BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust its Revenues for Electric Service	)))	**File No. ER-2022-0337**

ORDER SETTING TIME FOR OBJECTIONS TO EXHIBIT

Issue Date: February 15, 2023 Effective Date: February 15, 2023

During the February 9, 2023, St. Louis, Missouri, local public hearing, Kimberly Finnegan requested to submit the Legal Services of Eastern Missouri Opposition Statement and supporting articles as Local Public Hearing Exhibit 1, to be attached to the transcript of the St. Louis local public hearing. That statement and articles are attached to this order.

The Commission will set a deadline for objections to the admission of Local Public Hearing Exhibit 1.

THE COMMISSION ORDERS THAT:

1. Any party wishing to object to the admission of St. Louis, Missouri, Local Public Hearing Exhibit 1 shall do so no later than February 27, 2023.

2. This order is effective when issued.

BY THE COMMISSION

Morris L. Woodruff
Secretary

John T. Clark, Senior Regulatory Law Judge,
by delegation of authority pursuant to
Section 386.240, RSMo 2016.

Dated at Jefferson City, Missouri,
on this 15th day of February, 2023.

GRID MODERNIZATION LABORATORY CONSORTIUM
U.S. Department of Energy

Advancing Equity in Utility Regulation

Future Electric Utility Regulation
Report No. 12

November 2021

Chandra Farley, Partnership for Southern Equity
John Howat and Jenifer Bosco, National Consumer Law Center
Nidhi Thakar and Jake Wise, Portland General Electric
Jean Su, Center for Biological Diversity

Project Manager and Technical Editor:
Lisa Schwartz, Lawrence Berkeley National Laboratory

FUTURE ELECTRIC
Utility Regulation

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About the Authors

Partnership for Southern Equity

Chandra Farley is the CEO of ReSolve, a consulting practice with a mission to increase the impact of climate justice initiatives by creating equity-centered delivery infrastructure. She previously served as the Just Energy Director at Partnership for Southern Equity and worked at the Southface Energy Institute. Farley founded the "Good Energy Project" with a vision to connect the transformational power of Black Women to the movement for just and equitable clean energy. She also is the co-chair of the Hive Fund for Climate and Gender Justice Advisory Board, chair of the Georgia NAACP Environmental and Climate Justice Committee, a graduate of the U.S. Environmental Protection Agency's Environmental Justice Academy, and President Emeritus of the Environmental Justice Academy Alumni Association. She serves on the board of directors for American Council for an Energy-Efficient Economy, Community Movement Builders, Georgia Conservation Voters Education Fund, the People's Justice Council/Alabama Interfaith Power & Light, Greenlink Analytics, and Sol Nation.

National Consumer Law Center

John Howat is a Senior Energy Analyst at the National Consumer Law Center (NCLC). He manages projects in support of low-income consumers' access to affordable utility services, working with clients in 30 states on design and implementation of low-income energy affordability and efficiency programs, utility consumer protections, rate design, and metering technology. He has testified as an expert witness in 17 states and is a contributing author of NCLC's treatise, *Access to Utility Service*. He has authored or co-authored numerous reports, including co-authoring essays for two earlier reports in Berkeley Lab's Future Electric Utility Regulation series. Before joining NCLC, he served as Research Director of the Massachusetts Joint Legislative Committee on Energy, Economist with the Electric Power Division of the Massachusetts Department of Public Utilities, and Director of the Association of Massachusetts Local Energy Officials. Howat has a master's degree from Tufts University's Graduate Department of Urban and Environmental Policy and a bachelor of arts degree from The Evergreen State College.

Jenifer Bosco is a Staff Attorney at NCLC with a focus on energy and utility issues that affect low-income consumers. She has advocated for low-income consumers in utility proceedings in several states and is a contributing author of NCLC's treatises, *Access to Utility Service* and *Collection Actions*. She co-authored NCLC's essay for an earlier report in this series, *The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives*. Prior to joining NCLC, she was the first Director of the Office of Patient Protection at the Massachusetts Health Policy Commission. Previously, Bosco advocated for low-income clients at Health Law Advocates, the Massachusetts Law Reform Institute, and Merrimack Valley Legal Services. She also served as an Assistant Attorney General with the Office of the Massachusetts Attorney General. Bosco holds a JD from Georgetown University Law Center and a BA from Boston College.

Portland General Electric

Nidhi Thakar is the Director of Resource and Regulatory Strategy and Engagement for Portland General Electric (PGE), Oregon's largest utility, serving nearly one million customers in northwest Oregon. She leads cross-functional efforts to advance the company's priorities related to rapid decarbonization and electrification, resiliency and reliability, business model innovation, and customer products. Prior to joining PGE, Thakar served in the administration of California Governor Jerry Brown as Chief of Strategy and External Affairs to President Michael Picker of the California Public Utilities Commission. She also served in the Obama administration as Senior Advisor to the U.S. Department of

Energy's Loan Programs Office, where she was part of the executive team responsible for managing a $32 billion portfolio of loans and loan guarantees and for financing innovative, clean energy, and advanced vehicle technologies. Earlier in her career, Thakar was an attorney at Perkins Coie LLP and Deputy Director of the Public Lands Project at the Center for American Progress, worked on Capitol Hill for U.S. Representative Shelley Berkley of Nevada, and was a law clerk for the Federal Energy Regulatory Commission and U.S. Department of Justice's Environmental Enforcement Division. She holds a BA from the University of Maryland, College Park, and received her JD from Lewis & Clark Law School, with a Certificate in Environmental Law, where she was a member of the Law Review.

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Center for Biological Diversity

Jean Su is the Energy Justice Director and a Senior Attorney at the Center for Biological Diversity, a national conservation organization dedicated to saving life on earth using strategic litigation and campaigning. Su's litigation and advocacy work focuses on hastening a renewable and just energy future that addresses the climate emergency, racism, and ecocide. She practices before both state and federal courts and commissions. Prior to joining the Center, Su was a renewable energy project finance attorney with Milbank, Tweed, Hadley & McCloy LLP and worked in Asia and Africa on climate change with CARE International and McKinsey & Company. She is the chairwoman of the board of Climate Action Network International, the world's largest network of climate nongovernmental organizations. Su holds a bachelor's degree from Princeton University in the School of Public and International Affairs, a master's degree from the London School of Economics in Development Studies, and a law degree as a member of the inaugural class of the University of California, Irvine School of Law.

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Other reports in this series

1. *Electric Industry Structure and Regulatory Responses in a High Distributed Energy Resources Future* (November 2015)

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7. *The Future of Centrally-Organized Wholesale Electricity Markets* (March 2017)

8. *Regulatory Incentives and Disincentives for Utility Investments in Grid Modernization* (May 2017)

9. *Value-Added Electricity Services: New Roles for Utilities and Third-Party Providers* (October 2017)

10. *The Future of Transportation Electrification: Utility, Competitive Market and Consumer Perspectives* (August 2018)

11. *Utility Investments in Resilience of Electricity Systems* (April 2019)

Reports and webinar slides and recordings are available at **feur.lbl.gov**. Additional reports are underway.

Related reports

State Performance-Based Regulation Using Multiyear Rate Plans for U.S. Electric Utilities (July 2017). https://emp.lbl.gov/publications/state-performance-based-regulation

Renewable Energy Options for Large Utility Customers (June 2019). Report PDF. Webinar recording and slides.

All-Source Competitive Solicitations: State and Electric Utility Practices (March 2021). https://emp.lbl.gov/publications/all-source-competitive-solicitations.

Executive Summary

By Lisa Schwartz, Lawrence Berkeley National Laboratory

According to the Partnership for Southern Equity, *equity* is just and fair inclusion, and *energy equity* is the fair distribution of the benefits and burdens of energy production and consumption.[1] In the context of electric utility regulation, equity can be a goal, tool, or metric. For example, the primary goal of electricity affordability programs, disconnection moratoriums, and rate discounts is to advance equity. Public participation and intervenor compensation are critical equity tools. Appropriate metrics are needed to track and evaluate results of policies, regulations, and programs intended to deliver equitable outcomes. All of these approaches are needed for successful energy equity initiatives.

States are increasingly recognizing equity as a goal of utility regulation, going beyond the traditionally stated objectives to ensure that electricity systems are reliable, safe, and fairly priced. State initiatives are critical not only to address historical inequities, but to ensure equitable benefits and burdens in the transition to net-zero emissions by 2050.[2] Several states have enacted legislation to require or explicitly authorize utility regulators to consider equity, for all decision-making or for specific types of decisions—for example:

- California adopted legislation two decades ago (SB 89, 2000) requiring environmental justice achievements to be part of the state's mission. The state subsequently adopted several statutes directing the Public Utilities Commission to incorporate environmental and social justice objectives into various types of decisions, including prioritizing disadvantaged communities in integrated resource planning (SB 350, 2015) and implementing new approaches to reach communities affected by commission decisions (SB 512, 2016). A commission working group is identifying equity metrics for energy efficiency programs for customers of regulated utilities.[3]

- Colorado (SB 21-272, 2021) requires the Public Utilities Commission to adopt rules for "all of its work" to "…consider how best to provide equity, minimize impacts, and prioritize benefits to disproportionately impacted communities and address historical inequalities." Another bill (SB 21-103, 2021) gives the Colorado Office of the Utility Consumer Advocate expanded authority to intervene before the commission on environmental justice, just transition, and decarbonization issues.

- Among its provisions to advance equity and environmental justice, Illinois' Climate and Equitable Jobs Act (SB 2408, 2021) requires the Commerce Commission to conduct a comprehensive study and submit a report to the General Assembly by January 1, 2023, assessing whether low-income discount rates for electric (and natural gas) residential customers are appropriate and potential design and implementation. Upon completion of the study, the commission is authorized to permit or require utilities to file a tariff establishing low-income discount rates. The bill also significantly increased minimum spending levels for low-income energy efficiency programs.

- Maine (HP 1251, 2021) requires equity considerations to be incorporated in decision-making for state agencies, including the Public Utilities Commission.

[1] See chapter 1 in this report.
[2] With an interim target to achieve a 50%–52% reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030. Executive Order 14008, January 27, 2021. https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad.
[3] CAEECC. Equity Metrics Working Group Meeting. https://www.caeecc.org/equity-metrics-working-group-meeting.

- In Massachusetts (Bill S.9, 2021), the Department of Public Utilities must include equity among six priorities for meeting statewide greenhouse gas (GHG) emission limits, in addition to safety, security, reliability of service, affordability, and reductions in GHG emissions.

- In New York, the Climate Leadership and Community Protection Act (S6599, 2019) includes several energy justice provisions, including a requirement to direct at least 35%–40% of the program's benefits to historically disadvantaged communities.

- Oregon (HB 2475, 2021) recently added the following factors the Public Utility Commission may consider for classifying utility services for retail rates: "differential energy burdens on low-income customers and other economic, social equity or environmental justice factors that affect affordability for certain classes of utility customers."

- Washington's Clean Energy Transformation Act (SB 5116, 2019) charges the Washington Utilities and Transportation Commission with "Ensuring that all customers are benefiting from the transition to clean energy…[t]hrough the equitable distribution of energy and non-energy benefits and the reduction of burdens to vulnerable populations and highly impacted communities…."

In other states, public utility commissions are taking action to ensure energy equity under existing authorities. For example, the New Jersey Board of Public Utilities created an Office of Clean Energy Equity, charged with ensuring the state's clean energy future is accessible to all residents.[4] As part of its new performance-based regulatory framework, the Hawaii Public Utilities Commission approved an energy efficiency performance incentive mechanism to encourage increased collaboration between the utility and the third-party efficiency program administrator to provide low-to-moderate income customers with opportunities to better manage energy consumption.[5] The Connecticut Public Utilities Regulatory Authority embedded equity throughout its Framework for an Equitable Modern Grid,[6] such as planning to deploy 40% of residential storage installations for low-income households statewide and low-to-moderate income households in underserved communities. The agency also is prioritizing increased resilience for these households, as well as for environmental justice and economically distressed communities, customers with medical hardships, and public housing authorities.[7]

To formalize its promotion of diversity, equity, and inclusion (DEI), the Michigan Public Service Commission updated its bylaws to include a nondiscrimination policy as an employer and a regulator. Further, commissioners and staff comprehensively examined commission practices and identified opportunities to meaningfully promote DEI, including development of an official DEI policy statement, review of existing hiring and advancement practices, consideration of DEI in regulatory strategies, promoting DEI education and awareness, and surveying employees about diversity issues.[8][9] In addition,

[4] State of New Jersey Board of Public Utilities. 2020. "NJBPU Hires Deputy Director to Lead Clean Energy Equity Work." https://www.bpu.state.nj.us/bpu/newsroom/2020/approved/20201030.html.
[5] State of Hawaii Public Utilities Commission. 2021. Performance Based Regulation (PBR). https://puc.hawaii.gov/energy/pbr/.
[6] Connecticut Public Utilities Regulatory Authority. 2021. PURA's Framework for an Equitable Modern Grid. https://portal.ct.gov/PURA/Electric/Grid-Modernization/Grid-Modernization.
[7] Connecticut Public Utilities Regulatory Authority. 2021. Docket No. 17-12-03RE03 PURA Investigation into Distribution System Planning of the Electric Distribution Companies – Electric Storage. https://portal.ct.gov/-/media/PURA/electric/Final-Decision-17-12-03RE03.pdf.
[8] Michigan Public Service Commission. 2021. MPSC Spotlight. January. https://www.michigan.gov/mpsc/0,9535,7-395-93307_93313-549845--,00.html.
[9] Michigan's definition of environmental justice guides the work of all state agencies. https://www.michigan.gov/environmentaljustice/0,9615,7-400-98505---,00.html.

the commission will coordinate with and provide data[10] for the Department of Environment, Great Lakes, and Energy as the department considers environmental justice and public health in advisory opinions in utility integrated resource planning proceedings.[11]

Utilities also are targeting new energy programs to address historical inequities, with support of state policy and regulatory actions.[12]

At the national level, the Biden Administration issued an Executive Order[13] and created the Justice40 initiative[14] to ensure that federal agencies work with state and local governments to "deliver at least 40 percent of the overall benefits from federal investments in climate and clean energy to disadvantaged communities."

All of these activities are important steps toward ensuring an equitable transition to a clean energy future.

Earlier reports in the Future Electric Utility Regulation series[15] considered equity issues for low-income households with respect to recovery of utility fixed costs and transportation electrification. This report provides four perspectives on systemic changes to advance equity in electric utility regulation, from representatives of energy justice and consumer organizations and a leading utility in this area.

Chandra Farley, Partnership for Southern Equity (chapter 1), begins the conversation by examining energy equity and explaining why it is a crucial goal of utility regulation. She examines current inequities through a regional lens and provides practical steps toward energy justice, listed further below.

John Howat and Jenifer Bosco, National Consumer Law Center (chapter 2), use data from the U.S. Energy Information Administration to develop a series of graphs that illustrate historical inequities in the allocation of energy system costs and benefits based on household income, race, and ethnicity. The Center's "Equity Enhancement Toolbox" includes: (1) regular filing of granular utility data on residential customer counts, billing, receipts, arrearages, disconnections, and related credit and collections protocols to make visible the challenges and consequences of home energy affordability; and (2) bill affordability programs that meet key objectives for home energy security. They also make the case for additional consumer protections; programs that extend access to energy efficiency, solar, and electrification for disadvantaged households; and improved public participation in regulatory decisions for electric utilities.

Nidhi Thakar and Jake Wise, Portland General Electric (chapter 3), describe "the need to address historic and systemic barriers that have prevented and continue to prevent the progress and participation of

[10] See the Commission's September 24, 2021, order in U-20633. https://mi-psc.force.com/s/case/500t000000LvLzvAAF/com-energy-assessment-irp-and-distribution-plan-alignments.
[11] In response to Governor Whitman's Executive Directive 2020-10 at https://www.michigan.gov/whitmer/0,9309,7-387-90499_90704-540278--,00.html.
[12] For example, Xcel Energy in Colorado is identifying higher emissions communities that would be eligible for enhanced incentives through commercial and multifamily housing programs included in the utility's 2021–2023 Transportation Electrification Plan. See https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/CO%20Recent%20Filings/Higher-Emissions-Community-60-Day-Notice.pdf.
[13] The White House. 2021. Executive Order on Tackling the Climate Crisis at Home and Abroad. January 27. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/.
[14] Young, S., B. Mallory, and G. McCarthy. 2021. The Path to Achieving Justice40. The White House. https://www.whitehouse.gov/omb/briefing-room/2021/07/20/the-path-to-achieving-justice40/.
[15] The Future Electric Utility Regulation series focuses on regulated utilities—investor-owned utilities as well as rural electric cooperatives that are subject to rate regulation by public utility commissions in some states. Investor-owned utilities serve the majority of U.S. customers—72% as of 2019. Source: Communication with Edison Electric Institute, October 20, 2021, using data from EIA-861 Electric Power Industry Report (2019) and Hitachi Powergrids Energy Velocity.

historically underrepresented groups, in support of fostering equitable outcomes for all." Their essay explores how the utility is working to address three core energy justice principles—procedural justice, distributive justice, and restorative justice—in regulatory relationships and service to utility customers and communities. They provide examples in the context of state legislation, responses to the COVID-19 pandemic and wildfires, a new multi-year planning process for utility investments in distribution infrastructure, a community-based smart grid test bed, engagement with community-based organizations and Tribes, and workforce initiatives.

Jean Su, Center for Biological Diversity (chapter 4), lays out the injustices of the current energy system disproportionately experienced by communities of color and low-wealth communities due to fossil fuel pollution and health impacts; energy burden, energy insecurity, and energy poverty; climate disasters; and ecocide. She then focuses on legal and regulatory pathways toward addressing chronic energy injustices.

Following are top recommendations gleaned from each of these essays:[16]

Chapter 1

- Extend public engagement in utility regulatory decision making to include environmental justice organizations and provide the capacity for their effective participation through intervenor funding.
- Prioritize knowledge- and capacity-building on energy equity issues, both for people who may bear the brunt of inequitable outcomes and in statehouses and utility commissions.
- Mobilize coalitions of "uncommon allies"—clean energy, civil rights, and equity and environmental justice groups—to inform and educate "first-person advocates" on energy issues and utility decision-making.
- Expand the meaning of safe, reliable, and reasonable electricity service to include equity impacts.
- Enact legislation that protects against service disconnections, eliminates predatory disconnection fees, and funds bill assistance programs like percentage of income payment plans.
- Support utility programs and retail rate design that increase deployment of energy efficiency and other clean distributed resources for energy-burdened households.
- Involve impacted individuals and communities and environmental justice organizations in program design and evaluation and resource planning activities.
- Publicly post shutoff and arrearages data and use it to tailor programmatic solutions.

Chapter 2

- Protect vulnerable populations while also working to reduce greenhouse gas emissions by guiding utility investments and services toward achieving *both* equity and clean energy imperatives for electricity systems of the future.
- Reverse the regressivity in the distribution of electricity system costs and benefits through comprehensive and proactive actions that at a minimum address the following inequities:
    - The proportion of income required to maintain basic electric service
    - Access to on-site energy generation, storage, and energy efficiency technologies—and the bill savings and resilience benefits they can provide
    - Uninterrupted and affordable access to a basic level of electricity service
- Require electric service providers to report at a zip code-level the key data points needed to determine the extent to which residential customers are affordably accessing and retaining essential utility service.

[16] Some recommendations are echoed in subsequent chapters.

- Ensure that utility affordability programs: serve residential electricity customers who are income-eligible to receive federal energy assistance; lower participants' energy burdens to an affordable level; promote regular, timely payment of utility bills by participants; comprehensively address payment problems associated with participants' current and past-due bills; are funded through a mechanism that is reliable while providing sufficient resources to serve all income-eligible customers and meet policy objectives over an extended time frame; and are administered efficiently and effectively.
- Reexamine existing utility consumer protections to ensure that vulnerable customers who demonstrate good faith efforts to make affordable utility payments are protected from loss or degradation of service.
- Design low-income energy efficiency and technology distribution programs to require no up-front payments, result in positive cash flows, and mitigate any financing risks for participants.

Chapter 3

- Approach community engagement, in pursuit of the twin goals of equity and decarbonization, through the lens of environmental justice and in alignment with the Government Alliance on Race and Equity's Racial Equity Toolkit: listen and communicate, use data, ensure budget, ensure relevancy, and ensure time.
- Provide financial support to community-based organizations to enable their participation in utility proceedings and incorporate recommendations from these organizations in community engagement plans.
- Ensure that all communities the utility serves may benefit from a clean energy future by acknowledging those hardest hit by climate change impacts—and least able to avoid them—and providing access to opportunities.
- Consider distributive justice in utility program design and pricing.
- Acknowledge and seek to repair past harm by working with stakeholders on resilient solutions to climate change impacts.
- Partner with local cities and counties to advance their climate and sustainability action plans, work with community action agencies to deliver energy assistance to utility customers, and support state and federal legislation that assists low-income and vulnerable communities.

Chapter 4

- Expand the definition of "public interest" to encompass climate, environmental, and energy justice goals—for example:
    - When considering certificates of public convenience and necessity for new energy infrastructure
    - To protect utility customers from undue financial risk, including financial losses from stranded carbon-emitting assets, climate change-induced damages to generating facilities and delivery systems, reputational damage that may drive loss of investors, and access to insurance
- Consider energy burden, energy insecurity, and energy poverty as requisite factors in rate design.
- Prioritize deployment of energy efficiency, demand-side management, rooftop and community-owned solar, distributed storage, and microgrids for low-income households and energy-burdened communities.

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Any remaining errors or omissions are the sole responsibility of the authors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, The Regents of the University of California, or Future Electric Utility Regulation Advisory Group members.

About the Series

The provision of electricity in the United States is undergoing significant changes for many reasons. The implications are important and merit serious attention.

The current level of discussion and debate surrounding these changes is similar in magnitude to the discussion and debate in the 1990s on the then-major issue of electric industry restructuring, both at the wholesale and retail level. While today's issues are different, the scale of the discussion and the potential for major changes are similar. The U.S. Department of Energy (DOE) played a useful role by sponsoring a series of in-depth papers on a variety of issues being discussed at that time. Topics and authors were selected to showcase diverse positions on the issues to inform the ongoing discussion and debate, without driving an outcome.

Today's discussions have largely arisen from a range of challenges and opportunities created by new and improved technologies, changing customer and societal expectations and needs, and structural changes in the electric industry. Some technologies are at the wholesale (bulk power) level, some at the retail (distribution) level, and some blur the line between the two. Some technologies are ready for deployment or are already being deployed, while the future availability of others may be uncertain. Other key factors driving current discussions include changing state and federal policies and regulations. Issues evolving or outstanding from electric industry changes of the 1990s also are part of the current discussion and debate.

Further, in recent years foreign adversaries have been developing capabilities to initiate cyber and physical attacks on our energy infrastructure, possibly inducing regional-scale outages lasting weeks or longer. In addition to making our infrastructure more resilient against such actions, we must ensure that defense-critical energy infrastructure remains functional under any conditions. We are also increasingly vulnerable to damages from severe weather or natural events, such as hurricanes, earthquakes, and wildfires, due to increasing population density and economic development in the affected areas, and the growing interdependence among our energy, water, and communications systems.

To provide future reliable and affordable electricity, power sector regulatory approaches may require reconsideration and adaptation to change. Historically, major changes in the electricity industry often came with changes in regulation at the local, state, or federal levels.

DOE is funding a series of reports, of which this is a part, reflecting diverse viewpoints on issues surrounding future regulation of electric utilities. DOE hopes these reports will help better inform discussions underway and decisions by public stakeholders, including regulators and policymakers, as well as industry.

The topics for these papers were chosen with the assistance of a group of recognized subject matter experts. This advisory group, which includes state regulators, utilities, stakeholders, and academia, works closely with DOE and Lawrence Berkeley National Laboratory (Berkeley Lab) to identify key issues for consideration in discussion and debate.

The views and opinions expressed in this report are solely those of the authors and do not reflect those of the United States Government, or any agency thereof, The Regents of the University of California, or Advisory Group members.

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1.0 Advancing *Just Energy* in the South: The Potential for Equitable Utility Regulation through Public Participation

By Chandra Farley, Partnership for Southern Equity[17]

1.1 Introduction

Equity-centered energy, utility, and climate policies can positively impact household economic stability and improve the overall quality of our air, land, and water—all natural resources that affect our health, well-being, and economic prosperity. However, Black people, communities of color, and rural and low-wealth communities remain virtually unrepresented in the energy planning and decision-making processes that drive energy production, distribution, and regulation. This lack of representation has contributed to inequitable outcomes.

The data are clear: marginalized and under-resourced communities in the South—a region riven by racial, economic, and class inequities—bear a disproportionate burden of the negative impacts of our changing climate, carbon-based energy production, and rising utility costs. These societal barriers are compounded by the obscurity of utility commissions for the general public and their lack of understanding about utility planning and energy regulation. There are also procedural barriers[18] to equitable engagement that can limit opportunities to participate for the portion of the public disproportionately burdened by these negative impacts. Combined, these conditions have hampered the opportunity for marginalized communities to lend their perspective to the shaping of their clean energy future—a future that depends significantly on the decisions made by state legislators and regulators at public utility commissions.[19]

Important to the Southern context of equity in utility regulation are the current energy production conditions. Some of the largest coal plants, as measured by plant capacity, generation, and carbon dioxide (CO_2) emissions, are in the Southeast. Alabama is home to the coal plant with the highest CO_2 emissions of any plant in the lower 48 states, and Georgia, Tennessee, and West Virginia hold four of the largest coal plants in terms of plant capacity.[20] One of those four plants is Plant Bowen in Georgia, where the issue of toxic coal ash and how Georgia Power must

Essay author, Chandra Farley, leading the Just Energy Academy

[17] The mission of Partnership for Southern Equity (PSE) is to advance policies and institutional actions that promote racial equity and shared prosperity for all in the growth of metropolitan Atlanta and the American South. Utilizing equity as a lens, PSE coordinates advocacy across four key issue areas: energy and climate (Just Energy), land use/development (Just Growth), health (Just Health), and economy (Just Opportunity). Our main strategies are community organizing, leadership development, coalition building, authentic community engagement, and leveraging data and research. Daniel Tait, Energy and Policy Institute, provided research assistance for this essay.

[18] Jack-Scott, E. 2020. Energy Justice: A Complex But Vital Piece To A Clean Energy Transition. Energy Innovation: Policy and Technology. January 17, 2020. https://energyinnovation.org/2020/01/17/energy-justice-a-complex-but-vital-piece-to-a-clean-energy-transition/#:~:text=Procedural%20justice%20is%20concerned%20with,2016.

[19] In some states, public utility commissions are called *public service commissions* or other names—e.g., Utility Regulatory Commission (IN), Public Utilities Regulatory Authority (CT), and Public Regulation Commission (NM).

[20] Bradford, A. 2021. *Biggest Coal Plant CO2 Emissions - BTU Analytics*. BTU Analytics. https://btuanalytics.com/power-and-renewables/biggest-coal-plant-co2-emissions/.

deal with the pollution left over from decades of burning coal remains in litigation.[21] Environmental justice impacts such as groundwater contamination, large spills like those in Tennessee and North Carolina, and the potential for resulting health complications like cancer, reproductive issues, and heart problems show up in rate cases related to collecting cleanup fees from ratepayers.[22] When we overlay environmental justice considerations with persistent poverty conditions[23] and lagging clean energy development in the South, we can see the intersectional impact of energy generation and utility regulatory and ratemaking decisions that result in inequitable outcomes.

While some Southern utilities are moving away from coal-fired generation and retiring coal plants, they are not investing in energy efficiency at levels that capture efficiency savings achieved in other parts of the country.[24] Four Deep South states—South Carolina, Georgia, Alabama, and Mississippi—rank at the bottom of lists for energy efficiency policies and programs to reduce energy use, according to the 2020 Energy Efficiency Scorecard prepared by the American Council for an Energy-Efficient Economy (ACEEE).[25] This lack of adopting or advancing energy-saving targets is connected to the fact that four Southern cities (Memphis, Birmingham, Atlanta, and New Orleans) continue to post some of the highest rankings for energy burdens:[26] the portion of household income paid toward energy bills. This is directly related to the South's bottom-tier rankings for energy efficiency policies and programs and underfunded and under-resourced weatherization assistance programs that can reduce these high burdens.[27]

According to ACEEE, the median energy burden of Black households is 43% higher than that of white households. In my home state of Georgia, nearly 300,000 households live with incomes at or below 50% of the Federal Poverty Level and face a home energy burden of 28%.[28] When considering that the median U.S. energy burden across the cities in the ACEEE sample is 3.5%, we can see the paralyzing effects of increasing energy costs on a family's ability to thrive. With limited funding for weatherization assistance programs and financial barriers to cost-saving energy efficiency upgrades, the mounting costs of energy bills contribute to energy insecurity. Defined as an inability to adequately meet basic household energy needs,[29] vulnerable households are more likely to engage in risky behaviors to meet their energy needs.

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[21] Sierra Club. 2021. "Sierra Club Challenges Georgia Power's $525 million Rate Increase for Coal Ash Problem Company Created." April 29, 2021. https://www.sierraclub.org/press-releases/2021/06/sierra-club-challenges-georgia-power-s-525-million-rate-increase-for-coal-ash.

[22] Sierra Club.

[23] Oxfam America. 2009. *Exposed Social vulnerability and climate change in the US Southeast.* https://s3.amazonaws.com/oxfam-us/www/static/media/files/Exposed-Social-Vulnerability-and-Climate-Change-in-the-US-Southeast.pdf.

[24] Bradley-Wright, F. 2020. "Southeast Utilities Falling Behind: ACEEE Efficiency Scorecard Confirms What SACE Already Knew. Nowhere to Go But Up!" Southern Alliance for Clean Energy. https://cleanenergy.org/blog/southeast-utilities-falling-behind-aceee-efficiency-scorecard-confirms-what-sace-already-knew-nowhere-to-go-but-up/.

[25] Berg, W., S. Vaidyanathan, B. Jennings, E. Cooper, C. Perry, M. DiMascio, and J. Singletary. 2020. *The 2020 State Energy Efficiency Scorecard*. American Council for an Energy-Efficient Economy (ACEEE). https://www.aceee.org/research-report/u2011.

[26] Drehobl, A., L. Ross, and R. Ayala. 2020. *How High are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the U.S.* American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2006.

[27] *See* Berg et al. 2020. *Also see* Bednar, D., T. Reames, and G. Keoleian. 2017. "The Intersection of Energy Justice: Modeling the Spatial, Racial/Ethnic and Socioeconomic Patterns of Urban Residential Heating Consumption and Efficiency in Detroit, Michigan." *Energy and Buildings* 143: 25–34. doi.org/10.1016/j.enbuild.2017.03.028; Kontokosta, C., V. Reina, and B. Bonczak. 2019. "Energy Cost Burdens for Low-Income and Minority Households." *Journal of the American Planning Association* 86 (1): 89–105. doi.org/10.1080/01944363.2019.1647446.

[28] Fisher, Sheehan & Colton. Home Energy Affordability Gap data. http://www.homeenergyaffordabilitygap.com/03a_affordabilityData.html.

[29] Hernández, D. 2016. "Understanding 'energy insecurity' and why it matters to health." *Social Science & Medicine* 167(October 2016): 1–10. https://www.sciencedirect.com/science/article/pii/S0277953616304658.

That includes using high-interest payday loans, relying on dangerous heating sources such as space heaters or ovens, and forgoing other basic needs, such as food and medical care.[30]

Exacerbating the ongoing issue of energy insecurity are hundreds of thousands of struggling families and essential workers that are losing access to electricity, water, and broadband due to the economic fallout from COVID-19 and ending of utility shutoff moratoriums during an ongoing global pandemic. Georgia Power, for example, resumed disconnections after state utility regulators allowed a moratorium to expire in July 2020. One year later, Georgia Power reported more than 223,000 shutoffs—over 9% of its customers.[31] Many of the utility access issues spotlighted during COVID-19 were concerns long before the pandemic began. In its 2017 Lights Out in the Cold report, the NAACP framed critical issues that should be considered in the development of disconnection policies and called "the need to incorporate human rights into the utility business model a key component of the larger reform of the extractive energy economy and movement toward energy justice."[32]

This introductory framing of the negative impacts of fossil-fuel generation, legacy pollution, rising utility costs, and societal and policy barriers underscore the importance of equity considerations in the energy planning process. An equity agenda accounts for differences in opportunities and burdens, as well as needs, to propose and pursue just and equitable solutions to achieve systems-level change. Supporting more and diverse public participation in the full spectrum of energy planning and decision-making can advance equity in utility regulation and broader equitable outcomes beyond utility regulatory venues.

1.2 Defining Energy Equity

The Partnership for Southern Equity (PSE) level-sets all conversations with a definition of *equity*: just and fair inclusion. Understanding that "an equitable society is one in which all can participate, prosper, and reach their full potential,"[33] the goals of equity must be to create the conditions that allow all to reach their full potential. In a racially equitable society, the distribution of society's benefits and burdens would not be skewed by race. In short, equity creates the path from hope to change.

"Just Energy" is PSE's framework for advancing *energy equity,* which we define as the fair distribution of the benefits and burdens of energy production and consumption. We advance Just Energy by building civic power with Black people, communities of color, and rural and low-wealth communities across the South.

By highlighting the inequities present across the energy sector and connecting the dots between energy, racial injustice, economic disinvestment, health disparities, and other associated equity challenges, we have a unique opportunity to educate energy planning decision-makers, including utility regulators, while also activating the people in the communities most impacted by these inequities. Both make up the "inside and outside" forces necessary to achieve a just and equitable transformation of utility regulation and the energy sector.

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[30] Memmott, T., S. Carley, M. Graff, and D. Konisky. 2021. "Sociodemographic disparities in energy insecurity among low-income households before and during the COVID-19 pandemic." *Nature Energy* 6: 186–193. https://doi.org/10.1038/s41560-020-00763-9.

[31] *Document Filing #186756 - DKT 42516 Incremental Bad Debt Report for July 2021*. https://psc.ga.gov/search/facts-document/?documentId=186756.

[32] Patterson, J., M. Franklin, and C. Kurtz. 2017. *Lights Out in the Cold: Reforming Utility Shut-Off Policies as if Human Rights Matter.* https://naacp.org/resources/lights-out-cold.

[33] Patterson et al.

1.3 Current State of Equity Considerations in Utility Regulation

Despite bearing an inequitable proportion of the negative impacts of disparities in racial and economic energy burden and environmental injustices related to fossil fuel-based energy production and climate change, marginalized communities remain virtually unrepresented in the energy planning and decision-making processes that drive energy production, distribution, and regulation. That includes public utility commission proceedings that determine what utility investments are allowed in the utility's rate base and how those costs are recovered from different classes of customers. These proceedings determine the monthly utility bills that families pay, given the household's energy usage, as well as consumer protections from unfair practices. The full chain of decisions these activities trigger have an impact on people and families who must be at the center of any decision making that intends to center on equity.

Some states have enacted legislation to require or explicitly authorize utility regulators to consider equity in decision-making; in other states, regulators are considering equity under existing authorities. In addition to the examples in the Executive Summary of this report, North Carolina's H.B. 951 could be viewed as supporting equity considerations.[34] The bill calls for regulatory reform by authorizing the North Carolina Utilities Commission to implement several key components of performance-based regulation: revenue "decoupling," multi-year rate plans, and performance incentive mechanisms. These complementary components align utility investments with objectives developed on a consensus basis with customers and regulators. Performance-incentive mechanisms can target a host of desired outcomes, including grid modernization, reduced pollution, energy efficiency improvements, or more distributed clean energy.[35] While there remains some disagreement[36] on the details of H.B. 951, consumer and clean energy advocates are keeping an eye on an "open door" to modernize the utility model in a way that benefits the environment and customers.[37]

To the extent that equity issues are heard or addressed in utility commission venues in the South, they normally come through public comments or formal comments received in integrated resource planning (IRP) or rate case dockets.[38] Participating in utility processes like IRPs and rate cases can be expensive and time-consuming for under-resourced organizations and individuals which may not have the capacity to do so. In some states, such as South Carolina and Florida, regulators hold public comment sessions in various parts of the state to receive input from communities when undertaking a large decision, such as whether to raise rates. Public meetings and comments are often viewed as checking a box, but sometimes the local voices are heard, and decisions are changed, such as when regulators significantly reduced Dominion Energy's recent request to raise rates in South Carolina. The utility's requested rate increase of 7.68% would have led to a $9.68 a month increase for the average customer. Instead, a rate increase of 1.46% reduced that to $1.81 a month.[39]

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[34] Sweeney, D. 2021. "NC legislation mandates coal retirements in favor of natural gas, renewables." Spglobal.com. https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/nc-legislation-mandates-coal-retirements-in-favor-of-natural-gas-renewables-65034369.

[35] Ballentine, R. 2021. "Is North Carolina Moving Toward 21st Century Ratemaking?" *Green Strategies,* July 8, 2021. http://www.greenstrategies.com/is-north-carolina-moving-toward-21st-century-ratemaking/.

[36] Ouzts, E. 2021. "Critics: Duke-backed ratemaking reforms in N.C. fall short." *Energy News Network,* August 5, 2021. https://energynews.us/2021/08/05/why-critics-say-duke-energy-backed-ratemaking-reforms-in-n-c-fall-short/.

[37] Sierra Club North Carolina. 2019. House approves revised bill to study modern utility ratemaking tools. August 20, 2019. https://www.sierraclub.org/north-carolina/blog/2019/08/house-approves-revised-bill-study-modern-utility-ratemaking-tools.

[38] As demonstrated by the Georgia and South Carolina examples discussed in the "Approaches to Equity in Regulation" section of this essay.

[39] Bustos, J. 2021. "Why Dominion customers will see a small increase in their bills starting in September." *The State,* July 2, 2021. https://www.msn.com/en-us/money/companies/why-dominion-customers-will-see-a-small-increase-in-their-bills-starting-in-september/ar-AALHB4X.

Considering the scale and systemic nature of the inequitable outcomes related to energy planning, decision-making, and implementation, equity cannot be addressed without establishing and operationalizing key metrics for every decision of a state regulatory body.[40] Three categories are central to the equity metrics development process: target population identification, investment decision-making, and program impact assessment.[41] Had these equity concerns been prioritized by state legislators and utility regulators, the potential for disproportionate financial, societal, and environmental impacts on marginalized groups and under-resourced communities may have been avoided. Here are some examples.

- *Siphoning resources from the public and institutions supporting minorities.* Legislation allowed a utility in Georgia to collect costs for constructing and financing a nuclear power plant before construction began. These dollars were extracted from public government entities, including public school systems, whose budgets are vital to student achievement, strong property values, and attracting equitable development.[42] The project, originally projected to cost $14 billion with a completion date of 2017, has ballooned to at least $26 billion with a new projected completion date of 2023.[43]

- *Increasing energy burden for already overburdened households*. Utilities have sought large increases to the monthly basic service charge (often referred to as *fixed fees*) for residential customers.[44] That reduces the incentive to conserve energy, or invest in energy efficiency measures, by reducing potential cost savings for volumetric charges when customers reduce kilowatt-hour consumption. From 2015 to 2018, utilities made 158 proposals to state utility commissions to impose or increase fixed fees, and 31 utilities in 18 states asked for an increase of at least 100%.[45]

- *Seismic effects from failed projects.* The collapse of a nuclear project in South Carolina cost $9 billion, never produced any energy, and left nearly 6,000 people jobless. A program intended to assist low-income ratepayers affected by the project's failure was created.[46] Analysts say that residents will be paying for that failure for the next 20 years or more.[47]

- *Disabling energy efficiency programs.* Many utilities across the South have eliminated or drastically reduced energy efficiency and other distributed energy programs, cutting off critical access to practical ways to reduce energy burden when households do not have the up-front capital to make these investments.[48]

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[40] See discussion of metrics in the National Consumer Law Center's essay in this report.
[41] Preziuso, D., B. Tarekegne, and G. Pennell. 2021. Metrics for an Equitable and Just Energy System. Pacific Northwest National Laboratory. https://www.pnnl.gov/sites/default/files/media/file/Metrics%20for%20Energy%20Equity_0.pdf.
[42] *Georgia Nuclear Energy Financing Act*.
[43] Williams, D. 2021. "Georgia Power, state energy regulators reach tentative deal on Plant Vogtle costs." *The Augusta Chronicle,* October 15, 2021. https://www.augustachronicle.com/story/news/2021/10/15/augusta-ga-georgia-power-psc-reach-tentative-deal-plant-vogtle-costs/8459311002/.
[44] "Fixed fees" or "basic service charges" are a priority energy equity issue, as consumers classified as low-income get hit the worst by higher fixed fees. Three specific campaigns coordinated by Southern Alliance for Clean Energy and partners are discussed in the "Approaches to Equity in Regulation" section of this essay.
[45] Farrell, M. 2019. "How to Fight Back Against Utility Fees." *Consumer Reports,* May 29, 2019. https://www.consumerreports.org/fees-billing/how-to-fight-back-against-utility-fees/.
[46] *The Washington Post.* 2021. "Westinghouse agrees to pay $20 million over failed nuclear project." August 30, 2021. https://www.washingtonpost.com/business/economy/westinghouse-agrees-to-pay-20-million-over-failed-nuclear-project/2021/08/30/f8a13b6e-099c-11ec-aea1-42a8138f132a_story.html.
[47] Lacy, A. 2019. "South Carolina Spent $9 Billion to Dig a Hole in the Ground and Then Fill It Back In." *The Intercept,* February 6, 2019. https://theintercept.com/2019/02/06/south-caroline-green-new-deal-south-carolina-nuclear-energy/.
[48] From 2014–18, TVA cut its already limited efficiency spending by nearly two-thirds while completely eliminating its customer incentive programs. In 2019, the cuts went even further. *See* Bradley-Wright, F. 2021. "TVA Lost Its Way on Energy Efficiency, Now It's Dragging Southeast Down and Pushing Customer Bills Up." Southern Alliance for Clean Energy.

- *Systemic environmental injustice.* Regulators approved a gas plant in New Orleans despite strong opposition from the Vietnamese community where the plant would be located, and after the utility was caught paying actors to fake community support.[49] As another example, coal ash from a spill in Kingston, Tennessee,[50] was shipped to the Arrowhead Landfill in Uniontown, Alabama. Uniontown's population is 90% African American, the town's per capita income is less than $10,000, and more than 40% of the population live under the poverty line.[51]

1.4 Federal and State Examples of Steps Toward Inclusion

An example at the federal level of the practical steps and authentic engagement necessary to lead with equity in utility regulation is the Federal Energy Regulatory Commission's (FERC's) Office of Public Participation. Section 319 of the Federal Power Act (1978) directed the commission to establish the office to "coordinate assistance to the public with respect to authorities exercised by the Commission," including assistance to those seeking to intervene in its proceedings. While consumer advocacy groups pressured FERC on the issue, the office was not created until 42 years later. In December 2020, a U.S. Senate committee report that accompanied the 2020 COVID-19 omnibus bill included "a line item giving FERC 180 days to explain how it will establish a new Office of Public Participation. Specifically, the line item directs FERC to produce a report that provides an organizational structure and budget for the office with the assumption it will begin operating in fiscal year 2022."[52]

Following this, FERC announced a round of virtual listening sessions and a commissioner-led workshop to solicit public input and to hear from several stakeholder groups on how the commission should establish and operate the Office of Public Participation. This announcement included a public request for speaker nominations that made its way to utility justice, labor, faith, consumer, and environmental groups. The announcement also served as a launchpad for community-focused advocacy groups to activate their constituencies. As a member of the WE ACT Environmental Justice Leadership Forum (EJ Forum), PSE joined other EJ Forum members in a meeting with FERC Chairman Richard Glick. This meeting, and the corresponding public input process, was framed as an opportunity to leverage the national focus on racial equity and environmental justice to inform how FERC could work with marginalized communities and consumer advocates. This was an important meeting, as the EJ Forum is representative of groups that understand the connection between equitable utility regulation and the increased deployment of clean energy that can drive equity, environmental justice, and economic development.

Further supporting this "inside game," public interest groups, environmental justice organizations, and academia drove a consistent focus on what is required for the commission to ensure that the people behind "the public" have the resources they need to take full advantage of the engagement opportunities

https://cleanenergy.org/blog/tva-lost-its-way-on-energy-efficiency-now-its-dragging-region-down-and-pushing-customer-bills-up/.

[49] Karrick Surrusco, E. 2021. "Judge Sides With New Orleans Residents in Fight Against Dirty Gas Plant." Earthjustice, June 17, 2021. https://earthjustice.org/blog/2018-november/a-polluter-lies-to-new-orleans-city-council-still-gets-to-build-gas-plant.

[50] As of 2019, Kingston's population was 89.9% white, not Hispanic or Latino; per capita income was $28,856; and 8.9% of the population lived in poverty. U.S. Census Bureau. 2019. https://www.census.gov/quickfacts/kingstoncitytennessee.

[51] Engelman-Lado, M., C. Bustos, H. Leslie-Bole, and P. Leung. 2021. "Environmental Injustice in Uniontown, Alabama, Decades after the Civil Rights Act of 1964: It's Time For Action." American Bar Association, May 21, 2021. https://www.americanbar.org/groups/crsj/publications/human_rights_magazine_home/vol--44--no-2--housing/environmental-injustice-in-uniontown--alabama--decades-after-the/.

[52] Hale, Z. 2021. "Congress urges FERC to act on transmission and fund public participation." *S&P Global Market Intelligence,* December 22, 2021. https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/congress-urges-ferc-to-act-on-transmission-and-fund-public-participation-61861221.

created by the new office. An example is the need for intervenor funding (sometimes referred to as *intervenor compensation programs*).[53]

Public Citizen, a nonprofit consumer advocacy organization, highlighted this need. In addition to calling for compensation for intervenors, Public Citizen outlined a "Public Interest Attorney Referral Program to provide immediate, up-front assistance for those intervenors that cannot ride out the intervenor compensation process." Tyson Slocum, director of Public Citizen's Energy Program, said "It would finally place the public interest on even footing with energy corporations in regulatory proceedings" and could "help address social and environmental justice concerns that have often been ignored."

As Earthjustice and signatory parties note in their comments filed with FERC, regulatory proceedings are "fraught with barriers to meaningful participation for landowners, environmental groups, environmental justice communities, and tribal groups." If intervenor compensation models are to be authentically successful, they must also support "public engagement across the board, with a particular focus on local communities, landowners, environmental justice groups, and tribal entities."[54]

The opportunity to advance just and fair inclusion in utility regulatory proceedings through intervenor compensation also has been undertaken at the state level. The California Public Utilities Commission (CPUC) initiated the Intervenor Compensation Program in 1981, and the California Legislature codified the program in 1985. According to the CPUC, "by hearing from different perspectives, the CPUC is better able to make informed decisions that consider the impact of utility costs and services on all Californians." The California Intervenor Compensation Program includes the allowance of expert witness fees and is "intended to ensure that individuals and entities that represent residential or small commercial electric utility customers have the financial resources to bring their concerns and interests to the CPUC during formal proceedings." While this is certainly a model worthy of adaptation, there are issues with the fact that the compensation approval can only come *after* a decision is made.

Oregon just this year passed into law the "Energy Affordability Act[55] which, among other things, expands the state's existing intervenor funding program to include participation by organizations focusing specifically on environmental justice. In addition to addressing high energy burdens by "authorizing the PUC to consider differential energy burden and other inequities of affordability in rates," the Act "authorizes public utilities to enter into agreements to provide financial assistance for organizations to represent in regulatory proceedings before commission interests of low-income residential customers and residential customers that are members of environmental justice communities." According to Alma Pinto, Climate Justice Associate at Community Energy Project, "This bill will help ensure that the Public Utility Commission receives the real, on-the-ground expertise from community-based organizations representing low-income Oregonians, rural communities, and Black people, Indigenous people, and other people of color. We have seen first-hand how important this input is as we advocate for ways to reduce arrearages or past-due energy bills and prevent utility shutoffs and disconnections."[56]

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[53] Intervenor compensation pays for the costs of advocates representing utility customers, and sometimes other organizations representing the public interest, to officially participate in utility regulatory proceedings.

[54] See comments filed on April 23, 2021. https://elibrary.ferc.gov/eLibrary/docketsheet?docket_number=AD21-9-000&sub_docket=All&dt_from=1960-01-01&dt_to=2021-10-18&chklegadata=false&pageNm=dsearch&date_range=custom&search_type=docket&date_type=filed_date&sub_docket_q=Allsub.

[55] Oregon House Bill 2475. 2021.

[56] Oregon Clean Energy Opportunity campaign. 2021. "Energy Affordability Act (House Bill 2475) Passes Oregon Senate with Bipartisan Support." May 13, 2021. https://cleanenergyoregon.org/en/news/hb2475-victory.

Including California and Oregon, at least 11 states have legislation or rules that allow intervenor compensation to support public participation and intervention in public utility commission proceedings.[57] For example, in Michigan a five-member Utility Consumer Participation Board provides grants to qualified applicants that represent the interests of the state's residential energy utility customers at relevant proceedings before the Michigan Public Service Commission.[58] Grants are awarded in phases closer to the filing dates of actual cases instead of after a decision is made, as in most states providing intervenor funding. The grant process in Michigan, and for a similar program in Wisconsin,[59] elevate an important consideration for these programs to achieve their equity aims. Intervenor compensation should be addressed early in the process to provide advocacy organizations and grassroots groups with sufficient time and support so they can make better-informed decisions about committing their own resources and money to participate in these processes.

Recalling that equity is "just and fair inclusion," these "inside and outside" strategies provide a variety of learnings and pathways for states without these kinds of programs to build upon. The focus on increasing public engagement and providing the financial capacity for that engagement demonstrates what is necessary to begin to achieve more inclusive utility planning and regulation processes.

1.5 Approaches to Equity in Regulation

As Aladdine Jorof states, "Although the long-term goals of modernizing our electricity system, whether the sources of energy or the infrastructure (i.e., the grid), include greater personal control over energy usage and cost savings, there are up-front costs that will often be borne by consumers. Even if total costs do not increase, they may be redistributed as pricing systems evolve to reflect the changing nature of connections and customer usage patterns. Increased or redistributed costs raise concerns about potential impacts, particularly disproportionate impacts, on low-income consumers, who are frequently least able to accommodate higher or volatile energy prices. This concern drives questions as to whether decisions about our electricity system are 'fair' or 'equitable.'"[60]

Addressing these concerns demonstrates that there is much work still to be done around a shared understanding of equity and what that means in the various contexts and topics within utility regulation. Equity thought leaders and practitioners understand and teach that equity is a journey. Therefore, knowledge building and capacity building on topics of equity must continue to be a priority for residents who may bear the brunt of inequitable outcomes, and in statehouses and utility commissions where energy decision-making takes place. An important factor in this shared learning is "an understanding that an evaluation of equitable impacts thus should go beyond a static consideration of the cost of isolated actions"[61] and that a shared terminology that can be understood by all parties is necessary.

The Initiative for Energy Justice (IEJ) integrates the definition of equity used in the context of this essay, just and fair inclusion, and applies it to the concept of *energy justice*. "Energy justice refers to the goal of achieving equity in both the social and economic participation in the energy system, while also

[57] State Intervenor Compensation. 2020. https://www.lowincomesolar.org/wp-content/uploads/2020/12/State-Intervenor-Compensation.pdf. See the National Consumer Law Center's essay in this report for information on other state intervenor compensation programs.
[58] Michigan LARA - Utility Consumer Participation Board. https://www.michigan.gov/lara/0,4601,7-154-10573_76244---,00.html.
[59] PSC of Wisconsin Intervenor Compensation. https://psc.wi.gov/Pages/Programs/IntervernorComp.aspx.
[60] Jorof, A. 2017. "Energy Justice: What It Means and How to Integrate It into State Regulation of Electricity Markets." Environmental Law Institute. https://elpnet.org/sites/default/files/2020-04/energy_justice_-_what_it_means_and_how_to_integrate_it_into_state_regulation_of_electricity_markets.pdf.
[61] Jorof.

remediating social, economic, and health burdens on marginalized communities."[62] This framing supports the underlying concept of equity because "energy justice looks beyond income-based discount rates that, while necessary, are alone too blunt a tool to optimize the underlying dynamics that create the need for such discounts."[63] Within this terminology, there are two important dimensions of energy justice that IEJ brings forward: procedural justice and distributive justice.

Procedural justice concerns who is at the decision-making table and whether, once at the table, everyone's voice is heard.[64] This dimension is central to the position that equity in utility regulation cannot be achieved without the fair treatment and meaningful involvement of all people with respect to the development, implementation, and enforcement of policies and regulations. Intervenor compensation programs discussed in this essay are examples of procedural justice. Consumer protection advocate Eric Borden of the Utility Reform Network says intervenor compensation "gives consumers a shot" in an arena where they are otherwise out-resourced. From a procedural justice perspective, Emily Piontek, a grassroots organizer with Appalachian Voices, notes that "intervenor compensation is a good governance initiative because it improves the ability of affected parties to participate in decision-making."[65]

Demonstration at the Georgia PSC over Georgia Power's proposed increase in fixed fees

Beyond intervenor compensation programs, there are many examples of procedural justice in grassroots advocacy and community organizing focused on bringing ratepayers—and specifically residential customers experiencing higher energy burdens and marginalized by environmental injustices related to energy production, distribution, and regulation—to utility decision-making venues to ensure their voices are heard and recorded. For example, in partnership with coalitions of clean energy, civil rights, equity, and environmental justice advocacy groups, thousands of citizens in Georgia, South Carolina, and Tennessee have mobilized their voices in opposition to utility attempts to increase "fixed fees." These fees, also called "basic service charges," are a priority energy equity issue, as consumers classified as low-income get hit the worst by higher fixed fees. They generally "shoulder the highest percentage of rate increases" when fixed fees go up, because the additional burden falls hardest on low-consuming customers, and low-income customers are generally in that category, reasoned the National Association of State Utility Consumer Advocates in a 2015 resolution.[66] These fees take away customers' ability to control their energy bills, disincentivize energy conservation, and most heavily harm low energy users, including seniors, renters, low-income families, and residential solar energy users.[67]

In 2019, hundreds of concerned ratepayers in South Carolina attended public hearings and submitted written comments to the Public Service Commission to challenge Duke Energy Carolinas' request to

[62] Baker, S., S. DeVar, and S. Prakash. 2019. *The Energy Justice Workbook.* https://iejusa.org/wp-content/uploads/2019/12/The-Energy-Justice-Workbook-2019-web.pdf.
[63] Jorof.
[64] Jorof.
[65] Piontek, E. 2021. "Commentary: Intervenor compensation programs can level the regulatory playing field." *Energy News Network*, September 24, 2021. https://energynews.us/2021/09/24/commentary-intervenor-compensation-programs-can-level-the-regulatory-playing-field/.
[66] NASUCA. 2015. Customer Charge Resolution 2015-1. https://www.nasuca.org/customer-charge-resolution-2015-1/.
[67] Carnevale, C. 2019. "South Carolina PSC Slaps Down Outrageous Duke Fee Hike." Southern Alliance for Clean Energy. https://cleanenergy.org/blog/south-carolina-psc-slaps-down-outrageous-duke-fee-hike/.

triple its mandatory fixed fees. The commission rejected what would have been the highest "Basic Facilities Charge" in the nation for any investor-owned utility at that time.[68]

At the same time, the Georgia Public Service Commission (PSC) was reviewing a proposal by Georgia Power to nearly double the mandatory monthly fee, a basic service charge that is hidden on most Georgia Power customers' bills.[69] The fixed fee increase was accompanied by a proposal to increase the rate that residential customers pay for electricity and to increase riders,[70] which make up a large portion of monthly bills. In response, PSE and Just Energy Circle co-founder and member organization Southern Alliance for Clean Energy coordinated the "Fight the Hike" campaign.[71] Community conversations were held throughout the state to educate residents about the proposal to raise rates and fees, to inform them on the PSE's role, and provided concrete steps to act. This included calling commissioners, signing petitions, joining demonstrations, hosting community conversations in their neighborhoods, and traveling to commission venues across the state to deliver public comment during commission hearings.

Ultimately, increases in both the basic service charge and volumetric rates were approved at slightly reduced levels. A new, additional charge also was approved to pay for the utility's cleanup of toxic ash waste it created at its coal-fired plants. The methods of cleanup are currently the focus of more Georgia-based grassroots advocacy and community mobilization now reaching the Georgia Environmental Protection Division and the U.S. Environmental Protection Agency.

Despite these kinds of household economic and health impacts, there remains a large majority of people who may only think of energy when they see their monthly bills. Therefore, the success of these efforts lies in their ability to connect "uncommon allies" for a shared cause and to seed a base of first-person advocates who are informed, educated, and activated as it relates to energy issues and utility decision-making. This type of procedural justice is central to the position that equity in utility regulation must include the fair treatment and meaningful involvement of the people who will be impacted by utility policies and regulations.

Commissioner Echols of the Georgia PSC meeting with energy justice advocates

Distributive justice is outcome-focused and speaks to whether all equally share in the benefits and burdens of the energy system.[72] This is how PSE defines energy equity. The production and distribution of electricity and natural gas have economic, environmental, and public health impacts. However, utility regulators by their statutory authorities maintain a focus on safe, reliable, and reasonable electricity service while "utility impacts on air, water, land use, and land disposal are typically regulated by other government agencies."[73] If equity in utility regulation is to support the advancement of more just and equitable outcomes, state legislatures and

[68] Baker-Branstetter, S., and A. Winer. 2019. "South Carolina rejects Duke Energy fee hike after 'What the Fee?!' outcry." *Consumer Reports,* May 2, 2019. https://advocacy.consumerreports.org/press_release/south-carolina-rejects-duke-energy-fee-hike-after-what-the-fee-outcry/.

[69] Jacob, B. 2019. "Georgia Power Wants You to Pay More for Using Less Energy." Southern Alliance for Clean Energy. August 29, 2019. https://cleanenergy.org/blog/georgia-power-wants-you-to-pay-more-for-using-less-energy.

[70] A *rider* is a supplemental charge to recover costs from customers for specific items that are not included in the utility's base rates. Riders result from single-issue utility filings that are approved by the utility regulatory commission.

[71] Partnership for Southern Equity. http://fightthehike.org.

[72] Baker, DeVar, and Prakash.

[73] The Regulatory Assistance Project. 2011. *Electricity Regulation in the US: A Guide.* https://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-electricityregulationintheus-guide-2011-03.pdf.

ratemaking agencies must expand what is meant by safe, reliable, and reasonable, and for whom. The objectives of distributive energy justice would then include:[74]

1. Reducing energy burdens on low-income consumers;

2. Avoiding disproportionate distribution of the costs or negative impacts associated with building, operating, and maintaining electric power generation, transmission, and distribution systems;

3. Providing equitable distribution of and access to real benefits associated with building, operating, and maintaining electric power generation, transmission, and distribution systems; and

4. Ensuring a reliable source of electricity and protecting low-income households, including those on fixed incomes, from price fluctuations.

The Energy Equity Project housed at the Urban Energy Justice Lab at University of Michigan's School for Environment & Sustainability states that "despite the semblance of uniform utility rates and ubiquitous service, the negative outcomes of power shutoffs and cost burdens—and the positive benefits of weatherization, retrofits, and renewable energy—are not evenly distributed." They go on to state that despite more than $125 billion in energy efficiency and renewable energy investments in the United States in 2020, about 120 million households simultaneously face energy insecurity.[75] The Energy Equity Project is grounded in understanding how "benefits accrue to the privileged, [while] BIPOC and frontline communities may be left to pay higher costs to stay connected to failing electric grids and aging natural gas infrastructure, finding themselves priced out of housing that was affordable before "greentrification."[76]

This fact has driven racial equity organizations like Greenlining Institute, Race Forward, PSE and its Just Energy Circle member groups to elevate a focus on equity in energy—more specifically in PSE's case, to bring equity in utility regulation to the forefront of its "Just Energy" activities. But what is the difference between equity and racial equity, and why does it matter? Following PSE's definition that equity is just and fair inclusion, the goals of equity must be to create the conditions that allow all to reach their full potential. *Racial equity* refers to what a genuinely nonracist society would look like. In a racially equitable society, the distribution of society's benefits and burdens would not be skewed by race.[77]

Racial equity also creates space to understand that "America's dominant cultural lens and narrative center on white people…portray the country's past primarily as a story of social innovation and progress. Within this narrative, modern problems like poverty and crime are individual and communal failings, and, by extension, racial disparities are indicative of poor choices or behavioral patterns, not historical and continued discrimination."[78] Nearly every equity indicator that we can name, including those related to our energy and utility systems, can be linked to systemic racism and practices that institutionalized it. We can look to racist federal policy such as redlining, where the Federal Housing Administration, established in 1934, furthered segregation by refusing to insure mortgages in and near African-American neighborhoods.[79] Neighborhoods were color-coded green for "best," blue for "still desirable," yellow for "definitely declining," and red for "hazardous." Redlining buttressed the segregated structure of American

[74] Jorof.
[75] Energy Equity Project. 2021. The Energy Equity Project. https://energyequityproject.com/wp-content/uploads/2021/05/EEP-brochure.pdf.
[76] Energy Equity Project.
[77] From Partnership for Southern Equity's "Racial Equity 101" training materials.
[78] Spievack, N., and C. Okeke. 2020. "How We Should Talk about Racial Disparities." Urban Institute, February 26, 2020. https://www.urban.org/urban-wire/how-we-should-talk-about-racial-disparities.
[79] Gross, T. 2017. A 'Forgotten History' of How the U.S. Government Segregated America. NPR, May 3, 2017. https://www.npr.org/2017/05/03/526655831/a-forgotten-history-of-how-the-u-s-government-segregated-america.

cities. Most of the neighborhoods (74%) that the Home Owners' Loan Corporation (HOLC) graded as high-risk or "Hazardous" eight decades ago are low-to-moderate income today. Additionally, most of the HOLC graded "Hazardous" areas (nearly 64%) are minority neighborhoods now.[80] "The United States' long, shameful history of discriminatory housing policies and racial segregation is part of the reason why Black families are more likely to live in older, energy-inefficient homes that saddle them with higher energy burdens than white families at almost every position in the income distribution."[81]

There are good examples of outcome-focused "distributive justice" models with a specific focus on racial equity, and program design informed by a level of racial equity analysis. At the national level, Indigenous climate activists are serving as "water protectors" and calling for zero pollution by the energy system. They are fighting pipelines because of their impact on the climate crisis, oil spills, and infringement on Native treaty rights.[82] The American Public Power Association is working with the Navajo Tribal Utility Authority to bring electricity to the Navajo Nation, the largest Native American territory in the United States, with an estimated population of 300,000. Among the 55,000 homes located on the 27,000 square mile reservation, about 15,000 do not have electricity. They make up 75% of all unelectrified households in the United States.[83]

At the state level, consumer advocates are proposing legislation for protections against service disconnections, elimination of predatory disconnection fees, and additional bill reduction assistance programs like percentage of income payment plan (PIPP) programs. PIPPs are designed to reduce household energy burdens to an affordable level by capping eligible participants' utility payments at a predetermined percentage of household income. Ohio's PIPP legislation[84] sets a maximum utility bill for income-qualified residents, based on a percentage of household income. Residents who qualify and heat their homes with gas cannot pay more than 6% of their income on their monthly gas bill and 6% of their income on their monthly electric bill. Residents who qualify and heat their homes with electricity cannot pay more than 10% of their income on their electric bill. Participants do not need to pay monthly charges that exceed these maximum amounts, and charges are forgiven if they make 24 on-time and in-full payments. These types of programs address inequities in our energy system by alleviating energy insecurity and energy burdens that disproportionately impact Black, Latino, and Indigenous peoples and low-income, rural, and renter households.[85]

Given that low-income communities, communities of color, and vulnerable persons—including people who are elderly—are most vulnerable to shutoff,[86] instituting protections against service disconnections and reforming disconnection policies are integral to more equitable utility regulation. The *Lights Out in the Cold* report by the NAACP[87] called for the eventual elimination of disconnections for utility service and outlined several intermediate policy prescriptions toward that end. COVID-19 brought the hidden

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[80] Mitchell PhD., B., and J. Franco. 2018. "HOLC 'redlining' maps: The persistent structure of segregation and economic inequality." NCRC, March 20, 2018. https://ncrc.org/holc/.
[81] Williams-Tack, S. 2021. "From Redlining to Restorative Justice." *Sierra,* February 21, 2021. https://www.sierraclub.org/sierra/redlining-restorative-justice.
[82] Regan, S. 2021. "It's cultural genocide: inside the fight to stop a pipeline on tribal lands." *The Guardian,* February 19, 2021. https://www.theguardian.com/us-news/2021/feb/19/line-3-pipeline-ojibwe-tribal-lands.
[83] American Public Power Association. Light Up the Navajo Nation. https://www.publicpower.org/LightUpNavajo.
[84] Ohio Laws and Administrative Rules. Chapter 122:5-3 - Ohio Administrative Code. https://codes.ohio.gov/ohio-administrative-code/chapter-122:5-3#:~:text=Any%20customer%20whose%20annual%20household,in%20the%20PIPP%20plus%20program. Also see Ohio Department of Development. No Date. Percentage of Income Payment Plan Plus (PIPP). https://development.ohio.gov/is/is_pipp.htm.
[85] Drehobl, A., L. Ross, and R. Ayala. 2020. *How High Are Household Energy Burdens?* Washington, D.C.: American Council for an Energy-Efficient Economy.
[86] Kowalski, K. 2020. "Racial disparities persist in electric service. Is 'willful blindness' to blame?" *Energy News Network,* July 1, 2020. https://energynews.us/2020/07/01/racial-disparities-persist-in-electric-service-is-willful-blindness-to-blame/.
[87] Patterson, Franklin, and Kurtz.

crisis of utility disconnections to the forefront as millions of Americans were directed to stay home. Few protections exist outside of some medical exemptions or seasonal-based moratoria intended to keep people from freezing or dying of heat stroke in their homes, a situation only made more dire by climate change. Disconnection policies are often confusing and financially taxing for families who are already stretched thin and are unable to afford a past-due bill. This led over 830 organizations, 113 members of Congress, and hundreds of thousands of people to call for a nationwide moratorium on utility shutoffs for water, electricity, and broadband services.[88] The HEROES Act, passed by the House of Representatives in May 2020, included a nationwide moratorium on shutoffs. Ultimately, Oregon's U.S. Senator Jeff Merkley introduced the Maintaining Access to Essential Services Act of 2021—legislation that would create a new program to protect all Americans' access to power, heat, water, and internet service during the coronavirus crisis and ensure that these critical home utilities are not cut off.

Procedural justice and distributional justice provide important framing for three of the key components to equity in utility regulation—who is at the decision-making table; whether, once at the table, everyone's voice is heard; and whether all equally share in the benefits and burdens of the energy system. When combined with other energy equity frameworks such as The Energy Equity Project, which will assess two additional dimensions of equity—recognition and restorative—to measure "improved outcomes for BIPOC, lower income and frontline environmental justice communities," these shared terminologies can serve as foundational tools for community leaders, energy practitioners, legislators, and regulators committed to addressing racial equity for energy systems.

1.6 Utility Program Design, Investment, and Procurement

We can generate equity through utility program design and delivery, as well as retail rate design, that support increased deployment of energy efficiency and other clean distributed resources. Reducing energy burdens and stabilizing energy costs must be the top priority of these activities. Programs like Pay-as-You-Save (PAYS)[89] eliminate many of the obstacles such as income, credit score, and home ownership status, which frequently disqualify energy-burdened customers for loan-based or ownership-based financing programs. Other financing tools also can address affordability. For example, Michigan Saves, a nonprofit green bank with seed funding from the Michigan PSC, has financed over $325 million in energy efficiency and renewable energy projects. Financing is available for credit scores as low as 600. In addition, Michigan Saves partnered with DTE Energy on a bundled loan and rebate pilot program to target households with incomes up to 300% of federal poverty level who may not otherwise qualify for traditional financing. The utility program provides significant rebates to help keep the cost of the loan low. The rebate amount is tiered based on income. The monthly energy savings, combined with the rebate and resulting lower monthly financing payment, help ensure customers do not incur large added expenses.[90]

California has instituted a rebate of $2,500 for residents who purchase or lease a new clean energy-powered vehicle and have household incomes less than or equal to 400% of the federal poverty level.[91] The rebate is above and beyond the existing rebate for clean vehicles and has proven so successful that it is currently waitlisting new applicants. Utilities and regulators could direct investments into communities that have borne the brunt of energy burdens and environmental injustices, such as legacy pollution, on a scale commensurate with past damages.

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[88] Center for Biological Diversity. 2020. "New Data Underscores Urgent Need for Federal Moratorium on Utility Shutoffs." July 23, 2020. https://biologicaldiversity.org/w/news/press-releases/new-data-underscores-urgent-need-federal-moratorium-utility-shutoffs-2020-07-23/.
[89] About PAYS. https://www.cleanenergyworks.org/about-pays/.
[90] Michigan Saves. https://annualreport.michigansaves.org/.
[91] California Clean Vehicle Rebate Project. Income Eligibility. 2016. https://cleanvehiclerebate.org/eng/income-eligibility.

The federal Weatherization Assistance Program (WAP)[92] has historically played a large role in addressing energy burden but has been chronically underfunded despite its impact. WAP saw a massive influx of federal dollars from the American Recovery and Reinvestment Act of 2009; however, the investment level was not sustained beyond a few years. According to Oak Ridge National Laboratory, in program year 2010, WAP upgraded more than 340,000 homes and achieved energy savings of more than $1.1 billion (2010$) and health-related savings of more than $3.6 billion (present value). Each federal WAP dollar returned an estimated $4.50 to the economy.[93] It also supported directly and indirectly about 28,000 jobs. Additional job creation could be more targeted at marginalized communities with the right policies.[94]

The Biden Administration's Justice40 Initiative,[95] to ensure that federal agencies work with states and local communities to deliver at least 40% of the overall benefits from federal investments in climate and clean energy to disadvantaged communities, offers a strong model of commitment followed by research and data-backed program design and delivery options. The U.S. Department of Energy's Office of Economic Impact and Diversity[96] is leading this effort and is sure to shine a brighter light on equity in energy decision-making.

Other federal government contracting vehicles[97] often require certain percentages of contracts to go to disadvantaged companies, such as minority-, women-, or indigenous-led companies. Utilities and regulatory commissions can do the same, which would promote economic development and wealth-building in disadvantaged communities. Considering the scale of the opportunity to transition to clean energy and remediate environmental injustices, such mechanisms would have a two-fold impact: (1) by fixing environmental damage holding many communities back and (2) by safely employing local residents to improve their own communities.

Although some regulators may not consider these racial, economic, environmental, and public health considerations their top priority, accepting this interconnectivity is central to advancing equity in utility regulation.

1.7 Public Accountability

Given countless pressures from managing their daily lives, most Americans pay little attention to public utility commissions or understand the critical role they play in keeping electricity services affordable and equitable. Legislatures also may pay little attention to utility regulation until a crisis hits and makes the situation unavoidable. Governing from crisis to crisis has done little to fundamentally shift the status quo that preserves inequity in the energy system. Building awareness around regulatory roles is directly related to advancing equity because equity does not happen on its own. Public utility commissions and state legislatures will need to be held accountable for their roles in addressing inequities in the current energy system, as well as their responsibilities to resolve such inequity moving forward.

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[92] Administered by the U.S. Department of Energy (DOE), WAP provides weatherization improvements for low-income households, reducing their energy costs while ensuring their health and safety. https://www.energy.gov/eere/wap/weatherization-assistance-program.

[93] Tonn, Bruce, David Carroll, Erin Rose, Beth Hawkins, Scott Pigg, Daniel Bausch, Greg Dalhoff, Michael Blasnik, Joel Eisenberg, Claire Cowan, and Brian Conlon. 2015. Weatherization Works II – Summary of Findings from the ARRA Period Evaluation of the U.S. Department of Energy's Weatherization Assistance Program. Oak Ridge National Laboratory. ORNL/TM-2015/139. https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRecoveryActEvalFinalReports/ORNL_TM-2015_139.pdf.

[94] Atkin, E. 2020. "The WAP we need." *Heated,* August 17, 2020. https://heated.world/p/the-wap-we-need.

[95] Young, Mallory, and McCarthy.

[96] Energy.gov. Promoting Energy Justice. https://www.energy.gov/promoting-energy-justice.

[97] SBA. No date. 8(a) Business Development program. https://www.sba.gov/federal-contracting/contracting-assistance-programs/8a-business-development-program.

It is unlikely that regulators across all 50 states will address energy equity without significant outside pressure. That pressure can come in many forms, including changes to state law. However, achieving equity in utility regulation fundamentally requires that regulators and stakeholders of marginalized communities better understand the energy system and the root cause of related energy inequities. This has been demonstrated by campaigns such as "Fight the Hike" to oppose Georgia Power's proposed rate and fee hike.[98] Organizers with PSE and its Just Energy Circle member groups mobilized over 100 community members from Atlanta to Savannah in various roles such as field engagement leaders, demonstrators, sign-makers, and data gatherers. Many attended public town hall meetings, where they spoke directly with members of the Georgia PSC, and more than 30 community residents provided public comment. Most were engaging with the commission for the first time. Many had participated in PSE's Just Energy Academy, a seven-month leadership development program created to educate, engage, and activate seasoned and aspiring community leaders across the South to become energy justice advocates in their communities.

2021 Just Energy Academy cohort

Building from this engagement, PSE organizers were able to activate and partner with many of the same, as well as new, residents after the onset of the global pandemic. After joining with Center for Biological Diversity and other national groups, PSE took a national position on the issue of utility shutoffs. The alliance activated more than 575 utility justice, labor, faith, consumer, and environmental groups to sign a letter to state governors, mayors, and utility regulators, urging them to put a moratorium on electricity and water utility shutoffs in response to the COVID-19 crisis and resulting job losses.[99] The letter[100] also called for deeper policy changes that deploy distributed solar and establish PIPP programs to address systemic issues leading to utility shutoffs. At the state level, PSE, Southern Environmental Law Center, and Just Energy Circle member groups mobilized residents and ally organizations to oppose the Georgia PSC recommendation to resume utility disconnections. Over 30 groups signed a letter to the commission that cited concerns about its decision to lift the moratorium on utility shutoffs during the ongoing pandemic[101] and during the second-hottest July on record for the globe.[102]

Both letters described the systemic inequities related to these issues, as well as long-term solutions such as distributed solar and PIPP programs. While focused on the shutoffs and high energy burdens, the Georgia letter also stressed the need for "equal, if not greater, focus on: (1) securing the data necessary to fully understand the scope and detail of COVID-related customer arrearages; (2) developing and implementing a plan governing the Company's interactions with affected customers going forward; and (3) encouraging affected customers to participate in the Company's DSM [demand-side management]

[98] Smith, N., and C. Farley. 2019. "Opinion: Power rate hike would hurt low-income folks." *The Atlanta Journal-Constitution,* December 18, 2019. https://www.ajc.com/news/opinion/opinion-power-rate-hike-would-hurt-low-income-folks/AJq3zLXtL3Vg5oXQez8OlK/.

[99] Center for Biological Diversity. 2020. "In Coronavirus Crisis, 575 Groups Urge Halt to Electricity, Water Shutoffs." March 19, 2020. https://biologicaldiversity.org/w/news/press-releases/coronavirus-crisis-575-groups-urge-halt-electricity-water-shutoffs-2020-03-19/.

[100] Letter re Coronavirus and Electricity. 2020. https://www.biologicaldiversity.org/programs/energy-justice/pdfs/Signon-Letter-re-Coronavirus-and-Electricity.pdf.

[101] Southern Environmental Law Center. 2020. "GA Public Service Commission fails to protect customers from utility shut-offs." https://www.southernenvironment.org/news/georgia-public-service-commission-fails-to-protect-customers-from-utility-shut-offs/.

[102] According to the National Oceanic and Atmospheric Association's National Centers for Environmental Information.

offerings, which would help those customers manage their electric bills, while avoiding the compounding of current bad debt and the creation of future bad debt."[103] The commission did not vote to extend the moratorium, although commission staff recommended an extension to October 2020. However, Georgia Power agreed to provide basic data on shutoffs. While these data do not include any information on equity indicators such as race, income, or zip code, it is an example of how access to data can support equity in utility programming. Advocates and the public now have access to shutoff and arrearages data through the Georgia PSC website. This information is already being used by environmental groups, consumer advocates, and energy justice activists to tailor energy efficiency program proposals.

Just Energy Circle meeting

Connecting the dots between energy, racial injustice, economic disinvestment, health disparities, and other associated equity challenges becomes a clarion call for communities that are being completely left out of the clean energy economy. We must prioritize the voices and lived experiences of residents if we are to have more equity in utility regulation and equitably transform the energy sector.

Public accountability also creates opportunities for goal setting related to advancing equity in utility regulation. These opportunities include every rate case and integrated resource plan (IRP) proceeding. For example, in Minnesota, Fresh Energy has been working with Xcel Energy and advocates to move the utility towards more equitable outcomes (distributional justice) through its resource planning process. In early 2021, Fresh Energy teamed with Clean Grid Alliance, Union of Concerned Scientists, and Minnesota Center for Environmental Advocacy to file comments with the Minnesota Public Utilities Commission on Xcel Energy's IRP.[104] The groups had positive things to say about improvements that Xcel Energy made in recent years, such as doubling investment in energy efficiency programs for under-resourced customers. The filing included recommendations for more equity-centered resource planning such as "support[ing] involvement of impacted individuals and communities in program design and evaluation" and "explor[ing] the formation of an 'environmental justice advisory group' that would provide input and oversight on Xcel's planning activities."[105]

Tools exist to support utilities and energy equity advocates in this journey. We can look to racial equity formations like the Government Alliance for Racial Equity (GARE)[106] network founded by Race

[103] Southern Environmental Law Center. 2020. Re: Docket No. 42516: Georgia Power Company's 2019 Rate Case: Consideration of Staff's Recommendation on the Methodology for determining Incremental Bad Debt, and other costs incurred, due to COVID-19. https://www.southernenvironment.org/wp-content/uploads/legacy/words_docs/2020-06-15_Dkt_42516_post-moratorium_on_shutoffs_comments.pdf?cachebuster:39.
[104] Fresh Energy. 2021. "Xcel Energy's IRP: Clean energy and renewable progress undermined by plans for new fossil gas." February 11, 2021. https://fresh-energy.org/xcelenergy-irp.
[105] Fresh Energy.
[106] Government Alliance on Race and Equity. https://www.racialequityalliance.org/.

Forward. Portland,[107] Minneapolis,[108] and Seattle[109] have developed Racial Equity Impact Assessments or Racial Equity Toolkits. These tools are "designed to integrate explicit consideration of racial equity in decisions, including policies, practices, programs, and budgets."[110] They can be useful models for regulators and commission staff to employ when considering how to integrate equity in utility regulation.

1.8 Conclusion

Energy equity and, more specifically, energy justice, speaks directly to "how we plan for, invest in and regulate energy." Energy justice also illuminates a path forward that is "restorative or minimizes and reverses cumulative impacts of energy systems at local, regional and global levels."[111] When we develop a shared understanding of equity, why it matters, and the circumstances that perpetuate inequity, we can advance equity in utility regulation and clear a path for Black people, communities of color, and rural and low-wealth communities to lend their perspective to the shaping of a more just and equitable clean energy future.

[107] The City of Portland, Oregon. Racial Equity Toolkit (RET). https://www.portlandoregon.gov/oehr/71685.
[108] Minneapolis. REIA: Racial equity impact analysis. https://lims.minneapolismn.gov/Download/File/4827/REIA_Process_Guide.pdf.
[109] Seattle Office for Civil Rights. Racial Equity Toolkit. https://www.seattle.gov/civilrights/what-we-do/race-and-social-justice-initiative/racial-equity-toolkit.
[110] The City of Portland, Oregon. Equity Initiatives. https://www.portlandoregon.gov/oehr/62223.
[111] Salter, Raya, Carmen G. Gonzalez, Elizabeth A. Kronk Warner (eds.). *Energy Justice: US and International Perspectives.* United Kingdom, Edward Elgar Publishing, Incorporated.

2.0 A Consumer Advocate's Perspective on Equity in Electric Regulatory Decision-Making

by John Howat and Jenifer Bosco, National Consumer Law Center

2.1 Introduction

Home electric utility service is vital to health, safety, and economic security, both for individual households and communities at large. Affordable and reliable electric service also supports state and federal climate goals that include beneficial electrification.[112]

While all families should have access to uninterrupted electric service, that is not a priority in the current policy climate. However, support for mitigating measures that protect access to electric service, such as percentage of income payment programs (PIPP) and arrearage management programs, increased in several states during the COVID-19 pandemic and resulting economic hardship. The following principles should be incorporated into efforts to maintain electric service for economically disadvantaged households:

- Involuntary disconnection of electric service due to nonpayment should never be the preferred or default collections tool of utility companies.

- Disconnection policies should be revisited and rewritten to reverse the legacy of systemic discrimination and racism, which results in disproportionate numbers of Black and Latino households suffering involuntary disconnection of utility service.

- At a minimum, policymakers and regulators should adopt enforceable protections to maintain service for vulnerable populations, such as elders, those with serious illnesses, those who must rely on medical devices powered by electricity, and those experiencing extreme hot or cold weather.

Such principles are frequently in conflict with traditional cost causation ratemaking tenets for cost-of-service utility regulation. Ratemaking processes are often disconnected from the societal outcomes of regulatory decisions. Where necessary, legal authority of regulatory commissions should be expanded to ensure that equity and other public policy considerations are reflected in regulatory decisions outcomes. A growing understanding of systemic racism and economic inequalities, coupled with the real-time experience of watching such inequities play out with disastrous consequences for the larger community and regional economies during the COVID-19 pandemic, illustrate the need to evolve traditional ratemaking principles to reflect and address these realities.

Legislation in a number of states has directed utility regulators to include equity considerations in their decision-making.[113] This shift follows previous initiatives that incorporated programs to address climate

[112] *Beneficial electrification* may be defined as electrification that meets at least one of the following three goals, without adversely affecting the other two:
"1. Saves consumers money over the long run;
2. Enables better grid management; and
3. Reduces negative environmental impacts.";
Farnsworth, D., J. Shipley, J. Lazar, and N. Seidman. 2018. *Beneficial electrification: Ensuring electrification in the public interest.* Regulatory Assistance Project.

[113] See the Executive Summary in this report, referencing recent state laws.

change into utility ratemaking decisions—e.g., through the adoption of renewable portfolio standards, energy efficiency programs, electric vehicle (EV) programs, and solar energy incentives.

Where such legislation includes performance-based ratemaking (PBR), benchmarks should include affordability metrics defined by evidence of decreasing disconnections, fewer payment arrangement defaults, and increased energy assistance engagement as evidenced by monitoring of zip code disconnection rates.

Regulatory structures can protect vulnerable populations while also working to reduce greenhouse gas emissions and slow climate change. As electric utilities, regulators, state and federal policymakers, and a broad range of public- and private-sector stakeholders grapple with the challenges and opportunities presented by technological advances and rapidly changing energy resource economics, there is a pressing need for regulatory reform to ensure equity in the transition to clean electricity systems. In the transition, any proposed utility investment and service delivery proposals should be geared toward achieving *both* equity and clean energy imperatives.

These imperatives are not mutually exclusive or conflicting. Rather, the transition to cleaner electricity systems presents opportunities to meaningfully address the inequities that characterize the existing system. The transition to decarbonized generation, transportation, and building end uses can and should result in enhanced access to affordable service[114] rather than exacerbating payment difficulties and service access challenges for those who struggle most to maintain electricity service.

In this essay, we illustrate that under existing electric utility structures, household energy security—including access to affordable service without involuntary disconnections, not forgoing non-electric necessities such as food and health care, and maintaining healthy indoor temperatures—is inequitably distributed. In addition to highlighting inequities in the electric energy system, we discuss regulatory and utility decision-making changes necessary for enhanced equity in the transition to a cleaner electricity systems economy and outline programs and policies needed to mitigate existing inequities going forward. Our objectives in a "just transition" to a clean energy system include the following:

- Reverse the regressivity in the distribution of energy system and resource costs and benefits through comprehensive and proactive actions that at a minimum address these issues:
    - While all households require basic lighting, heating, cooling, and refrigeration, lower income households must devote a greater proportion of income to maintain basic service.
    - Access to on-site energy generation, storage, and efficiency technologies—and the bill savings and resilience benefits they can provide—is not an equal opportunity proposition. Higher-income households are more likely to gain access to the economic benefits of distributed energy resources and to bypass much of the cost of grid maintenance and modernization. The potential to benefit from emerging and mature energy resource technologies is often dependent upon a customer's access to up-front capital or financing on favorable terms. Detailed knowledge of energy markets, emerging energy resource technologies, and financial analysis are also required for individual consumers to make prudent energy investment decisions. Clearly, not all customers fit this new energy investor profile.

- Ensure uninterrupted, affordable access to a basic level of service by offering programs designed to avoid customer disconnection.

[114] Access to affordable service in the transition to cleaner energy resources should include assurance that low-income households and marginalized communities are not strapped with stranded costs of natural gas distribution systems.

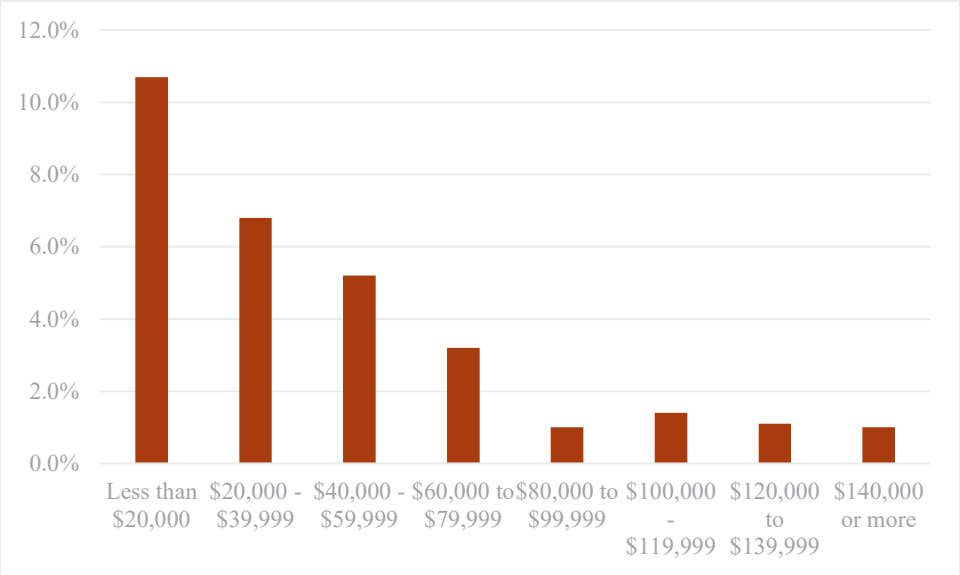
Careful planning and regulatory and other public sector interventions are required to ensure that the evolving energy system injects economic progressivity to existing systems. The evolving energy system should therefore incorporate rate design, cost allocation principles, programs, and policies to reverse the regressivity built into the current systems.

2.2 Historical Inequities in the Allocation of Energy System Costs and Benefits

Results of the most recent U.S. Energy Information Administration Residential Energy Consumption Survey (2015) clearly demonstrates that lower-income households experience unwelcomed loss of heating and cooling service due to unaffordable utility bills at a pace that far exceed those of higher-income households. Similarly, households of color experience loss of service more frequently than white households. Further, glaring disparities are observed in other measures of household energy security deficiencies, including forgoing necessities to pay for utility service, maintaining unhealthy indoor temperatures, and receipt of service disconnection notices.

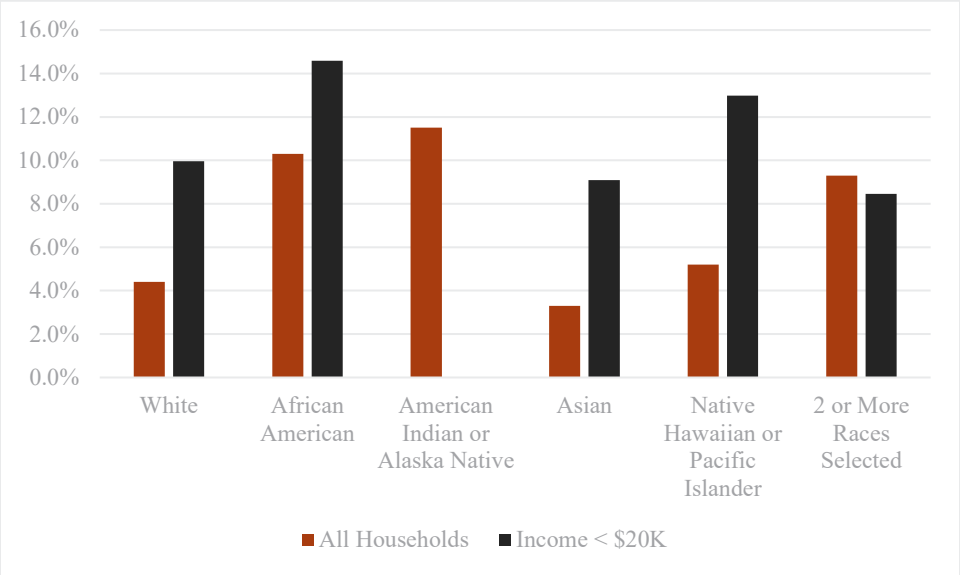
Following is a series of graphs illustrating these disparities by household income, race, and ethnicity. Figure 1 and Figure 2 show the impacts of these factors on loss of home heating for all fuels.[115]

Figure 1. Loss of Home Heating by Annual Gross Household Income



[115] Unless otherwise noted, data and charts in this section reflect crosstabulations of U.S. Department of Energy, Energy Information Administration (EIA), 2015 Residential Energy Consumption Survey microdata—the most recent data available. https://www.eia.gov/consumption/residential/data/2015/index.php?view=microdata. Data with insufficient sample size were omitted.

Figure 2. Loss of Home Heating by Race



Households with 2015 income less than $20,000 reported losing home heating service at a pace more than five times higher than households with 2015 income over $80,000 (Figure 1). Households of color were far more likely than those with a white householder to report loss of heating service (Figure 2).

Table 1 shows differences in loss of heat by primary heating fuel. The percentage of households losing heat was much higher for households using deliverable fuels—for example, propane, and fuel oil—than electric or gas heating customers. Households using deliverable fuels do not have access to regulatory protections limiting disconnections and requiring deferred payment agreements as an alternative to disconnection.[116] The extent to which households using deliverable fuels are more likely to experience loss of heating than those served by regulated utilities is relevant to the design and implementation of policies and programs to promote building electrification.

Table 1. Loss of Heat Due to Unaffordable Utility Service/Fuel or Heating System Repair

Primary Space Heating Fuel	Percent of Households Losing Heat (%)
Electricity	4.8
Natural gas	4.4
Propane	8.8
Fuel oil	9.2
Wood	4.9
Other fuel	9.8

[116] See Section 2.4.2, below, for a discussion of the regulatory consumer protection framework.

Figure 3 and Figure 4 show the impacts of household income and race on loss of home cooling. Even after selecting only those households with income below $20,000, profound racial disparity persists. Disparities carry over to ethnicity. For example, in 2015, 7.3% of Latinx households lost heat due to unaffordability, compared to 4.9% of other households.[117]

Figure 3. Loss of Home Cooling by Annual Gross Household Income

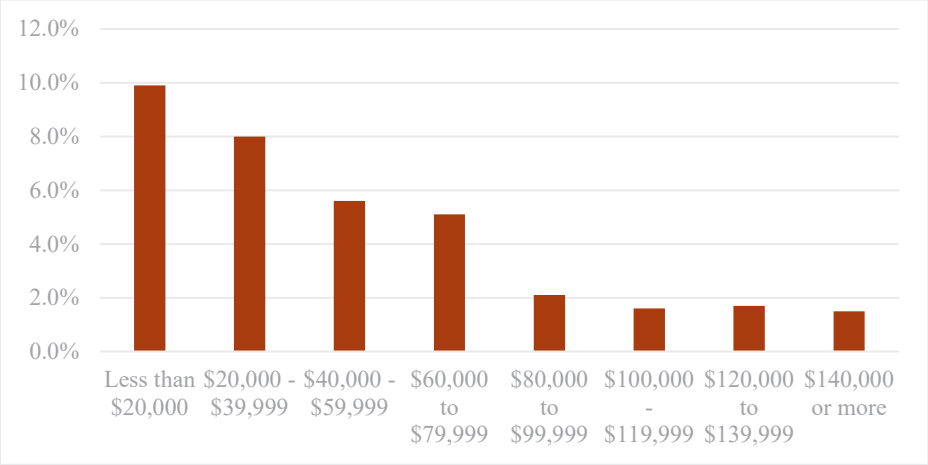
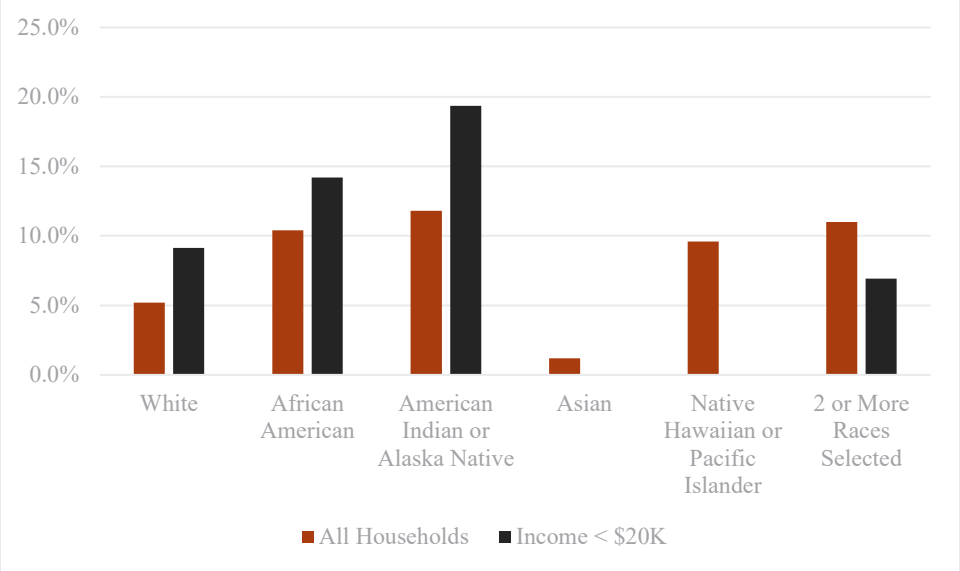


Figure 4. Loss of Home Cooling by Race



[117] Some 8.9% of Latinx households lost cooling due to unaffordability that year, compared to 5.4% of other households.

Inequality also is evident in frequency of households forgoing other necessities to pay for home energy service (figures 5–7) and receipt of utility disconnection notices (figures 8–11). These graphs cover all fuels. Unaffordable home electricity service leads not only to direct loss of that service, but also can be linked to other outcomes that have profound impacts on health, safety, and general well-being. For example, the EIA's 2015 Residential Energy Consumption Survey (RECS)[118] includes a question about forgoing necessities, including food and medicine, to pay for home energy bills.[119] Responses to this question establish the links between unaffordable home energy services (including electricity service), food insecurity, and compromised health care.[120] Figures 8–11, pertaining to receipt of disconnection notices, are relevant to the broader discussion of household energy security and the links between the threat of service loss and forgoing necessities. For households with insufficient income to pay for basic necessities, disconnection notices signal an emergency situation requiring drastic measures to retain access to essential service.

The racial and ethnic disparities in utility service access, credit, and collections outcomes are not only attributable to disparities in personal income, but also to the gap in wealth.[121] Black and Latinx families have considerably less wealth than white families. Black families' median and mean wealth is less than 15% that of white families, at $24,100 and $142,500, respectively. Hispanic families' median and mean wealth is $36,100 and $165,500, respectively.[122] Lack of assets, combined with relatively low, unpredictable income, create challenges staying connected to home electricity service. Absent purposeful action to reverse historic inequities, these challenges are likely to become more pronounced, even as electricity becomes more prevalent in building end uses.

Figure 5. Frequency of Forgoing Necessities to Pay for Home Energy Service, by Household Income

[118] EIA. No date. About the RECS. https://www.eia.gov/consumption/residential/about.php.
[119] 2015 RECS Household Questionnaire (EIA-457A), 185.
[120] For a more complete discussion of coping mechanisms used to avoid utility disconnections, *see* Hernández, D. and J. Laird. 2021. "Surviving a Utility Shutoff: U.S. Households at Greatest Risk of Utility Disconnections and How They Cope." Sage Publications.
[121] *Wealth* is defined here as the difference between gross assets and liabilities.
[122] Neil Bhutta, Andrew C. Chang, Lisa J. Dettling, and Joanne W. Hsu, Board of Governors of the Federal Reserve System. 2020. "FEDS Notes." September 28, 2020.

Figure 6. Frequency of Forgoing Necessities to Pay for Home Energy Service, by Race

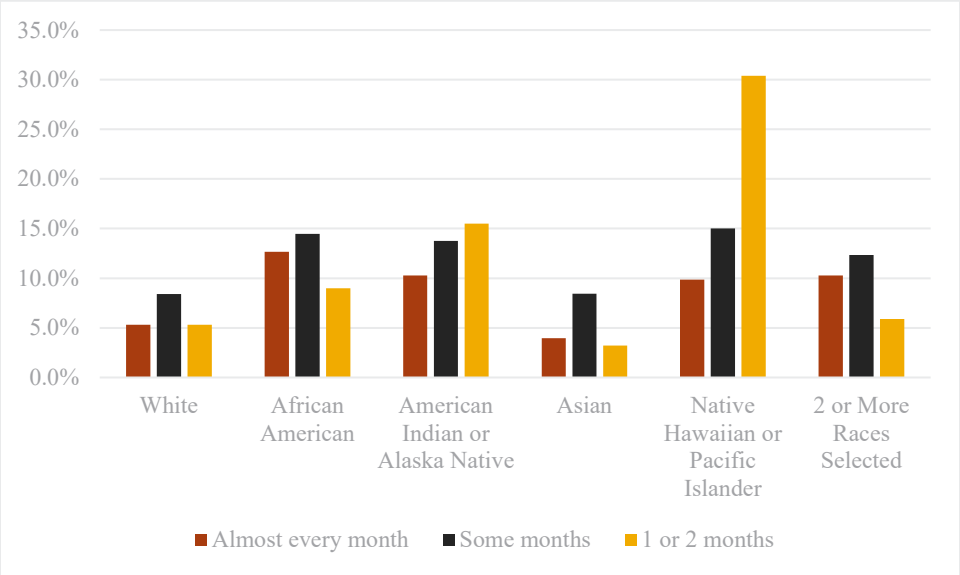


Figure 7. Frequency of Forgoing Necessities to Pay for Home Energy Service, by Ethnicity

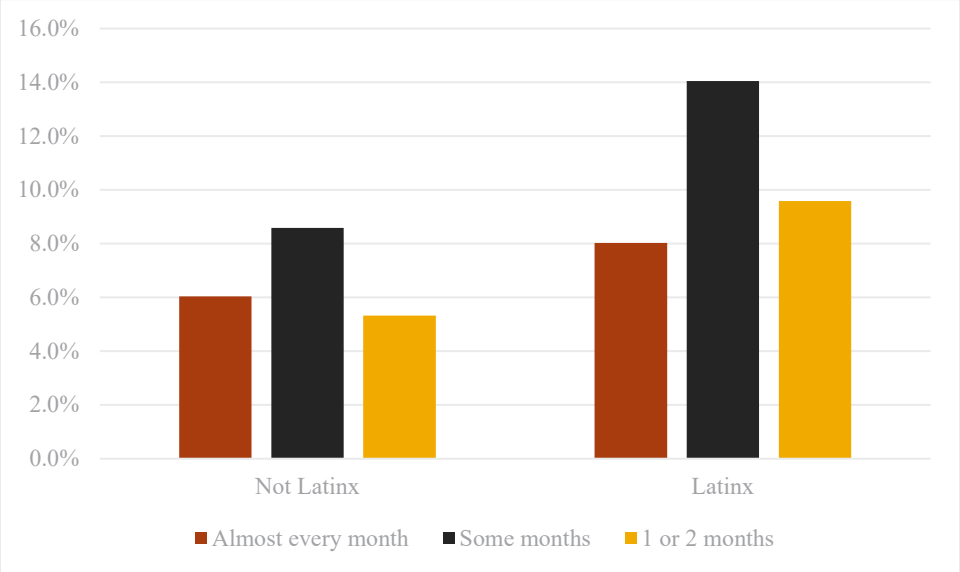


Figure 8. Frequency of Receiving Disconnection Notice, by Household Income

Figure 9. Frequency of Receiving Disconnection Notice, by Race

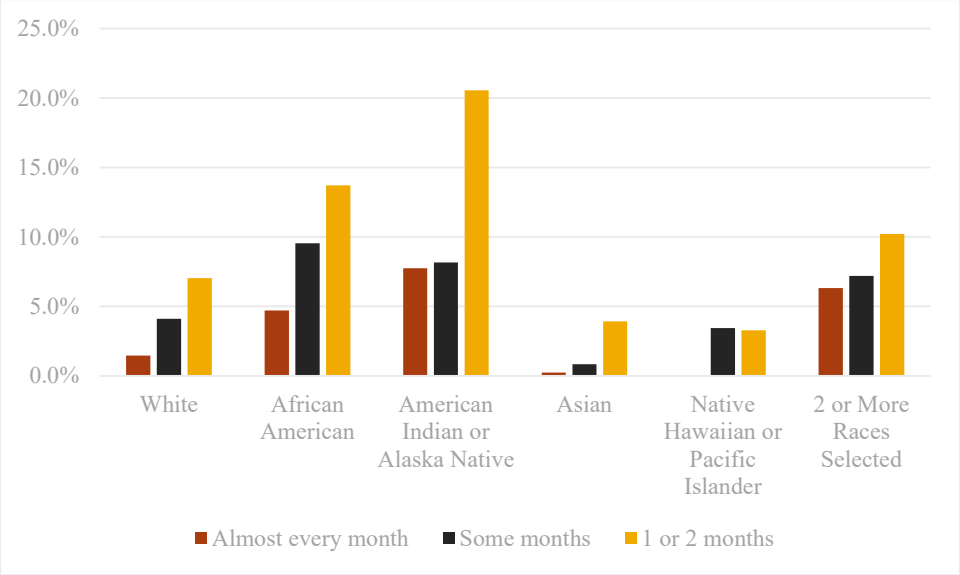


Figure 10. Frequency of Receiving Disconnection Notice, by Race, for Income <$20k

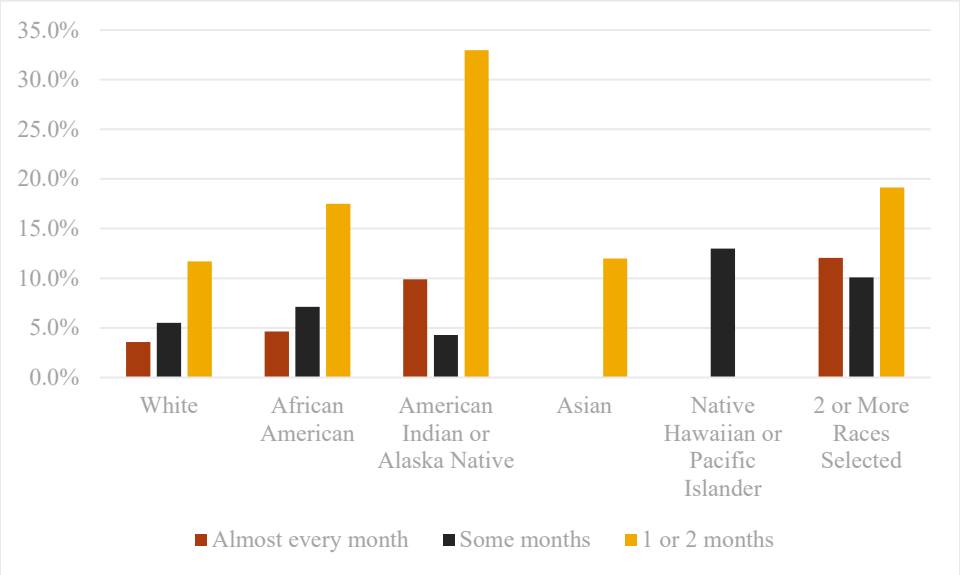
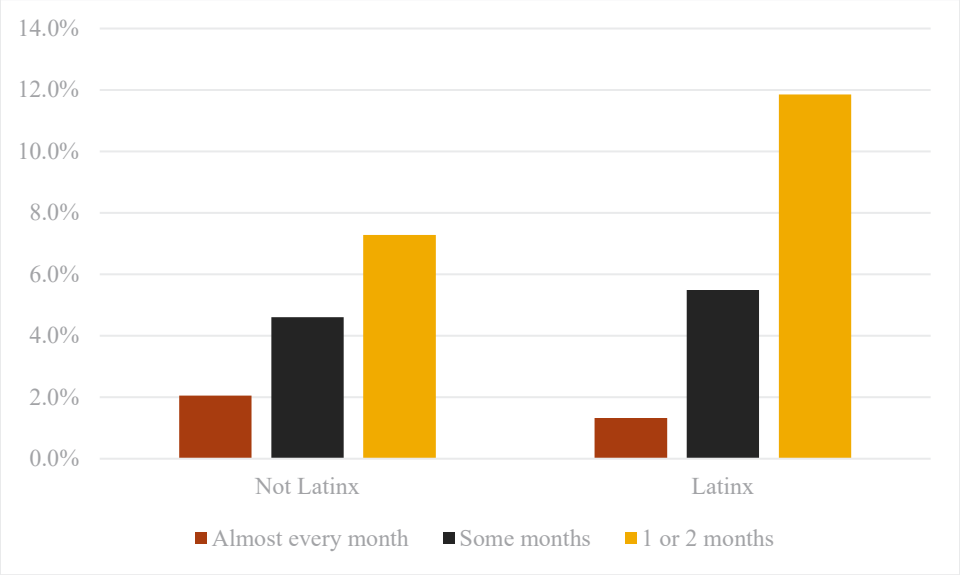


Figure 11. Frequency of Receiving Disconnection Notice, by Latinx Ethnicity



A consistent, unmistakable theme is reflected in the graphs above. Households with low incomes and households of color are particularly vulnerable to the challenges of maintaining secure access to affordable home utility service, posing risks to health, safety, and well-being. The transition to clean, decarbonized energy systems must include purposeful reversal of the undeniable inequities that are baked into the existing system.

2.3 Opportunities to Reverse Existing Inequities in the Transition: Overview of the Equity Enhancement "Toolbox" and Need for Purposeful Targeting of Resources

2.3.1 Customer, Credit, and Collections Data

In addition to survey data from the RECS,[123] effective design and implementation of clean and affordable electricity requires access to utility-specific data on residential customer counts, billing, receipts, arrearages, disconnections, and related credit and collections protocols. There is currently only limited information to gain a clear, data-driven understanding of the number of U.S. households that lose access to home energy services and otherwise struggle with utility affordability and security. Without the data, home energy affordability challenges and their often-dire consequences remain invisible, and the effectiveness of utility credit and collections practices cannot be assessed. Given the increasing importance of electricity service in the ability to function effectively and safely in society, gaining access to detailed, time series credit and collections data to assess the energy security "state of the field" is a matter of great public policy importance.

Further, development and implementation of effective programs and policies to address electricity access and affordability challenges is thwarted by lack of data. There is a pressing need to enhance utility collection and public reporting of data reflecting service disconnections and restorations, as well as other measures of household energy security.

2.3.1.1 Key Data Points

Most states do not require electric service providers to report the key data points needed to determine the extent to which residential customers are affordably accessing and retaining essential utility service. Understanding affordability and household energy security challenges that stem not only from utility bills, but also from credit and collection protocols, requires more than raw service disconnection numbers. Getting a clearer picture requires, at a minimum, obtaining the following monthly data by zip code—for both residential customers overall and identified low-income residential customers:[124]

- Number of customers
- Dollar amount billed
- Number of customers charged a late payment fee

[123] Through the tireless work of U.S. Department of Energy (DOE)/Energy Information Administration (EIA) staff, the RECS has for years provided invaluable information needed to understand patterns of household electricity usage and expenditures. This essential content is particularly relevant now as electricity system economics and technologies are undergoing rapid change. The pace of these changes, coinciding with the pressing need for data-driven analysis to drive the development and implementation of new programs and policies to effectively promote cleaner, more just electricity systems, flag the need to enhance and expand the RECS. Currently, the usefulness of the survey is limited by infrequent panels, lack of geographic granularity, and, in the case of the 2015 panel, insufficient household data. The survey is currently conducted every four years and results released at least two years later. This timing does not keep pace with technology and usage changes. With the exception of the 2009 panel, sampling for the surveys prior to the most recent (unreleased) 2020 panel limited reliable analysis to the Census Division level. Effective program design requires data that may reliably be filtered and cross-tabulated by demographic and income groups at the state or more granular level. Finally, calculation of household income-to-poverty ratios—essential to the design of effective programs to reverse existing electricity system inequities—requires reporting of respondent income in exact dollar terms or in brackets that are much tighter than those used in the 2015 survey. The 2020 survey will provide for state-level analysis, but significantly increased funding for DOE/EIA is required to administer and report with the appropriate frequency and detail.

[124] Reporting for utility affordability programs includes additional data.

- Dollar value of late fees collected
- Number of customers with a past due balance, by age of arrearage
    - 60–90 days
    - 90+ days
- Dollar value of arrearages, by vintage
    - 60–90 days
    - 90+ days
- Number of disconnection notices sent
- Number of disconnections for nonpayment
- Number of service restorations after disconnection for nonpayment
- Average duration of disconnection
- Dollar value of level of security deposits collected
- Number of security deposits collected
- Number of new deferred payment agreements entered into
- Average repayment term of new deferred payment agreements
- Successfully completed deferred payment agreements

In 2019, the National Association of Regulatory Utility Commissioners and the National Association of State Utility Consumer Advocates jointly adopted a resolution to advance utility reporting of credit and collections data. The joint resolution, which identifies a set of data points similar to those listed above, signals a growing recognition of the importance of making such information publicly available.[125] For example, the Michigan Public Service Commission required jurisdictional utilities to submit disconnections and related data on a regular basis. The data are made available to the public on the commission's website.[126]

2.3.1.2 Why Zip Code Level Reporting?

As demonstrated above, national data sets show disparities by race and ethnicity in disconnections and other important energy security metrics—even after at least partially controlling for income. These disparities raise profound racial justice concerns and highlight the importance of obtaining utility-specific credit and collections data at the zip code or even Census tract level. Geographically granular data are

[125] National Association of State Utility Consumer Advocates. 2019. Resolution 2019-07. Resolution on Best Practices in Data Collection and Reporting for Utility Services Delinquencies in Payments and Disconnections of Service. https://nasuca.org/wp-content/uploads/2018/11/2019-07-NASUCA-Data-Collection-Resolution-Joint-with-NARUC-Final.pdf.
[126] MPSC. 2021. Utility Customer Data. https://www.michigan.gov/mpsc/0,9535,7-395-93309_93438_93459-561128--,00.html.

needed to flag any disparities and to inform targeting of energy efficiency and other affordable energy programming. This level of data collection is not unprecedented. For example, investor-owned utilities in Illinois and California report disconnections and related metrics by zip code.[127] Data-driven analysis at the zip code level is needed to design and deliver effective, targeted programs and policies to reverse existing electricity system inequities and historical discrimination.

2.3.2 Bill Affordability Programs

Ratepayer-funded utility bill assistance programs currently operate in at least 30 U.S. states.[128] Programs vary widely in funding and benefit levels, eligibility criteria, administrative structures, and number of customers served. Programs range in scope from a modest customer charge discount for Supplemental Security Income or Medicaid participants in Alabama, to comprehensive electric and gas percentage of income payment plan with arrearage management offerings in Ohio funded at over $300 million annually.[129]

To help ensure household energy security for low-income residents, utility affordability programs should meet the following key objectives:

- Serve residential electricity customers who are income-eligible to participate in the Low Income Heat Energy Assistance Program (LIHEAP)
- Lower program participants' energy burdens to an affordable level
- Promote regular, timely payment of utility bills by program participants
- Comprehensively address payment problems associated with participants' current and past-due bills
- Be funded through a mechanism that is reliable while providing sufficient resources to both serve all income-eligible customers and to meet policy objectives over an extended time frame
- Be administered efficiently and effectively

This section outlines affordability program design features needed to meet these objectives. Program design features that determine the extent to which identified program objectives will be achieved include eligibility guidelines and enrollment protocols, benefit levels, comprehensive treatment of arrearages and current bills, program funding mechanism, and administrative structures. This section also compares the

[127] Illinois Commerce Commission. 2020. On Its Own Motion: In the Matter of Moratorium on Disconnection of Utility Services during the Public Health Emergency Declared on March 9, 2020 pursuant to Sections 4 and 7 of the Illinois Emergency Management Agency Act, ICC Docket No. 20-0309, Order of June 18, 2020, Appendix 1, p. 7, 16. https://www.icc.illinois.gov/docket/P2020-0309/documents/300566;
Decision 18-12-013 (Dec. 13, 2018), in CPUC R. 18-07-005, Order Instituting Rulemaking to Consider New Approaches to Disconnections and Reconnections to Improve Energy Access and Contain Costs. *See* Ordering Paragraph (OP) 6 and Appendix B. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M252/K025/252025563.PDF (zip code directions are on the last page of App B). *See also* D.20-06-003 (June 11, 2020) in CPUC R. 18-07-005, Order instituting Rulemaking to Consider New Approaches to Disconnections and Reconnections to Improve Energy Access and Contain Costs at p.36 (IOUs shall not exceed a disconnection rate of 30 percent in any zip code). In both Illinois and California, zip code level data are available on commission websites and subject to public review and analysis.

[128] *See* LIHEAP Clearinghouse 2014 State-by-state Ratepayer Funded Low-income Energy Assistance and Energy Efficiency." https://web.archive.org/web/20210318075618/https://liheapch.acf.hhs.gov/Supplements/2014/supplement14.htm.

[129] LIHEAP Clearinghouse. Ohio Ratepayer Funded Programs. https://web.archive.org/web/20210321175035/https://liheapch.acf.hhs.gov/dereg/states/ohsnapshot.htm.

predominant types of affordability programs in the United States and discusses quantification of their costs and benefits.

2.3.2.1 Program Eligibility Guidelines, Participation, and Enrollment

Unless statutorily prohibited, income eligibility for participation in a ratepayer-funded affordability program should be capped at no less than state-specific income-eligibility guidelines for the LIHEAP. All households receiving or eligible for benefits through this program should be automatically enrolled in a ratepayer-funded affordability program. Program benefits should be available to all income-eligible utility customers, regardless of immigration status. In addition, consenting households receiving benefits from other means-tested benefit programs, such as the federal Supplemental Nutrition Assistance Program (SNAP) and Medicaid, also should be enrolled automatically in the electricity affordability program. New Jersey is an example of a state with successful automatic enrollment experience.[130] Administrative costs can be minimized through implementation of a self-certification process, such as that utilized by California investor-owned utilities delivering the California Alternative Rates for Energy (CARE) low-income discount program.[131]

2.3.2.2 Program Participant Benefits

Low-income participants in an electricity affordability program funded by ratepayers should receive benefits in the form of discounted rates or fixed credits on their bills. Benefit levels should be set such that the household energy burden of low-income program participants is reduced substantially, ideally as close as possible to the energy burden of a median-income household. The Nevada percentage of income payment plan programs are required by statute to reduce participants' electric and gas burdens to the same percentage as that of a median income household.[132]

2.3.2.3 Incorporation of Arrearage Management into an Affordable Current Bill Program

To sustain participants' affordability and household energy security, program design must be comprehensive in its approach to dealing with both current bills and arrearage balances. A program that is intended to promote regular, timely payments through the reduction of home energy burdens to an affordable level is rendered less effective by a requirement that participants pay off an arrearage in addition to the affordable current bill. Simultaneous payment of preexisting arrears *and* the discounted electric bill therefore runs counter to the policy objectives of promoting affordable, regular, timely payments by program participants.[133]

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[130] In New Jersey, some applicants for SNAP, Pharmaceutical Assistance to the Aged and Disabled (PAAD), Lifeline Energy Assistance, and Medicare Part D are automatically screened for Universal Service Fund (USF) benefits and do not have to fill out a separate application. In general, this is done for applicants who pay for heat and live in a household that includes only members who are considered in determining eligibility for the USF program. https://www.lsnjlaw.org/Utilities/Help-with-Utility/Pages/NJ-EA-Programs.aspx.

[131] *See, e.g.,* PG&E's CARE application form, https://www.pge.com/pge_global/common/pdfs/save-energy-money/help-paying-your-bill/care-fera-application-large-print-en.pdf.

[132] NRS 702.250(7) provides as follows: "…if a household is eligible to receive assistance pursuant to this section, the Division:
(a) Shall, to the extent practicable, determine the amount of assistance that the household will receive by determining the amount of assistance that is sufficient to reduce the percentage of the household's income that is spent on natural gas and electricity to the median percentage of household income spent on natural gas and electricity statewide."

[133] Colorado, Ohio, and Massachusetts are examples of states that comprehensively provide benefits for low-income utility customers that include reduction of current bills and opportunities to have past due balances reduced through timely payment of current bills over a predetermined number of months.

There are two basic approaches to low-income utility arrearage management in the United States. One approach writes down customer arrears over time after a series of timely payments on current bills. The other method retires arrearage balances in full on a one-time basis. This one-time "forgiveness" model is administratively straightforward, but entails a large initial outlay of program cash resources.[134]

More gradual write-downs over a period of months may provide customers with an enhanced incentive to keep up with current bills (as long as they are affordable), while placing less strain on program cash flow. For states with a protracted arrearage write-down period, such as Illinois, which allows retirement over 18–24 months,[135] it is essential to provide considerable flexibility in allowing participants to make up for missed payments. For households lacking income sufficient to pay for all monthly necessities, it is unrealistic to assume that there will be 24 consecutive timely payments, even if current bills are reduced.

2.3.2.4 Program Funding

Funding for an affordability program needs to be sufficient and reliable. Program funding should be sufficient to provide meaningful energy burden reduction and energy security for all LIHEAP-eligible utility customers and cover necessary costs for program administration. A sustainable affordability program with set benefit levels and participation rates also requires funding that is predictable and reliable.

A uniform volumetric charge for all customer classes, approved prior to program implementation, is the optimal funding source for an effective program. However, in most states with extensive, high-participation program offerings, the largest commercial and industrial customers pay less on a volumetric basis than residential ratepayers for these programs.[136]

Creating equitable outcomes is redistributive by nature, and thus a uniform volumetric charge for funding utility affordability programs is warranted. The traditional regulatory system has resulted in regressive outcomes in allocation of electricity system costs and benefits.

2.3.2.5 Program Administration

Affordability program design should foster efficient, streamlined administrative procedures. With limited program resources available, funds should be devoted to participant benefits rather than administrative costs to the greatest extent feasible. Program administration costs of up to 10% of program benefits are required to ensure effective program intake and outreach, and to cover utility billing and information technology systems costs.[137] Minimizing administrative costs while delivering an effective affordability program requires that agencies, organizations, and individuals work together cooperatively and efficiently.

Nonprofit and community-based organizations with sufficient support from program administrative funds are ideally suited to conduct program intake and outreach functions. The agencies that certify LIHEAP eligibility could then simultaneously certify low-income rate and arrearage management eligibility using

[134] In New Hampshire, the Energy Assistance Program has from time to time provided a full, one-time arrearage forgiveness to participants.
[135] Illinois Commerce Commission, Docket 20-0309.
[136] For example, AEP Ohio customers using less than 833,000 kilowatt-hours (kWh)/month pay a volumetric charge of $0.0036634 through a Universal Service Rider. The volumetric charge for usage over 833,000 kWh is $0.0001756. Ohio Electric Distribution Utility Universal Service Fund riders from Stipulation Agreement approved by the Ohio Public Utilities Commission in Case No. 19-1270-EL-USF. http://dis.puc.state.oh.us/CaseRecord.aspx?CaseNo=19-1270.
[137] The U.S. Department of Health and Human Services allows state grantees to devote up to 10% of LIHEAP funds to be used for program administration. *See* "LIHEAP IM 2000-12 Costs for Planning and Administration."

the same procedures that currently apply to LIHEAP. In addition, auto-enrollment of participants in other means-tested benefit programs can dramatically increase affordability participation while minimizing administrative cost.

Utilities should be responsible for collecting customer charges to support the program, assigning qualified customers to a tariffed low-income rate, tracking arrearage write-down for customers who joined the program with arrears, and reporting program activities and financial transactions. All program costs, including bill credits or discounts, approved startup and ongoing administrative expenses, and approved arrearage retirement amounts, should be recoverable through volumetric charges to all customer classes.

2.3.2.6 Predominant Program Models

There are three predominant types of utility affordability programs funded by ratepayers in the United States today: (1) percentage of income payment plans (PIPPs), (2) flat percentage discounts, and (3) tiered discounts (Table 2). If well-designed and adequately funded, each of these program types have the potential to achieve key program objectives, including those related to burden reduction, broad participation, comprehensiveness in treating current bills and past due balances, utilization of adequate and reliable funding sources, and application of administrative efficiency measures. However, among the three models, PIPPs are best suited to protecting low-income households from the ill effects of increasing utility rates.

Table 2. Main Types of U.S. Utility Affordability Programs

Program Type	What Participants Pay for Utility Service	Pros	Cons
Percentage of Income Payment Plan (PIPP)	Payments are capped at a predetermined "affordable" % of income	Tailored to a household's income based on an affordability goal; particularly valuable to lowest-income participants; protects low-income households from rising retail rates	Greater administrative complexity; depending on structure, provides lower benefits for households that meet eligibility criteria but have somewhat higher incomes than other qualifying households
Flat Percentage Discount	Total utility bills are reduced by a specified % or $ amount	Relatively low administrative cost	Same discount for all eligible customers; not distinguished by individual household's income
Tiered Discounts	Distinct discount rate is applied to each income tier to achieve a predetermined limit on burden level	Tailored to household's income; determination of each household's monthly bill or fixed credit is not required	Administrative costs are somewhat higher for a tiered discount approach than a flat % discount, but less than for a PIPP

PIPP

Under a PIPP, participating customers pay a predetermined "affordable" percentage of income for utility service. PIPPs therefore target benefit levels to a household's particular income circumstances based on a predetermined affordability goal. Since separate billing and payment arrangements must be developed for each participating customer, PIPPs may entail a somewhat higher level of administrative complexity than straight discount rates. Utilities have implemented PIPPs in Colorado, Illinois, Maine, Nevada, New Jersey, Ohio, and Pennsylvania.[138]

A well-designed and implemented PIPP is the ideal "hold harmless" mechanism for protecting low-income electricity consumers from rate impacts associated with new utility capital investments, renewable energy or energy efficiency programs, or other major expenses. Since PIPP payments are capped at a predetermined percentage of participants' household income, home energy burdens do not increase as utility rates increase.

Percentage Discount

A straight percentage discount reduces the total utility bill by a specified percentage or dollar amount. The discount may be achieved through a set customer charge reduction, a usage charge reduction, or both. California and Massachusetts are two states that have adopted straight discount rates for utility customers who participate in LIHEAP.

The straight discount model reduces the energy burden of participants at a relatively low administrative cost. However, this model does not differentiate the benefit level within the broad participant group. For example, the benefit level is the same for a household living at 50% of the federal poverty level as it is for a household living at the upper limit of the income eligibility guideline. Further, barring adjustment of the percentage discount each time residential rates increase, straight discount participants are not held harmless from the financial impacts of those rate increases.[139]

Tiered Discount

A tiered discount represents a hybrid of PIPP and straight discount design elements. In a tiered discount, a series of income tiers is established (e.g., 0%–75%, 76%–125%, and 126%–150% of the federal poverty guidelines, and 151% of the guidelines up to the program income eligibility ceiling), and a distinct discount rate is applied to each tier. Tier-specific discounts are set to achieve a predetermined target burden level (e.g., 5% of household income) at the income tier midpoint. Like a PIPP, the tiered discount is designed to reduce a customer's bill to a predetermined, affordable level. Households in the lower income tiers receive a steeper discount than those in higher tiers. Thus, benefits are targeted according to a household's income circumstances, but determination of each participant's monthly bill or fixed credit is not required. The tiered discount model provides more precise targeting of benefits than a straight discount, but less precise than a PIPP.

Administrative costs are somewhat higher for a tiered discount approach than a straight discount, but less than for a PIPP. Tiered discount programs currently operate in New Hampshire and Indiana.[140]

[138] National Consumer Law Center, Access to Utility Service (6th ed. 2018), 159–176.
[139] National Consumer Law Center, Access to Utility Service (6th ed. 2018), 152–156.
[140] National Consumer Law Center, Access to Utility Service (6th ed. 2018), 157–158.

2.3.2.7 Quantification of Affordability Program Costs and Benefits

Utility regulation includes quantifying costs and benefits of investments and expenditures that have bearing on customers' rates. In many instances, such quantification is limited to energy-related costs and benefits in dollar terms. Projection and quantification of affordability program costs, particularly for a mature program, is a relatively straightforward endeavor. However, similar to quantifying and incorporating non-energy benefits in review of energy efficiency program cost-effectiveness, affordability program benefits are generally more challenging to ascertain and quantify.

Most prospective *costs* for low-income assistance programs may be readily quantified by multiplying the projected number of program participants by the revenue loss—the sum of the average monthly discount per customer and the average arrearage per customer that is retired—plus program administration costs.

Quantifying the entire range of affordability program *benefits*—including the full range of societal benefits associated with the program—presents a greater analytical challenge. For example, effective bill payment assistance programming may reduce uncollectible account write-offs. The extent to which this objective may be achieved is contingent on a number of conditions, including:

- The utility's existing bad debt profile and the extent to which uncollectible account write-offs are concentrated among low-income customers
- The income and expense circumstances of individual program participants
- Program benefit levels and reduction of participants' utility burden
- Effectiveness of outreach and targeting of "payment troubled" customers for participation
- Extent to which the program incorporates reduction of current bills with effective management of pre-program arrears
- Effectiveness of ongoing contact with program participants

In addition to challenges to quantifying bad debt reduction, the broad range of societal and participant benefits that accrue through effective low-income bill affordability programming—considerations often outside traditional cost-of-service regulatory review—also are challenging to quantify with precision. The value of enhanced household energy security and reduced service disconnections, improved health and safety, and housing security are benefits of utility affordability programs that are difficult to quantify in precise dollar terms. Similarly, societal benefits of reduced public health expenditures and the need for other transfer payments are difficult to quantify.

Nonetheless, quantification challenges do not appropriately lead to the conclusion that benefits simply do not exist. Rather, they suggest that decisions regarding adoption and implementation of low-income payment assistance programs should not hinge entirely on the results of overly simplified cost-benefit analysis.

2.4 Consumer Protections to Maintain Access to Electric Service

2.4.1 Overview

During the late 1970s through the mid-1980s, many state legislatures and public utility commissions developed new consumer protections to help ensure uninterrupted access to utility service.[141] The new rules were developed largely in response to rapidly rising electricity prices associated with the 1970s oil embargos and cost overruns on large nuclear power plant construction projects across the country. Today, in the face of sweeping economic and technological transformation of the energy sector and utility industry, and the prospect of dramatically increased reliance on electricity service in the face of electrification and decarbonization efforts, low-income and historically disadvantaged households and communities are particularly reliant upon effective consumer protections.

However, many of the consumer protection frameworks of the 1970s and 1980s are no longer effective in providing consumers with reasonable security from loss of vital service. Today's energy price levels and critical importance of service may not have been contemplated when original regulations were adopted five decades ago. As evidenced by the charts earlier in this essay, existing consumer protections have proven inadequate to provide an acceptable level of household energy security. In the meantime, the necessity of electricity service is increasing for a wider range of purposes—school, work, building end uses, and transportation.

When consumer protections are inadequate and energy security is compromised, the protections for low-income households actually work counter to the goals and objectives of federal and state payment assistance and energy efficiency programs. For example, when a state LIHEAP office scrambles to cobble together the resources necessary to keep a client from losing utility service, those efforts may be undermined by an unreasonable payment plan or onerous security deposit and late payment fee provisions. What is needed now is a state-by-state reexamination of existing utility consumer protections to ensure that vulnerable customers who demonstrate good faith efforts to make affordable utility payments are protected from loss or degradation of service.[142]

2.4.2 The Regulatory Consumer Protection Framework

Historically, electric utility rates have been regulated to protect against monopoly pricing of an essential service. Similarly, state utility regulatory authorities and legislatures established provisions pertaining to customer service so that utilities with exclusive franchise rights are precluded from delivering a necessary service in a discriminatory manner.

While utility rates are the primary determinant of what consumers pay for utility service, provisions related to late payment fees, security deposits, and other charges also determine the affordability of utility costs. Virtually every U.S. state has adopted a combination of legislation, rules, and regulations dealing with some or all of the following aspects of utility service:

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[141] The information in this section was drawn from National Consumer Law Center's *Access to Utility Service* (6th ed. 2018), Appx. A.2–A.4, 507–514. *Updated* at www.nclc.org/library; and Howat, "Regulatory Consumer Protections Primer" (*unpublished paper*), March 2006.

[142] *See also* National Consumer Law Center et al. 2021. "Essential Utility Services During the COVID-19 Pandemic and Beyond: A Roadmap to Utility Service as a Human Right." March 2021. https://www.nclc.org/images/pdf/special_projects/covid-19/IB_Utility_Service_Principles.pdf; National Consumer Law Center et al. 2021. *Implementing a Roadmap to Utility Service as a Human Right.* April. https://www.nclc.org/images/pdf/special_projects/covid-19/IB_Utility_Bill_of_Rights.pdf.

- Provision and denial of service
- Provision of consumer information
- Security deposits and advance payment for service
- Late payment fees
- Disconnection, termination, and restoration of service
- Establishment of payment plans
- Resolution of disputes between customers and utility companies

State provisions vary widely for each of these components. The following is a sampling of state provisions related to key regulatory consumer protections and customer service rules.

2.4.2.1 Disconnection Protections

Medical or Serious Illness Protections

Medical or serious illness protection rules are the primary way that states seek to prevent the health risks caused by terminating utility service for a household that includes a seriously ill individual. Typically, these rules prohibit termination of utility service when a health care professional certifies that an individual in a low-income household has a serious illness. How long the prohibition lasts and whether it can be renewed varies widely from state to state.[143] Rules in many states are limited in scope, overly restrictive with respect to the medical practitioners who may certify eligibility, and unrealistically limited in duration, even in cases of chronic conditions.

In Colorado, for example, even though service may not be discontinued or must be restored during any period when discontinuance would aggravate an existing medical condition or create a medical emergency for the customer or a permanent resident of the customer's household, certification is effective only for 60 days, with one 30-day extension period allowed. Thus, the provision provides only limited protection for those with a chronic illness. Further, a customer may invoke medical certification provisions only once during a 12-month period. Customers who secure service under this provision may enter or renegotiate installment payment plans. Those who miss a payment under the installment plan may not renegotiate terms and must become current by the expiration of the certification period to avoid disconnection.[144] Certification of a licensed doctor or health practitioner is required. Initial certification by phone is acceptable, though the utility may require written confirmation within 10 days of certification by phone.

[143] For a more complete discussion of states' serious illness protections, see Wein, O.B., and C. Harak. 2021. *Protecting Seriously Ill Consumers from Utility Disconnections: What States Can Do to Save Lives Now.* National Consumer Law Center. February. https://www.nclc.org/images/pdf/energy_utility_telecom/consumer_protection_and_regulatory_issues/Serious_Illness_Rpt.pdf.
[144] 4 Colo. Code Regs. § 723-3-13(f).

Weather-Related Protections

At least 20 states have adopted provisions that restrict electric service disconnection during periods of extreme heat or cold. In addition, at least 33 states have seasonal or date-based protections. As the frequency of climate change-related temperature extremes increases, states must reexamine these provisions to ensure they are adequate to protect health and safety.[145] As states examine their existing regulatory consumer protection structure to determine its adequacy and effectiveness, they should consider adding restrictions on disconnection for circumstances related to disasters such as wildfires and floods, which are increasing in frequency and intensity due to climate change.[146]

2.4.2.2 Payment-Related Protections

Elder and Child Protections

Many states have adopted electricity service disconnection limitations or prohibitions in cases where there is an elderly person living in a customer's household. In Hawaii, for example, disconnection of service to elderly customers may not proceed without an investigation and a written report by the utility to the regulatory commission. Elderly customers must provide proof that they are 62 or more years of age by appearing in person at the utility office or by verifying date of birth in a personal written statement.[147] In addition, at least one state has adopted protections for young children. In Massachusetts, regulated electric (and gas) utilities may not disconnect or refuse to restore a low-income customer's service if there is a child under the age of 12 months in the home and service had not been disconnected for nonpayment before the child's birth.[148]

The COVID-19 pandemic illuminated the struggle millions of households go through to maintain electricity service. Many states responded with temporary actions to enhance consumer protections during the pandemic.[149] States should consider revisiting their consumer protection structure, including potentially making permanent at least some of these enhancements, particularly in the face of increasing frequency and severity of extreme weather events and increased societal reliance on electricity.

Deferred Payment Agreements

In most states, utilities are required to offer deferred payment agreements to customers in arrears prior to disconnection for nonpayment. The availability of reasonable deferred payment agreement terms is a pivotal component of the regulatory consumer protection framework. However, the terms of such agreements in most states require large downpayments, are short in duration (resulting in large monthly installment requirements), and fail to reflect customers' financial circumstances. In many cases, a missed payment results in a punitive action: rapid disconnection or a "renegotiated" agreement with even more onerous terms.

For deferred payment agreements to be successful, they must incorporate an understanding of affordability challenges and insecure, changeable income circumstances of low-income households.

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[145] For a complete list of states' weather-related protections, see Access to Utility Service, Appx. A.1.
[146] For example, the Oregon Public Utility Commission is considering disconnection rule changes for days when the Air Quality Index (AQI) exceeds a certain level (e.g., 100 and above) or during an evacuation order—the day of and day after the order has been lifted. See UM 2114: https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=22570.
[147] Code of Hawaii Rules tit. 6 § 60-8.
[148] Mass. Gen. Laws Ch. 164, §124H; Mass. Regs. Code tit. 220, § 25.03.
[149] See NARUC. 2021. State Response Tracker. https://www.naruc.org/compilation-of-covid-19-news-resources/state-response-tracker/.

In most cases, utilities retain discretion to negotiate agreements with terms that are more generous than regulatory minimums. Utilities should negotiate agreements assuming that most customers want to pay off arrearages and be free of debt and that the financial circumstances of low-income households are fragile and changeable.

Iowa offers an example of a preferred structure for deferred payments. The state requires electric and gas utilities to offer residential customers who have received a disconnection notice an initial payment agreement of at least 12 months in duration. In setting the terms of the initial payment agreement, the utility is required to employ a "reasonableness" standard, taking into account the customer's income and expense circumstances that have bearing on ability to pay. In the event a customer makes a good faith effort—as exhibited by making at least two consecutive timely payments under the initial agreement—but then is late or misses a payment, the utility is required to offer a subsequent agreement of a term at least as long as that of the initial agreement.[150]

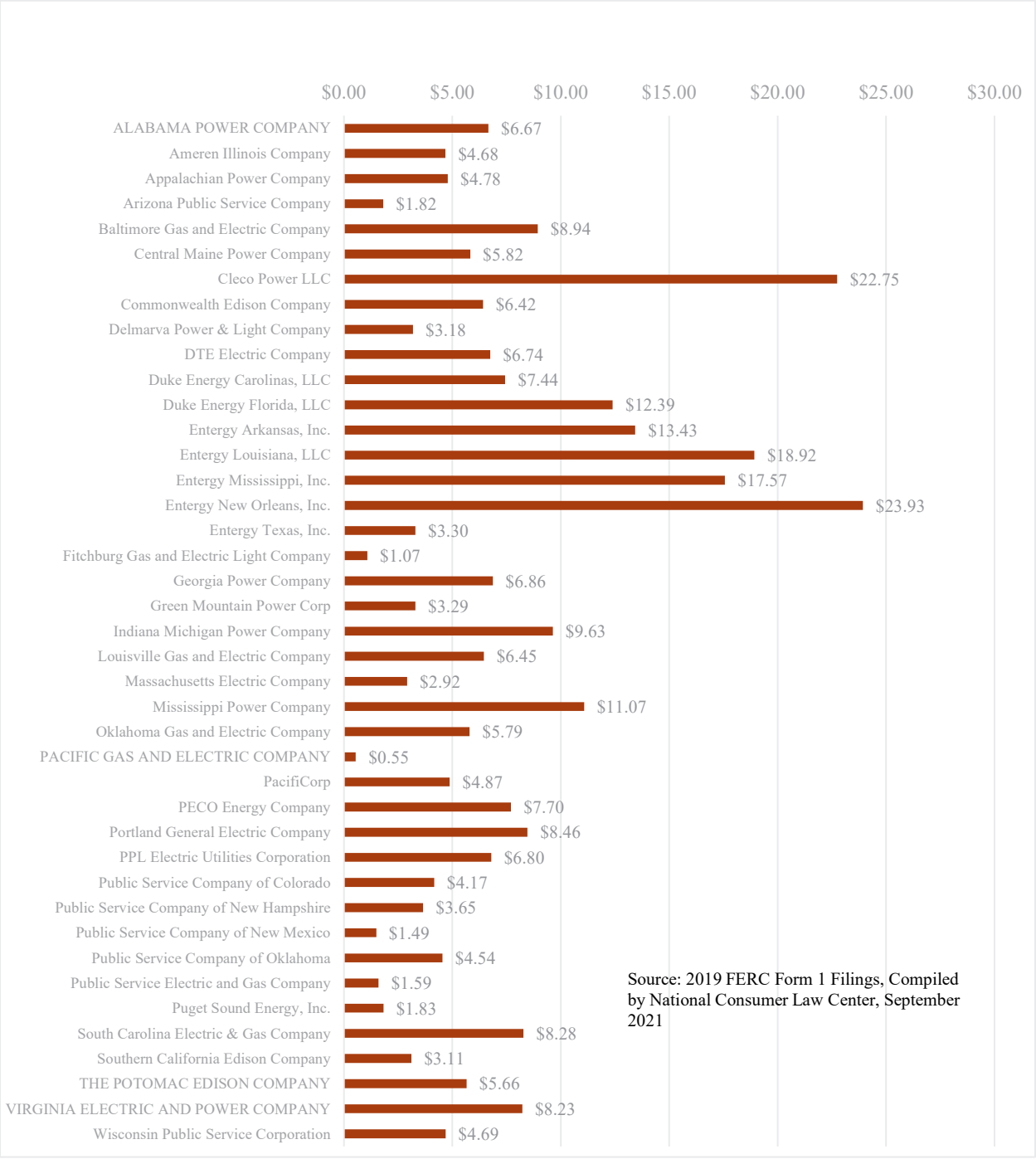
Deposits, Late Fees, and Other Customer Fees

Most states allow utility companies to require onerous security deposits, often equal to the cost of two or more average monthly bills, as a condition of providing service. For low-income households, this up-front cash requirement can serve as an impediment to establishing service. Millions of U.S. households lack the income and savings to pay for basic necessities.[151] In addition, most states allow utilities to charge late payment fees when payment arrives beyond the due date. Late payment fees, plus interest on late payments, can be highly burdensome to low-income households, adding to the total cost of maintaining necessary electricity service. Not all states allow such fees. For instance, Massachusetts investor-owned utilities are not allowed to charge residential customers security deposits.[152]

Table 3 shows the average per customer late fees collected by selected investor-owned electric utilities.[153]

[150] Iowa Admin. Code 199-19.4(11).
[151] See University of Washington. No date. Self Sufficiency Standard. http://www.selfsufficiencystandard.org/; Bhutta, Neil, Andrew C. Chang, Lisa J. Dettling, and Joanne W. Hsu. 2020. *Disparities in Wealth by Race and Ethnicity in the 2019 Survey of Consumer Finances.* September 28, 2020. https://www.federalreserve.gov/econres/notes/feds-notes/disparities-in-wealth-by-race-and-ethnicity-in-the-2019-survey-of-consumer-finances-20200928.htm.
[152] 220 Mass. Code Regs. 27.
[153] NCLC calculated selected electric utility late fees per customer by dividing late fee revenue (referred to as "forfeited discounts") reported on the 2019 FERC Form 1 by the total number of customers served. These data points may be found on page 300 of the FERC Form 1 filing. The customer counts used in the NCLC calculations included commercial and industrial customers in addition to residential customers. However, we assume for most utilities that a majority of late fee revenue comes from residential customers. NCLC selected utilities to reflect a diversity of U.S. regions.

Table 4. Late Fees per Customer – 2019



Source: 2019 FERC Form 1 Filings, Compiled by National Consumer Law Center, September 2021

2.5 Distribution of Clean Energy and Bill-Reducing Technology for Low-Income Households

2.5.1 Low-Income Principles

The U.S. Department of Energy's Weatherization Assistance Program (WAP) "reduces energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring health and safety."[154] Following are principles aligned with that mission.

Enhance Cash Flow

The WAP enabling statute references reduction of "total residential energy expenditures" as a primary purpose of the program.[155] Consistent with this provision, low-income energy efficiency and technology distribution programs should result in positive monthly cash flow for participants. This positive cash flow principle should allow for adjustments to usage to achieve health and safety objectives. In other words, a household that had previously kept the home at unhealthy or uncomfortable temperatures may be able to afford to keep the home at a safer and more comfortable temperature, which in some instances could lead to increased usage.

No Up-front Payments

WAP participants are not required to make up-front payments to receive program measures and services. This principle should apply to new programs in particular, since most low-income households, and particularly low-income households of color, lack savings and access to nonpredatory credit and other wealth resources needed to pay up front in anticipation of future savings.

No Financing Risk for Low-Income Households

Financing of energy efficiency and distributed energy resources for low-income households, including tariffed on-bill financing, should not be used to replace zero-contribution programs that fund energy efficiency or renewable energy programs for low-income consumers. Otherwise, late payment of a utility bill could result in service disconnection for nonpayment of the energy improvement portion of a utility bill. Monthly net bill neutrality should be guaranteed and verified over time for tariffed on-bill and other financing programs that aim to serve low-income customers. Further, any tariffed on-bill and other financing programs should be administered by an entity that is fully independent from home contractors and vendors, and marketing to low-income customers should not be conducted by contractors with an interest in maximizing sales. Finally, if tariffed on-bill financing is implemented in rental housing, financed measures should be limited to those that are less sensitive to changes in occupancy.[156]

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[154] U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, About the Weatherization Assistance Program. https://www.energy.gov/eere/wap/about-weatherization-assistance-program.

[155] 42 USC 6861(b).

[156] *See, e.g.,* State and Local Energy Efficiency Action Network. 2017. *Energy Efficiency Financing for Low- and Moderate-Income Households: Current State of the Market, Issues, and Opportunities*. Prepared by Greg Leventis, Chris Kramer, and Lisa Schwartz, Lawrence Berkeley National Laboratory. For an example of a program providing no-cost energy efficiency upgrades to low-income households, see National Consumer Law Center. 2014. *LEAN and Green: The Massachusetts Low-Income Energy Affordability Network (LEAN).* November. https://www.nclc.org/images/pdf/pr-reports/report-lean-green.pdf.
The California Low-Income Weatherization Program (LIWP) provides no-cost energy efficiency and renewable energy upgrades to low-income households. See California Department of Community Services & Development. 2020. *Low-Income Weatherization Program Impact Report.* November. https://www.csd.ca.gov/Shared%20Documents/LIWP-Impact-Report-November-2020.pdf.

2.5.2 Distributed Generation

2.5.2.1 Community Solar for Low-Income Households

Carefully designed community solar programs may be an option for extending access to renewable energy technologies to many low-income households. People of color and low-income households are more likely to be renters, and low-income homeowners may not have a roof or electric wiring that can support a solar installation or access to low-cost financing.[157]

Enrollment in community solar can avoid these pitfalls, but projects that are aimed at enrolling low-income customers must provide the benefits of solar technology without putting these homeowners at greater risk. Several states have examined ways of implementing such programs.[158] Strong consumer protections are needed.[159] General principles for low-income consumer protections should include the following:

- Low-income customers must not be exposed to financial harm or risk.
- Enrollment costs or fees must be prohibited.
- The community solar program should lower the household's electricity price per kilowatt-hour and reduce overall household energy costs.[160]
- Automatic enrollment of low-income customers into a guaranteed cost-saving program, accompanied by consumer education and the option to opt out, may be considered.

Projects that may emerge as models for providing affordable and accessible community solar to low-income consumers include Colorado's Solar Gardens program and Low-Income Community Solar demonstration projects, low-income community solar programs supported by funds from California Climate Investments, and the New York State Energy Research and Development Authority Inclusive Community Solar Adder program.[161] The Illinois Solar for All Program, which provides subsidies for community solar[162] and rooftop solar for low-income households, received additional support as part of the Illinois Energy Transition Act, which was enacted in 2021.[163] A settlement approved in Michigan,

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[157] *See, e.g.,* Joint Center for Housing Studies of Harvard University. America's Rental Housing 2020. https://www.jchs.harvard.edu/americas-rental-housing-2020; Divringi, Eileen. 2020. "Why Organizations Should Invest in Home Repairs to Improve Health." *Shelterforce,* February 12, 2020. https://shelterforce.org/2020/02/12/why-organizations-should-invest-in-home-repairs-to-improve-health/; Energy Clinic at Vermont Law School. 2018. Low-Income Solar Ownership in Vermont: Overcoming Barriers to Equitable Access. www.vermontlaw.edu.

[158] *See, e.g.,* Fekete, Emily. 2020. States with Community Solar Policy Updates and Capacity Grown Potential. National Renewable Energy Laboratory (NREL). November 20 (summarizing community solar policy developments in many states, including those focusing on access for low- and moderate-income consumers); Massachusetts Department of Public Utilities, Docket No. D.P.U. 20-145.

[159] *See, e.g.,* Clean Energy States Alliance. 2019. "Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market." December. https://www.cesa.org/resource-library/resource/solar-with-justice/.

[160] Recognizing that less expensive electricity could encourage the eventual adoption of appliances that increase beneficial electrification.

[161] *See* California Climate Investments webpage at http://www.caclimateinvestments.ca.gov/. *Also see, e.g.,* Dobos, Hillary, Emily Artale, Douglas Gagne, Alexandra Anzar, Joseph Pereira, Gillian Weaver, and Lindsey Stegall. 2017. Insights from the Colorado Energy Office Low-Income Solar Demonstration. Colorado Energy Office. December; Kennedy, Ryan. 2021. "New York adds $52.5 million in community solar incentives for low-income residents." *PV Magazine,* August 4, 2021.

[162] Illinois Solar for All. No date. Illinois Solar for All Low-Income Community Solar Program. https://www.illinoissfa.com/programs/community-solar/.

[163] Illinois Public Act 102-0662 (Sept. 15, 2021) (enacting Illinois SB2408).

directing DTE to establish three low-income community solar pilot programs and a Low-Income Solar Council, may yield information about successful program design or areas that need improvement.[164]

2.5.2.2 Rooftop Solar for Low-Income Households

> Many advocates for low-income consumers remain concerned about fair access to renewable energy technology, particularly the costs and benefits of rooftop solar.[165] The costs of rooftop solar have decreased over time,[166] and increasing numbers of low- and moderate-income households are now able to install solar panels compared to the costs seen a decade ago.[167] However, the technology may still be unaffordable or impractical for many low-income homeowners. Targeted assistance for low-income consumers can support the installation of rooftop solar and increase adoption without adding unmanageable financial burdens. Among these programs, subsidies supported by general state revenues, not ratepayer funding, spread program costs more broadly rather than raising utility rates.

Several states have created subsidy programs for low-income homeowners who wish to install solar. For instance, California's Single-Family Affordable Solar Homes Program operates in three utility service areas. The District of Columbia's Solar for All program covers full solar installation costs for eligible low-income residents.[168]

Leasing and financing programs developed to serve low-income customers also have been piloted in different states. Although some financing programs intended to increase access to rooftop solar have instead created additional financial hardships for customers,[169] other program designs with lower costs to the consumer and fewer potential risks have been piloted, such as the solar leasing programs through Connecticut's Green Bank.[170]

In addition, a low-income household eligible for discount rates or other protections should not lose eligibility for these assistance programs after installing solar panels.

On the demand side, energy efficiency measures should be put in place both to reduce home energy consumption and energy expenses. The federal WAP may see increased funding of $3.5 billion, allowing the program to implement more energy efficiency upgrades for low-income homeowners.[171] In addition, the U.S. Department of Energy issued a memorandum in 2017 allowing grantees to request approval to

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[164] Michigan Public Service Commission, Order, Case Nos. U-20713 & U-20851 (June 9, 2021), https://mi-psc.force.com/sfc/servlet.shepherd/version/download/068t000000PPEXYAA5.
[165] *See, e.g.,* CPUC, Order Instituting Rulemaking to Revisit Net Energy Metering Tariffs Pursuant to Decision 16-01-044, and to Address Other Issues Related to Net Energy Metering, Docket No. R20-08-020 (Aug. 27, 2020). https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:R2008020.
[166] NREL. U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark: Q1 2020, at https://www.nrel.gov/news/program/2021/documenting-a-decade-of-cost-declines-for-pv-systems.html. Also see Berkeley Lab's *Tracking the Sun* (2019) at https://emp.lbl.gov/publications/tracking-sun-pricing-and-design and Distributed Solar 2020 Data Update at https://emp.lbl.gov/sites/default/files/distributed_solar_2020_data_update.pdf.
[167] Barbose, Galen, Sydney Forrester, Eric O'Shaughnessy, and Naïm Darghouth. 2021. Residential Solar-Adopter Income and Demographic Trends: 2021 Update. Lawrence Berkeley National Laboratory, April 2021. https://eta-publications.lbl.gov/sites/default/files/solar-adopter_income_trends_final.pdf.
[168] DC Department of Energy & Environment. Solar for All. https://doee.dc.gov/node/1226501.
[169] *See, e.g.,* Burns, Rebecca. 2021. "The Subprime Solar Trap for Low-Income Homeowners" *Bloomberg News,* April 6, 2021. https://www.bloomberg.com/news/features/2021-04-06/the-subprime-solar-trap-for-low-income-homeowners?fbclid=IwAR3ydxOYYZLEobp9JQAIB1C-cuZR4bJ-8IG_RjJa_7-hLkmB7LLexqn7yz8.
[170] *See, e.g.,* Deason et al. 2021. *Performance of solar leasing for low-and middle-income customers in Connecticut: Evaluating the financial performance of the Connecticut Green Bank/PosiGen solar leasing program.* Lawrence Berkeley National Laboratory. May. https://emp.lbl.gov/publications/performance-solar-leasing-low-and.
[171] H.R. 3684. Infrastructure Investment and Jobs Act, Sec. 40551 Weatherization Assistance Program, 117th Congress (Aug. 10, 2021).

use WAP funds for solar installations in pilot programs.[172] Efficiency Vermont encourages households to pursue both energy efficiency and solar.[173]

2.5.3 Smart Meters and Time-varying Rates

As of 2019, digital meters with two-way communication capability comprised 61% of residential electric meters in the United States.[174] For investor-owned utilities, that figure was estimated at 75% in 2020.[175] These meters could provide consumers with useful, real-time information regarding electricity usage and expenditures, and are necessary to implement time-varying rates. However, advanced metering also provides utilities with the capacity to instantaneously and remotely disconnect service. Absent meaningful safeguards, this capacity threatens to exacerbate the income and racial energy security inequities outlined above. Further, mandatory time-varying rates may penalize those customers lacking the means to safely shift usage to lower-priced periods.

Also, advanced metering brings the potential for utilities to implement prepaid service, which has been shown to be concentrated among low-income households and households of color, and bring dramatically higher rates of involuntary service disconnection.[176] Yet, prepaid service rates are rarely, if ever, lower than those charged to the majority of customers who pay following the billing period.[177]

In addition, advanced metering infrastructure, including necessary communications and data management systems, are expensive. Without taxpayer support, capital and deployment costs are invariably passed through by utilities to ratepayers, with rate and bill impacts.

In light of these concerns, advanced metering should only be deployed under the following conditions:

- There should be no remote disconnection of service absent an in-person premise visit.
- Time-varying rate offerings should be optional[178] and accompanied by "shadow billing" information for all customers and "hold harmless" billing for low-income customers.[179]

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[172] U.S. Department of Energy. 2017. WAP Memorandum 024. "The Use of Solar PV in the WAP." January 17, 2017. https://betterbuildingssolutioncenter.energy.gov/sites/default/files/WAPMEMO%20024%201.17.17.pdf.

[173] Efficiency Vermont. "How to combine efficiency and solar energy to maximize benefits." https://www.efficiencyvermont.com/blog/how-to/how-to-combine-efficiency-and-solar-energy-to-maximize-benefits.

[174] U.S. Energy Information Administration, 2019 Electric Power Industry Report, Form EIA-861 detailed data files. https://www.eia.gov/electricity/data/eia861/.

[175] Cooper, A. and M. Shuster. 2021. *Electric Company Smart Meter Deployments: Foundation for a Smart Grid.* April. Prepared for Institute for Electric Innovation. https://www.edisonfoundation.net/-/media/Files/IEI/publications/IEI_Smart_Meter_Report_April_2021.ashx.

[176] *See, e.g.,* Schwartz, Jeremy. 2019. "Hostage to Heat: Lights out in a hurry – Prepaid utility plans leave some customers in the dark with little warning" GateHouse Media Texas. https://stories.usatodaynetwork.com/hostagetoheat/prepaid-utility-plans-leave-some-customers-without-electricity/.

[177] *See, e.g.,* Howat, Wein, and Lusson. 2020. "Prepaid Electric Utility Service: Assessment of Risks and Benefits to Low-Income Consumers in the District of Columbia." March 2020. *See also,* Drehobol, Ariel. 2017. "Should utility prepay plans be considered energy efficiency programs?" ACEEE. February 28, 2017 (examining potential problems with prepaid service for low-income consumers). https://www.aceee.org/blog/2017/02/should-utility-prepay-plans-be.

[178] Wood, Lisa, Ross Hemphill, John Howat, Ralph Cavanagh, Severin Borenstein, Jeff Deason, and Lisa C. Schwartz. 2016. Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives. Schwartz, Lisa C. (ed.) Future Electric Utility Regulation Report No. 5. Lawrence Berkeley National Laboratory. 27–28. https://emp.lbl.gov/publications/recovery-utility-fixed-costs-utility.

[179] While opt-out programs may result in greater participation numbers, opt-in programs for low-income consumers would be more protective by allowing each family to assess whether they can shift a significant amount of electrical load and whether it makes financial sense for the household to try a time-varying rate structure. For instance, low-income workers are more likely to work irregular schedules, and families with elders or small children may spend more time in the home and be less able to shift their electrical load. Low-income households are also less likely to have discretionary load from air conditioners, clothes dryers,

- Utilities must make a cost-effectiveness case prior to approval of advanced metering capital investments. Utilities should not be able to recover their full costs in the event that business case benefit projections do not materialize.

- All customers should have the option to obtain real-time information regarding electricity usage and expenditures and receive tools to make payments in advance of billing to build a credit balance. However, prepaid service that entails rapid disconnection upon depletion of a prepaid balance should not be permitted. Associated costs should be evaluated in a manner consistent with cost-effectiveness testing for other energy efficiency measures.

2.6 Additional Issues Related to Equitable Service

The following issues are closely aligned with equitable electricity service. In addition, policymakers and utility regulators can consider a more holistic approach to affordability for essential services provided by regulated utilities—electricity, natural gas, water, telephone, and internet.

2.6.1 Broadband

While internet and broadband access is a vital service on its own, the "digital divide" has clear implications for energy affordability and access to clean energy technology.[180] Lack of access to broadband can restrict a household's ability to use internet-connected technologies such as smart thermostats[181] or demand response programs.[182] As EVs become more affordable and common, a reliable internet connection may be necessary for drivers who want to locate public charging stations, or take advantage of certain equipment that may be used by utilities to implement demand response programs, EV time of use rates, or off-peak rebates for charging during times of low electricity demand.[183] Reliable internet access would help low-income consumers to use electrified public transit, since schedules and trip planning are most easily accessible through smartphone apps and other online planning tools.[184]

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and other appliances. *See* Golden, Lonnie. 2015. *Irregular Work Scheduling and Its Consequences.* Economic Policy Institute. April 9, 2015. https://www.epi.org/publication/irregular-work-scheduling-and-its-consequences/; O'Connor, Pete, and Mike Jacobs. 2017. *Charging Smart: Drivers and Utilities Can Both Benefit from Well- Integrated Electric Vehicles and Clean Energy.* Union of Concerned Scientists. May.; Mass. Dept. of Public Utilities, Smart Grid Pilot Evaluation Working Group, D.P.U. 10-82, *National Grid Smart Energy Solutions Pilot, Interim Evaluation Report.* February 22, 2016.

[180] For example, the United Nation's Broadband Commission established a policy recommendation to: "Include in broadband plans efforts on digital inclusion, measures to protect children online, **a focus on limiting environmental impacts and addressing climate**, and public access initiatives." See State of Broadband Report 2020: Geneva: International Telecommunication Union and United Nations Educational, Scientific and Cultural Organization, 2020 (emphasis added), https://www.unescap.org/resources/state-broadband-tackling-digital-inequalites.

[181] Smart thermostats are not an appropriate choice for all households, and careful consideration of individual household characteristics is required to determine if such devices should be installed for low-income customers. *See, e.g.,* Lusson, Karen. 2020. *Smart Thermostats: Assessing Their Value in Low-Income Weatherization Programs.* National Consumer Law Center. January. https://www.nclc.org/images/pdf/energy_utility_telecom/weatherization/rpt-smart-thermostats-jan2020.pdf.

[182] *See, e.g.,* U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. 2021. *A National Roadmap for Grid-Interactive Efficient Buildings.* May 17, 2021, 31. https://gebroadmap.lbl.gov/A%20National%20Roadmap%20for%20GEBs%20-%20Final.pdf. "Many demand flexibility programs depend on the participant having internet access, which can be a limiting factor among Low-to-Moderate-income (LMI) households," referencing the Alliance to Save Energy/Active Efficiency Collaborative, Improving Equity and Inclusion in Energy Efficiency and Demand Flexibility Programs.

[183] *See, e.g.,* Eversource. EV Home Charger Demand Response, listing a requirement that the home EV charger must have Wi-Fi connectivity in order to participate in the incentive program, https://www.eversource.com/content/wma/residential/save-money-energy/explore-alternatives/electric-vehicles/ev-charger-demand-response.

[184] *See, e.g.,* Golub, Aaron, Michael Serritella, Vivian Satterfield and Jai Singh. 2018. Community-based Assessment of Smart Transportation Needs in the City of Portland. NITC Project 1163. April. https://trec.pdx.edu/research/project/1163/Community-based_Assessment_of_Transportation_Needs_to_inform_City_of_Portland_Smart_Cities_Plan.

The digital divide is more severe for Black, Native American, and Latinx households, who experience barriers related to unaffordable or inadequate broadband service.[185] If the digital divide is not remedied, there is potential for the stacking of inequalities. In addition to disadvantaged households not having access to the opportunities empowered through digital access, they also may be prevented from benefiting from the clean energy transition as energy programs become more internet-dependent.

2.6.2 Building Electrification

Residential building electrification, and the transition away from fossil fuel appliances, can reduce carbon emissions and improve household health and safety. In particular, air source heat pumps, coupled with weatherization, can reduce energy bills for low-income households by hundreds of dollars while lowering greenhouse gas emissions that contribute to climate change. There are millions of homes in the United States with electric resistance heating, oil furnaces, or propane furnaces that, with customer education and careful design, can be retrofitted with air source heat pumps to simultaneously reduce emissions and decrease energy consumption in low-income households.[186] To maximize the beneficial impact of these installations, low-income energy efficiency programs should be designed to:

- Address the home's weatherization needs as the first step before installing an air source heat pump
- Give first priority to homes with electric resistance, oil, propane, or other deliverable fuel heating systems, as converting these homes to air source heat pumps will be financially beneficial to the household as well as the environment
- Mandate a vigorous program of outreach and education for low-income homeowners as part of the conversion plan so they are aware of programs available to assist in the conversion[187]

As building electrification proceeds, consumer advocates and utility regulators must be mindful of lower-income customers who may have difficulty affording the switch from natural gas to electric appliances and heating systems. Support for these consumers, through energy efficiency programs, bill payment assistance, and other aid, will likely be necessary to avoid the creation of a two-tiered system where low-income customers are stranded with an increasingly expensive gas utility system while higher-income customers switch to air-source heat pumps and induction stoves. State utility commissions are considering these issues in several proceedings.[188]

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[185] National Consumer Law Center. 2020. "Broadband is a Racial Equity Priority." September 2020. https://www.nclc.org/images/pdf/energy_utility_telecom/telecommunications/IB_Broadband_Racial_Equity.pdf.

[186] U.S. Department of Energy, Energy Information Administration. 2015 RECS Technical Documentation Summary, Appendix A. https://www.eia.gov/consumption/residential/reports/2015/methodology/pdf/RECSmethodology2015.pdf (estimating that 40.9 million homes use electricity for home heating, 5.8 million use fuel oil or kerosene, and 5 million use propane). See also Cluett, Rachel, Jennifer Amann, and Sodavy Ou. 2016. *Building Better Energy Efficiency Programs for Low-Income Households.* American Council for an Energy-Efficient Economy. March. https://www.aceee.org/sites/default/files/publications/researchreports/a1601.pdf (based on 2009 RECS data, finding that low-income households are more likely to rely on electricity for heat, and more frequently use more energy-intensive heating equipment, than do higher income households).

[187] Haynes, Berneta. 2021. "Air-Source Heat Pumps: Protecting the Wellbeing of Low-Income Families While Addressing Climate Change." National Consumer Law Center, July 2021. https://www.nclc.org/images/pdf/energy_utility_telecom/liheap/IB_ASHP.pdf.

[188] *See, e.g.,* California P.S.C. R.20-01.007; Colorado Proceeding No. 20M-0439G; Massachusetts D.P.U. Docket No. 20-80; New York P.S.C. Case No. 20-G-0131; Oregon P.U.C. Docket No. UM 2178.

2.6.3 Transportation Electrification

The transition to EVs holds promise for consumers, including low-income consumers, if the needs of disadvantaged communities are prioritized and if equity principles guide the transition. Policies that have been discussed in detail elsewhere[189] include:

- EV-only time of use rates and other rate design to shift EV load to off-peak hours, which creates the possibility for downward pressure on electric rates
- Prioritizing the needs of low-income communities and multifamily housing in plans for EV charging infrastructure
- EV affordability through such policies as implementing incentives for purchasing used EVs with attractive financing options
- Prioritizing affordable and reliable electric service, particularly for households that may struggle to pay their electric bills and may otherwise decide that EVs are not a feasible option

2.7 Public Participation in Regulatory Decision-Making Processes

2.7.1 Historical Exclusions and Need for Reform

The allocation of electricity system costs and benefits in the United States is beset by profound racial and economic inequities. Decisions by utility commissions and the Federal Energy Regulatory Commission (FERC) are too often based on records that are missing critical input from vulnerable and affected communities. Yet these decisions have tremendous bearing on equity, household energy security, health, and well-being of those living with low incomes and in communities affected by regulators' decisions. Public input from impacted communities can help develop a fuller record and lead to better decision-making and policies. Increasingly, regulators and industry participants have recognized the need to include a broader range of diverse stakeholders in proceedings.[190] Expanding the role of consumers, environmental justice communities, and underserved groups should be a priority at both the state and federal levels. Regulators may need to become more adept at considering input from stakeholders that is more narrative or personal than data that are traditionally presented in utility proceedings.

As described earlier, even before the onset of the COVID-19 pandemic, low-income households, and particularly households of color, disproportionately experienced household energy security challenges. Unaffordable utility bills, loss of vital service, forgoing necessities to pay home energy bills, and maintenance of unhealthy indoor temperatures continue to plague one in three U.S. families.[191] The impact on families of color is even more significant. For instance, Black households lose home heating service at almost 2.5 times the rate of white-headed households. Disparities persist even when controlling

[189] See The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives, Future Electric Utility Regulation report No. 10, by Philip B. Jones (Alliance for Transportation Electrification), Jonathan Levy (EVgo/Vision Ridge), Jenifer Bosco (NCLC), John Howat (NCLC), John W. Van Alst (NCLC), and Lisa C. Schwartz, editor. Lawrence Berkeley National Laboratory. August 2018. https://www.nclc.org/images/pdf/energy_utility_telecom/electric_vehicles_evs/future-transportation-report-2018.pdf; Synapse Energy Economics. 2019. *Making Electric Vehicles Work for Utility Customers: A Policy Handbook for Consumer Advocates.* November 25. https://www.synapse-energy.com/sites/default/files/Making-Electric-Vehicles-Work-for-Utility-Customers.pdf.

[190] *See, e.g.,* National Association of Regulatory Utility Commissioners. 2021. *Public Utility Commission Stakeholder Engagement: A Decision-Making Framework*. January, at bit.ly/PUCStakeholder.

[191] U.S. Department of Energy, Energy Information Administration. 2015 Residential Energy Consumption Survey. https://www.eia.gov/consumption/residential/reports/2015/energybills/.

for income. Among households in the Northeast with annual income at or below $20,000, African American headed households were more than twice as likely as their white counterparts to experience loss of heating service.[192] It is crucial to involve diverse communities and incorporate their input in all utility decision-making processes.

Decisions issued by state utility commissions and FERC have profound racial justice ramifications. These entities should play a role in assisting marginalized communities to participate and advocate for affordable energy pricing and resource decision-making. Following are some current and recent initiatives to build stronger public participation into electric utility regulatory decisions.

2.7.1.1 FERC OPP

As discussed in Chandra Farley's essay in this report, the FERC Office of Public Participation was established in June 2021, following an act of Congress and a FERC proceeding[193] that invited a wide range of public comments on the creation of the office. The office is intended to support a more diverse range of stakeholders to participate in FERC proceedings

2.7.1.2 FCC Public Engagement with Tribes

Although distinct from electricity regulation, the Federal Communications Commission (FCC) offers one example of government agency outreach and partnership with those who have often been marginalized in agency decision-making. The FCC's Office of Native Affairs and Policy, established in 2010,[194] is responsible for ensuring robust government-to-government consultation with federally recognized Tribes, Alaska Native Villages, and Native Hawaiian Organizations. The Office also works within the FCC to develop and implement policies for assisting Native communities and conducts regional and national Tribal consultation and Tribal training workshops to help build understanding and knowledge of FCC policies and programs. It also regularly represents the commission at national and regional inter-Tribal conferences. Although the FCC's efforts are a work in progress, the agency has taken concrete steps within its own institutional structure to be intentional about recognizing the sovereign status of Tribal nations.

2.7.1.3 State Intervenor Compensation Programs

As mentioned in Chandra Farley's essay in this report, several states have statutes that allow for intervenor compensation in utility commission proceedings. For instance, Colorado's statute allows for intervenor compensation if the issues raised by the intervenor had not been substantially addressed by the state's office of consumer counsel in the proceeding.[195] Maine also provides for intervenor compensation where the interests of the intervenor have not been adequately represented by commission staff or the state's utility consumer advocate.[196] Idaho law allows for intervenor compensation under limited circumstances, with an upper threshold of $40,000 in compensation per proceedings, for all intervening

[192] U.S. Department of Energy, Energy Information Administration. 2015 Residential Energy Consumption Survey microdata https://www.eia.gov/consumption/residential/data/2015/index.php?view=microdata.
[193] Docket No. AD21-09-000.
[194] Establishment of the Office of Native Affairs and Policy in the Consumer and Governmental Affairs Bureau, Order, FCC 10-411 (2010); *see also,* Office of Native Affairs and Policy et al. Issue Further Guidance on the Tribal Government Engagement Obligation Provisions of the Connect America Fund. Public Notice, 26 FCC Rcd 8176 (2012), https://docs.fcc.gov/public/attachments/DA-12-1165A1.pdf.
[195] CO ST § 40–6.5–105 (a); CO LEGIS 21-103 (2021), 2021 Colo. Legis. Serv. Ch. 21-103 (WEST).
[196] Me. Rev. Stat. tit. 35-A, § 1310.

parties.[197] Michigan created a utility consumer representation fund, comprised of required contributions from utility companies in the state, to support intervenor compensation. A utility consumer participation board oversees grants to avoid duplication of effort among intervenors.[198]

Wisconsin's Intervenor Compensation program permits advocacy groups to obtain funding for attorney and expert witness fees as well as their preparation of studies, displays and exhibits to enable the intervenor group to advocate in PSC cases.[199] The state Public Service Commission is authorized to award $542,500 per year in intervenor compensation.[200] Unlike in some states, where intervenor funds are awarded only after a case is completed and only after a determination that the funded testimony contributed to the case record, Wisconsin's program is authorized to provide funding either after the case is completed or while an intervenor's work on the case is ongoing. "To the extent practicable, the commission shall authorize payment within 30 days of receipt of the claim. The commission may make partial payments as a recipient's work progresses," the PSC administrative code reads.[201]

The California intervenor compensation system[202] is widely considered by stakeholders and advocates to be robust and inclusive. This California Public Utility Commission (CPUC) program[203] allows for a wide range of intervenors to receive compensation. A party intervening in a CPUC proceeding who wishes to obtain compensation must first file a Notice of Intent to claim compensation within 30 days of the initial Prehearing Conference, or such other deadline established by the presiding Administrative Judge. At the conclusion of a proceeding (or a significant portion that results in a CPUC decision), an intervenor seeking compensation must submit a detailed claim and demonstrate that its "presentation makes a substantial contribution to the adoption, in whole or in part, of the commission's order or decision." Moreover, the petitioning intervenor must show that "participation or intervention without an award of fees or costs imposes a significant financial hardship."[204]

The CPUC is directed to set compensation rates (e.g., hourly rates for attorneys and experts) that "take into consideration the market rates paid to persons of comparable training and experience who offer similar services," providing intervenors with the resources needed to retain attorneys and witnesses sufficiently skilled to effectively participate. California law requires the affected utility or utilities in a proceeding to pay the cost of any intervenor awards allowed, which in turn the utility can collect from its ratepayers.[205]

In a departure from some other state compensation programs, the intervenor in California does not need to show that they were the only party to address the issue in question, or that the CPUC relied solely on that intervenor's presentations to decide the issue. Rather, "participation by a customer that materially supplements, complements, or contributes to the presentation of another party, including the commission staff, may be fully eligible for compensation if the participation makes a substantial contribution to a commission order or decision."[206] This feature, in combination with others described above, lead to more

[197] Idaho Code Ann. § 61-617A.
[198] Mich. Comp. Laws Ann. § 460.6m.
[199] Wisc. Admin. Code, PSC 3.03. https://docs.legis.wisconsin.gov/code/admin_code/psc/3/03.
[200] Wisc. Act. 58 at 21, enacting Wisc. 2021 Assembly Bill 68 (July 8, 2021), https://doa.wi.gov/budget/SBO/2021%20Wisconsin%20Act%2058.pdf.
[201] Wisc. Admin. Code, PSC 3.03.
[202] Cal. Pub. Util. Code §1802 et seq.
[203] The CPUC has published a succinct and helpful summary of the Intervenor Compensation Program, at https://www.cpuc.ca.gov/proceedings-and-rulemaking/intervenor-compensation.
[204] Cal. Pub. Util. Code §1803.
[205] Cal. Pub. Util. Code §1806.
[206] Cal. Pub. Util Code §1802.5.

public input and participation than in other states.[207] In states with low population or small regulated utilities with limited revenue, state appropriations may be necessary to fund effective intervenor compensation.

2.7.1.4 Outreach to Stakeholders by Regulatory Agencies

California has created ongoing opportunities for greater input and participation by previously marginalized groups. Among other initiatives, California Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015, established a Disadvantaged Communities Advisory Group that conducts regular public meetings and includes representatives of environmental justice and racial justice organizations. such as the Greenlining Institute, the California Environmental Justice Institute, and others.[208]

In Massachusetts, the Department of Public Utilities recently opened a non-adjudicatory proceeding to examine how the department can expand public outreach and engagement.[209] The department also created notices in non-English languages as part of its outreach to communities not usually represented in utility proceedings.

Michigan recently created the Michigan Advisory Council on Environmental Justice, including representatives from community, environmental, and public health interests, as well as business and government representatives.[210]

2.7.1.5 Technical Assistance from Regulatory Agencies

Since utility proceedings involve technical knowledge as well as familiarity with legal process, providing an opportunity to intervene will likely not be adequate on its own. Educational materials and opportunities for stakeholders, combined with the availability of technical assistance with filing rules and intervenor compensation requests, are needed to ensure that previously excluded stakeholders can contribute to regulatory decision-making.

Grid modernization proceedings before several utility commissions, including recent proceedings in the District of Columbia, Michigan, and Ohio,[211] included technical sessions and working groups designed to encourage meaningful stakeholder participation.

2.8 Conclusion

In this essay we have shown that existing electricity systems produce measurable inequities by race and income in the distribution of system costs and benefits. We assert that policy imperatives to reverse these inequities and transition to cleaner electricity systems to mitigate climate change are not mutually exclusive. Rather, the transition to cleaner electricity systems presents opportunities to enhance affordability of electricity services and access to clean electricity generation, storage, and efficiency technologies for those disadvantaged by existing energy systems.

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[207] Additional examples of state intervenor compensation programs are GRID Alternatives et al., Low-Income Solar Policy Guide, State Intervenor Compensation (Dec. 2020), at https://www.lowincomesolar.org/wp-content/uploads/2020/12/State-Intervenor-Compensation.pdf.
[208] CPUC. Disadvantaged Communities Advisory Group. https://www.cpuc.ca.gov/dacag/.
[209] D.P.U. 21-50, https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber/21-50.
[210] Michigan Advisory Council on Environmental Justice (MAC-EJ), https://www.michigan.gov/environmentaljustice/0,9615,7-400-98505_98667---,00.html.
[211] *See* D.C. PSC Formal Case No. 1130; Michigan PSC Docket Nos. U-20645, U-20757; Ohio PUC "PowerForward" Docket No. 18-1595-EL-GRID.

We have outlined a broad range of programs and policies needed to achieve both equity and cleaner electricity objectives and note that regulatory reform is required for approval of program funding and implementation. Pure, unmodified cost-of-service and cost causation ratemaking principles are no longer viable in an era when investments in decarbonization *and* equity are mandatory to societal and environmental quality. In short, the transition to clean, decarbonized energy systems must include purposeful legislative and regulatory action to reverse the undeniable inequities that are baked into the existing systems.

3.0 Making More Room at the Table: A Utility Perspective on Energy Equity

By Nidhi Thakar and Jake Wise, Portland General Electric[212]

3.1 Introduction

When Portland General Electric (PGE) envisions the future of our industry and its place in our society, we are inspired by the clean energy transformation we see emerging today, along with the environmental benefits, economic advantages, and job opportunities that come with it. We see a flexible, resilient, and reliable two-way power grid that lets customers choose when and how to use energy, partnering with their utility to balance demand with emissions-free generation, storage, and other flexible load resources in a smart, climate-friendly energy system.

Deeply ingrained societal inequities, however, make it harder for some people to access energy-saving and clean energy programs and technologies. These inequities also make it challenging for them to make their voices heard in regulatory processes that guide collective decision-making and establish channels for access to clean energy. For everyone to benefit from a clean energy future, we must overcome economic and cultural barriers—including linguistic barriers—to ensure affected communities have a seat at the table when making these decisions.

The unfortunate reality is that the power system today in many ways shifts costs from higher-income customers to lower-income customers, creating disproportionate burdens on those least able to shoulder them. Everyone needs electricity, but the poor pay a higher proportion of their income to get it, and typically require more energy to achieve the same services—food storage, heating and air conditioning, etc.—because they cannot afford efficient housing or appliances.

As an essential service provider and a fully regulated utility, PGE will play a critical role in delivering Oregon's clean energy transition equitably to all. We are uniquely situated in the market to act on state policy goals—and to be held accountable to those goals in ways that the unregulated market is not. Electricity powers how our customers live, work, learn, and play: We must continue our intentional efforts to transform the energy system in an inclusive manner that addresses historic—and current—disparities.

As a working definition, when we talk about *equity* at PGE, we are talking about the need to address historic and systemic barriers that have prevented and continue to prevent the progress and participation of underrepresented groups, in support of fostering equitable outcomes for all. PGE seeks an equitable, clean energy future in which everyone can participate. Effective utility planners know that designing programs and solutions in collaboration with their communities (instead of *for* them) produces better and more enduring outcomes. Not only does engaging with the communities served "bring the genius of a much broader group of constituencies to the task of developing…roadmaps and policies [but in addition] the active support of those broader constituencies can help secure new policies and resources necessary to implement the strategies identified in roadmaps."[213]

[212] Thanks to PGE contributors Brooke Brownlee, Steve Corson, Rachel DeRosia, Allison Dobscha, Jason Salmi Klotz, McKena Miyashiro, Mini Ogle, Sunny Radcliffe, and Karla Wenzel.

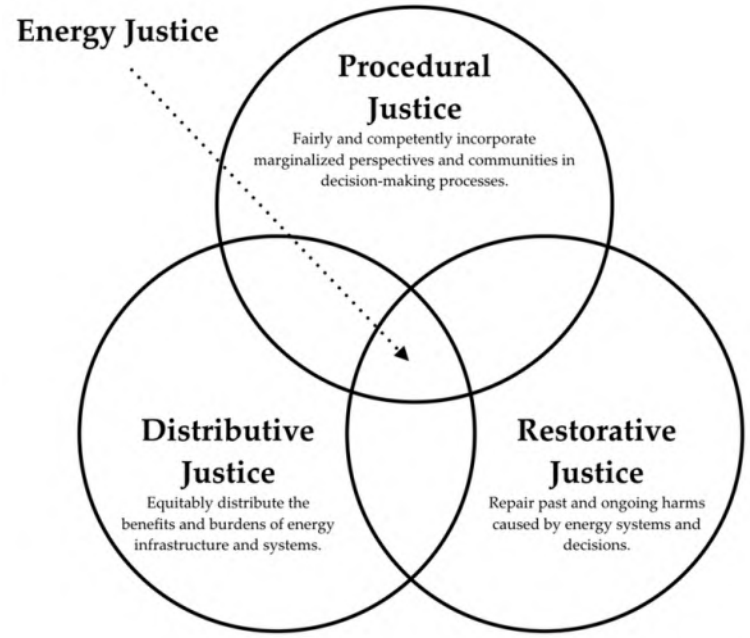
[213] Race Forward. 2019. *Equity Assessment Tool. Zero Cities Project.* Urban Sustainability Directors Network (USDN). https://www.usdn.org/uploads/cms/documents/equity_assessment_tool_-zero_cities_project_-_race_forward_2019.pdf.

Our state has ambitious goals to reduce greenhouse gas (GHG) emissions that contribute to climate change.[214] To achieve those goals we will all need to make this clean energy transition. If we fail to engage all of our communities, however, we are at risk of leaving some behind. We are also at risk of generating needless friction among advocates if the benefits of clean energy solutions are unfairly distributed. That is not just inequitable, saddling those left behind with potentially higher costs and other quality-of-life detriments, it's also a recipe for failure as we work to decarbonize and electrify in both the traditional electricity sector and in the transportation sector, our primary tools for creating a climate-friendly energy economy.

Customer adoption of new technologies—rooftop solar, battery storage, smart thermostats, and electric vehicles, among others—will play a critical role in the clean energy transformation. At the same time, these technologies have the potential to amplify existing disparities in how we generate, use, and conserve energy if they are not deployed thoughtfully and purposefully. By increasing opportunities for all to take advantage of these technologies, and by paying special attention to communities suffering disproportionate burdens—by striving for energy justice—we improve our collective success in achieving shared goals and benefits.

This essay explores the three core energy justice principles depicted in Figure 12 with thoughts on energy justice overall and then further elaborates on how we are working to address its components—procedural justice, distributive justice, and restorative justice—in our regulatory relationships and service to customers and communities.

Figure 12. Core Energy Justice Principles[215]



[214] H.B. 2021. Oregon Legislative Assembly. https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB2021/Enrolled

[215] Wallsgrove, R., J. Woo, J.-H. Lee, and L. Akiba. 2021. "The Emerging Potential of Microgrids in the Transition to 100% Renewable Energy Systems." *Energies* 14(6): 1687. https://www.researchgate.net/publication/350165950_The_Emerging_Potential_of_Microgrids_in_the_Transition_to_100_Renewable_Energy_Systems. Adapted from McCauley, D., and R. Heffron. 2018. "Just transition: Integrating climate, energy and environmental justice." *Energy Policy* 119: 1–7. doi:10.1016/j.enpol.2018.04.014.

We are offering our perspectives and some examples of our efforts in the spirit of sharing to support an active dialogue around this topic in the energy industry today. As a utility and community partner, PGE is proud of its history of support for diversity, equity, and inclusion. Yet, we are very aware that this is no victory lap. We have a lot to learn, and there is significant work ahead of us.

3.2 Energy Justice

Energy justice is a subset of environmental justice and refers specifically to the public policy, economic, and environmental impacts of the work we do as utilities, and our role in the communities where we do business. To achieve energy justice, we must achieve social and economic equity among participants in the energy system, while also remediating burdens on those historically harmed by the energy system.

Our work has always required collaboration with other energy providers, municipal and public partners, and those we serve. But that collaboration has also always suffered from critical gaps, reflecting well-worn business and regulatory practices that incorporated certain perspectives and constituencies without adequately considering others.

The core of our mission as a regulated utility has also always included protecting affordability for all in delivery of an essential service, and avoiding policies and regulations that unfairly shift costs from one group of customers to another. But historically—and still today—utilities, regulators, and even outside intervenors in regulatory processes have accepted a surface-level appearance of equality for actual justice. We accepted that if all residential customers pay the same price per kilowatt-hour for electricity and the utility serves anyone willing to pay that price, our system must be fair, just, and reasonable—and therefore equitable and nondiscriminatory.

Oregon's historically underserved customers, however—those who have effectively been denied energy justice—are environmental justice communities. These were defined by the Oregon Legislative Assembly in this year's House Bill (HB) 2021 as "communities of color, communities experiencing lower incomes, Tribal communities, rural communities, coastal communities, communities with limited infrastructure and other communities traditionally underrepresented in public processes and adversely harmed by environmental and health hazards, including but not limited to seniors, youth and persons with disabilities."[216]

Like the broader concept of environmental justice, energy justice acknowledges the racial, social, and economic root causes of disparities. Attention paid to race, gender, culture, and class is critical to ensuring that those who are hardest hit by climate change impacts and least able to avoid them can access opportunities, participate in policy decisions, and benefit from clean energy and carbon reduction investments. This will not only ensure the broadest base possible for progress on climate action, but also that all communities going forward enjoy the benefits of the clean energy transformation.

3.2.1 Procedural Justice

The energy industry is evolving rapidly, and to ensure that evolution achieves a truly sustainable energy future for all of us, those who are affected by disparities need a voice in the process. Regulatory and administrative processes, however, typically present many hurdles to participation. In this section, we share some examples of ways PGE is working to help customers understand how the energy system works, how to advocate in regulatory spaces, and which programs might benefit them.

[216] Oregon House Bill (HB) 2021 (2021), Section 1 (5). https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB2021/Enrolled.

Two examples that come to mind include: (1) the semi-annual roundtable forums PGE holds with the low-income agency service providers and community action agencies who deliver energy assistance to our customers, to work through operational issues and other concerns, and (2) the school-based conservation program we organize to teach students about energy-related issues and career paths, encouraging further engagement among diverse communities as the next generation comes of age.

However, to really get at the root of procedural justice—to "fairly and competently incorporate marginalized perspectives and communities in decision making processes"[217]—PGE must support the engagement of nontraditional stakeholders in new ways. These stakeholders require not only access to proceedings but also the context and financial wherewithal to engage meaningfully.

To seek counsel from community-based organizations (CBOs) without offering the financial support to enable their participation is extractive. Nontraditional stakeholders, both CBOs and individual community participants, should be compensated for their time and expertise—and indeed, may simply not be able to afford to dedicate the time and resources needed to participate if they are not compensated. This financial support may come in the form of a statement of work, stipend, or ratepayer-funded intervenor dollars—all of which PGE is supporting, depending on context, in different planning and regulatory processes. Naturally, the fact that the utility underwrites a CBO's participation does not mean the utility gets to apply a filter to the input they provide. The point is to bring their unfiltered voice to the table and include it in the decision-making process.

A first step in how we're approaching this: As PGE embarks on a new multi-year planning process for utility distribution infrastructure investment, the company is taking advantage of an opportunity to explore multiple forms of financial support to foster procedural inclusion and partner with the communities we serve to develop and deliver equitable and local distributed energy resource (DER) solutions. This is a great example of the need to involve disadvantaged communities early on in the process of evolving our system to ensure they have a voice in developing solutions suitable to their needs.

In support of the Oregon Public Utility Commission (OPUC) investigation into Distribution System Planning,[218] and PGE's work in developing its first Distribution System Plan (filed in October 2021), the company recognized the need for extensive input and engagement from environmental justice communities. PGE also recognized it had not yet cultivated the robust community relationships necessary to promote that level of participation, and so deferred to CBOs to facilitate a series of community workshops where PGE would join in community dialogue and lay the groundwork for future outreach without dominating the agenda. The scope of work included recruitment and convening, development of nontechnical and multilingual educational materials, and qualitative and quantitative research. The CBOs were compensated for their expertise and the participants for their time. The outcome of those workshops, apart from serving to demonstrate a new, collaborative model in which PGE partners with our communities to address mutually important issues, questions, concerns, and opportunities, is to incorporate community insight and CBO recommendations into a Community Engagement Plan to go before the OPUC. This will help lay the groundwork for constructive engagement among stakeholders in the future—including incorporating guidance or direction from both regulators and legislators, as well as feedback from affected stakeholders—to help determine who should be at the table and when.

[217] Wallsgrove et al.
[218] Oregon Public Utility Commission. 2021. Docket No. UM 2005. Investigation into Distribution System Planning. https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=21850.

PGE looks to CBOs in this context as two-way conduits to their communities—communities with whom PGE needs to build durable relationships and with whom PGE must build trust to elicit candid feedback. Two examples are the Coalition for Communities of Color and Unite Oregon, who are helping with development of the company's Distribution System Plan (Figure 13).

Figure 13. Examples of CBOs Assisting with PGE's Distribution System Plan

Source: https://mobile.twitter.com/orcleanenergy/status/1408858495030603777

Source: https://twitter.com/UniteOregon/header_photo

Workshops with traditional stakeholders—for example, residential and industrial ratepayer advocates represented by the Oregon Citizens' Utility Board and the Alliance of Western Energy Consumers, respectively—benefit from decades of collaboration with PGE and the OPUC. These parties and other intervenors experienced in regulatory proceedings typically have the administrative and technical knowledge and means to contribute to regulatory policy. Community stakeholders, however, are different. Workshops with traditionally underserved and underrepresented communities require that trust be established before proceeding. For this reason, in the Distribution System Planning process, PGE understood it was crucial that we partner with CBOs to engage these communities and their constituencies and establish agreements that enable a safe, inclusive space for discourse, acknowledge cultural histories of trauma and structural inequity, and articulate energy concepts in a relevant manner. Even understanding this, it is not always an easy thing to do, and our journey includes experience getting it wrong. Bringing disparate voices to the table can create situations where emotions run high. Promoting respectful dialogue takes commitment, persistence, and a willingness to acknowledge occasions when we have fallen short.

CBO compensation, in a fee for service model, is one pathway to enable underrepresented communities to claim their rightful seat at the table; intervenor funding is another. To help address barriers to

participation, a coalition of environmental justice groups, consumer advocates, local governments, and utilities (including PGE) advocated together for passage of Oregon HB 2475. The bill adopted by the Oregon Legislature in 2021 grants the OPUC the authority to consider differential energy burden in utility rates or programs and enables ratepayer-funded intervenor funding for environmental justice organizations. With respect to financial assistance to organizations representing customer interests in regulatory proceedings, those representing the broad interests of customers, the interests of low-income residential customers, or the interests of residential customers that are members of environmental justice communities may be considered. The OPUC will establish such qualifications.[219] The additional classifications of organizations authorized for consideration of intervenor funding provides access to organizations representing the people most affected by high energy burden so they can participate in regulatory processes in the same manner as other broad customer advocate groups like the Oregon Citizens' Utility Board. Oregon now has intervenor funding specifically targeted to Black, Indigenous, and People of Color (BIPOC) communities and CBOs, which will help ensure these voices are centered in dockets and utility processes going forward.[220]

In all these efforts, additional work is needed to address challenges inherent in administrative, planning, and regulatory processes that can frequently be a barrier to participation because they are often convoluted, complicated, and lengthy. We must constantly reinforce these efforts in partnership with the communities we serve and the OPUC, with consideration for strategies to reduce the burden of participation, like consolidating CBOs for purposes of representation (with their engagement and agreement) and minimizing requirements for legal representation.

3.2.2 Distributive Justice

As an essential service provider, PGE also has an opportunity to further distributive justice—to "equitably distribute the benefits and burdens of energy infrastructure and systems"[221] as depicted in the Venn diagram earlier in this essay—through program design and pricing. Key to achieving this objective is to understand our communities' needs and wants such that programs and pricing options invite greater participation and, ultimately, offer greater value and benefit to the customer.

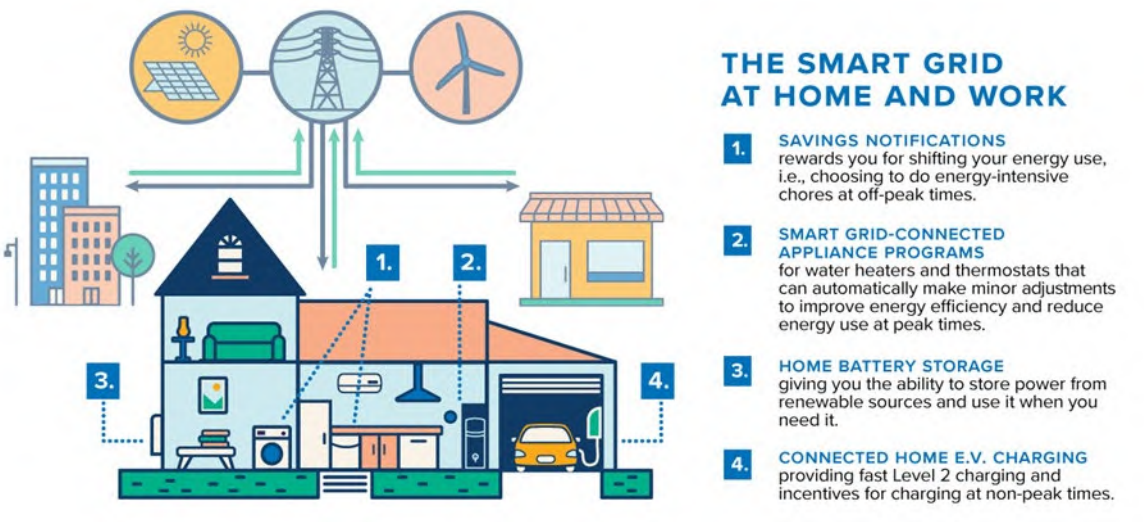
An equity-centered approach is an important pillar of PGE's business practice in this context, in recognition of historic and systemic barriers that limit fairness and equality in outcomes for underserved customers. One example of how we have incorporated this practice into our clean energy transformation efforts is the PGE Smart Grid Test Bed project.

[219] "The commission by rule shall establish such qualifications as the commission deems appropriate for determining which organizations are eligible for financial assistance under an agreement entered into under this section." (HB 2475, 2021)
[220] We address differential rates later in this essay.
[221] Wallsgrove et al.

Bringing the smart grid to underserved communities

PGE's Smart Grid Test Bed (Figure 14) explores how new technologies and two-way power flow can help us manage energy demand more successfully. Customers can choose to use smart thermostats, smart appliances, and energy storage devices, as well as shift their energy use to non-peak times—lowering both their overall costs and costs to the utility. Enabling the customer and the utility to utilize demand response can be a community effort with broader and immediate implications. PGE is delivering community benefits that go beyond assisting with customer bills and putting downward pressure on energy prices. Messaging to customers in the Test Bed communities promotes the community value of demand response and accessibility to innovative products to empower and enable customers to control their energy costs and address environmental considerations.

Figure 14. Features of PGE's Smart Grid Test Bed



The PGE Smart Grid Test Bed[222] team has incorporated principles of equity within the structure of the Test Bed strategy, designing the program to increase community participation, regardless of socioeconomic class, ability to pay, or language spoken. The team will continue to address equity considerations and concerns from stakeholders, especially those from community-based and environmental justice organizations, to ensure their voices are represented throughout the administration of the project.

The Test Bed operates in three specific geographic communities (Figure 15), and there is an advantage in creating a community environment to support this work. PGE wants customers to understand the value of being a part of this project and the contribution they can and will make if they participate. For this aspect of the project, it's important for PGE to have a presence in each of these communities so customers can ask questions and interact with each other. PGE and the cities involved have found that a community organizer-like presence within each Test Bed is necessary to attain and sustain participation and understand the customers taking service within each area. PGE believes that by having a personal presence at each site, we can more readily resolve customer issues and concerns while maximizing our potential for on-the-ground learnings.

[222] PGE. No date. Welcome to the Smart Grid Test Bed. https://portlandgeneral.com/about/who-we-are/innovative-energy/smart-grid-test-bed.

Figure 15. Communities Participating in the Smart Grid Test Bed

The approach and value of having a personal presence within a project of this size and complexity are not new. The seminal 1980 Hood River Conservation Project, conducted by the Bonneville Power Administration, U.S. Department of Energy, and Pacific Power, similarly used this approach.[223] In fact, evaluations of the project credited this personal presence for being able to keep the project on track and effectively and efficiently administered.[224] Within the Hood River Project, onsite personnel were credited with community outreach, resolution of contract quality-of-work issues, and identification of emerging issues. PGE has explored this approach with the Demand Response Review Committee, which the OPUC directed PGE to form when it acknowledged its 2016 Integrated Resource Plan. Members of the Committee include the Energy Trust of Oregon, Northwest Energy Efficiency Alliance, Pacific Northwest National Laboratory, Oregon Citizens' Utility Board, Oregon Department of Energy, Alliance of Western Energy Consumers, Northwest Power and Conservation Council staff, and OPUC staff. City partners and those members of the Committee familiar with the work of the Hood River Project were supportive of the approach.

One specific demand response program operating within the Test Beds—Peak Time Rebates (PTR)—illustrates how distributive justice is incorporated into the Test Beds strategy. PTR is an incentive program for reducing PGE's system load during peak periods like hot summer afternoons or cold winter mornings. In the Test Beds, program participation is opt-out, designed in a manner to be equitable and nonpunitive. It holds the customer harmless for not participating but rewards the customer's response to an event notice. This default approach, applied to all residential customers in the Test Bed, is inclusive and informed by an environmental justice principle of preventing harm (e.g., to nonparticipating customers).

To further ease any burden of responding to events, PGE is using its direct install thermostat program to offer a no-charge smart thermostat to those interested in automating their response. Smart thermostats not only enable the customer to respond to demand response event calls, but they are also an energy efficiency measure promoted by the Energy Trust of Oregon for both electric- and gas-heated homes. So, customers may also lower their monthly bills through energy efficiency and receive incentives for responding to PTR events. Any customer may opt-out of Test Bed activity and the PTR program by contacting PGE's Customer Service. While opting out means they will not benefit from rebates or other potential savings stemming from Test Bed programs—and they will not contribute to system benefits such as load management—there is no penalty or cost for nonparticipation. They simply continue business-as-usual service from the utility at their own request. Overall, we have had great interest in the

[223] Hirst, Eric, Richard Goeltz, and David Trumble. 1987. Electricity Use and Savings in the Hood River Conservation Project. ORNL/CON-231. https://www.osti.gov/biblio/6880640.
[224] U.S. Department of Energy Bonneville Power Administration. 1987. *The Hood River Story: How a Conservation Project Was Implemented*, Volume 1. September. BPA 2032 1987. Available through Bonneville Power Administration Library.

Test Bed program and look forward to our learnings once Phase 1 of the Test Bed is complete at the end of 2021.

In light of the initial successes of the program, PGE filed its Phase 2 application for the Test Bed.[225] One of the proposed projects in Phase 2 is the *Flexible Feeder Project,* which involves close collaboration between PGE and the Energy Trust of Oregon, the state's third-party administrator of energy efficiency programs. This next phase will provide learnings about co-deployment of DER solutions and the capabilities of a virtual power plant by investing in significant DER deployment in a traditionally underserved North Portland community (Overlook/Arbor Lodge), which historically has been subjected to redlining and gentrification. The Flexible Feeder Project will retrofit about 580 buildings in this area, improving efficiency by an average of 10%, while developing a 1.4 megawatt flexible load resource consisting of efficiency measures, connected devices, distributed solar, energy storage, and smart charging.

This project will fundamentally change the market for efficiency and load flexibility in the Pacific Northwest region by accounting for the full value of DERs as an operational resource while reducing energy burden for low-income customers. This effort also will provide valuable insights into how utilities must plan for and integrate these assets, the co-benefits of efficiency and flexibility measure adoption, the challenges and solutions needed for contractors to participate in this new market, and how historically underserved communities can be effectively engaged in flexible load programs. The Flexible Feeder Project also involves other partners, including the Northwest Energy Efficiency Alliance and the National Renewable Energy Laboratory. PGE was recently awarded a $6.65 million grant from the U.S. Department of Energy's Connected Communities grant program for the Flexible Feeder project.[226]

Real-time distributive justice: Responding to COVID-19

Another recent illustration of how PGE is pursuing distributive justice is PGE's response to the COVID-19 pandemic. The pandemic has further emphasized and reinforced the utility's role as an essential service provider. As the pandemic first unfolded in 2020, Oregon investor-owned energy utilities took voluntary actions to suspend disconnections of residential and nonresidential accounts, stop assessing late fees, offer more and flexible payment arrangements, and take other actions to assist customers impacted by COVID-19 through March 30, 2021. At the request of the OPUC, the utilities extended these actions through July 31, 2021.

The COVID-19 pandemic catalyzed a fresh look at our assistance programs for low-income customers, informed by increased awareness of the principle of distributive justice. In the summer of 2020, the OPUC facilitated a series of workshops with Oregon utilities, CBOs, and community action agencies to address customer impacts and account arrears due to COVID-19. As a result, at the beginning of 2021, the OPUC asked the six Oregon investor-owned energy utilities to allocate 1% of their 2019 revenue to help customers who were behind on their bills due to the pandemic. For PGE, that was approximately $18 million. PGE created a Bill Assistance Program, which allowed customers to make a one-time payment or spread their balance over several months while PGE would match the payments made. The program also provided instant grants and assistance to help with reconnection. PGE sent over 80,000 direct communications and made more than 6,000 direct calls to inform our customers about these programs. PGE also worked with more than 350 CBOs, food banks, and school districts to share

[225] PGE. October 1, 2021. Smart Grid Testbed Phase II Proposal. https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf.
[226] U.S. Department of Energy. 2021. "DOE Invests $61 Million for Smart Buildings that Accelerate Renewable Energy Adoption and Grid Resilience." October 13, 2021. https://www.energy.gov/articles/doe-invests-61-million-smart-buildings-accelerate-renewable-energy-adoption-and-grid.

information about these programs in 13 languages. From January to August 2021, PGE provided almost $10 million in assistance to 27,011 customers with arrearages. Of those customers, more than 16,000 now have a zero balance. Some 14% of customers enrolled in this program now have a preferred language other than English identified on their customer account, which will help with future communications (up from 8% at the start of the program).

These kinds of efforts are not limited to crisis situations like the pandemic. Each year, PGE works with various stakeholders to support state and federal legislation that provides support for low-income and vulnerable communities. In the 2021 Oregon legislative session, several new laws were passed to increase assistance for low-income utility customers and to help reduce barriers and increase access for environmental justice communities.

- HB 2475: Enables the OPUC to consider differential energy burdens and other economic, social equity, or environmental justice factors in rates or programs

- HB 2739: Temporarily increases low-income bill assistance funding by an additional $10 million per year through 2023

- HB 2842: Establishes a grant program within the Oregon Health Authority to provide financial assistance to repair and rehabilitate low-income homes

- HB 3141: Increases funding for low-income weatherization, directs the OPUC to set equity metrics for all funds invested by the Energy Trust of Oregon, and requires investment of 25% of renewable energy program funds to serve low- and moderate-income customers

PGE advocated, in coalition with others, for additional state and federal energy assistance funding, resulting in an additional $78 million allocated to Oregon between 2020 and 2021. PGE also helped secure authority for community action agencies to use express enrollment when qualifying customers for state bill assistance funding, reducing the need for duplicative application processes.

HB 2475 in particular provides the OPUC the authority to provide financial assistance to organizations that represent broad customer interests in regulatory proceedings—as noted earlier this essay—and considers differential energy burden in rates or programs. Energy burden is the percentage of a customer's total utility bill relative to income. In Oregon, a household paying greater than 6% of household income in energy costs is considered energy-burdened. (Severe energy burden equates to paying more than 10%. PGE has observed burden near 25% for some customers.) PGE has conferred with utilities in other states to understand their rate discount programs and has since built several tariff scenarios to share with OPUC staff, customer groups, and CBOs to elicit insight and guidance ahead of a filing in the fall of 2021.

3.2.3 Restorative Justice

Throughout these efforts, effective community engagement requires an acknowledgement that to build trust and advance partnerships with CBOs and the communities they represent, PGE must seek to advance restorative justice—to "repair past and ongoing harms caused by energy systems and decisions."[227] This is trauma-informed work for which PGE staff is developing the competency and literacy to navigate respectfully. Adopting restorative practices enables PGE to build the necessary social capital to evolve our business to better serve our communities. Two specific areas where this awareness informs our work are wildfire mitigation efforts and our Tribal relationships. More generally, PGE has an opportunity to partner with our cities and counties to advance their climate and sustainability action plans (currently

[227] Wallsgrove et al.

twelve municipalities have put forth such plans, nine of which are community-wide in scope) in a manner that meets the twin goals of equity and decarbonization.

Wildfire Impacts

Each substation and distribution line supports a community and serves several types of subcommunities, including underserved communities. This infrastructure is embedded in neighborhoods that will experience climate impact—and have already, as illustrated amply in PGE's service area over the course of the past year with wildfires, ice storms, and excessive heat events.

PGE's obligation to both serve and acknowledge disproportionate impact is realized, for instance, in our application of an equity lens to our wildfire mitigation efforts, and in particular the practice of proactively shutting off power in high-risk areas as a last-resort measure to protect communities against potential wildfire ignitions, called Public Safety Power Shutoffs (PSPS). PGE acknowledges that effective and inclusive communication with our vulnerable populations requires an approach that honors different modes, languages, and partnerships. As PGE is still learning where these customers live, we are seeking out and deferring to those with expertise and tenured relationships to serve as a two-way conduit for PSPS awareness and preparation.

To this end, PGE developed PSPS toolkits and communications in various modes (web, email, newsletter, social media) and languages—English, Arabic, Chinese (simplified), Chinese (traditional), Farsi, Japanese, Korean, Rohingya, Russian, Somali, Spanish, Swahili, and Vietnamese—to inform these populations as to how best to plan for a potential extended outage. Over 250 community partners were proactively contacted in mid-July, provided the toolkit, and asked if they were willing to serve as a conduit to their communities.

Many distributional inequities may stem from a lack of social or political recognition. In the context of climate resilience planning, PGE takes inspiration from scholars in this area and seeks to: "(1) acknowledge community members' different intersecting identities (e.g., race, gender, class, and age), (2) recognize that these identities are shaped by historical injustices and can shape individual vulnerability to shocks and stresses, ability to access resources, and capacity to participate in decision-making, and (3) foster respect for different groups."[228]

Investments in resilient infrastructure have a local, tangible, and visible impact. Infrastructure planning can and should address and redress historical harm and ensure PGE delivers electricity safely and reliably. As PGE is learning through our engagement with communities, there is a need to first acknowledge past harms to then engage on energy issues and plot a path forward together. PGE has a responsibility, in our role as an essential service provider, to create a space for respectful discourse, to facilitate conversations that hold up multiple perspectives, and to listen to understand.

Tribal Engagement

PGE has deep regard and respect for Native American Tribes and Indigenous communities, who play a unique role in achieving restorative justice as sovereign nations with standing similar to (or in some cases greater than) state and federal agencies in many aspects of our business. We acknowledge that they have continued to steward the lands that we have the opportunity to work in, since time immemorial. We also acknowledge that Tribes as a demographic have been historically marginalized and underrepresented in our work. We believe strongly that Tribes are a critical demographic whom PGE can serve, work with,

[228] Meerow, Sara, Pani Pajouhesh, and Thaddeus R. Miller. 2019. "Social equity in urban resilience planning." *Local Environment* DOI: 10.1080/13549839.2019.1645103. https://doi.org/10.1080/13549839.2019.1645103.

and learn from. We are currently developing a Strategic Tribal Engagement Plan (STEP) which will guide our work going forward by providing a thoughtful framework to understand the Tribes' role as economic drivers, political influencers, and nation-builders, as well as members of the community and our workforce.

Most of PGE's service territory and generation sites are part of Tribes' Ceded or Usual and Accustomed lands. The Confederated Tribes of Warm Springs (CTWS) have been PGE's business partner in different capacities on the Pelton Round Butte hydroelectric project since 1958 and have co-owned and co-managed the project for more than a decade. The Confederated Tribes of Grand Ronde are one of our key customers and have many areas of shared interest with the company. Other Tribal groups also have long historic and cultural connections with the lands and rivers where we operate, and Tribal governments also play a role as regulators when they review PGE's environmental and licensing permits. PGE works closely with Tribes to negotiate franchise agreements for transmission lines, as all regional Tribal governments act in a regulatory capacity and review our licenses and permits with the Federal Energy Regulatory Commission, Oregon Energy Facility Siting Council, and other entities. Our service territory and generating areas are also home to multiple individuals and communities who identify as Native American and Alaska Natives. Last but not least, individuals who identify as Native American or Alaskan Native are part of our employee work force.

PGE considers Tribal consultation meaningful when it is intentional, begins early, and is continuous. As such, PGE works diligently to bring awareness to historic barriers and focus on establishing long-term partnerships with area Tribes. PGE does this by striving internally to consciously and deliberately address Tribal equity in areas of shared concern or operations and by providing continuous education to those employees who work with Tribes. PGE consults with federally recognized Tribes prior to developing projects and initiatives, working closely with them to find mutually beneficial solutions for fish passage, water quality, recreation, and cultural resources management.

In addition to our partnership at Pelton Round Butte, PGE is working with CTWS on two new initiatives we believe also further the cause of restorative justice by laying a foundation for better understanding and closer engagement with the Tribes: Project Zero[229] and PGE's Line Apprenticeship Program.[230] Project Zero is a paid PGE internship and education program, operated in collaboration with community partners and Portland Public Schools that provides young adult participants with professional experience in clean energy and environmental stewardship positions. PGE and CTWS are working to identify opportunities for Tribal participation in the Project Zero program, preparing its participants for jobs in the green energy economy. Through PGE's Line Apprenticeship partnership, PGE will perform annual outreach to interested Tribal members, offering information and education regarding career opportunities available in our line pre-apprenticeship and apprenticeship programs.

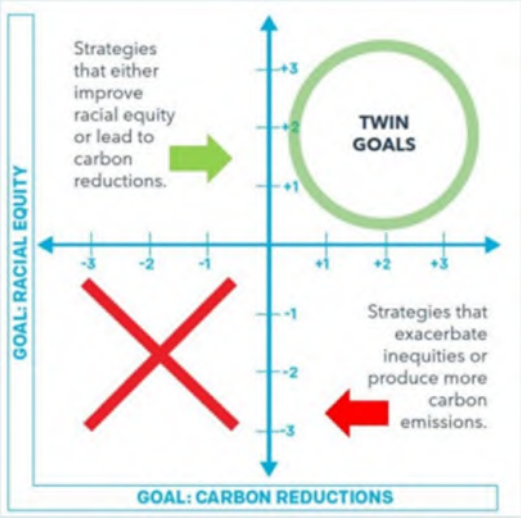
3.3 Conclusion

Combining energy equity and climate action into one strategy is not a concession that utilities and regulators should offer to environmental justice communities in the process of pursuing a clean energy future (Figure 16). Achieving equity and addressing climate change should not be in conflict, so utilities cannot pursue carbon reduction strategies in a way that exacerbate inequity, or achieve equity in ways that fail to support the clean energy transition. We must recognize that the proactive participation of these communities—encouraged and facilitated by utilities like ours—is necessary for the successful implementation of clean energy legislative and regulatory policy. It is essential that state policies align

[229] PGE. No date. PGE Project Zero. https://portlandgeneral.com/about/who-we-are/community/pge-project-zero
[230] PGE. No date. Journeymen Wanted. https://portlandgeneral.com/about/careers/find-your-career-at-pge/careers-journeymen-wanted/.

with the greater goal of cost-efficient decarbonization, freeing resources to provide additional support to traditionally underserved communities so they have meaningful access to weatherization, renewables, electric vehicles, and smart grid-enabled efficient technologies and appliances.

Figure 16. Strategies to Meet Racial Equity and Carbon Reduction Goals



As we stated in our introduction, the power system today creates disproportionate burdens on those least able to shoulder them. That creates an energy justice crisis that must also be resolved if we are to resolve the climate crisis. Recognizing our role as an essential service provider and a fully regulated utility—and simply as a good corporate citizen—PGE is fully committed to joining with the communities we serve, our regulators, and our stakeholders to rise to this challenge.

To do so, PGE must ensure it fosters procedural equity for all stakeholders and intervenors; affords distributive equity to all customers via program participation and prices that are fair, reasonable, and equity-centered; and acknowledges and seeks to repair past harm through its efforts to co-develop resilient solutions to meet the climate events of today and tomorrow. We also need to share our experience and report out on our progress. You can find our latest environmental, social and governance report on our website at https://portlandgeneral.com/about/who-we-are/sustainability. Noteworthy are the metrics we report, which are increasingly scrutinized not just by the communities we serve, but also by our shareholders and potential investors.

In a nutshell, drawing on the experience and initiatives we have described above, PGE's approach to community engagement in service to customers has evolved to align with the Government Alliance on Race and Equity (GARE) racial equity tool. That tool provides a line of inquiry that includes the following tenets: listen and communicate, use data, ensure budget, ensure relevancy, and ensure time. It is via application of this tool and its lens that PGE is seeking to partner with CBOs as a first step to better understand the needs of communities we serve that have been largely excluded from decision-making and dialogue in the past. In partnership with these organizations PGE understands the following to be prerequisites for successful community engagement:

- Creating a safe space for respectful dialogue means establishing meeting agreements and norms and beginning collaborations first from a place of trust and transparency.

- The lead-time for effective engagement is at least 4–6 months, depending on scope and preferably in partnership with CBOs.

- Budgets should include compensation for CBO partners and stipends for all participants.

- Workshop preparation and practice with interpreters are important to ensure relevant and nontechnical information is relayed meaningfully and accessibly.

- Workshop participants should understand how their feedback will be integrated into decision making and if not, why not.

Throughout this work, what we do externally needs to align with what we aim to do internally, and that in turn needs to be supported by recruiting and developing from the communities we serve. As our organization's workforce representation evolves to mirror that of our communities, we will be better able to identify and characterize needs and wants for all those we serve. It is that lived experience and community knowledge that ultimately will drive deeper connections with our customers.

This is a learning process as we embrace a new way of thinking and a new way of interacting with the communities we serve and are part of. We are testing new approaches, looking for feedback, and, sometimes, getting things wrong and going back to the drawing board or apologizing for missteps. We will not turn the concerns with equity in regulation around in a day or even a year, but while progress can be uneven, it is essential. We are embracing the challenge to truly live up to our goal of being our customers' trusted energy partner as we make the transition to a clean energy future.

4.0 Climate, Environmental, and Energy Justice: Integrating Justice into Electricity System Design and Decision-Making

By Jean Su, Center for Biological Diversity[231]

4.1 Introduction

The most recent report from the Intergovernmental Panel on Climate Change penned on paper what countless American communities are already living—the human-induced climate emergency is here.[232] Climate devastation is driven in large part by fossil fuel combustion,[233] and the planet's poorest households, who are more susceptible to climate disaster impacts, will pay the highest price and consequence—as most recently experienced in hurricanes like Ida.[234] In the United States, that reality is manifested in communities of color living within just miles of a fossil fuel power plant. Their health has been compromised by fossil fuel pollution; they experience heat waves more profoundly in redlined, unshaded neighborhoods; and they are subject to electricity disconnection because of higher energy burdens, exacerbated by the COVID-19 unemployment crisis and disproportionate exposure to the disease as majority essential workers.[235]

The cascading crises of the climate emergency and systemic racism are inexorably intertwined with the country's fossil fuel energy system. Yet there is a perception that the electricity system, an orchestra of energy technologies, infrastructure, and businesses, largely stands apart from the injustices it helps perpetuate. Regulators, industry players, academics, and advocates have historically divorced considerations about the energy system from its social, racial, and ecological dimensions. According to Dr. Shalanda Baker, the U.S. Department of Energy's inaugural Deputy Director for Energy Justice in the Office of Economic Impact and Diversity, "those shaping the new energy system into one driven by

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[231] Founded in 1989, the Center for Biological Diversity (CBD) is a national, nonprofit conservation organization with more than 1.7 million members and online activists dedicated to the protection of endangered species and wild places. The Center's Energy Justice Program focuses on advancing an environmentally and ecologically just renewable energy future through strategic litigation and campaigning. Howard Crystal, CBD Energy Justice Legal Director; Shaye Wolfe, CBD Senior Climate Scientist; Lisa Belenky, CBD Senior Attorney; and Ilana Cohen, CBD research intern contributed to this essay.

[232] Valerie Masson-Delmotte et al., Intergovernmental Panel on Climate Change, IPCC 2018: Global Warming of 1.5°C, An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, Summary for Policymakers (2018), https://www.ipcc.ch/sr15/chapter/spm/ [hereinafter *2018 IPCC Report*]. *See also* Valerie Masson-Delmotte et al. Intergovernmental Panel on Climate Change. 2021. *Climate Change 2021: The Physical Science Basis: Summary for Policymakers.* https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf [hereinafter *2021 IPCC Report*].

[233] *See 2018 IPCC Report;* International Energy Agency. 2021. *Net Zero by 2050.* May. https://www.iea.org/reports/net-zero-by-2050 (finding that nations would need to immediately stop approving new coal-fired power plants and new oil and gas fields and quickly phase out gasoline-powered vehicles if they want to avert the most catastrophic effects of climate change); Reuters. 2021. "*'Death knell for coal': Reactions to the U.N. climate report."* August 9, 2021. https://www.reuters.com/business/environment/what-they-said-about-code-red-un-climate-science-report-2021-08-09/. (U.N. Secretary General Antonio Guterres: "Today's IPCC Working Group 1 Report is a 'Code Red' for humanity…This report must sound a death knell for coal and fossil fuels, before they destroy our planet.").

[234] Kaplan, Sarah. 2021. "How climate change helped make Hurricane Ida one of Louisiana's worst." *The Washington Post,* August 30, 2021. https://www.washingtonpost.com/climate-environment/2021/08/29/how-climate-change-helped-make-hurricane-ida-one-louisianas-worst/; "Transcript of Biden's Speech on Climate Change and Hurricane Ida." *The New York Times,* September 7, 2021. https://www.nytimes.com/2021/09/07/us/politics/biden-speech-transcript-hurricane-ida.html.

[235] *See* "Too Many Black Americans Are Dying from COVID-19." *Sci. Am.,* August 1, 2020. https://www.scientificamerican.com/article/too-many-black-americans-are-dying-from-covid-19/; Oppel, Richard et al. 2020. "The Fullest Look Yet at the Racial Inequity of Coronavirus." *New York Times,* July 5, 2020. nytimes.com/interactive/2020/07/05/us/coronavirus-latinos-african-americans-cdc-data.html.

clean, renewable resources treat energy as a purely technical issue…. This overemphasis on technology and finance ignores the significant way our energy system, created through a series of policy choices, shapes every single aspect of life, particularly for poor people and people of color."[236]

This essay explores the equity impacts of the electricity system and provides a normative and regulatory framework to incorporate considerations of justice into utility regulatory decision-making. First, the essay discusses the scientific literature exposing several forms of energy injustice perpetuated by the status quo fossil-fuel energy system, including but not limited to: (1) fossil fuel pollution and disparate health impacts; (2) energy burden, energy insecurity, and energy poverty among communities of color; (3) climate disasters; and (4) ecocide.[237,238] Second, the essay focuses on two mutually reinforcing avenues available to utility regulators and lawmakers to systematically address these forms of energy injustice while building a clean, renewable, and energy-efficient electricity system:

- Adopting an expansive definition of the "public interest" that encompasses energy, climate, and environmental justice

- Adopting policies that prioritize the deployment of distributed energy resources (DERs) in communities that have been hit first and worst by the existing fossil fuel economy

The energy system has delivered unequal impacts across the country; communities of color and low-wealth communities have inordinately been polluted and carry unequal energy burdens, while others access energy without suffering its direct negative consequences. Equity in the energy system means addressing these inherent inequities in impact and ensuring that historically harmed communities can access nonpolluting, climate-safe, socially just, and ecologically protective energy. Equity in energy requires systemic and structural change where communities that have been hurt first and worst by the existing fossil fuel energy system are empowered with regenerative, renewable, and anti-racist energy. In addition, energy equity means assuring that these households can maximize energy efficiency technologies, which not only serve to reduce energy burden but also drive down energy consumption in service of addressing the climate emergency.

In this national moment of climate and racial reckoning, it is vital that decision-makers seize this unique opportunity to reimagine the electricity system into one where power is both literally and figuratively redistributed and where many aspects of chronic energy injustice and systemic racism can be addressed.

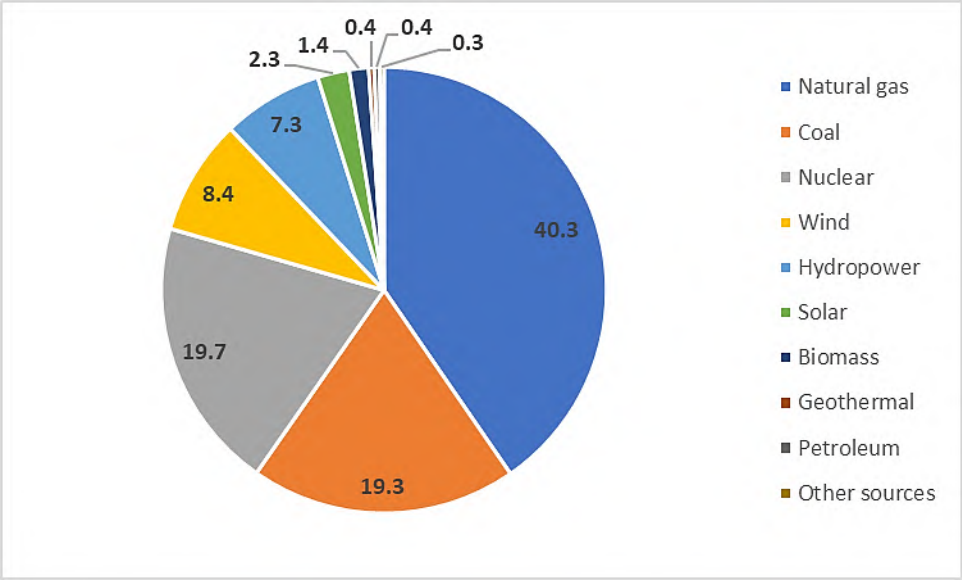
4.2 America's Electricity System and Its Chronic Energy Injustice

The current electricity system has perpetuated numerous forms of energy injustice against communities, wildlife, and ecological systems. The reason is rooted in the nation's fuel sources, and by extension the design of the existing electricity system. In 2020, the U.S. electricity sector accounted for 32% of the country's total energy-related carbon dioxide (CO_2) emissions, with 54% of emissions from coal, 44%

[236] Baker, Shalanda. 2021. Revolutionary Power 30.
[237] "Energy violence" is a rising term of art for energy injustice. *See*, *e.g.*, Finley-Brook, Mary, and Stephen Metts. Climate Crisis Energy Violence: Mapping Energy's Enduring Grasp on a Vulnerable Future (forthcoming).
[238] The plain definition of "ecocide" refers to "the destruction of large areas of the natural environment as a consequence of human activity." *Definition of ecocide*, Merriam-Webster, https://www.merriam-webster.com/dictionary/ecocide. Recently, international law experts have moved to elevate ecocide as a new fifth crime that the international criminal court may prosecute, particularly in light of the government actions driving the climate emergency. The Stop Ecocide International initiative defines "ecocide" as "unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and widespread or long-term damage to the environment being caused by those acts." *See* Stop Ecocide International, https://www.stopecocide.earth/.

from gas, and 1% from petroleum.[239] A portrait of the country's electricity generation by energy source sheds further light on the majority presence of fossil fuels and other energy sources that have polluting and other harmful impacts on communities and species. Fossil fuels dominate energy generation at 60%, with gas supplying 40% and coal at 19%. Among nonfossil energies are nuclear at nearly 20%, hydropower at 7%, and biomass at 1.4%. Renewable energies that inflict less ecological harm, especially if properly sited, remain at a minority 11%, with wind at 8%, solar at 2%, and geothermal at 0.4%.[240] See Figure 17.

Figure 17. U.S. Electricity Generation - Percentage by Source, 2020[241]



The impacts of this energy system are devastating, with rippling effects across human and ecological communities. This essay specifically focuses on forms of energy injustice disproportionately experienced by communities of color and low-wealth communities, and species impacted by fossil fuel pollution and electricity project siting. These injustices include, but are not limited to: (1) fossil fuel pollution and health impacts; (2) energy burden, energy insecurity, and energy poverty; (3) climate disasters; and (4) ecocide. Identifying these concrete impacts provides a far more nuanced portrait of our electricity system than is usually painted.

4.2.1 Fossil Fuel Pollution and Health Impacts

Communities of color and low-wealth families disproportionately suffer the consequences of the nation's dependence on fossil fuels. Each stage of the fossil fuel life cycle—extraction, processing, transport, and combustion—generates harmful air and water pollution, as well as greenhouse gas (GHG) emissions, that ultimately impact Black, Latinx, Indigenous, Asian and low-wealth communities disproportionately.[242]

[239] U.S. EIA. 2021. How much of U.S. carbon dioxide emissions are associated with electricity generation? March 14, 2021. https://www.eia.gov/tools/faqs/faq.php?id=77&t=11
[240] U.S. EIA. 2021. What is U.S. electricity generation by energy source? March 5, 2021. https://www.eia.gov/tools/faqs/faq.php?id=427&t=3.
[241] U.S. EIA. What is U.S. electricity generation by energy source?
[242] *See* Donaghy, Tim, and Charlie Jiang. 2021. *Fossil Fuel Racism.* Greenpeace. https://www.greenpeace.org/usa/wp-content/uploads/2021/04/Fossil-Fuel-Racism.pdf.

Because regulated utility companies choose and regulators may approve, within the bounds of federal and state laws and regulations, which energy sources they will use, it is important to discuss both the upstream and downstream impacts of fossil fuel choices on Americans.

The upstream extraction phase of coal and gas is associated with emissions of a wide range of hazardous and criteria air pollutants, including carcinogens such as benzene and endocrine disruptors that lead to cancer and other fatal or debilitating diseases.[243] While varying in geography, gas extraction has disproportionate negative health impacts on communities of color, especially Black people.[244] Nationwide, 17.6 million people live within one mile of an active oil or gas well.[245] The majority are shale wells using highly toxic hydraulic fracturing (or "fracking") and other hazardous drilling techniques.[246]

Separately, the downstream impacts of combusting fossil fuels at point sources—most relevantly here, power plants—also harms public health and disproportionately impacts communities of color and low-wealth families. People of color are more likely to live near fossil fuel power plants, with one study showing the share of minorities living within three miles (five kilometers) of a coal- or oil-fired power plant is 12%–37% higher than the national average of 25%.[247] Siting of dirty energy combustion plants leads to disproportionate health impacts on people of color.[248] A 2018 study found that Black people have 1.54 times the exposure to particulate matter (PM) due to living in proximity to PM-emitting facilities—

Transition from Coal to Gas Plants May Continue Pollution Disparity

The recent transition from coal to gas plants by many utilities has not necessarily brought relief to impacted communities, counseling electricity decision-makers to consider not only carbon but also other pollution impacts. A recent study found that the proportion of Black and Latinx residents living within three miles (five kilometers) of a power plant was higher for gas (13.4% Black, 19.8% Latinx) than for coal (8.1% Black, 6.1% Latinx). Gas-fired plants are often located closer to population centers, in contrast to coal plants which are often sited in more sparsely populated locations, and Black and Latinx communities are more highly concentrated in urban areas.* This data indicates that a climate policy that prioritizes switching from coal to natural gas as a "bridge fuel" does not necessarily resolve unjust pollution disparities and highlights the importance of considering specific locations where electricity generation takes place.

*Bridget, Diana et al. 2021. *Green for All: Integrating Air Quality and Environmental Justice into the Clean Energy Transition.* Political Economy Research Institute. 15–16. https://peri.umass.edu/images/GreenForAll.pdf.

[243] *See* Garcia-Gonzalez, Diana A. et al. 2019. "Hazardous Air Pollutants Associated with Upstream Oil and Natural Gas Development: A Critical Synthesis of Current Peer-Reviewed Literature." *Ann. Rev. Pub. Health* 40: 283. https://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-040218-043715.
[244] Zwickl, Klara. 2019. "The demographics of fracking: A spatial analysis for four U.S. states." *Ecol. Econ.* 161: 202.
[245] Czolowski, Eliza D., et al. 2017. "Toward consistent methodology to quantify populations in proximity to oil and gas development: A national spatial analysis and review." *Enviro. Health Persp.* 125.
[246] Concerned Health Professionals of New York and Physicians for Social Responsibility. 2020. *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Oil and Gas Extraction).* Seventh edition. 27. http://concernedhealthny.org/compendium/ [hereinafter *Compendium*].
[247] In the same areas, the percent of the population below the poverty line is also higher than the national average (13%), by 4 percentage points. Massetti, Emanuele et al. 2017. *Environmental Quality and the U.S. Power Sector: Air Quality, Water Quality, Land Use and Environmental Justice.* Oak Ridge National Laboratory. 84. https://info.ornl.gov/sites/publications/files/Pub60561.pdf.
[248] Bullard, Robert D. et al. 2007. *Toxic Wastes and Race at Twenty: 1987–2007.* Prepared for the United Church of Christ Justice and Witness Ministries. http://www.ejnet.org/ej/twart.pdf.

including power plants—compared to the overall population, while populations of color had 1.28 times higher burden than the general population.[249]

4.2.2 Energy Burden, Energy Insecurity, and Energy Poverty

Communities experiencing environmental injustice, or "environmental justice communities,"[250] are threatened by high energy burdens (a significant percentage of household income spent on energy bills), leading to threat of energy insecurity (the lack of ability to pay for energy) and ultimately resulting in energy poverty (lack of access to energy). This three-step progression to energy disconnection has particularly exploded during the COVID-19 pandemic for communities of color, but is a chronic issue that deserves careful and intentional consideration. As argued by leading energy justice scholars, Black and Latinx communities face systematic disadvantages in energy costs and limited access to renewable energy benefits. Addressing these disparities is an important part of achieving racial justice.[251]

Tens of millions of Americans suffer from high energy burdens, or a significant percentage of their household income spent on energy bills. Even before the pandemic, in 2018 the U.S. Energy Information Agency found that almost one in three households struggled to pay their energy bills.[252] And nearly one in five households sacrificed necessities like groceries and medicine to pay their bills.[253] These are all symptoms of energy poverty.

Communities of color are particularly at risk. Black and Latinx families on average bear quadruple the energy burdens of white families, with some Black households in the South bearing energy burdens as much as 40% of their total income.[254] Racial residential segregation and other systemic racist policies are drivers of this reality. The country's institutions of racism and anti-Blackness, including historical Jim Crow housing laws that have entrenched and codified racial segregation, have resulted in communities of color living in older and poorer quality housing stock that is less energy-efficient and more costly to cool and heat.[255] Currently, Black households pay significantly more than their white counterparts for energy

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[249] Mikati, Ihab et al. 2018. "Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status." *Am. J. Pub. Health* 108: 480.

[250] "Environmental justice communities," also known as "overburdened communities" under the terminology of the U.S. Environmental Protection Agency, refers to "minority, low-income, tribal, or indigenous populations or geographic locations in the United States that potentially experience disproportionate environmental harms and risks….The term describes situations where multiple factors, including both environmental and socio-economic stressors, may act cumulatively to affect health and the environment and contribute to persistent environmental health disparities." U.S. EPA. *EJ 2020 Glossary*. https://www.epa.gov/environmentaljustice/ej-2020-glossary. Recent proposed legislation from Senators Ed Markey and Tammy Duckworth and Representative Cori Bush has sought to properly identify "environmental justice communities" by creating a comprehensive map of communities experiencing environmental injustices and assisting the Biden administration in directing at least 40% of federal investments in a climate-safe future for communities that have been harmed by racist and unjust environmental practices. See *Senators Markey and Duckworth, Rep. Bush Introduce Legislation to Help Identify Environmental Justice Communities*, https://www.markey.senate.gov/news/press-releases/senators-markey-and-duckworth-rep-bush-introduce-legislation-to-help-identify-environmental-justice-communities.

[251] *See* generally *Nature Energy.* 2020. "Energy Justice toward Racial Justice." *Nature Energy* 5: 551. https://www.nature.com/articles/s41560-020-00681-w; Jenkins, K., D. McCauley, R. Heffron, H. Stephan, and R. Rehner. 2016. "Energy justice: a conceptual review." *Energy Res. Soc. Sci.* 11: 174–182. https://www.sciencedirect.com/science/article/abs/pii/S2214629615300669?via%3Dihub.

[252] U.S. EIA. 2018. One in three households faces a challenge in meeting energy needs. Sep. 19. https://www.eia.gov/todayinenergy/detail.php?id=37072.

[253] U.S. EIA, One in three households.

[254] *Climate Change—Preparing for the Energy Transition: Hearing Before the H. Subcomm. on Energy and Mineral Res. of the H. Comm on Nat. Res*, 116th Cong. 8-10 (2019) (statement of Chandra Farley, Just Energy Director, Partnership for Southern Equity).

[255] Lewis, J., D. Hernandez, and A. T. Geronimus. 2020. "Energy efficiency as energy justice: addressing racial inequities through investments in people and places." *Energy Effic.* 13: 419–432. https://doi.org/10.1007%2Fs12053-019-09820-z; Lyubich, Eva. 2020. *The Race Gap in Residential Energy Expenditures.* Energy Inst. at Haas, Working Paper No. 306,

due to higher energy demand, just as low-wealth households tend to spend more of their income on energy than their higher-wealth counterparts.[256] As a result, the impacts of a facially neutral rate structure applied equally to a population are felt inequitably by households of color, who on average bear a higher cost of energy and lower income and overall wealth that yield energy burden disparity.

Critically, the full scale of energy poverty in the form of electricity household disconnections is unknown because there is no industry standard or blanket mandate to compel utilities to disclose customer shutoffs. COVID-19 and the associated unemployment crisis resulted in a tsunami of utility disconnections across the country and revealed the underlying energy insecurity plaguing millions of American households.[257] The Center for Biological Diversity and Bailout Watch recently conducted a survey of utility commissions in all 50 states and the District of Columbia. About half of the state commissions (23) do not provide any public disconnection data. For the jurisdictions that do report such data, the study found that from March 2020, when COVID-19 was declared a national emergency, through June 2021, utilities disconnected households nearly 1 million times in the 17 states that reported shutoffs. This figure, if extrapolated across the country, is almost certainly exponentially greater than the reported 1.2 million household disconnects reported by the U.S. Census Bureau in 2017, the most recent data available from the Bureau.[258,259] Ten of the 28 jurisdictions reporting indicated no shutoffs because of voluntary or mandated moratoria. Of the 17 states that reported shutoffs, 13 states required monthly disclosures from investor-owned utilities and 4 states provided only partial data through special reports.

This lack of basic transparency in requiring and disclosing utility reports on disconnections hinders the public's efforts to accurately quantify the scale of the problem of electricity shutoffs and, ultimately, energy poverty.

The National Association of Regulatory Utility Commissioners (NARUC) adopted a resolution in 2019 stating that "States should consider requiring utilities to (1) collect monthly data that tracks uncollectibles, number of payment arrangements, number of payment arrangement defaults, number of revised payment arrangements, disconnections, reconnections, duration and frequency of disconnections, and other relevant data points; (2) make the data publicly available on a monthly basis, delineated by general residential customers and those receiving low-income assistance; and (3) file the data with State public utility commissions to be published on the public utility commission's website so that policymakers might have access to sufficient, objective and granular data for forming public policy aimed at protecting the public health, safety and welfare."[260] NARUC's resolution offers a positive step forward and urges practical implementation.

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https://haas.berkeley.edu/wp-content/uploads/WP306.pdf; Plumer, Brad, and Nadja Popovich. 2020. "How Decades of Racist Housing Policy Left Neighborhoods Sweltering." *New York Times,* August 24, 2020. https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html.

[256] ACEEE. Low-Income, Black, Hispanic, and Native American Households Face High Energy Burdens. https://www.aceee.org/energy-burden.

[257] Baker, Shalanda, Sanya Carley, and David Konisky. 2021. "Energy insecurity and the urgent need for utility disconnection protections." *Energy Policy* 159: 112663. December. https://doi.org/10.1016/j.enpol.2021.112663.

[258] U.S. Census Bureau, American Housing Survey. 2017 Delinquent Payments and Notices. https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00000&s_year=2017&s_tablename=TABLE1&s_bygroup1=1&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1.

[259] Su, Jean, and Chris Kuveke. 2021. *Powerless in the Pandemic.* Center for Biological Diversity and Bailout Watch. https://bailout.cdn.prismic.io/bailout/6d3d3f34-8a75-4ed5-9d42-225446bd32a8_Powerless_Report_v6.pdf (finding that 16 utilities enjoyed a collective $1.25 billion in government bailout benefits while shutting household power off 1 million times); *see also* Ryan, Greer. 2021. *Power Crisis.* Center for Biological Diversity. https://www.biologicaldiversity.org/programs/energy-justice/pdfs/Power-Crisis-Report-June-2021.pdf.

[260] NARUC. 2019. Resolution on Best Practices in Data Collection and Reporting for Utility Services Delinquencies in Payments and Disconnections of Service. November 19, 2019. https://pubs.naruc.org/pub/9392BD1E-D055-4A2C-9677-AAD00FEA7527.

Energy Insecurity Impacts on Communities of Color

Energy insecurity disproportionately impacts communities of color and low-wealth communities. According to researchers from the Indiana University O'Neill School of Public and Environmental Affairs, nearly 4.8 million low-income American households were unable to pay an energy bill in 2020, and low-income Black and Hispanic households were especially vulnerable to energy insecurity.[261] A recent University of California, Los Angeles, study found that up to one-third of households in Los Angeles have utility debt, and 64% of people severely affected are in Latinx and Black communities.[262] Current estimates show that people across the country are facing utility debt in the tens of billions. Critically, energy insecurity and resulting utility disconnections have fatal consequences. A study from the National Bureau of Economic Research found that a national moratorium on power and water utility shutoffs, had it been implemented at the start of the pandemic, could have reduced COVID-19 deaths by 14.8% and infections by 8.7%.[263] To this end, energy poverty is defined as the distinct notion of household energy deprivation that limits social and material necessities for participation in society.[264] Energy insecurity can lead to sustained cycles of poverty, whereby electricity shutoffs render houses uninhabitable, lead to evictions or unhoused conditions, adversely affect credit score ratings and purchasing power, and impact ability to obtain and sustain employment and provide for children and other family members.[265]

4.2.3 Climate Disasters

The dominance of fossil fuels in the energy system has helped fuel human-caused climate change,[266] resulting in extreme weather events that pose an existential threat to life on earth.[267] In the United States, the climate emergency has been increasingly experienced through growing frequency and intensity of extreme weather events including heat waves, tropical storms, hurricanes, floods, droughts, and wildfires,[268] as well as declining food security.[269] In 2020, the National Oceanic and Atmospheric

[261] Memmott, Trevor et al. 2021. "Sociodemographic disparities in energy insecurity among low-income households before and during the COVID-19 pandemic." *Nature Energy* 6: 186–93.
[262] Gonzalez, Silvia R. et al. 2021. *Keeping the Lights and Water On: COVID-19 and Utility Debt in Los Angeles' Communities of Color.* UCLA Luskin Ctr. for Innovation. https://innovation.luskin.ucla.edu/wp-content/uploads/2021/04/Keeping-the-Lights-and-Water-On.pdf.
[263] Jowers, Kay et al. 2021. "Housing Precarity & the Covid-19 Pandemic: Impacts of Utility Disconnection and Eviction Moratoria on Infections and Deaths Across U.S. Counties." Nat'l Bureau of Econ. Res. Working Paper No. 28394, January 2021. https://www.nber.org/system/files/working_papers/w28394/w28394.pdf.
[264] Hernández, D. 2016. "Understanding 'energy insecurity' and why it matters to health." *Social Science &. Medicine* 167: 1–10. The article defines energy insecurity as a three-dimensional construct marked by the interplay between economic, physical, and behavioral factors.
[265] Hernández, "Understanding 'energy insecurity.'"
[266] See *2018 IPCC Report*.
[267] *See, e.g.,* Pidcock, Roz, and Robert McSweeney. 2021. Mapped: How climate change affects extreme weather around the world. Carbon Brief. February 25, 2021. https://www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world.
[268] The 2020 California wildfires are estimated to have contributed to over 1,000 premature deaths due to air pollution alone. *See* Burke, Marshall, and Sam Heft-Neal. 2020. "Indirect mortality from recent wildfires in CA." G-FEED. September 11, 2020. http://www.g-feed.com/2020/09/indirect-mortality-from-recent.html.
[269] Climate change threatens food security for millions of Americans. About 14% of U.S. households currently do not have food security—defined as access by all people at all times to enough food for an active, healthy life—and more than 48 million people live in food insecure homes. Public Health Institute/Center for Climate Change and Health, Food Security, Climate Change and Health (2016). https://climatehealthconnect.org/wp-content/uploads/2016/09/FoodSecurity.pdf. Climate change threatens food security through a number of pathways, including through reduced crop and livestock production, contamination of food supplies, changes in land use and land availability, and decreasing access to food. Melillo, Jerry M. et al. (eds.). 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment.* U.S. Global Change Research Program. https://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0, at 150.

Administration identified a record-breaking 22 weather/climate disasters that cost over $1 billion in damages each, including seven tropical storms, drought and heat waves in Western states, and West Coast wildfires.[270]

Much like the health impacts of fossil fuel pollution, climate change impacts are and will be unevenly and inequitably distributed across the country.[271] Lower-income regions in the Southeast—including largely Black communities already experiencing high pollution burdens and a legacy of environmental racism[272]—are among the highest-risk to climate disasters[273] even as they contribute less GHG emissions than high-income households.[274] In most cities across the United States, studies show that communities of color and low-wealth families live in hotter neighborhoods than their white counterparts,[275] as exposure to extreme heat is associated with century-old patterns of redlining.[276]

Climate and Redlining

In the recent Pacific Northwest unprecedented "heat dome" of June 2021, Portland, Oregon, reached record-breaking temperatures, but urban heat islands—characterized as neighborhoods without trees and with black-absorbing asphalt, tall buildings, and highway exhaust—experienced 124°F, a full 25 degrees higher than the wealthier, leafier parts of the city.[277] Heat maps align with where Black, Indigenous, and People of Color and low-wealth communities live. Portland is a microcosm of the problem that links race and climate heat impacts. A recent national study found that historical residential segregation policies and "redlining," or the practice of refusing home loans or insurance to whole neighborhoods based on a racially motivated perception of safety for investment, may be directly responsible for the disproportionate exposure of current-day communities of color to extreme inter-urban heat.[278] Land surface temperatures in U.S. redlined areas are approximately 2.6°C warmer than in nonredlined areas; 94% of studied areas display consistent city-scale patterns of elevated land surface temperatures in formerly redlined areas relative to their nonredlined neighbors by as much as 7°C.[279] Another recent study by the real estate company Redfin found that formerly redlined areas faced 25% higher flood risks than nonredlined areas, and that those risks were disproportionately borne by people of color, who make up 58% of residents in the formerly redlined neighborhoods studied.[280]

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[270] NOAA. *Billion-Dollar Weather and Climate Disasters: Overview*. https://www.ncdc.noaa.gov/billions/.
[271] Hsiang, Solomon et al. 2017. "Estimating economic damage from climate change in the United States." *Science* 356: 1362. https://science.sciencemag.org/content/356/6345/1362.
[272] Environmental racism is defined as "any policy, practice or directive that differentially affects or disadvantages individuals, groups or communities based on race." Bullard, Robert. 1990. *Dumping in Dixie.* Taylor & Francis. In the energy and electricity sector, it includes actions of choosing to situate polluting gas and coal plants and other harmful infrastructure in communities of color.
[273] Associated Press. 2017. *"Poor, Southern counties are most at risk."* https://interactives.ap.org/climate-change-economic-damage/.
[274] Sager, Lutz. 2019. "Income inequality and carbon consumption: Evidence from Environmental Engel curves." *Energy Econ.* 84(104): 507.
[275] Hsu, Angel et al. Disproportionate Exposure to Urban Heat Island Across Major U.S. Cities. https://ssrn.com/abstract=3684952; Benz, Susanne, and Jennifer Burney. 2021. "Widespread Race and Class Disparities in Surface Urban Heat Extremes Across the United States." *Earth's Future* 9.
[276] Hoffman, Jeremy S. et al. 2020. "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas." *Climate* 8: 12.
[277] Kaplan, Sarah. 2021. "Heat waves are dangerous. Isolation and inequality make them deadly." *Washington Post,* July 21, 2021. https://www.washingtonpost.com/climate-environment/2021/07/21/heat-wave-death-portland/.
[278] Hoffman.
[279] Hoffman.
[280] Katz, Lily. 2021. "A Racist Past, a Flooded Future: Formerly Redlined Areas Have $107 Billion Worth of Homes Facing High Flood Risk—25% More Than Non-Redlined Areas." *Redfin News,* June 23, 2021. https://www.redfin.com/news/redlining-flood-risk/.

Moreover, as more frequent and severe disasters driven by climate change compromise the physical integrity of fossil fuel and related energy infrastructure more broadly, communities of color face the greatest risk.[281] Already, past climate disasters such as Hurricane Harvey have damaged highly contaminated Superfund sites, which can leak dangerous pollutants into surrounding communities and dramatically set back essential clean-up efforts.[282] In 2021, severe winter weather in Texas highlighted the risks of climate disasters to the electric grids when it caused millions to lose power, hitting Black and Brown Texans particularly hard. Minority neighborhoods tended to be disconnected first and reconnected last by utilities.[283,284]

4.2.4 Ecocide

The current electricity system, still majority fueled by fossil fuels, is fundamentally damaging to wildlife. Fossil fuel production, transmission, generation, and waste disposal activities cause a wide array of harms to species and ecosystems, such as destroying and fragmenting wildlife habitat, reducing water supplies often in water-stressed areas, causing air, noise, and light pollution; contaminating surface and ground water; and facilitating the spread of ecologically disruptive invasive species,[285] with similar harms in the offshore marine environment.[286] For many species, harms from the fossil fuel-based energy system have led to mortality, changes in behavior, population declines, disruptions to community composition, and loss of ecosystem function.[287]

Fossil fuel pollution from the energy system is also one main driver of the climate emergency, threatening catastrophic species losses if GHG emissions continue unabated.[288] Climate change is increasing stress on species and ecosystems, causing disruptions of species' distribution, timing of breeding and migration,

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[281] Uja, Wanter. 2020. "The Effects of Natural Disasters on Energy Infrastructure." *Lewis & Clark Law School: Environmental, Natural Resources, & Energy Law Blog,* August 19, 2020. https://law.lclark.edu/live/blogs/132-the-effects-of-natural-disasters-on-energy.

[282] U.S. GAO. 2019. *Climate Change and the Nation's Most Contaminated Hazardous Waste Sites*. November 18. https://www.gao.gov/blog/2019/11/18/climate-change-and-the-nations-most-contaminated-hazardous-waste-sites.

[283] Dobbins, James, and Hiroko Tabuchi. 2021. "Texas blackouts hit minority neighborhoods especially hard." *New York Times,* February 16, 2021. https://www.nytimes.com/2021/02/16/climate/texas-blackout-storm-minorities.html; Mulcahy, Shawn. 2021. "Many Texans have died because of the winter storm." *Texas Tribune,* February 19. 2021. https://www.texastribune.org/2021/02/19/texas-power-outage-winter-storm-deaths/; Ura, Alexa, and Juan Pablo Garnham. 2021. "Already hit hard by pandemic, Black and Hispanic communities suffer the blows of an unforgiving winter storm." *Texas Tribune,* February 19, 2021. https://www.texastribune.org/2021/02/19/Texas-winter-storm-suffering-inequities/; Skibell, Arianna. 2021. "Texas grid exposes environmental justice rifts." February 23, 2021. https://subscriber.politicopro.com/article/eenews/1063725725;
Neumann, Johanna. 2021. "Reliance on fossil fuels will lead to more energy disasters like Texas." *Bus. Insider,* February 28, 2021. https://www.businessinsider.com/fossil-fuel-dependence-texas-energy-green-new-deal-climate-change-2021-2.

[284] The disproportionate impacts of such outages on communities of color and low-wealth communities are a clear form of energy injustice, which can carry lifelong consequences for those communities. Su, Jean. 2020. "Losing Power in the Time of COVID-19, Climate Change and Racism." *Rosalux,* September 2, 2020. https://rosalux.nyc/utility-shut-offs/.

[285] Butt, Nathalie et al. 2013. "Biodiversity risks from fossil fuel extraction." *Science* 342: 425; Brittingham, Margaret C. et al. 2014. "Ecological risks of shale oil and gas development to wildlife, aquatic resources and their habitats." *Enviro. Sci. and Tech.* 48: 11,034; Pickell, Paul D. et al. 2014. "Monitoring forest change in landscapes under-going rapid energy development: challenges and new perspectives." *Land* 3: 617; Souther, Sara et al. 2014. "Biotic impacts of energy development from shale: research priorities and knowledge gaps." *Frontiers in Ecol. and the Enviro.* 12: 330; Allred, Brady W. et al. 2015. "Ecosystem services lost to oil and gas in North America." *Science* 348: 401; Harfoot, Michael B. et al. 2018. "Present and future biodiversity risks from fossil fuel exploitation." *Conserv. Letters* 11: 12,448.

[286] Venegas-Li, Rubén et al. 2019. "Global assessment of marine biodiversity potentially threatened by offshore hydrocarbon activities." *Global Change Bio.* 25: 2009.

[287] *See, e.g.*, Endangered Species Coalition & Ctr. for Bio. Diversity. Fueling Extinction: How Dirty Energy Drives Wildlife to the Brink. https://www.biologicaldiversity.org/publications/papers/Fueling_Extinction.pdf; Butt et al. "Biodiversity risks from fossil fuel extraction."

[288] Masson-Delmotte, Valerie et al. 2018. *Intergovernmental Panel on Climate Change, Global Warming of 1.5° C: Summary for Policymakers*. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf.

physiology, vital rates, genetics, as well as the ecosystem processes that support basic human needs.[289] Climate change-related local extinctions are already widespread.[290] Species extinction risk will accelerate with continued carbon pollution, threatening the loss of a third or more of animal and plant species in the next 50 years.[291] A 2019 United Nations report concluded that one million animal and plant species are now threatened with extinction, with climate change as a primary driver.[292] Scientists have called for a rapid transformation of our energy system away from fossil fuels to avoid a mass extinction event.[293]

At the same time, widespread deployment of renewable and clean energy, while vital to mitigating the climate emergency, also carries potentially adverse ecologically effects if not properly planned or sited. Overall, siting projects in areas that may impact imperiled species' habitat, vital habitat linkage areas and movement corridors, and fragile desert resources like Joshua tree woodlands, could undermine climate change adaptation strategies necessary for biodiversity conservation.

Hydropower, solar, wind and geothermal energy all bring different ecological disturbances:[294]

- Most large-scale hydropower facilities result in large-scale effects on riverine and adjacent upland habitats. These impacts are felt not just in the areas directly flooded under the reservoir footprint, but also via changes in hydrology to the entire length of the riverine ecosystem downstream of a dam, with substantial impacts to freshwater species and ecosystems. Secondary effects of associated roads and power lines on land-use change also pose a serious threat to terrestrial biodiversity.[295]

- Large-scale solar plant development can result in habitat fragmentation, loss of connectivity for terrestrial wildlife, destruction of carbon sequestration of soils, and introduction of predators and invasive weed species on intact habitat.[296] Critically, although ample space exists to develop solar facilities outside areas of high conservation value, some of the nation's utility-scale solar development has occurred in core habitats for endangered and sensitive species. Careful siting on already built environments, like residential and commercial building rooftops and parking lots, as well as degraded lands and areas without imperiled species, can avoid these impacts.[297]

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[289] *See*, *e.g.*, Ctr. for Biological Diversity. 2005. Before the Secretary of Interior: Petition to the list the polar bear (ursus martimus) as a threatened species under the Endangered Species Act. https://www.biologicaldiversity.org/species/mammals/polar_bear/pdfs/15976_7338.pdf; Ctr. for Biological Diversity. 2011. Court upholds Endangered Species Act Protection for Polar Bears: Ruling Confirms that Global Warming Threatens Polar Bears with Extinction. June 30. https://www.biologicaldiversity.org/news/press_releases/2011/polar-bear-06-30-2011.html; Warren, Rachel et al. 2011. "Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise." *Climatic Change* 106: 141; Scheffers, Brett R. et al. 2016. "The broad footprint of climate change from genes to biomes to people." *Science* 354: 719.

[290] Wiens, John J. 2016. "Climate-related local extinctions are already widespread among plant and animal species." *PLoS Bio.* 14. e2001104.

[291] Román-Palacios, Christian, and John J. Wiens. 2020. "Recent responses to climate change reveal the drivers of species extinction and survival." *PNAS* 117: 8.

[292] IPBES. 2019. *Global Assessment Report.* https://ipbes.net/news/Media-Release-Global-Assessment.

[293] Barnosky, Anthony D. 2015. "Transforming the global energy system is required to avoid the sixth mass extinction." *MRS Energy and Sustainability* 2: E10.

[294] Gibson, Luke et al. 2017. "*How Green is 'Green' Energy?" Trends in Ecol. & Evol.* 32: 2306.

[295] Gibson.

[296] Gibson.

[297] *See* Hernandez, R. R. et al. 2019. "Techno-Ecological Synergies of Solar Energy for Global Sustainability." *Nature Sustain.* 2: 560; Cameron, D. Richard et al. 2012. "*An Approach to Enhance the Conservation-Compatibility of Solar Energy Development*." *PLOS One*. *See also* Donnelly, Patrick, and Jean Su. 2021. "No free lunch on green energy." *Las Vegas Review-Journal,* June 19, 2021. https://www.reviewjournal.com/opinion/nevada-views-no-free-lunch-on-green-energy-2382525/; Swan, Noelle. 2021. "Energy, Wildlife, and the Myth of the Zero-Sum Game." *Christian Science Monitor* July 12, 2021. https://www.csmonitor.com/Commentary/From-the-Editor/2021/0712/Energy-wildlife-and-the-myth-of-the-zero-sum-game.

- Onshore wind projects, though they generally require a smaller footprint than solar projects and thus result in less direct loss of terrestrial habitat,[298] pose threats of fragmenting large swaths of land and habitat due to power lines and roads associated with these projects. Bird and bat mortality also are significant potential impacts of such projects. These impacts can often be reduced by siting, design, or operational measures, such as higher cut-in speeds and curtailment during certain seasons times of day, appropriate heights, and siting outside migratory pathways.[299] Offshore wind projects also require proper siting to avoid and mitigate species and ecosystem impacts.
- Geothermal energy has the potential to also impact biodiversity when sited adjacent to surficial thermal water features, which often are altered in their discharge temperature, geochemistry, or quantity after production commences.[300] Thermal water features hold disproportionately high levels of biodiversity compared to the broader ecosystem they occur in, and frequently harbor aquatic endemic species. Historical evidence shows that natural thermal features have frequently been affected at most high-temperature geothermal facilities.[301] To minimize conflicts, geothermal energy should be sited at so-called "blind resources"—that is, geothermal reservoirs with no surface expression at springs.

Rapid and widescale deployment of renewable energy projects is essential in addressing the climate crisis; however, such actions must be done in ways that do not unintentionally exacerbate the biodiversity crisis. Understanding concerns regarding siting, operations and proper mitigation guidance—along with meaningful engagement of affected communities, including energy burdened communities—is critical if utilities and independent project developers wish to build renewable energy projects that are consistent with societal goals of biodiversity conservation and climate and energy justice.

4.3 Pathways to Building a Clean and Renewable Energy System that Addresses Chronic Energy Injustice

The role of utilities, state policies, and utility regulations in energy injustice is both direct and vast. How to address this chronic energy injustice is also clear: regulators and utilities must shepherd and execute the rapid transition away from the existing dirty and inequitable energy system to an energy-efficient, renewable and just system.

The barriers to the clean and renewable energy transition are numerous. Some argue that the shareholder profit model of investor-owned utilities drives the construction of fossil fuel infrastructure and slows deployment of non-utility-owned renewable energy, particularly to the detriment of communities of color who suffer first and most from the fossil fuel economy.[302] There is a decades-old robust and heated debate

[298] Communication with Ben Hoen, Research Scientist, Lawrence Berkeley National Laboratory (Aug. 13, 2021). The National Renewable Energy Laboratory (NREL) estimated a density of 2.74 +/- 1.4 megawatts per kilometer (MW/km^2) for wind projects. *See* Harrison-Atlas, Dylan et al. 2021. "Spatially-Explicit Prediction of Capacity Density Advances Geographic Characterization of Wind Power Technical Potential." *Energies* 14: 3609, 3617. The Lawrence Berkeley National Laboratory estimated a density of 86 MW/km^2 for solar. *See* Bolinger. "Land requirements for utility-scale PV." ASES Solar 2021, August 5, 2021. For solar projects, nearly 100% of the land is covered with panels, while wind projects—after construction—only take up the area of the pad and access roads. NREL estimated this "direct" land impact as 333 MW/km^2. *See* Denholm, Paul et al. 2009. *Land-Use Requirements of Modern Wind Power Plants in the United States.* 10 tbl. 1. National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy09osti/45834.pdf.

[299] Loss, Scott et al. 2015. "Direct Mortality of Birds from Anthropogenic Causes." *Ann. Rev. Ecol., Evol., and System.* 46: 99.

[300] Sorey, M. L. 2000. Geothermal development and changes to surficial features: Examples from the Western United States. Proceedings World Geothermal Congress 2000. 705–711.

[301] United Nations University, Geothermal Training Programme. Reports 2000, Number 1:1–109.

[302] *See generally* Baker; Fairchild, Denise, Al Weinrub et al. 2017. *Energy Democracy: Advancing Equity in Clean Energy Solutions*; Kibbey, J. C. 2021. *Utility Accountability 101: How Do Utilities Make Money*? Natural Resources Defense Council January 20. https://www.nrdc.org/experts/jc-kibbey/utility-accountability-101-how-do-utilities-make-money.

about how America should fundamentally reform the energy system. These possibilities largely fall within a three-point spectrum: (1) the center, which urges keeping intact the status quo regulated utility system while seeking to generally improve regulation;[303] (2) the right, which promotes free-wheeling market competition with significantly less regulation;[304] and (3) some on the left, who seek accountable public ownership that eliminates profit incentive for the utility and provides democratic ownership of energy systems.[305] The latter point of view has gained traction among some in recent years, in light of growing awareness of the energy system's undue impacts, including chronic energy injustice, corruption,[306] and both utilities' and regulators' inadequate response to addressing climate change. Recently proposed public power legislation in New York,[307] public power resolutions made by Congressmembers Cori Bush and Jamaal Bowman,[308] considerations of city ownership of the bankrupt assets of Pacific Gas & Electric in California,[309] and the ongoing fight to establish Boulder as a municipal power authority[310] are examples of this trend.

The rest of this essay focuses on two immediate and mutually reinforcing legal and regulatory pathways that can be applied today to help address some of the chronic energy injustice issues identified above:

1. Redefining the "public interest" to encompass climate, environmental, and energy justice as goals

2. Optimizing the integration of DERs, such as rooftop and community solar, demand response, and energy storage, and prioritizing their deployment in communities that have suffered first and worst from the fossil fuel economy

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[303] *See*, *e.g.*, Boyd, William. 2014. "Public Utility and the Low-Carbon Future." *UCLA L. Review* 61: 1614 (arguing that a free market may be unable to deliver the kind of rapid, systemic change needed, and that the regulated utility sector is afflicted with problems but could be repaired by revitalizing the concept of public interest regulation).

[304] *See*, *e.g.*, Snitchler, Todd, and Brian George. 2020. "*Competition is the best medicine for corruption; 'prescribed' markets could be what the doctor ordered*." *Utility Dive,* August 11, 2020. https://www.utilitydive.com/news/competition-is-the-best-medicine-for-corruption-prescribed-markets-could/583232/.

[305] It should be noted that few models of accountable public power exist.

[306] *See*, *e.g.*, Kasper, Matt. 2020. "FirstEnergy scandal is latest example of utility corruption, deceit." *Energy and Pol'y Inst.,* July 23, 2020. https://www.energyandpolicy.org/utility-corruption/; Anderson, Dave. 2020. "Money trail in FirstEnergy corruption scandal leads outside Ohio." *Energy and Pol'y Inst.,* April 23, 2020. https://www.energyandpolicy.org/firstenergy-corruption/.

[307] In January 2021, the New York Legislature introduced the New York State Build Public Renewables Act, which creates a public option for electricity by expanding the territory and renewable generation of the New York Power Authority. *See* A.B. 1466-A, 2021 Assemb., Reg. Sess. (N.Y. 2021).

[308] In June 2021, Representatives Cori Bush and Jamaal Bowman introduced a resolution, endorsed and sponsored by the Center for Biological Diversity and The Democracy Collaborative, to make power a public utility to address climate, energy, and ecological injustices caused by the current vastly privatized energy utility system. *See* H.R. 457, 117th Cong. (2021); *see also* Reps. Cori Bush and Bowman Introduce Resolution to Make Power a Public Utility. June 3, 2021. https://bush.house.gov/media/press-releases/reps-cori-bush-and-jamaal-bowman-introduce-resolution-make-power-public-0.

[309] The California state government and San Francisco and San Jose city governments proposed to purchase all or parts of private utility Pacific Gas & Electric (PG&E) in the aftermath of its Chapter 11 bankruptcy filing due to, in part, mounting liability for wildfires sparked by the company's mismanagement of equipment. However, PG&E rejected those proposals and eventually (and successfully) sought bankruptcy protection to preserve the company. *See*, *e.g.*, Walton, Robert. 2019. "San Jose proposes multi-billion PG&E buyout. Utility says it's 'not for sale." *Utility Dive,* October 2, 2019. https://www.utilitydive.com/news/san-jose-proposes-multibillion-pge-buyout-utility-says-its-not-for-sale/565525/; Bozuwa, Johanna. 2019. "Public takeover of PG&E: A radically common-sense proposal." *Next System Proj.,* January 17, 2019. https://thenextsystem.org/learn/stories/public-takeover-pge-radically-common-sense-proposal; Smith, Rebecca. 2019. "San Jose to Propose Turning PG&E Into Giant Customer-Owned Utility." *Wall Street Journal,* October 21, 2019. https://www.wsj.com/articles/san-jose-to-propose-turning-pg-e-into-giant-customer-owned-utility-11571685117; Penn, Ivan. 2020. "PG&E, Troubled California Utility, Emerges from Bankruptcy." *The New York Times,* July 28, 2020. https://www.nytimes.com/2020/07/01/business/energy-environment/pge-bankruptcy-ends.html.

[310] For example, the years-long effort by the city of Boulder, Colorado, to form a municipal power authority to replace the for-profit Xcel Energy to pursues a clean, renewable energy portfolio for climate purposes. See *Boulder Local Power: A History*, Empower our Future, https://empowerourfuture.org/boulder-municipalization-a-history/.

4.3.1 Redefining the "Public Interest" to Include Climate, Environmental, and Energy Justice

The grounding intention of regulation over the electricity system was an obligation to serve the general public interest by delivering reliable, affordable electricity indiscriminately to all communities in exchange for providing private utilities a sufficient rate of return and a monopoly on service territory. However, the public interest has been impacted by the energy system in devastating ways unforeseen by those who forged the original regulatory structure. In reckoning with chronic energy injustice, it is plain that the public interest, as related to the energy system, lacks protection in profound ways—and thus raises foundational questions about the proper scope and definition of "public interest." Lawmakers and regulators possess the authority to address these issues pursuant to their foundational mandate to serve the public interest in the regulation of utilities. Explicitly defining the public interest to account for chronic energy injustice is a threshold step to addressing these problems as well as pragmatically creating regulatory certainty for utility action.

4.3.1.1 The Non-Universal Definition of "Public Interest" for Regulating Public Utilities[311]

Federal and state statutes have generally mandated utility regulators to protect the "public interest" when regulating private corporations delivering public goods like electricity.[312] Yet the term's scope is not standardized across the country. Regulators have not uniformly considered public interest to take into account changing societal circumstances, including the climate emergency, systemic racism concerns, and other forms of energy injustice.

The term "public interest" originates from the early 1900s, with New York and Wisconsin establishing the first state commissions with full regulatory powers over electric utilities in 1907.[313] The legal concept of public utilities is rooted in nineteenth century jurisprudence. The U.S. Supreme Court in *Munn v. Illinois* held that businesses "clothed in the public interest" should be subject to government regulation when such businesses act in a manner of "public consequence" and thus "must submit to be controlled by the public for the common good."[314] In its infancy, conceptions of protecting the public interest were narrowly tailored to democratizing access to energy in urban and rural areas and ensuring customers paid "just and reasonable rates" to prevent utility price-gouging—in exchange for granting monopolies over service territories to private utility corporations.[315] This foundational statutory mandate charged regulators

[311] For purposes of this essay, the term *public utilities* refers to regulated entities, particularly investor-owned utilities, as distinguished from publicly owned or publicly governed utilities.
[312] *See*, *e.g.*, N.C. Gen. Stat. § 62-2 ("It has been determined that the rates, services and operations of public utilities as defined herein, *are affected with the public interest* and that the availability of an adequate and reliable supply of electric power and natural gas to the people, economy and government of North Carolina is a matter of public policy. It is hereby declared to be the policy of the State of North Carolina (1) *to provide fair regulation of public utilities in the interest of the public*.") (emphasis added); Wash. Rev. Code § 80.01.040(3) ("[The Washington Utilities and Transportation Commission shall] *regulate in the public interest*, as provided by the public service laws, the rates, services, facilities, and practices of all persons engaging with this state in the business of supplying any utility service or commodity to the public for compensation.") (emphasis added).
[313] Filipink, Eric. 2009. *Serving the 'Public Interest'—Traditional vs Expansive Utility Regulation.* Nat. Reg. Res. Inst. Report No. 10-2. December 30.
[314] 94 U.S. 113, 126 (1876).
[315] Moreover, regulation, as an oversight mechanism for natural monopolies, and antitrust laws, as an oversight mechanism over competitive markets, have traditionally been viewed as binary legal approaches serving the same purpose: keeping industry in check and thereby ensuring fair consumer prices. Thus, as Justice Breyer has written, while antitrust laws serve to police competition in traditional competitive markets, regulation serves as "an alternative to antitrust, necessary when antitrust cannot successfully maintain a workably competitive marketplace or when such a marketplace is inadequate due to some other serious defect." Breyer, Stephen. 1982. *Regulation and Its Reform* 156–57.

with protection of the public interest because they presumed that private behavior, unregulated, diverges from the public interest.[316]

By the 1950s, state legislation over public utility commissions was traditionally limited to five areas, and these generally remain the core functions of commissions today:

1. Controlling market entry and exit, including the granting of certificates of public convenience and necessity (CPCN) for new energy facilities and infrastructure
2. Pricing, with the goal of setting "just and reasonable" rates to align consumer interests for reasonable rates with utility interests seeking a reasonable rate of return on their investments
3. Setting minimum standards for quality and safety of service, including the provision of continual service 24 hours a day
4. Assuring nondiscriminatory service, which requires utilities to serve all customers who are able to pay in a service territory
5. Preventing undue financial risk for utilities, which originally included barring utilities from financing non-utility investments[317]

Since the 1950s, state legislators have increasingly acknowledged and crafted policies addressing changing societal issues related to energy, particularly with respect to climate change, energy conservation, environmental protection, and environmental justice. In particular, state lawmakers have enacted two forms of law that encompassed new goals: (1) those that explicitly mandate commissions to reach particular policy goals and (2) those that are ambiguous and do not explicitly mandate commissions to act toward such goals.[318] A comprehensive survey across 27 states, conducted in 2009 for the National Regulatory Research Institute, reviewed the litigation with respect to expansive policy goals taken on by energy regulators.[319] In a nutshell, the survey found, predictably, that utilities are more likely to legally challenge regulators' decisions that are not supported by an explicit legislative policy goal that directly mandates commissions to act.[320]

Even when litigation by utilities does arise to challenge a regulatory action, some courts have upheld regulators' pursuit of an expansive policy goal that falls within the confines of enabling statutes or established regulatory roles. Judicial decisions in both federal and state courts concerning the definition of the "public interest" may be relied on in future cases. In one of the few cases to address the definition of "public interest" on a federal level, the U.S. Supreme Court in *National Association for the Advancement of Colored People v. Federal Power Commission* suggested that the Federal Power Commission (the predecessor to the Federal Energy Regulatory Commission [FERC]) possesses the authority to promote expansive public interest goals so long as such goals are within the bounds of the animating statute.[321] Specifically, the Supreme Court stated that while "'public interest' in a regulatory statute is not a broad license to promote the general public welfare," the term and its bounds nonetheless "take meaning from the purposes of the regulatory legislation."[322] In that case, the court noted that the purposes of both the

[316] Hempling, Scott. 2013. *Preside or Lead? The Attributes and Actions of Effective Regulators.* (2d ed.).
[317] *See* Filipink, 12.
[318] For example, the California legislature in 2014 passed Assembly Bill 327, which explicitly governed multiple aspects of regulated utility service, including net energy metering, the renewables portfolio standard, and electricity rates. The law specifically required the commission to open a proceeding regarding the integration of DERs into investor-owned utility electric distribution planning and a mandate for the commission to review these utility plans. A.B. 327, 2013 Assemb., Reg. Session (Cal. 2013).
[319] *See* Filipink.
[320] *See* Filipink, 22.
[321] 425 U.S. 662 (1976)
[322] 425 U.S. 669 (1976).

Federal Power Act[323] and Natural Gas Act[324] are to encourage energy production at reasonable rates as well as subsidiary purposes including addressing "conservation, environmental, and antitrust questions."[325]

More recent federal case law affirms that expansive policy goals tied to the statute's purpose are permitted. In *De La Comunidad v. FERC*, the D.C. Circuit recently overturned FERC's approval of gas infrastructure because it failed to properly analyze the projects' impacts on climate change and environmental justice communities as part of the commission's determination under the Natural Gas Act as to whether a gas facility will "be consistent with the public interest" or a pipeline is required for "public convenience and necessity" in service of the public interest.[326] That case follows established judicial precedent that FERC has the authority to consider climate change and other environmental impacts when considering "the public convenience and necessity" to construct interstate fossil fuel pipelines pursuant to its animating statute, the Natural Gas Act.[327]

Similarly, some state courts have upheld expansive authority that was somewhat tied to the purposes of the enabling statutes of the utility commission. For example, in 2014, in *Southern California Edison Co. v. California Public Utilities Commission*, the California Court of Appeals rejected Southern California Gas Company's challenge to the authority of the California Public Utilities Commission (CPUC) to implement the Electric Program Investment Charge (EPIC), which required electric utilities to collect a surcharge from ratepayers to fund renewable energy research, development, and demonstration projects.[328] The court ruled that the CPUC had the constitutional and statutory authority that vests it with "vast, inherent power to take any action that is cognate and germane to utility regulation, supervision, and rate setting, unless specifically barred by statute," and that EPIC was not an unlawful delegation of CPUC's authority.[329] Similarly, in 2010 in *Public Service Commission of Kentucky v. Commonwealth*, the Kentucky Supreme Court upheld the commission's regulation allowing utilities to extend discounted electricity rates in order to promote economic development in disadvantaged communities and brownfields, relying on a pair of enabling statutes that permit the commission both to ensure nondiscriminatory treatment of customers and a broad definition of customer classes.[330]

To the extent a conclusion can be made, these limited number of holdings suggest that at least in some states, to the extent regulators choose to take an equity-oriented, expansive approach to the public interest, courts may be deferential to those actions if those goals are tied to the purposes of the commission's enabling statutes. At base, the broad mandate in animating statutes charging commissions to serve the public interest thus provides a justifiable foundation for regulators to address in their decision-making the energy injustice impacts of the regulated energy system.[331]

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[323] 16 U.S.C. § 781 *et seq*.
[324] 15 U.S.C. § 717 *et seq*.
[325] 425 U.S. at 670, n.5 & n.6 (citing 16 US.C. §717s (a); 16 U.S.C. §§ 803(a), (h)). In this case, the court permitted the commission to decline to regulate discriminatory labor practices of subject utilities where the commission determined such regulations did not sufficiently tie to the Acts' purposes. *See also*
Gulf States Utilities Co. v. Fed. Power Comm'n, 411 U.S. 747 (1973) (holding that the term "public interest" requires the commission to take into account antitrust principles because that does fall within the scope of the Federal Power Act).
[326] 2021 U.S. App. LEXIS 22881, 22 (D.C. Cir. 2021).
[327] See, e.g., *Sierra Club v. FERC*, 867 F.3d 1357 (D.C. Cir 2017); *Minisink Residents for Envtl. Pres. & Safety v. FERC*, 762 F.3d 97 (D.C. Cir. 2014); *Myersville Citizens for a Rural Cmty. v. FERC*, 783 F.3d 1301, 1309 (D.C. Cir. 2015).
[328] 2014 Cal. App. Unpub. LEXIS 3758 (Cal. App. Ct. 2014).
[329] *Id*. at 17-18.
[330] 320 S.W.3d 660 (Ky 2010).
[331] There may be other laws, in addition to enabling statutes, that may constrain the public interest definition under which a utility commission operates. This essay encourages regulators to think flexibly within their state-specific legal frameworks.

4.3.1.2 Expanding the "Public Interest" Definition in Both Legislation and Regulatory Rulemaking to Include Climate, Environmental, and Energy Justice

There are two ways to bring about a more robust and precise definition of "public interest": legislation and regulatory rulemaking. First, both federal and state legislators should amend the definition of "public interest" in all energy regulation statutes to explicitly include goals of achieving climate, environmental, and energy justice and redressing energy injustice. The explicit articulation of these justice goals can be directly imported into federal statutes governing FERC and state statutes governing public utility commissions. The creation of a model statute defining "public interest" from reliable legal and regulatory scholars, with commentary explaining the text, would be a tangible first step to pursue legislative amendments. Second, recognizing barriers to passing legislation, regulators can use pathways for addressing chronic energy injustice through regulatory rulemaking.[332] To address these issues in the most legally defensible manner, while also providing the greatest amount of regulatory certainty for utilities and stakeholders, regulators should undertake a rulemaking process, if statutorily permitted, that explicitly defines public interest to include climate, environmental, and energy justice goals. As reiterated above, in states where the utility regulatory commission has such authority, the animating statutes governing utility commissions charge regulators with the responsibility to protect the public interest as it pertains to the regulation of utilities in the energy system; redressing the public harms of that regulated energy system is a fundamental part of protecting the public interest. Again, the creation of a model definition of "public interest" crafted by reliable legal and regulatory scholars, with commentary explaining the text, would be a tangible first step to pursuing administrative changes. Moreover, even absent a new explicit definition of public interest,[333] to lower the potential for litigation and help ensure courts will uphold a new public interest definition, regulators can tie this explicit demarcation of the public interest definition to traditional goals and roles of utility commissions—often statutorily tied to the five traditional areas of work outlined above: (1) managing market entry and exit, (2) pricing, (3) setting service standards, (4) assuring nondiscriminatory service, and (5) preventing undue financial risk. Exploring the expansive policy goals of addressing energy injustice can be directly tied to commissions' traditional responsibilities in the following ways.

Fossil fuel pollution, climate disaster, and ecological destruction. Regulators should take all three of these factors into account in relation to two traditional areas of regulatory work: CPCNs for new energy infrastructure and preventing undue financial risk.

First, many statutes enabling commissions to permit CPCNs—an outgrowth of regulators' primary responsibility to control market entry and exit—to employ a set of criteria that regulators must consider. For example, Vermont requires that the commission consider factors like "air and water pollution," "the natural environment," "public health and safety," and "wildlife, including necessary wildlife habitat and endangered species" when granting a CPCN.[334] Similarly, North Dakota employs both statute and administrative code to delegate to commissions several factors in energy infrastructure permitting and decision-making, including "available research and investigations relating to…the proposed facility on public health and welfare, natural resources, and the environment," and "adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated."[335] On a federal level, FERC is required to consider environmental and climate change impacts as part of the

[332] Some states require legislative approval of the rules of an administrative agency.
[333] James Bonbright provides some comfort in these suggested parameters of the public interest. Bonbright noted that energy regulation entails "[t]he identification of public interest with the welfare of the people in the community or nation, the state being regarded merely as an instrument for the attainment of this welfare." Bonbright, James. 1960. *Principles of Public Utility Rates.* Columbia University Press. October 10, 1960. https://www.raponline.org/knowledge-center/principles-of-public-utility-rates/.
[334] VT Stat. Ann. Tit. 30 § 248(b); tit. 10 §§ 1424a(d), 6086; Crystal, Howard, and Jean Su. 2021. *Comments to Federal Energy Regulatory Commission on Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection.* October 8. https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20211008-5220.
[335] N.D. Cent. Code § 49-22-09 (2008); N.D. Admin. Code § 69-06-08-019 (2008).

consideration of public necessity and convenience for fossil fuel pipelines,[336] as well as environmental justice impacts deriving from Executive Order 12,898, which directs all federal agencies to make environmental justice part of their missions.[337]

To the extent a commission already has relevant regulations in place, fossil fuel pollution, climate disaster, and ecocide can and should be analyzed in the context of factors regarding adverse impacts on the environment, wildlife and natural resources, and public health and safety. The key for regulators is to articulate tests of weighing factors against one another. With mounting scientific evidence of the harms of these forms of energy injustice, the weight of harm increases and can lead to more justice-inclusive decision-making.

Second, regulators are also traditionally responsible for whether utility actions pose undue financial risk to customers overall and ensuring reliable electricity. Continued investments in fossil fuel infrastructure expose customers and utilities and their shareholders to financial climate risk in several forms, including financial losses from stranded carbon-emitting assets and cost-of-capital implications;[338] climate disaster-induced damages to centralized fossil-fuel generation plants, grid, and transmission lines;[339] lost profit from lucrative opportunities for renewable energy development; and reputational damage that may drive loss of investors and costly political reactions,[340] access to insurance,[341] and other financial and operational vehicles. In fact, advocates have recently called on the Securities Exchange Commission to require utilities to disclose such climate risk to investors.[342]

Importantly, damages from climate disasters have already demonstrated grave risk to utilities.[343] For example, the Connecticut Public Utilities Regulatory Authority (PURA) recently reduced a Connecticut utility's return on equity as a result of that utility's failed response to Tropical Storm Isaias.[344] The PURA also indicated that it would look skeptically at any future attempt by the utility to recoup $230 million in storm recovery costs from ratepayers.[345] Regulators, when considering whether to permit infrastructure, are charged with a responsibility to prevent undue financial risk to customers—distinct from financial risk

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[336] See, e.g., *Sierra Club v. FERC*, 867 F.3d 1357 (D.C. Cir 2017); *Minisink Residents for Envtl. Pres. & Safety v. FERC*, 762 F.3d 97 (D.C. Cir. 2014); *Myersville Citizens for a Rural Cmty. v. FERC*, 783 F.3d 1301, 1309 (D.C. Cir. 2015).
[337] Executive Order 12,898, 59 Fed. Reg. 7,629 (Feb. 11, 1994).
[338] *See*, *e.g.*, Direct Testimony from Tyler Fitch on behalf of Vote Solar: In the Matter of South Carolina Energy Freedom Act (House Bill 3659) Proceeding Related to S.C. Code Ann. Section 58-37-40 and Integrated Resources Plans for Duke Energy Carolinas, LLC and Duke Energy Progress, LLC, Docket Nos. 2019-224-E and 2019-225-E (S.C.P.S.C. Feb 5, 2021).
[339] *See* Ctr. for Biological Diversity, 2021. Comment Letter on Proposed SEC Climate Disclosure Requirements. June 11, 2021, https://www.sec.gov/comments/climate-disclosure/cll12-8911759-244398.pdf; Crystal, Howard, and Ilana Cohen. 2021. "As climate risk disclosures loom, U.S. utilities must not evade accountability." *Utility Dive*, August 2, 2021. https://www.utilitydive.com/news/as-climate-risk-disclosures-loom-us-utilities-must-not-evade-accountabilit/603887/.
[340] Philips, Matt. 2021. "Exxon's Board Defeat Signals the Rise of Social-Good Activists." *New York Times,* June 9, 2021. https://www.nytimes.com/2021/06/09/business/exxon-mobil-engine-no1-activist.html.
[341] *See, e.g.,* Insure our Future. "First Major U.S. Insurance Company to Stop Insuring and Investing in Coal." July 1, 2019. https://www.insureourfuture.us/updates/2019/7/1/first-major-us-insurance-company-to-stop-insuring-and-investing-in-coal; Insure Our Future. 2017. *Insuring Coal No More: An Insurance Scorecard on Coal and Climate Change.* https://insureourfuture.co/wp-content/uploads/2017/11/UnfriendCoal-Insurance-Scorecard.pdf.
[342] *See, e.g.*, Direct Testimony from Tyler Fitch on behalf of Vote Solar: In the Matter of South Carolina Energy Freedom Act (House Bill 3659) Proceeding Related to S.C. Code Ann. Section 58-37-40 and Integrated Resources Plans for Duke Energy Carolinas, LLC and Duke Energy Progress, LLC, Docket Nos. 2019-224-E and 2019-225-E (S.C.P.S.C. Feb 5, 2021).
[343] *See*, *e.g.*, Direct Testimony of Greer Ryan for Center for Biological Diversity and Appalachian Voices: In the Matter of the Application of Duke Energy Carolinas, LLC for Adjustment of Rates and Charges Applicable to Electric Service in North Carolina, Docket No. E-7, SUB 1214, (N.C.U.C. Feb. 18, 2020).
[344] *See* Skahill, Patrick. 2021. "Eversource 'Failed Us': PURA Imposes Strict Penalties for Tropical Storm Isaias Response." Conn. Pub. Radio, April 28, 2021. https://www.ctpublic.org/environment/2021-04-28/eversource-failed-us-pura-imposes-strict-penalties-for-tropical-storm-isaias-response; *see generally* Investigation Into Electric Distribution Companies' Preparation for and Response to Tropical Storm Isaias, No. 20-08-03 (Conn. Pub. Util. Reg. Auth., Apr. 28, 2021).
[345] Investigation Into Electric Distribution Companies' Preparation for and Response to Tropical Storm Isaias, No. 20-08-03 (Conn. Pub. Util. Reg. Auth., Apr. 28, 2021).

to the utility and its stakeholders—and should weigh factors of fossil fuel pollution, climate disaster, and ecological destruction accordingly. At the same time, utilities should reflect upon the counterproductivity of continued investment in fossil fuels that power the climate emergency and eventual damages.

Energy burden, energy insecurity, and energy poverty. State utility regulators are charged with the responsibility of setting electricity rates for regulated utilities that (1) are "just and reasonable" and (2) do not grant any "undue preference or advantage" on various customers, while (3) providing utilities performing an obligatory public service "just compensation" under the Fifth Amendment.[346] Under cost of service regulation, the utility's authorized revenue is based on the utility's operational costs, capital investments, and a reasonable rate of return, in comparison to other utilities and similarly situated companies. Methods for just and reasonable rate design for different customer classes are based on cost causation. Typical rate design does not assess affordability for customers. It is not surprising, then, that issues considering energy burden, energy insecurity, and energy poverty are not systematically considered in pricing procedures. We are not aware of any state utility commission that has explicitly utilized energy burden and other precise factors of energy poverty in determining or capping electricity rates for low-income customers in initial rate-setting. Instead, some commissions have separately authorized programs designed to mitigate the impact of electricity rates on low-income households through discounts or payment programs.[347]

However, there is legal room for energy burden, energy insecurity, and energy poverty to be requisite factors in rate design—and deeper systemic questions about how these factors should affect rate design.

First, the phrase "just and reasonable" appears in most economic regulatory statutes, both federal and state, but has no fixed meaning and thus "does not unduly confine [regulators'] ratemaking authority."[348] Its ancestor form in the Interstate Commerce Act of 1887 indicates that "just and reasonable" was intended to take into account the interests of both buyers and sellers and sought to balance rates that are neither "less than compensatory" for utilities nor "excessive" for customers.[349]

In light of these undetermined parameters in statute and case precedent, a plain dictionary definition of the terms reads: "just" means "having a basis in fact or reason" and "reasonable" means "not extreme or excessive."[350] Currently, electricity rates that result in a household energy burden of greater than 6% are considered unaffordable to households[351]—in other words, unjust and unreasonable. Further, electricity rates that for individual households would result in energy insecurity and eventual electricity disconnection due to inability to afford the electricity are undeniably excessive for customers because they can no longer afford this basic utility service. Such electricity rates for low-wealth households also contravene the statutory responsibility to set rates that do not grant an undue preference or advantage among customers. Because household income varies, the same electricity price will lead to undue

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[346] Hempling, 213.

[347] It is important to note that commissions have set up payment programs and discount programs for low-income customers, and such customers also may access programs like the federal Low-Income Home Energy Assistance Program. None of these programs, however, impact the initial rate-setting itself. Rather, they are subsidies that impact a utility's setting of rates separately.

[348] *Farmers Union Cent. Exch. v. FERC,* 734 F.2d 1486, 1501 (D.C. Cir. 1984).

[349] *Farmers Union Cent. Exch. v. FERC,* 734 F.2d 1486, 1502 (D.C. Cir. 1984); Hempling, 220.

[350] *Just*, Merriam-Webster Dictionary, https://www.merriam-webster.com/dictionary/just; *Reasonable*, Merriam-Webster Dictionary, https://www.merriam-webster.com/dictionary/reasonable.

[351] Fisher, Sheehan, & Colton. 2013. Home Energy Affordability Gap (2013). http://www.homeenergyaffordabilitygap.com/. *See also* American Council for an Energy-Efficient Economy. 2018. Understanding Energy Affordability. 1. https://www.aceee.org/sites/default/files/energy-affordability.pdf ("The 6% affordability threshold is based on Fisher, Sheehan and Colton's Home Energy Affordability Gap Analysis. This affordability percentage is based on the assumption that an affordable housing burden is less than 30% of income spent on energy, and 20% of housing costs should be allocated to energy bills. This leads to 6% of an affordable housing burden spent on energy costs, or a 6% energy burden. For more information, see http://www.homeenergyaffordabilitygap.com/.").

preference for households with higher wealth and income that are not bearing an undue energy burden, threatened by energy insecurity and ultimately subject to energy poverty.

Thus, regulators have the discretionary authority to factor in energy burden, energy insecurity, and energy poverty into their traditional role of rate design in order to fulfill their greater mandate of protecting the public interest with respect to utility regulation.

If rate design is to account for energy burden, the natural follow-on question is who should bear the costs that cannot be borne by energy insecure communities. This fundamental question of "who pays" raises important and far deeper systemic questions about energy systems design. One possibility includes electricity rates based on income, like a tax, though such cost-shifting and cross-subsidization between consumer classes for revenue ultimately directed toward a private corporation is neither favorable nor fair. Another possibility is drawing such funds directly from the utility itself, including but not limited to federal or state taxation or the state regulatory commission's setting of the utility's revenue requirement. A recent report revealed that, over the course of the COVID-19 pandemic, top utilities reaped $1.25 billion in CARES Act funding and released shareholder dividends and executive compensation totaling $19.5 billion, while enacting nearly 1 million disclosed family disconnections. The report found that wiping out utility debt of the nearly 1 million households would have comprised but 8% of CARES Act bailout funds received and less than 1% of shareholder dividend and executive compensation payouts. For state utility regulators and lawmakers, this stark contrast between utility enrichment and experienced energy poverty should raise, at the very least, questions about how to integrate justice under cost-of-service regulation, and potential changes to other regulations that apply to private corporations servicing a public good and basic human right. While there are no easy answers, there are certainly concrete steps that could be taken to move these issues in a positive direction.

4.3.2 Optimizing DERs in Impacted Communities as a Cornerstone of a Just and Renewable Energy Future

There also is a technological pathway that can help redress the harms of the fossil fuel system: DERs, including rooftop and community solar, storage, and microgrids.[352] While the discussion above demonstrated how the centralized fossil fuel utility system has resulted in chronic energy injustice, DERs and *energy democracy systems*—defined as distributed energy systems that allow for democratic and public control and ownership[353]—present a golden opportunity to rebuild a new climate future that is just, equitable, and renewable for the communities that have disproportionately been impacted by the fossil fuel energy system.

4.3.3 Equitable Deployment of Distributed Energy Resources as a Technological Pathway to Combat Chronic Energy Injustice

DERs—including rooftop and community solar paired with energy storage, demand-side management (DSM),[354] and energy efficiency technologies together—can deliver on multiple fronts to redress chronic energy injustice if deployed equitably.

As a threshold matter, the systematic deployment of energy efficiency measures in less-efficient homes of low-income households slashes energy needs, reducing the high energy demand that partially yields

[352] Demand response technologies are vital to support a high renewable energy portfolio in order to balance out peaks and valleys in energy consumption to address intermittency.
[353] *See*, *e.g.*, Weinrub, A. and D. Fairchild. 2017. Energy Democracy: Advancing Equity in Clean Energy Solutions. Free Island Press. https://islandpress.org/books/energy-democracy
[354] *See* Hernandez et al.

energy insecurity. DERs to meet the remaining energy demand result in multiple energy justice benefits. First, solar is renewable and clean, displacing toxic and climate-warming fossil fuels like gas and coal and enhancing human health in communities polluted by fossil fuels. Second, on a decarbonization level, DERs can theoretically generate enough power to meet U.S. electricity needs multiple times over[355] and thus signify a smarter and more thoughtful solution to the renewable energy future when paired with other co-benefits.[356] Third, DERs can be more affordable than utility-provided fossil energy and relieve energy burden and insecurity driven by the fossil fuel system.[357] Fourth, rooftop and community-owned solar plus storage and microgrids offer critical resilience benefits in the wake of emergencies, including climate-induced hurricanes and wildfires.[358] Fifth, DERs in the form of rooftop and community-owned solar can empower communities hurt first and worst from the fossil fuel economy to realize systems of energy democracy, resulting in community energy choice, local job generation, and other regenerative economic benefits that are kept local. [359] Finally, DERs reduce urban heat island effects and avoid wildlife impacts that otherwise result from fossil fuel generation and large-scale clean energy projects.[360]

4.3.3.1 Regulators Should Prioritize the Deployment of Energy Efficiency Measures in Environmental Justice Communities as a Systemic Pathway for Addressing Energy Injustice

Energy efficiency measures are relatively low-cost with high-yield of energy savings. These measures are a first line of attack to significantly reduce energy needs, thus alleviating household energy burden and energy insecurity.

Both energy efficiency programs and low-income payment programs are offered at federal and state levels to help address energy poverty. Funding for federal low-income payment programs overshadows funding for energy efficiency programs. While low-income payment programs require continued investment, federal and state lawmakers—and state regulators and utilities—also should invest more in energy efficiency measures in environmental justice communities because deployment of energy efficiency delivers systemic benefits addressing historical energy injustices in ways that short-term payments are not designed to.

For example, a recent study found that on a federal level, funding for the Weatherization Assistance Program (WAP), which provides eligible low-income families with cost-effective energy efficiency upgrades, pales in comparison to funding for the Low Income Home Energy Assistance Program (LIHEAP), which provides energy bill assistance to help pay for energy expenditures.[361] The authors found that such funding disparities indicate a governmental preference for short-term solutions based on a

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[355] *See* Lopez, Anthony et al. 2012. *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis.* National Renewable Energy Laboratory. https://www.seia.org/sites/default/files/resources/NREL%20Renewable%20Resource%20in%20States%20Study.pdf.

[356] To further minimize life-cycle pollution from panels, recycling and sustainable mining practices should be advanced and incorporated into panel production processes.

[357] Roth, Sammy. "Boiling Point: How rooftop solar could save Americans $473 billion." *Los Angeles Times,* January 7, 2021. https://www.latimes.com/environment/newsletter/2021-01-07/how-rooftop-solar-could-save-americans-473-billion-dollars-boiling-point; Clack, Christopher et al. 2020. *Vibrant Clean Energy, Why Local Solar for All Costs Less: A New Roadmap for the Lowest Cost Grid.* Executive Summary. https://www.vibrantcleanenergy.com/wp-content/uploads/2020/12/WhyDERs_ES_Final.pdf.

[358] *See*, *e.g.*, Weinrub & Fairchild; Stout, Sherry et al. 2018. Distributed Energy Planning for Climate Resilience. National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy18osti/71310.pdf; *see also* Farrell, John. 2010. *Community Solar Power: Obstacles and Opportunities.* The New Rules Project. https://ilsr.org/wp-content/uploads/files/communitysolarpower2.pdf.

[359] *Id.*

[360] *See* Hernandez.

[361] Bednar, Dominic, and Tony Reames. 2020. "Recognition of and response to energy poverty in the United States." *Nature Energy* 5: 432–439. https://doi.org/10.1038/s41560-020-0582-0.

narrow definition of energy poverty focused on affordability over programs that aim to provide a more sustainable, long-term solution with a broader range of benefits, including public health benefits.[362] Critically, energy efficiency programs like WAP, and its sister state corollaries, directly address the consequences of structural racism in the form of residential segregation policies, which have led to higher rates of energy poverty and health impacts among people of color.

4.3.3.2 Regulators Should Prioritize Deploying Rooftop and Community-Owned Solar, Storage, Microgrids, and DSM in Environmental Justice Communities for Holistic Systems Change

Unlocking these benefits are only meaningful if they are intentionally deployed in environmental justice communities that have been historically harmed first and worst from the fossil fuel economy. Prioritizing DERs in fossil fuel-impacted communities first ensures that energy injustice can be halted in the near-term in exchange for a safer and healthier renewable energy future. There are many barriers to DER deployment, including technological and financial barriers and industry resistance to rooftop solar and renewable energy deployment generally, at both state and federal levels.[363]

There are direct pathways for state utility regulators to unlock DERs for fossil fuel-impacted communities:

- First, as a threshold matter, redefining public interest to enshrine justice goals serves as a primary avenue to reject new fossil fuel infrastructure in favor of DER systems, particularly for communities vulnerable to energy injustice.

- Second, utility incentive programs for DERs, including nonwire alternatives offerings, can include a focus on deployment for low-income households, whether through rooftop or community DER opportunities that can be made available for homeowners and renters.

- Third, regulators can encourage utilities to file tariffs for on-bill financing programs for DERs or support for other grant and financing programs.[364]

- Fourth, when rebuilding infrastructure after disasters and disruption, utility regulatory commissions can encourage utilities to "build back better" with community resilience investments in DERs, including microgrids.[365]

- Fifth, commissions can encourage rooftop and community solar by guarding against utility behavior that can obstruct such deployment. This can include commission monitoring and enforcement of reasonable interconnection times to avoid unwarranted delays, and ensuring that

[362] Bednar and Reames.
[363] *See*, *e.g.*, Lippeatt, J. David et al. Frontier Grp. and Environment Am. Res. & Pol'y Ctr. 2021. Blocking Rooftop Solar: The companies, lobbyists and front groups undermining local clean energy. https://frontiergroup.org/reports/fg/blocking-rooftop-solar.
[364] One example is the Pay As You Save® model. *See* Clean Energy Works. *PAYS for Energy Efficiency.* https://www.cleanenergyworks.org/about-pays-for-ee/. *See also* the National Consumer Law Center's essay in this report about consumer protections.
[365] *See* Comments of Center for Biological Diversity and Appalachian Voices Before the North Carolina Utilities Commission in the matter of: Joint Petition of Duke Energy Carolinas, LLC, and Duke Energy Progress, LLC, for Approval of Accounting Order to Defer Incremental Expenses as a Result of COVID-19, Docket No. E-7, Sub 1214 and Docket No. E-7, Sub 1258, Oct. 29, 2020, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=3bd1391d-b914-45f2-b88c-717bf368b322.

fees for any interconnection studies, and resulting interconnection costs borne by DER developers and hosts, are reasonable.[366]

- Sixth, while the above actions help communities access DER systems, regulators also can work with stakeholder groups to encourage models of energy democracy, community governance, and public participation, particularly in relation to community-owned solar systems.[367]

Importantly, as illustrated in California's recent dockets on net metering and high DER penetration, concerns about cross-subsidization among consumers raise questions about how to intentionally design DER programs such that low-wealth and environmental justice communities can lead the transition, and not just be left behind. In an effort to understand possibilities for such program design, public utility commissions can collaborate with other state agencies, and both federal and state legislators, to create financial products that unlock capital for both homeowners and communities that do not have access to up-front capital for installation.[368] For homeowners, this can include creating loan-to-grant programs or government-backed loan guarantees from private lenders at low to no interest rates. For lower-income communities that seek community ownership over solar, one key barrier is that federal tax incentives like the Investment Tax Credit are only available to those with a sufficient tax burden to make the credit valuable.[369] This leaves behind families who do not have sufficiently high income to benefit from the tax credit or third-party solar organizations that cannot convey tax credits back to the community.[370] To address this problem, states should consider direct subsidies or grants that can improve access to capital to communities who cannot otherwise access these advantageous financial vehicles.

4.4 Conclusion

The mythical bifurcation between energy as a technology and business, and energy as a driver of injustice, is no longer tenable. These aspects of the energy system are two sides of the same coin and cannot be separated. The energy system is not only made up of technology, business, and government regulation. It is entirely intertwined with and perpetuates racism, the climate emergency, and species extinction—social, racial, and ecological injustice dimensions that are traditionally excised from discussions about design and regulation of energy systems. Regulators play potentially the most pivotal role in acknowledging this entwinement and redressing the energy system injustices in the decisions they

[366] For example, the Minnesota Public Utilities Commission held a workshop seeking to address interconnection delays of rooftop and community solar. Developers filed more than 100 complaints related to substantial delays to connect DER systems to the grid. The commission's actions to understand and address such practices offer a solid example of how state regulators can directly redress concerns about utility practices that slow DER deployment. *See*, *e.g.*, Jossi, Frank. 2020. "Solar installers say they're waiting too long for Xcel Energy grid connections." *Energy News Network,* July 20, 2020. https://energynews.us/2020/07/20/solar-installers-say-theyre-waiting-too-long-for-xcel-energy-grid-connections/; Farrell, John, and Maria McCoy. "Utilities continue to slow-walk solar connection to the grid (conflict of interest much?)." *Red Green and Blue,* October 6, 2021. http://redgreenandblue.org/2021/10/06/utilities-continue-slow-walk-solar-connection-grid-conflict-interest-much/.

[367] See resources available through DOE's National Community Solar Partnership: https://www.energy.gov/eere/solar/national-community-solar-partnership.

[368] For programs funded by utility customers, see State and Local Energy Efficiency Action Network. 2017. *Energy Efficiency Financing for Low- and Moderate Income Households: Current State of the Market, Issues, and Opportunities*. Prepared by Greg Leventis, Chris Kramer, and Lisa Schwartz. Lawrence Berkeley National Laboratory; State and Local Energy Efficiency Action Network. 2015. *Making it Count: Understanding the Value of Regulated Energy Efficiency Financing Programs*. Prepared by Chris Kramer, Emily Martin Fadrhonc, Charles Goldman, Steve Schiller, and Lisa Schwartz. Lawrence Berkeley National Laboratory.

[369] *See* Olinsky-Paul, Todd. 2017. *Solar+Storage for Low- and Moderate-Income Communities: A Guide for States and Municipalities.* Clean Energy States Alliance. https://www.cesa.org/resource-library/resource/solar-storage-for-low-and-moderate-income-communities-a-guide-for-states-and-municipalities.

[370] Olinsky-Paul.

make on a day-to-day basis. Doing so would fulfill their primary statutory mandate: to regulate utilities genuinely in service to the public interest. At base, regrounding the public interest to center on people, through upholding the public interest in government decisions, can unlock a pathway for justice that has eluded the energy system for decades.

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Daniel K. Glazier
Executive Director and
General Counsel

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2/8/2023

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Office of Public Counsel
P.O. Box 2230
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Style of Case: In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust its Revenues for Electric Service
Case No. ER-2022-0337

To the Honorable Commission and Office of Public Counsel:

Legal Services of Eastern Missouri ("LSEM") is a non-profit legal aid organization that has offered free legal services to low-income Missourians for over 60 years. LSEM advances social justice through legal representation, education, and supportive services. Our core values are Action, Justice, and Hope; we work with the community to improve lives, promote fairness, and create opportunities for those in need.

According to the Consumer Price Index, electricity prices have reached a decade high of 13.7%, the largest 12-month increase since April 2006. As electricity prices rise, the risks of energy cost burdens grow, causing an increasing number of LSEM clients to struggle to afford basic household expenses, such as food and medication. One senior client stated:

> *I cannot stretch my Social Security anymore – I cannot afford to pay more for higher utility costs. I hate the thought of not being able to pay my bills. It is very hard out here for me and a lot of people on fixed incomes. I do not know how people will be able to buy food, medicine, and housing expenses. Right now, I have to pick between getting medicine or food or whether to go see my doctor. We are driving people to desperation.*
>
> *~D. Vorwold (age 67)*

Unfortunately, urban, rural, and low-income communities unfairly and disproportionately carry the burden of high energy costs with significant personal and household consequences. Black, American Indian, and Hawaiian/Pacific Islander households are often more than twice as likely to forgo food or medicine to pay energy costs than their counterparts. Black and Hispanic children are 2.5 times and 1.5 times more likely to live in energy-insecure homes at risk of energy disconnection. Because of these disparities, a utility rate increase will result in a greater economic disadvantage for low-income Missourians and added social and physical harm to the clients LSEM serves.

Access to power is fundamental to the functioning of daily life. Light, technology, and adjustments to climate conditions within one's home are necessities that are often the first to go when clients cannot afford their electric bill. This hinders safe communities, access to life-saving and educational technology for young students, and the ability of seniors to live comfortably in their own homes.

> *If these utility bills keep going up, I do not know how we will be able to continue to live in our home down the street from our church where we volunteer, and the food pantry we visit regularly. We love living in our community, but we do not have a lot of extra money to spend....these types of price increases hurt seniors and folks like us the most.*
>
> *~W. Matlock (age 70)*

Despite the uncomfortable truths about energy insecurity, access to electricity and power is often treated as a privilege, rather than a right, and costs to access these resources continue to rise. Our clients and similarly situated consumers continue to struggle to afford their current electricity bills.

> *The utility bills in my apartment are already too high and I don't have enough to go around. I have two utilities and the combined bills sometimes range from $100 to $250 a month. That is a large part of my Social Security. I have to go months without paying one bill or another.*
>
> *~E. Johnson (age 75)*
>
> *People are drowning in expenses as the costs of living and inflation continue to increase. Food prices are increasing. Medical expenses and medication prices are increasing. Costs are steadily increasing but earnings have not.*
>
> *~C. Graves*

As the gap between income and the cost of basic living expenses continues to widen for low-income Missourians, the inability to pay for electricity leads to increased shutoffs, endangering the safety, comfort, and livelihoods of impacted communities, and often snowballs into other health problems, housing crises, and family and community disruption as a result of lack of access to electricity.

LSEM advocates with and for clients often underrepresented by the infrastructure systems designed to benefit us all. We emphasize the ***necessity*** of access to electricity as a fundamental human right. Denying the Ameren rate increase request will sustain the health, livelihoods, and futures of low-income Missourians and communities of color. LSEM urges the Commission to reject the request for an electricity rate increase, thereby encouraging increased access to critical utility services.

Attached please find client statements and supporting research that speak directly to how the proposed rate increase would be detrimental to families and communities.

Sincerely,

Abigail Leonard /s/
Abigail Leonard, MSW

Kim Finnegan /s/
Kimberly R. Finnegan, JD, MSW, LMSW

Nyree Bradley /s/
Nyree Bradley, JD Candidate

Latasha Barnes /s/
Latasha Barnes, Attorney at Law

Enclosures: Client Testimonials (5)
Electricity Regulation with Equity and Justice for All
High Energy Burden and Low-Income Energy Affordability: Conclusions from a Literature Review
Advancing Equity in Utility Regulation

February 7, 2023

To the Public Service Commission:

Please do not approve another rate increase.

To me, I feel that a rate increase will hurt a lot of people because the cost of basic things like food and gas has increased.

This impacts me as a senior and a single person. I am trying to make it day by day and it is already hard for me to cover my expenses. I honestly cannot imagine how a rate increase would affect a family with children.

Ameren should not be increasing rates every few months. Our current bills are already too high for us to pay. Ameren should leave it as it is and not increase rates.

As a society, we should be making things more affordable. Milk and eggs are increasing in cost. How will be able to survive?

Thank you for listening.

Sincerely,

Larett Jolliff
4648 Pope Ave (1st Floor)
St. Louis, Missouri 63115

Legal Services of Eastern Missouri is proud to be a Legal Services Corporation (LSC) grantee, and we comply with all LSC conditions and prohibitions in acceptance of all funds.

February 6, 2023

My name is Ernestine Johnson and I am 75 years old. I am retired and I only get Social Security income. If the electric bill goes up, it would be devastating for me. The utility bills in my apartment are already too high and I don't have enough to go around. I have two utilities and the combined bills sometimes range from $100 to $250 a month. That is a large part of my Social Security. I have to go months without paying one bill or another. Sometimes I can get a little help paying my utility bills, but it's a lot.

I cannot just think about myself. I have to think about other people also and this is a hardship for a lot of poor people, especially mothers with children. If you can stop this from happening, please stop this.

Thank you.

Ernestine Johnson

3953 Chippewa Street (1st Floor)

St. Louis, Missouri 63116

Legal Services of Eastern Missouri is proud to be a Legal Services Corporation (LSC) grantee, and we comply with all LSC conditions and prohibitions in acceptance of all funds.

February 5, 2023

To Whom It May Concern:

My name is Willa Matlock. I submitted a letter about the American Water rate hike on January 24, 2023. I want you to know that I do not think the electricity rate should go up either.

I live with my husband Minister Frank Matlock. My husband is a retired veteran and I retired from the Veteran's Administration. We are in our 70s and we live on a very fixed income. My husband has early-onset dementia and renal kidney failure. After we pay our monthly bills and medical expenses, we barely have enough money left to buy food.

If these utility bills keep going up, I do not know how we will be able to continue to live in our home down the street from our church where we volunteer, and the food pantry we visit regularly. We love living in our community, but we do not have a lot of extra money to spend.

Like I said in my last letter, these types of price increases hurt seniors and folks like us the most. Please do not increase the electric rates.

Thank you for listening.

Sincerely,
Willa Matlock and Frank Matlock
Pheasant Drive
Florissant Missouri

February 8, 2023

To Whom It May Concern:

Ameren should not be allowed to increase their rates. This whole process makes me very anxious because everything is increasing. My medication is going up. Food is going up and I do not know how people can make it. I cannot make it. My medical expenses, insurance, and healthcare costs went up. When I got sick a few years ago, I was barely making it. Then COVID happened and it made everything worse. I cannot stretch my Social Security anymore – I cannot afford to pay more for higher utility costs. I hate the thought of not being able to pay my bills.

It is very hard out here for me and a lot of people on fixed incomes. I do not know how people will be able to buy food, medicine, and housing expenses. Right now, I have to pick between getting medicine or food or whether to go see my doctor. We are driving people to desperation. I'd hate to think about what people may have to do to feed themselves or their kids.

It is shameful of them to do this. Ameren should be focused on improving the grid and doing more with solar power or other types of energy. Ameren needs to incorporate more types of energy sources to reduce the cost.

We, as Americans, are not being treated fairly. This is a big problem.

Sincerely,

Donna Vorwold (age 67)

2761 Hermitage Avenue

St. Louis, Missouri 63143

February 7, 2023

Dear Public Service Commission,

I humbly ask that you vote against the pending Ameren rate increase.

People are drowning in expenses as the costs of living and inflation continue to increase. Food prices are increasing. Medical expenses and medication prices are increasing. Costs are steadily increasing but earnings have not.

I am a single mother. I have one child and I work two jobs: one full-time and another part-time. In addition to taking care of my family, I have very high medical expenses. I can personally say that increasing the cost of electric service will add additional financial strain on families like mine.

I hope you will consider our plight when deciding whether to approve the requested rate increase.

Thank you for your time and consideration.

Sincerely,

CG /s/

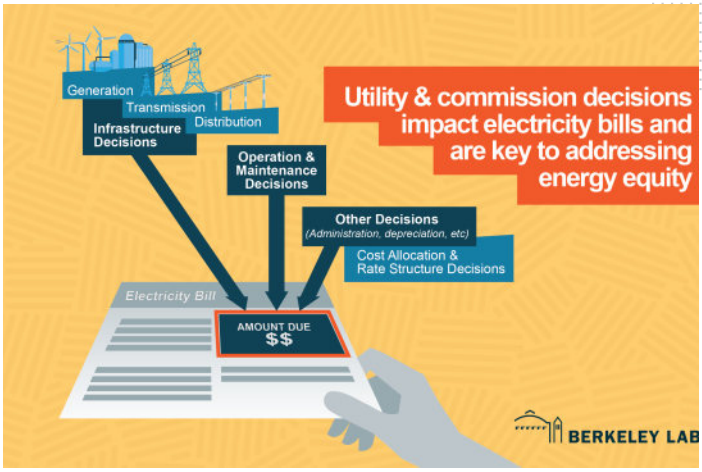
Candace Graves
Monsols Drive
Florissant, Missouri

Legal Services of Eastern Missouri is proud to be a Legal Services Corporation (LSC) grantee, and we comply with all LSC conditions and prohibitions in acceptance of all funds.

ARTICLE

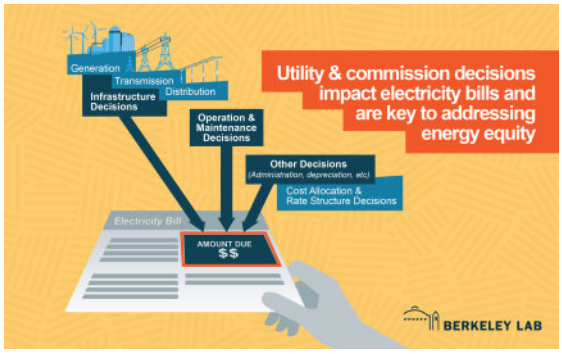
Electricity Regulation with Equity and Justice for All

By **Kiran Julin**
January 14, 2022



(Credit: Cristen Farley/Berkeley Lab)

Advancing Equity in Utility Regulation, a new report published by Berkeley Lab, makes a unifying case that utilities, regulators, and stakeholders need to prioritize energy equity in the deployment of clean energy technologies and resources.



(Credit: Cristen Farley/Berkeley Lab)

PORING OVER THE LINE ITEMS ON YOUR MONTHLY ELECTRICITY BILL may not sound like an enticing way to spend an afternoon, but the way electricity bills are structured has a significant impact on equitable energy access and distribution. For example, fixed fees can have a disproportionate impact on low-income households. And combined with other factors, low-income households and households of color are far more likely to report losing home heating service, according to recent federal data.

Advancing Equity in Utility Regulation, a new report published by the U.S. Department of Energy's (DOE's) Lawrence Berkeley National Laboratory (Berkeley Lab), makes a unifying case that utilities, regulators, and stakeholders need to prioritize energy equity in the deployment of clean energy technologies and resources. Equity in this context is the fair distribution of the benefits and burdens of energy production and consumption. The report outlines systemic changes needed to advance equity in electric utility regulation by providing perspectives from four organizations - Portland General Electric, a utility company; the National Consumer Law Center, a consumer advocacy organization; and the Partnership for Southern Equity and the Center for Biological Diversity, social justice and environmental organizations.

"While government and ratepayer-funded energy efficiency programs have made strides towards equity by enabling low-income households to access energy-efficiency measures, that has not yet extended in a major way to other clean-energy technologies," said Lisa Schwartz, a manager and strategic advisor at Berkeley Lab and technical editor of the report. "States and utilities can take the lead to make sure the clean-energy transition does not leave behind low-income households and communities of color. Decarbonization and energy equity goals are not mutually exclusive, and in fact, they need to go hand-in-hand."

Energy bills and electricity rates are governed by state laws and utility regulators, whose mission is to ensure that utility services are reliable, safe, and fairly priced. Public utility commissions also are increasingly recognizing equity as an important goal, tool, and metric. While states can use existing authorities to advance equity in their decision-making, several, including Illinois, Maine, Oregon, and Washington, have enacted legislation over the last couple of years to more explicitly require utility regulators to consider equity.

"The infrastructure investments that utility companies make today, and regulator decisions about what goes into electricity bills, will have significant impacts for decades to come," Schwartz said.

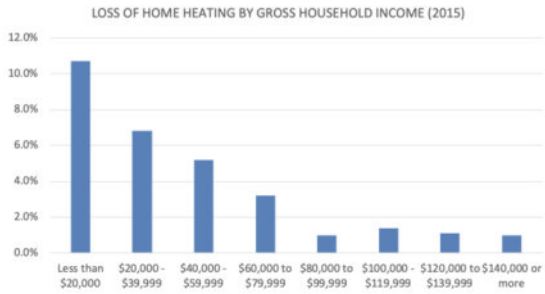
Solutions recommended in the report include considering energy justice goals when determining the "public interest" in regulatory decisions, allocating funding for energy justice organizations to participate in utility proceedings, supporting utility programs that increase deployment of energy efficiency and solar for low-income households, and accounting for energy inequities and access in designing electricity rates.

The report is part of **the Future of Electric Utility Regulation series** that started in 2015, led by Berkeley Lab and funded by DOE, to encourage informed discussion and debate on tackling the toughest issues related to state electric utility regulation. An advisory group of utilities, public utility commissioners, consumer advocates, environmental and social justice organizations, and other experts provides guidance.

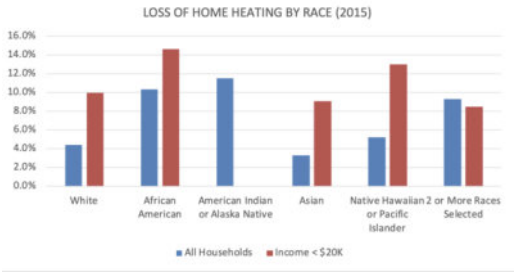
Taking stock of past and current energy inequities

One focus of the report is electricity bills. In addition to charges based on usage, electricity bills usually also have a fixed basic customer charge, which is the minimum amount a household has to pay every month to access electricity. The fixed charge varies widely, from $5 to more than $20. In recent years, utility companies have sought sizable increases in this charge to cover more costs.

This fixed charge means that no matter what a household does to use energy more efficiently or to conserve energy, there is always a minimum cost. Moreover, low-income households often live in older, poorly insulated housing. Current levels of public and utility funding for energy-efficiency programs fall far short of the need. The combined result is that the energy burden - or percent of income needed to keep the lights on and their homes at a healthy temperature - is far greater for lower-income households.



Based on the most recent data (2015) from the U.S. Energy Information Administration (EIA), households with income less than $20,000 reported losing home heating service at a rate more than five times higher than households with income over $80,000. Households of color were far more likely than those with a white householder to report loss of heating service. Click on chart for larger view. (Credit: John Howat/National Consumer Law Center, using EIA data)



"While all households require basic lighting, heating, cooling, and refrigeration, low-income households must devote a greater proportion of income to maintain basic service," explained John Howat and Jenifer Bosco from the National Consumer Law Center and co-authors of Berkeley Lab's report. Their analysis of data from the most recent U.S. Energy Information Administration's Residential Energy Consumption Survey shows households with income less than $20,000 reported losing home heating service at a pace more than five times higher than households with income over $80,000. Households of color were far more likely than those with a white householder to report loss of heating service. In addition, low-income households and households of color are more likely to have to choose between paying their energy bill or paying for other necessities, such as healthcare or food.

Moreover, while many of the infrastructure investment decisions that utilities make, such as whether and where to build a new power plant, often have long-term environmental and health consequences, impacted communities often are not at the table. "Despite bearing an inequitable proportion of the negative impacts of environmental injustices related to fossil fuel-based energy production and climate change, marginalized communities remain virtually unrepresented in the energy planning and decision-making processes that drive energy production, distribution, and regulation," wrote Chandra Farley, CEO of ReSolve and a co-author of the report.

Engaging impacted communities

Each of the perspectives in the report identify a need for meaningful engagement of underrepresented and disadvantaged communities in energy planning and utility decision-making. "Connecting the dots between energy, racial injustice, economic disinvestment, health disparities, and other associated equity challenges becomes a clarion call for communities that are being completely left out of the clean energy economy," wrote Farley, who previously served as the Just Energy Director at Partnership for Southern Equity. "We must prioritize the voices and lived experiences of residents if we are to have more equity in utility regulation and equitably transform the energy sector."

In another essay in the report, Nidhi Thaker and Jake Wise from Portland General Electric identify the importance of collaborating directly with the communities they serve. In 2021, the Oregon Legislature passed Oregon HB 2475, which allows the Oregon Public Utility Commission to allocate ratepayer funding for organizations representing people most affected by a high energy burden, enabling them to participate in utility regulatory processes.

The report explains why energy equity requires correcting inequities resulting from past and present failures as well as rethinking how we achieve future energy and decarbonization goals. "Equity in energy requires adopting an expansive definition of the 'public interest' that encompasses energy, climate,

and environmental justice. Energy equity also means prioritizing the deployment of distributed energy resources and clean energy technologies in areas that have been hit first and worst by the existing fossil fuel economy," wrote Jean Su, energy justice director and senior attorney at the Center for Biological Diversity.

This report was supported by DOE's Grid Modernization Laboratory Consortium, with funding from the Office of Energy Efficiency and Renewable Energy and the Office of Electricity.

# # #

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Additional information

Watch the **recorded webinar** discussion with the report's authors hosted by Berkeley Lab.

Progress in Energy

TOPICAL REVIEW • OPEN ACCESS

High energy burden and low-income energy affordability: conclusions from a literature review

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TOPICAL REVIEW

High energy burden and low-income energy affordability: conclusions from a literature review

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Keywords: energy burden, energy equity, home weatherization, energy bill assistance, equitable energy transition

Abstract

In an era of U.S. energy abundance, the persistently high energy bills paid by low-income households is troubling. After decades of weatherization and bill-payment programs, low-income households still spend a higher percent of their income on electricity and gas bills than any other income group. Their energy burden is not declining, and it remains persistently high in particular geographies such as the South, rural America, and minority communities. As public agencies and utilities attempt to transition to a sustainable energy future, many of the programs that promote energy efficiency, rooftop solar, electric vehicles, and home batteries are largely inaccessible to low-income households due to affordability barriers. This review describes the ecosystem of stakeholders and programs, and identifies promising opportunities to address low-income energy affordability, such as behavioral economics, data analytics, and leveraging health care benefits. Scalable approaches require linking programs and policies to tackle the complex web of causes and impacts faced by financially constrained households.

1. The energy poverty problem

Energy drives the U.S. economy and impacts nearly every dimension of modern society; it is an imperative to daily existence. When access to energy becomes difficult, the burden is felt in every facet of life—housing, mobility, health, work, education, and much more.

Since the 1970s when the U.S. Congress authorized the creation of the Weatherization Assistance Program (WAP) and the Low-Income Home Energy Assistance Program (LIHEAP), the nation's largest low-income energy programs, the nature of household energy consumption has evolved. For decades, the energy consumed by a typical household increased as suburbanization and sprawl allowed homes to grow, and affluence and innovation made central heating and cooling systems almost universal. Appliances multiplied, and 'plug loads' proliferated with the creation of new low-voltage AC devices: computers, telephones, hi-fi's and more (Nordman and Sanchez 2006). In contrast, low-income households often stayed put in the older core of American cities, following the concentric zones of American cities first identified by Park and Burgess (1925), in the first theory developed to explain the distribution of social groups in American cities.

Over time, these trends have reversed. Increasingly, congested urban areas have motivated the gentrification of inner cities, re-densifying older neighborhoods, sometimes at the expense of affordable housing. This has created a new geography of suburban poverty with issues of energy affordability that have not yet been documented. Innovations have continued to transform home energy use, most recently with the proliferation of increasingly efficient appliances, smart thermostats, solid state lighting, low-emissivity windows, foam insulation, and heat pumps, slashing the intensity of the average home's energy use. Rooftop

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solar panels have reached 'grid parity' in some parts of the U.S.,[6] and soon home energy storage systems and electric vehicles will enable households to arbitrage their energy assets.

In the midst of this transformation and in a new era of energy abundance—as the U.S. becomes a net energy exporter (U.S. Energy Information Administration (EIA) 2018), it is time to review what we know about the energy consumption and energy bills paid by low-income households:

- How have low-income energy burdens changed over the past decade?
- How have they been affected by energy programs, policies, and technology trends?
- What opportunities offer the greatest promise to reduce the energy burden of low-income households, as the U.S. continues its transition to a more efficient and renewable energy system?

To answer these questions, we summarize the knowledge embodied in the last decade of literature focused on low-income energy burdens in the U.S. Many stakeholders across the U.S.—chiefly utilities and federal and state agencies, but also non-profits and religious organizations as well as cities and community organizations—work to save energy and reduce the energy costs of low-income households. Yet energy bills as a percent of household incomes (that is, household 'energy burden') remains persistently high among low-income populations across the U.S. (Drehobl and Ross 2016).

The paper begins by characterizing the magnitude, causes, correlates, and impacts of the energy burden currently experienced by low-income households in the U.S. It then describes the complex web of energy programs and policies that impact low-income energy burdens. Program design, implementation, participation rates, and investment levels are described in section 3. This is followed by a summary of the cost-effectiveness and impacts of existing programs, which enables estimates of the remaining potential in section 4. Attention then turns to identifying major gaps and opportunities that energy programs and policies could address in the future (section 5). We end with conclusions about opportunities to scale up such efforts so that the energy-poverty cycle in the U.S. can be broken.

1.1. The energy equity lens

Issues of equity permeate the transition to a smarter and greener energy economy (Sovacool *et al* 2016, Valentine *et al* 2019). The nature and location of energy financing and infrastructure investments can cause low-income households to benefit or lose. For example, few low-income households participate in energy-efficiency, solar, and electric vehicle programs, but these programs are financed by raising the electric rates of all customers (Johnson *et al* 2017, Sigrin and Mooney 2018, Monyei *et al* 2019). While such inequitable impacts of electricity and natural gas tariffs can be offset by modest low-income energy assistance programs (Borenstein and Davis 2012), few utilities provide such compensation. Overall, the U.S. is experiencing a growing wealth disparity between low-income households and more affluent Americans (Curti *et al* 2018), and living in minority communities often means more limited access to resources (Reames 2016, Sunter *et al* 2019). This intersection of race, ethnicity and class can lead to problems of procedural, distributive and intergenerational equity (Curti *et al* 2018, Carley 2020a, 2020b).

1.1.1. Procedural equity

Procedural equity is the idea of fairness and transparency of the processes that allocate resources and resolve disputes. Connected to the desire for due process, one aspect of procedural equity relates to administrative and legal proceedings. Inclusive and authentic engagement in the process to develop, implement, and adjudicate programs or policies is key to procedural equity (Curti *et al* 2018, p 9).

Economically disadvantaged communities across the country are amplifying their voices to ensure that the clean energy transition considers their needs. For example, the Future Energy Jobs Act (FEJA) in Illinois materialized with the help of a coalition of interest groups, increasing investment in energy efficiency and targeting economically disadvantaged communities (Goldberg and Mckibbin 2018). Similarly, a coalition of advocates in Pennsylvania organized a collaborative multidisciplinary movement that drove improvements to low-income energy-efficiency policy across the State (Grevatt *et al* 2018).

1.1.2. Distributive equity

Distributive equity refers to fairness in the allocation of rights or resources, arguing that one's place of birth, social status, and family influences are matters of luck that should not unduly influence the benefits we receive in life (Rawls 1971). This line of reasoning has been extended by many to argue that distributive equity is achieved when programs and policies result in fair distributions of benefits and burdens across all segments of a community, and prioritizing those with the greatest need (Curti *et al* 2018, p 9).

[6] www.greentechmedia.com/articles/read/gtm-research-20-us-states-at-grid-parity-for-residential-solar#gs.7enug2.

Numerous clean energy programs fail tests of distributive justice, including many energy-efficiency programs, special rates for electric vehicles, and net metering of rooftop solar installations. Such programs are typically paid for in part by low-income ratepayers who do not receive commensurate benefits (Chant and Huessy 2018, Carley *et al* 2018).

1.1.3. Intergenerational equity

Intergenerational equity adds a time dimension to the equity discussion by considering community obligations to future generations. Actions that serve to increase rather than limit the development options of future generations can be said to improve intergenerational equity (Norton 2005). In the field of clean energy, intergenerational equity frequently involves deliberating which aspects of the present should be maintained or changed for future generations (Williams-Rajee 2015). Most clean energy programs do work to reduce CO_2 emissions and as a result, contribute positively to intergenerational equity in some ways. How these programs may impact the social and economic contours of communities across generations has received much less emphasis.

1.2. The context: multiple stakeholders in the low-income housing market

Numerous decision-makers and stakeholders influence the energy integrity of low-income housing. This highly fragmented affordable housing market challenges efforts to improve low-income energy affordability. Government agencies have administrative and regulatory roles that influence each of these stakeholders to varying degrees. In terms of word counts, energy utilities are mentioned most often in the abstracts of the 183 publications examined in this review. Local non-governmental organizations (NGOs) and community-based groups are also key stakeholders based on this tally. At the other extreme, the terms 'building manager' and 'property manager' do not appear in the 183 abstracts, and 'landlord' and 'property owner' are mentioned only 10 times, indicating that these stakeholders have received limited analysis in this body of literature. Local NGOs and community-based organizations are also key stakeholders based on this tally, while at the other extreme, property and building managers are not mentioned in the 183 abstracts. This figure provides a framework for understanding how current programs and policies operate and how they can be leveraged to provide a more effective and coordinated system of assistance.

1.3. Scope and structure of literature review

Our literature review began with a formal and systematic search of the peer-reviewed published literature and the associated grey literature of more informal documents. For the peer reviewed literature, the Web of Science bibliography was searched using a syntax of keywords that included synonyms of three attributes: low-income household status, energy efficiency and solar energy, and evaluation and data analysis. All three dimensions were required, at least one author had to be from the U.S., and the papers had to be published in the 2010–2018 timeframe. The resulting 270 peer-reviewed publications were culled for out-of-scope citations and also 'mined' for additional as the citations embedded in the original 270 publications were examined. This produced a curated set of 171 publications.

We then used a Delphi approach (i.e. consulting with experts in the field) to ensure our inclusion of the important grey literature—including conference proceedings and reports of trade associations, government agencies, and NGOs. An extensive review process by the U.S. Department of Energy resulted in 12 additional documents, bringing the final annotated bibliography to 183 references (Lapsa *et al* 2020). Because energy efficiency, PV systems, electric vehicles, home storage, and microgrids can all influence energy burdens, the technology scope of this bibliography and our review is quite broad. In 2020, Oak Ridge National Laboratory (ORNL) published a meta-review of these articles, and the results of that review are summarized in this paper following further assessment and consideration of the findings (Brown *et al* 2020).

2. The energy burden of low-income households: a persistent problem

Low-income households in the U.S. are diverse, as are their patterns of energy consumption. Perhaps it is therefore not surprising that multiple measures of energy burden are used to describe their energy consumption patterns, how these patterns have changed over the past decade, and the causes and effects of high energy burden among low-income households (figure 1).

2.1. Variable and inconsistent metrics

The term 'household energy burden' has become a dominant construct used by analysts working on low-income energy issues in the U.S. Early and subsequent research conducted for DOE by ORNL (Eisenberg 2014) and the non-profit agency, Economic Opportunity used energy burden as a means to characterize the U.S. population in need and to inform program and policy. The term is generally defined as the share of a

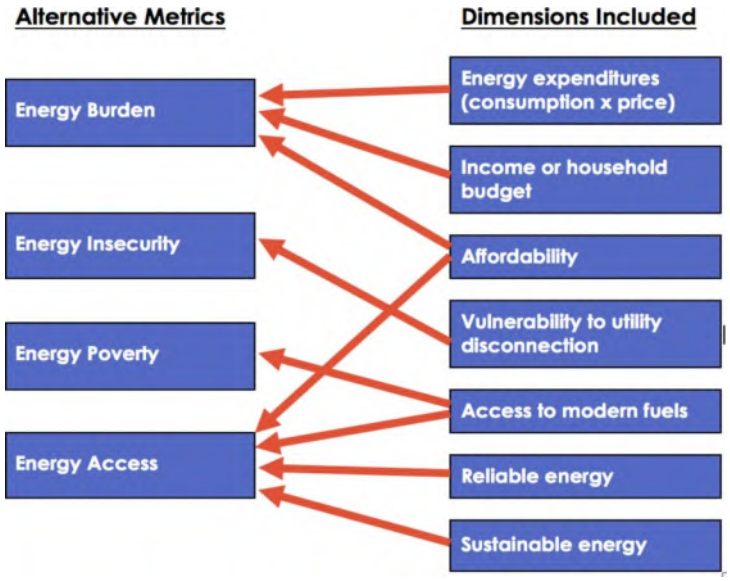

Figure 1. Alternative metrics and definitions. (Source: authors.)

household's income that is spent on energy utilities (Drehobl and Ross 2016). There are two parts to this definition—the numerator provides a measure of energy expenditure by the households, reflecting energy consumption and rates; the denominator is a measure of total income or household budget. Energy expenditure is usually measured by looking at the total spending on household utility bills for heating, cooling, and other home services (Berry *et al* 2018). Most energy burden studies do not analyze household spending on transportation energy or water expenditures, nor do they examine or include different sources of financial support as household income. Based on data from 2013–2014, household energy burdens were estimated to be 16.3% for low-income households compared to 3.5% for non-low-income households (Eisenberg 2014, p 10).

Based on household energy burden, Colton (2011) defines 'energy poor' households as those spending more than 6% of their income on meeting energy costs. The premise for this benchmark is that a household should not spend more than 30% of its income on housing expenses, and the utility costs should not exceed 20% of these expenses. This threshold is often used for comparison purposes and to estimate the 'affordability gap' (Fisher, Sheehan and Colton 2013). A range of thresholds has also been developed. In a study for the State of Colorado, Cook and Shah (2018) distinguished between 'energy stressed' households with energy burdens of 4%–7%, 'energy burdened' households with 7%–10% energy burdens, and 'energy impoverished' households with energy burdens greater than 10%. Based on this study, approximately 11% of Colorado residents were energy impoverished in 2015. In 2017, the same metric is 12% for Georgia (Cox 2019).

A second construct—'energy insecurity'—refers to the uncertainty that a household might face in being able to make utility bill payments (Berry *et al* 2018), which can ultimately result in being disconnected from energy services (Verclas and Hsieh 2018). Elnakat *et al* (2016) and Ross *et al* (2016) document that the incidence of energy security varies by region with the highest rates in the South; there are also strong correlations with gender, age, and level of education.

In contrast, the term 'energy poverty' generally refers to living in a home that does not have access to enough energy to meet their essential needs. More functionally, it is described by the U.N. Development Program (2005) 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.' Modern energy services are crucial to human well-being. About half a million Americans live without access to basic electricity services, and a majority of these households reside in U.S. territories or on American Indian reservations (EIA 2000, Begay 2018b).

In the international literature, 'energy access' is a common term, and is the basis of the United Nation's Sustainable Development Goal (SDG) 7 as adopted in 2015. SDG 7 aims to ensure access to affordable, reliable, sustainable and modern energy to all by 2030. Affordability and reliability are both critical components of energy burden analysis in the U.S. context, where high levels of access to energy exist, but many groups face high energy burdens.

In sum, multiple definitions are used to discuss low-income energy burdens, to qualify households for assistance in different programs, and to estimate the potential for future energy bill reductions

(Hoffman 2017). This is problematic for program managers and policy analysts because the extent and nature of the energy burden problem depends on the definition used (Berry *et al* 2018, Lin 2018b). With inconsistent definitions, it is difficult to compare results across studies and derive lessons learned. Nevertheless, consequential conclusions are broadly substantiated.

First and foremost, low-income households spend a higher proportion of their income on energy bills than any other income group (Eisenberg 2014, Drehobl and Ross 2016, Berry *et al* 2018). This is true, even though low-income households consume less energy per capita and they spend less on energy per square foot of living space than other households (Drehobl and Ross 2016).

Second, high energy burdens produce energy insecurity. Residential Energy Consumption Survey data for 2015 indicate that 31% of all U.S. households experienced some form of energy insecurity—sometimes even foregoing food and medicine in order to pay an energy bill. These rates are particularly high in mobile homes (58% of this sector experienced some form of energy insecurity) and in apartments in buildings with 2–4 units (where 46% experienced some form of energy insecurity) (Berry *et al* 2018). In 2015, nearly seven million households had their access to heat interrupted, and six million lost air conditioning (Verclas and Hsieh 2018).

Third, energy security is significantly more problematic for low-income households than for other income groups. Davis (2015)[7] estimates that 40% of households with income below $50 000 find it difficult to pay their energy bills at least 'once in a while.' In 2017, one-third of consumers with household incomes of less than $50 000 had trouble paying their electric or heating bills at least sometimes, 7% more than in 2016, despite the stronger economy (Treadway 2018). Utility disconnections are difficult to track, but they appear to be increasing in at least two states. In Texas, the number of recorded disconnections increased by 64% between 2010 and 2016, and in California, the numbers tripled between 2006 and 2016 (Verclas and Hsieh 2018).

Fourth, the energy consumption patterns of low-income households depend on the gender, age, race, education, occupation, and geography of their members (Elnakat *et al* 2016). Kontokosta *et al* (2019) examined an extensive database describing 3122 census block groups (CBGs) in five U.S. cities. Of these CBGs, 42% were classified as predominantly minority neighborhoods, and the remainder were predominantly non-hispanic white neighborhoods. Very-low-income residents ($\leq$50% AMI) in minority neighborhoods had energy burdens that were 1.56% higher than households of the same income category living in predominantly non-hispanic white communities. Household energy patterns range widely across highly urbanized areas (Porse *et al* 2016), suburbs (Verclas 2018), and rural and remote locations (Souba and Mendelson 2018, Lin 2018b, Ross *et al* 2018, Begay 2018a, 2018b). Many low-income households have experienced generations of the poverty cycle, especially the chronically unemployed including disabled individuals who are dependent on public assistance or charitable support for survival. Others have recently experienced income declines, due to shifting job opportunities and retirement from the workforce. Some have chosen low-paying professions, while others are unskilled or semi-skilled, working in low-wage jobs in retail, hospitality, and health services (Schwartz 2014).

2.2. Causes and correlates of high energy burden

The underlying causes of high energy burden can be divided into five main categories—location and geography, housing characteristics, socio-economic situation, energy prices and policies, and behavioral factors (table 1).

The first category of causes and correlates is geographic location, which is a strong predictor of energy burden. Low-income residents of rural communities pay higher-than-average bills for both electricity and heating fuels (Shoemaker *et al* 2018). With high energy costs, the benefits of energy efficiency could be significant, but rural residents face numerous other barriers such as a generally older housing stock that has produced a 'rural energy-efficiency gap' (Winner *et al* 2018).

At the other extreme, low-income households in the nation's largest cities are home to higher-than-average energy burdens (Drehobl and Ross 2016). Fox (2016) and Brown (2018) document the problem of low-income burdens in Southeastern cities, where poverty rates are high, and households consume significant amounts of energy for both heating and cooling to keep their old and leaky homes livable. Further, HVAC systems in the South tend to be electric whereas heating in most other regions is dominated by natural gas, which tends to be more affordable.

Second, housing characteristics are a major determinant of energy consumption and intensity (consumption per square foot). Older homes, public housing, and multifamily units also correlate with high energy burdens (Langevin *et al* 2013, Berkland *et al* 2018). These housing units usually have inefficient

[7] http://defgllc.com/news/article/how-well-are-you-reading-your-low-income-customers/.

Table 1. Causes and correlates of high energy burden.

Location and Geography	Housing Characteristics	Socio-economic Situation	Energy Prices and Policies	Behavioral Factors
• Rural, urban, remote community, Native American, island territory • Climate • Population density • Urban morphology (affecting access to jobs and efficient appliances)	• Characteristics of the building (manufactured, multifamily or single-family) • Rental and public housing • Type of appliances used • Type of thermostat: WiFi, smart, programmable, touch screen	• Income • Ethnicity and race • Immigrant vs native-born • Number of occupants, children, elderly, and handicapped	• Energy prices and rate designs • Energy mix and access to natural gas • Availability and effectiveness of low-income energy programs and appliances	• Lack of knowledge • Misplaced incentives/ principal-agent problems (especially in multi-family homes) • Lifestyle cultural factors • Lack of control over energy bills • High non-monetary costs

insulation and older appliances, further adding to the energy burden (Cabeza *et al* 2014). In addition, residents of rental housing often do not have control over their energy bills; for example, building management may control the heating and cooling settings, resulting in both a lack of control and thermal discomfort. In sum, much of the affordable housing/low-income housing in the U.S. remains energy inefficient despite advancements in building technologies and science.

Third, socioeconomic characteristics determine a household's ability to afford energy-efficiency retrofits and more energy-efficient appliances (Thorve *et al* 2018). For decades, de facto and de jure segregation pushed minorities, especially African Americans, into less-desirable lower quality housing.[8] Interestingly, Hernández *et al* (2016) find that while immigrant families and African Americans both have high housing costs, the utility costs are higher for African American families due to differences in energy related behavior. Understanding the relationship between social demographics, load shapes and energy burden is only now emerging as a research focus (Jaske 2016), which is particularly promising because it could help to guide efforts to manage consumption during hours when it matters most.

The fourth category of cause for energy burden are energy prices and policies. For example, high fixed components in power bills or reconnection fees are important barriers to reducing energy bills. Inter-regional comparisons of energy rates and energy burdens have not identified a correlation (Drehobl and Ross 2016), presumably because of autocorrelations with other regionally diverse factors. For instance, southern cities tend to have lower electricity rates, but higher energy burden. Where rates are low, the return-on-investment in energy efficiency is more challenging, which has resulted in less efficient housing in the South than compared to other regions (Brown *et al* 2014).

The fifth category covers behavioral determinants of energy consumption. Despite the stated willingness of households to conserve energy and invest in energy-efficient appliances, there is often incongruity between the values and actual behavior of customers based on their various internal and external determinants including liquidity and few nearby vendors of energy-efficient equipment (Brown and Sovacool 2018, Reames *et al* 2018). Some energy programs have long waitlists of eligible program participants, while others face difficulty meeting their outreach and participation goals (Hirshfield and Iyer 2012). From the utility's perspective, the small scale and dispersed nature of energy-efficiency projects challenges the aggregation of this resource, increasing its transaction costs. Effort is required to fill the 'pipeline' with energy-efficiency projects that are investment-ready and creditworthy (Brown and Wang 2015). Such transaction costs suggest the case for working with local community agencies that already offer a variety of human services and have people with completed income qualification paperwork for other programs (food, housing, medical care, etc.). This is particularly valuable for a program like WAP since its administrative costs are generally capped at 10%.

Lack of knowledge is another hurdle to participation and energy-efficiency investments. It is especially evident in rental apartments where tenants do not have control over appliance choices and insulation but have to pay the bills (a type of 'split incentive' problem) (Brown 2001). Landlords know more than tenants about the energy integrity of their units, leading to uninformed housing choices by tenants and excessive energy use (Brown and Wang 2015, Berkland *et al* 2018). In general, low-income households are often unaware of the effect their energy choices have on bills and the possible ways of reducing consumption. This

[8] Rothstein 2017. The Color of Law: A Forgotten History of How Our Government Segregated America. Liveright Publishing.

asymmetry of information leads tenants to make uninformed housing decisions, rendering them vulnerable to high bills and the possibility of eviction. Despite the stated willingness of most households to conserve energy and invest in energy-efficient appliances, there is often inconsistency between these values and their actual purchase behavior. These inconsistencies are sometimes based on various personal and contextual constraints including lack of available capital and nearby vendors (Brown and Sovacool 2018).

2.3. Effects of high energy burden

High energy burdens have far-reaching and enduring consequences. Broadly defined, high energy burdens for low-income households have two types of inter-locking effects related to household economics and health.

Adverse economic and financial consequences often occur when low-income households with high utility bills have to make trade-offs between meeting alternative critical household expenditures. Paying for food, medical care, telecommunications, and shelter are often sacrificed in order to make timely utility bill payments (Hernández *et al* 2016, Camprubí *et al* 2016). These trade-offs create a negative feedback loop that traps families in an enduring cycle f poverty. For example:

- Low-income families unable to pay their high energy bills become vulnerable to utility shut-offs and evictions (see section 5.2).
- Cash-strapped families and individuals become prey to predatory payday loans as their only option to pay utility bills and avoid shutoffs, which come with high interest rates that make repayment difficult (Levy and Sledge 2012, Tonn *et al* 2015, Brown 2018).

Adverse health effects of high energy burdens can span a range of illnesses and conditions. These include thermal discomfort and respiratory problems such as asthma (Fabian *et al* 2014, Wells *et al* 2015, Chen *et al* 2017), and exposure to lead and indoor air pollution (Fabian *et al* 2012). The fear of not being able to pay bills and the possibility of losing electricity service altogether can stress mental health problems. There are also health effects related to the inefficient energy usage and poorly insulated buildings that are amplified for families with young children, the elderly, and African Americans—groups that often have limited adaptive capacity because of fewer resources (Hernández *et al* 2016, Massetti *et al* 2017).

3. The ecosystem of low-income energy programs and policies

Across the U.S., many programs and policies help to reduce the energy burden of low-income households (Brown and Wang 2015, Berg *et al* 2018). For example, state building codes have improved the energy integrity of new home construction, and appliance standards have raised the energy performance of household equipment, arguably becoming the largest contributor to the energy efficiency of low-income housing today. Energy Star ratings have helped educate consumers about the energy consequences of the products they purchase, and federal tax policies have subsidized home energy retrofits. Several states also offer low-income homeowners financial incentives to overcome the high up-front cost of energy-efficiency appliances and equipment.[9] However, participating in these programs (purchasing new appliances and retrofitting homes) is not affordable for many low-income households.

More recently, policies and programs have been launched to accelerate the green energy transition. These include more than a decade of federal investment tax incentives and utility net metering programs that support rooftop solar panels and home battery storage systems. The federal government provides tax rebates to subsidize the purchase of electric vehicles, and many states are implementing programs to pay for the development of vehicle charging infrastructure (Narassimhan and Johnson 2018).

This complex ecosystem of energy policies does not target the needs of low-income households. Indeed, there is a growing body of literature that questions the fairness of policies that promote the clean energy transition when they are largely inaccessible to low-income households due to affordability barriers. For example, Cluett *et al* (2016) note that a majority of utility energy-efficiency programs require an up-front customer investment to leverage rebates and associated savings, which makes them unaffordable to low-income households. Low-income households often cannot afford the up-front financial 'match' required to obtain the rebates and loans available to consumers who buy energy-efficient household appliances. As a final example, the federal government promotes residential energy-efficiency and solar systems investments by offering tax credits. In the case of rooftop solar systems, these are called Investment Tax Credits. Such federal tax credits are worth very little to most low-income homeowners because they typically have limited tax liability.

[9] Database of State Incentives for Renewables & Efficiency (DSIRE) Financial Incentives for Energy Efficiency (2012).

This inequity is compounded by the fact that energy-efficiency programs raise electric and other utility costs by increasing the share of fixed utility fees for all customers (Johnson *et al* 2017, Sigrin and Mooney 2018). While such inequitable impacts of electricity and natural gas tariffs can be offset by modest low-income energy assistance programs (Borenstein and Davis 2012), such offsets are rarely established.

Within this U.S. ecosystem are numerous and diverse energy programs and policies that do target low-income households, which are summarized in tables 2 and 3, by implementing organization and type of program. Program implementers range from electric and gas utilities and federal and state agencies, to local government and community-based entities and philanthropic and non-profit organizations. Program types distinguish between utility bill assistance, financial incentives, energy information, and regulations. Gilleo *et al* (2017) identify some core practices of successful low-income energy efficiency programs. Some of these include ensuring statewide coordination, targeting program offerings to sections that yield the highest benefits, forming partnerships with local outreach organizations, and providing a single point of contact to participants and contractors.

In recent years, approximately 80% (or about $6.3 billion) of low-income energy funding has been spent on bill payment assistance, 14% ($1.17 billion) on energy efficiency, and 5% ($38 million) on unspecified support (Cluett *et al* 2016, p 7) (figure 2). Utilities are the single largest source of funding for low-income energy programs: providing 41% of ratepayer-funded low-income bill assistance and 10% of the total for ratepayer-funded low-income energy efficiency. Thus, Public Service Commissions, Boards of Directors of public utilities, and other state regulators are critical to establishing the policy ecosystem within which utilities design and implement low-income energy programs. Federal agencies provide 44% of the total (40% from LIHEAP for bill assistance, 2% from LIHEAP for efficiency, and 2% from DOE for the WAP). In 2016, the block grant allocation to LIHEAP was $3.3 billion, re-allotment funds were $1.2 million, and funds carried over from previous year was $167 million.[10] State and local contributions at 3% and non-profit organizations at 2% complete the picture.[11]

In addition to these funds, some states and counties use General Assistance, emergency assistance, local tax revenues, or similar funds to supplement federal LIHEAP funding. These funds may help low-income families pay for fuel, utilities, furnace repair, or other charges; some also help households avoid utility shut-offs during summer/winter. Eligibility criteria vary by state; for example. Some states require that applicants must be in an emergency condition.[12]

Corporate and private funds also support fuel assistance for low-income households. Eligibility is variable, but typically requires an emergency situation. Program administrators are typically state social services agencies. One of the largest funds is managed by the Citizens Energy Corporation, which uses proceeds from natural gas sales to provide charitable emergency assistance to 25 states.[13]

Over the past decade, annual expenditures on low-income energy-efficiency programs have ranged widely between about $1 and $3 billion/year. The greatest source of variability is the funding for DOE's WAP. The American Recovery and Reinvestment Act (ARRA) of 2009 raised WAP's appropriations from historic levels of $150 to $230 million each year since its inception in the late 1970s, to $5 billion between 2009 and 2011. As a result, WAP in 2010 spent an unprecedented $2 billion, implemented by about 1000 Subgrantees. With leveraging, the national weatherization network expenditures rose to $2.7 billion[14] (Tonn *et al* 2015). In the post-ARRA period, WAP has been operating at approximately the pre-ARRA Congressional appropriation level, increasing to $254 million in 2019 and $308.5 million in 2020.[15]

3.1. Electric and gas utility programs and policies

The share of utility residential energy efficiency funding that supports low-income households is lower than the percent of residential utility customers who are low-income (Drehobl and Castro-Alvarez 2017). Public utility commissions and city councils set customer benefit surcharges that are collected through customer utility bills. Utilities then use this money to fund low-income energy-efficiency programs. In 2014, energy efficiency spending for low-income programs accounted for 18% of residential electric efficiency spending

[10] https://liheappm.acf.hhs.gov.

[11] Data on ratepayer-funded bill assistance, ratepayer-funded energy efficiency, WAP, and LIHEAP assistance are from 2013. LIHEAP spending on efficiency is approximated based on 6% of LIHEAP funds spent on efficiency in 2006. Data on state and local contributions and private donations are from 2010.

[12] http://neada.org/state-tribal-programs/state-energy-assistance-directors/.

[13] www.ncoa.org/wp-content/uploads/Alternative-Sources-of-Energy-Assistance.pdf.

[14] To spend the additional funding, income eligibility requirements were extended to 200% of the federal poverty level (rather than 150%), and the maximum WAP investment allowed per home was raised from $2500 to $6500. As a result, participating households had higher incomes and fewer vulnerable household members (Tonn *et al* 2015).

[15] https://nascsp.org/wp-content/uploads/2018/02/fy201720wip20fact20sheet.pdf; https://www.edf.org/energy/equity-through-energy-efficiency.

Table 2. Illustrative low-income energy policies and programs.

	Energy Bill Assistance	Financial Incentives	Energy Information	Regulations
Electric and Gas Utilities	• Bill forgiveness programs • Budget billing • Prepaid electricity services • Payment plans	• Direct installation of efficiency measures • Round-up assistance programs • On-bill program designs	• Goal setting for low-income programs • Installation of home energy management systems • Real-time appliance and premise level feedback	• Rates and rate design • Shut-off and reconnection policies • Integrated resource planning • Adders for cost-effectiveness tests • Minimum requirements for low-income programs
Federal Agencies	• Low-Income Home Energy Assistance Program (LIHEAP) • HUD assisted housing utility allowance subsidies • USDA housing utility allowance subsidies	• Weatherization Assistance Program (WAP) • LIHEAP weatherization • Energy Efficiency and Conservation Loan Program (EECLP) • Low-Income Housing Tax Credit (LIHTC) program • HUD HOME/CDBG home repair funding	• WAP includes education of clients as an allowable activity • WAP Technical Assistance and Training • HUD Utility Benchmarking guidance	• Subsidized housing regulations • Federal Housing Administration (FHA) Duty to Serve • Environmental Protection Agency (EPA) energy justice and climate regulations • Federal Energy Regulatory Commission (FERC) affordable power for all regulations
State Agencies	• Implementation of federal bill assistance programs • State administered ratepayer funding for bill assistance	• Implementation of federal low-income energy efficiency programs including support for local, state and regional initiatives • State and county funds supplement WAP	• Technical assistance • Tools • Case studies • Peer exchange • Goal setting • Convening • Stakeholder engagement	• Subsidized housing regulations • Minimum requirements for low-income utility programs
Local Government, Community-Based Entities, and NGOs	• Bill forgiveness programs	• Weatherize Campaigns • Home repair financing	• Healthy housing programs • CDC Lead Control • Building codes and ordinances • Community education, outreach • Community convening • Pilot projects	• Subsidized housing regulations • Building and energy codes and standards

and 34% of residential natural gas efficiency spending, while the target segment of the population accounts for roughly one-third of total households (U.S. Census Bureau 2018).[16]

Low-income households are not excluded from programs offered to all residential customers, but data show that they are less likely than other customers to participate in them (Frank and Nowak 2015).[17] Utility

[16] www.census.gov/quickfacts/fact/table/US/PST045217#PST045217.

[17] https://beccconference.org/wp-content/uploads/2015/10/presentation_frank.pdf.

Table 3. Summary of benefits from DOE weatherization assistance program in 2008 and 2010.

Program Wide Benefits for All Housing Types		
	2008	2010
Total Homes Weatherized	97 965	340 158
Average Cost per Weatherized Home	Total Cost: $4695 DOE Investment: $2301	Total Cost: $6812 DOE Investment: $5926
Average Energy Measure Costs	$2899	$3545
Energy Savings Per Household (Present Value)	$4243	$3190
Total Energy Savings (Present Value)	$340 million	$1.2 billion
Savings-to-Investment Ratio	1.4[a]	0.98[a]
Total Benefits per Household Including Health & Safety (Present Value)	$13 550	$13 167
Carbon Reduction	2.25 million metric tons	7.38 million metric tons
Savings-to-Investment Ratio for Submarkets		
	2008	2010
Single-Family Homes	1.72	1.12 (0.82–1.53)
Mobile Homes	1.03	0.79 (0.66–0.79)
Small Multifamily	1.60	
Large Multi-Family (New York City only)	1.82	0.67 (0.55–0.84)

[a] These values include funding from some non-DOE sources that are not uniformly subject to DOE's Savings to Investment Ratio (SIR) requirement that is used to guide the measures that are installed. These funds are often used for more costly energy measures that result in lower SIRs for the combined funds.(Sources: Tonn *et al* 2014, DOE 2015, Tonn *et al* 2018)

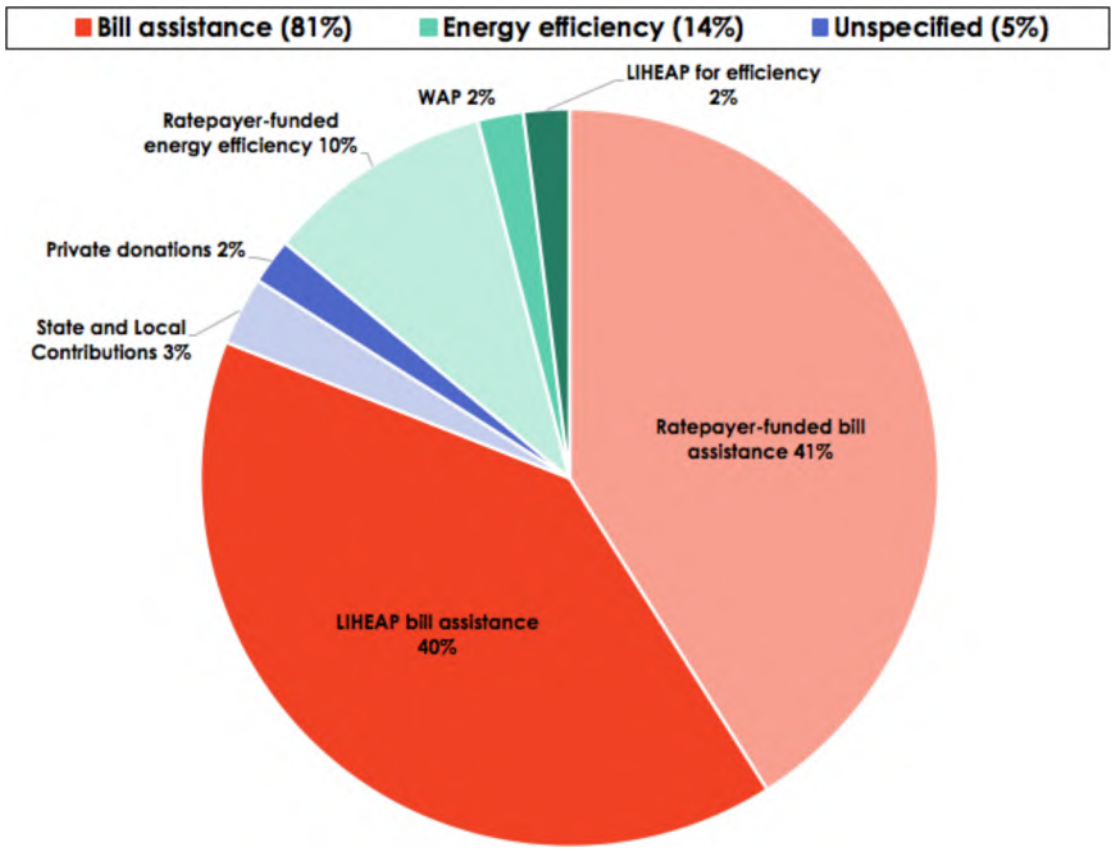

Figure 2. Expenditures on low-income energy programs in 2013–2017 (Note: excludes solar energy programs). (Source: authors, based on data from Hoffman *et al* (2018) and Cluett *et al* (2016).)

energy-efficiency programs, for example, often target homeowners and not renters, and they typically require participants to pay for a portion of the weatherization costs, which can be prohibitive for low-income households who tend to rent their homes and have limited discretionary income. Because of their limited

means, low-income households are also least able to participate in many types of initiatives aimed at reducing energy costs, because they often require up-front costs to participate.[18]

The nation's 51 largest electric utilities spent 8.93% of their total energy-efficiency program funds on low-income programs, saving on average 5.29 kWh of electricity per low-income customer in 2016. However, the low medians for both of these statistics (6.23% of total spending and 2.80 kWh of savings per low-income customer), suggest that the top performers are boosting the group average. For example, 22 utilities offer comprehensive programs including more than one low-income program as well as natural gas programs (Relf *et al* 2017).

A similar pattern of spending and accomplishment was reported in a survey of the largest electric and natural gas utilities serving the nation's 51 largest metropolitan statistical areas (MSAs). In 2015, 49 MSAs were served by a low-income electricity efficiency program, and 32 were served by a low-income natural gas efficiency program. Of the low-income customers served by these utilities, only 1.2% participated in electricity efficiency programs and only 1.5% participated in natural gas efficiency programs. Further, the amount spent, and savings achieved are highly variable across programs and fuels (Drehobl and Castro-Alvarez 2017):

- An average of $1538 was spent and 1377 kWh was saved per participating household.
- Per low-income customer, these averages drop to $3 and 22 kWh.
- For natural gas, slightly more ($2002) was spent per estimated low-income participant, and 135 therms were saved.
- Per low-income customer, these averages drop to $23 and 3 therms.

Of this sample, the cities served by utilities with the largest expenditures per low-income customer were Boston, San Antonio, Providence, San Francisco, and Hartford (figure 3). But in terms of kWh of electricity savings per low-income customer, the cities with the most impactful utilities were Boston, Hartford, San Antonio, Hartford, Providence, and Louisville, which each saved >50 kWh per low-income customer. About half of the electric and natural gas programs coordinated with WAP in 2015, indicating significant potential for improved leveraging. Many, but not all programs target specific households such as high energy users, which also indicates room for improvement. State WAP Grantees specify priority populations in their annual state plans, targeting elderly, disabled, families with children, and high energy users in accordance with the WAP statute.

Across rural America, utility expenditures on energy-efficiency programs are lagging behind. Evidence from 12 utilities offering tariffed on-bill financing (Hummel and Lachman 2018), and detailed analysis of on-bill programs implemented by a rural electric co-op in Arkansas suggest that the Pay-as-You-Save approach offers an effective approach. In Arkansas, household energy usage was decreased by almost a quarter, and the utility benefited from peak demand reduction, as well (Lin 2018a). These results suggest a promising approach for the more than 900 cooperatives in the country.

Utility companies offer an array of programs and policies to help customers who are in arrears and to recover costs associated with non-payment. Utilities can implement prepaid electric service, offer payment plans, and implement alternatives to shutting off services. They can also eliminate late fees and interest payments and can promote level billing to reduce spikes in prices during extreme weather events. However, there is also evidence of the potential negative impact of some of these programs leading to 'self-disconnection', propagating inequities, and adding stress to the households under difficult financial situations.[19]

Utility companies and their customers can both benefit from assistance with arrearages by reducing costs associated with shut-offs and reconnections (Hernandez and Bird 2010). While these services and procedures are not intended to be long-term solutions to the low-income energy burden problem (Verclas and Hsieh 2018), they can be effective in the short-run while the housing stock, HVAC equipment, and appliances are made more energy efficient.

3.1.1. Integrated resource planning, goal setting, and cost-effectiveness tests

Many utilities have a history of using ratepayer resources to support low-income energy programs. In regulated markets, these programs are often proposed in integrated resource plans (IRPs) that are typically written every three years or so by utilities and reviewed by Public Utility Commissions or other regulatory entities. Goals may be set by these Commissions, and cost-effectiveness tests are often deployed to determine if subsequent investments are cost-justified. Regulators of public utilities, such as the Board of Directors of

[18] www.cee1.org/annual-industry-reports.

[19] www.nclc.org/issues/prepaid-utility-service.html.

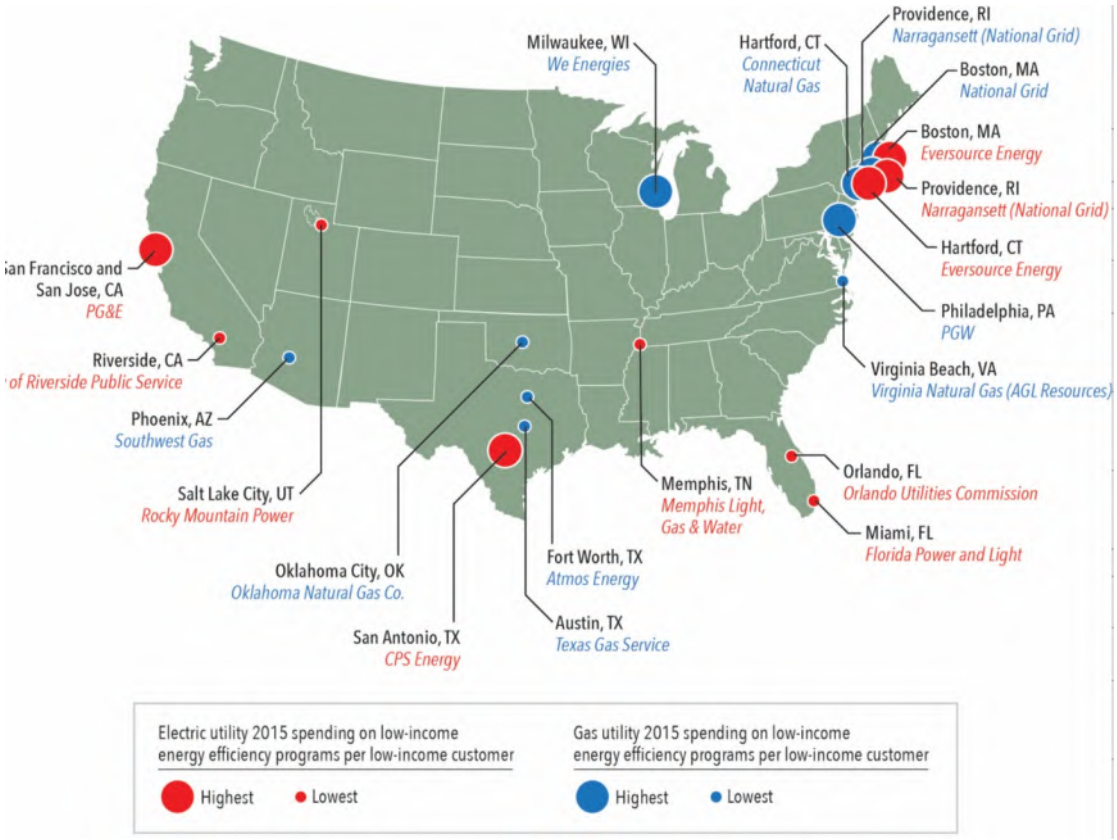

Figure 3. Electric and gas utility spending on low-income energy-efficiency programs per low-income customer in 2015. (Source: authors, based on data from Drehobl and Castro-Alvarez (2017).)

the Tennessee Valley Authority (TVA) can authorize budgets for such expenditures. This was the case with the 'Extreme Energy Makeover Program' low-income program launched in 2015, which was approved by the TVA Board as a response to EPA regulations and fines. The program targeted 800 old homes (20 years +) located in lower-income communities served by seven local power companies; each pilot had an electric energy usage reduction target of 25% per home.[20] To assess future options to address energy equity, TVA created the Energy Efficiency Information Exchange. One of their key recommendations was adopted: to integrate TVA's eScore technology platform & training systems with WAP in order to streamline multiple aspects of WAP implementation to build capacity and serve more customers.[21]

Local power companies can also initiate program and project proposals, which are then reviewed by Utility Commissions and discussed in public hearings independent of IRPs. Typically, Utility Commissions specify in advance the cost-effectiveness tests that will be used to evaluate such proposals. Different tests dominate different regions of the U.S. For instance, the Rate Impact Measure (RIM) (or 'nonparticipant test') is relied upon in the Southeast, while California and the Pacific Northwest emphasize the Total Resource Cost test and the Societal test that allows for the inclusion of the cost of environmental externalities. The more that societal impacts are considered (such as environmental and public health benefits), the higher the benefit-cost ratio of low-income energy-efficiency expenditures. The inverse of this is also true: the more weight the RIM test is given, the less likely that low-income energy efficiency programs will be approved (Brown and Wang 2015).

3.1.2. Residential on-bill lending designs

A residential on-bill program is a type of financing design that can be explicitly used to incentivize energy-efficiency projects by low-income utility customers. It is a financial product that is serviced by a utility company for energy-efficiency improvements in a building that are repaid through utility bills. Such loans can help overcome the liquidity and budget constraints of low-income households. Tying repayment to

[20] www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Air%20Quality/EPA%20Mitigation%20Projects/Smart%20Communities%20-%20Extreme%20Energy%20Makeovers%20FAQ.pdf.
[21] https://annualmeeting.naseo.org/Data/Sites/1/events/Annual-Meeting/2017/presentations/Cripps-TVA-Low-Income-Program-Highlights.pdf.

utility bills, allows households to consider energy upgrades as an operational savings rather than a capital expenditure (Gillingham *et al* 2009). While these programs require the participation of a utility, they also often benefit from government support in terms of legal authority and the initial financing, as is the case with the Energy Efficiency and Conservation Loan Program (EECLP). Energy saving performance contracts also address the problem of up-front financing.[22]

Two types of designs are currently used. On-bill loans create consumer debt that is tied to the borrower and is paid back through the bill. Alternatively, on-bill tariffs are tied to the meter and therefore are transferred to subsequent renters or owners of the property (Ross *et al* 2018). The tariff design helps to address split incentive barriers that renters may face, as the investment stays with the property and not the tenant.

Pay as You Save® (PAYS®) financing is the most prominent on-bill financing program; it uses a tariff design (Lin 2018a). It is modeled to provide 20% savings to the customer, with 80% going to repayment of cost of project. Lin (2018a) highlights the PAYS potential for success in a case study highlighting a rural Arkansas co-op. The program produced electricity bill savings to customers and benefits to implementing utilities, especially in rural areas. Through its on-bill tariff design, PAYS overcomes many barriers, such as the split-incentive challenge and the need for upfront outlays. Hummel and Lachman (2018) summarize field data reported by 12 utilities offering inclusive financing through tariffed on-bill programs in six states. Cost recovery rates in these programs have exceeded 99.9%, and no utility has reported a case of disconnection for non-payment of PAYS charges. Their program data produces a striking picture of an inclusive financing mechanism that can reach previously underserved markets even in areas of persistent poverty.

Based on an early assessment of on-bill financing, defaults are uncommon (Bell *et al* 2011). While on-bill loans would appear to be promising for owner-occupied housing, they may not be a good fit for building owners who take on the liability for the debt, but whose tenants typically have responsibility for the energy bills (Brown and Wang 2015). Also, property lien can have negative consequences. For example, households with liens on properties in Atlanta, Georgia, were deemed ineligible for accessing a tax relief fund for legacy residents.[23]

3.1.3. Round-up assistance programs

Round-up assistance programs are designed to provide financial assistance to families and communities in need of help. It is a voluntary program in which utility customers agree to have their utility bill 'rounded up' to the next whole dollar amount. The extra money paid on a utility bill, which is a donation to the round-up program fund, goes towards helping the less fortunate pay their bills and other community-based programs. The utility designs the program such that the customer can either opt in, or opt out (i.e. customers are automatically enrolled in the program and must 'opt out' in order stop contributing to the round-up assistance fund. Utility round-up programs are particularly prevalent amongst municipal and local cooperative utilities. States, however, are now introducing policies that require utilities to pro-actively inform their customers about the round-up programs if they operate on an 'opt-out basis.'[24]

The round-up funds raised from customers, often supplemented by donations from utility companies and local businesses, are put into a fund used to assist local individuals and community organizations with crucial needs. Many of those who receive financial help are low-income families with children, seniors, and someone just facing a short-term crisis. In some cases, the charity run program also provides cash grants to community projects and local non-profit organizations such as food pantries, volunteer fire departments, and rural ambulance services. In addition, assistance is also provided directly to individuals. Round-up programs may help with utility bills, rent, food, shelter, health care, clothing, emergency services, education, job training, and other charitable causes.

For example, under Northwest Georgia Electric Membership Cooperative's (NGEMC) Round-up Program, a monthly bill of $70.01 is rounded up to $71, with 99 cents going to the program that makes donations to community non-profit organizations in the seven counties the cooperative serves.[25] All of NGEMC's 98 000 customers were enrolled in the program automatically at the outset of the program, and the program has awarded annual grants to individuals, families and communities in need totaling more than $100 000 each year since 2016.

[22] https://www4.eere.energy.gov/seeaction/publication/energy-efficiency-financing-low-and-moderate-income-households-current-state-market.

[23] Source: Erin Rose, Three Cubed, personal communication, August 2019.

[24] https://legiscan.com/TN/text/SB0308/2019.

[25] www.ngemc.com/ORU.

3.1.4. Prepaid electric services

Prepaid services are emerging in many product areas, including prepaid gift cards, transit cards, pay-as-you-go cell phones, and pre-loaded credit cards. They allow customers to manage and budget their expenditures in advance. Many countries around the world have implemented prepaid electric services, and utilities in the U.S. are beginning to implement them, particularly municipal and co-op electric service providers. In this context, prepaid services give the customer more oversight and control over usage, but the short-term credit inherent in the postpaid model is lost (Chen 2012).

Because prepaid electricity services do not require a deposit, they can be appealing to low-income customers. With the availability of digital meters with remote connection and disconnection capabilities, utilities can respond quickly to a customer's account status, reducing the time required to turn service on and off, thereby reducing disconnection times, and with advance alerts from the utility, the customer can quickly replenish the account and avoid service shut-off.

At the same time, with increased smart meter deployment, there is a potential for increased disconnections. Prior to smart meters, each disconnection required a costly physical trip to the meter. Smart meter technologies allow utilities to disconnect customers remotely (Verclas and Hsieh 2018).

It has been argued that prepaid service generally costs the distribution utility less than postpaid service because it reduces the utility's carrying costs, uncollectible accounts, and collection costs (Chen 2012). Reflecting this fact, the National Association of State Utility Consumer Advocates passed a resolution advising utilities that 'Rates for prepaid service are lower than rates for comparable credit-based service,…'[26] Data on the adoption of prepaid service and its impact on rates and disconnection times are difficult to obtain.

3.1.5. Payment plans

Payment plans allow customers in arrears to pay off their debt over time. State regulations typically require utilities to offer payment plans to customers who are in arrears and at risk of disconnection (Chen 2012). Customers must repay their arrearage over a predetermined number of months, provide a down payment, and pay a minimum towards their electricity bill. Such payment plans often are based on the amount that the customer owes and do not consider the ability of the household to pay. As a result, the customer debt levels can continue to increase (Verclas and Hsieh 2018).

In addition, there is evidence that budget billing (BB) and level billing can increase consumption. Both types of billing dilute the price signal since customers do not see seasonal or monthly variations in cost (Treadway 2018). Getachew *et al*[27] estimates that BB increases energy consumption by 3.8% to 4.7%, on average. Sexton (2015) found that automatic bill payments (ABP) and BB used by PG&E customers can cause an increase in customers' energy consumption, attributable to a loss of price salience. For low-income customers, this would mean even larger utility bills for consumers who are already struggling with high energy burdens. DNV GL provide evidence that PG&E's Home Energy Report (HER) Program at least partially claws back these increases, which suggests that ABP and BB should be coupled with HERs to combat the loss of price salience.[28]

3.1.6. Disconnection alterntives

Utility companies and their customers can benefit by reducing costs associated with shut-offs and reconnections (Hernandez and Bird. 2010). While these services and procedures are not intended to be long-term solutions to the low-income energy burden problem (Verclas and Hsieh 2018), they can be effective in the short-run while the housing stock, HVAC equipment, and appliances are made more energy efficient.

Lack of data on the frequency and duration of utility shut-offs makes it difficult to quantify the explicit and implicit costs associated with utility disconnections. Electricity termination can have health and safety consequences, which can be particularly serious for the elderly and young children, and for those needing medical equipment. It can also cause social stigma and ultimately lead to homelessness because many landlords consider disconnection to be grounds for eviction. While some states collect data on utility shut-off and disconnection, for privacy reasons, the data usually only includes the number of accounts disconnected, without indicating whether a limited number of accounts are being disconnected multiple times or if a large number of accounts are getting disconnected and reconnected just once (Verclas and Hsieh 2018).

[26] http://nasuca.org/nwp/wp-content/uploads/2014/01/NASUCA-2011-3.pdf.

[27] https://beccconference.org/wp-content/uploads/2017/10/sadhasivan_presentation.pdf.

[28] http://calmac.org/results.asp?flag=&searchtext=Auto+Pay&pubsearch=1&selAuthor=252&dFrom=1%2F18%2F1990&dTo=12%2F28%2F2018&yFrom=1980&yTo=2018&selPubDates=1%2F1%2F2003&selToDate=12%2F28-2018&selProgYear=&selToYear=&pubsort=1&Submit=Search.

The EcoPinion Consumer Survey No. 23 conducted in 2015 (Wimberly 2016, 2017) provides some assessment of the extent of the problem. Four percent of households with incomes less than $50 000 had their electric service disconnected within the previous two years. This rate increased to 6% for renters and doubled to 8% for households earning less than $25 000. With 24.4 million households earning less than $25 000,[29] this suggests that nearly 2 million U.S. households have had their electricity disconnected over the past two years.

Most utilities have disconnection policies that make households vulnerable to energy insecurity. To temper the effects of disconnections, most states have policies that protect households by setting procedures consistent with the 1978 case of Memphis Light, Gas and Water v. Craft (436 U.S. 1, 1978).[30]

The U.S. Supreme Court ruling recognized that 'The customer's interest in not having services terminated is self-evident, the risk of erroneous deprivation of services is not insubstantial, and the utility's interests are not incompatible with affording the notice and procedure described above.'[31] The U.S. Supreme Court has also ruled that all customers have a constitutional right to be given notice prior to termination of utility service.[32] Though a minimum level of notice is required, the length of notice and notice procedures vary widely across states. Robust notice policies could protect customers from being disconnected and alert them of their duty to pay for utility service, but delivery is complicated by factors such as language barriers and an inability to reach customers when phone and internet access are unavailable, which is often the case in low-income households.

States typically provide one or more types of disconnection limitations (Verclas and Hsieh 2018). They range from being date based (to cover winter months), temperature-based, or tied to the need for medical equipment such as nebulizers, life support machines, and dialysis machines.

These procedural protections are not long-term solutions to the low-income energy burden problem. They do not provide financial support or other assistance to provide low-income customers with a chance to overcome debt to the utility in the long term. Additional policies are needed to help customers maintain energy access.

3.2. Federal programs and policies

The dominant low-income federal programs and policies are the WAP operated by DOE and the LIHEAP operated by the U.S. Department of Health and Human Services (HHS). In addition, EECLP managed by the Rural Utilities Service for the U.S. Department of Agriculture (USDA), and the Low-Income Housing Tax Credit (LIHTC) Program run by the U.S. Housing and Urban Development (HUD) are also described because of their pertinence to low-income households.

3.2.1. DOE weatherization assistance

DOE's WAP was created by Congress in 1976 under Title IV of the Energy Conservation and Production Act. The purpose and scope of this Program is to increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential energy expenditures, and improve their health and safety, especially low-income persons who are particularly vulnerable such as the elderly, persons with disabilities, families with children, high residential energy users, and households with a high energy burden (see 10 CFR 440.1 and the discussion of it in Carroll *et al* 2014). The program treats single family and mobile homes, and multifamily buildings in all climate zones.

WAP provides grants to U.S. states, territories, and tribes, which then provide grants to local weatherization agencies to weatherize income-eligible low-income homes. These Grantees demarcate their own eligibility criteria, subject to WAP restrictions. The federally stipulated guideline is 200% of the Federal Poverty Level (FPL) or 60% State Median Income. LIHEAP uses a lower income threshold (150% FPL), and utility low-income programs tend to match WAP or LIHEAP, although they may qualify households up to 80% AMI and may also have moderate-income programs.

Households that receive Supplemental Security Income or Temporary Assistance for Needy Families (previously called Aid to Families with Dependent Children) are automatically eligible to receive weatherization services. Per WAP guidance, states give preference to:

- People over 60 years of age
- Families with one or more members with a disability
- Families with children
- Those with a high energy burden

[29] www.statista.com/statistics/203183/percentage-distribution-of-household-income-in-the-us/.
[30] https://supreme.justia.com/cases/federal/us/436/1/.
[31] Mathews v. Eldridge, 424 U. S. 319. Pp. 436 U. S. 16–19.
[32] https://supreme.justia.com/cases/federal/us/436/1/.

- Those with high energy usage

As noted earlier, bill assistance provides a critical service to low-income households in crisis situations. Weatherization reduces energy usage and thereby decreases energy costs over the long term. Weatherization provides a longer-term solution to energy burden by addressing insulation, air infiltration, baseload energy use, and energy-efficient appliances to make homes more energy efficient. Since 1979 through the WAP and other leveraged funding, DOE has funded or otherwise supported energy-efficiency improvements and minor associated repairs for more than 7 million low-income households (Hoffman 2017).

'Professionally trained weatherization crews use computerized energy assessments and advanced diagnostic equipment, such as blower doors, flue-gas analyzers, and infrared cameras to create a comprehensive analysis of the home to determine the most cost-effective measures appropriate and to identify any health and safety concerns associated with the energy retrofits. Weatherization providers also thoroughly inspect households served to ensure the occupant's safety, check for indoor air quality, combustion safety, and carbon monoxide, and identify mold infestations—which are all indications of energy waste. The auditor creates a customized work order, and trained crews install the identified energy efficient and health and safety measures.'[33] Hundred percent of units served under WAP receive an inspection from a certified Quality Control Inspector who ensures all work is completed correctly and that the home is safe for the occupants. Additionally, State WAP Grantees inspect 5–10% of these units, providing an additional layer of quality assurance.

In 2015, utilities and states supplemented DOE funding by providing an additional $883 million, or $4.62 for every dollar invested by DOE.[34] This estimate includes utility funds, and any state or local funds that were coordinated with DOE's WAP. The National Association of State Community Services Programs (NASCSP) tracks the leveraging of each state; more information on state LIHEAP transfers can be found in the HHS LIHEAP Clearinghouse Database.[35]

3.2.2. LIHEAP bill assistance

LIHEAP is a federally-funded program that helps low-income households meet their immediate home energy needs. LIHEAP began in the 1970s in response to increasing energy prices that made it difficult for low-income families to pay their utility bills.

HHS operates LIHEAP in every state and the District of Columbia, as well as on most tribal reservations and U.S. territories. Congress established the formula for distributing funds to Grantees based primarily on each state's weather, fuel prices, and low-income population. Grantees can use funds for heating and/or cooling costs as well as up to 15% of their funding (or 25% with a waiver) for weatherization assistance. The parameters on how these households are assisted are very broad, but the majority of the funds are used for two-party checks between the bill payer and the utility company.

According to the National Energy Assistance Director's Association, in 2015, LIHEAP provided essential heating assistance to 6.9 million households, and essential cooling assistance to about 996 000 households. In 2009, LIHEAP was budgeted $5.1 billion, which was the most it has been in history. LIHEAP's recent annual budgets of about $3 billion is only able to serve about 20% of the eligible households in the country (Drehobl and Ross 2016). The most common reason for not applying for bill assistance is a lack of awareness of assistance programs and confusion over how to apply (Treadway 2018).

Collaboration between LIHEAP and WAP has proven valuable. For example, tracking WAP deferrals can be used to effectively target LIHEAP funds and LIHEAP recipients with high energy burden can be directly referred to WAP for services.[36] Weatherization funding is also available from LIHEAP. Up to 25% of LIHEAP appropriations can be spent on weatherization at the discretion of the authorizing state agency. The LIHEAP Statute requires that Grantees receive a state waiver to increase the maximum from 15% to 25%. NASCSP tracks the leveraging of each state. Its most recent funding report estimates that in FY 2017, the $223.5 million of DOE WAP funding leveraged $423.1 million of LIHEAP funding and $225.6 million of other funding, mostly from utilities ($138.3 million).

HHS requires Grantees to have a plan for how to use LIHEAP funds for weatherization and the funds must be expended in accordance to the plan. Grantees can choose to administer the LIHEAP funds according to entirely DOE WAP rules, entirely LIHEAP rules, mostly LIHEAP rules, or mostly DOE rules. LIHEAP weatherization investments must be for cost-effective, residential weatherization measures or other energy-related home repairs that do not constitute construction.

[33] https://nascsp.org/wp-content/uploads/2017/09/WAP_ProgramOverviewFactSheet_3.16.17.pdf.
[34] https://nascsp.org/wp-content/uploads/2017/09/WAP_ProgramOverviewFactSheet_3.16.17.pdf.
[35] https://liheappm.acf.hhs.gov/data_warehouse/index.php?report\protect$\relax=$homepage.
[36] www.rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program.

3.2.3. Other federal programs and policies

At least two additional federal initiatives have a strong direct impact on the energy burden of low-income households: The EECLP operated by the USDA and the LIHTC tax credit monitored by the Internal Revenue Service. EECLP provides loans to finance energy efficiency and conservation programs of rural electric cooperatives that serve towns or unincorporated areas with no more than 20 000 inhabitants.[37] Eligible utilities can borrow money tied to Treasury rates of interest and re-lend the money to develop new and diverse energy service products within their service territories. The borrowed funding must be used to improve energy efficiency or encourage the use of renewable energy fuels for demand-side management, including solar PV systems, energy audits, community awareness and outreach, as well as consumer education. For instance, several utilities have used EECLP funds to support the PAYS® financing programs described by Lin (2018a).

State and local housing finance agencies have incorporated green building rating systems and associated funding into the construction and retrofit practices of public housing. The federal government spends about $6 billion annually on the LIHTC program. LIHTC was authorized in the Tax Reform Act of 1986; it has supported more than 2 million housing units to date.[38] An analysis of units participating in LIHTC in Virginia concluded that they used 12.5% less energy than non-participating units. 'The savings equate to 9.3%, 5.6%, and 3.5% of annual income for extremely low-income, very low-income, and low-income households' (Zhao *et al* 2018, p 559). At the same time, Reina and Kontokosta (2017) note that subsidized housing is less efficient than comparable private-sector housing, perhaps as a result of limited public funding for maintenance and upgrades. Low-income households living in subsidized or public housing units are eligible for participation in WAP.

3.3. State programs and policies

Many State Energy Offices play active roles in extending energy-efficiency benefits and other energy services to low-income customers. State and regional resources that fund these initiatives include the Regional Greenhouse Gas Initiative, State Energy Program, Qualified Energy Conservation Bonds, state revolving loan funds, state treasure funding, general obligation bonds, utility ratepayer funds, and environmental settlements funds.

State regulators and state energy offices can play a key role in encouraging utilities to carefully consider and expand the role of low-income energy-efficiency programs in their program portfolios. A mix of different strategies have been used, including (1) goals that specify minimum levels of expenditure or savings and (2) cost-effectiveness testing that gives extra credit for improving low-income energy efficiency. Nearly half of states have spending requirements for their low-income energy-efficiency programs, but only Pennsylvania and California have low-income savings requirements (Berg and Drehobl 2018). For example, the Illinois FEJA directed utilities to implement designated levels of low-income energy efficiency. In addition, Ameren Illinois Corporation was required to spend at least $8.35 million per year (Simms and Casentini 2018).

Adders to cost-effectiveness tests applied to state low-income programs are key factors guiding investment levels. In contrast to traditional residential efficiency programs, low-income programs often seek to address a wider range of challenges beyond simply achieving energy savings; these can include health and safety issues, home durability, arrearage reduction, and electricity terminations and reconnections. For this reason, low-income programs are often not held to the same cost-benefit requirements or thresholds as other types of residential efficiency programs.

3.4. Local government, community-based, ngo and privately funded programs

Local and community low-income energy programs often focus on opportunities for stimulating economic development, creating livable-wage jobs, meeting local environmental and sustainability goals, and increasing prosperity by expanding and deepening local collaborations and initiatives. For example, Donovan *et al* (2018) used a value chain approach to design such programs for communities in upstate New Hampshire.

Shoemaker *et al* (2018) highlight six energy efficiency programs serving rural areas. Community-based implementation strategies such as 'Weatherize' campaigns are overcoming market barriers and accelerating the adoption of energy efficiency in low-income rural communities, Native American villages, and other underserved areas in Northern New England and Alaska (Winner *et al* 2018). They are typically supported by loan and rebate programs that resonate in rural areas.

Another trend identified at the local level is the use of environmental settlement funds to support local energy efficiency assistance programs. In Tennessee, the Bristol Energy Efficiency Assistance Program was

[37] www.rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program.

[38] https://betterbuildingssolutioncenter.energy.gov/sites/default/files/PP_Incorporate%20EE%20RE%20Standards%20as%20a%20Criterion%20in%20Tax%20Credits_FINAL_3.pdf.

announced as a part of an environmental settlement in 2014. The program involved coordination between local economic development and community assistance program officials in conjunction with state environmental regulators. Tennessee's State Energy Office worked in partnership with local economic and community development officials to oversee the program's implementation process, coordinate measures and enrolment using existing community assistance programs, and served as technical advisors to local program administrators throughout the project.[39] The Bristol Energy Efficiency Assistance Program partnered with an existing program in the City of Bristol that provided housing repair assistance to economically disadvantaged homeowners. Through this partnership, a ready-made qualified group of people could be targeted for support under the King Consent Decree funding.

Many cities are developing climate change adaptation and mitigation plans, and many of them consider their impacts on low-income households alongside other equity issues (Barbier 2014). For example, in Portland, Oregon, the incorporation of equity considerations in the city's climate action plans resulted in a 'Climate Action through Equity' plan in 2016. Towns and cities have also organized Weatherize campaigns, modeled after Solarize campaigns, where goals are set and providers are pre-approved in order to foster local participation.[40]

NGOs operate energy and affordable housing initiatives at all scales from the local to the international. For example, the National Center for Healthy Housing, provides guiding documents related to safety, ventilation, moisture control, and thermal comfort, all of which impact energy usage and are particularly pertinent to low-income housing where indoor air quality problems can be severe.[41] The magnitude of philanthropic funding of the totality of these initiatives has not been estimated in the last decade of searchable publications in the Web of Science.

4. The impacts and cost-effectiveness of low-income energy programs policies

This section describes the impacts and cost-effectiveness of the many different types of programs and policies that address the energy burdens of low-income households.

4.1. Estimates of costs, benefits, and cost effectiveness

Extensive assessments of the cost-effectiveness of DOE's WAP and utility low-income energy efficiency programs have been conducted, and their results are summarized here. The performance of state, local government, and community-based programs has also been documented in case studies and comparative assessments. Some have also benefited from the same level of systematic assessment typical of national programs, including field surveys, inspections, and utility-bill analysis.

4.1.1. Electric and gas utility low income programs

The literature documents that the average cost of saving electricity is higher for low-income programs than for other residential, commercial, and industrial programs. For example, Hoffman *et al* (2018) examined data spanning 815 program-years of low-income efficiency programs operated by electric utilities from 2009–2015. Their assessment of cost-effectiveness distinguishes between the program administrator cost per kWh saved and the metric when participant costs are included in addition to the program administrator cost. Across all 815 utility programs in the U.S., saving-weighted average program administrator's cost of saved electricity is $0.025 (in $2016)/kWh, and this rises to $0.050 when participant costs are added. For low-income programs, the average program administrator's cost of saved electricity is $0.105 (in $2016)/kWh, and this rises to $0.145 when participant costs are added (figure 4). Low-income participants contribute about 1.3 cents per kWh saved, which is less than in other programs that serve higher income households. This low contribution by low-income customers is consistent with their limited access to financial resources.

4.1.2. DOE weatherization assistance program

The 2008 program supported the weatherization of 97 965 units and reduced energy costs by $340 million over the lifetime of its installed measures. With an average household energy savings of $4243 and energy measure costs of $2899, the savings-to-investment ratio (SIR) for the energy measures is 1.4. The 2010 program supported the weatherization of about 340 000 units, reducing energy costs by $1.2 billion and resulting in an energy-based SIR of 1.0. Environmental, health, and household related benefits were found to

[39] www.tn.gov/environment/program-areas/energy/state-energy-office-seo-/programs-projects/programs-and-projects/special-energy-projects0/redirect-special-energy-projects/city-of-bristol-energy-efficiency-assistance-program.html.
[40] www.greenenergytimes.org/2018/12/17/weatherize-campaigns-spread-across-new-hampshire/.
[41] https://nchh.org/information-and-evidence/learn-about-healthy-housing/healthy-homes-principles/.

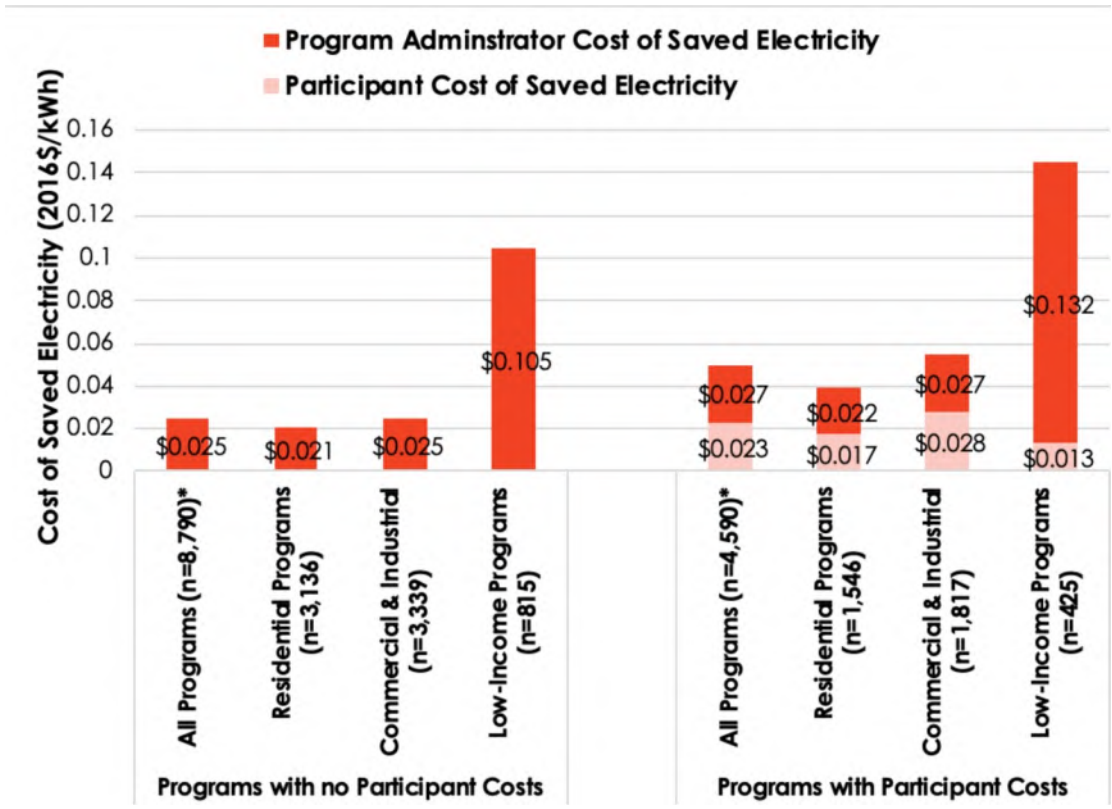

Figure 4. Cost of saving electricity in utility energy-efficiency programs. (Source: authors, based on data from Hoffman *et al* (2018).)

be significant in both program evaluations. The 2008 program evaluation results are indicative of the program generally and today because the funding during the ARRA period was an order of magnitude greater than normal and occurred in a condensed timeline.

When communities can enjoy more energy-efficient utilities, they derive a variety of benefits including improved public health, higher investment in the local economy, poverty alleviation and sometimes job creation with weatherization policies.

Tonn *et al* (2018) found that the energy savings vary by housing type, with site-built homes saving more than mobile or multi-family homes. Costs and benefits were also influenced by fuel type and climate zone.

A limited number of studies estimate the potential of a 'rebound effect' in low-income houses. The concern is that participants in energy-efficiency programs may increase their use of energy services after their home is retrofitted, reducing or potentially negating any energy savings. In an evaluation of households participating in WAP, Tonn *et al* (2015) conclude that this effect is negligible based on surveys of behavior pre- and post-weatherization.

4.1.3. State green building policies

Longitudinal analysis has been used in a few studies to examine the time effects of state green building policies (operating independently of WAP) on the energy performance of low-income housing units. In one case, Zhao *et al* (2018) evaluated monthly energy use data over three years from 310 residential units across 16 developments in the State of Virginia and conducted profile analysis and multivariate analysis of variance. Their results estimate financial savings of $648 per year due to reduced energy usage in green buildings. These savings equate to 9.3%, 5.6%, and 3.5% of annual income for extremely low-income, very low-income, and low-income families, respectively, suggesting that green building incentives and practices can enable housing with affordable energy systems. The broader goal of affordable housing is a much bigger issue tied to regional economics, housing vintage, and many other factors. Energy is just one piece of the poverty puzzle; making energy more affordable and sustainable is important but not a complete solution to the poverty problem.

4.1.4. Community partnerships

Local partnerships in some states and communities, such as those supported by the DOE initiative called the Clean Energy for Low Income Communities Accelerator (CELICA), have been designed to take a more holistic approach to energy affordability. It required partnerships across different levels of government

agencies, where DOE provided assistance to states and local governments on the design and implementation of low-income energy programs. CELICA not only provided support to reduce energy burdens, but also provided tools for managing and monitoring progress (DOE 2017). Taking a broader perspective, CELICA not only leveraged the WAP and its network of providers to expand access to energy efficiency for low income households beyond what federal funding could address, but also promoted distributed renewables to provide stability from rising energy costs, promoted economic development, and improved the environment.

4.2. Under-served low-income cohorts

Evidence suggests that three cohorts have been under-served by efforts aimed at addressing the high energy burden of low-income households: multi-family and rental markets, rural communities, and manufactured and mobile homes.

Multifamily buildings are home to nearly 25% of the U.S. population and more than half of low-income households (Frey *et al* 2015, Hernández *et al* 2016, Corso *et al* 2017). For a variety of reasons including high land values, cities and urban areas have a disproportionate number of multifamily buildings (Hernandez and Phillips 2015).

With high rates of various vulnerabilities and a lack of access to housing improvements, households in low-income multifamily housing face disproportionate health and financial challenges (Fabian *et al* 2012, Waite *et al* 2018) At the same time, these households are often underserved by traditional energy-efficiency programs (Ross *et al* 2016, Berkland *et al* 2018).

These markets have been hard to reach by traditional utility and government programs (Henderson 2015, Corso *et al* 2017). A major reason is that when tenants pay the energy bills, the building owner may not be motivated to invest in improvements since the bill savings accrue to occupants (Reina and Kontokosta 2017). Similarly, tenants may not be incentivized to save if they are not paying the bill, as in master-metered buildings (Brown 2001, Inskeep *et al* 2015).

Considering their high concentration, these markets represent a significant potential for energy and cost savings and for improving people's lives including the quality of the air they breathe (Henderson 2015, Frey *et al* 2015, Chant *et al* 2016). Further, government control over multifamily units that form part of public housing make it easy to integrate different policies (Reina and Kontokosta 2017). The consensus appears to be that there is a need for scaling up the energy-efficiency and related improvement programs for multifamily and rental markets (Samarripas *et al* 2017).

Different types of energy-efficiency programs have been implemented to address low-income multifamily market needs. These include programs led by utilities and NGOs; financing programs (Leventis *et al* 2017); and data collection programs (Long *et al* 2018). Several lessons can be found in the reports and studies we analyzed. Community support is particularly useful in multifamily programs (Chant *et al* 2016, Sanchez *et al* 2018). In two cities in Ohio, Andrews and Poe (2018) found that local community involvement led to increased participation, ultimately leading to improvements in health and safety for tenants as well as landlords. Similarly, community based social marketing can increase the success of programs (Keilty 2018). Carefully designing the incentives and utility-managed on-bill financing can help address the problem of misaligned incentives (Bird and Hernandez 2012). Finally, by integrating energy efficiency into solar projects, energy burdens can be significantly reduced (Samarripas and York 2018).

Low-income households in **rural communities** often spend as much as a quarter of their income on energy (Ross *et al* 2018), due partly to the low-density built environment enabled by lower land values. Lower densities can make it difficult to access energy-efficiency programs resulting in high program implementation costs (Shoemaker *et al* 2018). Rural communities also have high gas pipeline construction costs, making it difficult for residents to convert from electricity, fuel oil, kerosene and other fuels to natural gas, which is often the least-cost fuel for home heating (Ross *et al* 2018). As a result, their fuel mix is distinct, as are their regulatory structures.

Native American reservations also have similar trends and account for some of the highest rates of energy poverty in the U.S. Their off-grid homes span the contiguous United States and Alaska (Begay 2018a). Connecting to the grid to bring electric services to remote areas in the reservations at affordable rates has been a challenge for the traditional electricity development model. Looking to the future, these reservations have a lot of promise because they represent 2% of the U.S. landmass but 5% of the renewable energy resources (Begay 2018a). Harnessing these local resources could help rejuvenate the economies of rural communities (De Silva *et al* 2016, Donovan *et al* 2018). The rooftop solar solution the Navajo Nation has adopted in collaboration with Sandia National Laboratories offers insights into how the Navajo Tribal Utility Authority's work could serve as a residential model to meet the needs of the 1.2 billion people globally who are without on-grid electric power.

Several programs have been piloted and rolled out to reduce energy burdens and increase access in these communities over time. They involve direct funding from government programs, NGO involvement, and

funding from charitable organizations. Different agencies are responsible for implementing these projects, including state energy offices, electric cooperatives, municipal or investor owned utilities (Donovan *et al* 2018, Shoemaker *et al* 2018).

Results and findings from pilot projects and other programs focused on rural areas show that gains from targeted rural energy-efficiency programs can be increased by using cooperatives in remote rural locations (Lin 2018a). This is especially true if the financial support can be earmarked to meet upfront costs and the challenge of split incentives. Similarly, community-based programs where partnerships with NGOs are leveraged are also found to be successful (Andrews and Poe 2018, Donovan *et al* 2018). There are significant gains to be made from pooling resources from different projects to achieve economies of scale, and from training workers to operate these new systems (Souba and Mendelson 2018). It has been estimated that strategies to tackle the energy-efficiency gap in rural and small-town America could reduce energy burdens by as much as 25% (Ross *et al* 2018).

The opportunity to address the high energy burdens of low-income households occupying **manufactured housing** has received limited analysis and policy focus. This oversight is related to the limited attention given to the energy-efficiency gap in rural America, where 70% of all manufactured homes are situated. Manufactured homes made up 9% of new U.S. homes in 2017 and housed more than 20 million people in total. Manufactured homes consume 35% less energy than other homes due to their smaller footprint, but unfortunately residents spend 70% more per square foot on energy (Ross *et al* 2018). With a median family income of $30 000, residents of manufactured homes have higher-than-average energy burdens.[42]

4.3. Technologies and measures installed

Through its Grantees and its network of hundreds of Subgrantees providing services at the local level, WAP installs energy efficiency measures and a limited amount of energy-related safety/health measures at no financial cost to homeowners. Air sealing and insulation are the two most common measures (figure 5). Some utilities also use contractors to directly install measures. The most common measures installed by contractors under electric utility programs are lighting, air sealing, insulation, and water heater upgrades, typically at no financial cost to the household. Some utilities also offer energy-savings kits with weatherstripping, caulking, LED bulbs, and other low-cost items that homeowners can install themselves.

Drehobl and Castro-Alvarez (2017) found that the majority of cities have access to utility programs with lighting, air sealing, and insulation measures, while smart thermostats and health and safety measures were the least common program measures. In terms of cost-effectiveness, Elsawaf *et al* (2013) found that that air-source heat pumps could reduce heating costs in low-income mobile homes by up to 52% when integrated in an electric strip heat system, while also improving thermal comfort in their analysis of eastern North Carolina. They also found that their benefits exceed the initial cost of installation.

Bradshaw *et al* (2016) investigate the benefits and cost-effectiveness of three types of weatherization treatments: replacing a standard thermostat with a programmable thermostat, installing attic insulation, and envelope air sealing. These treatments were modeled for the low-income housing stock of six contrasting American urban areas: Orlando, Florida; Los Angeles-Long Beach, California; Seattle, Washington; Philadelphia, Pennsylvania; Detroit, Michigan; and Milwaukee, Wisconsin. Results show that (1) regional variations have high impact on the cost-effectiveness of weatherization treatments, (2) housing stocks with substantial electric space conditioning tend to offer greater energy cost and greenhouse gas (GHG) savings, (3) the effect of a GHG price is small compared to energy cost savings when evaluating the cost-effectiveness of weatherization treatments, and (4) installing programmable thermostats is the most cost-effective treatment. This study highlights the importance of thoughtful consideration of weatherization program goals when selecting cities or regions to prioritize because different goals suggest different approaches.

4.4 The energy saving potential of low-income households in the U.S

In a study of the 48 largest cities in the country, Drehobl and Ross (2016) estimate that if the low-income housing stock were brought up to the efficiency level of the average U.S. home, 35% of the low-income energy burden could be eliminated.

Focusing specifically on possible electricity savings from weatherization, Hoffman (2017) assessed the implications of pursuing energy efficiency neighborhood-by-neighborhood where low-income households are prevalent. Using data on demographics, housing types and recent savings from low-income retrofits, and assuming that households at 200% of the FPL are eligible, Hoffman (2017) provides rough electricity savings estimates of 51.5 billion kWh. A majority of these savings are in the South (54%) and in hot-humid climate zones (38%), where much of the nation's poverty is concentrated.

[42] https://aceee.org/blog/2016/08/mobile-homes-move-toward-efficiency.

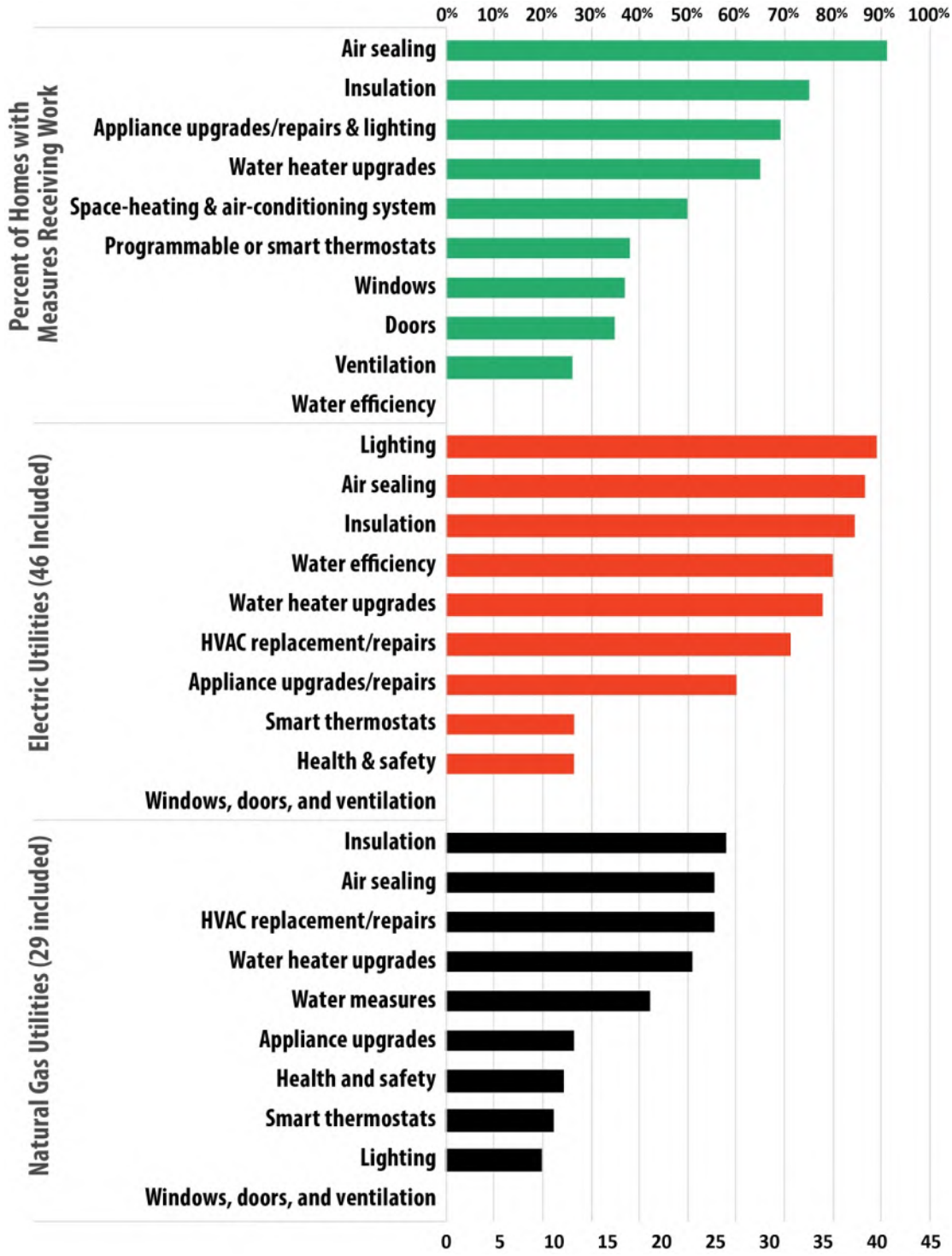

Figure 5. Measures installed in low-income programs. (Source: authors, based on data from Tonn *et al* (2014), Drehobl and Castro-Alvarez (2017).) Note: the top graph refers to measures installed by the Weatherization Assistance Program in 2008. The middle graph refers to measures installed in low-income programs operated by electric utilities in 2015. The bottom graph refers to measures installed in low-income programs operated by gas utilities in 2015.

5. Promising practices

Several practices appear to be particularly promising as effective ways to reduce low-income energy burdens—behavioral economics, data analytics, solar energy, advanced information and communications, and leveraging health care benefits.

5.1. Behavioral economics and social science approaches

The study of low-income energy burdens is beginning to benefit from the emergence of behavioral economics and social-psychological approaches to understanding energy behavior.

Behavioral economics is the application of lessons from psychological and experimental studies to 'nudge' people to change their behavior. Well established concepts in behavioral and experimental economics on principal agent problems, information asymmetry, and bounded rationality inform this research (Simon 1976, Brown 2001, Gillingham *et al* 2009, Allcott and Rogers 2014). However, most of these analyses do not focus specifically on low-income households. As a result, there is deep uncertainty about likely responses to information feedback, incentives, and an array of other policy interventions and program offerings. Extant studies analyze the role of behavioral economics in determining and nudging people's energy choices (Sunstein and Reisch 2014, Allcott and Taubinsky 2015, Chetty 2015). Behavioral motivations may include monetary gains, information campaigns, education programs, audits and energy reports (Drehobl *et al* 2018). The studies span a range of themes—behavioral response to energy efficiency, using green vs grey energy, willingness to pay, and community-based programs (Sunstein and Reisch 2014, Allcott and Taubinsky 2015, Chetty 2015). As noted earlier, the incongruence between households' values and intrinsic and extrinsic factors can limit their ability to invest in energy saving activities. This gap is especially relevant for low-income households, which generally have lower energy literacy than other income groups.[43]

Local governments are introducing programs that encourage behavior change at the consumer level. Several strategies have been adopted to engage residents and low-income households in energy-efficient behavior, chief among them being in-person engagement and education campaigns (Craig 2016, Drehobl *et al* 2018, Simms and Casentini 2018). Most low-income adults (and especially women and homeowners) are interested in learning about ways they can save on their electric or heating bills and avoid paying late fees and reconnection charges (Treadway 2018).

Some studies indicate there may also be high non-monetary costs associated with participation in a weatherization program that affect participation (Hirshfield and Iyer 2012, Fowlie *et al* 2015). Lack of knowledge about the features of different appliances and ineffective targeting can also lead to low uptake of these high-efficiency technologies among low-income households (O'Dwyer 2013). Effective approaches to address different groups and sub-segments are going to be quite distinct (Treadway 2018). Low-income program services and outreach messaging need to reflect the critical difference between sub-segments of vulnerable populations in the low-income market, including, for example, single mothers working two jobs, fixed-income senior citizens, and Native American populations returning to reservations (Treadway 2018).

The limitations notwithstanding, local, municipal, and community level energy initiatives have the advantage of knowing and being more closely in touch with their local target market. Consistent with the findings on multifamily rental markets and rural customers, local engagement programs and partnering with local community-based organizations has significant gains and benefits (Hirshfield and Iyer 2012, Simms and Casentini 2018). This is also true in the case of household level usage of gas (Long *et al* 2018). Niederberger (2018) suggests using 'nudges' to encourage low-income energy consumers to buy energy-efficient products. Further, designing a marketing model of local programs that takes into account the role of behavioral changes by continued engagement, paying attention to customer experience, relying on strong stakeholder communication, and using interactions that allow for actionable information to be exchanged are all useful lessons for future program implementation (Keilty 2018). Donovan *et al* (2014) also note the potential for increasing energy efficiency by integrating technology that provides information on energy usage to low-income households. In-home displays, energy-efficiency coaching, and providing usage information have all been successful strategies (Donovan *et al* 2014).

5.2. Data analytics

New approaches have allowed for visibility into energy affordability and the socio-demographics of households. Data analytics and new digital tools such as the NREL Solar for All,[44] and NREL ResStock[45] can help explain the relationship between energy affordability and socio-economic indicators to better understand the key factors that would drive changes in energy consumption. These techniques can be instrumental in estimating patterns of consumption and identifying areas where most of the savings can be made at the household levels (Wierzba *et al* 2011, Hosgoer and Fischbeck 2015, Nahmens *et al* 2015, Porse *et al* 2016, Reina and Kontokosta 2017, Long *et al* 2018, Zhang *et al* 2018).

Jafary and Shephard (2018) use data from appliance usage to characterize consumption patterns of households across different building types. More high-quality data and techniques for analysis can also be useful in estimating the effect of the changing nature and composition of the energy sector on consumers. For example, Johnson *et al* (2017) use data from the PJM markets to estimate the effect of high solar PV

[43] https://nef1.org/wp-content/uploads/2018/11/NEF-National-Energy-Literacy-Survey-White-Paper-181115.pdf.

[44] https://maps.nrel.gov/solar-for-all/?aL=6m-d90%255Bv%255D%3Dt&bL=clight&cE=0&lR=0&mC=38.870832155646326%2C-98.34521484375001&tour=splash&zL=5.

[45] www.osti.gov/biblio/1436972.

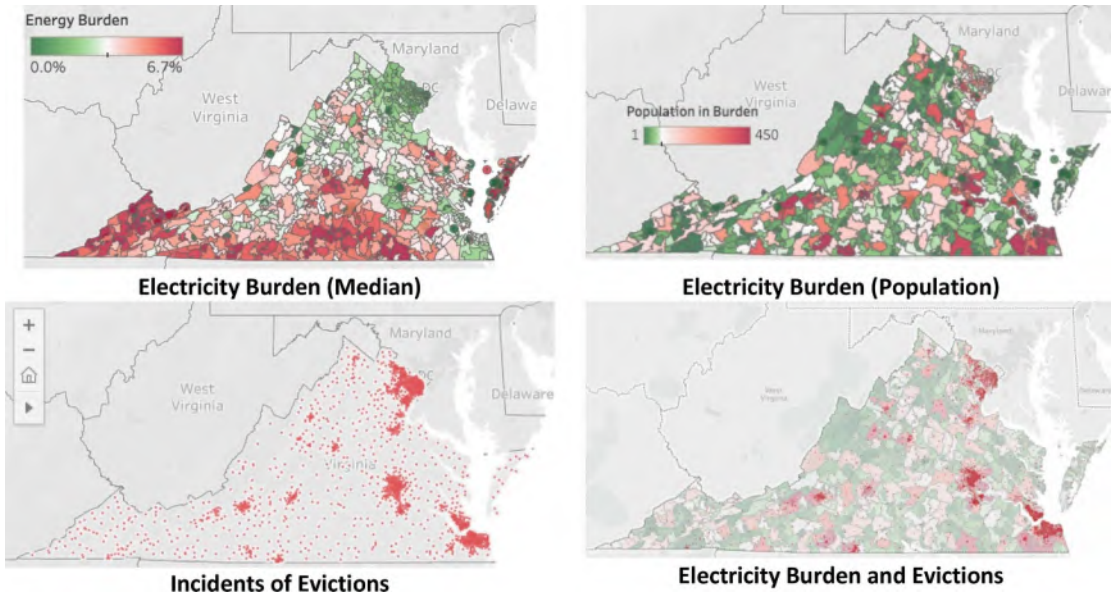

Figure 6. Data analytics of energy burden and evictions across zip codes in Virginia.[46]

adoption on cross-rate class subsidization and distribution of energy burden. Further, collecting and providing data can facilitate innovative approaches to analysis. It can help estimate the level and severity of the problem (Berry *et al* 2018); it can be used to test the effectiveness of different programs and project designs (Hoffman 2017); further, data can be useful to draw more concrete results for utilities in order to target consumers who would gain from programs such as LIHEAP (O'Dwyer 2017).

Understanding the impacts of low-income energy programs and policies can also be enhanced with data analytics. For example, the Greenlink Group has used mapping sciences to help visualize the relationship between household energy burdens at the county level and utility evictions in the State of Virginia (figure 6).

Integrating new technology for collecting, generating data and analyzing data can contribute to improved data analytics (Donovan *et al* 2014, O'Dwyer 2017). Machine learning techniques (Zhang *et al* 2018) and agent-based modeling (Zhang *et al* 2016) are promising approaches. With high-resolution data, investments in demand-side management can be designed to potentially displace the more expensive options of generation and grid investments (Reames 2016, Khan and Duffy 2018). All income groups would benefit from a shift from supply- to demand-side energy utility company investments enabled by data analytics. However, in many regions, such data are not available. The first step in making better data analytics possible will therefore be collecting, analyzing, and visualizing more spatially and temporally high-resolution data to better inform low income energy programs (Reames 2016).

5.3. Solar energy for low-income households

Historically, affluent households have dominated the market for residential solar installations, but with expanding production and declining costs, solar systems are now beginning to reach previously underserved markets. Solar energy can significantly reduce energy burdens in targeted areas today, while also generating living-wage jobs and displacing pollution from fossil fuels, which can mitigate historic environmental injustices (Franklin and Osborne 2017). Federal and state programs focused on addressing energy poverty have traditionally helped deploy weatherization and bill assistance programs; however, coupling these services with solar financing assistance presents a potentially attractive way to more dramatically reduce the energy burden of low-income households (Ulrich *et al* 2018). The Navajo Nation provides a vivid example of rooftop solar systems being installed in the U.S. to tackle energy poverty among its 35 000 remote off-grid tribal members, living in vast and rugged terrain, with dispersed housing, where solar PV rooftop systems are overcoming this rural electrification dilemma (Begay 2018b).

Programs are emerging that target barriers to solar installations for low-income households. They include rooftop solar and community solar initiatives.

Rooftop solar programs include 'Solarize' and 'Solar for All' campaigns.

[46] www.thegreenlinkgroup.com/energy-equity.

In general, Solarize campaigns aim to remove barriers and headaches of installing solar in residences (Cook 2014), while 'Solar for All' programs typically include incentives for solar panels so that low-income households can afford to install them. Both models support the creation of 'prosumers' who generate and export solar power, thereby reducing their energy bills and burden. The magnitude of electricity bill reductions depends on the utility's net metering. Another type of program integrates solar panels into low-income home retrofits, and sometimes electric vehicles are part of the expanded program.

'Solar for All' programs typically aim to install PV systems in low-income households and to provide grants to other organizations with similar goals. For example, the Washington DC's 'Solar for All' program is funded by DC's Department of Energy and Environment and plans to install solar PV systems on more than 6000 low-income homes annually with a goal of reaching 100 000 low-income households by 2032. This program helps lower the energy burden of its low-income households and contributes to accomplishing its renewable energy goals.[47]

Another sizeable community-led solar aggregation and energy efficiency program is targeting low-to-moderate-income residents of Northern Manhattan (Roundtree Jr. 2018). A community-led Energy Democracy Working Group (EDWG) selected and evaluated solar installers and is coordinating with the Housing Development Fund Corporation to reach co-op residents who are predominantly low to moderate income people of color. The project team also works with solar installers and the EDWG to promote local job creation related to the initiative.

California's Multifamily Affordable Solar Housing (MASH) Program shows that subsidized efforts can bring solar resources successfully to multifamily housing. MASH targets multifamily housing and was created under the California Solar Initiative bill enacted in 2006. Homes must be using either Pacific Gas and Electric, Southern California Edison, or San Diego Gas and Electric as their utility provider. Customers must also have an occupancy permit of two years or more. This program provides fixed, upfront payment based on the system's potential capacity. Incentives for these multifamily homes are all Expected Performance Based Buydown. As of July 2017, the program has contributed 33.75 MW of interconnected solar capacity, successfully operated 427 projects statewide in multifamily low-income housing, and paid $95 million in incentives to customers (Coughlin *et al* 2013).

Several case studies have shown that risks associated with installing solar on affordable housing can be mitigated by leveraging investments in energy efficiency (Samarripas and York 2018). Two Michigan communities took advantage of additional WAP-ARRA-funding through the Sustainable Energy Resources for Consumers Grants to expand weatherization to include solar. Their efforts concluded that renewable energy may have additional quality of life benefits to offer families beyond the cost savings (Walton 2014). Similarly, Colorado and New York State have initiated efforts to hybridize weatherization with solar investments in WAP projects; and in a few states, LIHEAP rules allow weatherization projects to incorporate PV as an option to reduce household energy burden (Ulrich *et al* 2018). Evidence of cost effectiveness of this energy-efficiency and renewable energy combination has emerged from the efforts of the Colorado Energy Office in a state with high solar irradiance. In their evaluation of the CEO's efforts, Cook and Shah (2018) found that regardless of the type of energy-efficiency improvements, incorporating PV as a measure to reduce the cost of electricity cuts customer bills by $400 or more annually. (This is without taking into account the maintenance costs of the system.) Integrating electric vehicles can reduce costs further, as in the Single Family Affordable Solar Housing pilot program (Verclas 2018), and Vermont has also hybridized all three types of measures—energy efficiency, solar, and electric vehicles—with home energy storage.

Recent studies have also found evidence that despite high solar rooftop potential, many LMI communities might not be able to leverage the benefits for a variety of reasons such as income, demographic characteristics, language proficiency, age of the housing stock, and internet access (Reames 2020). As such, understanding local conditions and 'dynamics', and accounting for disparities along social and cultural characteristics can help design equitable and more successful programs.

Community solar helps low-income households take advantage of utility-scale solar projects by allowing them to purchase a small portion of as little as one panel of an offsite, local solar array in exchange for reductions to their utility bill for the entire life of the solar system (Booth 2014). Sometimes called 'shared solar', community solar refers to local solar facilities shared by multiple subscribers. Community solar is particularly suitable for low-income renters and multifamily residents who can access solar via two alternative business models (IREC 2018). With on-site shared solar, energy generation credits can be purchased from a single solar system that is shared virtually among multiple tenant accounts. With off-site shared solar, multiple remote customers can receive credits on their various utility bills for the shares they own in a common system. In sum, community solar provides three benefits. It can make solar accessible to

[47] https://doee.dcgov/solarforall.

Table 4. Favorite way to receive daily account information from local electric utility.

	Number of Households	Age		Household Income	
		18–54	55 +	<$25 K	$25 K to $49
Total Respondents with HH Income	(534)	(364)	(170)	(232)	(302)
Less than $50 000	%	%	%	%	%
Email	45	42	53[a]	41	48[a]
Text message	15	16	12	19[a]	12
Mobile app notification	12	15[a]	4	8	15[a]
More than one channel (phone, text message, email or app)	10	11	10	10	11
Recorded phone call	4	4	5	6[a]	3
Do not know/no opinion	13	12	17	16	12

Q. B18: If you elected to receive daily account from your local electric utility, how would you receive it? Please choose your top choice.
[a] Indicates figure is significantly higher than other sub-group at a 95% confidence level. The Russell Omnibus was conducted via the Internet among 1092 adults 18 years of age or older from October 21–24, 2016.(Source of Data: Treadway 2018)

homeowners without a rooftop and to renters, it can be easily transferable, and it may reduce replacement risks for on-site solar systems.

The state level policies on solar vary across states. While many states have some type of policy initiative to support the adoption of community solar, most of these are one-off policies rather than state-wide programs. In the absence of state-led programs, voluntary and utility-led programs from will not reach underserved communities (Solar 2018) Community solar programs in the U.S. have at least four distinct ownership and management arrangements. In a Utility-Sponsored Model, shares are offered to electric ratepayers. In a Special Purpose Entity Model, community investors can receive a Return on Investment and offset their personal electricity use. In a non-profit model, donors contribute to a non-profit that owns the community installation. In a community-shared model, a third-party solar vendor owns the facility and community members sign up to be a part of the solar campaign (Coughlin *et al* 2013). Several of these have served low-income multifamily residents, including MASH in California which is utility-sponsored, co-op power in New York which is a non-profit, and the Maryland PSC pilot program that is Utility Sponsored. Like many Solarize programs, Solarize Mass-Somerville is a community shared model that does not have an income qualification (Coughlin *et al* 2013). It is available for low-income households, who otherwise would be unable to purchase rooftop solar.

Thus, program administrators of low-income programs are learning from models that have successfully served higher-income customers and are creating new types of business models that are adapted and evolved to meet the needs of low-income households (Chan *et al* 2017, Cook and Shah 2018, Heeter *et al* 2018). However, the applicability of these strategies to low-income markets depends on the type of housing and the ownership status. As a result, Cook and Bird (2018) identified 13 different financing options that could be deployed, each with its own unique features and impacts. Policymakers need to weigh the pros and cons of each type when considering applicability to their low-income communities. IREC (2016) recommends using alternative financing tools such as anchor subscribers and back-up guarantees, direct and tax incentives, loan programs and credit enhancements, and low-cost public financing.

An interesting finding for the future of community solar is that utilities are motivated to develop it not only to satisfy consumer demand or meet regulatory requirements for renewable energy, but also to alleviate revenue losses related to residential solar PV (Funkhouser *et al* 2015). Thus, it would appear that community solar for low-income households could thrive because it benefits the business model of the incumbent energy stakeholders—the electric utilities. As the community solar models get adopted widely, it is pertinent to remain cognizant of the definition of communities and avoid any potential 'community washing' (Ptak *et al* 2018). In addition, to foster the continued adoption of community solar, projects need to be financially beneficial for low-to-moderate income families (Solar 2018).

Despite the expanding penetration of low-income solar systems, research to date has not yet fully assessed what proportion of low-income housing is suitable for solar PV or what fraction of low-income electricity needs could be met by solar systems (Sigrin and Mooney 2018). Such assessments need to consider the barriers that make it difficult for low-income households to acquire solar resources.

5.4. Advanced information and communication technologies (ICT)

Digital, market-based programs are being used to educate, incentivize, incentivize and 'nudge' consumers to purchase energy-efficient products (Niederberger 2018). Adopting market-based and behavioral strategies supported by data to target online marketing and incentives for greatest impact can scale participation and

improve the cost-effectiveness of residential programs to reduce energy burdens. Digital platforms and smart meter data are increasingly being deployed to reach households with high energy burdens (Sovacool *et al* 2017). Energy burdens could be reduced if low-income tenants had a more expansive knowledge of how best to conserve energy (along with enabling resources to invest in upgrades), and ICT can help achieve this greater energy literacy. However, low-income households often lack Internet access—a 'digital divide' exists. At best, they are unable to use such platforms or at worst, could be harmed by such business models.

When low-income respondents were asked how they would like to receive daily account information from their local utility, e-mailing was the dominant response, representing 45% of the households. Text messaging and the use of a mobile app were viewed as the preferred information mechanism by 15% and 12% of respondents, respectively (table 4). Consistent with the digital divide, older and lower-income households are less likely to prefer the use of mobile apps (Treadway 2018).

One way for households to easily access and recognize their energy consumption is through the use of smart meters and thermostats (Brown *et al* 2018). These smart meters allow the utility companies to track peak demand times and usage. Nest thermostats are WiFi enabled and can be controlled by computers and cell phones. They display the current energy consumption of the home and have sensors for temperature, humidity, and motion. The Nest thermostat learns the user's behavior, guarantees that no energy is wasted if no one is home, and helps manage usage during peak and off-peak times to help low-income households lower their total energy bill. Nest thermostats can be expensive at $250 before installation, deterring many low-income households from purchasing the device. Georgia Power currently offers a $100 rebate on Nest thermostats, but for low-income households, $150 is still a large sum of their monthly income. Therefore, implementing a monthly payment plan, on top of the rebates as an incentive program, is more feasible for these families. A Nest thermostat, on average, saves a household $140 per year, hence the price per month that they will pay for the Nest thermostat would be equivalent to the monthly savings made through their electric bill.[48]

'Peer-to-peer electricity' sharing could create a more affordable marketplace for electricity. In this marketplace, the people who can afford power generating sources such as solar panels can sell electricity to people who are unable to afford generating sources or who might have access to electricity but require more electricity at certain times (Inam *et al* 2015). While this concept appears to not be operational in the U.S., it is beginning to enter markets in the Netherlands and Australia.[49]

5.5. Leveraging the healthcare benefits of energy-efficient housing

The healthcare industry has the potential to be a strong ally in the effort to reduce the energy burdens of low-income households. Problems associated with high energy burdens often include adverse health effects. Insufficient heating and cooling systems and leaky homes can cause hypothermia and heat stress. Improper air filtration cracked heat exchangers, and poor venting can exacerbate asthma and other respiratory problems for occupants (Batterman *et al* 2012, Doll *et al* 2016). Bad air conditioning units can transmit bacteria and lead to increased infection rates. Additionally, medical conditions often require electricity for treatment and medicines, such as diabetics needing refrigeration for insulin and those with breathing-related complications needing electrically powered breathing assistance devices. If updates to infrastructure are too costly and energy burdens are too high, households can end up sacrificing their health in order to cope with their energy bills. This in turn can lead to higher healthcare costs that further exacerbate the expenditure burden of households and lead to chronic stress (Hernández *et al* 2016).

The physical and mental health benefits of energy-efficiency upgrades are well documented (Fabian *et al* 2012, 2014, Frey *et al* 2015, Camprubí *et al* 2016, Leventis *et al* 2017, Coombs *et al* 2018). Surveys and case studies of residents systematically identify favorable health effects (Hernandez and Phillips 2015, Hernández *et al* 2016). Based on the self-reports of public housing residents, Jacobs *et al* (2015) found that green and healthy housing produced health benefits; specifically, there were reduced rates of hay fever, asthma, headaches, sinusitis, respiratory allergies, and angina. The latest WAP evaluation indicates that the value of the program's health benefits exceeds those of its energy benefits (Tonn *et al* 2018).

Collaboration and co-funding across the energy and healthcare industries offer an opportunity for both industries—and the vulnerable populations they serve—to benefit. The healthcare industry, and in particular Medicaid and Medicare and those states with value-based healthcare, have a vested interest in providing healthy low-income housing, and the energy industry often cannot invest in energy-efficiency measures or install solar PV without first making structural and safety investments (Breysse *et al* 2011). Co-funded programs can leverage the potential benefits to both sectors (Kravatz *et al* 2018, Ulrich *et al* 2018). By combining health and safety housing improvements with efficiency retrofits using established

[48] Nest Thermostat Real Savings. (n.d.). Retrieved April 22, 2018, from https://nest.com/thermostats/real-savings/.
[49] https://vandebron.nl/about; https://arena.gov.au/assets/2017/10/Final-Report-MHC-AGL-IBM-P2P-DLT.pdf.

energy-efficiency programs, the cost-effectiveness of efficiency investments can be strengthened. Spillman *et al* (2016) provides examples of state initiatives where Medicaid funding has been used to make improvements and educate residents about the health benefits of home energy upgrades. Healthy home measures include cleaning air conditioners and vents, improving HVAC systems, installing standalone air filters, plugging air leaks, and better insulation. By expanding the labor force of energy retrofit and public health professionals serving vulnerable populations, both stakeholder industries can improve (Dryden *et al* 2018).

6. Conclusions

In the midst of a rapidly transforming energy system, this paper reviews the literature to assess how low-income burdens are changing, what policies and programs are impacting them, and what opportunities hold promise for progress in the future. Our literature review uses an energy equity lens to focus on procedural, distributional and intergenerational issues related to low-income energy burdens.

Our literature review is complicated by several methodological challenges:

- Variable and inconsistent definitions and metrics are used to describe the energy consumption patterns of low-income households.
- The extent and nature of energy burden, and the estimated impact and value of solutions, depend upon the metrics used.
- There is limited publicly available data on low-income energy consumption, particularly at high spatial and temporal resolution, which constrains the ability of data analytics to fine-tune program targeting and design.

The last decade has produced a large and expanding literature on low-income energy burden. This literature supports several broad conclusions with equity implications.

- Energy burden is higher among low-income households than other income groups.
- Low-income energy burden is not declining, and it continues to be high in particular geographies and socio-economic groups.
- Many policies and programs that promote energy efficiency and renewable energy technologies (e.g. rooftop solar PV and home battery systems) are largely inaccessible to low-income households.
- The share of utility residential energy-efficiency funding that supports low-income households is lower than the percent of residential utility customers who are low-income.

The literature also documents several new approaches to the design and implementation of low-income energy programs and policies that appear to offer opportunities to amplify their success.

6.1. Improving equity through program design and implementation

A majority of energy program funding focuses on short-term fixes to energy insecurity and not long-term solutions to reduce energy burden.

- Funding for temporary assistance (e.g. for bill payments) dwarfs funding for more enduring assistance (e.g. weatherization), though both serve a critical need and benefit from being linked (Cluett *et al* 2016, Hoffman *et al* 2018, Bednar and Reames 2020).
- Funding for low-income energy programs peaked as a result of ARRA; it has returned to levels above the pre-ARRA funding, reflecting modest increases in weatherization funding and more substantial increases in low-income solar programs.

A number of submarkets and socio-demographic groups tend to be underserved by current low-income energy programs. Programs like WAP serve both to reduce energy burden and to improve the low-income housing stock across the country by making it more energy-efficient, comfortable, and healthier. Because many low-income energy programs serve home owners, they also mainly serve white households (a distributive justice concern). Eliminating barriers to serving rental properties could drastically reduce energy burden and insecurity for households of color while reducing health and other racial disparities.

- The multifamily low-income market has been difficult to reach with traditional energy-efficiency programs due partly to misalignment of incentives.
- The opportunity to address the high energy burden of low-income households occupying manufactured and mobile homes has received limited analysis and policy focus.

- Low-income households in rural communities often spend as much as a quarter of their income on energy due partly to their low-density geography; assistance from local community programs and organizations are particularly critical to success in these markets.

Several promising technology approaches are not generally well integrated into low-income energy programs.

- Rooftop and community solar systems are now cost effective in many states as the result of declining costs and their involvement in low-income energy programs is beginning to take hold in some states.
- Health and safety upgrades are not components of most utility low-income energy-efficiency programs, and they are not fully integrated into the cost-benefit calculations of the WAP or state low-income energy programs.
- Information and communication technologies including smart thermostats and information feedback support low-cost behavioral approaches to improving energy efficiency; while they tend not to be incorporated into low-income energy programs, their presence in these programs is increasing.
- Electric vehicles and other approaches to affordable transportation have played limited roles in federal, state, local, and utility low-income energy programs to date.

Policies can be designed to address these gaps.

- States are using minimum requirements and adders to cost-effectiveness tests to promote greater investment in low-income energy programs.
- New program designs can align incentives more effectively for building owners and tenants.
- Strong community engagement and effective building owner and property manager partnerships can help reach multifamily markets.
- Active community involvement can expand participation rates and enhance the success of low-income energy programs.

6.2. Scaling impacts with leveraging, partnerships, and policy integration

Scalable approaches to reduce low-income energy burden require linking programs and policies to tackle the complex web of causes and impacts that households face, who have limited resources to pay energy bills. Two distinct opportunities exist: inter-agency cooperation and integrated technology-policy approaches.

Inter-agency partnerships offer greater resources and leverage, particularly if they span multiple scales (national, regional, state, and community) and multiple agencies with missions that touch on low-income energy burden. Evidence of the potential payback to engagement of non-energy agencies is provided by the significant non-energy benefits that are created by low-income energy programs.

- At least four parallel federal programs have missions related to low-income energy burdens, with varying levels of inter-agency coordination.
- The SIR of WAP is favorable based on the value of its energy savings alone.
- Without monetizing non-energy benefits, low-income energy-efficiency programs operated by electric and gas utilities cost more to implement per household and are less cost-effective than utility-operated energy-efficiency programs serving higher income groups. Low-income energy programs ensure low-income households can benefit from ratepayer funding that they help pay for but would otherwise not benefit from.
- The value of the non-energy benefits of WAP and other low-income energy programs are significant.

Integrated technology-policy approaches offer opportunities to leverage a broader array of rapidly advancing technologies (advanced efficiency, solar PV, storage assets, smart meters, and more). Expanding implementation of these technologies can be achieved with novel and integrated approaches to inclusive financing, philanthropic partnerships, energy assistance, and payment arrangements. More holistic approaches can maximize benefits and minimize costs.

- Expanding the technology scope of low-income energy-efficiency programs to include solar PV, smart meters, storage, and electric vehicles could significantly improve energy affordability for low-income households.
- Broadening finance and administrative options (e.g. on-bill tariff designs) can maximize benefits and minimize costs, if designed effectively.
- Public-private-philanthropic-partnerships and interagency coordination and leveraging can reduce energy costs for low-income households while also delivering non-energy benefits.

Both funding and execution will require finely meshed and interwoven delivery systems that engage stakeholders. A coordinated approach to home energy, health, safety, and housing could reduce low-income energy burden while delivering numerous other benefits. As the U.S. transitions to a new energy economy, these solutions offer low-income households the opportunity to meet their energy service requirements more efficiently. At the same time, the expansion of home working, schooling, exercising, and cooking during the COVID-19 pandemic—made easier by advances in on-line and real-time computing—may portend a future with more home-based activities and higher home energy bills. Thus, the home environment may increasingly determine society's health and prosperity, underscoring the need for effective programs to help low-income households cope and adapt.

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STATE OF MISSOURI

OFFICE OF THE PUBLIC SERVICE COMMISSION

I have compared the preceding copy with the original on file in this office and I do hereby certify the same to be a true copy therefrom and the whole thereof.

WITNESS my hand and seal of the Public Service Commission, at Jefferson City, Missouri, this 15th day of February, 2023.

Morris L. Woodruff
Secretary

MOPSC

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MISSOURI PUBLIC SERVICE COMMISSION

February 15, 2023

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Enclosed find a certified copy of an Order or Notice issued in the above-referenced matter(s).

Sincerely,

Morris L. Woodruff
Secretary

Recipients listed above with a valid e-mail address will receive electronic service. Recipients without a valid e-mail address will receive paper service.