LIFT Solar Project Data Collection

The LIFT Solar team collected data detailing community solar projects that specifically serve low- and moderate-income (LMI) customers. The team first established a definition for projects that included community solar (CS) projects that mandate a minimum level of project capacity to serve customers either through a carve-out or income eligibility generally. Initial data was gathered from state programs with legislative mandates for LMI participation in CS. For example, the MA SMART program, Illinois Solar for All, DC Solar for All, etc. Program administrators for these and similar programs typically publish data for projects awarded funds through their programs. Utilities and public commissions also publish interconnection reports that include LMI specific CS projects and data. Third-party reporting that included LMI CS project data and case studies was also leveraged, including reports from the National Renewable Energy Laboratory (NREL), Lawrence Berkeley National Laboratory (LBNL), the U. S. Dept. of Energy (DOE), as well as state energy offices, advocacy organizations, and the solar industry. A draft database of over 400 projects was created in early 2021.

In 2021, NREL collected data on CS installations across the U.S. for its "*Sharing the Sun, Community Solar Deployment, Subscription Savings, and Energy Burden Reduction*" database and report (Heeter and Xi, 2021). This report included data indicating LMI participation. The LIFT Solar team coordinated with NREL to share and reconcile data collected on CS projects nationally. Our definitions for LMI community solar were also reconciled, i.e., defining LMI community solar as any project that is mandated to serve LMI households, whether through income eligibility or carve-out requirement. No specific income definition was used, although most programs determined eligibility based on third-party LMI energy program eligibility, area median income (AMI), or HUD-defined poverty levels. One notable difference between LIFT Solar data and NREL data is that LIFT Solar only included data for CS projects that were allocated funds for specific installations by program administrators. NREL included all stated capacity for CS programs, even if funds were not yet allocated to specific projects.

Once a project database was reconciled, the LIFT Solar team began documenting key project data relevant to LMI CS projects to inform several important research efforts, as well as the tools made available in the LIFT Solar Tool Kit. Some data variables were consistently provided across all sources. But most were not. For example, some sources published project capacity in alternating current (AC) and others in direct current (DC). Some capacity data was based on initial project or interconnection application assumptions, while others were based on energized capacity. Some projects provided specific subscriber numbers and LMI participation, while others did not. To gather missing data and reconcile inconsistencies, the LIFT Solar team engaged project owners, program administrators, and researchers to finalize the database. As such, there remain gaps and some assumptions were made to allow the team to complete our research and build our tools. The data dictionary below provides some detail on how this reconciliation was done. We encourage project owners and program administrators to share any incorrect or missing data with the LIFT Solar team to help manage this important resource moving forward.

Field	Definition	Description/Approach
Installation Name	The distinct name of the specific installation. Multiple installations may be part of a community solar project.	Program administrator and interconnection reports were the most common source of project installation names. Note that installation names often changed from initial funding application to interconnection applications and energization. Projects were often sold, resulting in further name changes.
Program Name	The name of the program providing funding and/or managing the qualifications and requirements of participating projects. Typically a state or other government agency or their administrator.	Program names are often consistent and come from legislative mandates (usually at the state level). Some programs are local and some are pilots not mandated legislatively. In instances where no specific program governs the project (often pilot projects, no program name is given and the project name is used.
Installation type	Roof, ground, canopy, or combination.	The installation type is typically detailed in program administrator or interconnection reports. In rare instances, further research was needed.
Year Energized	The year the project was energized and produced energy for the first time.	The most reliable source for year energized are interconnection reports. Some program administrators list energization year based on application dates or dates funding was awarded. This presents some inconsistencies. Where possible, energization dates were reconciled with interconnection reports.
GeoCode	Geographical coordinates corresponding to a specific location, represented in longitude and latitude.	In most cases, specific installation locations were found and visually confirmed through tools like Google or Google Earth. GeoCodes were easily captured where installation could be visually verified. Other installation locations could not be specifically located or visually confirmed. In these instances, GeoCodes representing zip codes or even towns were used as proxies. The Geocodes are used to define an installation's position on the LIFT Solar project map.
Address	The street address of the physical installation.	Many installations, especially ground mount, do not have traditional street addresses. This field was often left blank. But, since GeoCodes were used to populate map locations, the street address was not required.
City/Town	The name of the city or town where the panels were installed.	The city or town where the installation was located is typically included in program administrator and interconnection reports. However, some installations, especially ground mounted, are not located in incorporated areas and may not have a specific town name. Some reports include the name of the closest town. So, some differences may be present.

State	The name of the state where the installation is located.	The state was consistently indicated because programs and interconnections must be state specific.
Zip	The zip code where the installation is located.	In most instances, the zip code is clearly indicated. But, similar to the city or town, where installations are difficult to verify visually, zip codes may be difficult to determine. Some were left blank.
Project Status	Operational or Pending.	The status for most projects were indicated and could be confirmed through interconnection reports. But a number of projects did not have a clear indication of whether energization happened. Some projects were awarded funds and even granted interconnection but were never built or interconnected. Also, importantly, the time taken for gathering data was long enough that some projects initially indicated as pending in this database may have been energized after the release of this database.
Utility Name	The name of the utility whose service territory the installation was located and interconnected.	Utility names were typically included in program administrator or interconnection reports. Where the utility name was not provided, the city, town or zip code allowed us to confirm the utility..
Project Developer or Owner	The name of the legal entity that developed or owns the community solar project.	The name of the solar developer is not always the name of the project owner. Ownership also commonly changes from the development stage to project energization. This inconsistency was somewhat resolved by combining these two fields into one. Another common issue is that the developer or owning entity may be an LLC and affiliations to other organizations or companies is difficult to find.
Project Capacity KW-AC	The overall capacity of a specific installation as indicated by nameplate capacity in Alternating Current (AC).	Determining the capacity of a given installation is limited by some disparity in reporting from program administrators or interconnection reports. Capacity is often first published from data collected at the time of funding or interconnection application. The final, energized system may have a different capacity. Where projects are listed in interconnection reports, that capacity was used. Otherwise, capacity was determined through initial application records. Some projects increase in size over time, with additional panels added after initial energization. Where the additional capacity can be verified through reports, that capacity was used.
System Size Category	<500 KW-AC, 500-1999 KW-AC, 2000 KW-AC+	Indicates system capacity in KW-AC, once established, as one of three categories.

LMI Share of Capacity	The share of the overall AC capacity of the given installation as a percentage dedicated to serving LMI households.	The specific LMI share is difficult to ascertain with available data. In some instances, data is published with numbers of LMI households versus non-LMI households. But this may not be an exact representation of that share in terms of KW-AC. In some instances, there may be mandated carve-out listed as a percentage of overall capacity. Where project owners or administrators provide specific numbers, that data was used. Where no data is available and programs state a specific minimum share of capacity as a program requirement, that minimum as used. In many instances, project capacity is 100% dedicated to LMI households.
LMI Project Capacity KW-AC	The share of LMI capacity in KW-AC.	Once a share is established and the system capacity is known, we can calculate the LMI share as KW-AC.
LMI Requirement	Carve-out, income eligible, other.	All projects in the database must mandate that LMI households are served. In all cases, our projects fell into one of two categories: Carve out or income eligible. For carve-outs, a specific percentage of system capacity is set aside for LMI households. For income-eligible, all subscribers must meet LMI income eligibility requirements. Many state programs are designed to have specific carve-outs. Others are dedicated to LMI households. Program administration or legislative and regulatory documentation provides this specific guidance. In the case of pilot projects, each individual project states its own requirement.
Utility Type	1 = Investor-Owned Utility (I.O.U.) 2 = Electric Membership Cooperative (Coop) 3 = Municipally-Owned Utility (Muni)	All utilities, once identified, are categorized into one of three types via easily available public information.
Regulatory Structure	1 = Regulated 2 = Deregulated	Each U. S. state is either regulated or deregulated. This is available through the DSIRE database and other easily accessible public information.
Energy Rate Average	The average cost of a kilowatt hour for the state.	This was gathered via the Energy Information Administration (EIA) database.
Energy Rate Category	1 = Below Average (=<$.11 per kWh) 2 = Average ($.11 to $.15 per kWh) 3 = Above Average ($.15+ per kWh)	The state average cost of a kilowatt hour indicated as one of three categories.
Community Solar Bill Credit Value	1 = Retail Rate 2 = Value of Solar 3 = Supply-Only/Avoided Cost	Where CS is enabled through legislative or regulatory action, the bill credit rate is established as a regulatory requirement. In these states, the bill credit rates are published through these regulatory documents

		and through resources like the DSIRE database. In states where no enabling legislation exists, bill credit rates are typically established voluntarily by utilities. This is the case for most pilot projects in this database. In these instances, research was conducted at a project level, typically by outreach to project administrators or utilities, to determine the greed rate structure applied to the project.
Community Solar Enabling Legislation	1 = Enabling legislation enacted 2 = No enabling legislation, but projects piloted 3 = No enabling legislation or projects	While the legislative and regulatory landscape changes quickly at the state level, several resources exist that document the current state of community solar regulations, including through NREL, as well as the DSIRE database.
Value of State Level RECs & Subsidies	1 = Poor (Less than 20% of value stack) 2 = Moderate (20% to 50% of value stack) 3 = High (More than 50% of value stack)	Generic calculations were done to include the value of readily available incentives or RECs in compliance markets. The Elevate community solar business case tool was used. The combination of RECs and incentives was calculated as a percentage of the full value stack. That percentage was placed into one of three categories. Only compliance markets were considered
Eligible for Tax Benefits	Yes or No, the project was able to capture tax benefits.	For the project database, this indicates whether project developers claimed the Investment Tax Credit, depreciation, or used tax equity investment to enhance the value stack for this project. It is difficult to get project specific financial information, as this is proprietary. Where developers were commercial entities, we assumed Yes. For nonprofit and publicly owned projects, research was conducted via developers, owners, and case studies to determine whether tax equity investment was used. Where no verification was possible for nonprofit and public projects, No was assumed.
LMI Customer Savings (category)	1 = Pays a Premium (pays more for electricity than utility rate) 2 = Low (Below 20% savings) 3 = Moderate (>20% but less than 50% savings) 4 = High (Greater than 50% savings)	Once the savings rate has been determined, they are categorized into four ranges of savings.
LMI Customer Savings %	The percentage of savings an LMI customer receives. Typically determined as a savings per kWh, i.e. community solar rate subtracted from the utility rate, divided by the utility rate.	Community solar programs have either a specific, established savings requirement or a minimum savings requirement. Where established savings rates are indicated, those were used. For programs with minimum savings requirements, research was done through program administrators or subscriber management organizations to determine

		the specific savings offer. Where no specific savings offer was found, the required minimum was used. For non-program projects, similar outreach was done to program administrators or subscriber management organizations to determine savings levels.
Minimum LMI Savings Mandated	Yes or No, the program is governed by regulatory requirements for specific savings levels.	Some programs or projects may have a specific savings requirement. Regulatory documents are the primary source for whether or not these minimum savings requirements exist. Program administrators and subscriber management organizations were sources in some instances where regulatory information was not.
Potential # LMI Subscribers	The number of LMI subscribers served by this installation.	Captured either by 1) specific numbers of LMI subscribers indicated by project administrators, or 2) the established percentage of LMI capacity times the overall capacity. Where specific numbers of subscribers are published, those numbers were used. Where no specific number of subscribers are published, we assumed an average of 2.5 KW per subscriber.