. Perhaps in part for this reason, grid modernization and energy poverty are rarely discussed in the same conversation, much less in the same sentence.[9] Yet grid modernization—for all its anticipated substantial long-term benefits—requires substantial short-term spending, and carries both short- and long-term distributional consequences. Most decisions on how to modernize both infrastructure and regulatory frameworks are made by state electricity regulators, "nearly all [of whom] feel pressure or the desire to address the issue of affordability.[10] For this reason, as the project of grid modernization substantially advances in many states, regulators no longer feel able to ignore its intersections with energy poverty.

If fully carried out, the Department of Energy has suggested that the project of grid modernization "may transform America as much as the Internet has done, redefining every aspect of electricity generation, distribution, and use."[11] For a long time, the primary impediment to this transformation was technical—we simply did not have the infrastructure necessary to reform energy

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[8] *See, e.g.*, *Deadly Dangers of Using the Stove for Heat*, METRO. TENANTS ORG. (Feb. 18, 2011, 11:13 AM), http://www.tenants-rights.org/deadly-dangers-of-using-the-stove-for-heat/.

[9] Although this measure is crude, one might also note that the two terms have never appeared together in a single law review article archived on Westlaw (as indicated by a January 2017 Westlaw search for the terms in the "Law Reviews and Journals" database). *Cf.* Karen Bickerstaff et al., *Introduction: Making Sense of Energy Justice to* ENERGY JUSTICE IN A CHANGING CLIMATE: SOCIAL JUSTICE AND LOW-CARBON ENERGY 2 (Karen Bickerstaff et al. eds., 2013) ("[E]nergy justice is one of the most critical, and yet least developed, concepts associated with theories and practices of low-carbon transitions, and one that must underpin a sustainable energy future.").

[10] *See* SEVERIN BORENSTEIN, THE REDISTRIBUTIONAL IMPACT OF NON-LINEAR ELECTRICITY PRICING 35 (Energy Institute at Haas, Working Paper No. 204R, 2011), https://ei.haas.berkeley.edu/research/abstracts/abstract_wp204R.html [hereinafter Borenstein, *Non-Linear Electricity Pricing*].

[11] Eisen, *supra* note 2, at 6.

pricing and integrate new technologies. Now, however—thanks in large part to a significant amount of funding from the 2009 American Recovery and Reinvestment Act[12]—the necessary technology is in place in much of the country.[13]

And yet, we have seen limited and patchwork regulatory initiatives towards significant grid modernization.[14] Outside of a few leading states, state energy regulators appear loath to embrace full-throated versions of the project. Consumers, too, have proven wary about adopting putatively beneficial but unfamiliar energy management technologies and strategies.[15] In light of these challenges, it seems clear that the major impediments to grid modernization are now firmly within the social and regulatory realms.[16]

Many others have made this same observation in recent years.[17] They have propounded a list of hurdles holding us back from our grid modernizing potential, including conservatism on the part of utilities and regulators, challenges to utility profitability, concerns over increasing consumers' electric bill volatility, and privacy concerns over the new mountains of consumption data that a modern grid might produce.[18] This symposium article aims to make a modest addition to this conversation: In brief, it argues that the

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[12] *See* American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009); Paul L. Joskow & Catherine D. Wolfram, *Dynamic Pricing of Electricity*, 102 AM. ECON. REV. 381, 382 (2012) ("The American Recovery and Reinvestment Act of 2009 (ARRA) provided about $5.0 billion for smart grid demonstration and technology deployment projects . . . .").

[13] *See infra* Part III.

[14] Ahmad Faruqui, *The Ethics of Dynamic Pricing*, 23 ELECTRICITY J. 13, 18 (2010) (describing how some economists "believed that given the overwhelming efficiency benefits that would flow from dynamic pricing, it was inevitable that deployment of this optimal rate design would soon follow. But it did not.").

[15] *See infra* Part I.

[16] Although, of course, it is difficult to establish "a clear and widely accepted border between what is considered to be unquestionably technical and what is recognized as unquestionably social." MICHAEL CALLON ET AL., ACTING IN AN UNCERTAIN WORLD: AN ESSAY ON TECHNICAL DEMOCRACY 25 (Graham Burchell trans., MIT 2001).

[17] *See infra* Section II.B.

[18] *See id.*

under-discussed problem of energy poverty in the United States is a critical contributing factor in the gap between grid modernization's possibilities and our regulatory reality. Only by explicitly understanding how these issues intersect, and by coming up with creative ways to address the challenges created, can regulators gain the comfort they need to move forward with grid modernization reforms in the face of rising inequality and substantial energy poverty.[19]

To get at these connections, this Article utilizes a case study of New York State's grid modernization efforts. New York is at the forefront of efforts to dramatically redesign regulatory structures to incentivize a modernized grid, through a process referred to as "Reforming the Energy Vision" (REV).[20] New York's struggles with the problem of energy poverty during its REV proceedings illustrate the importance, challenges, and possibilities of explicitly linking energy poverty to grid modernization efforts. In addition,

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[19] Michael Dworkin and Benjamin Sovacool have been doing path-breaking work recently on defining the concept of "energy justice"—an endeavor certainly relevant here. My discussion here resonates with their broader thesis: "In sum, it is a mistake to talk about building infrastructure, improving energy security, developing energy resources, forecasting future energy demand, or conducting research on new technologies without first assessing energy justice: asking what this energy is for, what values and moral frameworks ought to guide us, and who benefits." *See* Benjamin K. Sovacool & Michael H. Dworkin, *Energy Justice: Conceptual Insights and Practical Applications*, 142 APPLIED ENERGY 435, 441 (2015) [hereinafter Sovacool & Dworkin, *Energy Justice*]; *see also generally* BENJAMIN K. SOVACOOL & MICHAEL H. DWORKIN, GLOBAL ENERGY JUSTICE: PROBLEMS, PRINCIPLES, AND PRACTICES (2014). However, the point here is less normative and more pragmatic: whether or not one thinks energy justice *should* be a central concern in grid modernization is not of central importance to me in this article. Instead, my argument is that simply as a matter of fact, energy poverty *does* matter to state energy regulators, such that progress on grid modernization depends on a willingness to consider its interaction with energy poverty and an ability to articulate a nuanced understanding of their tensions and synergies. Although the Author happens to share Dworkin and Sovacool's normative outlook, even those who do not, might appreciate the more pragmatic version of the argument advanced here.

[20] *Proceeding on Motion of the Comm'n in Regard to Reforming the Energy Vision*, No. 14-M-0101 (N.Y. Pub. Serv. Comm'n, Apr. 25, 2014) [hereinafter NYPSC Order Instituting Proceeding] (on file with author).

the Article contends, New York's experience foretells the pressures that other states are likely to face as they proceed with announced plans of similarly ambitious reform agendas.[21]

There is a significant risk that the challenges of grid modernization may splinter groups working on causes frequently cast together on the left: those struggling for a cleaner environment, and those struggling against persistent and deepening inequality. Such tensions have deep roots in the history of the environmental justice movement.[22] Fresh fractures are emerging in

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[21] Numerous states are just at the cusp of substantially overhauling their outdated regulatory systems and grid infrastructure. *See, e.g.*, Investigation by the Department of Public Utilities on its own Motion into Modernization of the Electric Grid, D.P.U. 12-76-B (Mass., June 12, 2014), http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=12-76%2FOrder_1276B.pdf; Nancy Lange et al., *Building a Minnesota Conversation on Grid Modernization with a Focus on Distribution Systems,* Minn. Pub. Utils. Comm'n (Minn., May 12, 2015), http://mn.gov/puc/documents/pdf_files/grid_modernization_5-12-2015.pdf; *Commission's Inclinations on the Future of Hawaii's Electric Utilities*, *In the Matter of Pub. Utilities Comm'n*, 314 PUB. UTILS. REPORTS 4TH 49 Exhibit A (Haw., Apr. 28, 2014), http://puc.hawaii.gov/wp-content/uploads/2014/04/Commissions-Inclinations.pdf; KRISTIN RALFF DOUGLAS, CUSTOMERS AS GRID PARTICIPANTS: A FUNDAMENTALLY NEW ROLE FOR CUSTOMERS 3 (CAL. PUB. UTILS. COMM'N, POL'Y & PLANNING DIV., May 15, 2013); Proposed Decision on Order Instituting Rulemaking on the Commission's Own Motion to Conduct a Comprehensive Examination of Investor Owned Electric Utilities' Residential Rate Structures, the Transition to Time Varying and Dynamic Rates, and Other Statutory Obligations, Rulemaking 12-06-013 (Cal. Pub. Util. Comm'n Apr. 21, 2015) [hereinafter California Rulemaking], http://www.sandiegocan.org/wp-content/uploads/2015/07/Revised-Final-Decision.pdf; Herman K. Trabish, *Confidence in Collaboration: Rhode Island Targets a Common Perspective on DER Values*, UTIL. DIVE (Sept. 6, 2016), http://www.utilitydive.com/news/confidence-in-collaboration-rhode-island-targets-a-common-perspective-on-d/425700/; Robert Walton, *Maryland's REV: How Utility Regulators Plan to Tackle Business Model, DER Reforms*, UTIL. DIVE (Oct. 10, 2016), http://www.utilitydive.com/news/marylands-rev-how-utility-regulators-plan-to-tackle-business-model-der-r/427681/.

[22] *See* CLIFFORD RECHTSCHAFFEN & EILEEN GAUNA, ENVIRONMENTAL JUSTICE: LAW, POLICY, & REGULATION 3–5 (Carolina Academic Press) (2002).

many places across the country, as those in favor of policies promoting rooftop solar confront suggestions that such policies favor wealthier homeowners who can afford an appropriate perch for such panels at the expense of other ratepayers.[23]

However, New York offers an antidote to such tales: there, environmentalists and social justice organizers have staunchly stood together, insisting in joint filings that their causes not be parsed, nor pitted against one another.[24] New York's Commission has listened, responding with a combination of enhanced bill protections and more inclusive REV policies.[25] In sum, the New York example offers at least three important lessons to other states. First, merely emphasizing the potential wonders of grid modernization—including its potential economic upsides—is unlikely to sufficiently allay the fears of those most desperately struggling to maintain electricity under current policies. Separately protecting the most vulnerable remains a priority for many regulators and community members. Second, those worried about energy poverty no longer want it addressed as a stand-alone issue, considered apart from efforts towards renewable energy, new technologies, or addressing climate change.[26] Instead, there emerged from New York's proceedings an insistent refrain that energy poverty concerns "should not be viewed in isolation from the [REV] and related proceedings."[27] Third, process matters: New

[23] Krysti Shallenberger, *10 Rooftop Solar Debates to Watch in 2017 and Beyond*, UTIL. DIVE (Feb. 9, 2017), http://www.utilitydive.com/news/10-rooftop-solar-debates-to-watch-in-2017-and-beyond/435070/ (In 2015, there were 175 debates over rooftop solar policies in the U.S. . . . In 2016, there were 212. And this year, those numbers are expected to rise yet again . . . .). A separate, similar debate exists in California over the advisability of addressing climate change through "cap-and-trade" policies, which environmental justice advocates suggest create hot-spots that harm low-income communities. *See* Lara J. Cushing et al., *A Preliminary Environmental Equity Assessment Of California's Cap-and-Trade Program,* USCDORNSIFE (Sept. 2016), http://dornsife.usc.edu/PERE/enviro-equity-CA-cap-trade.

[24] *See infra* Part IV.

[25] *See id.*

[26] *See id.*

[27] COMMENTS TO NEW YORK PUBLIC SERVICE COMMISSION STAFF REPORT, PROCEEDING ON MOTION OF THE COMMISSION TO EXAMINE PROGRAMS TO

York's relatively successful integration of energy poverty alleviation and grid modernization policies has engaged a considerably wider-than-normal group of stakeholder participants, through a substantial commitment of regulators' time and effort.[28]

This Article is organized as follows: Parts I through III give a brief overview of grid modernization and energy poverty as separate topics. Part IV delves into the story of how New York accommodated the marriage of these two issues in its ambitious REV process, and Part V draws some lessons from its experience to inform other emerging state forays into grid modernization.

I. THE PROMISE OF GRID MODERNIZATION

It is "easy enough to make the case for smart grid development."[29] There are many wondrous benefits that grid modernization might bring—not least of which is the potential alleviation of energy poverty. This section briefly reviews the many reasons the project of grid modernization deserves all the attention it has recently received, and more. This discussion is short because many authors have chronicled these benefits at considerably greater length.[30]

In its most capacious usage, "grid modernization" refers to two sets of interlocking projects and objectives: modernizing "antiquated" portions of the grid and expanding the grid where

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ADDRESS ENERGY AFFORDABILITY FOR LOW INCOME UTILITY CUSTOMERS, NO. 14-M-0565, at 3–4 (N.Y.P.S.C., Aug. 24, 2015) [hereinafter NYPSC Comments to Low Income Staff Report] (on file with author).

[28] *See infra* Part IV.

[29] *Cf.* Elias L. Quinn & Adam L. Reed, *Envisioning the Smart Grid: Network Architecture, Information Control, and the Public Policy Balancing Act*, 81 U. COLO. L. REV. 833, 861 (2010) (noting consistent with my introductory remarks, that it is "easy enough to make the case for smart grid development," but "harder to lay out a plan for its actual deployment in any specific region or jurisdiction").

[30] *See generally* Massachusetts Institute of Technology, *supra* note 2; Quinn & Reed, *supra* note 29; Eisen, *supra* note 2; PETER FOX-PENNER, SMART POWER: CLIMATE CHANGE, THE SMART GRID, & THE FUTURE OF ELECTRIC UTILITIES (2010); GRETCHEN BAKKE, THE GRID: THE FRAYING WIRES BETWEEN AMERICANS AND OUR ENERGY FUTURE (2016).

necessary;[31] and "providing consumers with dramatic new ways to make, use, and conserve electricity."[32] The first project, grid retooling, focuses largely on upgrades to utility-owned equipment and services—such as investments in new transmission infrastructure, voltage support devices, and network monitoring systems.[33] The second project—opening up the electricity grid to consumer-side participation—requires both technological investment and substantial recalibration of social relations around electricity. Consumers must be given the tools and knowledge to become "participants" in the electric grid.[34]

Smart meter deployment is critical to this transition.[35] These meters record electricity consumption in granular detail, so that

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[31] Massachusetts Institute of Technology, *supra* note 2, at 7 (noting the grid is often referred to as "antiquated," although taking some issue with the characterization).

[32] Eisen, *supra* note 2, at 3; Energy Independence and Security Act of 2007, 42 U.S.C. §§ 17381–17386 (2007) ("Statement of Policy on the Modernization of Electricity Grid"). *See* Massachusetts Institute of Technology, *supra* note 2, at 11–12; Paul L. Joskow, *Creating a Smarter U.S. Electricity Grid*, 26 J. ECON. PERSP. 29, 40 (2012). MINN. PUB. UTILS. COMM'N, STAFF REPORT ON GRID MODERNIZATION 1–2 (Mar. 2016), http://morethansmart.org/wp-content/uploads/2015/06/MNPUC_Staff_Report_on_Grid_Modernization_March2016.pdf. ("A modernized grid assures continued safe, reliable, and resilient utility network operations, and enables Minnesota to meet its energy policy goals, including the integration of variable renewable electricity sources and distributed energy resources. An integrated, modern grid provides for greater system efficiency and greater utilization of grid assets, enables the development of new products and services, provides customers with necessary information and tools to enable their energy choices, and supports a standards-based and interoperable utility network.").

[33] *See* Massachusetts Institute of Technology, *supra* note 2, at 31-52 (describing these technologies in detail).

[34] *See* Shelley Welton, *Clean Electrification*, U. COLO. L. REV., 14 (forthcoming 2017) [hereinafter Welton, *Clean Electrification*] (describing state movement towards a "participatory grid"); *see also, e.g.*, Douglas, *supra* note 21, at 3 ("Customer participation, more than the actions of the utilities or of the regulators, is critical to meet California's greenhouse gas emission goals in a cost-effective manner.").

[35] Joel B. Eisen, *Distributed Energy Resources, "Virtual Power Plants," and the Smart Grid*, 7 ENVTL. & ENERGY L. & POL'Y J. 191, 200 (2012) [hereinafter Eisen, *Distributed Energy Resources*] ("Price signals cannot be made available

one can measure changes in consumption throughout the day.[36] As of late 2016, utilities and other grid operators had installed 57.1 million of these meters in approximately 49% of U.S. households (and an additional 7.3 million in businesses and industrial operations).[37] Smart meters allow utilities to better understand the ebb and flow of consumer electricity demand, creating the possibility of smarter programs to manage consumer demand during periods of grid stress.[38] More profoundly, smart meter installation allows for the implementation of a reform long touted by economists and scholars of utility regulation: a transition from flat-fee, per-kilowatt-hour payments[39] to more "dynamic" forms of pricing. Under dynamic pricing, the price that end-use consumers pay reflects the price that electricity actually costs to generate, which fluctuates considerably throughout the day.[40]

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to consumers without investments in advanced 'smart meters' and other systems to support them.").

[36] *Frequently Asked Questions*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/faqs/faq.cfm?id=108&t=3 (last visited Feb. 23, 2017) [hereinafter USEIA] ("Advanced metering infrastructure includes meters that measure and record electricity usage at a minimum of hourly intervals and that provide the data to both the utility and the utility customer at least once a day. AMI installations range from basic hourly interval meters to real-time meters with built-in two-way communication that is capable of recording and transmitting instantaneous data.").

[37] This statistic was obtained by dividing the Energy Information Administration's reported number of residential smart meter installations – 57.1 million – by the U.S. Census Bureau's latest statistics regarding the number of U.S. households – 117 million. *See* U.S. Energy Info. Admin., *An Assessment of Interval Data and Their Potential Application to Residential Electricity End-Use Modeling* 3 (Feb. 2015); UNITED STATES CENSUS BUREAU, *supra* note 5.

[38] United States Energy Information Administration, *supra* note 37; Mike Faden, *"Smart-Grid" Appliances*, 6 FRONTIERS IN ECOLOGY & THE ENV'T 62, 62 (2008).

[39] *See* Joshua A. Blonz, *Making the Best of the Second-Best: Welfare Consequences of Time-Varying Electricity Prices* 1 (Energy Inst. at Haas, Working Paper No. 275, 2016).

[40] *See generally* Severin Borenstein, *Effective and Equitable Adoption of Opt-In Residential Dynamic Electricity Pricing*, 42 REV. INDUS. ORG. 127, 127 (2013) [hereinafter Borenstein, *Dynamic Electricity Pricing*] ("Economists who study electricity markets are virtually unanimous in arguing that time-varying

"Dynamic" pricing can take several forms. Real-time pricing links retail rates directly to the wholesale price of electricity.[41] Other less drastic options include time-of-use rates, which employ several different pricing levels for different times of day; and critical peak pricing, which prices certain particularly expensive hours much higher (generally 100–200 hours per year).[42] It is generally believed that altering retail prices might be one of the most efficient, effective ways to motivate the kinds of consumer participation that smart grid proponents hope to achieve.[43] With dynamic pricing in place, consumers would have concrete economic incentives to invest in the range of technologies previewed in the Introduction, including solar panels; "smart" thermostats; dishwashers, washers, and dryers capable of starting

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retail pricing for electricity would improve the efficiency of electricity systems and would lower the overall cost of meeting electricity demand."); Joskow, *supra* note 32, at 32 (showing graph of fluctuations in New England's real-time energy prices on a single day). Dynamic pricing's benefits have long been understood—"[a study from] the late 1970s produced over 100 reports that outlined why dynamic pricing was important and described how it could be achieved." Theresa Flaim et al., *Pilot Paralysis: Why Dynamic Pricing Remains Over-Hyped and Underachieved*, 26(4) ELECTRICITY J. 8, 8 (2013). *See also* JAMES C. BONBRIGHT, PRINCIPLES OF PUBLIC UTILITY RATES (1961); Stephen Buryk et al., *Investigating Preferences for Dynamic Electricity Tariffs: The Effect of Environmental and System Benefit Disclosure*, 80 ENERGY POL'Y 190, 190 (2015); FOX-PENNER, *supra* note 30, at 49.

[41] *See* Blonz, *supra* note 39, at 1.

[42] *See id.* at 1–2; Eisen, *supra* note 2, at 19. Critical peak pricing programs are the most common form of dynamic pricing programs in the United States at present. Blonz, *supra* note 39, at 2; *see also* Zheng Hu et al., *Review of Dynamic Pricing Programs in the U.S. and Europe: Status Quo and Policy Recommendations*, 42 RENEWABLE & SUSTAINABLE ENERGY REV'S 743 (2015).

[43] *See generally* Joskow & Wolfram, *supra* note 12, at 381–82 (tracing the 50-year history of the theory of dynamic pricing); Blonz, *supra* note 39, at I (explaining how flat rates "lead[] to overconsumption during peak periods, requiring the construction of excess generation capacity compared to first-best prices that adjust at short time intervals to reflect changing marginal cost" and finding that well-constructed time-of-use rates could produce significant welfare gains); *see also* Quinn & Reed, *supra* note 29, at 871.

and stopping in response to changes in electricity pricing; electric vehicles; and rooftop storage systems.[44]

Grid modernization holds potential efficienct, environmental, and social gains. In its fullest instantiation, it might create "spectacular technological breakthroughs, the rise of entire new industries, and consumer uses far beyond anyone's wildest dreams."[45] Although likely to impose significant up-front expenses, many experts predict that investments in grid modernizing technologies will ultimately save society considerable money, as an updated "grid would 'operate more efficiently, would need less maintenance and large-scale infrastructural investment, and would fall victim to fewer 'power disturbances" such as outages and overloads that impose significant costs on the U.S. economy.'"[46] Additionally, the modernization of equipment and integration of consumer-side offerings is likely to prove critical in the U.S. effort to transition to greater reliance on renewable energy.[47] Because renewables operate "intermittently," when the sun shines or the wind blows, integrating them in high quantities is much easier if there is an ability to respond rapidly to shifts in supply with near-

[44] Eisen, *supra* note 2, at 10–11; Quinn & Reed, *supra* note 29, at 871 ("To this end, these efforts would be best supported by technologies that provide targeted, real-time information to electricity customers, and measured usage in relatively small time slices so that electricity consumers are aware of specific appliance loads and can react in an informed way to either price signals or environmental directives and information.").

[45] Eisen, *supra* note 2, at 3. Some envision that a smart grid might ultimately allow consumers to contract directly with producers of electricity, such that you could pick to buy your produce and your wind from the same trusted farmer down the road. *See* Matthew Crosby, *An Airbnb or Uber for the Electricity Grid?*, RMI BLOG (Sept. 2, 2014), http://blog.rmi.org/blog_2014_09_02_an_airbnb_or_uber_for_the_electricity_grid.

[46] Quinn & Reed, *supra* note 29, at 837.

[47] Twenty-nine U.S. states have "renewable portfolio standards" in place that aim to promote enhanced reliance on renewable energy sources in the coming decades. *See* DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (DSIRE), RENEWABLE PORTFOLIO STANDARD POLICIES (Feb. 2017), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/02/Renewable-Portfolio-Standards_Feb2017.pdf.

contemporaneous shifts in demand.[48] A modernized grid could enable precisely this type of quick-fire management of electricity demand.[49] At the same time, by empowering greater potential demand reductions, grid modernization would help "avoid unnecessary expenses of building new generation, transmission, and distribution infrastructure."[50] In addition, grid modernization may hold much-vaunted job-creating potential, as it will provide opportunities for new companies to emerge and situate themselves as "energy managers" for consumers who have limited inclination to invest their own time and resources in grid participation.[51]

II. GETTING THERE: ROLES AND IMPEDIMENTS

To extol the virtues of a modern grid invites the question of why we all are not already boasting the suite of high-tech gadgets previewed above, or receiving monthly "negative bills" from our energy management companies detailing the amount of energy savings they have earned us in the last month (after subtracting out their cut of these savings, naturally). Grid modernization, as a theory, has been around a long while, and yet the future it portends still feels at least marginally in the realm of science fiction, rather than reality.

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[48] Quinn & Reed, *supra* note 29, at 838; Eisen, *Distributed Energy Resources*, *supra* note 35, at 195.

[49] *See* Borenstein, *Dynamic Electricity Pricing*, *supra* note 40, at 130 ("Dynamic pricing makes it possible to match more closely demand fluctuations to the exogenous supply fluctuations and, thus, reduce the system costs of integrating these renewable energy sources."); Quinn & Reed, *supra* note 29, at 838; Buryk et al., *supra* note 40, at 191. The Federal Energy Regulatory Commission has estimated that demand response programs, aimed at cutting demand during peak periods, could eliminate about 8.7% of U.S. peak demand. *See* Flaim et al., *supra* note 40, at 9.

[50] Eisen, *supra* note 2, at 12. *See generally* Shelley Welton, *Non-Transmission Alternatives*, 39 HARV. ENVTL. L. REV. 457 (2015); Elec. Power Research Inst. (EPRI), *The Green Grid: Energy Savings and Carbon Emissions Reductions Enabled by a Smart Grid.*, No. 1016905, 1–3 (2008), https://www.smartgrid.gov/files/The_Green_Grid_Energy_Savings_Carbon_Emission_Reduction_En_200812.pdf.

[51] *See* Eisen, *supra* note 2, at 12.

As with the task of envisioning and defining grid modernization, many scholars have taken us a long way towards understanding why grid modernization has been such a slow process. This part summarizes their research regarding reasons for delay, almost all of which fall within the realm of social or regulatory—rather than technical—impediments. Because the impediments are chiefly of this variety, it is necessary to explain in a bit more detail the regulatory role in grid modernization before chronicling its challenges.

A. The Regulatory Role in Grid Modernization

Decades after the "deregulation" of many major U.S. industries,[52] energy regulation continues to be relatively heavy-handed. There are good reasons for this heavy-handedness: unlike most products, electricity requires perfect, second-by-second balancing between quantities of electricity being supplied into the grid, and quantities of electricity being drawn out of it.[53] Without constant monitoring, the electricity grid would cease to function, and blackouts would become the norm.[54]

Moreover, the prevailing U.S. sentiment is that electricity is a modern necessity that should be made available to every American willing and able to pay for it.[55] This sentiment is instantiated in the regulatory structure of every U.S. state, in which a "Public Utility Commission" ("PUC") oversees monopoly electric utilities. In exchange for being granted an exclusive service area, these utilities agree to supply all residents of that area with electricity at PUC-determined "just and reasonable" rates.[56] Included in these rates are the utilities' costs of generating or purchasing electric power, as

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[52] *See* Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323 (1998).

[53] *See* Joskow, *supra* note 32, at 31–33.

[54] Right now, the grid does not have significant storage capacity to smooth out differences in supply and demand, although the development of greater storage capacity may help alleviate this problem in the future. *See* Joskow, *supra* note 32, at 36.

[55] *See* Welton, *Clean Electrification*, *supra* note 34, at 107.

[56] *See id.* at 111; *see also* 1 ALFRED E. KAHN, THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS 3 (1988).

well as their costs of constructing the transmission and distribution infrastructure necessary to move electricity to customers.[57]

PUCs thus have a significant role to play in determining how grid modernization unfolds. For those expenses that utilities will incur—including upgrades to the transmission and distribution infrastructure—PUCs have to decide whether or not to allow utilities to recoup the costs from their customers as part of "just and reasonable" rates.[58] Similarly, PUCs play a prominent role in deciding whether or not to move customers towards any forms of "dynamic pricing."[59] PUCs are also responsible for figuring out how to compensate distributed energy technologies that consumers might deploy to supply extra power to the grid, such as rooftop solar panels.[60] For all of these reasons, PUCs have become the locus of substantial societal contestation over grid modernization. In these contests, they have embraced modernization only half-heartedly and often reluctantly, for reasons that are the focus of the remainder of this article.

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[57] In providing this short summary of state regulatory structures, this Article necessarily glosses over some significant disparities among various states in the country. For a thorough explanation of the flavors of state electricity regulation, and how this basic structure has evolved in many states over time, see William Boyd & Ann E. Carlson, *Accidents of Federalism: Ratemaking and Policy Innovation in Public Utility Law*, 63 UCLA L. REV. 810 (2016).

[58] *See* Eisen, *supra* note 2, at 17; *see also, e.g.*, In re Baltimore Gas & Elec., 101 Md. P.S.C. 149, at 6 (Md. P.S.C., June 21, 2010) (Authorization to Deploy a Smart Grid Initiative and to Establish a Surcharge for the Recovery of Cost) (rejecting utility's application for a smart grid program in part because the Commission was "persuaded that some of the Company's most vulnerable residential customers . . . are less likely to realize the potential benefits of [time-of-use] pricing than would the 'average' residential customer").

[59] For discussion of the various forms of dynamic pricing, *see supra* note 42.

[60] *See* Welton, *Clean Electrification*, *supra* note 34, at 20–25; *see also* Sanya Carley & Lincoln L. Davies, *Nevada's Net Energy Metering Experience: The Making of a Policy Eclipse?*, BROOKINGS MOUNTAIN WEST (2016), http://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=1042&context=brookings_pubs.

B. Well-Documented Challenges

This article is far from the first to observe that social impediments—rather than technical—form the chief barrier to grid modernization. This subpart briefly summarizes the research that has been done to date on reasons why grid modernization is proceeding more slowly than its proponents might desire, or economic theory might predict.[61] These challenges might be grouped into two broad categories: (1) misaligned utility and regulatory incentives, and (2) individual cognitive and behavioral barriers.

Joel Eisen suggests that one key challenge facing grid modernization is the inherent conservatism of utilities and state PUCs. Given PUCs' mandate to maintain "just and reasonable rates," these institutions shy away from allowing utilities to recover from consumers any infrastructure investments that do not provide clear and imminent economic gains to consumers.[62] However, the benefits of grid modernization may not be apparent or certain until a whole suite of presently non-existent technologies and changes come into place—not just infrastructure investments and advanced metering installation, but the emergence of new companies, technologies, and pricing structures to respond to these advancements.[63] For this reason, PUCs have expressed skepticism about the cost-benefit tradeoff of asking customers to fund the early utility-side infrastructure necessary to enable a full-throated version of grid modernization.[64]

Similar skepticism exists around significant changes to current electricity pricing. "At the residential level, time-varying pricing has gotten very little traction in any form."[65] Opt-in schemes are unpopular with consumers, and few state regulators are willing to

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[61] *See* Joskow, *supra* note 32, at 40.

[62] Eisen, *supra* note 2, at 17.

[63] *See supra* Part I.

[64] *See* Eisen, *supra* note 2, at 17; Joskow, *supra* note 32, at 15.

[65] Borenstein, *Dynamic Electricity Pricing*, *supra* note 40, at 127–28 ("[T]ime-varying retail electricity pricing is very popular with economists, but has little support among regulators and consumers.").

require mandatory or even default dynamic pricing regimes.[66] This hesitance is due in part to worries that consumers will not understand or appropriately utilize new pricing structures.[67] However, Catherine Wolfram and Paul Joskow argue that evidence from recent pilot experiments suggests quite the opposite: a substantial portion of customers in many pilots understand and respond to differentials in electricity prices over time.[68] For this reason, they suggest that "[t]he fear of large redistributions across customers is possibly the largest impediment to further adoption of dynamic pricing."[69] That is to say, regulators are most worried about those who will *not* respond to dynamic pricing, and thus see their bills go up.[70]

A few scholars have tackled the question of precisely whose bills might rise under dynamic pricing with mixed results. Some find that low-income households are not systematically disadvantaged by dynamic pricing, while others have found cause for concern.[71] The following sections contextualize the importance

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[66] California is poised to become the first state to create default time-of-use rates, which should become active in 2019. *See* California Rulemaking, *supra* note 21, at 1; Laurie Guevara-Stone, *California Flattens Rate Blocks, Rolls Out Default Time-Of-Use Pricing*, ROCKY MOUNTAIN INST. BLOG (Jun. 5, 2015), http://blog.rmi.org/blog_2015_06_05_california_flattens_rate_blocks_rolls_out_default_time_of_use_pricing.

[67] Joskow & Wolfram, *supra* note 12, at 383; *see also*, Borenstein, *Dynamic Electricity Pricing*, *supra* note 40, at 137.

[68] Joskow & Wolfram, *supra* note 12, at 383.

[69] *Id.* at 384.

[70] *See id.* at 384

[71] *See* Borenstein, *Dynamic Electricity Pricing*, *supra* note 40, at 144–45 (collecting sources on both sides of this debate and finding in his own study that low-income consumers would not benefit substantially, although most would see only small bill changes); *see also* Flaim et al., *supra* note 40, at 18 (finding that control technologies are important in being able to respond to dynamic pricing); Faruqui, *supra* note 14, at 21–22 (suggesting that low-income consumers might on the whole benefit from a shift to dynamic pricing); Frank A. Felder, *The Equity Implications of Smart Grid: Questioning the Size and Distribution of Smart Grid Costs and Benefits*, *in* SMART GRID: INTEGRATING RENEWABLE, DISTRIBUTED AND EFFICIENT ENERGY 85, 88 (2012) ("There is nothing close to a majority view, let alone a near consensus, that these technologies should be adopted."); William W. Hogan, *Fairness and Dynamic Pricing: Comments*,

of this mixed evidence, observing that these inconclusive empirics present substantial concerns to regulators.

Utilities, for their part, have obvious self-preservation instincts that may conflict with the project of grid modernization. Some of the investments required to modernize the grid might benefit utilities' bottom line, by allowing them to invest in new infrastructure on which they earn a PUC-established "rate of return."[72] But at the same time, "traditional rate-of-return regulation creates incentives in many ways antithetical to the modern project of electricity reform."[73] Efforts to cut consumers' energy demand and allow them to self-generate a portion of their electricity needs cuts against utilities' core business—the selling of electricity.[74] For this reason, utilities may hesitate to promote many components of grid modernization, and may actively argue against their adoption by state regulators.[75]

On the other side of the meter, even though consumers stand to benefit considerably in the long run from grid modernization, many of our human instincts impede us from getting to that point. The costs of getting set up with all the gadgetry necessary to

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23(6) ELECTRICITY J. 28, 29 (2010) (arguing that "existing tariff designs with constant prices already embed distributional consequences"). *See also* Welton, *Clean Electrification*, *supra* note 34 (gathering evidence on both sides of this debate).

[72] Quinn & Reed, *supra* note 29, at 873.

[73] *Id.*

[74] Quinn and Reed observe that certain technologies—including advanced metering and home automation for time-shifting of demand—might "reduce costs while otherwise maintaining existing sales levels," but argue that on the whole, smart grid technologies are likely to harm utilities' profitability. *Id.*

[75] *Id.* at 873–74; *see also* Michael P. Vandenbergh & Jim Rossi, *Good for You, Bad for Us: The Financial Disincentive for Net Demand Reduction*, 65 VAND. L. REV. 1527 1544–45 (2012). One prominent example of utility resistance emerges in the battles over state net metering policies, which are under assault in dozens of states across the country. Utilities dislike these policies because they promote rooftop solar via generous buy-back policies for solar panel owners, causing utilities to lose customer revenue. *See* Welton, *Clean Electrification, supra* note 34.

"participate" in the modern grid[76] are substantial, both in terms of time and money.[77] And the gadgets themselves aren't exactly trendy must-haves—as Eisen has observed, "[n]o one is standing in line at an Apple Store for a smart thermostat[78] Nor is it clear whether and how consumers might access all the data that smart meters' provide about their individualized use, as state laws regarding this data remain unsatisfactory or inconclusive on this point.[79] All of which leaves consumers—similarly to regulators—hesitant to move first in adopting grid modernization technologies, or to opt into any variety of dynamic pricing that might increase the volatility of their bills.[80]

Consumers have expressed a separate, substantial worry with grid modernization that can only be partially attributed to cognitive failings: that of consumer privacy. In brief, the concern is that advanced meters, with their near-constant monitoring of household electricity usage, may give regulators and utilities a new world of information about how we each live our wired-in lives "within the

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[76] *See* Welton, *Clean Electrification*, *supra* note 34 (chronicling state efforts to create a "participatory" grid).

[77] Eisen, *supra* note 2, at 15; Alexandra B. Klass & Elizabeth J. Wilson, *Remaking Energy: The Critical Role of Energy Consumption Data*, 104 CALIF. L. REV. 1095, 1108–09 (2016).

[78] Eisen, *supra* note 2, at 15.

[79] *See* Klass & Wilson, *supra* note 77, at 1100, 1105 (arguing that "the inability of municipalities, energy efficiency providers, and customers to easily obtain energy consumption data in a standardized format excludes them from participating in energy markets, evaluating different rate pricing schemes, and understanding the value of energy investments" and suggesting that state PUCs have by and large been slow to mandate standards for consumer interface with this data).

[80] Buryk et al., *supra* note 40, at 191 (finding that in "opt-in" dynamic pricing pilots, only between 5% and 28% of persons asked were successfully recruited to participate); Flaim et al., *supra* note 40, at 8 ("Despite the recent resurgence of pilots and field trials, dynamic pricing at the retail level remains limited."); Eisen, *supra* note 2, at 19–20; Blonz, *supra* note 39, at 5 ("Some customers would face significantly higher energy bills under real-time pricing, creating a constituency opposed to the new pricing system.").

putative privacy of the home."[81] What might be revealed? Such details as:

When you turn off the lights. When you take a shower. When you leave home. Where your electric vehicle is being charged . . . [I]f the security system is activated, if one cooks with a microwave or the stove, the presence of certain medical equipment, how much and when the household watches television . . . .[82]

Largely in response to these concerns, some PUCs are allowing consumers "to *refuse* to be fitted with a smart meter if they do not want one—for whatever reason."[83]

All of these concerns are important elements of understanding why the grid modernization project is going slower than expected in many places. Nevertheless, this list ignores one important additional impediment: that of regulators' substantial concerns over protecting those consumers experiencing "energy poverty."

III. UNDERSTANDING ENERGY POVERTY

When most people hear the term energy poverty, they think of faraway places: women forced to walk hours to gather firewood bundles that they lug home to cook with, villages with spotty or no access to electricity, or cook stoves filling small huts with dangerous emissions.[84] These are, to be sure, substantial and

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[81] *See* Kevin L. Doran, *Privacy and Smart Grid: When Progress and Privacy Collide*, 41 U. TOL. L. REV. 909, 910 (2010); *see also* Eisen, *supra* note 2, at 16. *See generally* Sonia K. McNeil, *Privacy and the Modern Grid*, 25 HARV. J. L. & TECH. 199 (2011); Cheryl Dancey Balough, *Privacy Implications of Smart Meters*, 86 CHI.-KENT L. REV. 161 (2011); Samuel J. Harvey, *Smart Meters, Smarter Regulation: Balancing Privacy and Innovation in the Electric Grid*, 61 UCLA L. REV. 2068 (2014).

[82] Balough, *supra* note 81, at 161, 167.

[83] ELECTRICITY, *Dynamic Pricing*, *supra* note 63, at 6 (emphasis in original) (explaining that California has taken this step). Some consumers also worry about electromagnetic fields ("EMF") created by smart meters, and their potential to induce headaches, nausea, and other physical symptoms. *See id.*

[84] *See, e.g.*, Fatih Birol, *Energy Economics: A Place for Energy Poverty in the Agenda?*, 28 ENERGY J. 1, 2–4 (2007); UNITED NATIONS, SUSTAINABLE ENERGY FOR ALL: AN OVERVIEW 1, http://www.un.org/millenniumgoals/pdf/SEFA.pdf (last visited Feb. 23, 2017); Christian E. Casillas & Daniel M.

pressing problems. "Today, 1.6 billion people in developing countries do not have access to electricity in their homes."[85] And "2.5 billion people—40% of the world's population—rely on traditional biomass such as wood, agricultural residues and dung to meet virtually all of their cooking energy needs."[86]

But energy poverty is not a problem confined to developing countries. Although different in degree if not kind, the energy poverty challenges facing U.S. families remain substantial impediments to fulfilling basic human and social needs,[87] and stand as a reproach to the long-standing aim of enabling all Americans to access affordable electricity.[88]

Scholars are just beginning to grapple with the concept of energy poverty in the United States,[89] and definitional problems

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Kammen, *The Energy-Poverty-Climate Nexus*, 330 SCI. 1181 (Nov. 2010); Benjamin K. Sovacool, *The Political Economy of Energy Poverty: A Review of Key Challenges*, 16 ENERGY FOR SUSTAINABLE DEV. 272, 273 (2012) [hereinafter Sovacool, *Energy Poverty*] ("[T]he UNDP explicitly defines energy poverty as the 'inability to cook with modern cooking fuels and the lack of a bare minimum of electric lighting to read or for other household and productive activities at sunset.'" (quoting AMIE GAYE, HUMAN DEVELOPMENT REPORT 2007/2008, ACCESS TO ENERGY AND HUMAN DEVELOPMENT 4 (2007))).

[85] Birol, *supra* note 84, at 3.

[86] *Id.*

[87] *See* Benjamin K. Sovacool, *Fuel Poverty, Affordability, and Energy Justice in England: Policy Insights from the Warm Front Program*, 93 ENERGY 361, 361 (2012) [hereinafter Sovacool, *Fuel Poverty*] ("Though many may take it for granted, having a warm, comfortable, well-lit home is an instrumental part of modern, industrialized life."); Diana Hernández, *Sacrifice Along the Energy Continuum: A Call for Energy Justice*, 8 ENVTL. JUST. 151, 154 ("Whereas infrastructure presents the most significant barrier to energy in the poorer nations, the circumstances surrounding energy justice in industrialized nations are more nuanced.").

[88] *See* Welton, *supra* note 34 (chronicling how this aim has manifested itself throughout the history of U.S. electricity policy).

[89] Sovacool, *Fuel Poverty*, *supra* note 87, at 361 (arguing that "the topic of fuel poverty and vulnerability . . . is all too often ignored in contemporary energy policy discussions"). The European Union, and the United Kingdom in particular, are considerably further along in their discussion of energy poverty and in developing policy responses to address it. *See* Ralitsa Petrova Hiteva,

plague the field.[90] In basic terms, energy poverty—also often referred to as fuel poverty or energy insecurity[91]—is "the inability of households to afford energy services for adequate heating and cooling resulting in uncomfortable indoor temperatures, material deprivation, and accumulated utility debt."[92] But of course, electricity affords more than just livable temperatures in our modern world—it is also essential for forming and maintaining social connections, knowledge, and cultural capital.[93]

Fuel Poverty and Vulnerability in the EU Low-Carbon Transition: The Case of Renewable Electricity, 18 LOC. ENV'T 487 (2013).

[90] Sovacool, *Energy Poverty*, *supra* note 84, at 273 ("As there is no simple definition of poverty, conceptualizing 'energy poverty' is a somewhat arduous process.").

[91] Many researchers use the terms "energy poverty" and "fuel poverty" as synonyms. *See, e.g.*, Reames, *supra* note 4, at 549; Sovacool, *Fuel Poverty*, *supra* note 87, at 362 (describing his work as "center[ing] the discussion of fuel poverty not only on traditional notions of affordability or household energy poverty, but also on novel notions of energy justice, ethics, and recognition"); Conor Harrison & Jeff Popke, *"Because You Got to Have Heat": The Networked Assemblage of Energy Poverty in Eastern North Carolina*, 101 ANNALS ASS'N AM. GEOGRAPHERS 949, 950 (2011). Others treat them as overlapping but not necessarily synonymous concepts. *See* Kang Li et al., *Energy Poor or Fuel Poor: What Are the Differences?*, 68 ENERGY POL'Y 476–81 (2014); Hiteva, *supra* note 89, at 492 ("[V]ariations exist in the way fuel poverty is defined and the contexts within which it is sometimes interchangeably used with the term energy poverty or distinguished from it."). This Article treats the concepts synonymously, and uses "energy poverty" throughout. However, readers should take note that the terms do not have clearly delineated meanings, and alternative phrasings exist. *See* Rosie Day & Gordon Walker, *Household Energy Vulnerability as 'Assemblage*,*' in* ENERGY JUSTICE IN A CHANGING CLIMATE, *supra* note 9, at 14 ("Partly because research and policy attention has emerged in a quite differentiated manner, different languages have been employed to characterize the problem that is at issue, including those of fuel poverty, energy poverty, energy insecurity, energy deprivation and energy precariousness.").

[92] Reames, *supra* note 4, at 549; Sovacool, *Fuel Poverty*, *supra* note 87, at 362 (reporting that inadequately heated housing results in "higher rates of mortality among the elderly, a greater prevalence of circulatory and respiratory diseases in adults, reduced physical and emotional well-being, and an increased risk of falls, mental health illness, social isolation, and hospital admissions").

[93] To understand this assertion, imagine what life would look like without your cell phone, computer, access to the internet or at least cable news, or the

How can one know whether someone is suffering from energy poverty? There is partial but incomplete overlap between Americans in general poverty and the group experiencing *energy poverty* specifically.[94] "Poverty" is typically defined by reference to a particular income level.[95] Energy poverty, in contrast, is defined specifically in terms of a household's ability to maintain a comfortable standard of existence in their home.[96] Those researchers most carefully theorizing energy poverty tend to resist the tendency to describe it in quantifiable terms, preferring instead to view it as "contingent," "multidimensional in character and produced through the coming together of social, technological, and natural processes."[97] Often, though, as a practical matter, the delineation of this contingent condition turns on the amount of money a family must put *specifically* towards energy services each month or year.[98] When quantified, "energy poverty" is typically defined by a measure of a household's "energy burden," which is the percentage of income spent on energy.[99] Measuring energy burdens proves a useful way to disaggregate general poverty and energy poverty, because:

> Some people are poor but can afford adequate warmth. Others with incomes above the accepted poverty line nevertheless cannot afford to be warm—because their home is difficult or expensive to heat. There are also people

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ability to pick up a book, magazine, or newspaper before sunrise or after sunset. Electricity, simply put, is the oft-hidden thread that binds together the fabric of modern American society.

[94] *See* Sovacool, *Fuel Poverty*, *supra* note 87, at 362.

[95] *See How the Census Bureau Measures Poverty*, U.S. CENSUS BUREAU, https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html (last updated Apr. 19, 2016).

[96] Harrison & Popke, *supra* note 91, at 950.

[97] Day & Walker, *supra* note 91, at 16. *See also* Will Anderson et al., *Coping with Low Incomes and Cold Homes*, 49 ENERGY POL'Y 40, 40 (2012).

[98] Sovacool, *Fuel Poverty*, *supra* note 87, at 362; Reames, *supra* note 4, at 550.

[99] Reames, *supra* note 4, at 550.

> who purchase warmth only at the expense of adequate diets or going short in other ways.[100]

In the United States, experts often pinpoint the "energy burden" threshold for tipping into energy poverty as spending more than 6% of the household income on energy.[101] Some of the poorest U.S. households spend 25 to 30% of their income on energy.[102] In contrast, the median U.S. household spends around 3.5% of its income on energy bills.[103]

There is no national U.S. survey designed to specifically measure energy poverty;[104] accordingly, estimates are hard to come by. The federally administered Low Income Home Energy Assistance Program ("LIHEAP"), which provides energy assistance to a portion of those households in need, determines eligibility by income alone, rather than energy burden.[105] According to the most recent LIHEAP data available, 38.5 million

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[100] Sovacool, *Fuel Poverty*, *supra* note 87, at 362 (quoting Jonathan Bradshaw & Sandra Hutton, *Social Policy Options and Fuel Poverty*, 3 J. ECON. PSYCHOL. 249 (1983)).

[101] *See* Dan Boyce & Jordan Wirfs-Brock, *High Utility Costs Force Hard Decisions for the Poor*, INSIDE ENERGY (May 8, 2016), http://insideenergy.org/2016/05/08/high-utility-costs-force-hard-decisions-for-the-poor/; Adam Chandler, *Where the Poor Spend More Than 10 Percent of Their Income on Energy*, THE ATLANTIC (June 8, 2016), http://www.theatlantic.com/business/archive/2016/06/energy-poverty-low-income-households/486197/. In Europe, where energy is more expensive, the figure is often 10%. Sovacool, *Fuel Poverty*, *supra* note 87.

[102] Boyce & Wirfs-Brock, *supra* note 101.

[103] ARIEL DREHOBL & LAUREN ROSS, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., LIFTING THE HIGH ENERGY BURDEN IN AMERICA'S LARGEST CITIES: HOW ENERGY EFFICIENCY CAN IMPROVE LOW INCOME AND UNDERSERVED COMMUNITIES 4 (Apr. 2016), http://aceee.org/sites/default/files/publications/researchreports/u1602.pdf [hereinafter ACEEE REPORT].

[104] Hernández, *supra* note 87, at 153.

[105] Off. of Cmty. Servs., U.S. Dep't of Health & Hum. Servs., Low Income Home Energy Assistance Program: Report to Congress for Fiscal Year 2014, v-vi, 83, 45 n.2 (2014), https://www.acf.hhs.gov/sites/default/files/ocs/fy14_liheap_rtc_final.pdf [hereinafter LIHEAP].

U.S. households had incomes that qualified for home energy assistance under the federal income standard.[106] Private data suggests that the "energy affordability gap" in the United States—by which the authors mean the amount of money that Americans spend on energy above "affordable" energy bills[107]—was around $41 billion in 2015 (up from $18.2 billion in 2003).[108] Additional research suggests that the disparity in energy burdens results in large part from the fact that low-income homes are less efficient, such that the poor spend more not only as a percentage of income but also on a *per-square-foot* basis.[109]

Although some energy bill assistance is available to households in need, it comes nowhere close to meeting the "affordability gap" described above. In 2015, LIHEAP funds provided $3.3 billion in funding, reaching only 6.3 million of the 38.5 million federally eligible households, and covering only a portion of each of these household's needs.[110] A "scattering" of additional state programs—typically funded by ratepayers and administered by utilities—helps

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[106] The federally qualifying income is 150% or less of federal poverty guidelines, although states are permitted to set more stringent standards. *Id.* at v.

[107] "Affordability" is calculated using the 6% energy burden figure, but the authors do not report the total number of U.S. households whose utility spending rises above this percentage. Fisher Sheehan et al., *What is the Home Energy Affordability Gap?*, HOME ENERGY AFFORDABILITY GAP, http://www.homeenergyaffordabilitygap.com/01_whatIsHEAG2.html# (last visited Feb. 23, 2017).

[108] *Id.*

[109] *See* ACEEE Report, *supra* note 103, at 4; *see also* ARIEL DREHOBL & LAUREN ROSS, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., THE US LOW-INCOME ENERGY AFFORDABILITY LANDSCAPE: ALLEVIATING HIGH ENERGY BURDEN WITH ENERGY EFFICIENCY IN LOW-INCOME COMMUNITIES 2 (2016), http://aceee.org/files/proceedings/2016/data/papers/11_326.pdf (finding that low-income households pay $1.41 per square foot, compared to a household average of $1.23 per square foot) [hereinafter ACEEE STUDY].

[110] LIHEAP, *supra* note 105, at vi (reporting that the average level of assistance was $366); *see also* FISHER SHEEHAN ET. AL., THE HOME ENERGY AFFORDABILITY GAP 2015 (2016), http://www.homeenergyaffordabilitygap.com/downloads/2015_Released_Apr16/HEAG2015%20Regional%20Fact%20Sheets.pdf.

fill remaining needs in some states, but none come close to closing the gap.[111]

Unsurprisingly, the concepts of "energy burdens" or an "affordability gap" fail to fully capture the lived experience of energy poverty.[112] Consider the following accounts, all drawn from public testimony to the New York State Public Service Commission in 2016:

> John Washington, in Buffalo, NY: This system is designed to keep people poor, to keep them cold, to keep them unhealthy, and to keep them hungry. It is designed to transfer our public wealth to private institutions. You may disagree, but National Fuel and National Grid [two New York utility companies] are private institutions that pay their C.E.O.s millions of dollars. There is absolutely no reason, except for profit, that 800 million dollars of arrears exists [in New York State]. That should be immediately wiped out. . . . Last week, I had my lights cut off. My family slept in the dark for 2 days because I paid 6 dollars and 95 cents less than the program that I was in wanted. You don't think I wanted to pay 6 dollars and 95 cents? You don't think I wanted to do that? Have you ever slept in a dark apartment? Have you ever had your child ask you why can't the lights go on? I have a 3-year-old. He doesn't

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[111] Meg Power, *Fuel Poverty in the USA: The Overview and the Outlook*, 98 ENERGY ACTION 1 (Mar. 2006) ("Simple price discounts for vulnerable households identified by a service agency remain the preferred tool for sympathetic regulators; in some states this is supplemented by modest investment in programmes of energy advice and/or guidance on other sources of assistance and managing household budgets."); *see also* ACEEE REPORT, *supra* note 103, at 27–28; ACEEE STUDY, *supra* note 109, at 1.

[112] Conor Harrison, *The Historical–Geographical Construction of Power: Electricity in Eastern North Carolina*, 18 LOC. ENV'T. 469, 471 (2013) ("[I]t is not only expensive electricity that leads to energy poverty, rather it results from a range of factors and relationships, including the sources and types of household energy, the energy efficiency of a given home, and the unique circumstances individuals and groups face in order to stay comfortable in their home."). See *infra* Part IV for a more robust description of one state's programs—New York.

> understand this. . . . All he wants to do is watch cartoons with his dad. But his dad couldn't pay 6.95, so he's got to cry himself to sleep. I want you to think about that.[113]
>
> Dawn Rounds, in Buffalo, NY: But with the bills, the only thing we have to support ourselves with is his military pension, and my bills keep getting higher and higher, and I don't know should I buy food, his medicine, her medicine, pay the bills? I go to HEAP [LIHEAP], but HEAP for electric doesn't even start until January. I need the electric to turn my heater on. Many times I've had the electric shut off until I could get help and we'd have no heat or electric. We struggle every day. I'm always behind. Borrow from Peter to pay Paul. We've been living where we are now for about eight years, and it's just getting harder and harder. We got a little bit of extra income for my granddaughter, but because of the extra income, our food stamps went down and my rent went up.[114]
>
> Zakiyyah Salahuddin, in Poughkeepsie, NY: Have you ever been cold and frozen inside your house? It's colder than the freezer. You see your breath. Your lungs get messed up. You start deteriorating. I sleep in my car for the past four years, yeah, 'cause it's warmer. I can put on the heat then. And in the day I get in, wash and do whatever I have to do.[115]

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[113] Proceeding on the Motion of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers: Public Statement Hearing Before the N.Y. Pub. Serv. Comm'n, No. 14-M-0565, at 42–43 (Oct. 1, 2015, 3:00 p.m.) (statement of John Washington, Buffalo transcript).

[114] Proceeding on the Motion of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers: Public Statement Hearing Before the N.Y Pub. Serv. Comm'n, No. 14-M-0565, at 22 (Oct. 1, 2015, 7:00 p.m.) (statement of Dawn Rounds, Buffalo transcript).

[115] Proceeding on the Motion of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers: Public Statement Hearing Before the N.Y Pub. Serv. Comm'n, No. 14-M-0565, at 35 (Sept. 24, 2015, 7:00 p.m.) (statement of Zakiyyah Salahuddin, Poughkeepsie transcript).

> Deborah May, in Poughkeepsie, NY: I got a call a few months ago from an undesirable place, I won't name it, and I went over there, and they were happy to have me, and I said well, let me talk to some of the people who live here first, and I talked to about ten people there, and they all told me the same story: You think it's cheap to live here, but be ready to wear your winter coat inside all year, because if you have the heat on, you will be paying as much as for electric as you are for rent. And everybody told me the same thing. Now, I know it's hearsay, but I'm telling you that's what they told me. And I realized I can't even afford public housing? I mean, that's the cheapest thing you can get and I can't even afford that because of the added cost of electricity. So I'm feeling really stuck.[116]
>
> Suwany Westney, in New York City, NY: I'm on a fixed income also, I get SSI and SSD. And in 2014, I got a bill for three thousand dollars, and they—when I asked them, they said they read the meter wrong, and they took off like two thousand off the bill. But ever since then, I've been backed up, and I'm on the budget payment. . . . And I called them and said I cannot afford to pay the seven hundred dollar bill, I was willing to pay four hundred dollars and try to work on something like that. They said no, and from that they turned off my lights.[117]

Much better than statistical accounts, these testimonials help illustrate the frustrations and humiliations that arise from the ways in which electricity law, and in particular utility rate regulation, interacts with poverty in the United States. More remains to be done to connect such lived experiences to policy discussions, but important work exists in this direction. Recent research has added

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[116] *Id.* at 42–43 (statement of Deborah May, Poughkeepsie transcript) (on file with author).

[117] Proceeding on the Motion of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers: Public Statement Hearing Before the N.Y Pub. Serv. Comm'n, No. 14-M-0565, at 49 (Oct. 13, 2015, 7:00 p.m.) (statement of Suwany Westney, New York transcript) (on file with author).

sociological and historical depth to the concept of energy poverty by describing the ways in which these statistics interact with housing infrastructure and urban settlement patterns,[118] as well as the ways in which the economics of electricity influenced its geographical spread and contributed to current patterns of energy poverty.[119] For example, Diana Hernández charts disparate pockets of energy poverty in Detroit, where "almost 27 percent of low-income households fell behind on utility payments and an additional seven percent experienced a utility shut-off [following the Great Recession]."[120] Hernández links these disparate rates with race and class, finding that:

> Blacks were almost twice as likely as non-blacks to report being behind on utilities payments (41% versus 22%) and over three times more likely to experience a utility service shut-off than non-blacks (15% versus 4%). Low (38%) and moderate-income (32%) groups were disproportionately more likely to be behind on utilities payments as well as to experience a shut-off (14% and 5%, respectively) compared to higher income households in each category (14% and 2%, respectively).[121]

These more nuanced emerging accounts of energy poverty help answer certain questions often asked of those researching the topic: Why should we focus on *this* aspect of poverty, to the exclusion of others? What's the use in addressing energy poverty *separately* from the general problems of poverty or inequality plaguing the United States? This Article's intention is not to promote energy poverty to a place of primacy above the other challenges of poverty in the United States. But it remains a useful disaggregated measure for purposes of energy law because energy regulators play a particular role both in creating the problem and in responding to it.

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[118] *See* Reames, *supra* note 4; Diana Hernández & Stephen Bird, *Energy Burden and the Need for Integrated Low-Income Housing and Energy Policy*, 2 POVERTY & PUB. POL'Y 5, 5, 10 (Nov. 2010).

[119] *See* Harrison, *supra* note 112 (exploring the "historical–geographical foundations of energy poverty" in Eastern North Carolina).

[120] Hernández, *supra* note 87, at 151.

[121] *Id.*

To understand why, Connor Harrison's historical examination of energy poverty in North Carolina proves illuminating. Harrison paints a scene of significant disparities in the price of electricity across various Eastern North Carolina cities and towns and explains these disparities largely in terms of the history of electrification.[122] Electricity came to rural North Carolina "as part of a state-led modernisation effort aimed at a particular type of progress during the early and middle parts of the twentieth century."[123] This state-led effort resulted in the formation of rural electric cooperatives, whose economics only made sense if consumption patterns were sufficiently high to justify the building of transmission lines.[124] Consequently, the leaders of rural electrification efforts viewed their objective as not only providing access to electricity but also as "build[ing] up the psychology of generous use of electricity."[125] Thus, energy regulators put in place policies aimed at encouraging households to use increasing quantities of electricity—the same quantities that now threaten the stability of successive generations of these households.[126]

None of this history suggests energy poverty is any more pressing of an issue than the housing crisis, or hunger and food insecurity. What it does suggest is that the problem of energy poverty is at least in part structurally created by the legal frameworks governing electricity consumption.[127] And it is influenced not only by human agents, but also by the physical

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[122] Harrison, *supra* note 112, at 479.

[123] *Id*.

[124] *See id.*; *see also* Welton, *Clean Electrification*, *supra* note 34 (on the history of electrification and its economic as well as social drivers).

[125] Harrison, *supra* note 112, at 479 (quoting Morris Cooke, an early leader of the Rural Electrification Administration).

[126] *See id.* at 480. Harrison goes on to describe the ways in which investment in nuclear power caused rates to rise particularly rapidly for households tied to publicly owned utilities, exacerbating the problem of their high levels of consumption. *See id.* at 482–84.

[127] *Cf. id.* at 484 ("If the high electricity bills and high electricity consumption of the energy poor are to be put in their historic and geographic contexts, so must the actions of the state and the electric utilities that helped produce them.").

infrastructure that has been built to accommodate widespread interconnection and consumption.[128] Because this is the case, the radical re-examination of electricity law's governing frameworks presents an opportunity to reconsider how regulators making infrastructure decisions can either exacerbate or mitigate the problem of energy poverty. Here is where grid modernization and energy poverty intersect.

IV. ENERGY POVERTY & GRID MODERNIZATION IN CONVERSATION

The personal accounts of energy poverty quoted above emerged out of New York's REV proceedings. This final part tells the story of how the REV proceedings precipitated such a narrative-rich account of the problem of energy poverty and what regulators did in response.

New York's Public Service Commission ("the Commission") launched the REV proceeding in April 2014 with a fairly standard—albeit ambitious—vision of grid modernization in mind: "to align electric utility practices and our regulatory paradigm with technological advances in information management and power generation and distribution."[129] REV aims to promote "improvements in system efficiency, greater customer choice, and greater penetration of clean generation and energy efficiency technologies," by better aligning utility and customer incentives with regulatory goals.[130] The crux of the strategy involves transforming utilities into engines for change by tying their earning incentives to their ability to draw consumer-side resources into a competitive marketplace.[131] It is a deeply transformative—some

[128] *See* Day & Walker, *supra* note 91, at 20.
[129] NYPSC Order Instituting Proceeding, *supra* note 20, at 2.
[130] *Id.*
[131] *See Proceeding on Motion of the Comm'n in Regard to Reforming the Energy Vision: Order Adopting Ratemaking and Utility Revenue Model Policy Framework*, 329 P.U.R.4th 1, 3 (May 19, 2016) (Order adopting a ratemaking and utility revenue model policy framework).

have even said "wildly ambitious"[132]—plan for reform, and three years later, the Commission is still ironing out the details of how REV will proceed.[133]

The Commission early on recognized that affordability would be a key concern in the REV proceedings.[134] The Order Instituting Proceedings included this goal: "Maintain Commitment to Affordable Universal Service."[135] It readily became apparent to the Commission, however, that this aim would require more concentrated attention than REV's implementing documents necessarily contemplated. Commenters quickly pushed the Commission in this direction, through both procedural and substantive arguments. Procedurally, several commenters urged the Commission to *slow down* implementation, to allow for greater citizen input and participation.[136] Substantively, commenters called the Commission's attention to the plight of low-income New Yorkers struggling to pay their electricity bills and insisted that REV include this perspective as it moved forward.[137]

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[132] David Roberts, *New York Is Transforming Its Energy Systems. Meet the "Czar" in Charge.*, VOX (Nov. 20, 2015, 1:00 pm), http://www.vox.com/2015/11/20/9769856/new-york-kauffman-interview.

[133] *See DPS—Reforming the Energy Vision*, N.Y. STATE, http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCFE2?OpenDocument (last updated Jan. 20, 2017).

[134] NYPSC Order Instituting Proceeding, *supra* note 20, at 58–59.

[135] *Id*.

[136] Letter from Beth Finkel, AARP & Russ Haven, NYPIRG, Pub. Util. Law Project of N.Y., to the Honorable Kathleen Burgess, N.Y. State Pub. Serv. Comm'n 5 (July 18, 2014); *see* Letter from David Hepinstall, Exec. Director, & Valerie Strauss, Director of Pol'y & Reg. Affs., Ass'n for Energy Affordability, Inc. (AEA), to the Honorable Kathleen Burgess, N.Y. State Pub. Serv. Comm'n (July 18, 2014).

[137] Letter from Beth Finkel & Russ Haven, Pub. Util. Law Project of N.Y., to the Honorable Kathleen Burgess, N.Y. State Pub. Serv. Comm'n 5 (July 17, 2014). *See also* Letter from Nat. Res. Def. Council et al., to the Honorable Kathleen Burgess, N.Y. State Pub. Serv. Comm'n (July 18, 2014); Letter from David Hepinstall, Exec. Director, & Valerie Strauss, Director of Pol'y & Reg. Affs., Ass'n for Energy Affordability, Inc. (AEA), to the Honorable Kathleen Burgess, N.Y. State Pub. Serv. Comm'n (July 18, 2014).

The Commission responded to these concerns by launching a separate "Proceeding on Motion of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers" in January 2015.[138] The Order began by recognizing the long-standing but piecemeal nature of low-income protections in New York electricity law.[139] It declared the "primary purpose" of the proceeding was to "standardize utility low income programs to reflect best practices[,]" and directed Commission staff to provide a report with recommendations to this effect.[140] Note here how the Commission's language suggested a separation between issues of affordability and the primary goals of REV—a point the Article returns to below.

Commission Staff provided the requested report on June 1, 2015.[141] The statistics presented in the report are sobering: the Commission found that over one million New York households (out of a total of around 8.2 million[142]) were in arrears on their utility bills and owed a total of around $800 million to utilities.[143] In the previous year, almost 300,000 New Yorker households had utility service disconnected for non-payment.[144] In terms of "energy burdens," Staff calculated that New Yorkers around the federal poverty level spent between 15 and 22% of their income on energy, and those at less than 50% of the federal poverty level spent 41% (whereas "middle and higher income customers

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[138] Proceeding on Motion of the Comm'n to Examine Programs to Address Energy Affordability for Low Income Util. Customers, N.Y. Pub. Serv. Comm'n, No. 14-M-0565 (Jan. 9, 2015) [hereinafter NY Order Instituting Low Income Proceeding].

[139] *Id.* at 2.

[140] *Id.* at 4–5.

[141] *See* STAFF REPORT, PROCEEDING OF THE COMM'N TO EXAMINE PROGRAMS TO ADDRESS ENERGY AFFORDABILITY FOR LOW INCOME UTILITY CUSTOMERS, N.Y. PUB. SERV. COMM'N, No. 14-M-0565 (June 1, 2015) [hereinafter NYPSC Low-Income Staff Report].

[142] *QuickFacts*, US CENSUS BUREAU, http://www.census.gov/quickfacts/table/HSG010215/36 (last visited Feb. 22, 2017) (New York).

[143] NYPSC Low-Income Staff Report, *supra* note 141, at 4. Total New York state population is 19.25 million.

[144] *Id.*

experience energy costs in the general area of one to five percent").[145] In terms of bill assistance, Staff found that "New York's current low income affordability programs provide[d] an average annual benefit of roughly 10% of a residential customers' total utility bill"—amounting to around $227 for those who received gas and electric assistance.[146]

Staff noted wide disagreement on how to redesign low income programs,[147] but ultimately recommended a tiered system of benefits, tying the level of assistance received to specific income levels, so as to better target energy poverty by providing larger discounts for those most in need.[148] Staff further suggested that programs should be aimed at reducing energy burdens to 6%,[149] "with an overall increase in statewide program budgets of about 46%."[150]

A group of thirty-four "bitterly disappointed" organizations and elected officials offered two major criticisms of this proposal.[151] First, they suggested it did not do nearly enough to widen the net of those eligible for energy poverty assistance, as Staff pegged eligibility for the state programs to receipt of federal energy assistance.[152] According to the groups calculations, the proposal would thereby "lock out the 50-70% of low-income New Yorkers who are eligible for HEAP, but do not actually receive it."[153] At the same time, the group was one of many calling for the Commission to give considerably more thought to how to integrate low-income affordability and the broader goals of the REV proceeding, by providing more funding for low-income efficiency

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[145] *Id.* at 5.
[146] *Id.* at 29.
[147] *Id.* at 30.
[148] NYPSC Low-Income Staff Report, *supra* note 141, at 31–41.
[149] *Id.*
[150] *Id.* at 34.
[151] Group Comment submitted by Alliance for a Green Economy on Proceeding of the Comm'n to Examine Programs to Address Energy Affordability for Low Income Util. Customers, N.Y. Pub. Serv. Comm'n, No. 14-M-0565, at 2 (Aug. 24, 2015) [hereinafter Group Response].
[152] *Id.*
[153] *Id.* at 3.

programs and considering creative new solutions: for example, by "allow[ing] low-income discount recipients to redirect their discounts into shared renewable energy projects, giving low-income people a choice in where their electricity comes from and reducing their utility costs."[154]

At the same time, other groups pushed the Commission to do more to hear and understand the concerns of those directly experiencing energy poverty. In particular, groups requested more hearings on the low-income affordability proceedings, held at locations throughout the state.[155] The Commission responded by scheduling additional hearings throughout the state, resulting in a total of twelve public hearing statements at which—as the Commission noted in its final order:

> [M]ore than 100 speakers offered statements on the Staff Report, generating nearly 600 pages of transcript. Many of the speakers were low income electric and natural gas customers, who testified to the difficulties that they have

[154] *Id.* at 4. *See also* Public Statement Hearing, Proceeding On The Motion Of The Comm'n To Examine Programs To Address Energy Affordability For Low Income Util. Customers, N.Y. Pub. Serv. Comm'n, No. 14-M-0565, at 5 (Oct. 21, 2015, 7:00 p.m.) (statement of Richard Berkley, Albany transcript) ("Only 37 percent of [households meeting the current criteria for utility assistance] in Albany County would be eligible for low-income energy assistance under the Staff's initial proposal"). *See also* NYPSC Comments to Low Income Staff Report, *supra* note 27, at 3–4; Public Statement Hearing, Proceeding On The Motion Of The Comm'n To Examine Programs To Address Energy Affordability For Low Income Util. Customers, N.Y. Pub. Serv. Comm'n, No. 14-M-0565, at 61 (Oct. 1, 2015, 3:00 p.m.) (statement of Maloney De Zuldivar, Buffalo 2 transcript) ("And it has been mentioned multiple times, but the issue of root causes, you say you're only going to talk about discounts. Well, I know a lot of people in the low- income communities that would be more than happy to use the money that they get on discounts and put that to a shared renewable facility. Invest in solar. Invest in the much needed home repairs and weatherization.").

[155] Letter from Richard Berkley, Exec. Director, Pub. Util. Law Project of N.Y., to The Honorable Kathleen Burgess, N.Y. State Pub. Serv. Comm'n, at 1 (Sept. 25, 2015) (on file with author).

> faced paying for service, and the need to improve energy affordability for the poorest New Yorkers.[156]

It is these personal accounts that appear in the section above on energy poverty.

These hearings appear to have had a substantial impact on the Commission's course of action. The Commission's May 2016 Final Order took two significant steps. First, it expanded state low-income bill assistance programs considerably, aiming for a program that caps the energy burden of all households in New York at 6 percent.[157] To do so, it increased ratepayer funding of such programs by *87 percent*.[158] Second, despite having started the proceeding focused specifically on reform of low-income assistance programs, the Commission's emphasis broadened considerably in its final order, observing:

> [T]he best solution for all customers, including low income, lies in facilitating opportunities to invest in clean energy and the means to reduce energy costs. Greater access and support for low income and underserved communities to DER [distributed energy resources] is the best way to narrow the affordability gap that needs to be filled with direct financial assistance for customers with low incomes. Greater access to advanced energy management products to increase efficiency for low income customers will empower those for whom these savings may have the greatest value, as well as allowing the most disadvantaged customers more choice in how they manage and consume energy.[159]

The Commission's Order goes on to detail several steps it is already taking to integrate programs to accomplish REV and

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[156] Proceeding on Motion of the Comm'n to Examine Programs to Address Energy Affordability for Low Income Util. Customers, N.Y. Pub. Serv. Comm'n, No. 14-M-0565, 2016 WL 3018703, at 7 (May 19, 2016) [hereinafter NY Low Income Order].

[157] *Id.*

[158] *Id.* at 16. The Commission also called for further inquiry into how to expand eligibility beyond current LIHEAP recipients, but did not make final recommendations on this point. *See id.*

[159] *Id.* at 10.

address energy poverty simultaneously, and it makes a commitment to further integrate these issues in later phases of the REV proceeding.[160]

It is too early to suggest that New York's Commission has cracked the nut of how to affirmatively include low-income consumers in grid modernization efforts. But it is, at least, taking steps towards concrete proposals—with a particular focus on including low-income consumers in New York's new efforts to promote "community distributed generation" ("CDG").[161] CDG allows customers to contract for the right to either own or purchase electricity from larger, community-scale distributed generation systems, eliminating the need for an appropriate private rooftop to install small-scale renewable energy.[162] The Commission's first step towards ensuring the participation of low-income customers in CDG was to establish a "collaborative" in 2015 to "identify barriers to low-income customer participation in Community DG projects and the mechanisms necessary to remove those barriers," through a process involving relevant stakeholders.[163] That collaborative resulted in a series of working groups and culminated in a report issued in August 2016, which identifies numerous strategies for creating CDG efforts that include substantial numbers of low-income subscribers.[164] These strategies range from innovative financing arrangements to make participation in CDG more attainable for low-income customers,[165] to state mandates or

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[160] *Id.* at 24.

[161] *See* NYPSC Low-Income Staff Report, *supra* note 141, at 2.

[162] *See id.* For those projects where community members do not take direct ownership, "subscriptions can be structured as a power purchase agreement (PPA), lease, or loan." *Id.*

[163] *Id*.

[164] *See* Proceeding on Motion of the Comm'n as to the Policies, Requirements and Conditions for Implementing a Community Net Metering Programs, N.Y. Pub. Serv. Comm'n, No. 15-E-0082 (Summary of the Collaborative Working Group Reports Regarding Community Distributed Generation for Low-Income Customers) (Aug. 15, 2016) [hereinafter NY Solar Working Group Report].

[165] "Most parties agreed that the major barriers to low-income customer participation in Community DG projects are the upfront cost of the subscription and customers' low credit scores that prevent outside financing." NY Solar

goals regarding the number of low-income subscribers either particular projects or the program as a whole should obtain, to incentive programs targeted specifically at low-income customers.[166]

In a contemporaneous August 2016 Status Report, Commission Staff expressed what reads as at least latent frustration with the outcomes of this collaborative, explaining: "Although, the Collaborative spent a great deal of time and effort investigating the barriers to low-income customer participation in CDG projects, workable solutions have not arisen that would overcome those barriers."[167] Accordingly, staff decided to end the collaborative and produce a staff white paper recommending next steps, which has yet to be published.[168] Presumably, more specific solutions—including potentially permitting utility ownership of CDG projects targeting low-income consumers[169]—will be forthcoming in that white paper.

It remains important, however, not to focus exclusively on the (relatively) glamorous option of "solar panels for all." Often, programs that focus on strategic cutting of demand, or smarter targeting of traditional energy efficiency, may better serve low-income groups and the grid as a whole. To that end, New York's Commission is also piloting an effort to allow New York City's utility, ConEdison (ConEd), to develop a project focused on strategies beyond CDG. In the company's Brownsville Project, ConEd is developing substantial consumer-side solutions to delay the need to build expensive sub-transmission infrastructure.[170] The

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Working Group Report, *supra* note 164, at 6. To address these challenges, the Working Group recommended that: "Working in cooperation with Community Development Financial Institutions (CDFIs) or directly with NY Green Bank, banks could extend credit to a project sponsored for low-income households for the purpose of subscribing to a Community DG project." *Id.* at 9.

[166] *See id.* at 37–39; NYPSC Low-Income Staff Report, *supra* note 141, at 6.

[167] *See* NYPSC Low-Income Staff Report, *supra* note 141, at 12.

[168] *See id.*

[169] *See id.* at 13.

[170] *See* Order Establishing Brooklyn/Queens Demand Management Program, No. 14-E-0302, at 1–5 (N.Y.P.S.C., Dec. 12, 2014) (approving the acquisition of

project will take place in a high demand, densely residential, low-income area of Brooklyn and Queens with an above average proportion of renters as compared to owners.[171] Using geo-targeted data to identify pockets of high peak energy use, ConEd will provide local residents with energy efficiency, demand management, distributed generation, apartment complex microgrids, and "other innovative solutions."[172] ConEd estimates that the cost of the demand-side solutions will be approximately $200 million, whereas the traditional transmission solution would have cost ratepayers $1 billion.[173] As a result, the Commission has agreed to allow ConEd to recover most of the costs of the program from its ratepayers, and has given the company several additional incentives.[174]

There are a few important points to note about New York's process and outcome. First, one thing that advocates of grid modernization often point out when confronted with questions about its distributive consequences is, "What distributive consequences? The whole point of grid modernization is it ideally will make everyone's bills go down!" This aspiration, standing alone, is true enough: many analyses suggest that when done properly and robustly, grid modernization could in fact reduce overall grid costs and reduce bills across the board.[175] But it is important to understand that this assertion of an eventual hopeful conclusion does little to assuage the doubts of those who feel the current system is failing them miserably. They need something far more than the promise of an eventual minor decrease in electricity

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41 megawatts of consumer-side solutions) [hereinafter Demand Management Program Order].

[171] Rebecca Craft, Con Edison's Use of Targeted Demand-Side Resources, Presentation to the National Regulatory Research Institute (Feb. 26, 2015).

[172] *See* Demand Management Program Order, *supra* note 170, at 4; Craft, *supra* note 171.

[173] Demand Management Program Order, *supra* note 170, at 19.

[174] *Id.* at 21 (describing additional incentives in the form of a regulated return of investment, a 10-year amortization period, and opportunities to increase the return on equity by achieving certain milestones).

[175] *See supra* note 46.

bills.[176] The moment of system re-design opens up the opportunity for a conversation about how governance reforms might not only modernize the grid and bring down costs as a general matter, but also do a better job addressing those whom the current system under-serves.[177] New York's commission took seriously the concerns over how energy poverty and grid modernization interrelate, rather than brushing these aside as irrelevant to a proceeding that aimed to reduce overall system costs, over the long term. In doing so, it came to see considerable potential to address the two issues synergistically, rather than treating them as separate policy challenges.

Second, there is a procedural as well as substantive lesson to be learned from New York's experience: the Commission responded to the request of those affected by energy poverty to be heard. It is hard to gauge the extent to which this impacted the ultimate outcome of the Commission regarding integrating energy poverty and grid modernization and increasing funding levels. Nevertheless, it seems likely that it made some impact, given the movement one can see between the Commission's opening of the

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[176] *See, e.g.*, Group Response, *supra* note 151 (asserting that current programs "are entirely inadequate to stem the rising number of shutoffs and arrears in New York. . . . When utility service is shut off because people cannot afford their bills this mandate is not being met. For many New Yorkers, utility service is neither reliable, nor are the rates just and reasonable."). *See also* Public Statement Hearing, Proceeding On The Motion Of The Commission To Examine Programs To Address Energy Affordability For Low Income Utility Customers, No. 14-M-0565, at 11 (N.Y.P.S.C., Oct. 21, 2015, 3:00 p.m.) (statement of Russ Haven, Albany 2 transcript) ("Across the board, in all areas, including this part of the state, there was concern about how REV would affect utility bills. This can and must mean that consumer ratepayers, particularly low- and moderate-income New Yorkers, end up paying less for electric in the REV marketplace than in the current system we have now.").

[177] "Under-serves," at least in the sense that many cannot afford basic utility service. Whether or not the state should in fact provide such service to them at discounted rates remains, of course, a matter of substantial academic and practical debate. But it is hard to quibble with the assertion that electricity is a pretty basic need at this point in our country, even if one disagrees with whether or not the state should help provide for it.

proceeding and the outcomes of its final order.[178] At the same time, it likely served a cathartic function for those who participated, helping to increase the perceived legitimacy of the Commission's ultimate decision.[179]

V. NAVIGATING THE TENSIONS

What is to be learned from New York's experience? There are obvious epistemological limits to case studies. What mattered in New York may not matter in other states, as the social context, interested parties, and governing law may all differ. These challenges offer real impediments to generalization. Yet New York's experience at least serves as a bellwether of *tensions* likely to arise in other states, for several reasons. For one, New York is out ahead of the rest of the country in terms of the magnitude of its contemplated changes in electricity regulation, but not for long. Several states are following its lead,[180] and many more are likely to be forced into similar conversations by the sheer scale of structural and technological changes confronting the electricity industry.[181] Moreover, although New York's particular *solutions* to the

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[178] See *supra* note 156.

[179] *See* Public Statement Hearing, Proceeding On The Motion Of The Commission To Examine Programs To Address Energy Affordability For Low Income Utility Customers, No. 14-M-0565, at 7 (N.Y.P.S.C., Oct. 21, 2015, 3:00 p.m.) (statement of NYPIRG, Albany 2 transcript) (testimony from representative of New York Public Interest Research Group that "NYPIRG was among several groups to emphasize to Department staff . . . the central importance to REV of consumer protections and affordability issues. We were pleased that the staff clearly heard these concerns. As a result, Chair Zibelman in turn established regular meetings with the groups and personally met several times to discuss affordability and consumer protection concerns."). *See generally* Tom R. Tyler, *Procedural Justice, Legitimacy, and the Effective Rule of Law*, 30 CRIME & JUST. 283. *See also* Sovacool & Dworkin, *Energy Justice*, *supra* note 19, at 437 (positing a procedural component to energy justice, contra projects proceeding "with exclusionary forms of decision-making that lack due process and representation").

[180] *See supra* note 21.

[181] *See* Peter Kind, Edison Elec. Inst., Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business 6–9 (Jan. 2013).

problem may strike some as particularly "progressive" and thus limited to areas of deep blue shading on electoral maps, neither its governance structure nor the challenge it faced is unique: energy poverty is a pervasive problem across states, and all states use public utility law to determine how to apportion costs of the grid among end-use customers.[182] Thus, it is likely that as large-scale grid modernization proceedings unfold across the country, regulators in all states will be asked to seriously re-engage with the problem of energy poverty as part and parcel of the push for a more sophisticated, cleaner grid. Early anecdotal evidence bolsters this prediction: California's Commission, another state at the forefront of modernization efforts, has also engaged in substantial discussion about the relationship between energy poverty and rate re-design.[183] Similarly, as the European Union has proceeded on its path towards robust decarbonization, the topic of energy poverty has emerged as a significant flash point.[184]

There is not space in this brief article to analyze whether New York's response is the *best* response to such tensions, or how well

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[182] This statement slightly oversimplifies the case — in the case of the few states that have moved fully to "retail choice," public utility law plays a more limited role. *See* Boyd & Carlson, *supra* note 57 (describing the three types of state utility regulation). However, even in states that have moved to competitive retail electricity markets, the historic utility often continues to serve most customers as the "provider of last resort," such that in practice these states' structural challenges in confronting energy poverty are more similar to traditional states than may appear at first blush.

[183] *See* NY Solar Working Group Report, *supra* note 164, at 19 (describing California's efforts in this regard); *see also* Cal. Gov't Code § 12894 (S.B. 535, 2011–12 Regular Session (Cal. 2012) (adopted Sept. 30. 2012)) (requiring that twenty-five percent of revenues from the State's carbon dioxide cap-and-trade auctions go to projects that benefit identified disadvantaged communities); Distributed Generation & Distributed Energy Res., D. 06-01-024, 2006 WL 162584, 5, 39–40 (Cal. P.U.C., Jan. 12, 2006) (interim order).

[184] Hiteva, *supra* note 89, at 487 ("The heightened interest in fuel poverty and vulnerability in Europe is taking place in the background of a low-carbon energy transition within the European Union."). *See also* Sovacool, *Fuel Poverty*, *supra* note 87, at 361 (describing the United Kingdom's Warm Front Home Energy Efficiency Scheme, which "removed about 2.36 million English households from fuel poverty" between 2000 and 2013).

it would work in other states. Instead, the article aims to draw out New York's experience to underscore both a more preliminary and broader point: the conversation about how to modernize the grid cannot—as a practical and political endeavor—afford to ignore either the uncomfortable challenges or substantial ameliorative possibilities that the project of redesigning electricity governance and the electricity grid raises for those in energy poverty.

On this point, this article has at moments in this article framed energy poverty as an "impediment" to grid modernization, and it certainly can be. In one way, the two issues form a discordant pairing. But another way to view the increasingly interwoven nature of these two projects is as an opportunity for reaffirming energy law's core commitments in a new era. The fact that regulators in New York took energy poverty seriously—and responded substantially to the stories they heard of its effects on state residents—suggests that regulators there view REV as more than just a project of finally perfecting the efficiency of the grid.[185] Instead, both the re-airing of the problem of energy poverty and the wholesale re-examination of current electricity governance structures form part of single, larger project: that of building a more sustainable, just society, from the grid up.

[185] *Cf. supra* Part II (describing the ways in which grid modernization would finally bring to fruition the dreams of many energy economists).