



Photo by Dennis Schroeder, NREL 60074

Equitable Access to Community Solar: Program Design and Subscription Considerations

More than 3.2 gigawatts-AC (GW_{ac}) of community solar have been installed in the United States as of 2020, and 53% (1.7 GW_{ac}) of that has been installed since 2018¹ (Heeter, Xu, and Chan 2021).

Community solar refers to a system that allows customers to subscribe to part of a solar photovoltaic (PV) system and receive benefits based on power production (Heeter, Kaifeng, and Fekete 2020). By sharing the solar output, a community solar project provides broader renewable energy accessibility, especially for people with limited or no access to on-site solar (Coughlin et al. 2012). In addition, because many community solar customers subscribe on a monthly basis rather than paying one-time high upfront, community solar can expand consumer adoption of solar energy. Although community solar growth is making it easier for more people to access solar energy, subscribers may still face challenges, such as no or low credit scores (Gagne and Aznar 2018).

Since 2008, at least 21 states and the District of Columbia have developed community solar-related programs intended to benefit all economic situations including Low-and-Moderate Income (LMI) customers (Stanton 2020). To investigate community solar program designs and subscription considerations for all customers, this fact

¹ NREL continues to update the community solar database, so capacity numbers may change. In this fact sheet, capacities are represented as gigawatt alternating current (GW_{ac}) and megawatt alternating current (MW_{ac}). For projects reported as gigawatt direct current (GW_{dc}) and megawatt direct current (MW_{dc}), unless specified, we assume AC capacity is 77% of the capacity for those systems reporting in DC.

² These requirements, to date, have been focused on including LMI subscribers.

sheet provides a summary of existing state-level programs that are targeted to serve historically excluded households, as well as estimated their capacity and subscribers in the United States. In addition, we highlight strategies to reach potential customers, drawing from our previous report, *Design and Implementation of Community Solar Programs for Low-and Moderate-Income Customers* (Heeter et al. 2018).

Equitable Community Solar Programs

The National Renewable Energy Laboratory (NREL) has identified four general approaches to encourage equitable community solar development: (1) policy mandates, (2) financial incentives, (3) Equity requirements², and (4) voluntary utility-led programs. Some states adopt policy mandates for community solar projects with certain requirements for equitable participation (e.g., Colorado, Connecticut, Hawaii, Maryland, Nevada, and Oregon). For example, the Colorado Community Solar Gardens Act required 5% LMI capacity (carve-out) for each community solar project to make community solar accessible to households that would not otherwise qualify. Providing incentives is the second common approach and has been adopted in California, Illinois, Massachusetts, New Hampshire, Rhode Island, and Washington, D.C. These could be a financial incentive for installing solar PV systems, like providing subsidies or incentives to LMI customers to access locally generated clean energy. For instance, in 2018, Illinois launched the Long-Term Renewable Resources Procurement Plan. Under the Illinois Solar for All program, more than 50% of the state's renewable energy resources fund will be used to benefit community solar developments that serve historically excluded households and frontline communities.



In the third approach, programs do not identify specific levels of community solar participation, but they do include requirements for at least some equitable components. One example is solar installations for multifamily housing projects, which is a typical approach (already used, for example, in California and Washington, D.C.). California developed its Solar on Multifamily Affordable Housing program in 2019 to provide financial incentives for PV system installations for eligible multifamily affordable housing. In the fourth approach to encourage greater solar access, utilities in some states also have voluntarily developed community solar programs (e.g., California, Michigan, Texas, South Carolina, and Florida) that include an equitable customer access component. Figure 1 summarizes the state equitable community solar program designs. See the **Appendix** for program details.

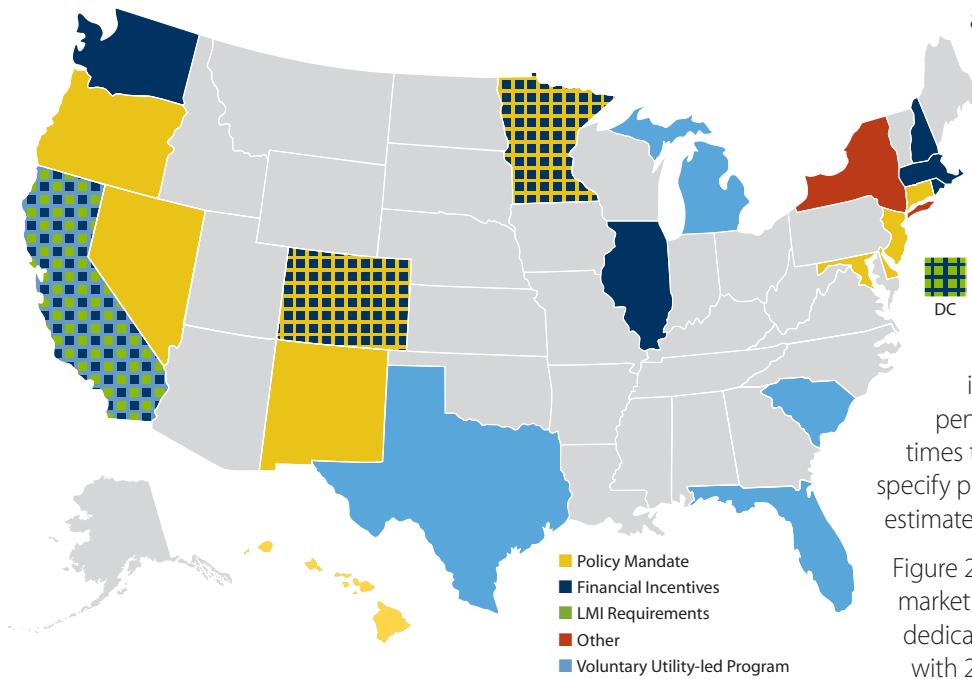


Figure 1. States with a community solar program with an equitable component Updated based on Heeter, Kaifeng, and Fekete (2020) and Clean Energy States Alliance (2021)

Equitable Community Solar Market and Potential Subscribers

As one of the key components of equitable community solar development, community solar projects provide greater access for local historically excluded populations. To evaluate community solar market trends, we estimated the installed LMI capacity and potential LMI subscribers. Our analysis focuses on collecting LMI community solar data based on existing and emerging state-level community solar programs. As such, some LMI-only projects or small pilot programs may be omitted. The definitions of LMI dedicated community solar vary by programs, so we use the following definitions:

- **Installed LMI:** The installed LMI capacity refers to community solar capacity serving LMI customers. For each community

solar program, the LMI capacity depends on the program requirements; for example, in some cases projects are 100% LMI, or have a portion of a project that serves LMI customers. Some states have clear LMI capacity goals. For example, Maryland launched the Community Solar Pilot Program with a statewide cap at 194 MW_{ac}, and designated 30% of the projects to focus on LMI customers. Of this designated capacity, 30% are set aside for people who meet LMI criteria (Maryland Energy Administration 2019)³

- **Pending LMI:** Pending LMI defines projects that have received awards or are under construction. Projects waitlisted, under review, or meeting requirements but not yet awarded are not included in this category. (For example, the Solar Massachusetts Renewable Target (SMART) Program reports approved, under review, and waitlisted pending projects, and this fact sheet only includes approved projects.) Regarding pending capacity, for this fact sheet, if a program does not specify the share of LMI subscribers, the carve-out mandates were used to evaluate pending projects' share of LMI. For example, the SMART program requires at least 50% of energy output from the low-income community shared solar to be allocated to low-income customers. We assume the estimated pending capacity equals qualified total capacity times the 50% carve-out. If a program does not specify projects status, we use the LMI capacity cap to estimate pending capacity.

Figure 2 shows the current LMI community solar market by states. At least 26 MW_{ac} community solar dedicated to LMI participants have been installed with 211 MW_{ac} pending across 10 U.S. states by the end of 2020.

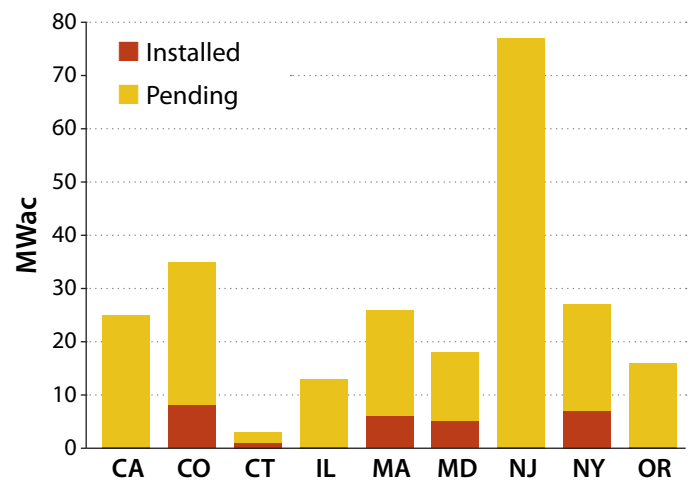


Figure 2. LMI dedicated community solar capacity by state as of 2020 (capacity installed and pending)

Notes: Data were collected from state programs and LMI dedicated community solar projects. Sources include the California Imperial Irrigation District Residential Energy Assistance Program and pilots projects (California Department of Community Services & Development 2019; Imperial Irrigation District 2019); Colorado Xcel Solar*Reward Program (Colorado PUC 2020); Connecticut Shared

³ In 2021, Maryland extended the program to seven years with a statewide cap at 418 MW_{ac}; the LMI capacity may increase.

Clean Energy Facility Pilot Program (Connecticut Department of Energy and Environmental Protection 2020); Illinois Solar for All Program (Illinois Solar for All 2021); Massachusetts Solar Massachusetts Renewable Target (SMART) Program (Massachusetts Government 2019); Maryland Community Solar Pilot Program (Maryland PUC 2018); New Jersey Community Solar Energy Pilot Program (New Jersey Community Solar 2020); New York Solar for All Program quarterly LMI status reports (NYSERDA 2021); Oregon Community Solar Program (Oregon CSP 2020).

The number of subscribers supported by 1 MW_{ac} of solar are significantly different across projects because of energy use in housing stock and weather zones. For example, in Colorado, the average number of LMI subscribers per MW of capacity is equal to 110 households per MW (Colorado PUC 2020). In California, where subscription sizes are much smaller, a 1-MW project could benefit approximately 500 households (Imperial Irrigation District 2019; Colorado PUC 2020). Although many programs do not report the number of LMI subscribers, we use 110 households per MW as a conservative estimate for programs without subscription details. Based on this calculation, conservatively, we estimate these programs will benefit more than 26,000 LMI households.

Outreach to Potential Subscribers

Equitable community solar project designs, financing strategies, and siting concerns play important roles in implementing accessible community solar projects, but subscriber outreach strategies also affect equitable community solar implementation. This section presents the key outreach features; for more details, see Heeter et al. (2018).

- **Subscriber Eligibility:** Households with low or no credit scores face challenges participating in community solar projects. Projects that avoid upfront costs and enable participation on a pay-as-you-go basis are best suited to help these households overcome cost barriers. Other solutions include providing a loan-loss reserve mechanism or using alternative underwriting criteria like good billing payment history. For programs with eligibility requirements, making the eligibility consistent with pre-existing programs such as the Low Income Home Energy Assistance Program (LIHEAP), local utility programs, or allowing subscribers to self-attest to their income are potential approaches to achieving more equitable solar deployment.
- **Customer Outreach:** Making community solar interesting and relevant to the participant requires specific explanation of how the subscribers' monthly budget will be impacted. One approach is to provide information through referrals from friends or trusted government programs such as LIHEAP, similar to on-site solar marketing (NREL, 2020).
- **Partnership Outreach:** Under resourced households could be renters, multifamily housing agencies, and other housing complex types. Collaborations with different kinds of organizations, therefore, are important for supporting customer acquisition and subscription management. Effective partnership outreach often includes participating utilities, community solar project developers, nongovernmental organizations, housing authorities, and existing LMI energy efficiency programs.

- **Messaging and Communication:** An LMI customer survey conducted by the Pacific Consulting Group indicates that messaging focused on the utility bill is the most effective form of communication to market community solar, followed by other lower-cost approaches such as TV and direct mail (Heeter et al. 2018). Three elements are needed when communicating with LMI customers. First, the costs and benefits of participation should be transparent, to reduce skepticism by LMI customers, who may have been previously targeted with misleading electricity products. Second, marketing materials should be designed to reach customers in their native languages and should include basic educational information about the community solar project. Third, using pilots to test messages provides a chance to improve messaging and increase communication effectiveness.

Conclusion

Community solar provides opportunities for people without rooftop solar to access renewable energy, and the efforts on equitable community solar developments are still in the early stage. Most equitable community solar project deployments are driven by state renewable mandate, financial incentives, and LMI carve-out. As a result, projects dedicated to historically excluded households are small compared to the total community solar capacities. More efforts are required to address the financing, system siting, customer outreach, communication, and eligibility issues to expand the equitable community solar market.

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Appendix

Table A.1 Equitable Community Solar Programs in the United States *For programs that have no links, see additional information in Heeter et al. (2018).*

State Program	State	Year	Level	Program Status (Launch Date)	Program Structure
California Multifamily Affordable Solar Housing (MASH)	CA	2015	State	Closed to new applicants (2015)	Incentives for solar systems on multifamily housing
California Solar on Multifamily Affordable Housing (SOMAH)	CA	2019	State	Active (2019)	Financial incentives for installing PV solar systems on eligible multifamily affordable housing
California Imperial Irrigation District CS	CA	2019	Project	Active (2019)	Launched a 30-MW new community solar project dedicated to low-income customers
Colorado Xcel Energy Settlement	CO	2017	Program	Launched (2017)	13.5 MW of RFPs for new LMI community solar systems, with Xcel Energy assuming 5% carve-out through new program (under development)
Colorado Low-Income Community Shared Solar Demonstration Projects	CO	2015	Project	Closed (2015)	Incentives for 1.5 MW of dedicated LMI community solar arrays
Colorado Community Solar Gardens Act	CO	2011	State	Active (2011)	Specified LMI participation levels: 5% of each project designated through rulemaking
Connecticut Shared Clean Energy Facility Pilot Program	CT	2017	State	Active (2017)	5.2 MW across three projects, with 20% LMI participation in each; Senate Bill 9 (2018) made the Shared Clean Energy Facility program permanent, allowing up to 25 MW of projects per year, with 10% of capacity towards LI subscribers, 10% to LMI or LI service organizations
District of Columbia Solar for All	DC	2016	State	Active (2016)	Program required to reduce electricity bills of at least 100,000 LI households by at least 50% (community solar is one piece of this program); incentives for demonstration projects
Florida SolarTogether Program	FL	2020	Program	Active (2020)	FPL SolarTogether Phase I will reserve capacity for low-income customers. FPL will allocate 10% of the residential capacity, or 37.5 MW, to low-income customers
Hawaii Community-Based Renewable Energy	HI	2018	State	Active (2018)	Specified LMI participation levels: 50% for 9 MW of utility-led projects
Illinois Community Renewable Generation Program	IL	2018	State	Launched (2018)	Incentives to LMI customers or developers: 37.5% of Solar for All funds will subsidize LMI customer for community solar participation; 22.5% of funds will go to LMI community solar pilot projects
Massachusetts Virtual Net Metering	MA	2017	-	Phasing out (2017)	Incentives to LMI customers; LMI customers are eligible for low-interest financing from the Mass Solar Loan program
Illinois Solar for All—Low Income Community Solar Program	IL	2018	State	Active (2018)	The budget for the Low-Income Community Solar program is up to \$12.5 million per year, making it a highly competitive application process for approved vendors. Qualified participants who subscribe to a Low-Income Community Solar project do not incur upfront costs, and any ongoing costs and fees will not exceed 50% of the value of the energy produced.
Illinois Low-Income Community Solar Pilot	IL	2019	State	Active (2019)	Rather than applying to the Illinois Solar for All Program and receiving an administratively determined REC price (as is the case for the other Illinois Solar for All sub-programs), projects selected through the Low-Income Community Solar Pilot will receive a \$/REC price determined through a competitive bidding process.
Solar Massachusetts Renewable Target (SMART)	MA	2018	State	Active (2018)	1,600-MW declining block net-metering program. Community solar serving at least 50% low-income customers receives an added 6 cents/kWh; low-income community solar projects less than 25 kW will receive 230% of the base compensation rate
Maryland Community Solar Energy Generating Systems Pilot Program	MD	2017	State	Pilot (2017)	Specified LMI participation levels: 60-MW carve-out for projects where LMI customers own 20% of output; additional 60-MW carve-out for "small" projects, including projects with more than 50% LMI participation

Appendix (cont.)

State Program	State	Year	Level	Program Status (Launch Date)	Program Structure
Michigan Energy Office's Low-Income Community Solar Program	MI	2018	State	Active (2018)	Partnered with Cherryland Electric Cooperative and Northwest Michigan Community Action Agency to deliver \$350/year in additional savings for participating, previously weatherized, low-income households.
Minnesota Xcel 2019 Solar*Rewards Program	MN	2019	Program	Launched (2019)	Xcel Energy opened its 2019 Solar*Rewards Program for residential and commercial customers on Jan. 28, 2019, with approximately \$1 million of the \$10 million program earmarked for its Income-Qualified Customers program.
Minnesota Community Solar Gardens	MN	2014	State	Active (2014)	Utilities are required by commission to submit plans for LMI projects. Xcel's pilot proposal involves a 0.5- to 1.0-MW system providing free subscriptions to low-income customers
New Hampshire Low-Income Community Solar Act	NH	2019	State	Active (2019)	Allows eligible LMI community solar projects to receive 3 cent per kwh addition from July 1, 2019 through July 1, 2021 and a 2.5 cent per kwh addition thereafter for low-moderate income community solar projects
New Jersey Community Solar Energy Pilot Program (Senate Bill 877)	NJ	2019	State	Active (2019)	Senate Bill 877 directs the Board of Public Utilities to develop a community solar pilot program; the program must "provide access" to LMI customers. In Year 1, at least 40% of program capacity (i.e., at least 30 MW) will be allocated to LMI projects
Nevada Assembly Bill 465	NV	2019	State	Active (2019)	25% of program capacity must be for low-income eligible customers
Con Edison "Shared Solar" Project for Low-Income Customers	NY	2018	Program	Active (2018)	While the pilot project will initially produce 3 MW of power, Con Edison could propose and seek Commission approval of an expansion to 11 MW that could serve a total of 6,000 customers if the pilot is deemed successful
NYSERDA Low Income Community Solar Initiative Through Solar For All program	NY	2018	State	Active (2018)	NYSERDA announced that nine community solar projects throughout New York have been awarded contracts through the Solar For All program. This is the first in a series of awards under the program to provide access to no-cost community solar to 10,000 low-income New Yorkers.
NY Affordable Solar Predevelopment and Technical Assistance program	NY	2017	State	Closed to new applicants (2017)	Provides incentives to LMI community solar customer. As of Q3 2019, 21 projects (26 MW total, or 21 MWac) proposed have been approved.
Oregon Community Solar	OR	2016	State	Active (2016)	Specified LMI participation level of 10%; rules under development
La Loma Community Solar farm	TX	2018	Project	Active (2018)	Austin Energy, with the completion of La Loma Community Solar farm in East Austin, provides 100% local solar to 440 participating customers, including 220 low-income households
Oregon Community Solar (Senate Bill 1547)	OR	2016	State	Active (2016)	The community solar legislation and rules require that 10% of the program capacity serve low-income customers. The initial PUC guidance suggests a requirement that each project have 5% allocated to low-income customers.
Community Solar for Community Action	VT	2019	Project	Closed to new applicants (2019)	This innovative project will consist of a 150-kW ground- and roof-mounted solar array sited on Southeastern Vermont Community Action's (SEVCA's) property in Westminster, VT. Approximately 70 of SEVCA's low-income clients with high energy burdens will become subscribers to the solar project, and receive virtual net metering credits as a form of energy assistance.
Rhode Island Community Remote Net Metering	RI	2016	State	Active (2016)	Incentives to LMI developers: \$200/LMI subscriber bonus to developer that is passed on to LMI subscribers
Duke Energy Shared Solar Program	SC	2018	Program	Active (2018)	Duke's 5-MW community solar program involves 1 MW of shared solar, of which 400 kW are carved out for low-income customers in the company's South Carolina territory
South Carolina Electric & Gas Program	SC	2017	Program	Active (2017)	The SCE&G program, which reached full subscription for all customers (both LMI and non-LMI) in October 2017, includes 1 MW of capacity specifically for LMI customers
Virginia Shared solar program	VA	2020	State	Active (2020)	Under the new statute, the Commission must approve a shared solar program of 150 MW with a minimum requirement of 30% low-income customers
Solar Deployment Grant Program—Clean Energy Fund	WA	2019	Program	Active (2019)	This program is for the deployment of solar projects in Washington state. Applications are now open for a new grant solicitation focused on Low-Income Community Solar Deployment.
New Mexico Senate Bill 84	NM	2021	State	Active (2021)	This bill paves the way for a statewide community solar program in 2022 that includes a 30% capacity carve-out for low-income people and service organizations