

ENERGY EQUITY: A FRAMEWORK FOR EVALUATING SOLAR PROGRAMS TARGETING LOW-INCOME COMMUNITIES

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Abstract: This article will examine the concepts of energy burden and energy equity to outline a framework for evaluating the recent deployment of solar programs targeting low-income communities. Energy burden is defined as the percentage of income spent on energy costs. Low-income households spend a disproportionate share of their income on house energy costs. The recent shift in addressing energy equity and energy burden shows great promise for promoting energy affordability in urban areas, but engaging all households to participate in solar programs and incentives, especially low-income households, is a significant challenge. There is no straightforward definition for energy equity, but it has different components: procedural equity, distributive equity, and structural equity. Assessing these programs' effectiveness through an energy equity lens can help identify additional characteristics that might influence a program's success. This article adopts an "energy equity" framework to analyze the solar programs implemented in Washington, D.C., New Orleans, and Los Angeles that target low-income communities. Specifically, the article examines those three programs to discover if each: (1) incorporates community participation and outreach as a part of the program; (2) recognizes and engages all low-income households; (3) removes or avoids barriers to entry; (4) collects, tracks, and reports data on solar program participation and engagement; and (5) effectively reduces energy burden for low-income households.

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I. INTRODUCTION

Energy powers life's necessities, including storing and cooking food, heating and cooling homes, and in some cases, powering crucial medical devices.[1] Households that struggle to meet their energy needs are considered "energy insecure."[2] Such households tend to "engage in risky behaviors to meet their energy needs" and pay their utility bills.[3] Some use "high-interest payday loans."[4] Others rely on dangerous energy or heat sources or "forego[] . . . food and medical care."[5] "Energy-insecure households are more likely to remain in poverty" and will disproportionately experience "adverse mental and physical health" issues.[6]

Household energy costs do not track household income nor do they always correlate with a household's square footage.[7] However, some key energy cost-drivers can negatively correlate with income.[8] For example, lower income homes frequently do not have efficient weatherization of the building envelope that is characteristic of more expensive homes.[9] Also, lower income homes may have appliances that are less energy efficient – and may support the needs of more residents per square foot.[10] Those that study this issue define "energy burden" as "the share of a household's income that is spent on energy utilities."[11] Every household in the United States has an energy burden.[12] However, low-income households

1. Trevor Memmott et al., *Sociodemographic Disparities in Energy Insecurity Among Low-Income Households Before and During the COVID-19 Pandemic*, NATURE ENERGY, Feb. 2021, at 186.

2. *Id.*

3. *Id.*

4. *Id.*

5. Memmott et al., *supra* note 1, at 186.

6. *Id.*

7. *Id.*

8. *Id.*

9. Marilyn A. Brown et al., *High Energy Burden and Low-Income Energy Affordability: Conclusions from a Literature Review*, PROGRESS IN ENERGY, Oct. 2020, at 1, 16.

10. *Id.* at 5-6 (citing Ariel Drehobl & Lauren Ross, *Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low-Income and Underserved Communities*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. (Apr. 20, 2016), https://www.aceee.org/research-report/u1602).

11. *Id.* at 3-4.

12. *Id.* at 4.

spend a disproportionate share of their income on home energy costs.[13] "Annual electricity bills exceeding six percent of total household income are widely considered to be financially unsustainable."[14] This can require households to forego meeting some of their energy needs (such as adequate heating or cooling) or reduce their ability to afford other necessities.[15] Renewable energy, particularly wind and solar, is playing an increasing role in U.S. energy policy targeting low-income communities impacted by energy burden.[16]

An excessive energy burden is present in low-income households in both rural and urban regions of the United States.[17] However, the character of that burden differs significantly between rural and urban populations.[18] Rural households generally experience higher energy burdens than urban households.[19] In some states, like Georgia, rural energy burdens are higher "at every income level compared to their urban counterparts."[20] Although urban areas have higher utility rates than their rural counterparts, rural households have greater energy burdens because the housing tends to "lie[] in older, less-efficient housing, lack[ing] . . . access to energy efficiency, . . . in deeply rooted housing disparities."[21] Rural areas have more single-family rental housing, while urban areas have more multifamily housing, or apartment buildings.[22] Rural areas also face unique challenges related to "a lack of economic diversification, geographic isolation, and barriers to accessing public and private resources, creating particularly challenging relationships with the energy sector."[23] Despite the disproportionate energy burdens experienced by both urban and rural communities, this article seeks to examine what policies are effective in addressing energy burden. Such policies are more likely to be seen in urban

13. Brown et al., *supra* note 9, at 5.

14. Michelle Moore, *Bridging the Rural-Urban Energy-Efficiency Divide*, GREENBIZ (Mar. 28, 2022), https://www.greenbiz.com/article/bridging-rural-urban-energy-efficiency-divide.

15. Brown et al., *supra* note 9, at 7.

16. *Id.* at 25.

17. Moore, *supra* note 14.

18. *Id.*

19. *Id.*

20. *Id.* (citing Elvis Moleka, *A Call to Action: Analyzing Rural Energy Burdens in Georgia*, GROUNDSWELL, INC. (2022), https://groundswell-web-assets.s3.amazonaws.com/lift-solar/Energy+Impoverishment+and+Climate+Change+(1).pdf) ("With a statewide [low-to-moderate-income] energy burden of 19.4 percent . . . 14 of [Georgia's] 159 counties have average [low-to-moderate-income] energy burdens exceeding 30 percent.").

21. Moore, *supra* note 14 ("Disproportionate rural energy burdens aren't limited to low-income [rural] households. In fact, rural Georgians at every income level experienced higher energy burdens than their urban counterparts. Why? Rural residents don't have higher utility rates than people who live in cities. The explanation lies in older, less-efficient housing, lack of access to energy efficiency, and in deeply rooted housing disparities.").

22. *Id.*

23. Ann M. Eisenberg & Elizabeth Kronk Warner, *The Precipice of Justice: Equity, Energy, and the Environment in Indian Country and Rural Communities*, 42 ENERGY L.J. 282, 284 (2021) (citing Ann M. Eisenberg, *Distributive Justice and Rural America*, 61 B.C. L. REV. 189, 224 (2020)) (examining the frameworks of energy justice, environmental justice, climate justice, and just transitions as they pertained to Indian country and coal-reliant rural communities while acknowledging the overlaps and distinctions between the two communities).

settings and are only starting to be addressed in rural communities and cooperatives.[24] This article restricts its analysis to three major metropolitan areas that have implemented significant renewable energy policies targeting low-income communities: Washington D.C. (DC), New Orleans, and Los Angeles. This article will track the elements of energy equity outlined, *infra*.

These cities were selected for a variety of reasons. The low-income programs in these cities are comparable and target the urban population. Each city is located in a different geographic location of the United States: the East Coast, the West Coast, and the South. Geographic diversity of the programs can help provide a comprehensive examination of low-income households across the United States despite the small sample size. The selection of these cities also allowed a view of the efficacy of such programs when applied to customers of a variety of utility ownership structures.[25] It is important to note that the scope of this article is limited to these three cities based on the availability of data and geographic diversity. Similar and notable programs in other cities were not included to maintain the geographic diversity of this article's scope.

- Washington, D.C. receives distribution service from the Potomac Electric Power Company (commonly referred to as "Pepco"), an investor-owned subsidiary of Exelon.[26] Although Pepco serves areas outside of Washington, D.C.[27] Its activities within the DC footprint are regulated by the District of Columbia Public Service Commission and it must comply with laws established by Washington, D.C.'s local government.[28] Residents of Washington, D.C. may elect to receive their electricity supply from a competitive supplier.[29]

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24. *See* Moore, *supra* note 14 (pointing out the example of LIHEAP and other "national energy-efficiency programs [being] either insufficient or [not reaching] into rural communities").

25. *Investor-owned Utilities Served 72% of U.S. Electricity Customers in 2017*, U.S. ENERGY INFO. ADMIN. (Aug. 15, 2019), https://www.eia.gov/todayinenergy/detail.php?id=40913. The U.S. Energy Information Administration "classifies utilities into three ownership [structures]: investor-owned utilities, publicly run or managed utilities, and cooperatives." *Id.* "Investor-owned utilities . . . are large electric distributors . . . owned by shareholders," while publicly owned utilities are government entities or "utilities . . . vot[ed] into existence" outside of the local government. *Id.* "Cooperatives . . . are not-for-profit member-owned utilities." *Id.* "According to the U.S. Energy Information Administration . . . [a]lthough there are fewer investor-owned utilities than the other two types of utilities, they tend to be very large. Investor-owned utilities serve three out of every four utility customers nationwide." *Id.*

26. *Potomac Electric Power Company (Pepco)*, ENERGY STAR, https://www.energystar.gov/about/content/potomac_electric_power_company_pepco_1.

27. *Id.*

28. *Energy Supply Options*, PEPCO, https://www.pepco.com/MyAccount/MyService/Pages/DC/EnergySupplyOptions.aspx.

29. *See* D.C. Code § 34-1502(b)(1) ("Customer choice must be available for all consumers, regardless of customer class, no later than 2 years after the initial implementation date."). *See also* D.C. Code § 34-1501(14) (defining "[c]ustomer choice" as "the right of electricity suppliers and consumers to use and interconnect with the electric distribution system on a nondiscriminatory basis in order to distribute electricity from any electric supplier to any customer. Under this right, consumers shall the opportunity to purchase electricity supply from their choice of licensed electricity suppliers.").

- Entergy New Orleans, another subsidiary of an investor-owned utility (Entergy), supplies energy to New Orleans and is regulated by the New Orleans City Council, not the Louisiana Public Service Commission.[30] Entergy New Orleans is a vertically-integrated utility and provides residents with both electricity and distribution services.[31]
- The Los Angeles Department of Water and Power (LADWP) is "the largest municipal water and power utility in the [United States]," supplying a majority of electricity to the City of Los Angeles.[32] Like Entergy New Orleans, LADWP is also vertically integrated, and provides both electricity and distribution services to residential customers.[33]

Section II of this article will provide additional clarity on the concepts of energy burden and energy equity. Section III will briefly catalog and contextualize the Washington, D.C., New Orleans, and Los Angeles programs. Section IV will analyze these policies based on the framework established in Section II.

II. ENERGY BURDEN AND ENERGY EQUITY

Before analyzing the energy programs and policies, it is necessary to examine the terms "energy burden" and "energy equity" conceptually and outline a framework of energy equity that will be used to analyze the solar programs targeting urban low-income households.

30. *See* NEW ORLEANS, LA., CODE OF ORDINANCES, § 3-130(1)(2022) ("The Council of the City of New Orleans have all powers of supervision, regulation, and control consistent with the maximum permissible exercise of the City's home rule authority and the Constitution of the State of Louisiana and shall be subject to all constitutional restrictions over any . . . electric, gas, heat, power . . . and other public utility providing service within the City of New Orleans . . . .").

31. Michael Isaac Stein, '*No Place to Go But Up': Entergy Critics Urge a New Look at Abandoned Plan to Sell Transmission Grid, Break Up Vertical Monopoly*, THE LENS (Oct. 5, 2021), https://thelensnola.org/2021/10/05/no-place-to-go-but-up-entergy-critics-urge-a-new-look-at-abandoned-plan-to-sell-transmission-grid-break-up-vertical-monopoly.

32. *Who we Are*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-whoweare?_adf.ctrl-state=1c6q6pmp8h_96&_afrLoop=317741138301984&_afrWindowMode=0&_afrWindo...&_afrWindowId=null#%40%3F_afrWindowId%3Dnull%26_afrLoop%3D317741138301984%26_afrWindo...%3D%26_afrWindowMode%3D0%26_adf.ctrl-state%3Dwbl5mtbt3_4. Other cities within Los Angeles County, such as Claremont, Malibu, and Compton, are served by Southern California Edison, a subsidiary of investor-owned utility Edison International. S. CAL. EDISON, SOUTHERN CALIFORNIA EDISON'S SERVICE AREA, https://download.newsroom.edison.com/create_memory_file/?f_id=5cc32d492cfac24d21aecf4c&content_verified=True (last updated Apr. 25, 2019).

33. *Power Today*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-pastandpresent/a-p-pp-powertoday?_adf.ctrl-state=uas5puvtp_17&_afrLoop=204664016102798.

A. Energy Burden

The U.S. Department of Energy (DOE) defines energy burden as "the percentage of gross household income spent on energy costs."[34] However, there is no standardized measure or specific percentage that determines whether a household's energy burden is disproportionate or not.[35] DOE estimates "the national average energy burden for low-income households is 8.6%."[36] It also estimates the energy burden for non-low-income households to be just 3%.[37] As noted, *infra*, some researchers believe energy burden is unsustainable for a household when energy bills are more than 6% of the household's annual gross income.[38] That number is based on estimates that a household can only afford to spend up to 30% of the household income on shelter costs, of which 20% would be used for energy bills.[39] Other researchers argue that the energy burden affordability threshold is 11% of a household's gross annual income, based on the estimate that around 50%

34. *Low-Income Community Energy Solutions*, U.S. DEP'T OF ENERGY, https://www.energy.gov/eere/slsc/low-income-community-energy-solutions.

35. Drehobl & Ross, *supra* note 10, at 10.

36. U.S. DEP'T OF HOUSING AND URBAN DEV., METHODOLOGY FOR DETERMINING SECTION 8 INCOME LIMITS (2016), https://www.huduser.gov/portal/datasets/il//il18/IncomeLimitsMethodology-FY18.pdf.

37. *Low-Income Community Energy Solutions*, *supra* note 34 ("[T]he national average energy burden for low-income households is 8.6%, three times higher than for non-low income households which is estimated at 3%. . . . Of all U.S. households, 44%, or about 50 million, are defined as low-income [according to the U.S. department of Housing and Urban Development, Office of Policy Development and Research].").

38. *Home Energy Affordability Gap*, FISHER SHEEHAN & COLTON, http://www.homeenergyaffordabilitygap.com/index.html.

39. AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., UNDERSTANDING ENERGY AFFORDABILITY 1 n.2, https://www.aceee.org/sites/default/files/energy-affordability.pdf (citing FISHER SHEEHAN & COLTON, *supra* note 38).

of household income can be used for shelter costs, of which 22% are expected to be used for energy costs.[40]

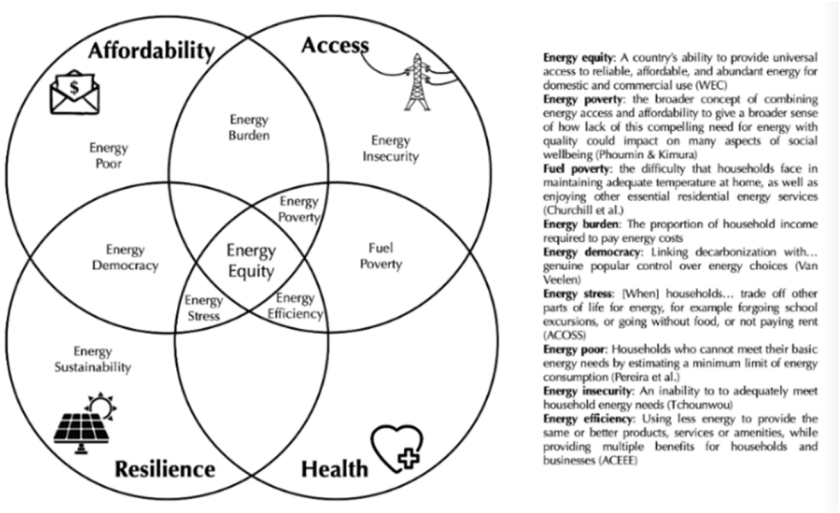

Figure 1. Dimensions of Energy Issues and Metrics.[41]

Although there is no consensus as to the precise percentage of energy burden that is unsustainable, a number of studies have shown that low-income households in the United States, including a disproportionate share of minority households, have higher energy burdens than the average household in their relative cities.[42] Unfortunately, a higher energy burden is correlated with secondary impacts, e.g.

40. APPLIED PUBLIC POL'Y RESEARCH INST. FOR STUDY AND EVALUATION & FISHER, SHEEHAN, AND COLTON, RATEPAYER-FUNDED LOW-INCOME ENERGY PROGRAMS: PERFORMANCE AND POSSIBILITIES iv (2007), http://www.appriseinc.org/reports/NLIEC%20Multi-Sponsor%20Study.pdf.

41. Lucy Hummer, Sustainable G.W. Fellow. There are a myriad of different dimensions relating to energy issues that overlap with one another. *Id.* For example, energy burden can be confused for "energy insecurity," which involves the instability in making utility bill payments that leaves a household vulnerable to losing energy services. *Id.* Other concepts, like "energy poverty" and "energy access," are separate constructs that operate in different contexts, which are not the primary focus of this article since the focus is on energy burden. *Id.* The charts above provide clarification to distinguish energy burden from the various dimensions of energy issues and metrics. *Id.*

42. Drehobl & Ross, *supra* note 10, at 3–4 ("[T]he overwhelming majority of single-family and multifamily low-income households (those with income at or below 80% of area median income), minority households, low-income households residing in multifamily buildings, and renting households experienced higher energy burdens than the average household in the same city. For example, the median U.S. energy burden across all cities [was] 3.5%. The median low-income household's energy burden was more than twice as high at 7.2%, and three times greater than higher income households (2.3%). Overall, low-income households experienced the highest energy burden (7.2%), followed by African-American households (5.4%), low-income households living in multifamily buildings (5.0%), Latino households (4.1%), and renting households (4.0%)."). *See* U.S. DEP'T OF ENERGY, LOW-INCOME HOUSEHOLD ENERGY BURDEN VARIES AMONG STATES – EFFICIENCY CAN HELP IN ALL OF THEM (2018), https://www.energy.gov/sites/prod/files/2019/01/f58/WIP-Energy-Burden_final.pdf [hereinafter LOW-INCOME HOUSEHOLD ENERGY BURDEN].

a greater risk for "respiratory diseases and increased stress," which is then amplified by economic hardship and cyclical poverty.[43]

However, relying on net income alone as a predictor of energy burden may not be reliable. Energy burden can vary by region, even for individuals in the same socio-economic group, because energy-related costs depend on a variety of factors including the weather patterns at different geographic locations, the type and efficiency of the available housing, energy costs, and behavioral factors.[44] For example, the American Council for an Energy-Efficient Economy reports that in Los Angeles, "the median energy burden is [about] 2.2%, [but] the median low-income energy burden is 6%."[45] On the other hand, in Washington D.C., the "median energy burden is 2%, [while] the median low-income energy burden is [around] 7.5%."[46]

As noted above, high energy burdens on low-income families have several causes related to "location and geography, housing characteristics, socio-economic situation, [and] energy prices and policies."[47] Policy makers in the utility space that want to address disproportionate local energy burden should consider how utility rates impact low-income households, the availability and effectiveness of subsidy programs targeting low-income households, and the behavioral components of energy consumption in the targeted low-income community, such as lack of knowledge and lifestyle.[48]

This article assesses these programs based on whether they reduced participants' energy burden as a percentage of the total cost of housing. In addition, this article evaluates the programs' mechanisms (if any) for addressing the secondary impacts that a reduction in energy costs can have.

B. Energy Equity

There is no straightforward definition for energy equity.[49] "Equity" has different components: procedural equity, distributive equity, and structural equity.[50] Procedural equity involves inclusively engaging stakeholders and representatives

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43. Drehobl & Ross, *supra* note 10, at 3.

44. *Low-Income Community Energy Solutions*, *supra* note 34. *See also* LOW-INCOME HOUSEHOLD ENERGY BURDEN, *supra* note 42.

45. AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., ENERGY BURDENS IN LOS ANGELES (2020), https://www.aceee.org/sites/default/files/pdfs/aceee-01_energy_burden_-_los_angeles.pdf. The American Council for an Energy-Efficient Economy finds "a high energy burden is considered to be above 6%" "of income spent on home energy bills," "while a severe energy burden [is] above 10%." *Id.* "[About] 17% of Los Angeles households . . . have a high energy burden" and about "9% of . . . households . . . have a severe energy burden." *Id.*

46. AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., ENERGY BURDENS IN WASHINGTON, DC (2020), https://www.aceee.org/sites/default/files/pdfs/aceee-01_energy_burden_-_washington_dc.pdf. About "14% of Washington, D.C. households . . . have a high energy burden" and about "7% of . . . households have a severe energy burden." *Id.*

47. Brown et al., *supra* note 9, at 5–6.

48. *Id*.

49. *Energy Equity*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., https://www.aceee.org/topic/energy-equity.

50. *Id.*

in decision-making and implementation of programs and policies.[51] Distributive equity involves a just distribution of benefits and services across all levels of a community based on need.[52] Structural equity, also frequently referred to as recognition equity, refers to recognizing and understanding the social inequities that plague marginalized communities as opposed to more privileged communities.[53] Framing energy equity using these components will provide a comprehensive understanding of the solutions needed to combat energy burden.

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51. *See* Angela Park, *Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs*, URB. SUSTAINABILITY DIRS. NETWORK i:4 (2014), https://www.usdn.org/uploads/cms/documents/usdn_equity_scan_sept_2014_final.pdf (defining procedural equity as "inclusive, accessible, authentic engagement and representation in the process to develop or implement programs or policies"); Dr. Darren McCauley et. al., *Advancing Energy Justice: The Triumvirate of Tenets*, 32 INTL. ENERGY L. REV. 107 (2013) (defining procedural justice as the ability of people to be involved in decision-making about energy system infrastructures and technologies and the fairness of those decision-making processes). *See also* Brown et al., *supra* note 9 (defining procedural equity as "the idea of fairness and transparency of the processes the allocate resources and resolve disputes. . . . Inclusive and authentic engagement in the process to develop, implement, and adjudicate programs or policies is key to procedural equity."). The absence of procedural equity is seen in a number of remediation programs aimed for overburdened communities, such as the U.S. Superfund program, due to "bias in prioritization and program delivery." Simone J. Domingue & Christopher T. Emrich, *Social Vulnerability and Procedural Equity: Exploring the Distribution of Disaster Aid Across Counties in the United States*, AM. REV. OF PUB. ADMIN., 2019, at 897 (citing Martin Burda & Matthew Harding, *Environmental Justice: Evidence from Superfund Cleanup Durations*, J. OF ECON. BEHAV. & ORG., 2014, at 380). Without Spanish language assistance, Latino communities face procedural barriers to government programs, as documented by environmental justice studies. *Id.* (citing David Schlosberg, DEFINING ENVIRONMENTAL JUSTICE: THEORIES, MOVEMENTS, AND NATURE (Oxford Academic ed., 2007)).

52. *See* Park, *supra* note 51, at i:1 (defining distributional equity as access to "programs and policies [that] result in fair distributions of benefits and burdens across all segments of a community, prioritizing those with highest need"); *see also* McCauley et al., *supra* note 51, at 2 (defining distributional justice as the issues relating to the distribution of the benefits and burdens of energy deployment, including economic issues and issues relating to "the siting of energy infrastructure"); Brown et al., *supra* note 9, at 2 (defining distributive equity as "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"). Shortcomings of distributive equity can be seen in transportation polices impacting low-income individuals, women, and ethnic minority access to public transport infrastructure and services. Rafael Henrique Moraes Pereira, Distributive Justice and Transportation Equity: Inequality in Accessibility in Rio de Janeiro (2018) (Ph.D. thesis, University of Oxford), http://redpgv.coppe.ufrj.br/index.php/pt-BR/producao-da-rede/dissertacoes-e-teses/2018/1148-rafael-pereira-distributive-justice-and-transportation-equity-inequality-in-accessibility-in-rio-de-janeiro/file (applying a framework of distributive justice to assess transport policies and plans in Rio de Janeiro).

53. *See* Park, *supra* note 51, at 3 (defining structural equity as "decisions [that] are made with a recognition of the historical, cultural, and institutional dynamics and structures that have routinely advantaged or privileged groups in society and resulted in chronic, cumulative disadvantage for subordinated groups"); *see also* McCauley et al., *supra* note 51 (defining recognition justice as the issues relating to the understanding of the basis or social inequalities and the reconciliation of inequalities suffered by marginalized and deprived communities in relation to energy systems). An example of structural inequity can be seen with racial disparities in neighborhoods. "A 2010 study found that non-White families with incomes above $75,000 are more likely to live in poor communities than White families with incomes below $40,000. Poor neighborhoods are less safe, and the schools are of a lower quality than those in affluent areas." Kimberly Amadeo, *What is Structural Inequality? How Structural Inequality Stifles the American Dream*, THE BALANCE (Mar. 26, 2022), https://www.thebalance.com/structural-inequality-facts-types-causes-solution-4174727 (citing John R. Logan, *Diversity and Inequality: Recent Shocks and Continuing Trends*, *in* DIVERSITY AND DISPARITIES: AMERICA ENTERS A NEW CENTURY (2014)).

Because society is undergoing an energy transition, the question of energy equity is now more applicable than ever. Renewable energy technologies are becoming more affordable to implement.[54] Utilities have introduced net metering for "rooftop solar panels and home battery storage programs" that promote customer renewable generation into the power mix.[55] Utilities credit ratepayers with rooftop solar for the electricity they provide to the grid and ratepayers are billed for their "net" energy consumption.[56] Federal programs are also providing tax incentives for energy efficiency programs.[57] State and local governments have implemented renewable portfolio standards and carbon reduction targets to incentivize utilities to improve efficiency, purchase and develop renewable energy, and invest in energy storage.[58] State programs also allow consumers and ratepayers to purchase "clean" or "green" energy.[59]

54. James Ellsmoor, *Renewable Energy is Now The Cheapest Option – Even Without Subsidies*, FORBES (June 15, 2019, 2:39 P.M.), https://www.forbes.com/sites/jamesellsmoor/2019/06/15/renewable-energy-is-now-the-cheapest-option-even-without-subsidies.

55. Brown et al., *supra* note 9 at 7.

56. *Net Metering*, SOLAR ENERGY INDUS. ASS'N, https://www.seia.org/initiatives/net-metering. *See Guide to Net Metering and Net Billing*, OESOLAR (Aug. 1, 2016), https://osceolaenergy.com/guide-net-metering-net-billing (explaining that net metering, which credits excess electricity generated to the ratepayer's account, should be distinguished from net billing which "allows solar customers to generate electricity for personal use, and sell any excess energy to the utility company at wholesale or 'avoided cost' prices, while purchasing power at the retail rate").

57. Brown et al., *supra* note 9, at 7.

58. *State Renewable Portfolio Standards and Goals*, NAT'L CONF. OF STATE LEGISLATURES (Aug. 13, 2021), https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx.

59. *See* Christopher McMichael, ENERGY JUSTICE AND THE ENERGY TRANSITION, NAT'L CONF. OF STATE LEGISLATURES 1 (2022), https://www.ncsl.org/Portals/1/Documents/energy/EnergyJusticeReport_2021_37639.pdf (discussing various state initiatives to promote energy justice and the energy transition). "States including Illinois, Oregon, North Carolina, Washington, New York and Virginia have enacted broad clean energy or emissions reduction legislation in the past few years." *Id.* at 4. *See What is Green Energy?*, NATIONALGRID, https://www.nationalgrid.com/stories/energy-explained/what-is-green-energy (stating that "green energy" is energy that comes from nature, for example solar energy).

Utilities are the single largest distributor of low-income energy programs and about 80% of the funding utilities receive to address energy burden challenges for low-income households is used on bill payment assistance, as depicted in the chart below.[60]

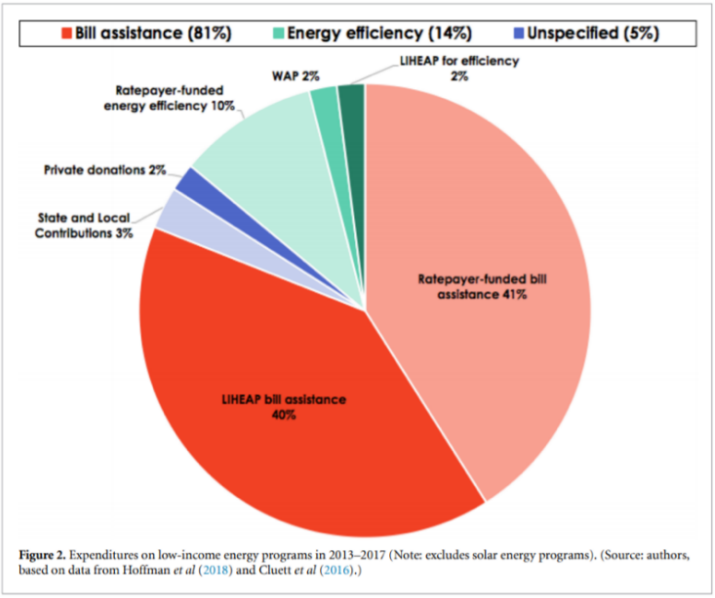

Figure 2. Expenditures on Low-Income Energy Programs in 2013-2017.[61]

Policy makers have been experimenting with solar programs targeting low-income households.[62] These experiments show great promise for promoting energy affordability in urban areas.[63] However, efforts to recruit low-income households in solar programs and incentives is a significant challenge.[64] Assessing such programs' effectiveness through an energy equity lens might help identify additional characteristics that might further a program's success.

C. Assessment Framework for Reducing Energy Burden and Increasing Energy Equity

Based on the components of energy equity (procedural, distributive, and structural), an energy equity framework that is useful for assessing programs aimed at reducing energy burden specifically requires looking at the following:

60. Brown et al., *supra* note 9, at 10.
61. *Id.*
62. *Id.* at 24.
63. *Id.* at 24-26.
64. Brown et al., *supra* note 9, at 25-26.

- Incorporating community participation and awareness surrounding the causes of energy burden and how the solar program reduces that burden [Procedural Equity][65];
- Recognizing and engaging *all* low-income households such as those residing in single-family homes, apartment buildings,[66] government-subsidized housing, and manufactured/mobile homes [Structural Equity][67];
- Removing or avoiding barriers to entry by, e.g., subsidizing up-front costs for equal access and participation [Distributive Equity][68];
- Including mechanisms for collecting, tracking, and reporting data for solar program participation and outreach, especially for low-income households with high energy burdens[69]; and
- Effectively reducing energy burden for low-income households.[70]

If a project is going to reduce energy burden across all low-income households, it should reckon with all of these factors. The next section will catalog the community solar and other solar programs and policies enacted and implemented by the local governments of Washington, D.C., New Orleans, and Los Angeles. The following section will then analyze and assess these programs through an energy equity lens by applying the factors listed above.

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65. *Id.* at 2, 29. "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." *Id.* at 10-11.

66. McCauley et al., supra note 51. "More than two-thirds of the multifamily rental market consists of households that have an annual household income of less than $50,000 (NMHC 2015)." Drehobl & Ross, *supra* note 10, at 6. *See* Brown et al., *supra* note 9, at 1, 20 (explaining that "[m]ultifamily buildings are home to nearly 25% of the U.S. Population and more than half of low-income households . . . . For a variety of reasons including high land values, cities and urban areas have a disproportionate number of multifamily buildings.").

67. Brown et al., *supra* note 9, at 21 ("Although 70% of manufactured/mobile homes are situated in rural areas, they are still important for urban utilities to consider since they have higher than average energy burdens despite relatively less energy consumption.").

68. *Id.* at 10-11 ("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.").

69. Drehbol & Ross, *supra* note 10, at 7 ("Demographic information can inform program design and marketing and outreach strategies. Examples of demographic data that should be incorporated into program evaluation include income level, renter versus owner, multifamily versus single family, and race and ethnicity."). *See* Brown et al., *supra* note 9, at 23 ("[Most behavior economics] 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. . . . [T]he 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.").

70. Brown et al., *supra* note 9, at 28-29.

III. SURVEY OF URBAN LOW-INCOME SOLAR PROGRAMS ACROSS THE U.S.

Washington D.C., New Orleans, and Los Angeles have enacted renewable energy policies targeting low-income households.[71]

Washington D.C.'s Solar for All Program aims to reduce the electricity bills of 100,000 low-income households through solar power generation and panel installations.[72] New Orleans recently approved regulations creating a community solar program while also enacting a Solar For All program that connects low-income households to local solar developers.[73] Los Angeles has implemented several energy programs targeting low-income households, most notably the Solar Rooftop program and the Shared Solar program.[74]

Evaluating these programs through an energy equity lens requires an in-depth catalog of each city's programs and energy policies. The following will detail the program components, focusing on how low-income households are targeted, how these programs aim to reduce energy burden, and the application process for low-income household participation.

A. Washington D.C.

In 2018, Washington D.C. pledged to operate on 100% renewable energy by 2032, an ambitious mandate rivaling other major state targets.[75] However, reducing energy burden and promoting energy equity was on the agenda even prior to its pledge.[76] On July 25, 2016, DC's mayor, Muriel Bowser signed into law, the "Renewable Portfolio Standard Expansion Amendment Act of 2016."[77] The Act established the "Solar for All" program, which was designed to reduce the cost of electricity bills for low-income DC residents via taxpayer subsidies.[78] The DC Department of Energy & Environment is required to fund the program.[79] The cited

71. *Id.* at 25. *See* Allison Cormier & Benaiah Harvey, *Solar for All NOLA*, CITY OF NEW ORLEANS (July 9, 2020), https://www.nola.gov/neighborhood-engagement/news/?tagname=gnoha&groupid=21.

72. Brown et al., *supra* note 9, at 25.

73. Cormier & Harvey, *supra* note 71.

74. Brown et al., *supra* note 9, at 25.

75. Warren Leon, *Table of 100% Clean Energy States*, CLEAN ENERGY STATES ALL., https://www.cesa.org/projects/100-clean-energy-collaborative/guide/table-of-100-clean-energy-states/. New York pledged to be on "100% carbon-free electricity by 2040" and Washington state pledged to operate on 100% clean energy by 2045. *Id.* California has pledged to operate on "100% carbon-free electricity by 2045," while Hawaii has pledged to have "100% renewable energy by 2045 through" implementation of its renewable portfolio standards. *Id.*

76. Wayne Barber, *Transmission Constraints, Renewables Affect Clean Power Plan, PJM says*, TRANSMISSIONHUB (Sept. 1, 2016), https://www.transmissionhub.com/articles/2016/09/transmission-constraints-renewables-affect-clean-power-plan-pjm-says.html.

77. *Id.*

78. *Solar Initiatives*, DEP'T OF ENERGY AND ENV'T, https://doee.dc.gov/service/solar-initiatives.

79. *Clean Energy DC*, DEP'T OF ENERGY AND ENV'T, https://doee.dc.gov/cleanenergydc.

motivation underlying the legislation and establishment of the Solar for All program was equity.[80] Ward 3 Councilmember Mary M. Cheh defines equity as equal access to solar for all folks in the district no matter what their income is.[81]

DC's Solar for All program aims to reach 100,000 residents of low-income households, including renters and residents in apartment buildings, and reduce their electricity bills by 50% by December 31, 2032.[82] The DC local government implements the Solar for All program primarily through its Department on Energy & Environment (DOEE), which in turn utilizes the expertise of the District of Columbia Sustainable Energy Utility (DCSEU).[83] DCSEU, on behalf of the DOEE, works directly with the designated solar vendor partners to design and install the solar panels for eligible households.[84] The DOEE expects the Solar for All program to install approximately 240 to 300 megawatts of solar power in DC.[85]

In the early stages of the program in mid-2017, the Department of Energy & Environment "awarded $13.2 million in 'Solar for All DC Innovation & Expansion Grants' to 10 applicants'[86] that responded to the request for applications."[87] The Council of the District of Columbia and the Department of Energy & Environment looked to solar developers and innovators through these grants to come up with a program that provides the benefits of solar power to low-income households while reducing their energy burden.[88]

Out of the $13.2 million in grants, about $8 million was designated to install "4 to 8 megawatts of new solar capacity on multifamily homes, commercial buildings, and non-residential surface spaces."[89] The other $5 million was designated "to install 2.5 to 5 megawatts of solar capacity on low-income single-family

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80. Dep't of Energy and Env't, *DC Solar Stories EP1 Solar for All*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=yjKYgpQk7y4.

81. *Id.*

82. *DOEE Announces Intent to Award 10 "Solar for All" Grants Totaling $13.2 Million to Deploy 7MW of Solar*, DEP'T OF ENERGY AND ENV'T (July 21, 2017), https://doee.dc.gov/release/doee-announces-intent-award-10-solar-all-grants-totaling-132-million-deploy-7mw-solar.

83. *DC Sustainable Energy Utility (DCSEU)*, DEP'T OF ENERGY AND ENV'T, https://doee.dc.gov/service/dc-sustainable-energy-utility-dcseu. The Clean and Affordable Energy Act of 2008 required the DOEE "to contract with a private entity to conduct sustainable energy programs," which led to the creation of the District of Columbia Sustainable Energy Utility (DCSEU). *Id.*

84. *Solar for All*, DC SUSTAINABLE ENERGY UTIL., www.dcseu.com/solar-for-all.

85. GOV'T OF THE DISTRICT OF COLUMBIA DEP'T OF ENERGY AND ENV'T, SOLAR FOR ALL IMPLEMENTATION PLAN 14 (2017), https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/DOEE-%20Report-%20Solar%20for%20All%20Implementation-%20Final%20for%20Transmittal.pdf.

86. *DOEE Announces Intent to Award 10 "Solar for All" Grants Totaling $13.2 Million to Deploy 7MW of Solar*, *supra* note 82. Awards were to be granted to: Solar United Neighbors, formerly known as "Community Power Network; [as well as] Groundswell, Inc.; GRID Alternatives Mid-Atlantic; New Partners Community Solar Corp.; Urban Energy Advisors; PEER Consultants, P.C.; Neighborhood Solar Equity, LLC; Open Market ESCO LLC; Ethos Strategic Consulting, LLC; and Community Preservation and Development Corporation." *Id.*

87. *Id.*

88. *DC Solar Stories EP1 Solar for All*, *supra* note 80.

89. *DOEE Announces $13 Million in Funding for Solar for All DC Innovation and Expansion*, DEP'T OF ENERGY AND ENV'T (Feb. 16, 2017), https://doee.dc.gov/release/doee-announces-13-million-funding-solar-all-dc-innovation-and-expansion.

homes, small businesses, and owner-occupied nonprofits."[90] For example, one of the awarded applicants, Solar United Neighbors, used their grant money to provide free solar through solar co-ops "to more than 200 low- and moderate-income DC residents living in single-family homes."[91]

The partners for the DC Solar for All project are the following listed vendors:

- Community Preservation and Development Corporation,
- Groundswell Community Power,
- GRID Alternatives Mid-Atlantic,
- Neighborhood Solar Equity,
- New Partners Community Solar Corp.,
- OpenMarket ESCO,
- PEER Consultants, P.C.,
- Urban Ingenuity,
- Enflection Energy Consulting,
- SaveSolar, and
- New Columbia Solar.[92]

These vendors are building trust with low-income household communities by educating them about the DC Solar for All program and how it is an option to reduce their energy costs while also building relationships and forming trust with these residents.[93]

DC's Solar for All program defines eligible households with incomes "below 80% of the area median income (AMI) threshold."[94] The chart below shows the 2020 income threshold eligibilities for households of various sizes:

Persons in household	1	2	3	4	5	6	7	8	9	10
Income threshold	$70,600	$80,650	$90,750	$100,800	$110,900	$121,000	$131,050	$141,150	$151,200	$161,300

Household income amounts listed in the eligibility table are effective as of 04/01/20, but may change.

Please visit the US Dept of Housing and Urban Development website for the most up-to-date numbers.

Figure 3. 2022 Area Median Income (AMI) Thresholds.[95]

90. *Id*.

91. *Solar for All in D.C.*, SOLAR UNITED NEIGHBORS, www.solarunitedneighbors.org/campaigns/solar-for-all-in-d-c/.

92. *Solar for All*, DEP'T OF ENERGY AND ENV'T, https://doee.dc.gov/solarforall. Most, but not all of the vendor partners for DC Solar for All, received grants from the Solar for All program. *DOEE Announces Intent to Award 10 "Solar for All" Grants Totaling $13.2 Million to Deploy 7MW of Solar*, *supra* note 82.

93. Dep't of Energy and Env't, *DC Solar Stories EP2 Solar for All*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=q0zmzfupoPk.

94. *Solar for All*, *supra* note 92.

95. *Id.*

The Potomac Electric Power Company (Pepco), an investor-owned utility operating in the District of Columbia and a subsidiary of major energy provider Exelon, is not listed as a partner to DC's Solar for All.[96] Pepco does not participate with the program's implementation or development.[97] Rather, Pepco's role in the project is limited to facilitating the electrical connections to its system, where applicable, and administering the solar credit to the program's participants.[98] Credits generated by solar installations, both those that serve a single customer-location and community solar projects, are applied to the customer bills by PEPCO where applicable.[99] Community solar projects differ from traditional rooftop solar, where each beneficiary hosts a solar system on their rooftop.[100] In community solar projects, the solar panels are "installed in a common location and operate as a single project" to benefit multiple households.[101]

DC has a "definitional distinction" between individual net metering programs and "community net metering."[102] Individual net metering involves a single customer at a single location, where both the solar generation and consumption occur.[103] There, the customer receives credit for the solar it generates in excess of its usage.[104] The community net metering model, as illustrated in the diagram[105] below, is more complex. It allows for multiple beneficiaries of a single solar project.[106] The community net metering model has 4 primary actors: (1) subscribers

96. *Id.*

97. *Id.*

98. *Solar for All, supra* note 92.

99. *Community Solar FAQs,* PEPCO, HTTPS://WWW.PEPCO.COM/SMARTENERGY/MYGREENPOWERCONNECTION/PAGES/DC/COMMUNITYSOLARFAQS.ASPX. Customers who receive their power from an alternative power supplier under the District of Columbia's retail choice program may also receive payments from their alternative power supplier for offsets to their power supply costs. *See Frequently Asked Questions*, DC POWER CONNECT, https://dcpowerconnect.com/faqs/.

100. *Community Solar Basics*, DEP'T OF ENERGY, https://www.energy.gov/eere/solar/community-solar-basics.

101. Donna Attanasio et al., *Catalyzing Community Solar: A Handbook for* Municipalities 2, GEO. WASH. (2017) ("A community solar project functions very much like a rooftop solar project, except that rather than each beneficiary hosting a solar system on [their] own roof, the panels are installed in a common location and operate as a single project. While project locations vary considerably, ranging from a shared rooftop of a multi-family building unit, to a structure over a parking area, to a ground-mounted installation on otherwise vacant land in the utility's service territory, in most cases the power generated is not behind the meter of the benefitting ratepayer.").

102. *Net Metering*, SOLAR UNITED NEIGHBORS, https://www.solarunitedneighbors.org/learn-the-issues/net-metering/#othertypes.

103. *What is Net Metering and How Does it Work?*, ENERGYSAGE, https://www.energysage.com/solar/solar-101/net-metering/ (last updated Aug. 29, 2022).

104. *Net Metering, supra* note 102.

105. *Community Energy*, PEPCO, https://www.pepco.com/MyAccount/MyService/Pages/DC/CommunityEnergy.aspx.

106. *Id.*

or Pepco customers; (2) subscriber organizations; (3) "community renewable energy facility[ies]"; and (4) Pepco.[107] Customers can participate in subscriber organizations for shares of electricity generated at community renewable energy facilities.[108] This allows those customers to earn credit on their electricity bill from Pepco.[109] The Community Renewable Energy Facility can be located anywhere in Pepco's DC service territory, as can the subscribers.[110] Below, as earlier referenced, is a diagram depicting Pepco's community net metering structure:

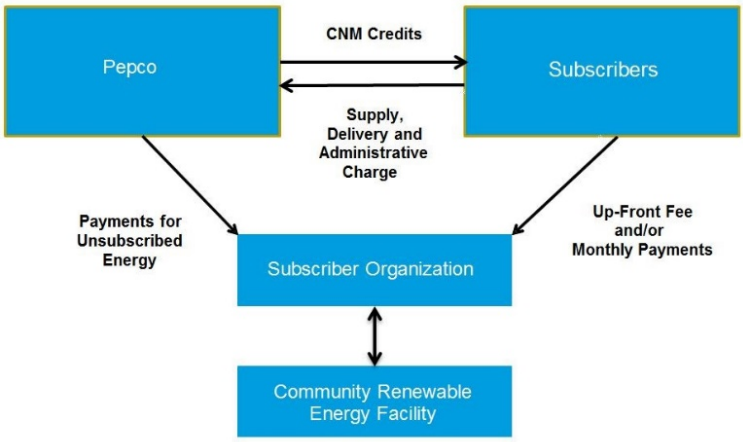

Figure 4. "Community Net Metering in a Nutshell."[111]

The DCSEU works with solar developers to install these community renewable energy facilities throughout the city as a part of the Solar for All program, and subscribers participate based on the community net metering model as a part of the Solar for All program.[112] These facilities then produce the credits which Pepco applies to the eligible low-income residents' bills.[113] Those credits have on average allowed customers to reduce their electricity bills by up to 50%.[114] In

107. PEPCO, NET ENERGY METERING AND INTERCONNECTIONS, COMMUNITY SOLAR IN THE DISTRICT OF COLUMBIA 6-7 (2016), https://www.pepco.com/SiteCollectionDocuments/Pepco%20DC%20Cref%20Training.pdf.

108. *Id.* at 6.

109. *Id.* at 7.

110. *Id.* at 6.

111. *Community Energy, supra* note 105.

112. *DC Sustainable Energy Utility (DCSEU)*, *supra* note 83. *See What is the DC "Solar for All" Program?,* HONEYDEW ENERGY ADVISORS (Apr. 5, 2019), https://honeydewadvisors.com/what-is-the-dc-solar-for-all-program/; *DC Sustainable Energy Utility (DCSEU) Request for Proposals for Solar For All Program*, HOUS. ASS'N OF NONPROFIT DEVS. (Dec. 9, 2019), https://www.handhousing.org/dc-sustainable-energy-utility-dcseu-request-for-proposals-for-solar-for-all-program/.

113. *Community Energy, supra* note 105.

114. DC SUSTAINABLE ENERGY UTIL., *supra* note 84.

2019, approximately 2,000 eligible households received credit on their Pepco electricity bill as a result of the Solar for All program.[115]

Given the rapid expansion of the solar industry in DC, the Solar for All program also required a larger workforce.[116] Commendably, some solar developers also trains individuals of the targeted communities as a pathway to join the solar workforce.[117] This training program, known as Solar Works DC, is part of DC's Solar for All initiative and is implemented by DC Solar for All's partner/vendor, GRID Alternatives Mid-Atlantic.[118]

The DOEE was tasked with reducing the energy burden of 100,000 households in the city.[119] But during both its inception and innovation phase, DC Solar for All faced challenges in reducing the energy burden for all of DC's low-income households, because many residents lived in apartment buildings or in subsidized housing. [120] Single-family residences can access the program by having solar panels directly installed on their homes.[121] A problem unique to some renters is the presence of a single meter monitoring energy consumption for the residence.[122] In such cases, the landlord might not choose to pass the solar credits onto the tenants.[123] Another concern for eligible low-income participants that reside in subsidized housing is the impact the reduction of their energy costs has on their rent costs.[124] According to the Department of Housing and Urban Development, if their energy costs are lower, the rent subsidy low-income households receive is reduced because the assistance they receive is determined based on the ratio of the total cost of rent and utilities to their income.[125]

Given the city's low-income population, DC's Solar for All program could not achieve its mandate of benefitting 100,000 households unless these difficult-to-reach households were included.[126] Therefore, DOEE and the Solar for All partners and vendors needed to develop creative solutions to distribute the savings from solar panel installation in other ways, such as community benefits in the form of "enhanced daycare services," "rebate checks," "financial literacy trainings," or

115. Dep't of Energy and Env't, *DC Solar Stories EP8 Solar Future*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=eWroxIqdZ6s&t=303s.

116. Dep't of Energy and Env't, *DC Solar Stories EP4 Building Workforce*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=etujDhQjqa4&t=15s.

117. *Id.*

118. *Solar Works DC*, GRID ALTERNATIVES, https://gridalternatives.org/regions/midatlantic/solar-works-dc.

119. *DC Solar Stories EP1 Solar for All*, *supra* note 80.

120. Dep't of Energy and Env't, *DC Solar Stories EP6 Sharing the Wealth*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=uQUzetnRwvo.

121. *Id.*

122. *Id.*

123. *Id.*

124. *DC Solar Stories EP6 Sharing the Wealth*, *supra* note 120.

125. *Id. See Housing Choice Vouchers Fact Sheet*, DEP'T OF HOUSING & URB. DEV., https://www.hud.gov/program_offices/public_indian_housing/programs/hcv/about/fact_sheet (explaining the amount of subsidy available under the Section 8 housing program).

126. Dep't of Energy and Env't, *DC Solar Stories EP7 Innovation and Collaboration*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=JljA9cr-I4E&t=217s.

enhanced security.[127] For residents that pay their own electric bill but lack a rooftop or other suitable location, community renewable energy facilities installed on apartment buildings directly channeled the benefits of energy savings to eligible tenants.[128] However, the solar panels installed as a part of this community solar program did not necessarily have to be installed on the residences of the eligible/participating low-income households – a number of the panels were also installed in Northeast and Northwest DC, including on office buildings, to generate energy for households in Southeast and Southwest DC.[129]

Another issue DOEE and Solar for All's partners/vendors faced was physical space and locations for the solar panel installations.[130] DC's Solar for All program expected to install up to "240-300 megawatts of solar power" but is limited in real estate and space.[131] However, the locational flexibility of siting community solar projects helps address this problem. Given the number of commercial buildings in the city, rooftop installations are less challenging.[132] Large scale ground solar installations often are opposed by residential communities with available space, but the availability of commercial rooftops aid in siting solar installations.[133]

One significant issue DOEE faced in developing the Solar for All program was the "split-incentive problem" which arises when financing for the solar project comes from different sources and some of those sources are cash-flow contingent.[134] In these cases, the solar developer does not benefit from lower costs of the project, the lenders do.[135] This problem provides less incentives for solar developers to participate in the Solar for All program. Accordingly, DOEE created the Solar for All grant to assure solar developers get a cash payment at closing to increase their overall returns.[136]

B. New Orleans

Louisiana, ranking 35th in the country for "state solar installations" has seen very little renewable energy deployment.[137] Only 0.12 percent of Louisiana's electricity is generated by solar, and the state does not employ a "Renewable Portfolio

127. *Id.*

128. *Id.*

129. Dep't of Energy and Env't, *DC Solar Stories EP3 Power to the People*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=809ouuMbl9Y&t=130s.

130. SOLAR FOR ALL IMPLEMENTATION PLAN, *supra* note 85.

131. *Id*. at 11-12.

132. *DC Solar Stories EP8 Solar Future*, *supra* note 115.

133. *Id.*

134. Dep't of Energy and Env't, *DC Solar Stories EP5 Solving the Split Incentive Problem*, YOUTUBE (Nov. 12, 2019), https://www.youtube.com/watch?v=v03ugmAChno&t=183s.

135. *Id.*

136. *Id*.

137. Seth Mullendore et al., *Resilient Southeast – Exploring Opportunities for Solar + Storage in New Orleans, LA*, CLEAN ENERGY GROUP 10 (Apr. 2019), https://www.cleanegroup.org/wp-content/uploads/Resilient-Southeast-New-Orleans.pdf.

Standard" or "any voluntary renewable energy or energy storage targets or mandates."[138] Louisiana is among the most prolific state producers and consumers of natural gas.[139] Louisiana's carbon-free power comes from two nuclear plants operated by Entergy, constituting about "16% of the state's electricity."[140]

Despite Louisiana's minimal renewable energy policies, the City of New Orleans has followed a different trajectory. On April 15, 2020, the New Orleans City Council, the local government for the city, voted to adopt a Renewable and Clean Portfolio Standard, "mandating net-zero carbon emissions by 2040, and a zero-carbon energy portfolio by 2050."[141]

New Orleans' energy landscape is unique in that Entergy New Orleans, the utility for the City of New Orleans and a subsidiary of the investor-owned Entergy, is regulated by the New Orleans City Council.[142] The Louisiana Public Service Commission oversees the rest of Louisiana.[143] The New Orleans City Council 2020 decision requires Entergy New Orleans to show progress towards the 100% carbon-free 2050 target every year or face potential fines.[144] Entergy New Orleans has outlined a plan to provide 70% of its generation from "clean energy" sources by 2030.[145]

New Orleans also has a net metering policy for both residential and commercial customers.[146] Entergy New Orleans must provide retail rate crediting to customers' bills to account for exported solar energy to the local grid and customers receive the credit on their account for the following month.[147] If the customer chooses to terminate the service, Entergy New Orleans reimburses the customer for any excess credits accrued.[148] However, "individual net-metered systems are limited to 300 kilowatts for commercial and agricultural customers and 25 kilowatts for residential customers."[149]

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138. *Id*.

139. *The Louisiana Oil and Gas Industry Growth: Natural Gas*, STI GRP. (June 27, 2013), https://setxind.com/downstream/louisiana-oil-gas-growth-natural-gas/.

140. Michael Burns & Mark Sullivan, *Entergy Nuclear Plants Contribute to Louisiana's Bright Future,* ENTERGY CORP. (Jan. 7, 2019), https://www.entergynewsroom.com/news/entergy-nuclear-plants-contribute-louisiana-s-bright-future/#:~:text=Entergy%20owns%20and%20operates%20power,9%2C000%20megawatts%20of%20nuclear%20power.

141. Catherine Weidert, *New Orleans Approves Net-Zero Carbon Standard by 2040*, AUDUBON LOUISIANA (Apr. 15, 2020), https://la.audubon.org/press-release/new-orleans-approves-net-zero-carbon-standard-2040.

142. Mullendore et al., *supra* note 137, at 11.

143. *Utilities Division*, LA. PUB. SER. COMM'N, https://www.lpsc.louisiana.gov/Utilities.

144. Jessica Williams, *Green by 2050: New Orleans City Council Orders Entergy to Cut Emissions*, NOLA.COM (May 20, 2021), https://www.nola.com/news/business/article_5297cdc4-b982-11eb-903e-b3ae5b66d433.html.

145. *Vision 2030*, ENTERGY, https://www.entergy-neworleans.com/cleanenergy/.

146. *Net Metering and Distributed Generation (New Orleans)*, ENTERGY, https://www.entergy-neworleans.com/net_metering/.

147. *Id*.

148. *Id.*

149. Mullendore et al., *supra* note 137, at 11.

1. New Orleans City Council Community Solar

Although none of their plans are to the scale of DC's Solar for All, it is possible that the New Orleans City Council developed a similar community solar program.[150] In 2018, the New Orleans City Council voted to create a community solar program that would provide access to "solar for all residents, including renters and low-income residents."[151]

During the public comment phase of the rulemaking process for the new community solar regulations, "the Alliance for Affordable Energy, 350 New Orleans, the Sierra Club, solar developers, and other community advocates" pushed the New Orleans City Council "to do more for low-income" households with the community solar program.[152] These community advocates also pushed for greater community engagement in the rulemaking process, as well as "a different measure to calculate bill credits" to ensure community solar participants receive the same benefits as residential solar owners.[153] The community advocates envisioned reduced energy burden and lower utility bills through their recommendations for the community solar program.[154]

On March 28, 2019, the New Orleans City Council adopted final rules for the community solar program.[155] The rules opened the community solar program to renters, low-income homeowners, and homeowners with rooftops that are unsuitable for solar installation.[156] On January 28, 2021, the New Orleans City Council,[157] approved Entergy New Orleans' implementation plan. The plan provided a subscription program where customers receive bill credits if they subscribe to a large community solar development.[158] Implementation began in summer of 2021.[159]

150. Michael Bates, *New Orleans Implementing Solar for All Program*, SOLAR INDUS. (Jan. 27, 2020), https://solarindustrymag.com/new-orleans-program-offers-accessible-clean-energy. *See* Brown, *supra* note 9.

151. Mullendore et al., *supra* note 137, at 11.

152. Nikki Luke & Nik Heynen, *Community Solar as Energy Reparations: Abolishing Petro-Racial Capitalism in New Orleans*, AM. Q., Sept. 2020, at 603, 616.

153. *Id*.

154. *Id*.

155. Resolution and Order Establishing Rules for Community Solar Projects, R-19-111 (Mar. 19, 2019), https://www.all4energy.org/uploads/1/0/5/6/105637723/2019_03_28_ud-18-03_cno_r-19-111_res_and_order_establishing_rules_for_comm_solar_projetcs.pdf.

156. *Id*.

157. Resolution and Order Approving Rules for Community Solar Projects, R-21-38 (Jan. 28, 2021), https://www.all4energy.org/uploads/1/0/5/6/105637723/2021_01_28_ud-18-03_curo_r-21-38_approved_rules_for_comm_solar_projects.pdf.

158. *Id.*

159. *Id.*

Entergy New Orleans and other local solar providers are permitted to do installs.[160] Customers can "either purchase or lease the panels based on the developers' price.[161] Each community solar project must have "a minimum of three participants."[162] Applications are submitted to Entergy New Orleans and upon approval are designated as qualifying for one of two categories: (1) open; and (2) low-income.[163] The Community Solar Program Rules define a "Low-Income Customer" as:

> a Customer whose gross annual household income is at or below 50 percent of Area Median Income for the year of subscription [OR] who is certified as eligible for any federal, state, or local assistance program that limits participation to households whose income is at or below 50 percent of Area Median Income.[164]

On December 8, 2021, the Alliance or Affordable Energy filed a motion with the City Council of New Orleans to redefine the definition of "Low-Income Customers" to include:

> [a] Customer whose gross annual household income is at or below 60 percent of Area Median Income for the year of subscription or who is certified as eligible for any federal, state, or local assistance program that limits participation to households whose income is at or below 60 percent of Area Median Income.[165]

The open category of solar facilities can be "of any size of up to 2 megawatts."[166] The low-income category of solar facilities can also be "any size of up to 2 megawatts," but at least 30% of the facility's output must be provided to low-income customers.[167] Entergy New Orleans must designate no more than half of

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160. *See* R-19-111, *supra* note 155, at Appendix A, 4 ("A Subscriber Organization that has registered with the Council through CURO, that wishes to construct and operate a CSG Facility as part of the Community Solar Program shall submit an application to the Utility in accordance with the CSG Facility project application procedure established by the Utility as part of these Rules."). "Subscriber Organization" is defined as "a person or legal entity that owns and operates a CSG Facility, or operates a CSG Facility that is built and owned by a third party under contract with such Subscriber Organization . . . ." *Id.* at Appendix A, 3.

161. Jessica Williams, *City Council Approves First Steps Toward 'Community Solar' Power Program* 4, NOLA.COM (Jun. 21, 2018, 5:15 PM), https://www.nola.com/news/article_04df5db1-f15f-5c41-a073-f0c65af300f8.html.

162. *Id.*

163. Resolution and Order Establishing Rules for Community Solar Projects, R-18-538, Appendix A, 6 (Dec. 20, 2018), https://www.all4energy.org/uploads/1/0/5/6/105637723/2018_12_20_ud-18-03_cno_r-18-538_resolution_establishing_rules_for_community_solar_projects.pdf. *See* R-19-111, *supra* note 155, at 6.

164. R-19-111, *supra* note 155, at 5-7. Initially the Proposed Rules put out by the Council suggested defining "Low Income Customer" as "a Customer whose gross annual household income is at or below 175% of the federal poverty level for the year of subscription or who is certified as eligible or any federal, state, or local assistance program that limits participation to households whose income is at or below 175% of the federal poverty limit." *Id.* at 5. However, advocacy groups during the comment period pushed for a definition that would replace "175% of the federal poverty level" with "below 50% of Area Median Income" because it is the same methodology used by the Housing Authority of New Orleans, Louisiana Housing Corporation, and Louisiana Department of Health. In addition, this definition would expand the number of customers or Subscribers that could qualify as a "Low Income Customer." *Id.* at 5-7.

165. Resolution and Order Establishing a Comment Period to Amend the Community Solar Rules, R-21-472 (Dec. 16, 2021), https://www.all4energy.org/uploads/1/0/5/6/105637723/2021_12_16_ud-18-03_curo_r-21-472_establishing_cmnt_period_comm_solar.pdf.

166. R-18-538, *supra* note 163, at Appendix A, 6.

167. *Id*. at Appendix A, 7-8.

the community solar program to the open category and reserve at least half of the solar facilities for the low-income category.[168] Owners or operators of apartments and, or multifamily residences that qualify as low-income, may apply to the New Orleans City Council to qualify as subscriber as long as they "demonstrate . . . that the subscription credits will be credited to the tenants."[169]

The final rules also provide "low-income customers will receive full retail credit for each kilowatt-hour generated by their portion of a project," while other subscribers "will receive credit based on" the utility's avoided energy and capacity costs.[170] If there is an excess of credits on a customer's bill, those credits can roll over to the next month without any expiration.[171] The chart below depicts the program's subscriber credit rate thus far through Entergy New Orleans for both low-income households and non-low-income households.

ENTERGY NEW ORLEANS, LLC
COMMUNITY SOLAR GENERATING FACILITIES - SUBSCRIBER CREDIT RATE

	$ PER KWH	
	LOW INCOME	NON-LOW INCOME
June 2021	$ 0.09457	$ 0.05174
July 2021	$ 0.10575	$ 0.05174
August 2021	$ 0.11248	$ 0.05174
September 2021	$ 0.10602	$ 0.05174
October 2021	$ 0.10871	$ 0.05174
November 2021	$ 0.10902	$ 0.05174
December 2021	$ 0.10784	$ 0.05174
January 2022	$ 0.10365	$ 0.05174
February 2022	$ 0.09814	$ 0.05174

Figure 5. Entergy New Orleans, LLC, Community Subsriber Credit Rate.[172]

168. Jenny Heeter et al., DESIGN AND IMPLEMENTATION OF COMMUNITY SOLAR PROGRAMS FOR LOW- AND MODERATE-INCOME CUSTOMERS, NAT'L RENEWABLE ENERGY LAB'Y 21 (2018), https://www.nrel.gov/docs/fy19osti/71652.pdf. This is sometimes referred to as a "LMI carve-out" in that a fraction of a project's capacity generation is reserved for low-income to medium-income households. *Id.* at 5. Of the three programs examined, New Orleans is the only program implementing a carve-out program (as opposed to a "participation incentives" which apply to D.C. and Los Angeles). Some advantages to this design are that it "ensure[s] a minimum level of [low-income households] participat[e]" in the community solar program, higher income household participation helps lower costs for low-income households, greater participant eligibility, and reduced risk of default. *Id.* However, some disadvantages are increased costs in the event of low-income household turnover, artificial limits, and additional costs imposed on higher-income households as a result of low-income household participation. *Id.*

169. R-18-538, *supra* note 163, at Appendix A, 14-15 ("The operator of a low-income multi-family dwelling unit may apply to the Council to qualify as a Low-Income Subscriber for the purposes of the Community Solar Program. The operator should demonstrate to the Council that the Subscription Credits will be credited to the tenants of low-income multi-family dwelling. A Subscriber Organization shall certify to the Utility in writing that the Subscriber Organization has verified the eligibility of all Low-Income Subscribers needed to qualify for the program prior to receiving permission to operate from the Utility. The Council will provide guidelines for acceptable methods for Subscriber Organizations to verify Low-Income Customer status of Subscribers within 90 days from the effective date of these Rules.").

170. Mullendore et al., *supra* note 137, at 11.

171. *Id*. at 10-11.

172. ENTERGY NEW ORLEANS, COMMUNITY SOLAR GENERATING FACILITIES-SUBSCRIBER CREDIT RATE, https://cdn.entergy-neworleans.com/userfiles/community-solar/ENO_Community_Solar_Rate_History.pdf.

Entergy New Orleans is prohibited from "establish[ing] a separate surcharge fee or rate" for any community solar costs, and any cost recovery related to the community solar program will be determined by the New Orleans City Council based on its review of the community solar tariffs.[173]

2. Solar for All NOLA

In 2020, while the City of New Orleans was finalizing the mechanisms for the community solar program, New Orleans Mayor LaToya Cantrell announced the city would implement a "Solar for All NOLA" year-long program aimed at providing financial and reliability – incentives for all qualifying households through rooftop solar.[174]

"Solar for All NOLA [is] led by the Greater New Orleans Housing Alliance ('GNOHA')"[175] in coordination with PosiGen Solar[176] and Solar Alternatives, two local businesses focused on expanding solar infrastructure throughout New Orleans.[177] As a part of the Solar for All program, "PosiGen Solar and Solar Alternatives . . . provide free solar evaluations to all homeowners and small business owners interested in seeing if clean energy can save them money on their utility bills."[178] For those households that can accommodate solar installations, PosiGen Solar offers accessible financing solutions[179] that are not limited to the traditional financing.[180] Interested participants have the option to lease or purchase a solar system.[181]

In 2020, Solar for All NOLA engaged "450 New Orleans homeowners and businesses" in rooftop solar and energy efficiency, provided an "average savings of $532.00 per customer" for that year, and created "1,300 solar jobs in the metro New Orleans area."[182] Solar for All NOLA has been renewed for 2021 and is being funded by Mayor Cantrell's Forward Together New Orleans fund.[183]

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173. R-18-538, *supra* note 163, at Appendix B, 12.

174. Bates, *supra* note 150.

175. *Id.* GNOHA is "a nonprofit that advocates for affordable housing [and] affordable energy bills . . . for . . . vulnerable working families and retirees." *Id.*

176. *Id.* PosiGen's mission statement focuses on low-income solar installations. *POSIGEN, https://www.posigen.com/about/*.

177. Bates, *supra* note 150.

178. Cormier & Harvey, *supra* note 71.

179. *Solar for All NOLA*, CITY OF NEW ORLEANS, https://www.solarforallnola.com/ ("Solar for All NOLA offers 100% of solar feasible homeowners and business owners an easy solution with either a no money down, no credit requirement solar lease with energy efficiency upgrades, or traditional financing for eligible homeowners and small businesses who wish to acquire a solar energy system.").

180. Bates, *supra* note 150.

181. *Solar for All NOLA*, *supra* note 179.

182. *Mayor Cantrell Celebrates Relaunch of Solar for All NOLA Program Reducing Energy Costs for Residents and Businesses*, CITY OF NEW ORLEANS (Mar. 5, 2021), https://nola.gov/mayor/news/march-2021/mayor-cantrell-celebrates-relaunch-of-solar-for-all-nola-program-reducing-energy-costs-for-residents/.

183. *Id*.

C. Los Angeles

"The Los Angeles Department of Water and Power (LADWP) is the largest municipal utility in the [United States]."[184] LADWP's Board of Commissioners, which establishes utility policy, is composed of 5 members who are appointed by the Mayor of Los Angeles and confirmed by the Los Angeles City Council.[185] LADWP's Board of Commissioners vote on power matters such as "utility rates [and] renewable energy projects."[186] LADWP has set a goal of having 55% of its power generated by renewable sources by 2025.[187] The City of Los Angeles has committed to reducing carbon emissions[188] and has instituted renewable energy programs through LADWP, specifically with LADWP's "Go Green" initiatives.[189] As a part of this "Go Green" initiative, LADWP offers a number of solar programs such as feed-in-tariffs (FITs),[190] virtual net metering, and two solar installation

184. MEISTER CONSULTANTS GRP., FRAMEWORK FOR AN EQUITABLE ENERGY SUPPLY TRANSFORMATION 9 (2018), https://cadmusgroup.com/wp-content/uploads/2018/08/MCG_Framework-for-an-Equitable-Energy-Supply-Transformation.pdf.

185. *Facts & Figures*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-factandfigures. *See* MEISTER CONSULTANTS GRP., *supra* note 184, at 9.

186. *See* MEISTER CONSULTANTS GRP., *supra* note 184, at 9.

187. Emily Guerin, *LA Program Would Let Renters Plug into the Benefits, Good Karma of Solar*, ELEMENTAL (Oct. 22, 2018), https://elementalreports.com/kpcc/2018/10/22/la-program-would-let-renters-plug-into-the-benefits-good-karma-of-solar/.

188. *Sustainability*, OFF. OF MAYOR ERIC GARCETTI OF LOS ANGELES, https://www.lamayor.org/sustainability.

189. *Go Green*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/ladwp/partners/p-gogreen?_afrLoop=570791575261222&_afrWindowMode=0&_afrWindowId=null#%40%3F_afrWindowId%3Dnull%26_afrLoop%3D570791575261222%26_afrWindowMode%3D0%26_adf.ctrl-state%3D5ji069ybw_76.

190. *Feed-in Tariff (FiT) Program*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/ladwp/partners/p-gogreen/p-gg-localrenewableenergyprogram?_adf.ctrl-state=xuumn6is3_4&_afrLoop=506889630438187. FITs are designed to "guarantee[] . . . a set price" for customers with eligible renewable electricity generators, such as rooftop solar, "from the utility for the power they generate and provide to the grid." *See Feed-in Tariff: A policy Tool Encouraging Deployment of Renewable Electricity Technologies,* U.S. ENERGY INFO. ADMIN. (May 13, 2013), https://www.eia.gov/todayinenergy/detail.php?id=11471#:~:text=A%20FIT%20is%20a%20performance,credits%20or%20other%20investment%20subsidies. In addition, "a FIT is a performance-based incentive rather than an investment-based incentive, and in that respect is more similar to production tax credits and the renewable energy credits of an RPS market than to investment tax credits of other investment subsidies. In the United States, FITs are typically used in combination with one or more of these other incentives. FITs are most similar to the federal Qualifying Facility (QF) incentives available in the United States since the late 1970s, although the QF contracts were limited to paying avoided cost rates based on the utility's cost-of-generation rather than the above-utility-cost rates typical of a FIT. FIT programs are also similar to net metering programs but differ significantly in one key aspect: the power generated by a utility customer's system is compensated at the rate set by the FIT rather than the retail electricity rate. This generation is treated independently from the customer's own electricity use, which is billed at the utility's regular retail rates. In a net metering program, a utility customer is effectively paid the retail rate for any generation that is fed back into the grid." *Id.*

programs, Solar Rooftops and Shared Solar.[191] Programs from the Go Green Initiative[192] that focus specifically on low-income communities are discussed below.

1. Equity Metrics Data Initiative

Around 2013, LADWP examined its data on energy incentive program participation and realized that its preexisting solar initiatives were benefiting wealthier neighborhoods more than its lower-income communities.[193] That meant its solar energy program was not reaching those lower-income neighborhoods, which limited the programs' effectiveness.[194] Promotion of existing solar programs was insufficient because they included barriers for low-income participation related to the high-cost of installation and living in apartments rather than single-family homes.[195] To fully understand the impact of the existing solar programs on all customers, the LADWP Board of Commissioners "adopted the Equity Metrics Data Initiative Resolution (EMD)."[196] The EMD is required to "track, measure, and report on how LADWP programs are serving every customer in its service area," including low-income households and communities.[197] LADWP releases the collected data publicly on its website and engages with local communities and advocacy groups to analyze the data for ways to improve the programs.[198]

Although EMD does not produce data specific to the following LADWP solar programs, it does a tracking mechanism of energy rate impacts on low-income households.[199] By using the EMD data in this way to improve existing programs, LADWP has subsequently implemented several solar programs geared towards low-income households in Los Angeles.[200]

2. Solar Rooftop Program

In 2017, as a response to remedy cited skewed solar participation, LADWP implemented the Solar Rooftop Program, which provides single-family residences rooftop solar systems free of charge.[201] Through this program, single-family households lease their rooftops to LADWP for solar production.[202] LADWP does

191. *Solar Incentive Program,* L.A. DEP'T OF WATER AND POWER, HTTPS://WWW.LADWP.COM/LADWP/FACES/LADWP/PARTNERS/P-GOGREEN/P-GG-INSTALLSOLAR?_ADF.CTRL-STATE=SM9MCM6Y6_29&_AFRLOOP=572131546901560.

192. *See infra,* Section III.C.1.

193. Kate O'Brien, *Behavior Change Case Study: LA Department of Water & Power – The Shared Solar Program*, MEETING OF THE MINDS (June 4, 2019), https://meetingoftheminds.org/behavior-change-case-study-la-department-of-water-power-the-shared-solar-program-30480.

194. *Id.*

195. *Id.*

196. *Id.*

197. O'Brien, *supra* note 193.

198. *Id.*

199. *Id.*

200. *Id.*

201. MEISTER CONSULTANTS GRP., *supra* note 184, at 9.

202. *Id.*

not charge the resident customers solar panel installation fees.[203] Maintenance and operation of the panels are the responsibility of LADWP and not the customer participant since the utility retains ownership over the solar panels.[204] The energy generated from these panels (which is around 2-4 kW) does *not* offset the customer's bills through net metering and is instead delivered directly to the grid.[205] Customer bills are not reduced because of this program.[206] Instead, customers receive a prepayment of $360.00 for the first year's lease payment.[207] Depending on the type of solar system installed and its size, "LADWP will either issue a fixed monthly lease payment between $20 and $50 per month, or between $240 and $600 per year," resulting in financial benefits between $4,800 to $12,000 over 20 years.[208] Each rooftop is leased for a 20-year term from the date the solar panel is installed, but "homeowners can terminate the agreement with a 60-day written notice."[209]

The program uses the utility's class rate structure for identifying low-income households and communities.[210] So, those households that are specifically classified as Schedule "R1-D-Low-Income" under LADWP's rate structure would qualify for this program.[211] However, priority is given to those communities that have low solar participation, which is determined based on the household's zip code.[212] No credit checks or up-front costs are required, but customers' "utility accounts must be 'in good standing' to participate."[213] Systems can be removed twice at no charge to the household as long as the first time is "for rooftop repairs" and the second time is "at the end of the program term."[214] Single-family homes must meet the following eligibility requirements for the program:

- The home must be "owner occupied."[215]

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203. *LADWP Low-Income Program – Is it Really Worth It?*, SOLAR EARTH CHOICE, INC. (Aug. 12, 2019), https://www.solarearthchoice.com/2019/08/12/ladwp-low-income-program-is-it-really-worth-it/.

204. MEISTER CONSULTANTS GRP., *supra* note 184, at 9.

205. *Id*.

206. *Id.*

207. SOLAR EARTH CHOICE, INC., *supra* note 203.

208. *Solar Rooftops*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/ladwp/residential/r-gogreen/r-gg-ressolar/r-gg-rs-solarrooftops?_adf.ctrl-state=c72jqqmwb_118&_afrLoop=334002142504691. *See* SOLAR EARTH CHOICE, *supra* note 203 (stating that "[a]fter the first year is completed, the [customers] receive a $30.00 credit on their monthly utility bill" or $360.00 prepayment for each subsequent year as payment for the utility leasing their rooftops).

209. L.A. DEP'T OF WATER AND POWER, SOLAR ROOFTOPS PROGRAM GUIDELINES: COMMUNITY SOLAR 9 (2016), http://clkrep.lacity.org/onlinedocs/2016/16-1284_misc_1_11-16-2016.pdf [hereinafter SOLAR ROOFTOPS PROGRAM GUIDELINES].

210. *Id.* at 3.

211. *Id.* Although the target is low-income households, LADWP also considers applicants for the program from "R1-A-Standard," "R1-B-Time-of-Use," and "R1-E-Lifeline" rate classes. *Id.*

212. MEISTER CONSULTANTS GRP., *supra* note 184, at 10.

213. *Id.* at 9.

214. SOLAR ROOFTOPS PROGRAM GUIDELINES, *supra* note 209, at 2.

215. *Id.*

- The single-family home must "meet all of the LADWP and Los Angeles Department of Building and Safety expedited PV installation criteria."[216]
- The home must be "a single story."[217]
- The home must "have [a] suitable rooftop[] with composite shingle roofing" to allow safe installation.[218]

The Solar Rooftop program aims to include around 300-400 low-income residential households as "customers" of the program.[219] In addition, although it is not officially identified as an "equity" component, LADWP also provides jobs and training for LADWP's workforce through this program.[220]

The Solar Rooftops program focuses on expanding renewable energy programs into low-income communities with little exposure to solar savings due to the high cost of installation rather than reducing the energy burden for low-income communities without access to renewable energy.[221] As of September 2020, "LADWP ha[s] performed over 400" single-home rooftop inspections for the suitability of panels for the Solar Rooftop Program.[222] However, since April 5, 2021, the Solar Rooftop program stopped accepting applications due to a back-log in processing applications received during the pandemic.[223] The suspension is deemed temporary, but LADWP has since not provided any updates to the program.[224]

3. Shared Solar Program

More recently in 2018, LADWP launched the Shared Solar Program which targets multifamily and renters who do not own rooftops.[225] Customers do not need to install solar panels on the rooftops of their buildings to participate.[226] LADWP and city-owned structures provide locations for the Solar installations to supply power to the program's participants.[227] Solar power for this project "also

216. *Id.*

217. *Id.*

218. SOLAR ROOFTOPS PROGRAM GUIDELINES, *supra* note 209, at 1.

219. *Id.* at 2.

220. MEISTER CONSULTANTS GRP., *supra* note 184, at 9-10.

221. *Id.* at 10.

222. *LADWP Community Solar Program Honored for Innovative Community Service*, L.A. DEP'T OF WATER AND POWER (Sept. 23, 2020), https://www.ladwpnews.com/ladwp-community-solar-program-honored-for-innovative-community-service/.

223. *Solar Rooftops: Temporary Suspension*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/wcnav_externalId/r-gg-rs-solarrooftops?_adf.ctrl-state=uwdqf4m19_29&_afrLoop=906610503513541 (last updated Mar. 2022).

224. *Id.*

225. Guerin, *supra* note 187.

226. *Id.*

227. *LADWP Will Launch New Community Solar Power Program for Renters*, PHOTON.INFO (Sept. 27, 2018), https://www.photon.info/en/news/ladwp-will-launch-new-community-solar-power-program-renters.

come[s] from a large-scale 90 MW solar project . . . in the Mojave Desert," which is more economical to build and operate compared to single rooftops.[228]

The Shared Solar Program allows customers to purchase "blocks of solar power" from these locations that are remote from their dwellings.[229] They may purchase "up to 100 kWh per month at a 10-year fixed rate."[230] Customers that subscribe to the program have a portion of their energy costs "fixed," which allows the customer to have bill certainty.[231] The solar rate for this program will be "[$0.1/kWh] *more expensive* than the" standard LADWP residential rates at the outset of the program.[232] The benefits of this structure are the consistency and predictability of utility bills.[233] Customers can cancel at any time, and, as is common for community solar projects, customers can transfer their subscriptions to the program to other eligible locations.[234] Like the Solar Rooftop program, Shared Solar is available to those renters that LADWP classifies as "R1-D-Low-Income."[235]

LADWP aims to provide 10 MW of solar power through this program.[236] Shared Solar targets approximately 13,000 customers to participate in the program.[237] Below is an infographic from LADWP on the structure of the Shared Solar Program.

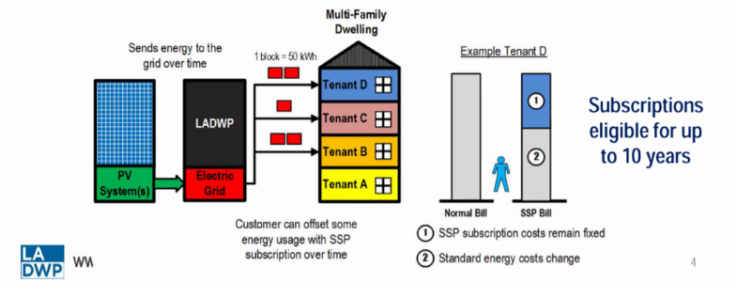

Figure 6. "Shared Solar Program Overview Decision."[238]

228. *Id.*

229. *LADWP Approves New Community Solar Power Program for Renters*, L.A. DEP'T OF WATER AND POWER (Sept. 26, 2018), https://www.ladwpnews.com/ladwp-approves-new-community-solar-power-program-for-renters/.

230. PHOTON.INFO, *supra* note 227.

231. L.A. DEP'T OF WATER AND POWER, SHARED SOLAR PROGRAM: ENERGY, CLIMATE CHANGE, AND ENVIRONMENTAL JUSTICE COMMITTEE 4 (2019), http://clkrep.lacity.org/onlinedocs/2018/18-0928_misc_03-19-2019.pdf.

232. Guerin, *supra* note 187.

233. SOLAR ROOFTOPS PROGRAM GUIDELINES, *supra* note 209.

234. L.A. DEP'T OF WATER AND POWER, LADWP SHARED SOLAR GUIDELINES 12 (2019), available for download at https://www.ladwp.com/ladwp/faces/ladwp/residential/r-gogreen/r-gg-ressolar?_adf.ctrl-state=rtyabwcx0_75&_afrLoop=587974238828151.

235. SOLAR ROOFTOPS PROGRAM GUIDELINES, *supra* note 209, at 3 (explaining that LADWP also considers applicants for the program from "R1-A-Standard," "R1-B-Time-of-Use," and "R1-E-Lifeline" rate classes).

236. PHOTON.INFO, *supra* note 227.

237. LADWP SHARED SOLAR GUIDELINES, *supra* note 234, at 6.

238. *Id.* at 10.

The motivations behind this program were energy equity.[239] The program allows families and residents access to utility bill predictability even though they are renters and not homeowners.[240] In 2018, approximately 63% of residents rented their housing while 37% of households were owner-occupied.[241] LADWP engaged with two local community based organizations in developing and shaping this program in order to incorporate community concerns and reduce skepticism within the communities.[242] LADWP mentioned attempts of seeking additional federal and local funding for discounted solar rates for low-income households, but no updates or progress have been reported.[243]

IV. COMPARATIVE ANALYSIS THROUGH ENERGY EQUITY LENS

Although all three cities have implemented solar programs targeting low-income communities, these programs have different elements and end-results which touch on different aspects of energy equity. A careful evaluation of these programs not only reveals their effectiveness in reducing energy burden, but also their effectiveness in promoting equity for low-income households. To recapitulate the framework established in section II, this section will examine the following energy equity components in these low-income solar programs:

- Incorporating community participation and awareness surrounding the causes of energy burden into the low-income solar program can make the program more efficient [Procedural Equity] [244];
- Recognizing and engaging *all* low-income households such as those residing in single-family homes, apartment buildings, government-subsidized housing, and manufactured/mobile homes [Structural Equity][245];
- Removing or avoiding barriers to entry such as up-front costs for equal access and participation [Distributive Equity] [246];
- Having some mechanisms for collecting, tracking, and reporting data for solar program participation and engagement, especially from low-income households experiencing high energy burdens.[247] Among other things, the data should be suitable for revealing any issues and incongruities that can be addressed through "in-person engagement and education campaigns" as well as ways in which the program can be improved[248]; and
- Effectively reducing energy burden of low-income households.

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239. O'Brien, *supra* note 193.

240. *Id.*

241. Guerin, *supra* note 187.

242. O'Brien, *supra* note 193 (names of the local "community based organizations" were not listed or mentioned).

243. *Id*.

244. Park, *supra* note 51, at 3.

245. O'Brien, *supra* note 193; Park, *supra* note 51, at 3

246. O'Brien, *supra* note 193; Park, *supra* note 51, at 3.

247. Brown et al., *supra* note 9, at 23-24.

248. *Id.* at 23.

These components may reveal the strengths and weakness of the identified low-income solar programs, but more importantly, they will reconcile the goals of these programs with the goals of energy equity to provide a more focused perspective on energy equity in low-income solar programs aiming to address energy burden.

A. Community Participation – Procedural Equity

Community participation plays a significant role in both the effectiveness and accessibility of the solar program. If the targeted low-income communities are unable to communicate their desires and concerns in the planning and implementation of a program directly affecting them, then the program fails in achieving procedural equity.[249] Lack of community engagement can impede a program's success, most obviously because the program's targets are either unaware of the program or do not understand its benefits, but also because understanding the complexities of the impacted population is likely to improve outreach efforts.[250] All three programs ultimately relied on advocacy organizations and third-party vendors to engage community participation, but the approaches of third-party partners were different across the programs.[251]

DC's Solar for All program, led by DC's DOEE, worked directly with local community advocacy groups and solar developers both during the planning stages and implementation phases of the program.[252] However, it was the solar developers/community advocacy groups that formed relationships with the targeted communities to inform them about the DC Solar for All program as an option to reduce their energy burdens.[253] Similarly, LADWP worked with local community organizations to develop and structure the Shared Solar Program to reduce skepticism and incorporate community concerns of solar benefits for low-income residents in apartment buildings.[254] The New Orleans' City Council's Community Solar program is still in its early stages, so information on effective community engagement during its implementation phases is scarce.[255] However, it is worth noting that community advocacy organizations played a significant role in shaping the program during its rule and comment period while engaging stakeholders.[256]

The community solar programs in D.C. and Los Angeles tried to increase employment opportunities for community members through the solar industry workforce.[257] These workforce programs, although not directly impacting energy burden, to the extent they were successful in providing additional employment

249. Park, *supra* note 51, at 4.

250. *Id.*

251. *Solar for All in D.C.*, *supra* note 91; Luke & Heynen, *supra* note 152, at 616; O'Brien, *supra* note 193.

252. *Solar for All in D.C.*, *supra* note 91.

253. *DC Solar Stories EP2 Solar for All*, *supra* note 93.

254. O'Brien, *supra* note 193.

255. Luke & Heynen, *supra* note 152, at 618.

256. *Id.* at 616.

257. MEISTER CONSULTANTS GRP., *supra* note 184, at 9; *DC Solar Stories EP4 Building Workforce*, *supra* note 116.

opportunities to impacted communities, provided them with a greater role in the energy transition.[258] Although there is always room for improvement, all three programs had varying degrees of awareness surrounding the importance of community engagement.[259]

Community solar programs in their early stages seeking to encourage community engagement and awareness should replicate the outreach tactics used by the community solar programs in Washington D.C., Los Angeles, and New Orleans. All three programs engaged local advocacy groups in shaping the community solar programs in its early phases since the local advocacy groups better understood the needs and constraints of low-income communities.[260] Nonprofit and community advocacy groups can also act as intermediaries between policymakers and communities to ensure concerns and awareness are communicated effectively.[261] Policymakers and/or utilities looking to develop community solar programs for disadvantaged communities but have not yet fostered a relationship with these communities can consider hosting workshops or forums of open dialogue for community members and community advocacy organizations.[262]

B. Engaging all low-income households – Structural Equity

A shortcoming of some solar programs is that they benefit particular groups (such as single-family homeowners) but do not account for the barriers to participation faced by other low-income groups, e.g. renters. Local governments and utilities must recognize that the way many current programs are structured prevents low-income households from accessing the benefits of the solar power programs.

All the identified solar programs have addressed (to varying degrees) the gap in the access to the benefits of the solar programs between homeowners and renters.[263] DC's Solar for All program was focused on tenants of apartment buildings accessing solar benefits because the low-income population of Washington D.C. largely consists of renters, not homeowners. DC's Solar for All program identified and accounted for the concerns related to apartment buildings and devised a solution that benefits renters and tenants of apartment buildings.[264] This

258. MEISTER CONSULTANTS GRP., *supra* note 184, at 9.

259. *Solar for All in D.C.*, *supra* note 91; Luke & Heynen, *supra* note 152, at 616; O'Brien, *supra* note 193.

260. *Solar for All in D.C.*, *supra* note 91; Luke & Heynen, *supra* note 152, at 616; O'Brien, *supra* note 193.

261. Heeter et al., *supra* note 168, at 33.

262. *See* Nidhi Thakar & Jake Wise, *Making More Room at the Table: A Utility Perspective on Energy Equity*, *in* 12 ADVANCING EQUITY IN UTILITY REGULATION 51 (Lisa Schwartz ed., 2021) (discussing in the context of distribution system planning how Portland General Electric "deferred to [community-based organizations] to facilitate a series of community workshops where [Portland General Electric] 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" from which Portland General Electric developed a Community Engagement Plan).

263. PHOTON.INFO, *supra* note 227; *Solar for All in D.C.*, *supra* note 91; *DC Solar Stories EP6 Sharing the Wealth*, *supra* note 120. *See* NOLA, WHITE PAPER OF THE COUNCIL'S UTILITY ADVISORS REGARDING COMMUNITY SOLAR AND OTHER SHARED DISTRIBUTED ENERGY RESOURCES 9-10 (2018), https://council.nola.gov/council/media/Assets/Committees/Utility/White-Paper-on-community-solar(107122241_5).pdf.

264. Heeter et al., *supra* note 168, at 12; *Solar for All in D.C.*, *supra* note 91.

DC program's recognition of renters played a significant role in the development of the overall program.[265] LADWP took a different approach by first implementing a single-family home program and then moving forward with implementing a program targeting renters.[266] Although the latter solar program came sometime later than the single-family solar program, LADWP still recognized the disparity between single-family homes and apartment buildings.[267]

New Orleans' programs, on the other hand, have not fully addressed this disparity. NOLA's Solar for All program was directed at single-family households.[268] It did not include any options to connect solar developers with occupants of apartment buildings. The New Orleans Community Solar rules allow renters to qualify for subscription credits that would then benefit tenants.[269] Yet, there is still no other provision or benefit directed specifically at residents of apartment buildings who could seek solar benefits outside the landlord or building owner applying for the program.[270] Even when a landlord's permission is not a barrier, if eligible participants live in government housing where they pay 30% of their income towards rent and utilities, this can complicate how the tenants benefit from share solar savings/credits.[271] That is why DC's Solar for All program diverted some savings to community benefits or rebates for similarly situated low-income consumers.[272] The New Orleans' Community Solar program should consider the DC program experiences and address these issues.

It is not clear from public information whether LADWP's Shared Solar program is designed to address this barrier. If not, they too may want to consider the solutions suggested by DC's program.

Although the solar programs in all three cities recognized the struggles renters, these solar programs have not recognized other social inequities that impact low-income communities, such as racial disparities.

Structural equity requires a recognition of issues relating to *social inequalities* affecting marginalized groups, which include both low-income and racial inequalities.[273] Although the focus of this article is on energy equity for low-income communities, it is valuable to recognize the intersection of race with energy equity for low-income communities.[274] For example, in New Orleans,

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265. Heeter et al., *supra* note 168, at 27.

266. O'Brien, *supra* note 193.

267. *Id*.

268. *Solar for All NOLA*, *supra* note 179.

269. Luke & Heynen, *supra* note 152, at 615.

270. *Id.* Heeter et al., *supra* note 168, at 8.

271. Heeter et al., *supra* note 168, at 8.

272. DC SUSTAINABLE ENERGY UTIL, *supra* note 84.

273. Park, *supra* note 51, at 3 (defining structural equity).

274. Chandra Farley, *Advancing* Just Energy *in the South: The Potential for Equitable Utility Regulation through Public Participation, in* 12 ADVANCING EQUITY IN UTILITY REGULATION 1 (Lisa Schwartz ed., 2021) ("Nearly every equity indicator . . . including those related to our energy and utility systems, can be linked to systemic racism and practices that institutionalize 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. . . . Redlining buttressed the segregated structure of American

> Black households are six times more likely to live in poverty relative to white households, Black workers are three times more likely than white workers to be unemployed, Black households pay more than 8 percent of household income on average in energy bills relative to a citywide average closer to 5 percent.

These disparities ultimately stem from New Orleans' history of housing and employment policy impacting Black communities.[275] The New Orleans Community Solar rules do not address or recognize this disparity despite the intersection with participants who would qualify as "low-income" under the program.[276] DC's Solar for All program[277] and LADWP[278] also do not use any particular language beyond "low-income," which ultimately leads to failure in recognition of other socioeconomic inequities related to solar benefits. Although no official language is used by these programs,[279] understanding and recognizing certain racial disparities in the targeted communities can broaden the impact and effectiveness of these solar programs.

In determining whether or not racial disparities are reduced by focusing solely on poverty and low-income groups, these programs should collect data to assess whether the programs that are designed for low-income communities are promoting structural equity for *all* groups or whether a racial disparity and inequity continues to persist if not addressed. Using that information, policymakers and utilities should ensure participation by communities with high concentrations of communities of color and other underrepresented communities. Meaningful promotion and awareness of the benefits of the community solar program directed at underrepresented communities, given the intersectionality as "low-income households," is one way to campaign for structural equity.[280] Engaging community advocacy groups with either a focus on racial justice or strong ties to underrepresented communities can also increase participation and promote structural equity.

C. Removing Barriers to Entry – Distributive Equity

Traditional programs promoting cleaner energy generation typically benefit higher-income households that can afford (i) additional up-front costs, such as solar panel installation fees, or (ii) higher electricity bills.[281] To include participants from all economic classes in the energy transition equitably, low-income solar programs must be designed to accommodate the financial limitations of low-in-

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cities. . . . 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.").

275. Luke & Heynen, *supra* note 152, at 616–17.

276. *Id*. at 616.

277. *Solar Initiatives*, *supra* note 78.

278. *Solar Rooftops*, *supra* note 208.

279. *Solar Initiatives*, *supra* note 78. *Solar Rooftops*, *supra* note 208.

280. *See* Park, *supra* note 51, at i:4.

281. Heeter et al., *supra* note 168, at 5 (This class disparity is not intentional because implementing community solar projects with a majority of low-income participants end up being costlier due to "higher customer acquisition costs, . . . eligibility verification, and increased project financing costs").

come households while reducing their energy burdens. Specifically, these programs must address and/or remove the barriers to entry and participation that prevent such households from enjoying solar benefits.

All three of the surveyed cities implemented these programs while conscious that additional costs and burdens cannot be imposed on low-income household participants.[282] LADWP recognized their existing solar programs' nature and design excluded low-income households, which ultimately led to the creation of the Solar Rooftop and Shared Solar programs.[283] LADWP designed these programs to meet some of the barriers faced by low-income households by not charging installation, maintenance, or operation fees to the participants and by giving both renters and homeowners the power to participate without significant barriers to access.[284] While Los Angeles created two separate low-income solar programs for single-family homes and renters to bridge the gap for renting families, D.C. incorporated other benefits for renters into their Solar for All program through community benefits such as rebate checks, daycare services, or financial literacy trainings.[285] The New Orleans City Council Community Solar program was originally intended to be a city-wide program for all residents with some provisions directed for low-income households.[286] Advocacy by local New Orleans nonprofit organizations pushed for allocation of solar benefits to low-income households leading to the expanded scope of the program's definition of "low-income" and setting aside solar generation capacity specifically for low-income participants.[287]

One other issue that these programs must consider is retention–households may sign up for the program as participants, but will they continue to participate for the entire duration of the program? Generally, low-income household retention, especially from renters, is a major issue for community solar programs, especially when acquiring and replacing customers leaves the solar program with additional costs.[288] None of the three programs mentioned how they address the issue of retention, especially in circumstances of distributive equity barriers, which could harm program management.[289] One option to consider when facing issues of retention is designating representatives to communities engaged with the program to survey and address concerns of participants with the program.[290] Gathering feedback regarding cost-based barriers and directly resolving participant issues could have some impact on participant satisfaction and ultimately retention of low-

282. *Id*. at 22.

283. Guerin, *supra* note 187.

284. *Id. See* SOLAR ROOFTOPS PROGRAM GUIDELINES, *supra* note 209.

285. *DC Solar Stories EP7 Innovation and Collaboration*, *supra* note 126.

286. *City Council Approves First Steps Toward 'Community Solar' Power Program*, *supra* note 161.

287. Luke & Heynen, *supra* note 152, at 616.

288. Heeter et al., *supra* note 168, at 11.

289. *Id*. at 11-12.

290. *Id.* at 11.

income households in the community solar programs.[291] Community solar participation and retention can be better managed when relationships are fostered and maintained with engaged communities.[292] Another option policymakers should determine is which stakeholder is responsible for participant retention because that entity would be responsible for the continuation of the program.[293] Heeter, et al. also outline several options to addressing participant turnover and retention, including prepaid subscriptions for a set period of time supported by external funding, shorter contracts, and incorporating large subscribers such as cities and places of worship to cover any shortages.[294]

D. Data Collection and Tracking

Understanding energy equity requires access to data for many reasons. Pre- and post-program implementation data are needed to assess the program's effectiveness. Data provides an understanding to the energy burden of a particular household in relation to its community. Data is a tool to understand what barriers low-income households face in accessing benefits from solar programs. Data also informs and engages a community on how they are affected by a particular solar program. Without access to data and measurements of success, it is difficult to determine whether a program is successful, where it (1) reduces energy burden for low-income households, and (2) addresses structural equity.

LADWP approached its solution to energy burden on low-income households through its data tracking mechanism, the Equity Metrics Data Initiative, which aims to enhance the services LADWP provides to its customers.[295] The EMD monitors LADWP's programs and utility rates based on their impacts on low-income households and communities and then releases this information publicly on its website.[296] Through this initiative, LADWP also engages local communities

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291. *See* Thakar & Wise, *supra* note 262, at 57 (discussing Portland General Electric's smart grid program for low-income households and how the program implements a "community organizer-like presence" in order to "attain and sustain participation and understand the customers taking service within each [geographic] area"). This approach was modeled after the 1980 Hood River Conservation Project conducted by the Bonneville Power Administration where "onsite personnel were credited with community outreach, resolution of contract quality-of-work issues, and identification of emerging issues." *Id.* at 58.

292. *See* Heeter et al., *supra* note 168, at 11 ("Solar developers typically specialize in up-front customer acquisition but are unaccustomed to ongoing subscription management. For this reason, effective subscription management may require a partnership with a utility or community organization with an ongoing relationship with potential subscribers.").

293. *Id.* at 9 (considering the disadvantages and advantages of acquisition and retention of low-income households in community solar programs by three entities: utilities, third-party community solar developers, and affordable housing facilities as subscribers).

294. Heeter et al., *supra* note 168, at 11–14.

295. O'Brien, *supra* note 193.

296. *Equity Metrics Data Initiative*, L.A. DEP'T OF WATER AND POWER, https://www.ladwp.com/ladwp/faces/wcnav_externalId/au-fr-corporateperformance-emdi?_adf.ctrl-state=gmru1ugso_4&data-source=ucm%23dDocName%3A2063_EN)))&_afrLoop=232956639110764&_afrWindowMode=0&_afrWindowId=null#%40%3F_afrWindowId%3Dnull%26_afrLoop%3D232956639110764%26data-source%3Ducm%2523dDocName%253A2063_EN%2529%2529%2529%26_afrWindowMode%3D0%26_adf.ctrl-state%3Da5nduksbe_41.

and civil society to analyze the data and find ways to improve their programs.[297] This initiative does not produce data specific to the Solar Rooftop program or the Shared Solar program, but it provides some tracking mechanism of energy impacts on low-income households, which New Orleans appears to lack.[298]

Tracking mechanisms and data reporting on the community solar programs would provide transparency, which in turn will promote improvements on the different components of energy equity. Data reporting on a geographic or zip code level can help pinpoint which demographics and communities are participating in the community solar programs and which ones are experiencing barriers to access or misinformation. Data collection would also aid community advocacy groups in targeting and aiding communities for community solar benefits. Data reporting can take the form of revealing general changes in customer rates over time as a part of participation in the program.

E. Reducing Energy Burden

In addition to all the aforementioned considerations, these programs can and often do *effectively* reduce energy burden for their program participants. The presence of a disproportionate energy burden can influence how or if a low-income household chooses to participate in the solar program and the overall energy transition.[299] If certain entry costs are not reduced, then there is little incentive for some low-income households to participate given their limited financial capacity.

DC and New Orleans tailor their community solar programs to provide direct credit or savings to their participating households either on their electricity bills or in some other rebate or community benefit (as is the case with DC's apartment buildings where direct passthrough of the financial benefits to the residents of the building is not otherwise feasible).[300] The National Renewable Energy Laboratory (NREL) has found the DC Solar for All program to be a particular success; it has reduced energy burden for the "lowest income households from 13.5% to 8.8%."[301] Los Angeles, on the other hand, focuses on "predictability" and "long-term savings" through its programs by providing a sense of fixed rates or fixed savings but does not necessarily guarantee a reduction in electricity bills.[302] Luckily, none of the major low-income solar programs (with the exception of Solar for

297. *Id.*

298. MEISTER CONSULTANTS GRP., *supra* note 184, at 9-10; *see DCSEU – Quarterly and Annual Reports*, DEP'T OF ENERGY AND ENV'T (June 24, 2022), https://doee.dc.gov/publication/dcseu-quarterly-and-annual-reports.

299. Jenny Heeter et al., *Affordable and Accessible Solar for All: Barriers, Solutions, and On-Site Adoption Potential*, NAT'L RENEWABLE ENERGY LAB'Y (2021), https://www.nrel.gov/docs/fy21osti/80532.pdf.

300. NET ENERGY METERING AND INTERCONNECTIONS, COMMUNITY SOLAR IN THE DISTRICT OF COLUMBIA, *supra* note 107; *see Net Metering and Distributed Generation (New Orleans)*, *supra* note 146.

301. Heeter et al., *supra* note 299. *See also* Herman K. Trabish, *Bringing equity to electricity service through home, power sector and regulatory innovation*, UTILITY DIVE (Oct. 27, 2022), https://www.utilitydive.com/news/bringing-equity-to-electricity-service-through-home-power-sector-and-regul/630253/.

302. SOLAR ROOFTOPS PROGRAM GUIDELINES, *supra* note 209, at 1.

All NOLA) involve upfront costs that would preclude participation given the financial constraints.[303]

Although LADWP's energy bill predictability can be appealing for long-term budgeting and planning, it ultimately does not directly impact the energy burden of a low-income household in the short-term to the same extent subscription credit and savings would.[304] Further, long-term savings are predicated on the assumption that utility rates will increase from their present level; such that in comparison, the solar rates locked-in today will look more attractive than the utility-provided alternative in the future.[305] LADWP appears to recognize this shortcoming and has stated its intentions to secure federal funding to provide rate credits to its customers, but it has not released any updates, progress, or information regarding federal funding.[306] Without any reduction or reimbursement on a participant's energy bill, a low-income household's near-term energy burden ultimately remains the same or possibly higher after entering the program than before.[307]

F. Other Considerations

Each of the identified programs are in different stages of implementation. Each are still measuring their impacts and achievements of savings through solar power. The New Orleans' Community Solar program has only begun its implementation while DC's Solar for All has been providing benefits to low-income households for a couple of years.

The most important question to consider is to what extent have these programs successfully promoted equity. Energy equity was the underlying motivation for these programs regardless of whether they used this term in their promotion and overarching discourse.[308]

Although to varying extents, all three of the cities' programs included some element of "procedural equity" by working with non-profit organizations and third-party solar vendors to enhance community engagement and participation.[309] Although each program engaged local advocacy groups and considered particular concerns associated with their local communities, there is room for improvement. These programs can engage local communities regularly by obtaining feedback and understanding concerns the communities have with the program. Regardless, all three programs shared the same goal: expanding solar capacity to benefit low-income households.[310]

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303. *See* Heeter et al., *supra* note 168, at 19.

304. Ben Zientara, *LADWP Solar Programs, Incentives, and Net Metering*, SOLAR REVIEWS (Sept. 19, 2022), https://www.solarreviews.com/blog/going-solar-with-los-angeles-department-of-water-and-power#programs.

305. *Id*.

306. *Id*.

307. *Id*.

308. Bridget Williams, *Solar for All Demonstrates the Importance of Equity in Clean Energy*, ENVT'L & ENERGY STUDY INST. (JUNE 8, 2020), https://www.eesi.org/articles/view/solar-for-all-demonstrates-the-importance-of-equity-in-clean-energy; SOLAR FOR ALL IMPLEMENTATION PLAN, *supra* note 85.

309. *Solar for All in D.C.*, *supra* note 91; Luke & Heynen, *supra* note 152, at 616; O'Brien, *supra* note 193.

310. *Solar for All in D.C.*, *supra* note 91; Luke & Heynen, *supra* note 152, at 603; O'Brien, *supra* note 193.

Looking at all three cities, DC's Solar for All program seems to have made the most progress in not only reducing energy burden but in promoting energy equity. Not only has there been an actual reduction in energy burden for some low-income households,[311] the program components utilized community groups to engage participants and identify significant equity issues – acting on procedural equity.[312] Participants see a reduction in their energy bill while expanding the city's solar generation capacity.[313] Importantly, it recognized the issue that not all participants can directly see the savings from solar on their energy bill, and therefore DC's Solar for All program made sure to redistribute these benefits for certain renters by enhancing community facilities and providing rebates – addressing both distributive and structural equity.[314] DC's Solar for All program could improve by working directly with community members in recognizing other disparities impacting energy burden (structural equity beyond a low-income lens) and implementing a robust data collection and reporting program as LADWP did.[315] However, the DC Solar For All's progress cannot be denied.

New Orleans' Community Solar program has the right mechanisms in place to be successful to the same extent that DC's Solar for All program is. Although the program is new and still in its early phases, New Orleans should consider the challenges that could arise in multifamily housing where rent is based on income or where there is only a single meter shared for the whole building. Encompassing these considerations would make the community solar program more equitable from a distributive and structural equity standpoint.

Los Angeles' programs embody many of the components of equity but require more attention and resources towards reducing energy burden. Without the incentive of reducing energy burden or savings in general, especially with its Shared Solar program, low-income household participation and retention will serve as a major barrier to the programs' continuation. However, LADWP's Equity Metrics Data Initiative[316] serves as an excellent example of what other cities and utilities can do to track and report data on equity participation of solar programs.

V. CONCLUSION

Energy equity has three different components: procedural equity, distributive equity, and structural equity.[317] The recent shift in addressing energy equity and energy burden shows great promise for promoting energy affordability in urban areas. Engaging all households to participate in solar programs and incentives, especially low-income households, is a significant challenge. A reduction in energy costs can have secondary impact on total cost of housing and utilities for low-

311. Heeter, et. al., *supra* note 299.
312. *Id.*
313. *Id.*
314. DC SUSTAINABLE ENERGY UTIL, *supra* note 84.
315. O'Brien, *supra* note 193.
316. *Id.*
317. *Energy Equity*, *supra* note 49.

income households and other intended recipients. Assessing these programs' effectiveness through an energy equity lens can help identify additional characteristics that might influence a program's success. The identified solar programs targeting low-income communities have elements and end-results that are different from one another, and thus touch on different aspects of energy equity. Continuing to evaluating these programs from an energy equity framework will reveal their effectiveness in reducing energy burden and promoting equity for low-income households. Washington D.C., New Orleans, and Los Angeles are accomplishing significant strides through their solar programs.[318] However, given the nascent state of low-income oriented solar programs with limited data, these programs can expand their reach to better promote energy equity and reduce energy burden for low-income communities.

318. *See supra*, Section III.