

## Solar Energy that Pays for Low-Income Customers and Communities

By Tom Stanton

### Introduction

State public utility regulators have focused special attention on the needs of low-income customers and utility bill affordability for many years. The federal Low-Income Heating Energy Assistance Program (LIHEAP) began in 1981, consolidating the federal energy financial assistance programs that started in the early 1970s.<sup>1</sup> Despite nearly a half-century of concerted efforts on the part of regulators, utility companies, and dozens of social and human services agencies, consumer advocacy groups, and service providers “many utility customers have chronic difficulties paying their utility bills in full.”<sup>2</sup>

As solar energy becomes more widely used, regulators are working with solar and consumer advocates to include solar in low-income programs. In the past, the majority of taxpayer and ratepayer subsidies that policy makers used to support progress in the fledgling solar industry were claimed by more affluent consumers. Few of those funds were delivered to those in financial need who would most benefit from reductions in their energy bills. Today,

providers and regulators are realizing that “[N]o one benefits from energy savings more than low-income consumers, who pay a much higher portion of their income for energy than middle- and high-income consumers.” Unfortunately, solar incentive programs often “fail to reach low-income populations.”<sup>3</sup>

Today, many groups are working to make sure that low-income customers and communities can benefit from solar energy. State-level policies and programs supporting community solar installations that include special provisions for low- and middle-income customers are already in place in more than a dozen states and the District of Columbia, and many voluntary programs are also underway.<sup>4</sup>

This paper highlights the key aspects of program design and implementation that are helping providers deliver cost-saving solar energy and associated products and services to low-income consumers, organizations that provide services to low-income clientele, and disadvantaged communities. The paper also briefly reports on some of the most successful efforts to date.

1 LIHEAP Clearinghouse, *LIHEAP History* [electronic article]. Available at [https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/History\\_of\\_LIHEAP.pdf](https://liheapch.acf.hhs.gov/sites/default/files/webfiles/docs/History_of_LIHEAP.pdf).

2 NARUC, 2019, *Resolution on Best Practices in Data Collection and Reporting for Utility Services Delinquencies in Payments and Disconnections of Service*. Available at <https://www.naruc.org/resolutions-index/2019-annual-meeting-resolutions/>.

3 Paulos, 2017, *Bringing the Benefits of Solar Energy to Low-Income Consumers – A Guide for States & Municipalities. Report for Clean Energy States Alliance*, pp. 5-6. Available at <https://www.cesa.org/resource-library/resource/bringing-the-benefits-of-solar-energy-to-low-income-consumers/>.

4 USDOE, *Low-Income Community Energy Solutions* [Web page, retrieved August 2020], <http://www.energy.gov/eere/slsc/low-income-community-energy-solutions>. Low-income solar programs targeting multi-family dwellings and community solar are important. Estimates show as many as 59 percent of low-income households are renters, rather than homeowners, and renters are not likely to have opportunities for installing solar on their own residences.

See also: Heeter, Bird, et al., 2018, *Design and Implementation of Community Solar Programs for Low- and Moderate-Income Customers*, National Renewable Energy Laboratory, <https://www.nrel.gov/docs/fy19osti/71652.pdf>; and, Gallucci, 2019, “Energy Equity: Bringing Solar Power to Low-Income Communities,” *Yale Environment 360*, <https://e360.yale.edu/features/energy-equity-bringing-solar-power-to-low-income-communities>.

**Figure 1** shows that 21 states and the District of Columbia are extending the benefits of solar energy to low-income consumers and communities.<sup>5</sup> These efforts are directed toward five key market segments: (1) community-shared solar participation (17 states); (2) single-family homes (11 states); (3) multi-family homes (10 states) and in five states; and (4) businesses, NGOs, and government agencies that provide services to low-income clientele. In addition, four states include provisions for historically disadvantaged or environmental justice communities.<sup>6</sup>

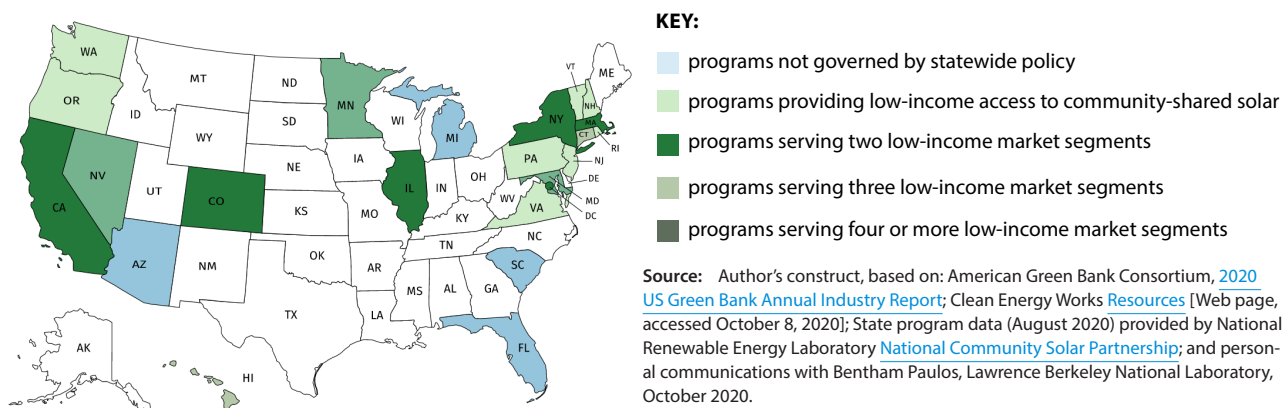
One way that low-income customers can receive solar energy benefits is by participating in neighborhood or community-shared solar projects. Although definitions vary, “shared solar” typically refers to projects “that allocate the electricity of a jointly owned or third-party-owned (TPO) system to offset multiple individual businesses’ or households’ consumption.”<sup>7</sup>

Many states have issued policy directives to ensure that community solar projects benefit low-income customers, service providers, and communities. In most programs utility bill credits are issued monthly, applying virtual-net-metering provisions.<sup>8</sup>

Three major policy mechanisms support low-income participation in solar programming. One is special inclusive financing programs, whereby consumers obtain cost savings through their utility bills. Typically, inclusive financing provides for no up-front payments, minimal credit checks or verifications, monthly cost savings greater than monthly repayments, and ample consumer protections.<sup>9</sup>

A second policy mechanism to support low-income participation is subsidies or incentives funded by taxpayers or ratepayers. Seventeen jurisdictions include these in low-income solar programs. A third

**Figure 1: State Actions Extending Solar Energy Benefits to Low-Income Consumers and Communities**



5 The most [current data on community solar](#) is collected by the National Renewable Energy Laboratory. This data shows rapid growth in numbers of projects and installed capacity. More than 1,200 community solar projects have been installed in 40 states, representing over 2GW of installed capacity. Many of those projects represent individual utility projects.

Eighteen states and the District of Columbia have solar power policy initiatives, as shown in **Figure 1**. In the absence of statewide programs, regulators in Arizona, Florida, Michigan, and South Carolina have approved one or more proposals from individual utility companies, to bring solar savings to low-income customers. The Vermont Energy Investment Corporation (VEIC) is also implementing a community solar program with low-income provisions. Readers are invited to bring additional programs to the author’s attention.

6 Market segments addressed by many state programs are listed in the **Appendix**. Not all states or programs are described in the **Appendix**.

7 Feldman, David, Anna M. Brockway, et al., 2015, *Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation*, National Renewable Energy Laboratory, NREL/TP-6A20-63892, <https://www.nrel.gov/docs/fy15osti/63892.pdf>. See also: Stanton & Kline, 2016, *The Ecology of Community Solar Gardening: A ‘Companion Planting’ Guide*, National Regulatory Research Institute, Report No. 16-07, <https://pubs.naruc.org/pub/FA85C744-AB5F-C165-8DF0-C82D0DB5DA09>.

8 Id. See also National Renewable Energy Laboratory *Community Solar* [Web page, retrieved September 2020], <https://www.nrel.gov/state-local-tribal/community-solar.html>.

9 See Stanton and Sklar, 2020, 2020. *Utility Tariff On-Bill Financing: Provisions and Precautions for Equitable Programs*. National Regulatory Research Institute. <https://www.naruc.org/nrri/nrri-library/nrri-insights/>.

policy is set-asides or carve-outs that require utilities or project developers to include low-income customers and communities in solar programs. These carve-outs generally require either a percentage of low-income participation or require that the projects serve only low-income consumers, service providers, or disadvantaged communities. One or both of those program types is present in at least 13 jurisdictions.<sup>10</sup>

A number of other non-solar energy government programs and policies work toward reducing poverty, providing and improving housing, promoting energy efficiency and clean energy, and more. These programs can also provide strong foundations for delivering the benefits of solar energy to low-income households. However, project experience demonstrates that special attention is needed to effectively combine and coordinate multiple low-income programs and implement ideas about how best to deliver solar benefits to low-income customers. This includes “government policies and programs, new business approaches, and philanthropic and volunteer initiatives.”<sup>11</sup>

Successful programs generally provide combinations of the six major features summarized in **Table 1**. Those features include: (1) clearly-identified target audiences; (2) well-targeted consumer communications, engagement and education, and marketing; (3) efficient program administration and delivery of comprehensive, holistic services; (4) sufficient consumer protections; (5) workable financing options; and, (6) reduced or removed implementation barriers.

**Table 2** provides an overview of the benefits that successful programs might deliver to participating customers, the host utility, and society at large.<sup>12</sup>

The **Appendix** includes descriptions of, and links to,

additional information on state programs and project examples.

## Addressing Major Challenges and Next Steps

Low-income solar programming is still in the early stages of experimentation and designs are being tried, tested, and improved through monitoring, evaluation, and feedback.<sup>13</sup> While there have already been some important successes in delivering low-income solar, a number of challenges must be addressed before such programs can scale rapidly.

Utility bill affordability for low-income consumers is a pervasive challenge for regulators, utilities, government, and NGO social services organizations. The economic disruption associated with the COVID-19 pandemic has exacerbated this challenge.<sup>14</sup>

More work is needed to systematically identify and catalog the major challenges for low-income solar programs. These challenges include:

- (1) Coordinating among multiple providers, programs, and services to deliver comprehensive support services;
- (2) Reaching the sometimes difficult-to-reach low-income target audiences, and achieving sufficient trust, so that potential participants will accept the available support; and
- (3) Achieving maximum self-sufficiency in order to deliver programs that can and will eventually pay their own way, minimizing the need for ongoing subsidies and charitable donations and enabling programs to scale quickly to reach a greater number of participants.

10 Sources for this summary of state program types include: American Green Bank Consortium, *2020 US Green Bank Annual Industry Report*; Clean Energy Works *Resources* [Web page, accessed October 8, 2020]; State program data (August 2020) provided by National Renewable Energy Laboratory, *National Community Solar Partnership*; personal communications with Bentham Paulos, Lawrence Berkeley National Laboratory, October 2020; and Xu 2020, National Community Solar Partnership *Featured Resources*.

11 Id. See also Distributed Energy Financial Group, 2019, *Low Income Consumer Solar Working Group – Final Report and Roadmap*, Report for Low-Income Energy Issues Forum, <http://defgllc.com/publications/community-solar/>.

12 For more details about valuing and measuring potential costs and benefits, see: Woolf, Neme, et al., 2020, *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*, National Energy Screening Project, <https://www.nationalenergyscreening-project.org/national-standard-practice-manual/>.

13 Op. cit. note 9, Distributed Energy Financial Group, 2019.

14 See the NARUC compilation of Covid-19 resources at <https://www.naruc.org/compilation-of-covid-19-news-resources/additional-resources/> [Web page, retrieved August 2020].

The first of these challenges is the number of low-income support programs and services, provided by dozens of different organizations. These are not only for electricity, but many also address accessibility and affordability for communications and broadband, natural gas or other heating fuels, water, and wastewater utilities.<sup>15</sup>

A number of possible solutions have been identified to date:

- Connecticut is engaged in efforts to consolidate offerings from among many applicable programs.
- Massachusetts offers programs and services using a [one-stop shopping platform](#).
- [Michigan](#) and [Washington](#) use trained navigators to help customers understand the many options available.
- Working groups have been helping to guide program development, in [Illinois](#), [Massachusetts](#), [Michigan](#), [Minnesota](#), [New York](#), and [Oregon](#).
- Maryland's [Critical Needs Medical Program](#) is coordinating energy efficiency and solar services with essential medical care facilities and community emergency services. And, Washington's [Matchmaker](#) program has a similar objective.

The second challenge includes efforts to identify and target audience participants, and use appropriate marketing, outreach, and education efforts to break down the barriers to participating. Experience to date demonstrates several important program features associated with successes.

- Partnering with well-known and trusted local organizations and institutions, particularly mission-driven organizations that regularly work with low-income households;

- Using multiple, trusted communications channels to reach target participants with messages that educate, inform, and market the programs; and,
- Providing and clearly communicating effective consumer protections.<sup>16</sup>

[Connecticut](#) and the [District of Columbia](#) are demonstrating that combining and coordinating low-income solar offerings with multiple other program efforts can effectively cut low-income customer electric bills by as much as half or more. Solar services to low-income customers can complement energy efficiency savings and [healthy home attributes](#). Early success with [on-bill financing in Hawaii](#) demonstrates how that option, with no-money down and utility bill savings assurances, can attract participants.<sup>17</sup> One long-term goal could be designing comprehensive programs that work for not only low- or middle-income customers, but for all customers, because the benefits are substantial, easy to achieve, and easy to communicate.

The third challenge is building self-supporting programs. This means developing mechanisms that can wean themselves from taxpayer and ratepayer subsidies. Features that support this goal include:

- Lowering costs throughout the value chain, from manufacturing to system operations and maintenance;
- Standardizing project business models and system designs as much as practical, using separate models, if necessary, to facilitate replicating successes for both (a) vertically-integrated and restructured utility markets, and (b) markets with and without state community solar policy frameworks; and
- Expanding value propositions by combining solar with storage and adding offerings for other community-based and distributed energy resources.

15 Hayes, 2020, *The Energy Efficiency Sector Can Help Address Longstanding Health Inequities*, American Council for an Energy Efficient Economy, available at <https://www.aceee.org/blog-post/2020/06/energy-efficiency-sector-can-help-address-longstanding-health-inequities>. The [211 of Connecticut](#) summary, New Jersey [Kinship Navigators](#) program, and a South Carolina Energy Office [Energy Saver](#) on-line catalog all demonstrate how many programs might need coordinating. In addition, as Hayes points out, coordination is also needed across multiple agencies, including those supporting affordable housing, local food systems, and public health.

16 Sources include: [Applied Public Policy Research Institute for Study and Evaluation](#) 2020; [Brown et al.](#) 2020; [Chwastyk et al.](#) 2017; [Curti et al.](#) 2018; [Dobos et al.](#) 2017; [Grid Alternatives and Vote Solar](#) 2020; [Heeter et al.](#) 2018; [Leon et al.](#) 2019; [Paulos](#) 2017; and, [Srivastava](#) et al. 2020.

17 LIFT Solar Collaborative is exploring opportunities for using utility tariff on-bill financing to expand opportunities for on-site solar systems to benefit low-income customers and renters. See: LIFT Solar Collaborative, 2020, *Applying the PAYS® System to On-Site Solar to Expand Access for All*, <https://groundswell.org/liftsolar/>.

The U.S. Department of Energy's [SunShot Initiative](#) has been working to systematically lower costs for solar equipment and "soft costs," for such things as permitting, interconnection, insurance, and more. That program launched in 2011, with the goal of reducing total solar system costs by 75 percent by the end of the decade. That goal was achieved by year-end 2017. An updated program, [SunShot 2030](#), is intended to cut costs by another 50 percent by 2030. [SunShot 2030](#) also includes goals for integrating solar with thermal or battery chemical storage, to "enable solar energy to supply a large share of U.S. electricity," as much as "50 percent by 2050."

Work is also proceeding on efforts to standardize successful business models.<sup>18</sup> The [National Community Solar Partnership](#) (NCSP), is supporting this work through information exchange, technical assistance, and collaborative workgroups.

Early examples of projects expanding well beyond just solar power and energy efficiency include Indiana's [Broadway Lofts](#), Maryland's [Resiliency Hub](#), New Jersey's [Equitable and Resilient Solar + Storage Policy Roadmap](#), and New York's [Marcus Garvey Housing](#) project. In addition, a newly announced South Chicago project in the Auburn-Gresham community will demonstrate an [integrated food and agriculture facility](#), including on-site solar and other renewable power sources, in a neighborhood with many low-income residents.

There is ample experience with low-income solar energy offerings that are demonstrating success in reaching each of the major target audiences discussed here. Moving forward, regulators and others should focus on making programs increasingly more self-sufficient and scalable. Progress toward those objectives depends in part on collecting, disseminating, and learning from program monitoring and evaluations. For example, policy makers and program designers may want to identify special project features that could be replicated elsewhere. The states may also want to standardize program information, such as:

- How much subsidy, if any, is associated with successful project start-up, and is the need for subsidy diminishing over time?

- How many low-income customers is each program and project reaching?
- What bill reductions are achieved both in real dollars and as a percentage of customer bills? Are any participating customers seeing no-change in bills or bill increases, and if so why?
- What percentage of participants are continuing with the programs over time? Are some participants leaving the program, and if so can reasons be identified?

With continuing attention focused on how best to deliver the benefits of solar energy to low-income customers and communities, there is good reason to expect those benefits will grow and spread rapidly to increasingly larger populations.

18 Op. cit. note 6, Distributed Energy Financial Group, 2019, pp. 30-36. See also Institute for Sustainable Communities, 2018, *Solar Market Pathways Final Report*, <https://www.osti.gov/servlets/purl/1474296>.

**Table 1: Major features supporting success in serving low-income customers and communities**

Program or project feature	Provisions supporting success
Clearly-identified target audience(s)	<ul style="list-style-type: none"> <li>• Have multiple offerings:               <ul style="list-style-type: none"> <li>○ for individuals and families as home-owners, renters, for multi-family buildings, and, for community solar; and,</li> <li>○ for commercial entities and institutions that serve low-income clients, constituents, and communities.</li> </ul> </li> <li>• Target high-value siting that increases local grid resiliency, local economic and employment benefits, and siting in high-visibility, community-supported locations.</li> <li>• Support local solar providers.</li> </ul>
Well-targeted consumer communications, engagement and education, and marketing	<ul style="list-style-type: none"> <li>• Involve key, trusted partners.</li> <li>• Use multiple messages and channels.</li> </ul>
Efficient program administration and delivery of comprehensive, holistic services	<ul style="list-style-type: none"> <li>• Include solar as one component of broader utility-affordability programming, including: (a) one-stop shopping for consumers; (b) help navigating and coordinating multiple providers, programs, and contractors; and, (c) bundling multiple programs for service delivery and maximizing utility-bill savings.</li> <li>• Plan for and accept ample program flexibility, to adapt to changing market circumstances.</li> </ul>
Sufficient consumer protections	<ul style="list-style-type: none"> <li>• Prevent predatory lending and misleading sales practices.</li> <li>• Ensure options for limited-duration participation and easy transferability.</li> <li>• Minimize participant risk, offering immediate, guaranteed savings with protections against increased costs and bills.</li> <li>• Include for participants utility bill stability and predictability.</li> </ul>
Workable financing options	<ul style="list-style-type: none"> <li>• Minimize and simplify, if not eliminate, consumer income verification checking, and credit checking and requirements.</li> <li>• Deliver robust financing options, including no-money down and at least some guaranteed, immediate, cost savings.</li> <li>• Provide adequate incentives to grow participation and enable programs to scale as interest grows.</li> <li>• Use utility billing and crediting for solar production, with built-in rate discounts.</li> <li>• Use limited taxpayer and ratepayer funds to leverage much larger private investments.</li> </ul>
Reduced or removed implementation barriers	<ul style="list-style-type: none"> <li>• Invite all interested parties to participate in program design decisions.</li> <li>• Make participating communities “solar friendly,” by reducing red tape, shrinking total project development time, and opening market pathways.</li> </ul>

Sources: Author’s construct, based on: [Applied Public Policy Research Institute for Study and Evaluation 2020](#); [Chwastyk et al. 2018](#); [Curti et al. 2018](#); [Distributed Energy Financial Group 2019](#); [Dobos et al. 2017](#); [Greene 2019](#); [Grid Alternatives and Vote Solar 2020](#); [Heeter, Bird et al. 2018](#); [Howat et al. 2019](#); [Interstate Renewable Energy Council 2016 and 2018](#); [Leon et al. 2019](#); [Solar United Neighbors 2020](#); [Southern Environmental Law Center 2016](#); [Srivastava, Bastian et al. 2020](#); [USDOE 2020b](#); [Vermont Law School Energy Clinic 2018](#); [Vote Solar 2020a](#) and [2020b](#); [Wood McKenzie 2018](#); and [Xu 2020](#).

**Table 2: Tentative list of potential benefits for participating customers, participating utility companies, the utility system, and society at large**

Type of Benefit	Notes and examples
<b>Participating customer benefits</b>	
<ul style="list-style-type: none"> <li>• Direct and immediate cost savings, reduced utility bill insecurity.</li> </ul>	<ul style="list-style-type: none"> <li>• Access could be required to some appropriate combination of subsidies and inclusive financing</li> </ul>
<ul style="list-style-type: none"> <li>• Improved public health, comfort, worker productivity.</li> </ul>	<ul style="list-style-type: none"> <li>• Positive results are attributed more from energy efficiency measures combined with solar, rather than solar per se</li> </ul>
<ul style="list-style-type: none"> <li>• Pride of ownership and participation</li> </ul>	<ul style="list-style-type: none"> <li>• Positive consumer engagement mechanisms support widely held social values like community participation, inclusion, and personal dignity</li> </ul>
<b>Host utility company and system benefits</b>	
<ul style="list-style-type: none"> <li>• Potential new value streams, increasing revenues</li> </ul>	<ul style="list-style-type: none"> <li>• With appropriate oversight, utilities could be solar developers, financiers, operators, and owners</li> </ul>
<ul style="list-style-type: none"> <li>• Education and experience</li> </ul>	<ul style="list-style-type: none"> <li>• Utility gains operating experience with solar power</li> </ul>
<ul style="list-style-type: none"> <li>• Good will, public perception</li> </ul>	<ul style="list-style-type: none"> <li>• Meets customer and community demands for clean, locally-produced energy</li> <li>• Positive relationships with community partners</li> <li>• Positive publicity, good will</li> </ul>
<ul style="list-style-type: none"> <li>• Achieve regulatory goals and objectives</li> </ul>	<ul style="list-style-type: none"> <li>• RPS goals, including carve-outs or set-asides for solar and DG.</li> <li>• Help address high-bill complaints, while reducing bill-payment arrearages and uncollectibles</li> </ul>
<ul style="list-style-type: none"> <li>• Service territory economic development, increasing sales</li> </ul>	<ul style="list-style-type: none"> <li>• Utility lost revenues due to decreased sales are at least partially offset by increased local economic and employment multipliers and improved customer payments</li> </ul>
<ul style="list-style-type: none"> <li>• Locational values</li> </ul>	<ul style="list-style-type: none"> <li>• Locational values sometimes increase when projects are coordinated with distribution system planning</li> </ul>
<b>Societal benefits</b>	
<ul style="list-style-type: none"> <li>• Reduce uncollectibles</li> </ul>	<ul style="list-style-type: none"> <li>• Costs for uncollectibles end up raising rates for all customers</li> </ul>
<ul style="list-style-type: none"> <li>• Put downward pressure on fuel costs, rates</li> </ul>	<ul style="list-style-type: none"> <li>• At ample scale, adding generation with no fuel-costs, such as wind and solar, results in measurable cost savings</li> </ul>
<ul style="list-style-type: none"> <li>• Improved economy, employment</li> </ul>	<ul style="list-style-type: none"> <li>• Many projects partner with local job-training and -placement programs for trainees, especially welcoming veterans, local youth, and community members</li> </ul>
<ul style="list-style-type: none"> <li>• Resiliency benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Meet multiple community needs, including first responders, health care providers, and other critical needs facilities, during wide-area grid disturbances</li> <li>• Ensure reliability and resiliency for home medical care devices</li> </ul>
<ul style="list-style-type: none"> <li>• Community development</li> </ul>	<ul style="list-style-type: none"> <li>• Cost-saving projects help build and retain community wealth</li> </ul>
<ul style="list-style-type: none"> <li>• Strategic project siting</li> </ul>	<ul style="list-style-type: none"> <li>• In disadvantaged and underserved communities</li> <li>• Carefully, beneficially integrated with other land uses (e.g., airports, agriculture, brownfield redevelopment, parking lots, rooftops, etc.)</li> <li>• Improving habitat (e.g., pollinator species, "agrivoltaics" beneficial co-siting of solar with specific farm operations)</li> </ul>

Sources: Author's construct, based on: Distributed Energy Financial Group 2019, [Low Income Consumer Solar Working Group – Final Report and Roadmap](#); Dobos et al. 2017, [Insights from the Colorado Energy Office Low-Income Community Solar Demonstration Project](#); and, Paulos 2019, [Minnesota's Solar Gardens](#).

## Appendix: State Programs and Project Examples<sup>1</sup>

State	Description	Market Segments Served <sup>1</sup>
Arizona	<ul style="list-style-type: none"> <li>Arizona Public Service <a href="#">Solar Communities</a> program installs utility-owned solar for low-income customers and low-income services providers, providing bill credits.</li> </ul>	SF, NGO
California	<ul style="list-style-type: none"> <li>An Energy Equity Docket, <a href="#">No. 18-IEPR-08</a>, is proceeding at the California Energy Commission.</li> <li>California is implementing multiple programs, slated to run through 2030, for <a href="#">disadvantaged communities</a>, for <a href="#">single-family homes</a>, for <a href="#">multi-family homes</a>. Programs include job-training and placement.</li> </ul>	CS, SF, MF, EJ
Colorado	<ul style="list-style-type: none"> <li>A Colorado Energy Office <a href="#">Low-Income Community Solar Demonstration</a> program for eight cooperative and municipal utilities resulted in participant annual utility bill savings from 15 to 50%, with an average of \$382 per participant.</li> <li><a href="#">Independent evaluations</a> checked each project “for effectiveness, challenges, successes, and best practices...”</li> </ul>	CS, SF
District of Columbia	<ul style="list-style-type: none"> <li>DC’s <a href="#">Solar for All</a> program aims “to reduce by at least 50% the electric bills of at least 100,000... low-income households... by December 31, 2032.” The program also includes a <a href="#">job-training initiative</a>.</li> </ul>	CS, SF, MF
Hawaii	<ul style="list-style-type: none"> <li>Hawaii’s Green Bank administers <a href="#">Green Energy Money Savers</a> (GEM\$), which works with utility <a href="#">on-bill financing</a>. Customers can use GEM\$ for energy efficiency improvements, solar water heating, and solar PV. GEM\$ integrates with state tax refunds for LMI customers. In the first nine months, GEM\$ solar PV projects totaled \$6.6 million, about 1.6MW of capacity, with 78% serving LMI customers. For 2021, GEM\$ has an <a href="#">open solicitation</a> for private capital. GEM\$ is presently working on metering and billing for multi-family projects, so solar production from one building-wide installation can be divided into credits for each participant.</li> </ul>	CS, SF, MF
Illinois	<ul style="list-style-type: none"> <li>Illinois’ <a href="#">Solar for All</a> program supports four major activities: (1) Low-income solar for individual homes or multi-family buildings with credits provided through net metering; (2) Low-income community solar, treated as virtual net metering; (3) incentives for non-profit and public facilities, which “offer essential services to low-income or EJ communities;” and, (4) Low-income community solar pilot projects. One-quarter of incentive funding for the first three sub-programs is set-aside for <a href="#">environmental justice (EJ) communities</a>. Illinois Solar for All incorporates strong <a href="#">consumer protections</a>, <a href="#">grassroots education</a>, and <a href="#">program evaluation</a>. Also included is <a href="#">job-training</a>, with priority for vendors hiring graduates.</li> </ul>	CS, SF, MF, NGO, EJ

<sup>1</sup> See explanation of Market Segment information at the end of this table.

<sup>1</sup> Examples included in TABLE 3 are drawn from many sources, as indicated by web-links and citations.

Case study reports are also included in: Clean Energy States Alliance, 2018, [A Directory of State Clean Energy Programs and Policies for Low- and Moderate-Income Residents](#); Leon et al., 2019, [Returning Champions—State Clean Energy Leadership Since 2015](#); and, Leon et al., 2019, [Solar with Justice: Strategies for Powering Up Under-Resourced Communities and Growing an Inclusive Solar Market](#).

This descriptions do not attempt to include every program and project in every jurisdiction: Descriptions focus on programs with track records demonstrating one or more of the key features that lead to success. For example, Florida PSC [approved in March 2020 a SolarTogether program](#) for Florida Power & Light, and Duke Energy Florida has applied for approval of a similar design, in [Docket No. 20200176](#). Those programs are not reported here because they are just beginning.



State	Description	Market Segments Served <sup>1</sup>
<b>Maryland</b>	<ul style="list-style-type: none"> <li>• Maryland PSC is implementing a seven-year <a href="#">Community Solar Pilot</a>, with nearly 30% set-aside for LMI customers. Capacity is <a href="#">divided by system types and sizes</a>, including brownfields. Eligible providers, including <a href="#">utilities and retail electricity suppliers</a>, must be <a href="#">preapproved</a>.</li> <li>• Maryland Energy Administration also manages <a href="#">community solar</a> grant funding for pilot projects with at least 51% LMI participation. The Energy Administration <a href="#">Resiliency Hub</a> program assists local governments, non-profits, or businesses that support LMI neighborhoods, providing safe havens during grid outages. <a href="#">Resilient Maryland pilot program</a> updates for 2020 include coordinating with medical facilities and emergency services. The program already awarded <a href="#">13 projects</a>, for feasibility studies, preliminary engineering, and system designs.</li> </ul>	CS, NGO
<b>Massachusetts</b>	<ul style="list-style-type: none"> <li>• Massachusetts has been <a href="#">promoting low-income solar</a> for over a decade. A state Affordable Access Working Group issued a <a href="#">report with action recommendations</a> in 2017.</li> <li>• The <a href="#">Solar Massachusetts Renewable Target (SMART) Program</a> offers <a href="#">added incentives</a> for serving low-income customers, low-income multi-family housing, and community-shared solar with at least 50% of <a href="#">output credited</a> to low-income customers. Massachusetts <a href="#">allows participation</a> by both net-metering and by <a href="#">PURPA QFs</a>.</li> <li>• A one-stop website, <a href="#">MassSave</a>, helps homeowners, landlords, and renters find information and guidance about reducing energy use and utility bills, including financial incentives.</li> <li>• A <a href="#">case study report</a> highlights one successful project in Boston.</li> </ul>	CS, SF, MF
<b>Michigan</b>	<ul style="list-style-type: none"> <li>• <a href="#">Michigan Saves</a>, a public-private green bank partnership that was <a href="#">initiated by Michigan PSC</a>, offers special financing, for energy efficiency and on-site solar, for single-family and multi-family housing, and for businesses or others providing services to low-income clientele. Over half of Michigan Saves residential work is for <a href="#">low- and moderate-income customers</a>. Michigan Saves integrates its offerings with the state's <a href="#">utility energy waste reduction</a> programs.</li> </ul>	CS, SF, MF
<b>Minnesota</b>	<ul style="list-style-type: none"> <li>• Minnesota participates in a <a href="#">Clean Energy States Alliance</a> project, along with Connecticut, D.C., New Mexico, Oregon, and Rhode Island. Minnesota calls its effort, <a href="#">Connecting Low-Income Communities through Efficiency and Renewable Sources</a> (CLICERS). A <a href="#">Strategic Solar Actions Plan</a> published in June 2018 calls for “comprehensively integrating energy efficiency and renewable energy solutions... rather than competing, with current efforts.”</li> <li>• Many low-income customers are participating in the <a href="#">Minnesota Community Solar Gardens program</a>. This includes the first U.S. solar garden <a href="#">serving only low-income customers</a> and another project directly <a href="#">a housing project for veterans and a fund for assisting families</a> facing utility disconnections.</li> <li>• One <a href="#">prize-winning Minnesota program</a> integrates community solar and energy assistance for low-income families, nonprofits, and First Nations.</li> </ul>	CS, SF, MF, NGO

State	Description	Market Segments Served <sup>1</sup>
<b>New Hampshire</b>	<ul style="list-style-type: none"> <li>New Hampshire low-income programs are included in the <a href="#">New Hampshire Clean Energy Jobs and Opportunity Act of 2017</a>, followed by 2019 amendments, entitled <a href="#">The Low-Income Community Solar Act of 2019</a>. The PUC <a href="#">2020 report</a> to the legislature indicates <a href="#">early projects</a> including: (1) subscription-based community solar; (2) a manufactured housing resident-owned community solar installation; and (3) multi-family rental housing behind-the-meter solar. Financial incentives are drawn from the <a href="#">New Hampshire Renewable Energy Fund</a>, established in the state's <a href="#">renewable portfolio standard legislation</a>.</li> </ul>	CS, SF, MF
<b>New Jersey</b>	<ul style="list-style-type: none"> <li>New Jersey initiated a <a href="#">community solar pilot program</a> with a 40% carve-out for projects serving at least 51% LMI customers, based on <a href="#">2018 legislation</a>. Of 45 <a href="#">2019 projects</a>, 30 were sited on rooftops, nine on landfills, and six more at least partly in parking lot canopies, on brown-fields, and on a former sand and gravel mining site. BPU held an open meeting on July 27, 2020, about "<a href="#">lessons learned</a>" from the first year of the program, inviting comments on: (a) equity and including LMI households; (b) the 2019 application form and process; (c) the year-two application form and process; and, (d) other issues, including program rules.</li> <li><a href="#">NJ Governor Phil Murphy</a> directed the BPU to "initiate a proceeding in early 2021 to transition from the pilot to a full-scale Community Solar Energy Program with a focus on LMI [low- and middle-income] and EJ [environmental justice] communities." The Governor's plan also calls for updating New Jersey's Solar Siting Analysis system, to "enhance smart siting of solar," including dual-uses for open-space and agricultural lands.</li> <li>As an outgrowth of the Clean Energy Act and Energy Master Plan, New Jersey justice, climate, and solar energy advocates combined efforts in late 2019 to produce a <a href="#">New Jersey Equitable and Resilient Solar + Storage Policy Roadmap</a>. Goals of the <a href="#">Roadmap</a> include solar energy for 250,000 low-income households by 2030, solar plus storage deployment for environmental justice communities, education and outreach, and workforce development."</li> </ul>	CS, EJ
<b>Nevada</b>	<ul style="list-style-type: none"> <li>Nevada established a pilot program for <a href="#">low-income solar energy</a> in 2013, made it permanent in 2017. <a href="#">Legislation in 2019</a> requires Nevada Electric to expand solar access for low-income customers, disadvantaged businesses, and nonprofit organizations. A rulemaking, <a href="#">Docket No. 19-06028</a>, will implement the Act, <a href="#">AB465 of 2019</a>. <a href="#">Proposed rules</a> were issued in July 2020.</li> </ul>	SF, MF, NGO

State	Description	Market Segments Served <sup>1</sup>
<p><b>New York</b></p>	<ul style="list-style-type: none"> <li>• New York State Energy Research and Development Administration (NYSERDA) started working <a href="#">on clean energy development for low-income communities</a> in 2015. A <a href="#">steering committee</a> was formed in 2017. New York expanded efforts in 2018 with a <a href="#">Solar for All</a> program, including <a href="#">“no-cost community solar”</a> for 10,000 low-income customers. (In this context, “no-cost” means no up-front costs and no fees for participating.) The <a href="#">NY-SUN program</a> supports residential solar and energy efficiency. NY-SUN also supports solar for <a href="#">businesses</a> and <a href="#">communities and local governments</a>.</li> <li>• New legislation in 2019, the New York <a href="#">Climate Leadership and Community Protection Act</a> (CLCPA, <a href="#">S6599 of 2019</a>), sets a new goal, for solar energy for at least 250,000 families in disadvantaged communities. A new CLCPA initiative will ensure that “disadvantaged communities receive at least 35% of overall benefits from NYS climate programs.” A <a href="#">New York Climate Justice Working Group</a> is focused on that goal.</li> <li>• <a href="#">New York Green Bank</a> supports in-state solar development, including commitments for over \$250 million for low- and moderate-income communities, and more for residential solar. The <a href="#">2020 Business Plan</a> calls for continuing innovation to serve low-income customers and disadvantaged communities.</li> <li>• One particular New York project that has garnered much acclaim is the <a href="#">Marcus Garvey affordable-housing project</a>, in Brooklyn. It includes a solar plus battery storage <a href="#">microgrid</a>, serving critical need facilities.</li> </ul>	<p>CS, SF, MF, NGO, EJ</p>
<p><b>Rhode Island</b></p>	<ul style="list-style-type: none"> <li>• Rhode Island has <a href="#">a state community solar marketplace website</a>. It <a href="#">lists all projects</a> and indicates whether they are fully subscribed.</li> <li>• Rhode Island provides financial support for <a href="#">solar on brownfield sites</a>.</li> <li>• RI Office of Energy Resources is <a href="#">developing plans</a> for increasing low-income participation in the state’s Community Remote Net Metering program.</li> <li>• The city of <a href="#">Providence, Rhode Island</a>, has also embarked on a special net-zero housing project intended to serve LMI clientele, called <a href="#">Sheridan Small Homes</a>. <a href="#">Rhode Island School of Design</a> (RISD) faculty and students developed the basic designs. The city’s planning office <a href="#">identifies as many as 250 vacant lots</a> where similar homes could be constructed.</li> </ul>	<p>CS, SF</p>
<p><b>Vermont</b></p>	<ul style="list-style-type: none"> <li>• Vermont is home to three <a href="#">successful programs</a>. In one, participants saved an average of over 20% on their utility bills. That model is now being expanded into a <a href="#">“pay for success”</a> program, with performance-based compensation, “where private social impact investors provide the capital to build solar projects.” In the second program, Vermont Energy Investment Corporation (VEIC) developed <a href="#">SunShares</a>, which is a <a href="#">community solar mechanism</a> that works through employers. A solar array installed on their facilities, and then solar energy share subscriptions are offered to employees. Solar energy delivered to the employer’s facilities is metered, and the local utility company assigns monthly utility bill credits to the participating employees. Another <a href="#">prize-winning program</a> integrates community solar and energy assistance for low-income families, non-profits, and First Nations.</li> </ul>	<p>SF, NGO, EJ</p>

State	Description	Market Segments Served <sup>1</sup>
Virginia	<ul style="list-style-type: none"> <li>• Virginia's 2020 <a href="#">Clean Economy Act</a> includes provisions for the benefit of "low-income geographic areas and historically economically disadvantaged communities." <a href="#">Legislation in 2019</a> developed a special fund for LMI solar loans and rebates. Another 2020 law, <a href="#">H.B. 572</a>, establishes a multi-family shared solar program. The rulemaking is in <a href="#">Case No. PUR-2020-00125</a>.</li> <li>• Virginia is recognized in the Interstate Renewable Energy Council <a href="#">2020 Clean States Honor Roll</a>, for its low-income solar energy efforts.</li> </ul>	SF, MF, EJ
Washington	<ul style="list-style-type: none"> <li>• Washington is presently soliciting public input for updating its <a href="#">Low-Income Community Solar Deployment</a> (LICSD) grants, supported in part by the state's <a href="#">Clean Energy Fund</a>. Priorities include low-income households and low-income service providers, maximizing direct and indirect benefits to subscribers and reducing distribution system peak demand.</li> <li>• The US DOE <a href="#">Solar Plus Initiative</a> convenes stakeholders in Washington and Oregon to work toward solar market growth, job creation, community resilience, and solar access. <a href="#">Utility regulators and state energy offices</a> for both states are participating.</li> </ul>	CS

<sup>1</sup> Market segments listed are based on data from: American Green Bank Consortium, [2020 US Green Bank Annual Industry Report](#); Clean Energy Works [Resources](#) [Web page, accessed October 8, 2020]; State program data (August 2020) provided by National Renewable Energy Laboratory [National Community Solar Partnership](#). Market segments listed sometimes reflect programs or projects not described in this table.

Market segment types include: community-shared solar (CS); single-family homes (SF); multi-family buildings (MF); businesses, NGOs, and government agencies that provide services to low-income clientele (NGO); and special provisions for historically disadvantaged or environmental justice communities (EJ).

**About the Author**

Tom Stanton is the NRRI Principal Researcher for Energy and Environment.

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