



Customer Experience Benchmarking Analysis

Accelerating Low-Income Financing and Transactions for Solar
Access Everywhere (LIFT Solar)

May 2020



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Insights from this benchmarking research provide a basis and foundation for the LIFT research project’s continuing analysis of community solar programs and how these programs may be shaped to optimize benefits, access and service for low- and moderate-income residential utility customers in every state, under all forms of utility business models.

This report is part of the overall research project known as “Accelerating Low-Income Financing and Transactions for Solar Access Everywhere, or LIFT Solar. It is supported by the U.S. Department of Energy’s Office of Energy Efficiency and Renewable Energy (EERE) under the Solar Energy Technologies Office Award Number DE-0008567.

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1. Executive Summary: “Customer Centered-Innovation” Needed

How often have you been surprised during the baseline phase of a multi-year research project?

In initiating research regarding historic energy efficiency programs, the LIFT research team hoped to reveal patterns in the customer experience practices of energy utilities and municipalities that could be used as a baseline for improved, sustainable program elements in community solar and solar programs offered in the United States. The organizations collaborating in LIFT and our supporting Federal agency, the US Department of Energy, share the mission of accelerating access to clean energy generation for our low- and moderate-income neighbors; we all share the goal of optimizing benefits to our most vulnerable families, while making community solar and solar programs financially sustainable to the utility, municipality or program sponsor. LIFT sought to collect data first from utility-sponsored energy efficiency programs (broadly including demand side management, weatherization, and other energy saving programs) that might identify low- and moderate-income (LMI) ratepayers within their programs, and provide data on customer experience/behavior measures that could inform similar program elements for solar programs serving LMI families.

What we discovered was that, first, even successful energy efficiency programs often did not conduct significant customer engagement activity. Secondly, when program managers did inquire as to **why** customers signed up to participate (motivation), the programs did not identify customers by income level. And asking customers whether they were “satisfied” by the programs in which they participated (satisfaction) was rare, and inconsistent across programs even within the same utility.

Developing Customer-Centered Innovation: Good service depends on actually *servicing* – knowing what customers want and need; listening to customers; engaging with customers to make sure they understand that the services they receive are delivering the benefits and savings customers expect. The needs and expectations of LMI customers may differ from those of higher-income customers. Additional engagement with LMI customers; asking, listening and establishing trust with these customers may take different effort for the utility or community solar program manager.

LIFT will address this ‘gap’ in clean energy customer engagement by designing and administering our own customer experience survey for LMI ratepayers of solar and community solar programs. We plan to devote the next phase of our research in active partnership with utilities and solar program managers, helping answer the question of what our LMI neighbors want from community solar – whether renters or homeowners, and whether they are served by investor-owned utilities, municipally-owned utilities or rural cooperatives. As research progresses, LIFT will integrate customer experience data with project-level financial outcome data, informing a “Tool Kit” of optimal program and financing elements for future community solar and solar programs.

We look forward to partnering in customer experience engagement! Contact us at: LIFTsolar@groundswell.org

2. LIFT Solar Summary

Supported by funding from the U.S. Department of Energy, the Accelerating Low-Income Financing and Transactions for Solar Access Everywhere project (LIFT Solar) seeks to advance low- and moderate-income (LMI) clean energy and resource efficiency delivery and financing models through research and the development of tools and resources for program administrators and stakeholders. LIFT Solar has conducted benchmarking research of existing LMI clean energy and resource efficiency programs to assess customer experience and financial performance at the program or project level. This benchmarking research will inform and guide primary research in the latter stages of the LIFT Solar project through customer experience survey research of participating programs across the country, culminating in the delivery of the LIFT Solar Tool Kit. With this tool kit, the LIFT Solar project team seeks to enable rapid scaling and adoption of solar, both distributed generation (onsite) and community solar, for LMI customers nationwide. This benchmarking research may also provide insights and recommendations that will help clean energy and resource efficiency program administrators nationally serving LMI participants design and measure meaningful customer experiences that will enhance the programs and financial products being offered.

LIFT Solar primary research may encompass multiple solar services, including community solar, residential rooftop solar, and bundled energy efficiency/solar programming. It will assess the financial performance of participating delivery programs, including innovative financial customer delivery models. Where possible, the primary research will also consider diverse state regulatory environments, housing status (renters and homeowners in multifamily and single-family housing), and utility business models (investor-owned, municipally owned, and rural cooperative). By advancing a thorough understanding of these emergent models and measuring delivery success through both customer experience and financial performance, LIFT Solar will deliver essential research that, when applied, will help emerging, advancing, and maturing state marketplaces to more rapidly accelerate LMI solar photovoltaic (PV) access.

This research will examine LMI PV programs or projects that represent a minimum of three innovative finance and associated customer enrollment and support models designed to expand LMI access to residential rooftop and community solar:

- “Pay as You Save” (PAYS), a tariff-based structure for utility-financed residential rooftop and community solar access that pays for solar with shared savings. PAYS is open to all customers, regardless of income, credit score, or home ownership status.
- Credit enhancement that leverages alternative finance, including loss reserves that may be offered through foundations, municipal authorities, or public-private partnerships.
- Private finance, including community development finance, using an innovative credit structure that mimics utility credit structures. This model is market-based, leverages private finance, and can eliminate financial barriers to LMI participation including consumer credit scores and up-front payments.

The participating programs will be measured using a consistent set of customer experience and financial performance metrics to better understand performance variations and overall success of different approaches to delivering solar to LMI customers. Research will be conducted across delivery programs administered both by LIFT Solar project partners and other participating organizations voluntarily participating in LIFT Solar research. A final set of deliverables that includes the LIFT Solar Tool Kit will be designed so that service providers may easily access research results, apply findings, and use the analysis and case study examples to inform the adoption of recommended program design elements identified in this research.

2. Benchmarking Analysis

2.1 The Importance of Customer Experience Research

Customer Experience research is critical for program design and optimization, especially for solar and low-income solar, where markets are often just emerging or not yet mature. Capturing the drivers of program participation, program understanding, and customer satisfaction can not only measure the success of program delivery but may also provide guiding principles for sustaining success over long term administration. Customer experience research can also help provide a deeper understanding of financial performance and provide pathways to optimize that performance. For LIFT Solar, customer experience research will help to inform and calibrate financial performance research, allowing for variances or anomalies in financial performance of participating programs to be assessed through the lens of customer experience. This will provide insight into whether the financial products being offered deliver anticipated results and meet customer expectations. This benchmarking analysis has been conducted primarily to shape the research framework for administering customer experience survey research in program years two and three to ensure a consistent measure of customer experience is conducted across all participating projects and programs. This analysis may also provide important insights for clean energy and resource efficiency program administrators more broadly, supporting the acceleration of effective LMI solar PV delivery nationally.

2.2 Establishing the Research Framework

LIFT Solar will establish a primary research framework that will guide the collection of data from emerging and in-progress LMI solar projects or programs. This framework will incorporate customer experience and financial performance research, including a survey research design established from this analysis of program data from past clean energy and resource efficiency programs. The programs assessed in this report are primarily energy efficiency programs delivering services specifically to LMI customers. This report represents the outcome of that benchmarking analysis.

LIFT Solar will establish separate primary research methods for customer experience and financial performance, linking the two in the final analysis and delivery of the LIFT Solar Tool Kit. The final analysis of primary research results will help administrators understand a common measure of success for program delivery to LMI customers based not just on the financial performance of the finance models being offered, but also on customer experience, including adoption rates, motivations, assessment of barriers, customer satisfaction, and

other important aspects. Customer experience research may provide insight into why variances in financial performance exist across finance models or calibrate differences by illustrating common customer experiences.

2.3 Data Collection and Data Management

Data for this benchmarking analysis was collected from prior energy programs administered by project partners, including Groundswell, Clean Energy Works, Southface, and Elevate Energy. A data call was announced in January 2020 for external organizations to provide datasets to include in LIFT Solar analysis for both customer experience and financial performance benchmarking. It became clear early in this process that while financial data was often available, customer experience data for energy programs is not common and even less so for programs serving LMI customers. Where programs do have customer experience data, the data collected is rudimentary and often collected by utilities, which are less likely to share data that is not required to be public. As such, the customer experience analysis focused on several datasets provided by project partners and relied on secondary research and a literature review to support the analysis. The secondary datasets and reports that were reviewed for this analysis are listed in the Appendix of this report.

This important finding also suggests that executing customer experience research, typically through survey research methods, is not common and may present a barrier to participation in LIFT Solar. As such, the primary research framework will be adjusted to allow the LIFT Solar team to develop and implement the primary customer experience research for all participating partners throughout the project timeline. This will include programming survey delivery in multiple methodologies, data collection, data cleaning and aggregation, and tabulations. By taking a facilitating role in the data collection for LIFT Solar primary customer experience research across program partners, it is hoped that barriers to participation are minimized and the data collection process is simplified for this critical component of the research.

2.4 Data Analysis

The primary dataset used for this analysis was data collected via electronic and paper survey research for the Energy Impact Illinois (EI2) program. The EI2 program, now completed, provided incentives for single family and small multifamily property owners in Illinois to complete energy retrofit and weatherization measures. The sample size of respondents that completed retrofits was approximately $n=3,500$ and those that completed surveys was $n=617$. Data was analyzed for all respondents and, where possible, responses were compared across households in census tracts that have a density of more than half of the households being 80 percent or more of Area Median Income (AMI) versus those that are not. Statistical tests, including t-tests and chi-squared tests, were used where feasible to identify statistically significant differences in customer experiences between LMI and non-LMI communities.

3. Customer Experience Findings

3.1 Energy Burden and Customer Savings

3.1.1. Defining Energy Burden

Energy burden is defined as a high ratio of energy expenses to household income. Clean energy and resource efficiency programs serving low- and moderate-income households, including energy efficiency, water efficiency, and solar programs, aim directly or indirectly to reduce or eliminate energy burden for participants. Based on Elevate Energy’s analysis of the 2013 Panel Study of Income Dynamics (PSID) data, U.S. households spent, on average, 6 percent of their annual household income on residential energy costs.¹ Low-income households making less than 200 percent of the Federal Poverty Line (\$31,020 for a two-person household during the same time period)² paid more than 13 percent of their income on energy costs, compared to 3 percent for all other households. Energy burden can vary substantially by location. The American Council for an Energy-Efficient Economy (ACEEE) found that 25 percent of all low-income households live in extreme energy poverty, with an energy burden greater than 14 percent.³ Energy burden reduction is an important metric for any energy program serving LMI households. But, the data needed to tie energy burden to customer specific data can be complex and problematic.

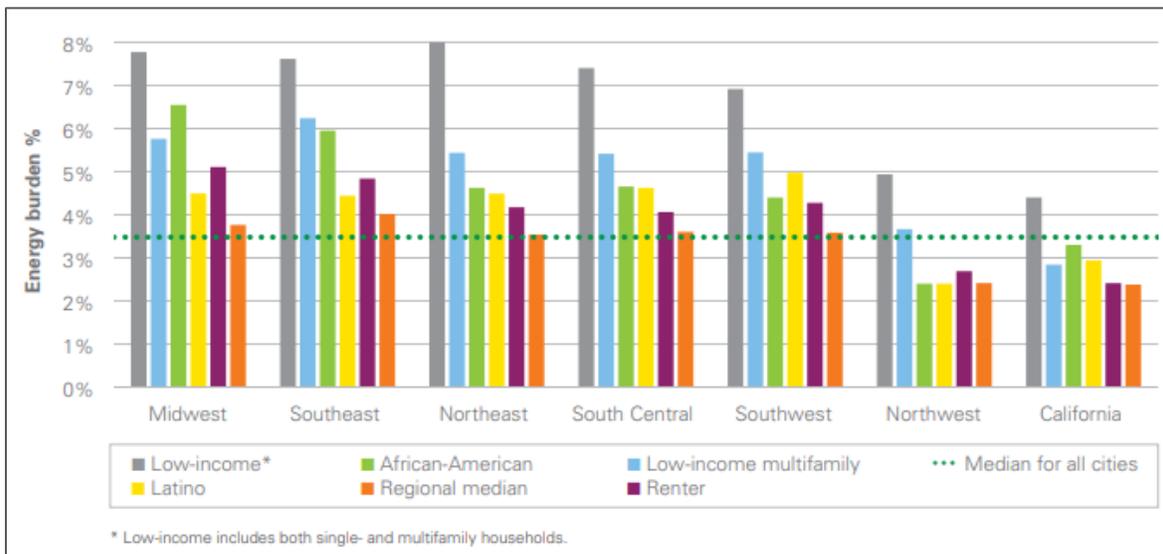


Figure 1: Energy Burden of Select Groups by Region
 Ordered from highest to lowest based on the average of the median energy burdens across all groups.
 American Council for an Energy-Efficient Economy

3.1.2. Defining Savings

Measuring savings for clean energy and resource efficiency programs can be challenging, especially for low- and moderate-income participants. But understanding customer savings levels can provide important insight into

¹ Figures on energy and water costs, as well as energy burden, are taken from the Panel Study of Income Dynamics, the 2013 panel of responses. Only respondents that paid for their own utilities were included.

² The average household size was around two and the low-income limit was adjusted for each individual household.

³ ACEEE: Lifting the High Energy Burden in America’s Largest Cities; Ariel Drehobl and Lauren Ross.

financial performance. Savings is typically not well defined and can mean several things, like the ratio of the participant's cost at a per kilowatt hour rate compared to their average net metering credit as a per kilowatt hour rate. Savings can also be measured as the projected ratio of the reduction in electricity costs from the participant's electricity bill after installing the measure compared to their total electricity bill prior to installation. Some programs include fixed electricity bill costs in their savings calculation, and some do not. Savings captured at the program level typically do not consider all energy costs (electricity, gas, and water, for example) and cannot, therefore, accurately measure reductions in energy burden.

3.1.3. Defining and Calculating Energy Burden Reduction

Defining and calculating energy burden is not difficult. It is the ratio of all energy expenses to household income.

$$\frac{\text{Total Energy Costs Annually}}{\text{Total Household Income Annually}} = \text{Energy Burden percent}$$

A reduction in energy burden is calculated by comparing the energy burden before and after the installation of the delivered energy measures. Capturing the data required for an energy burden calculation, however, can be difficult because it requires all household income and utility bill data. This presents challenges for program administrators in collecting and managing sensitive personal data and can introduce consumer protections issues that may be regulated in some markets.

For programs that collect income data for eligibility verification, collecting the additional utility expense data may not be a significant additional barrier. Energy burden metrics must integrate savings to illustrate the reduction in energy burden. For most programs, the savings will be projected as participants enter the program. This projected savings can be used to determine the reduction in utility costs when calculating energy burden after program qualified energy measures are installed.

$$\text{Energy Burden prior to energy measures installed} - \text{Energy Burden after energy measures are installed} = \text{Energy Burden Reduction}$$

Capturing reductions in energy burden, however, may be problematic for participating LIFT Solar programs or projects. As described further below, capturing income and utility data, especially self-reported data via survey research, is problematic in many ways and not recommended for this research. However, analyzing projected savings, along with nationally available energy burden and income data at the census tract level may provide some insight into the impact of participation on energy burden. For example, the Low-Income Energy Affordability Data (LEAD) Tool, developed by the U.S. Department of Energy’s office of Energy Efficiency and Renewable Energy (EERE), provides granular data of this kind, nationally⁴.

3.1.4. Calculating Savings

Collecting savings data can be done at the program level rather than as part of customer experience research – especially when savings levels are mandated and consistent for all participants. For most solar programs, savings calculations will vary based on the participant models being offered. For example, many solar programs offer system purchase, system lease, and/or kWh-block/PPA participant models. While these calculations can be complex, they are almost universally done by program administrators or solar providers when proposing solar systems, shares, or contracts. Each may be measured differently, but the premise is the same:

$$\text{Total Energy Value received over the term of the agreement (typically via net metering)} - \text{Total Costs over the term of the agreement (all costs and fees)} = \text{Total Savings}$$

⁴ Low-Income Energy Affordability Data (LEAD) Tool; <https://www.energy.gov/eere/slsc/maps/lead-tool>.

System/Panel Purchase participant models:

Total costs over the term of the agreement will include all fees and costs for energy delivery and installation, whether upfront payments or loan premiums, and capital costs over time. The energy value is determined in the same way regardless of participant model, by establishing the projected energy or net metering value, in this case, over the life of the system (25 years). This will vary by the customer’s electricity rate and tariff structure, and may assume a full retail rate, supply rate, avoided cost, or a combination of offset and energy export rates for each utility. Energy escalation rates must be clearly stated and factored into costs/savings, as should assumed system energy production and degradation over time. Below is an example of a savings calculation chart for system ownership over 25 years.

Year	Energy Prod. kWh	Customer Energy rate	Customer Energy value	Customer payments	Customer Savings \$	Customer Savings %
1	6,150	\$0.1248	\$767.52	\$318.00	\$449.52	58.6%
2	6,119	\$0.1269	\$776.67	\$318.00	\$458.67	59.1%
3	6,089	\$0.1291	\$785.92	\$318.00	\$467.92	59.5%
4	6,058	\$0.1313	\$795.28	\$318.00	\$477.28	60.0%
5	6,028	\$0.1335	\$804.76	\$318.00	\$486.76	60.5%
6	5,998	\$0.1358	\$814.35	\$318.00	\$496.35	61.0%
7	5,968	\$0.1381	\$824.05	\$318.00	\$506.05	61.4%
8	5,938	\$0.1404	\$833.87	\$318.00	\$515.87	61.9%
9	5,908	\$0.1428	\$843.80	\$318.00	\$525.80	62.3%
10	5,879	\$0.1452	\$853.86	\$318.00	\$535.86	62.8%
11	5,849	\$0.1477	\$864.03	\$0.00	\$864.03	100.0%
12	5,820	\$0.1502	\$874.33	\$0.00	\$874.33	100.0%
13	5,791	\$0.1528	\$884.74	\$0.00	\$884.74	100.0%
14	5,762	\$0.1554	\$895.29	\$0.00	\$895.29	100.0%
15	5,733	\$0.1580	\$905.95	\$0.00	\$905.95	100.0%
16	5,705	\$0.1607	\$916.75	\$0.00	\$916.75	100.0%
17	5,676	\$0.1634	\$927.67	\$0.00	\$927.67	100.0%
18	5,648	\$0.1662	\$938.72	\$0.00	\$938.72	100.0%
19	5,619	\$0.1690	\$949.91	\$0.00	\$949.91	100.0%
20	5,591	\$0.1719	\$961.23	\$0.00	\$961.23	100.0%
21	5,563	\$0.1748	\$972.68	\$0.00	\$972.68	100.0%
22	5,536	\$0.1778	\$984.27	\$0.00	\$984.27	100.0%
23	5,508	\$0.1808	\$996.00	\$0.00	\$996.00	100.0%
24	5,480	\$0.1839	\$1,007.87	\$0.00	\$1,007.87	100.0%
25	5,453	\$0.1870	\$1,019.87	\$0.00	\$1,019.87	100.0%
	144,869		\$22,199.39	\$3,180.00	\$19,019.39	85.7%

Figure 2: Common Customer Savings Calculation for System or Panel Purchase

5 kW behind-the-meter system, assuming 0.5 percent system degradation, 1.7 percent energy escalation, and a 10-year traditional loan.

Elevate Energy

System/Panel Lease participant models:

Total costs over the term of the lease agreement will include all fees and lease payments, including upfront costs or initiation fees. The energy value is typically determined in the same way regardless of participant model, by establishing the projected energy or net metering value. But for System/Panel lease models, the value is calculated only over the term of the lease or contract period, rather than the life of the system. Where system ownership reverts to customers at the end of the lease term, the energy value could be extended to the life of the system or 25 years. But these transfers typically require fees and decisions for buy-outs are not made until the term of the lease is over. Therefore, these should not be included as upfront assumptions for savings calculations. Like other participant models, the energy or net metering value varies by the customer’s rate and tariff structure and may assume a full retail rate, supply rate, avoided cost, or a combination of offset and energy export rates for each utility. Energy and customer payment escalation rates must be clearly stated and factored into costs/savings, as should assumed lease share energy production and degradation over time.

Year	Energy Prod. kWh	Customer Energy rate	Customer Energy value	Customer payments	Customer Savings \$	Customer Savings %
1	6,150	\$0.1248	\$767.52	\$372.00	\$395.52	51.5%
2	6,119	\$0.1254	\$767.50	\$373.86	\$393.64	51.3%
3	6,089	\$0.1261	\$767.48	\$375.73	\$391.75	51.0%
4	6,058	\$0.1267	\$767.46	\$377.61	\$389.85	50.8%
5	6,028	\$0.1273	\$767.44	\$379.50	\$387.95	50.6%
6	5,998	\$0.1280	\$767.42	\$381.39	\$386.03	50.3%
7	5,968	\$0.1286	\$767.40	\$383.30	\$384.10	50.1%
8	5,938	\$0.1292	\$767.39	\$385.22	\$382.17	49.8%
9	5,908	\$0.1299	\$767.37	\$387.14	\$380.22	49.5%
10	5,879	\$0.1305	\$767.35	\$389.08	\$378.27	49.3%
11	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
12	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
13	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
14	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
15	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
16	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
17	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
18	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
19	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
20	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
21	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
22	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
23	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
24	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
25	0	\$0.0000	\$0.00	\$0.00	\$0.00	N/A
				\$0.00		
	60,135		\$7,674.34	\$3,804.83	\$3,869.51	50.4%

Figure 3: Common Customer Savings Calculation for System or Panel Lease

5 kW behind-the-meter system, assuming 0.5 percent system degradation, 1.7 percent energy escalation, and a 10-year lease agreement.

Elevate Energy

Power Purchase Agreement or Per Kilowatt Hour Rate participant models:

Total costs over the term of the agreement will include all fees and payments per kilowatt hour over the term of the lease agreement. This assumes a set block of kilowatt hours purchased over the term of the agreement at a specific rate. The per kWh rate at which the customer’s PPA and the utility-purchased electricity escalates over time should be clearly stated and factored into costs. The energy value is determined in the same way regardless of participant model, by establishing the projected net metering value, in this case, over the contracted term of the agreement.

Year	Energy Prod. kWh	Customer Net Metering rate	Customer Energy value	Customer Per kWh Payment Rate	Customer payments	Customer Savings \$	Customer Savings %
1	6,150	\$0.1248	\$767.52	\$0.0600	\$369.00	\$398.52	51.9%
2	6,119	\$0.1254	\$767.50	\$0.0606	\$370.83	\$396.67	51.7%
3	6,089	\$0.1261	\$767.48	\$0.0612	\$372.66	\$394.82	51.4%
4	6,058	\$0.1267	\$767.46	\$0.0618	\$374.51	\$392.96	51.2%
5	6,028	\$0.1273	\$767.44	\$0.0624	\$376.36	\$391.08	51.0%
6	5,998	\$0.1280	\$767.42	\$0.0631	\$378.22	\$389.20	50.7%
7	5,968	\$0.1286	\$767.40	\$0.0637	\$380.10	\$387.31	50.5%
8	5,938	\$0.1292	\$767.39	\$0.0643	\$381.98	\$385.41	50.2%
9	5,908	\$0.1299	\$767.37	\$0.0650	\$383.87	\$383.50	50.0%
10	5,879	\$0.1305	\$767.35	\$0.0656	\$385.77	\$381.58	49.7%
11	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
12	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
13	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
14	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
15	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
16	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
17	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
18	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
19	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
20	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
21	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
22	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
23	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
24	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
25	0	\$0.0000	\$0.00	\$0.0000	\$0.00	\$0.00	N/A
					\$0.00		
	60,135		\$7,674.34		\$3,773.29	\$3,901.05	50.8%

Figure 4: Common Customer Savings Calculation for PPA Agreement

5 kW behind-the-meter system, assuming \$0.06 starting PPA Rate, 1.7 percent energy and PPA escalation, and a 10-year PPA agreement.

Elevate Energy

3.1.5. Collecting Savings and Energy Burden Data

It is immediately recognized that capturing savings and energy expense data is complex and problematic. Self-reported data is often inconsistent or incorrect. It can also be a barrier to participation because customers are reluctant to share this level of personal information. Data provided by program administrators, however, can mitigate much of this risk. The complexity created by working with administrator data is largely around privacy issues and the handling of personally identifiable information (PII). It is assumed that the primary research framework will include data that is collected by program administrators as internal data, as well as customer survey data. The savings data described below should be collected as internal administrator data. While all personally identifiable information should be removed, the savings data should be attributable to individual customer experience records. This will allow LIFT Solar analysts flexibility in creating energy burden reduction calculations using published, macro data (such as by census block) or to aggregate and classify findings based on

participant segments or financial product types. This individual customer identification can be done by using consistent customer identification numbers or other customer-specific variables added to the data.

Capturing Savings Data:

It is assumed that any solar program, whether the program offers distributed generation or community solar, System Purchase, System Lease, or PPA, will generate savings projections as part of the customer acquisition process. In many instances (especially for subsidized programs), savings levels are regulated or otherwise mandated. So, consistent savings levels and methods for calculating them are common across all participants or groups of participants. The key to this research framework with regards to capturing savings data is to establish a consistent calculation method, as well as consistent data requirements for all participating programs or projects. This may require some adjustments based on the available data or it may mean that some participating programs will simply not have the necessary data for this measure. It is the view of the LIFT Solar team that this will provide the simplest approach for capturing this in all instances and will not limit inclusion in the research if this data is difficult or unavailable.

The various methods of calculations described above are common across the industry. The critical aspect of the application for LIFT Solar partner programs will be in clearly defining the needed data to calculate savings metrics and to ensure the formulas used are consistent across all customers and datasets, even if variables like escalation rates differ. The customer-level metrics derived from the collection are as follows:

- **Program Type:** Distributed Generation or Community Solar
- **Contract Type:** System Purchase, System Lease, or PPA
- **Projected First-Year Energy Value:** Typically, the net metering or bill crediting value based on the projected energy produced by the customers system/share
- **Projected First-Year Costs:** All costs and fees the customer pays upfront and over the course of the first year related to purchasing solar energy through the program

The data to be captured from administrators is recommended to be as follows:

- **Program Type:** Distributed Generation or Community Solar
- **Contract Type:** System Purchase, System Lease, or PPA
- All customer costs and fees in year one of participation
- All costs and fees over the term of the contract
- All net metering benefits/bill credits projected over the first year
- All net metering benefits/bill credits projected over the term of the contract

Capturing Income Data:

Because participants in this research may or may not be LMI customers, researchers will need the ability to distinguish income in the analysis. However, self-reported income via survey research is not recommended because of the high risk of inconsistencies in interpreting the definition of income and the potential for this question to negatively impact cooperation rates. Administrators may, however, have data that indicates whether their participants are LMI. In which case, this identifier should be included in the data that administrators provide, absent any other personally identifiable information. The difficulty is that income and

income eligibility can be determined in many ways. For example, 80 percent or less Area Median Income is the most common definition for LMI households. But income can be based on a percentage of poverty or by living in census blocks with a high density of poverty. Based on the data received, a determination can be made as to the best way to indicate LMI households. Multiple definitions can be indicated differently in the data or any definition can be allowed as an indicator of LMI status as a high-level categorization.

3.2 Demographics

3.2.1. Classification and Demographics

Demographic data presents opportunities for segmenting and categorizing customers, and potentially for narrowing or isolating anomalies around program delivery or outcomes. But the more demographic data collected, the greater the potential for creating data collection barriers. Because the proposed customer experience research framework calls for data to be collected via survey research after solar installation/subscription in participating programs, the participant relationship to the program and its administrator may be strong enough to overcome these barriers. This is less the case when collecting data from households that started the process but chose not to participate with solar installation/subscription. In all instances, it is recommended that demographic questions be asked last in the survey sequence, because demographic and income information tends to be the most sensitive to collect and allows for a portion of customer experience data to be collected even if surveys are ended at the demographic stage. Demographic data that may help classify participants include:

- Urban/suburban/rural (address)
- Size of household
- Renters versus homeowners
- Single-family versus multifamily properties
- Race and ethnicity
- Education

3.2.2. Recommended Survey Questions

Address, housing type, and rent/own status, if needed, would typically be captured by administrators as part of the program application process. This may represent data as simple as address and can be shared along with other customer-level data. Ethnicity data, if collected, can provide responses that represent common categories nationally and “Other.” Primary language spoken, if collected, may be more localized. Common languages can be provided in fixed responses and “Other (please specify)” can be included to allow coding on the back-end.

Q – Demographics – Ethnicity

Which of the following best describes you?

Choose all that apply

- a. Non-Hispanic White or Euro-American
- b. Black, Afro-Caribbean, or African American
- c. Latino or Hispanic American
- d. East Asian or Asian American
- e. South Asian or Indian American
- f. Middle Eastern or Arab American

- g. Native American or Alaskan Native
- h. Other

Q – Demographics – Language Spoken

Which of the following languages is primarily spoken at home?

Select one response

- a. English
- b. Spanish
- c. Chinese (Cantonese, Mandarin, etc.)
- d. French or French Creole
- e. Tagalog
- f. Vietnamese
- g. Other

3.3 Customer Satisfaction

3.3.1. Measuring Customer Satisfaction

A critical measure for any program, and one that is commonly collected even when customer experience research is minimal, is overall customer satisfaction. Customer satisfaction is a direct indication of how well the program is meeting the anticipated outcomes, as well as the needs and expectations of participants. It can also serve as a means of understanding and calibrating findings. For example, for Energy Impact Illinois (EI2), an energy efficiency retrofit program that operated from 2012 to 2014, the customer experience research found that participants consistently rated Saving Money as their single most important issue. However, after completion of the energy efficiency retrofit, participants felt that Saving Money was realized to a lesser extent than Energy Efficiency and Increasing Comfort. Because Overall Customer Satisfaction shows that more than 78 percent of these participants were Satisfied or Very Satisfied after participating, this misalignment was not considered negative for participants.

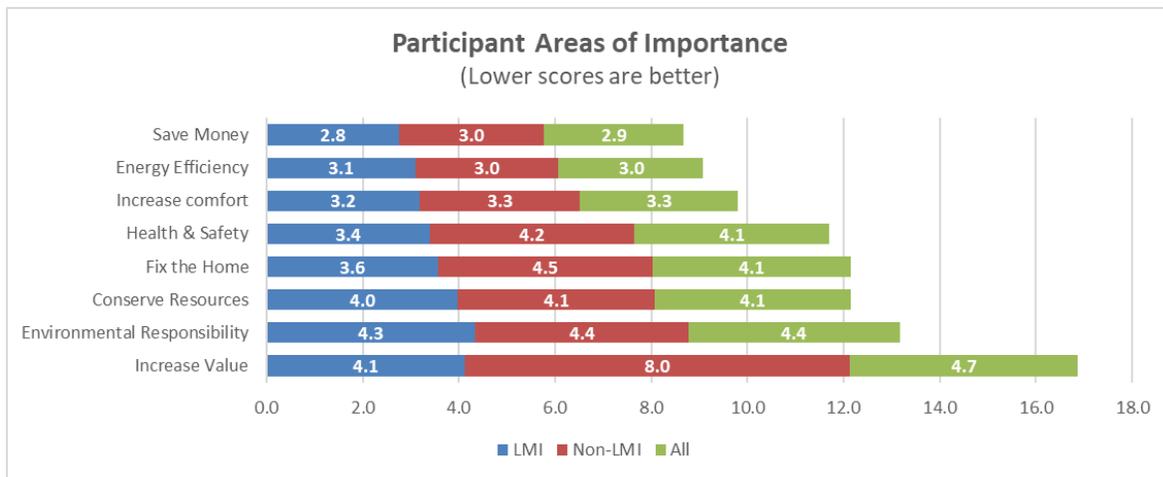


Figure 5: Energy Impact Illinois, Participant Areas of Importance
Please rate the following items from 1 to 8 in order of importance to you; 1 being the most important.
Elevate Energy

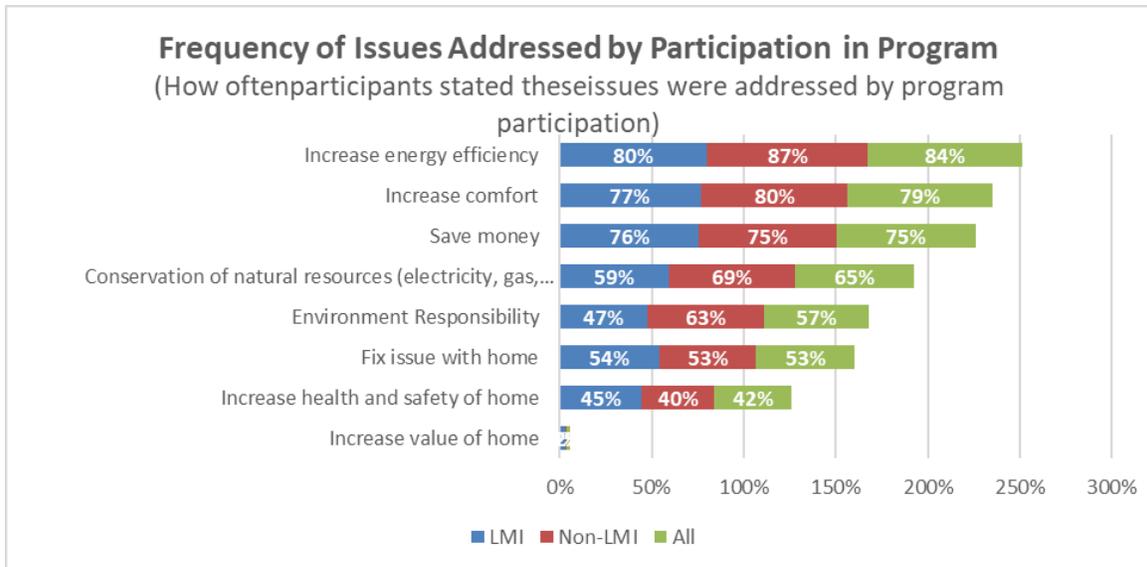


Figure 6: Energy Impact Illinois, Issues Addressed by Program Participation

Which of the following items do you feel were addressed after completing energy efficiency improvements on your home?
 Select all that apply.
 Elevate Energy

Below is a summary of cumulative Overall Program Satisfaction scores for several energy programs. These programs differ in that they include energy efficiency, time-of-use electricity programs, and direct install weatherization programs. All of these programs provide some level of incentive, with the direct install program being 100 percent free to participants. While this may suggest a threshold for program satisfaction, it is not recommended that specific thresholds be used to set expectations for participating LIFT Solar programs. This comparison does provide insight, however, into a narrow variance even across very different programs.

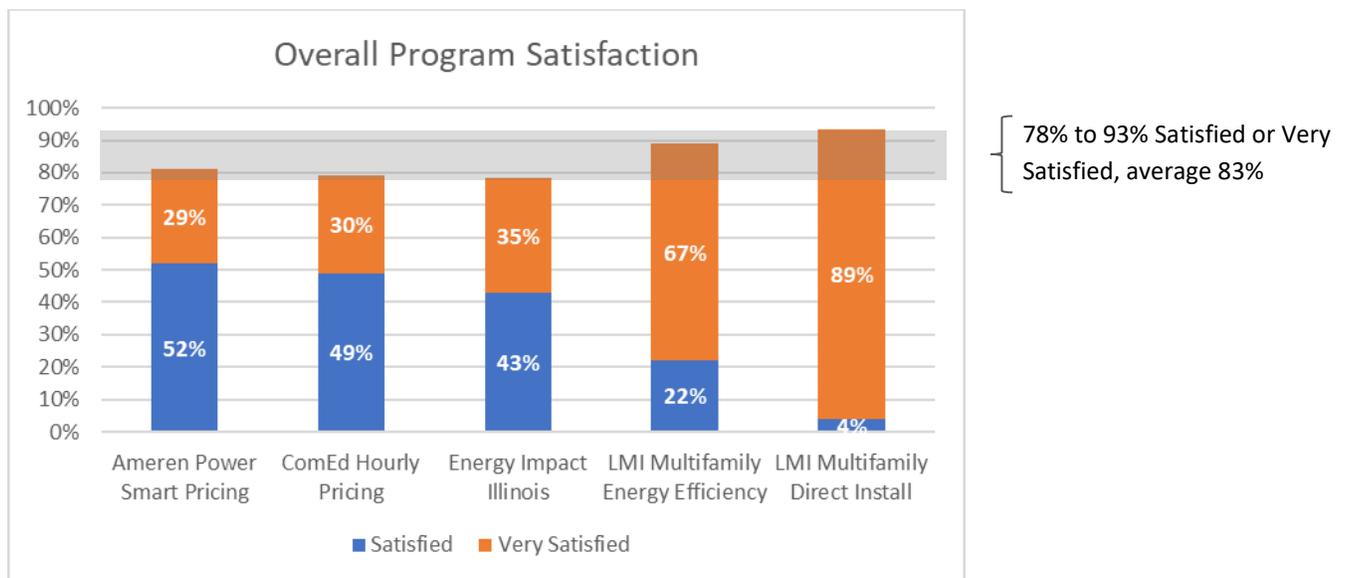


Figure 7: Overall Program Satisfaction Across Energy Programs
 Elevate Energy

3.3.2. Recommended Survey Questions

Capturing overall program satisfaction should be straightforward. It is recommended that a Likert scale should be used. A Likert scale is a five- or seven-point scale which is used to allow the individual to express how much they agree or disagree with a statement. A Likert scale “assumes that the strength/intensity of an attitude is linear, i.e., on a continuum from ‘strongly agree to strongly disagree’ and that these attitudes can be measured”⁵. Likert scales can also be used to measure satisfaction or other attitudes, values, and preferences.

Q – Program Satisfaction

Overall, how satisfied are you with the program? Please use a 5-point scale, where 5 means Very Satisfied and 1 means Very Dissatisfied.

Select one response

- 5. Very Satisfied
- 4. Satisfied
- 3. Neither Satisfied nor Dissatisfied
- 2. Dissatisfied
- 1. Very Dissatisfied

3.4 Motivations and Issues of Importance

3.4.1. Customer Attitudes that Motivate Program Participation

Understanding how participants identify with issues that drive energy decisions or what motivates participants to move forward with participating in energy programs is critical for managing program offers, as well as for messaging and communication. Measuring the importance of key issues and motivations may also help administrators better understand how barriers are being addressed within any specific program offer – especially for financial barriers or financial product offers.

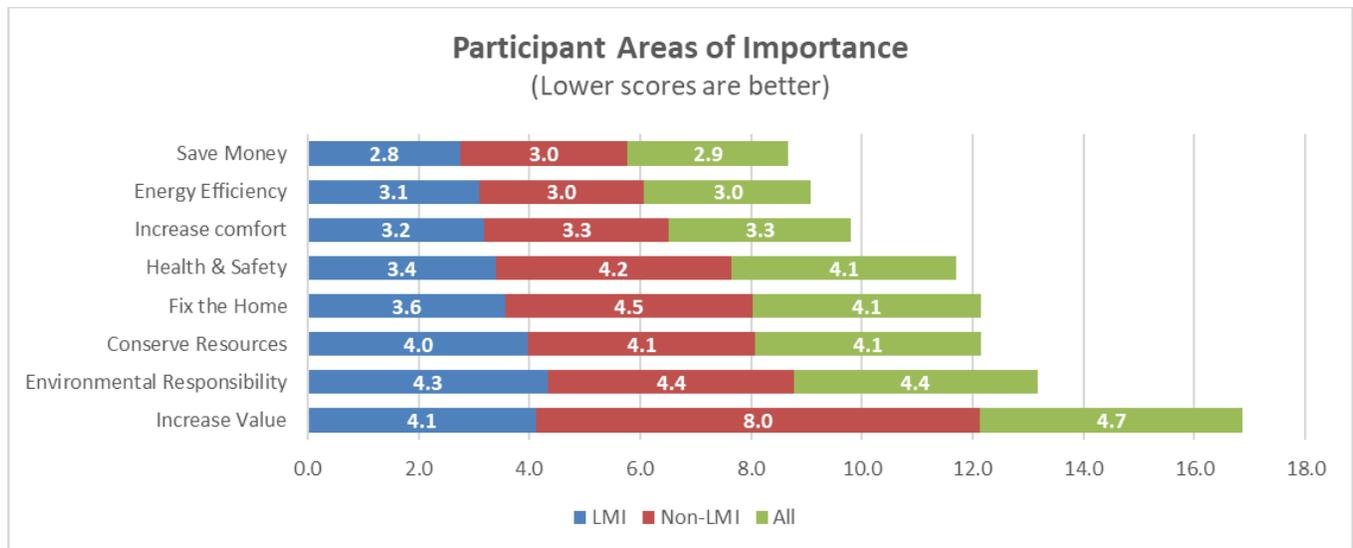


Figure 8: Energy Impact Illinois, Areas of Importance

⁵ <https://www.simplypsychology.org/likert-scale.html>

Please rate the following items from 1 to 8 in order of importance to you; 1 being the most important.
Elevate Energy

A consistent finding holds true across many clean energy and resource efficiency programs and studies: Saving money is almost always the primary motivation to act. The Energy Impact Illinois research shows clearly that saving money is ranked as the top issue that participants identify with related to energy efficiency improvements. Similarly, research by the Shelton Group and Smart Electric Power Alliance shows that the highest motivation for customers to participate in community solar programs is cost savings, with 65 percent indicating “I want to have lower monthly energy costs.”⁶

As far back as 2010, U.S. Department of Energy research found a similar result, showing that saving money is the most compelling reason for homeowners to get energy improvements done to their existing homes.⁷ Research by the Harris School of Public Policy published in January 2020 also said that both low-income and non-low-income customers rated saving money on their electricity bills as the primary reason for going solar. Interestingly, the low- and moderate-income segments in this recent report shows that environmental concerns, while not the primary issue of importance, was of greater importance than in non-low-income households.

Clearly, saving money is an important issue for participants in clean energy and resource efficiency programs, whether low-income households or not. Capturing all participant issues of importance and motivations is a critical aspect of customer experience research, especially when measuring the effectiveness of financing offers designed to increase access to LMI households. These motivations, for example, may provide insight into why an offer is well received or not.

In addition to cost savings, ease of access can be important. A survey of approximately 500 potential LMI customers conducted by Pacific Consulting Group (PCG 2017) found that the most appealing messaging to respondents was being presented with a solar offer available to everyone (homeowners and renters), no start-up costs, cost savings, and the ability to buy solar immediately.⁸ These findings may also provide insight into the uptake of financial offerings in the context of LIFT Solar projects and may be calibrated with the financial performance of various offerings to provide further insight.

⁶ What the Community Solar Customer Wants: Identifying the right target audiences for community solar – and the marketing strategies that will win them over. Shelton Group and SEPA, U.S. Dept. of Energy SunShot initiative.

⁷ Report: Motivating Home Energy Improvements; U.S. Dept. of Energy.

⁸ Design and Implementation of Community Solar Programs for Low- and Moderate-Income Customers; NREL 2017.

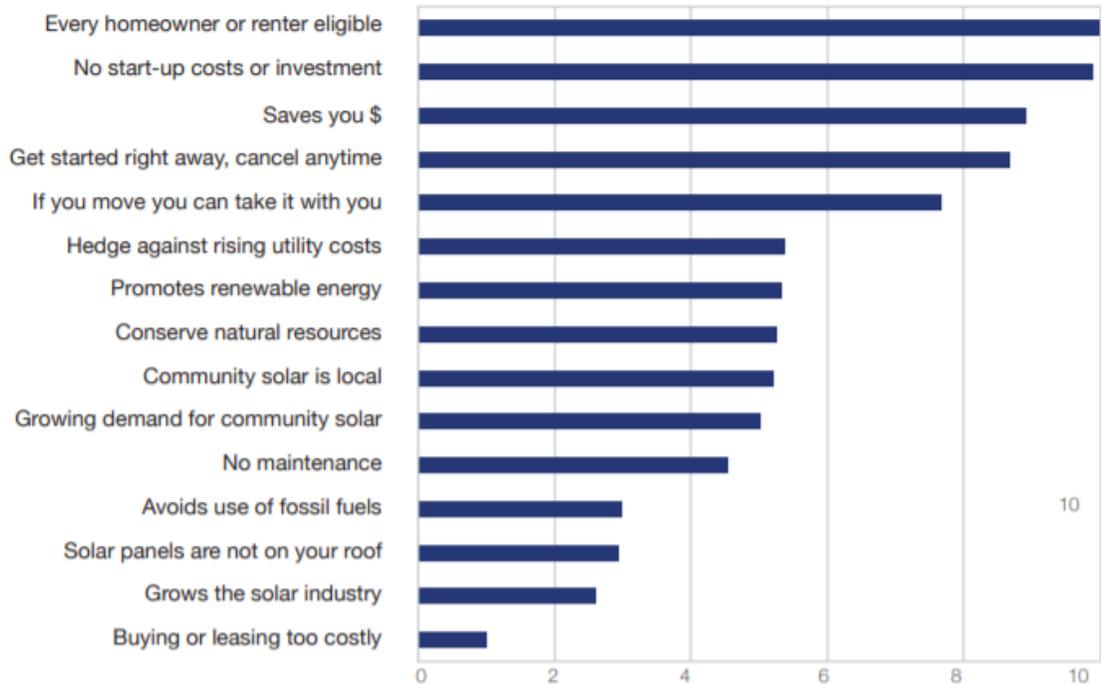


Figure 9: Messaging Most Effective for Solar Participants
National Renewable Energy Laboratory

3.4.2. Categorizing Motivations

Careful consideration should be given to the list of motivations presented as options to participants, including, where possible, an “Other” option. It’s also important to ensure items are clearly defined. For example, “Cost” may not be enough to indicate the intended meaning – Cost of Installation, Cost over the Term of the Agreement, or Upfront Costs.

3.4.3. Recommended Survey Questions

Capturing data for areas of importance or motivation to participants should balance the desire for granularity with the need to ensure questions are not redundant or confusing to respondents. Below is a sample list that includes key measures from a number of clean energy and resource efficiency programs assessed as part of this analysis. Data can be captured in several ways. Ranking can be used, which forces a respondent to consider and compare all items on the list. However, ranking can be problematic when choices are included respondents do not agree with.

Respondents can also be asked to select all statements that are important to them. However, this method may offer respondents the ability to simply select many or all statements with no ability to distinguish levels of importance. It is recommended that individual Likert scale questions be used for each statement being captured. This allows respondents the ability to address each statement individually and mean scores can be calculated for each. Below is an example of a question in this format with a common set of statements that can work for LMI solar applications.

Q – Reasons for Participating: Agree/Disagree

Please indicate how much you Agree or Disagree that each of the following statements influenced your decision to participate in the program. Use a 5-point scale, where 5 means you “Completely Agree” and 1 means you “Completely Disagree.”

- 5. Completely Agree
- 4. Agree
- 3. Neither Agree nor Disagree
- 2. Disagree
- 1. Completely Disagree
- 0. Don’t Know/Unsure

One response for each statement

	Saves me money
	Helps the environment
	Increases the value of my home
	No upfronts costs
	Easy to qualify
	Keep my energy costs low
	Cancel at any time
	The program was highly recommended
	It’s important to my community
	I want to impress my neighbors

3.5 Barriers to Participation

3.5.1. Understanding Barriers to Participation

Just as important as understanding participant motivations is understanding the barriers that keep potential participants from acting. Good customer experience research will seek to understand the reasons for success, as well as where and why aspects of the program fall short. Measuring the reasons why potential participants do not move forward presents an immediate challenge in that the research design must include both individuals that fully participated in the program and those that did not.

The Energy Impact Illinois customer experience research indicates the most common reason property owners chose not to move forward with improvements was that they had other priority improvements that needed to come first. Cost was the next most common issue. Understandably, many clean energy and resource efficiency programs that work specifically with LMI property owners find an increased occurrence of deferred maintenance issues that are deemed priorities over other improvements or are themselves barriers for participation. For example, the need for roofing or electrical repairs may disqualify a household from participation in a solar program or the presence of asbestos or lead paint may preclude households from participating in many energy efficiency programs.

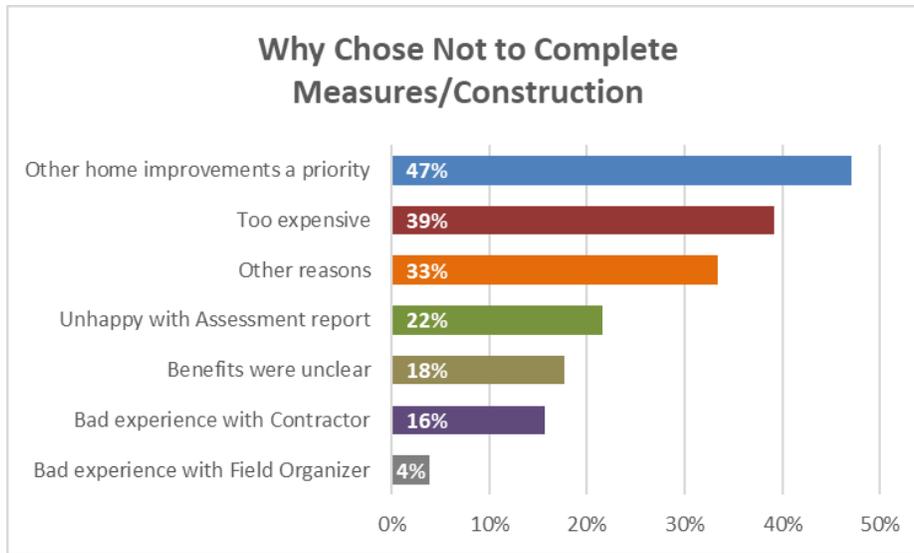


Figure 10: Energy Impact Illinois, Why Customers Did Not Participate

Please select the item(s) below that best describes why you decided not to complete energy efficiency improvements (check all that apply).
Elevate Energy

LMI households were also more likely not to disclose why they would not move forward with improvements. It is problematic to infer reasons. For many program administrators working in low-income communities, the issue of trust is critical to program success. This may be a primary motivator or a primary obstacle for participation. But this may not be easily captured in customer experience research. For those potential participants that refuse to answer why they did not participate, it is possible that trust was not established enough to share this important information.

A recent NREL report indicated that having an easier exit option over the lifetime of the solar investment may make it more attractive to potential customers” was of primary concern.⁹ A report from the Smart Electric Power Alliance on community solar identified sign up fees as the biggest factor lowering the interest of potential subscribers.¹⁰ Other identified issues include upfront costs, credit score requirements, the amount of paperwork, the income verification process, and language barriers.

3.5.2. Recommended Survey Questions

Like the question capturing areas of importance or motivation to participants, a question capturing barriers or reasons not to participate should also ensure responses are not redundant or confusing to respondents. This question might also be asked as a ranking question, by selecting all statements that apply or an agree/disagree response for each. Similarly, a question asking for agreement levels of various statements using a Likert scale is recommended.

⁹ Shared Solar-Current Landscape and Market Potential; NREL

¹⁰ Community Solar Customer Wants; SEPA

Q – Reasons for Not Participating

Please indicate how much you Agree or Disagree that each of the following statements influenced your decision **not** to participate in the program. Use a 5-point scale, where 5 means you “Completely Agree” and 1 means you “Completely Disagree.”

- 5. Completely Agree
- 4. Agree
- 3. Neither Agree nor Disagree
- 2. Disagree
- 1. Completely Disagree
- 0. Don’t Know/Unsure

- *One response for each statement.*
- *Ask respondents that did not install or subscribe to solar only .*

	It was too expensive
	The process was too confusing
	Other home improvements were more of a priority
	The savings seemed too good to be true
	The paperwork was too complicated
	I did not qualify for the program
	I had a bad experience with the program representative
	The contract period was too long
	Trust

3.6 Meeting Customer Expectations

3.6.1. Measuring Customer Expectations

Saving money is the single most common reason why customers participate in clean energy and resource efficiency programs. SEPA found in a review of community solar programs that when programs promised immediate bill savings, they were almost universally fully subscribed.¹¹ Interestingly, the Energy Impact Illinois data indicates that when property owners were asked what they achieved after completing energy improvements, energy efficiency and increasing comfort were more likely to be addressed than saving money, even though saving money was the most important issue with which they identified.

¹¹ Community Solar Program Design Models; SEPA

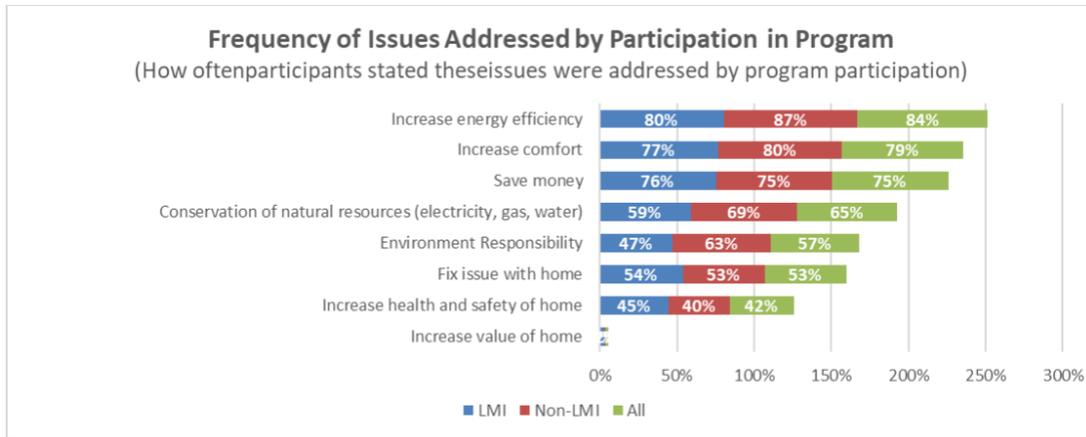


Figure 11: Energy Impact Illinois, Issues Addressed by Program Participation

Which of the following items do you feel were addressed after completing energy efficiency improvements on your home?

Select all that apply.

Elevate Energy

Although the issues EI2 participants most identified with and those they stated as being addressed by participation were not wholly aligned, it did not seem to affect program satisfaction, with more than 78 percent of participants being Satisfied or Very Satisfied. This also indicates that those issues participants are motivated by may be different than the issues achieved or affected by participating in a clean energy and resource efficiency program.

When using structured multiple-choice questions, including those where respondents can select all that apply, it’s important to assess the list for overlap or potential redundancy. For example, in the list above, Energy Efficiency and Conserving Resources may not have distinct meanings for respondents. A concise list that measures the key aspects of anticipated program outcomes, messaging, or barriers the program is designed to overcome should be asked. It is also important to anticipate long term metrics to minimize changes in survey questions over time, which can render the meaning or impact of the data less meaningful or not comparable.

3.6.2. Recommended Survey Questions

It is important that when capturing data on how well various items were satisfied by participating in the program that the items align directly with motivations (detailed earlier). The importance in analysis is to understand how well the program does in satisfying expectations based on identified items of importance. As such, it is recommended that a series of questions asking for agreement to the same list of statements be used.

Q – Meeting Expectations: Agree/Disagree

Please indicate whether you Agree or Disagree that your participation in the program satisfied each of the following statements. Use a 5-point scale, where 5 means you “Completely Agree” and 1 means you “Completely Disagree.”

- 5. Completely Agree
- 4. Agree
- 3. Neither Agree nor Disagree
- 2. Disagree
- 1. Completely Disagree

0. Don't Know/Unsure

One response for each statement

	Saves me money
	Helps the environment
	Increases the value of my home
	No upfronts costs
	Easy to qualify
	Keep my energy costs low
	Cancel at any time
	The program was highly recommended
	It's important to my community
	I want to impress my neighbors

3.7 Customer Attitudes Towards Financial Offers

3.7.1. Impact of Incentives and Loans

The availability and ease of accessing incentives or loans can greatly impact participation and satisfaction in clean energy and resource efficiency programs. Barriers to access are commonly driven by cost, especially upfront costs for LMI households – which can be directly overcome by the availability of incentives or loans. The Smart Electric Power Alliance found that 44 percent of the community solar programs they reviewed had at least some level of LMI participation, but that participation was subsidized, used external funding, or used creatively structured customer offers.¹¹ Additionally, NREL points out that it is difficult to set incentives to appropriate levels. Too high results in overspending, while too low may result in low or no LMI participation.¹² To be clear, the availability of incentives is not required to ensure the feasibility of LMI solar programs. Successful models for LMI solar exist with no subsidies, which may be why financial products are so important as alternatives. Availability and access, however, have proven to be distinct issues worth measuring. If incentives are available and rich, and financial products have great terms, access can still create barriers, like stringent qualifications or complex verification processes.

First considering availability, 41 percent of E12 participants that installed measures stated that they would not have participated in the program without incentives and 44 percent of participants who took loans stated that they would not have participated without them¹³. Similar shares of participants said they would have done less work without incentives or loans. Not surprisingly, LMI households were less likely to state they would do any or all work with no rebates than non-LMI households, but were more likely to state they would do all or more work in the absence of loans. These questions can provide some measure of the importance of these offers and their impact on participation.

¹² Design and Implementation of Community Solar Programs for Low- and Moderate-Income Consumers; NREL

¹³ Note that the question on rebates included responses for “NA No Rebates” and “NA No Loans,” which may have created confusion and affected results.

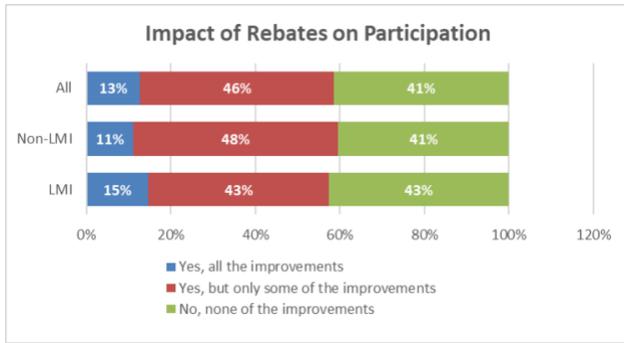


Figure 12: E12, Impact of Rebates on Participation
 If you took advantage of rebates, would you have still made the improvements without this financial help?
 Elevate Energy

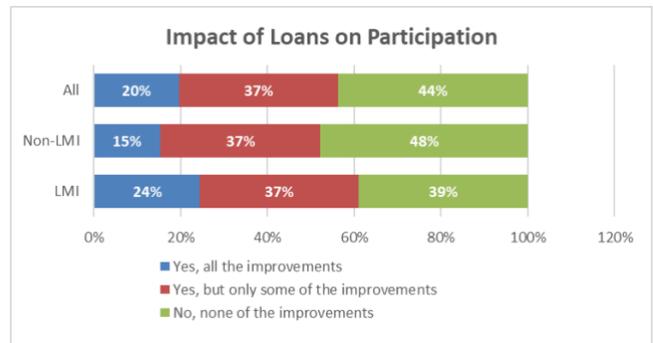


Figure 13: E12, Impact of Loans on Participation
 If you took advantage of a loan, would you have still made the improvements without this financial help?
 Elevate Energy

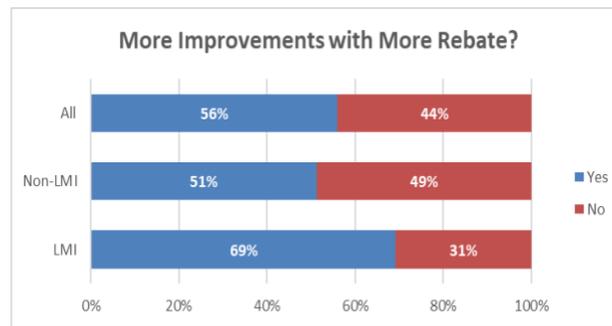


Figure 14: E12, Impact of Rebate on Scope of Work
 If the rebate would have covered more of the cost of the energy efficiency improvements, would you have committed to the full project?
 Elevate Energy

Access, conversely, can be measured by determining why participants did not take advantage of incentives or financial offers. All participants in the E12 program immediately qualified for incentives and the incentives were facilitated by the program administrator. So, access to incentives was not deemed an issue. Loans, however, were not guaranteed and were often needed to cover costs that the incentives did not cover. The E12 customer experience survey asked participants for reasons why they did not take advantage of loan offers. However, this question was added late in the program cycle, with too few respondents to analyze. The following responses can be considered as a basis for this question in the primary research design.

- The loan process was too confusing
- The paperwork was too difficult to complete
- I did not qualify for the loan
- I qualified for the loan but could not be verified
- I did not need a loan
- Other reason

3.7.2. Measuring Awareness of Financial Offers

Measuring awareness of the financial products being offered can be important as well. The examples below from E12 indicate that while a significant majority of those aware of rebate and loan offers said those offers were explained well, nearly 40 percent indicated that they were not even aware of the loan products being offered. This illustrates the importance of capturing awareness and clarity of offers being presented to ensure any measure about uptake of financial products is attributed appropriately.

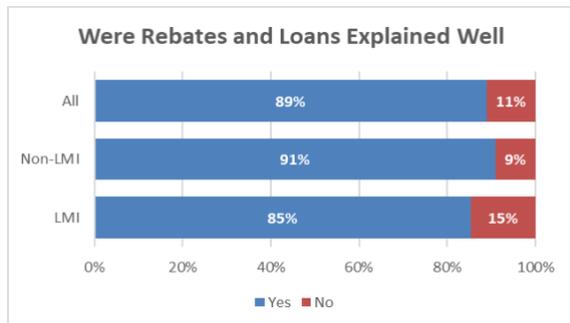


Figure 15: E12, Rebates and Loans Well Explained
 Were the rebate and financing options clearly explained to you?
 Elevate Energy



Figure 16: E12, Awareness of Loan Offer
 Are you aware that a low-interest loan is available to help assist with the upfront cost of energy efficiency improvements?
 Elevate Energy

For the LIFT Solar primary research, capturing customer data on their incentive and loan experiences will be critical for calibrating the effectiveness of each offer. This will ensure that the levels of uptake for each offer are informed by levels of participant awareness and understanding, as well as perceptions on how availability of these offers changes participation rates. Like other areas of measure, this will require interviewing participants who complete energy measures as well as those that do not. It's important to note that because incentives and loans can vary widely across participating programs, the questions need to be stated in a way that offers meaningful insight in any instance.

It's also important to note that qualifying for financial products can be a substantial barrier for LMI households. Much work is being done nationally to spotlight the issue and alternative approaches to FICO scores. CESA notes that while credit requirements vary among companies and lending programs, scores of at least 650-680 are often required.¹⁴ And while research has identified large populations of LMI customers who have credit scores high enough to secure financing,¹⁵ it remains a barrier.

It's not intended that this benchmarking analysis present recommendations on any specific offers or qualifications. Instead, this is illustrated to stress the importance of capturing enough data to ensure a clear understanding of why offers were not taken or effective.

¹⁴ Bringing the Benefits of Solar Energy to Low-Income Consumers; CESA

¹⁵ Design and Implementation of Community Solar Programs for Low-and Moderate-Income Customers; NREL

3.7.3. Recommended Survey Questions

Because the financial products being assessed will vary across participating programs, there will likely be many nuanced aspects that would benefit from being measured. It is critical, however, that the survey be concise and the overall time to complete be manageable. The following list of Likert scale ratings can help measure high level awareness and understanding of the financial product being offered. This may require that certain questions are added or removed from the survey based on their applicability to a given program. Otherwise, they can be stated in a way that clearly indicates when they are not applicable. It is recommended that this question focus on customer loan or financial offers, rather than incentives, since this is the primary focus of LIFT Solar research.

Q – Assessing the Financial Product – Effectiveness and Understanding

Please rate the following statements based on how much you agree or disagree with each. Please use a 5-point scale, where 5 means you “Completely Agree” and 1 means you “Completely Disagree.”

- 5. Completely Agree
- 4. Agree
- 3. Neither Agree nor Disagree
- 2. Disagree
- 1. Completely Disagree
- 0. Not Applicable/Don’t Know/Unsure

Provide one answer only for each statement

	I was fully aware of the [FINANCIAL PRODUCT] available to me
	All aspects of the [FINANCIAL PRODUCT] were made very clear to me
	Even without taking advantage of [THE FINANCIAL PRODUCT], I would have participated in the program
	Without taking advantage of [THE FINANCIAL PRODUCT], I would have agreed to a smaller system or share
	Completing the [FINANCIAL PRODUCT] application process was simple and easy
	The terms of the [FINANCIAL PRODUCT] were fair

For the question capturing why a participant did not take advantage of a financial product, a series of agreement to statement questions using Likert scales is recommended.

Q – Assessing the Financial Product – Why Did Not Take Advantage of Financial Product

Which of the following reasons describes why you chose not to take advantage of the [FINANCIAL PRODUCT]?

Check all that apply

	I did not qualify for [FINANCIAL PRODUCT]
	I qualified for [FINANCIAL PRODUCT] but could not verify my qualification
	The application process was too difficult
	The application process was too confusing
	The terms of the [FINANCIAL PRODUCT] agreement were not good
	I did not trust the organization offering the [FINANCIAL PRODUCT]
	I was not aware of the [FINANCIAL PRODUCT]
	Some other reason (Please specify)

I prefer not to answer

3.8 Program Awareness and Understanding

3.8.1. Measuring Program Awareness and Understanding

Many companies and programs may not market to LMI customers at all. Solar marketers may not advertise to low-income households if they are getting enough business from wealthier households.¹⁴ The Smart Electric Power Alliance states that, "Americans are barely aware that community solar exists, which is by far the biggest hurdle to getting programs subscribed."¹⁰ This suggests that basic awareness and understanding may be critical building blocks to LMI participation and satisfaction.

Capturing basic levels of understanding of solar or community solar may be important to measure how levels of understanding correlate to participation or satisfaction. Measuring how well program materials convey the intended message may be similarly important. Examples include those presented above asking how well incentives or loans were explained or basic awareness of a financial offer. In another example, the E12 research asked which parts of the assessment and participant process provided the best learning experience for participants. Findings consistently showed that, although technical in nature, the in-home energy audit provided the greatest opportunity for learning about their energy use than all other parts of the program process. Questions like this may also provide insight into where participation or communication breaks down.

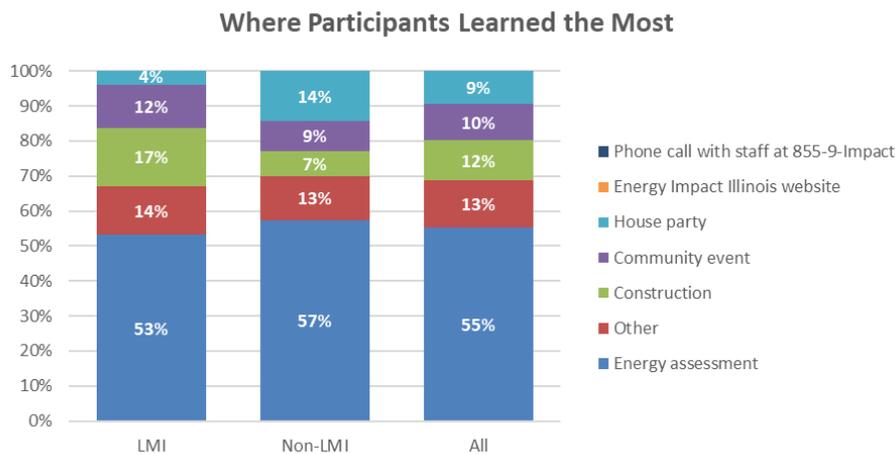


Figure 17: Energy Impact Illinois, Where Participants Learned the Most
Please select the option below where you learned the most.
Elevate Energy

There are substantial challenges to understanding energy efficiency or solar improvements. Contracts can be difficult to understand and vary widely across regions and programs. NREL identifies a lack of uniformity or standardization of contracts as a barrier to community solar for LMI customers.⁹ Additionally, marketing materials may not be available in languages other than English, which poses a barrier to customers whose primary language is not English.¹⁴ This report does not aim to solve these problems or mandate universal materials across participating LIFT Solar programs. But customer experience research should be consistent to

allow the ability to measure the impact of awareness and understanding on participation and uptake of financial offers presented to customers.

3.8.2 Recommended Survey Questions

It is recommended that a simple measure of clarity for each key element of the program be captured. For example, measuring clarity and understanding of the sign-up process, the home/electricity assessment process, the cost and savings explanation, and the contract.

Q – Assessing Clarity

Please rate the following statements based on how much you agree or disagree with each. Please use a 5-point scale, where 5 means you “Completely Agree” and 1 means you “Completely Disagree.”

5. Completely Agree
4. Agree
3. Neither Agree nor Disagree
2. Disagree
1. Completely Disagree

- Provide one answer only for each statement.
- Ask all respondents.

	I clearly understood the program sign-up process
	My home energy assessment was clear and helpful
	The cost and savings were explained clearly
	The [FINANCIAL PRODUCT] terms were explained clearly
	The energy contract/agreement was easy to understand
	All aspects of the program were explained clearly

3.9 Outreach and Engagement

3.9.1. Measuring Outreach and Engagement

The ways in which LMI customers hear about, engage with, or enter a clean energy and resource efficiency program may have an impact on their understanding of program nuances or whether they participate fully or completely. The various methods by which they learn about program offers or technical details is important, particularly when messaging conveys details about costs, savings, and financial commitments. In its *Utility LMI CS Policy Guide*, the Environmental Law and Policy Center identifies challenges to outreach, education, and enrollment as key barriers to low-income solar program access and suggests that, “Engagement should include partnerships with trusted local community-based organizations, which can help educate and enroll customers.”¹⁶ Customer experience data captured for EI2 participants helps provide some insight on engagement, including questions about how well specific offers were explained or which aspects of engagement provided the greatest learning (above). Additionally, EI2 captured how participants learned about the program. Interestingly, EI2 findings show that what works for non-LMI participants may not work as well for LMI participants.

¹⁶ Utility LMI CS Policy Guide; ELPC

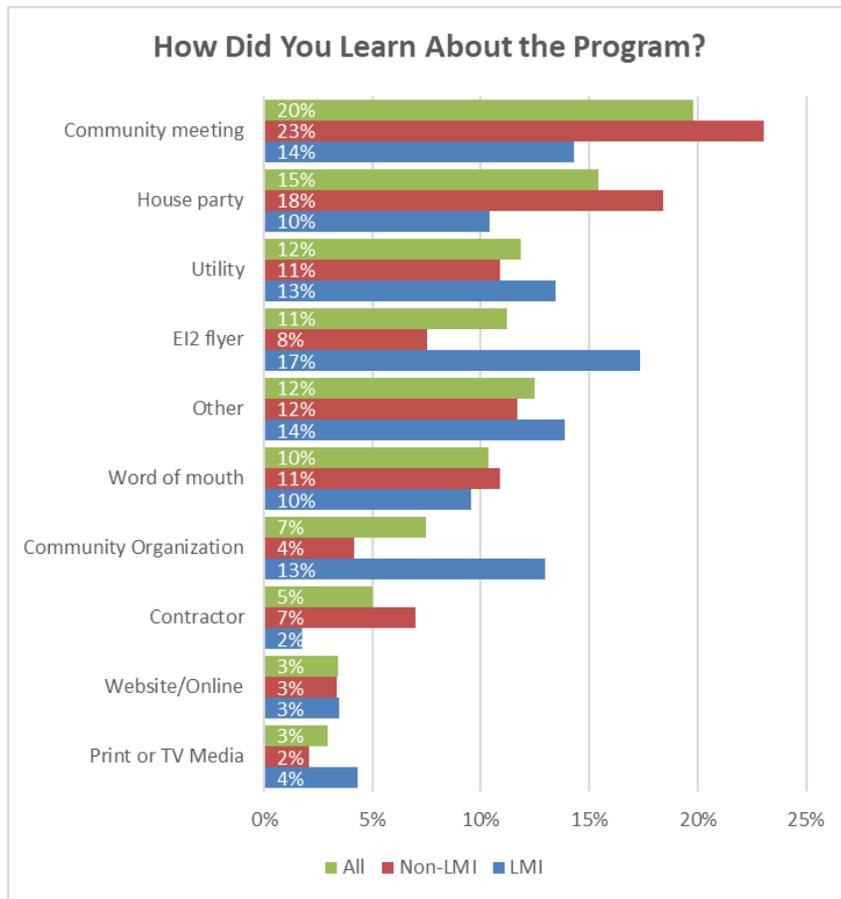


Figure 18: Energy Impact Illinois, Where Participants Learned About the Program
 How did you learn about the program? Check all that apply.
 Elevate Energy

Messaging related to outreach can also be critical and may be an important way to analyze program success and the effectiveness of specific offers through customer experience research. According to NREL, a survey of approximately 500 potential LMI customers that was conducted by Pacific Consulting Group found that the most appealing messaging to respondents was messaging about the availability of a solar offer to everyone (homeowners and renters), as well as no start-up costs, cost savings, and the ability to buy solar immediately.⁸ Capturing aspects of messaging may help to better understand the effectiveness and uptake of various financial product offers, especially where variances in financial performance or uptake exist.

Effectiveness of outreach may be most effectively captured as the methods of learning about the program. Capturing the methods of learning about the program may also help better understand complex issues of trust. NREL notes that, "...local stakeholder input is crucial for optimal design of local programs and that additional education and outreach are needed to convey the potential of shared solar."⁹ The participation of a community group or utility helped assuage trust concerns as part of the Colorado Low-Income Community Solar Demonstration Project.¹⁷ This was clearly reflected in responses of EI2 participants, where Community

¹⁷ Insights from the CEO Low-Income Community Solar Demonstration Project; CEO

Organizations, Community Meetings, and Utilities represented the top three out of four methods of where participants learned about the program.

3.9.2. Recommended Survey Questions

With awareness and understanding captured in previous questions, the recommended approach to understanding engagement is to include a question on the methods of first contact for participants or how they first heard about the program. This question presents difficulty in creating a consistent pre-list that will satisfy multiple and varied programs. Individual response can be worded to be broadly applicable and the list can be long. But, some methods of outreach may be unique. Including an “Other, please specify” response will help.

Q – First Contact – How Participants Heard about the Program

How did you first hear about the program?

Select all that apply.

<input type="checkbox"/>	At a community meeting
<input type="checkbox"/>	From a community organization
<input type="checkbox"/>	From a contractor
<input type="checkbox"/>	From a government agency or official
<input type="checkbox"/>	From my utility
<input type="checkbox"/>	From the program administrator
<input type="checkbox"/>	Magazine or newspaper ad
<input type="checkbox"/>	Social media
<input type="checkbox"/>	TV or radio ad
<input type="checkbox"/>	Website or online
<input type="checkbox"/>	Other, please specify: _____

3.10 Behavioral Change

3.10.1. Measuring Behavioral Change

The primary measure of success for all clean energy and resource efficiency programs is the ability to lower energy use and costs for participants. A critical piece to achieving these successful outcomes sustained over time is not only to increase the share of clean energy or lower overall usage by introducing efficiency, but also to effect behavioral changes that accelerate these positive outcomes well into the future. A recent study published by the American Academy of Science indicates that, “... household decisions that directly affect energy consumption—choices about personal transportation, appliance purchase and use, or home heating and cooling, for instance—are very consequential. A conservative estimate suggests that these decisions account for more than 30 percent of U.S. CO₂ emissions and a comparable amount of overall energy use.”¹⁸

Most clean energy and resource efficiency programs do not measure energy use behaviors in any meaningful way, let alone set program outcome goals based on them. Awareness is certainly a first step, but it does not necessarily equate to ongoing action. Ingeborgrud et al discuss the “awareness-action gap” or the “value-action gap”, which stipulates that people do not need more information to behave in a more energy-efficient manner,

¹⁸ Reducing Carbon-Based Energy Consumption through Changes in Household Behavior; Dietz, Stern & Weber

and knowledge alone does not necessarily instigate behavioral change.¹⁹ The authors also discuss “rebound effects”, which stipulate that increased savings from an efficient behavior may lead to increased spending in other areas, mitigating the environmental benefits from that behavior. If your car uses less gas, you may be inclined to drive further. If your house is more efficient, you may be inclined to use more energy.

3.10.2. Recommended Survey Questions

Customer experience research may simply seek to ask whether it is likely that future energy behavior will change. Some programs measure real savings over time to calibrate savings projections, to ensure energy use reductions are maximized or, in some cases, as a requirement of program administration. While the LIFT Solar research will not allow for long term measurement of real savings, capturing attitudes toward future behavioral change may be beneficial.

Q – Behavioral Change

In the future, how likely are you to change the way you use energy in your home?

Select one response.

<input type="checkbox"/>	I will definitely make choices that reduce the energy I use in my home
<input type="checkbox"/>	I will probably make choices that reduce the energy I use in my home
<input type="checkbox"/>	I’m not sure if my choices about how I use energy will change in the future
<input type="checkbox"/>	I will probably not make choices that reduce the energy I use in my home
<input type="checkbox"/>	I will definitely not make choices that reduce the energy I use in my home
<input type="checkbox"/>	I don’t know

4 Primary Research Recommendations

4.1 Primary Research Framework

4.1.1. The Research Rationale

The goal of the customer experience benchmarking analysis is to provide the basis for a research framework. This framework will be informed by the findings in this report and will include a methodological plan and a data collection instrument for administrators who take part in LIFT Solar research. These LIFT Solar partners have committed to share financial performance data and have agreed to allow the LIFT Solar team to conduct customer experience survey research among their customers. The customer experience data collected will provide a basis for understanding customer attitudes about how the program was delivered and how it met their needs.

At the simplest level, it could be assumed that programs that provide a solid financial return for participants should be well received; i.e., participant expectations were met, and they were satisfied overall. It may be, however, that financial offers with very good returns for participants have very poor uptake. Is this because the offers are too complex or do not seem to address primary needs? Customer experience data will help the LIFT Solar team understand these nuances and calibrate financial performance to customer experience.

¹⁹ Expanding the Scope and Implications of Energy Research; Energy Research and Social Science

If anomalies in financial performance are uncovered within a subset of participating LIFT Solar projects, looking deeper into customer experience may help to better understand the underlying issues. For example, if a specific financial product being offered shows a consistent financial underperformance, customer experience can be used to understand customer perceptions of the complexity of the offer, how well it satisfied expectations, or their overall program satisfaction. These measures may suggest trends that show problems with how the financial offer was delivered or it may suggest the understanding and delivery were well received and the issue is strictly about terms of the financial offer. Similarly, a program that indicates very good financial performance may indicate a very poor customer experience or customer satisfaction.

4.1.2. Identifying Customer Respondents

Based on the findings of this report, respondents must include customers that have participated in solar programs by signing up for a solar installation/subscription, as well as those that entered a participating program but chose not to install/subscribe. This will help to ensure that data is captured for both successful program elements and offers, as well as those that underperform. It is recommended that data collection be conducted very soon after 1) the participant successfully completes the installation or begins receiving bill credits for a community solar subscription, or 2) has dropped from the program. Participants in the first category should be interviewed within 90 days of solar activation; i.e., after receiving their first bill credits. Those not participating should be interviewed within 90 days of making the decision not to install/subscribe to solar.

The recommended sample size is less clear because the final set of financial products being assessed has not yet been finalized. It is also not yet clear what the final set of participating projects or programs will be. However, the more granular the results by various segments in the final analysis, the better. This includes assessing results by utility type, financial product type, geography, and more. Therefore, the recommendation is that all participating programs or projects aim to maximize the percentage of completed surveys during the study period (approximately 12 to 18 months).

4.1.3. Informing the Research Instrument and Data Collection Methodologies

The findings in this report have provided a basis for establishing a set of metrics that can measure participant attitudes toward program performance and delivery. Question types and approaches were identified for each area of measure that represent the basis for a survey instrument that can be delivered to respondents in several ways.

Data collection will need to balance efficiency and ease of access. For example, online surveys are fast and efficient. But these may present limitations for participants without consistent internet access or for segments of the population less comfortable with navigating websites and online forms. A paper survey has the benefit of ensuring anyone can participate. Self-administered paper surveys, however, can be complex and can lead to missing or incorrect data and should be used only where other methods are not possible. Telephone surveys may provide a means to allow participation from those who are not able to complete surveys online, while eliminating many of the data inconsistencies seen in paper surveys because surveys are interviewer-administered. Because the goal is to maximize the number of completed surveys and to ensure the widest inclusion, it is recommended that multiple methodologies be considered. Care will need to be taken to ensure the questions are written in a way that will be understood consistently across methodologies to ensure comparable results. Details of the methodological plan will be included in the research framework separately.

Appendices

Appendix 1: Datasets

Program Name	Energy Impact Illinois
Program Description	Comprehensive energy efficiency program working primarily to incent air sealing, insulation, and weatherization retrofits for single family and small multifamily properties in northern Illinois. The program also developed online assessment tools and loan products to support energy efficiency. Approximately 3,600 units completed retrofits in 2013 and 2014.
Data Type	Customer experience survey data (public)
Respondent Description	Single family and small multifamily properties, including all income ranges. Data segmented by high density low- and moderate-income census tracts and non-high-density tracts.
Sample Size	N=617
Collection Date	2013 to 2014

Program Name	Power Smart Pricing
Program Description	Time of Use electricity program provided by Ameren Illinois, serving approximately 13,000 customers.
Data Type	Annual customer experience survey data for program year 2018-19 (not public)
Respondent Description	Illinois ratepayers served by Ameren Illinois electric utility and enrolled in Power Smart Pricing. No income eligibility required.
Sample Size	N=2,469
Collection Date	Q4 2019

Program Name	ComEd Hourly Pricing
Program Description	Time of Use electricity program provided by Commonwealth Edison, serving approximately 30,000 customers.
Data Type	Annual customer experience survey data for program year 2018-19 (not public)
Respondent Description	Illinois ratepayers served by Commonwealth Edison electric utility and enrolled in ComEd Hourly Pricing. No income eligibility required.
Sample Size	N=4,553
Collection Date	Q4 2019

Program Name	Care and Conserve Plumbing Repair Program
Program Description	Provides elderly, low-income, and disabled Atlanta homeowners with free plumbing repair services, bill payment assistance, and installation of water-efficient fixtures.
Data Type	Service and customer experience survey data for program year 2018-19 (public)
Respondent Description	Provides elderly, low-income, and disabled Atlanta homeowners
Sample Size	N=413
Collection Date	August 2018 to April 2019

Program Name	Chicago Metropolitan Agency for Planning Energy Efficiency Research and Segmentation Study
Program Description	Attitudes and needs assessment conducted with moderate- to high-income homeowners in northern Illinois to inform energy efficiency program development.
Data Type	Primary survey research (public)
Respondent Description	Single family and small multifamily property owners in Northern Illinois
Sample Size	N=1,653
Collection Date	2012

Appendix 2: Secondary Reports and Literature

Report Title	What the Community Solar Customer Wants: Identifying the right target audiences for community solar - and the marketing strategies that will win them over.
Published by	2015; Smart Electric Power Alliance, Shelton Group
Report Description	Community solar customer experience survey research
Report Type	Survey Research and Analysis
Sample Description	N=2001; U.S. residential utility customers

Report Title	Community Solar Program Design Models
Published by	2017; Smart Electric Power Alliance
Author	Dan Chwastyk, Jared Leader, Jeff Cramer, Mason Rolph
Report Description	A community solar overview with a database that collects program size, launch year, and customer value proposition. Surveys of utilities and program administrators provide insights into challenges and program structure.
Report Type	Survey Research and Analysis
Sample Description	N=50; survey of utilities and program administrators

Report Title	Progress and Potential for Community-Scale Solar: How rural electric cooperatives can use low-cost, distributed energy to save money, serve customers, and unlock billions in infrastructure spending
Published by	2018; Rocky Mountain Institute
Author	Kevin Brehm, Thomas Koch Blank, and Leah Mosier
Report Description	Study of the emergence, growth, and barriers of community-scale solar
Report Type	White Paper

Report Title	Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States
Published by	2018; National Renewable Energy Laboratory (Benjamin Sigrin and Meghan Mooney)
Author	Benjamin Sigrin and Meghan Mooney
Report Description	National assessment of rooftop solar feasibility for LMI households; interactive map and data index
Report Type	White Paper
Sample Description	National LiDAR and socio-economic data

Report Title	Design and Implementation of Community Solar Programs for Low- and Moderate-income Customers
Published by	2018; National Renewable Energy Laboratory
Author	Jenny Heeter, Lori Bird, Eric O'Shaughnessey, Sam Koebrich (data collection by Pacific Consulting Group)
Report Description	Administrator considerations for community solar programs serving LMI customers
Report Type	Survey Research, White Paper

Sample Description	N=500; national existing and potential community solar customers
Report Title	Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation
Published by	2015; National Renewable Energy Laboratory, U.S. Department of Energy
Author	David Feldman (NREL), Anna M. Brockway (DOE), Elaine Ulrich (DOE), Robert Margolis (NREL)
Report Description	Shared solar market potential; impacts of SEC regulations on shared solar
Report Type	Working Group, White Paper
Sample Description	N=33 Attendees
Report Title	Bridging the Solar Income Gap
Published by	2015; The George Washington University, GW Solar Institute
Author	James A. Mueller, Amit Ronen
Report Description	Assessment of barriers and mitigations for accelerating LMI solar adoption
Report Type	White Paper, Panel Discussion Summary
Report Title	Expanding the scope and implications of energy research: A guide to key themes and concepts from the Social Sciences and Humanities
Published by	2020; Energy Research & Social Science Journal
Author	Lina Ingeboggrund, Sara Heidenreich, Marianna Ryhaug, Tomas Moe Skjølvold, Chris Foulds, Rosie Robison, Katrin Buchmann, Ruth Mourik
Report Description	An analysis of social sciences and humanities perspectives on energy use and carbon transition
Report Type	Literature Review
Report Title	Low-Income Solar Policy Guide: Principles and Recommendations for Utility Participation in Solar Programs for Low-Income Customers
Published by	2020; The Environmental Law & Policy Center, GRID Alternatives, and Vote Solar
Author	Tom Figel (GRID), Rick Gilliam (Vote solar), MeLena Hessel (ELPC), Melanie Santiago-Mosier, Marta Tomic (Vote Solar)
Report Description	Utility strategies for accelerating LMI solar adoption
Report Type	White paper, Literature Review
Report Title	Community energy meets smart grids: Reviewing goals, structure, and roles in Virtual Power Plants in Ireland, Belgium and the Netherlands
Published by	Energy Research & Social Science Journal
Author	Luc F.M. van Summeren, Anna J. Wiczorek, Gunter J.T. Bombaerts, Geert P.J. Verbong; School of Industrial Engineering & Innovation Sciences, Eindhoven University of Technology
Report Description	Global integration of community-based virtual power plants onto the grid
Sample Description	Case studies, interviews with representatives from the cVPPs
Report Type	Literature Review; Case Studies and Analysis

Report Title [Bringing the Benefits of Solar Energy to Low-Income Consumers: A Guide for States & Municipalities](#)

Published by 2017; Clean Energy States Alliance

Author Bentham Paulos, Paulos Analysis

Report Description Guidance on program design and financing for LMI solar

Sample Description Assessment of 38 programs

Report Type Literature Review, Stakeholder Interviews

Report Title [Insights from the Colorado Energy Office Low-Income Community Solar Demonstration Project](#)

Published by 2017; The Colorado Energy Office

Author Hillary Dobos and Emily Artale, Lotus Engineering and Sustainability, LLC. Supporting authors: Douglas Gagne and Alexandria Anzar, NREL, and Joseph Pereira, Gillian Weaver, and Lindsey Stegall, Colorado Energy Office

Report Description Analysis of program design, realized benefits, and savings for LMI households participating

Sample Description Case studies on each of the CS pilot projects

Sample Description N=380 LMI households across eight community solar projects evaluated

Report Type Internal Data Assessment and White Paper
