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Addressing Equity with State-level Residential Solar Energy Policies

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The adoption of residential rooftop solar continues to grow across the United States, experiencing five consecutive quarters of modest growth, and the largest quarter of growth in two years during the fourth quarter of 2018. Nearly 315,000 households added solar in 2018.¹ However, this growth has not been equitably distributed across socioeconomic groups nor race and ethnicity. Nationally, although households earning less than \$40,000 annually make up 40% of all U.S. households, they accounted for less than five percent of installed residential rooftop solar systems.² However, there is great market potential for low-income rooftop solar. For instance, data from the National Renewable Energy Lab (NREL) show that low- to moderate-income (LMI) rooftops represent approximately 42% of the estimated total rooftop megawatt (MW) potential.³ *Figure 1* (on page 5) illustrates estimates of the percent of residential rooftop solar potential on LMI rooftops in each state.

Moreover, racial/ethnic disparities in national solar adoption have also been discovered. When compared to census tracts with the same median income, black- and Hispanic-majority census tracts have installed 69% and 30% less rooftop solar, respectively, compared to census tracts with no racial majority. Conversely, white-majority census tracts have installed 21% more rooftop solar than census tracts with no racial majority.⁴

To achieve parity in the benefits of solar energy, a growing number of states have developed policies and programs to address socioeconomic disparities by designating and targeting LMI households, as well as racial and ethnic disparities by designating and targeting environmental justice (EJ) communities. This policy brief describes some of these efforts.

Solar Equity Policies and Approaches

State governments have instituted four primary mechanisms by which they seek to define, target, and track efforts for increasing solar equity: 1) targeting LMI households; 2) targeting EJ communities; 3) targeting LMI-serving nonprofit and public facilities; and 4) setting and tracking solar equity goals.

1 Solar Energy Industry Association (2019) U.S. Solar Market Adds 10.6 GW of PV in 2018, Residential Market Rebounds. <https://www.seia.org/news>

2 GW Solar Institute (2016). Can Electricity Rate Subsidies be Reallocated to Boost Low-Income Solar?

3 Mooney, Meghan; Sigrin, Ben (2018): Rooftop Energy Potential of Low Income Communities in America REPLICA. National Renewable Energy Laboratory. <https://dx.doi.org/10.7799/1432837>

4 Sunter, D. A., Castellanos, S., & Kammen, D. M. (2019). Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity. *Nature Sustainability*, 2(1), 71.

Targeting LMI Households

Most states with solar equity policies take a people-based approach focusing primarily on household-level socioeconomic indicators such as setting an area median income (AMI) threshold for LMI program eligibility and targeting. *Table 1* provides a sample of AMI thresholds established by different states, including the District of Columbia.

Table 1
LMI Household Income Targets

Area Median Income Threshold	States
≤ 80%	DC, Illinois, California, Massachusetts
≤ 60 %	New York
≤ 50%	Minnesota

Two examples of state-level LMI household solar programs include:

- Massachusetts' Mass Solar Loan program targets LMI households (≤ 80% AMI) with three incentives for purchasing a solar PV system or a share in a behind-the-meter community shared solar system: a 1.5% interest rate buy down; a loan loss reserve for the lender when an applicant's credit record is less than perfect; and a 30% loan support incentive (up to \$10,500).⁵
- California's Single-Family Affordable Solar Housing (SASH) and Multi-Family Affordable Solar Housing (MASH) programs target LMI households (≤ 80% AMI) in investor-owned utility territories for no-cost rooftop solar installations funded by the California Solar Initiative (CSI).⁶

Targeting Environmental Justice (EJ) Communities

In addition to targeting LMI households that can live anywhere in the state, some states are implementing place-based solar targeting approaches that prioritize those who live in designated environmental justice communities. This approach is a recognition of the principle of environmental justice—that regardless of race, national origin, age, or income, no segment of the population should bear disproportionately high or adverse environmental burdens. In particular to the benefits of solar, on average majority black and Hispanic communities experience high pollution exposure and high energy burdens (or the proportion of income spent on energy costs). Nationally, EJ communities have been designated through mapping exercises and calculations publicly available through the US EPA's Environmental Justice Screening and Mapping tool⁷ which displays census tracts with higher exposure to pollution and other environmental and socioeconomic risk factors.

In California, the Clean Energy and Pollution Reduction Act of 2015 required the California Public Utility Commission to help improve air quality and economic conditions in disadvantaged communities which permitted the targeting of solar investments in those communities. In Illinois, the Future Energy Jobs Act which established the Illinois Solar for All Program required designating and targeting environmental justice communities for solar investments. California's disadvantaged communities are easily identified on the state's online CalEnviroScreen mapping tool,⁸ while Illinois has an online tool to search an address to determine its EJ community designation status as well as users can apply for review to designate an area as an EJ community.⁹

5 Mass Solar Loan. <https://www.masssolarloan.com>

6 California Public Utility Commission. <https://www.cpuc.ca.gov/general.aspx?id=3043>

7 EPA EJSscreen tool <https://www.epa.gov/ejscreen>

8 CalEnviroScreen tool <https://oehha.ca.gov/calenviroscreen>

9 Illinois Solar for All Environmental Justice Communities <https://www.illinoisfa.com/environmental-justice-communities/>

Census tracts scoring higher than state averages on select environmental, socioeconomic, and demographic factors are often designated as EJ communities. Standard factors to determine EJ community designations include:

- Ozone and Fine Particulate Matter (PM_{2.5}) pollution exposure rates,
- Proximity to hazardous waste sites,
- % Minority population,
- % Low-Income,
- % of population with less than high school education,
- Linguistic isolation,
- % of individuals under age 5, and
- % of individuals over age 64

Targeting LMI-serving non-profit and public facilities

Some states have committed to providing explicit solar incentives to nonprofit and public facilities that serve LMI and environmental justice communities with a goal of offsetting energy costs so savings can be put toward programming that benefit the communities they serve. For example, Illinois seeks to increase solar equity by targeting nonprofit and public facilities serving LMI and environmental justice communities such as public housing, K–12 public schools, homeless shelters, and places of worship. The Illinois Solar For All Program commits 15% of the budget to support the Incentives for Nonprofits and Public Facilities sub-program. According to a NREL report, solar systems on LMI-serving non-profit and public facilities could be oversized to share some of the solar power that is generated with the surrounding community.¹⁰

Setting and Tracking Solar Equity Goals

Beyond defining solar equity targeting approaches, some governments have set measurable and trackable solar equity goals. For example, Washington, DC has set goals for its Solar For All program to install rooftop solar on 100,000 LMI households and reduce LMI energy burdens by 50% by 2032. Illinois has set a goal that a minimum of 25% of its solar incentives be allocated to projects located within environmental justice communities. Additionally, California has established a transparent online resource for tracking its solar equity progress. The statistics and charts are frequently updated based on completed applications for its SASH and MASH programs.¹¹

¹⁰ Data Source: Sigrin, Ben, and Mooney, Meghan. 2018. Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-70901.

¹¹ California Distributed Generation Statistics. <https://www.californiadgstats.ca.gov/charts/li>

Conclusion

In sum, state governments considering developing a residential solar equity approach should consider the following three actions:

1. Quantify the current residential solar equity gap by exploring adoption disparities spatially (e.g., between counties), racially, and socioeconomically.
2. Determine and define the desired people- and place-based approaches to policy design and implementation that best address identified disparities. This will facilitate targeting, public engagement, and investment strategies.
 - If a people-based approach is considered, determine the household income threshold that best defines the state's LMI population
 - If a place-based approach is considered, conduct an environmental justice mapping exercise using established methods (e.g., US EPA, California, or Illinois) centered on environmental, socioeconomic, and demographic risk factors.
3. Establish measurable solar equity goals and transparent mechanisms for tracking progress.

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Figure 1

The percent of estimated state-level residential rooftop solar potential on LMI rooftops

(Data Source: Rooftop Energy Potential of Low Income Communities in America, REPLICA <https://dx.doi.org/10.7799/1432837>)

