Accelerating LMI Access to Solar: Preliminary Project Finance Research Findings

LIFT Solar Everywhere

Lead Author: Emily Robichaux, Groundswell
Sr Director of Finance & Product Development

Executive Summary

LIFT Solar Everywhere research will accelerate low- and moderate-income (LMI) solar access for homeowners and renters by identifying optimal finance and customer models for each regulatory and utility service territory type, addressing both residential rooftop and community solar.

This report summarizes preliminary findings based on the in-progress collection of six project finance datasets. Data collection is focused on residential rooftop and community solar projects and programs financing approaches. A financing approach is characterized by having a particular capital stack - the organization of all the capital used to develop a solar project or portfolio of projects. The datasets collected so far center on solar asset portfolios inclusive of residential rooftop, commercial net metered, and community solar projects ranging from 0.151 to 1.4 MW in aggregated capacity; all datasets collected to date (May 2020) are from deregulated markets with investor-owned utilities in operation. Initial analysis of the data has informed the following preliminary findings:

- Capital stacks are varied, highly place-based, and time sensitive
- Pre-development expenses, scale, and transaction costs are barriers to LMI-inclusive developers
- Relationships, innovative financing, and persistence are necessary for LMI-inclusion

Forthcoming research will expand data collection into other utility types (namely, municipal-owned and rural cooperative utilities) as well as regulated electricity markets) while ensuring diversity along geographic, residential density, and state-level incentive availability parameters. Initial research findings and conversations with financiers reaffirmed the need for the LIFT Solar Everywhere toolkit to provide recommendations and solutions that anticipate trends for solar finance - where solar project finance is headed - rather than a retrospective on financing approaches that may no longer be applicable. To address this, LIFT may develop an additional report on solar financing trends anticipated in the near future.

Research Framework

LIFT Solar Everywhere research will accelerate low- and moderate-income (LMI) solar access for homeowners and renters by identifying optimal finance and customer models for each regulatory and utility service territory type, addressing both rooftop and community solar systems. To identify optimal finance models to research, LIFT issued in December 2019 a data call for solar project finance data. To date, LIFT has identified more than 200 potential sources for solar finance data. As of the writing of this report, 22 of these data sources have been engaged, ten data sharing consents have been received from sources, and six data sets are

nearing final completion and submission. This report is based on the six initial data sets collected.

Data Collection Focus

Data collection is focused on residential rooftop and community solar projects and programs financing approaches. A financing approach is characterized by having a particular capital stack - the organization of all the capital used to develop a solar project or portfolio of projects. Changes in the capital stack result in a change in financing approach for the purposes of this research. Deployment of a financing approach can run the gamut from one project one time to multiple projects multiple times. A single developer, financier, or other data source could leverage multiple financial approaches during their course of work.

For the purposes of this research, community solar is defined as solar PV production that is shared by at least two parties; the parties can be owners, subscribers, or lessors. The parties receive the value of the solar PV production as credits on their electricity bill, or they receive the value thereof via another direct delivery method (guaranteed rent reduction, transportation stipend, additional services, etc.). For the purposes of LIFT research, solar projects providing benefits to non-profit and commercial institutions behind-the-meter or as community solar anchor tenants are not considered in scope unless a portion or all of the solar savings are passed through in tangible form to individuals or households. Community solar projects are assumed to not be installed "behind the meter." However, in municipal-owned and co-op utility service territories, solar installed behind-the-meter by the utility may be counted as community solar if there is a corresponding program which ratepayers can join. For further clarification, solar installations that simply change the utility's fuel mix are out of scope for this research. Projects and programs that do not include or specifically serve low- and moderate (LMI) customers are not included in this research. LIFT has assumed that municipal-owned and co-op utility programs will include LMI households even if that customer base is not recruited, tracked, or managed separately from other customer bases.

Data Categorization and Diversification

To provide structure to our outreach and to ensure that a diversity of financing mechanisms are studied, LIFT has developed a matrix of basic solar project settings. Basic categories include utility type - investor-owned, municipal-owned, and coop - as well as electricity market regulatory type - deregulated or regulated. The underlying principle of this matrix structure is that solar project finance may take vastly different forms and have different performance requirements based on the utility type, and the investor and investment possibilities may differ based on the electricity market type. This matrix is summarized as follows:

	Investor-Owned Utility	Municipal-Owned Utility	Utility Coop
Deregulated	*[Financing approaches]*	*[Financing approaches]*	*[Financing approaches]*
Regulated	*[Financing approaches]*	*[Financing approaches]*	*[Financing approaches]*

In addition to targeting sufficient data collection in each matrix category, LIFT will target diversification in terms of regional geography, density of service area (urban, exurban, rural), and state-level incentive availability.

Summary of Findings

Characteristics of the Financing Approaches

The LIFT project team has collected partial datasets from six financing approaches. Five of the financing approaches deliver solar benefits directly to LMI households; some data on a sixth financing approach has been collected, but as delivery or passthrough of solar benefits directly to LMI households has not yet been confirmed, this dataset has been excluded from the analysis presented in this findings report. All data summarized have been aggregated and anonymized.

Characteristics of the financing approaches are summarized as follows:

- All financing approaches have been deployed in the investor-owned **utility type territory** (Pepco and Eversource)
- All financing approaches have been deployed in the deregulated **electricity market type** (District of Columbia, Massachusetts)
- **Portfolio sizes** range from 0.1511 MW to 1.4 MW with a median of 1 MW. One financing approach was used for a single project, one financing approach was used for a collection of residential rooftop installations, and three financing approaches were used for a portfolio containing multiple installations.
- **Solar installation types** include community solar (three), residential rooftop (two), and net-metered (two). In four of five financing approaches, only one solar installation type is included; in one of five, three installation types are included.
- **Development timelines** for financed projects range from eight months to 34 months, inclusive of acquisitions and pre-development
- **Financing timelines** range from seven months to 17 months
- **Total upfront capital requirements** range from $450,000 to $9 million

- **All-in dollar-per-watt** ($/W) costs range from $3/W to $4.33/W

Capital Stack

The capital stack in each financing approach differs based on market structure including available incentives and on available capital including the developer's own balance sheet.

Four of the five financing approaches leveraged tax equity. Three of the five financing approaches leveraged sponsor equity. Three of the five utilized construction financing; in the two that did not use construction financing, one leveraged a state grant and an SREC prepayment (SREC strip) to finance construction, and the other went directly into a term loan as the solar asset was already under construction. Three of the approaches use term loans. Four of the five approaches included state grants or incentives as part of the capital stack. One of the five twinned the Investment Tax Credit (ITC) with New Market Tax Credits (NMTC).

Trends

Capital stacks are varied, highly place-based, and time sensitive

The capital stack in each of the financing approaches studied to date are all different. Approaches may share similarities, such as use of tax equity, but none of the approaches studied replicated another. This is understandable given that all projects studied to date are in deregulated markets with investor-owned utilities, markets where one might expect the most innovation and variety. It also reflects the fractured nature of the US energy market in which each state defines its own regulations regarding the price of electricity, available incentives, and framework for the sale of electricity. Attempting to transport a financing approach across state lines would necessitate a re-evaluation of the entire model based on the state-level parameters which may vary greatly. This is a barrier to developers with multi-market capacity from a development perspective as it requires either building new relationships with financiers or working with an existing financier to "get comfortable" with a new structure.

These state-level parameters also change over time, with incentive set-asides becoming depleted or incentive structures changing entirely. This an impact seen at the federal level as well with, for example, the availability of New Market Tax Credits and the value of the Investment Tax Credit. Any shift, particularly rapid ones, in incentive structures or other market conditions can prevent a developer from replicating a tried-and-true financing approach at a later time and can turn solar assets into solar liabilities that cost more to operate than the revenue they generate (for example, by a sudden or prolonged decrease in electricity prices). Both of these scenarios were seen in the approaches studied to date, and interviewees expressed concern about that particular financing approach being studied as it is no longer deployable in today's solar market.

All of these conditions inhibit the solar market in general, but there is a particular impact to solar developers attempting to serve LMI households when combined with additional challenges facing these projects as explored below. One specific impact is that often (but not always) projects serving LMI households offer discounts on electricity for these households; this opportunity cost is offset by incentives or other assumptions in the capital stack, such as the price of electricity. Changes in these assumptions can be amplified for LMI customers, which may cause the projects to be seen as more risky, which in turn prolongs the time to transaction and/or may introduce derisking measures that prohibit or constrain LMI household participation in these projects, such as long term PPAs.

Pre-development expenses, scale, and transaction costs are barriers to LMI-inclusive developers

As demonstrated in the research to date, tax equity is typically used to finance solar projects. The demand for tax equity outpaces its supply, which enables tax equity providers to be more “choosy” regarding the transactions in which they will participate. This generally drives transactions towards larger portfolios, in which tax equity can be deployed more efficiently (the same level of effort is needed almost regardless of portfolio size). Several developers spoke about working with “values aligned” investors, investors who actively seek (or do not actively exclude) projects that serve LMI households. Even these investors have minimum portfolio requirements that must be met before engaging substantively in a proposed transaction.

In order to meet thresholds or minimum portfolio sizes to get tax equity investors to the table, developers seek scale and volume. In the approaches studied to date, this meant two co-located ground mount installations of 500 kW each, installations across 23 rooftops, and one portfolio containing three different installation types with none comprising more than 30% of the total capacity. This variety greatly increases pre-development expenses for solar developers operating in the non-utility scale space. Pre-development work includes site acquisition and initial technical feasibility studies - minimum requirements for getting the tax equity investor to the table. Typically these expenses do not increase with increased solar capacity given the time needed to secure site control, the technical complexity that may arise at each install site, etc. These expenses are typically fronted by the developer and recouped later from a developer fee. This structure can be prohibitive in particular for start-up and non-profit developers who lack the deep pockets of more established developers, who are able to float costs until projects begin. This may in turn have an impact on the advancement of LMI-inclusive projects sought by these developers for mission-related purposes.

The drive for volume and scale has even led some developers to aggregate projects across state lines and utility service territories, which further increases complexity and extends development timelines for the reasons outlined above. Pre-development expenses are further increased when portfolios include affordable housing buildings, as is the case in several portfolios studied to date, in alignment with the developers’ desire to deliver benefits to the households most in need. Affordable housing buildings come with a particular set of

encumbrances when supported by federal funds that require additional paperwork and signatures by all stakeholders in order to bring a solar asset onto the property. These encumbrances increase the time needed for building the capital stack and executing the transaction, and they may have implications for financing based on the seniority/subordination of debt from various parties and their willingness to provide favorable debt terms in response to that risk or subordination.

Lastly, many of the parties interviewed spoke about the high legal and accounting costs associated with the transactions. Scale helps here as well by spreading out a fixed amount over a larger solar capacity, thereby reducing the dollar-per-watt of these expenses; developers may also be willing to absorb high transaction costs if they're able to replicate the transaction with a lower transaction cost. However, as demonstrated above, scale can also increase the legal and accounting costs, and replicability of any particular financing approach is uncertain given market variances and the passing of time. Examples of increased legal expenses discussed during the interviews include execution of multiple site control documents, execution of site control documents in the context of a federally supported affordable housing building, whether the financial closing occurred on a rolling basis as projects were delivered or once all projects were delivered, legal structuring specific for use of New Market Tax Credits, and lender underwriting of all project documents if debt is included in the capital stack.

In four of the five financing approaches studied, pre-development expenses were financed by the developer's balance sheet. This may be easily done by some developers and may be a struggle for smaller or non-profit developers given both the total cost of these expenses as well as the potentially lengthy timeline for cost recovery depending on project development timelines and negotiated payment milestones. In the remaining instance, pre-development expenses were financed by a government grant without which the portfolio would not have been constructed. There is an opportunity here for values-aligned investors, lenders, and government entities to make capital available for pre-development expenses for LMI-inclusive developers.

Relationships, innovative financing, and persistence are necessary for LMI-inclusion

Four of the five interviewees referenced relationships that played a critical role in the execution of a transaction, which has a direct impact on LMI households and on the amount of savings and speed with which they are delivered. Examples of these relationships include existing banking relationships that decrease the due diligence period for a bank providing debt; existing banking relationships that reduced the interest rates offered or made available different types of loan products; existing banking relationships that were able to deliver tax equity and debt efficiency; and a non-profit's relationship with a government service provider that was able to deliver higher upfront payout SREC values than available on the market for construction costs for LMI installations. The financing approach without pre-existing relationships among the stakeholders had the longest development timeline.

Even values-aligned capital sources are evaluating risk, though, and this is where innovative financing plays an important role in mitigating what may be seen as risks stemming from LMI participation. Note as well that risks may vary per market as noted above, may change over time as noted above, and may be mitigated differently with each deal. In one of the approaches studied, New Market Tax Credits were included in the capital stack to bring additional value to the investors, which enabled the sharing of electricity discounts with LMI households at no cost to those households. In four of the approaches studied, state incentives including SRECs, grant funds, or watt-based financial incentives were used to finance construction (thereby de-risking pre-development), de-risk electricity payments (thereby reducing or eliminating the need for payment from LMI customers), or provide takeout funds (thereby de-risking a term loan). These were all innovative and different approaches to using public funds or state-level incentives to de-risk projects and finance them on better terms. As one interviewee said, developers either “have to get finance comfortable with LMI or make LMI participation concerns irrelevant because the project has been sufficiently de-risked.”

Lastly, patience and persistence were themes throughout each of the conversations and several pre-interview discussions. Site acquisition and initial relationship building with values-aligned financiers can take several months, or longer. Lenders may conduct lengthy due diligence reviews (even cited by one interviewee as perhaps unnecessarily lengthy given the size of the loan in discussion), particularly if they have not lent into LMI-inclusive portfolios before. The time needed to build these relationships and get everyone to the table for a transaction can overwhelm a low-resourced developer. In a pre-interview discussion, a financier shared that even values-aligned financiers and LMI-inclusive developers have had to abandon projects or approaches because the upfront cash flow wasn’t sufficient to meet investors’ needed; in this case, they found it easier and faster to generate cash through other types of projects (e.g. commercial net metered projects) to satisfy investors’ return requirements and would return to LMI-inclusive project development after establishing a longer runway. While the soft cost of establishing relationships and helping capital sources “get comfortable” both with community solar as a concept and with the inclusion of LMI participants are costs that may not be recovered, they seem to have an impact on the speed and cost of capital at which transactions occur once relationships and comfort levels are established. Relationship building also gives all parties an opportunity to explore values alignment and establish trust.

Next Steps and Initial Implications for the LIFT Toolkit

As discussed, project finance research to date has primarily focused on the deregulated - investor-owned utility category of the above matrix. Project finance research will continue into LIFT’s Budget Period 2. During that time, the LIFT team will expand the breadth and depth of finance research into the other matrix categories listed above. As part of this expansion in

research, the LIFT team will target financing approaches deployed in the approximately ten states with LMI-inclusive solar policies or incentives as well as in the states with the most community solar capacity in the queue for deployment (Colorado, Illinois, Massachusetts, Minnesota, and New York). The LIFT team will also ensure sufficient data collection to provide meaningful insights per the other examination lenses identified, including regional geography, density of service area, and state-level incentive availability.

Looking ahead to the toolkit design, the LIFT team will be sensitive to solar market shifts. These shifts can include city-level policy changes (carbon pricing in New York City, for example), state-level shifts (redesigns of SREC programs such as in Massachusetts and New Jersey or the potential loss of funding in Illinois), and federal level change such as the pending FERC net metering case and upcoming stepdown of the ITC. The ongoing COVID-19 pandemic will also undoubtedly impact the solar market, the length and severity of which is still to be determined. The design of the toolkit therefore must anticipate changed economics; as stated above, the market conditions and economics that made a project financeable even last year may not be available or applicable at the time the toolkit is deployed. LIFT will keep this at the forefront of our work as we design the toolkit and will ensure we are designing with an eye on where solar project finance is headed. To address this, LIFT may develop an additional report on solar financing trends anticipated in the near future.

Remaining project finance work will also continue creating the connections with upcoming customer experience data collection and analysis, particularly the design and administration of a LIFT customer experience survey. Project finance interviewees are being asked for their consent to participate in these studies so that the LIFT project team can compare financial performance data with customer satisfaction, yielding a suite of project and program designs that meet investment criteria while also delivering the best possible customer experience to our neighbors in need.

####