



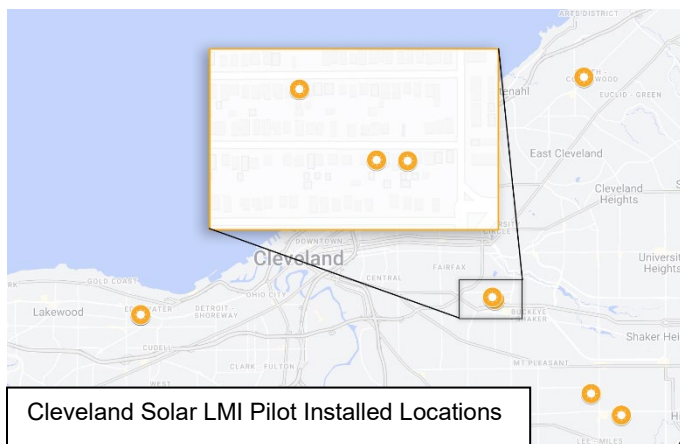
## CLEVELAND LOW-TO MODERATE-INCOME (LMI) SOLAR PROJECT

### *Final Report*

The Cleveland LMI pilot solar project ('project') launched in April 2022 with a press conference with Cleveland's Mayor Justin Bibb and then Cuyahoga County's Executive Armond Budish (pictured right). The [media attention](#) combined with strong partnerships with regional organizations such as Black Environmental Leaders and Cleveland Neighborhood Progress, and internal city departments such as the Mayor's Office of Sustainability, Department of Aging and Community Development, gained the project community-wide interest and support.



Over **175 individuals** from all over the city submitted applications to participate. Of those 175, 20 met the income, roof, and resident criteria and were qualified to move forward through the program. Of those 20, ultimately only ten (10) were eligible for net-metered connection due to utility assistance programs' incompatibility with net-metering tariffs.



Solar United Neighbors (SUN) in collaboration with the qualified LMI residents as well as SUN's market based Cuyahoga County Solar Co-op program participants, selected YellowLite to be the solar installer for the project through a competitive bid process. YellowLite is a Cleveland-based minority-owned and managed company, adding another aspect of community impact to the project.

Altogether, **7 grant-funded installations** were completed through the **City of Cleveland's Solar LMI program**, on the homes of income-qualified participants, and facilitated a **total of 28.37 kW of new solar installations total**. **These solar installations provided over \$90,000 of investment in the regional economy, \$95,000 in lifetime aggregate household energy bill savings over the next 25 years, 42.4 million pounds of CO2 equivalent emissions eliminated over the next 25 years, and support for 2 new solar jobs.** Through this project, we met with approximately 150 people to educate them about renewable technologies via our free information sessions. These metrics achieved our goals of successfully completing between 5 to 10 LMI program installs within the program budget and grant timeframe.



## ***Barriers and Lessons-Learned***

One of the primary objectives of the LMI pilot program has been to identify barriers to solar for those with low to moderate incomes. We have listed some of the primary barriers faced during the process and how we collectively overcame most of them during the program implementation. Key to program success was constant communication and check-ins within the overall program team (City of Cleveland, SUN and YellowLite), as well as with the program's funders.

### **Barriers:**

- **Individual**

- Solar Understanding -
  - As part of the program, we spent time talking to residents about how solar works and what the benefits can be to them. This particular group began the process with more limited background knowledge of PV solar technologies, requiring a bit more resources during the information sessions than normal.
- Financial - Ability to pay for/ finance system
  - All participants indicated that they had never considered going solar until the system was offered at no cost.
  - All participants responded to the questionnaire that they had little to no discretionary income or savings available to fund a solar array. However, most participants reported being in a stable financial position otherwise.
- Structural - Roof and electrical
  - 20% of participants who were income-qualified were disqualified due to shaded/aging roof conditions or inadequate electrical systems.
  - Deferred maintenance and sub-standard repair jobs were common.
- Rate Structure - Assistance program compatibility
  - Another 50% of the income-qualified individuals were receiving HEAP or PIPP+ utility assistance from FirstEnergy, which conflicts with net-metering, a billing mechanism that allows solar customers to receive fair credit for the energy they produce, but do not use. We chose not to move forward with this group of individuals as they would lose their utility assistance if we proceeded to install solar with the net-metering option.

- **Process**

- Income Qualification Process
  - 80% who were initially interested did not complete the income verification process. Some indicated they found out later they did not qualify, others noted they had lost interest, more were simply unresponsive. Many attempts were made to reach these individuals.
  - All 20 individuals who submitted documents were followed-up with, and met income qualifications for the program.



- Trust
  - Several individuals who were initially qualified chose not to move forward as they did not trust that we were offering free installations. Even with the backing of the City of Cleveland, Habitat for Humanity, and others, they perceived signing contracts as a risk they were not ready or willing to take.
- Install Process
  - Even though we did not lose any participation due to the installation process, some participants voiced concern about the process. This included site surveys, paperwork, and physical installation being time-consuming or inefficient.
  - Some of this may be due to permitting and the interconnection process not being fully explained, as well as the added approval steps needed for the LMI program.
  - Even as this did not prevent anyone from moving forward, we feel strongly that as the program scales, the installation and permitting process must be streamlined and explained to the homeowner, or this will present a significant barrier at scale.

## Recommended Program Improvements

We learned a great deal about how to approach these types of programs through our experience setting up and executing the pilot. From overall program accessibility to making sure we use digestible language, despite our success at implementing the pilot, there are areas for improvement. A few of those areas where we recommend that future program managers pay particular attention to, are listed below:

- Data Collection
  - As early in the process as possible, have program participants give permission to access solar monitoring and utility data. Every utility has an authorization form/process to aid in granting the program manager authority to access utility information of the participant, reducing the burden on LMI individual to render documents during and after the program.
  - Tracking projects in real time at every stage is critical to understanding many aspects of the program. These types of funded/direct pay micro-grant programs separate the end-customer from the program owner/client. In our market rate work, the customer and client are the same entity. Here, the City is helping to channel grant funds or pay for the work, while the customer is receiving the service. Typical Solar Installers and even program managers may very well not be used to these kinds of layers. A close eye on the progress of each project is critical.

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**Table 1.1 - Cleveland LMI project stage tracking snapshot**

First Name	Last Name	Date of Site Visit	Date of Proposal	Permit Submitted	Permit Approval Granted	Interconnect Step 1 Submitted	Installation Starts	Install Complete	Electrical Inspection (YL on site)	Building Inspection	Utility Inspection (from Utilities after Electrical Inspection)	Permission to Operate Meter Swap (First Energy) or Reprogram
Takeis	Camp	10/20/2022	10/13/2022	10/20/2022	11/4/2022	10/22/2022	11/16/2022	11/21/2023	12/1/2022	1/13/2023	12/9/2022	12/13/2022
Kerry	Hudson	10/19/2022	10/13/2022	10/19/2022	11/4/2022	10/22/2022	11/16/2022	11/18/2022	11/30/2022	1/13/2023	12/20/2022	12/29/2022
Daniel	Julock	10/19/2022	10/13/2022	10/19/2022	11/01/2022	10/22/2022	11/9/2022	11/14/2023	11/16/2022	11/28/2022	11/28/2022	12/5/2022
Kassy	Allen	10/20/2022	10/13/2022	10/20/2022	11/01/2022	10/22/2022	11/10/2022	11/10/2023	11/21/2022	12/15/2022	11/29/2022	12/29/2022
Sadie	Anderson	11/15/2022	11/15/2022	12/2/2022	12/22/2022	12/1/2022	12/22/2022	12/22/2022	1/4/2022	2/9/2023	01/10/2023	01/23/2023
Cheryl	Brown	2/8/2023	2/8/2023	2/16/2023	3/8/2023	2/16/2023	3/28/2023					
Megan	Tolliver	2/13/2023	2/13/2023	2/16/2023	3/10/2023	2/16/2023	3/31/2023					



- Participant Communications
  - When communicating with participants, reduce or eliminate communications within email schedules that do not pertain to the program. Regular communication is very important, those touches should stay focused on program objectives. Creating a communications flow or 'drip campaign' in advance and separate from all other organizational communications to members/recipients is key.
- Income Verification/Qualification (IQ)
  - Establish income guidelines with input from community partners who may be able to help implement the income verification/qualification stage.
  - Partner with one or more organizations that have existing IQ protocols and processes. These organizations can help with IQ.
  - Alternatively, if IQ guidelines match partner organizations' guidelines, participants referred to the LMI program from these existing programs can be set up to automatically be income-verified.
  - If at all possible, use self-declaration of income and an honor system. (During our pilot program, there were no participants who claimed to meet income guidelines and then sent in paperwork that failed to qualify, i.e. indicate otherwise)
- Improved permitting and interconnection
  - Meet with and/or establish lines of communication with utilities and building departments. These programs can serve as a window into local permitting and interconnection processes that can be more efficient for the sake of the program for all stakeholders involved, including reducing the 'soft costs' for solar installations.

In the table below, we have outlined the stages of participation qualification, how many participants completed each stage, some barriers that contributed to attrition at each stage and how some of these barriers were overcome at each stage.

**Table 1.2 Participant Pipeline Status**

Stage	Expressed Interest	Roofs Qualified	Income Qualified (IQ)	Net-meter Eligible	Electrical, structural solar ready	Participants solar installed
<b>Participants</b>	175	108	20	10	<b>4</b>	<b>7</b>
<b>Barriers/How Overcome &amp; Lessons Learnt</b>	<i>(Earned media surrounding launch was a large part of this interest)</i>	Typical attrition due to shading in Cleveland area.	Streamlining IQ process will be key to future success.  Reduce steps for participants.	PIPP+ and HEAP incompatible was a big setback. State Legislative action is needed (for Investor Owned Utilities)	Many LMI homes require new roofs & electrical upgrades before solar	Habitat for Humanity and City of Cleveland's Department of Aging and Community Dev. referred new participants with newer, solar-ready roofs



Another primary objective of our work was to develop a sustainable pipeline of LMI solar participants. Early on, we started working with the City of Cleveland's Department of Aging and Department of Community Development, as well as the Cleveland Habitat for Humanity, as additional sources for participation. This effort proved fruitful. Both groups assisted with outreach and recruiting and engaged their clients/homeowners who were already income qualified. Habitat for Humanity homeowners also have new builds, complete with new roofs with very little shading and solar-ready electrical systems, making them a very good fit for the LMI solar program. These partners have allowed us to add participants to the queue later on in the process, saving time and reducing attrition.

## **Scalability, Sustainability & Next Steps**

Fully-funded solar installations have made large strides in building community trust, proving to decision makers that solar works here in Cleveland, developing a pipeline that is as effective as it is efficient, and building a fair distribution system. The problem of sustaining a program like this in perpetuity, still looms. Future pilot programs are required to continue to understand what types of incentives work, and to develop partnerships with green banks and other financial institutions to offer new low-cost financial products that are self-sustaining. We have to also better understand what a family is willing to pay monthly or upfront for a solar system and figure out what level of incentives will work best to motivate adoption. We also seek to learn more about the impacts of battery integration on the reliability and resilience of the residential and the grid electrical connectivity and systems. For these reasons, we plan to continue to seek funding to continue this important work.

Recently, Habitat for Humanity has expressed interest in at-least partially funding solar installs on their homes moving forward. We are very happy to continue to work with them and other partners to further the program's mission.

## **Conclusion**

Through this first of its kind pilot in the State of Ohio, we have explored many barriers to solar adoption in low- to moderate-income communities and developed ideas on how to improve adoption rates in these communities. We built trust in the community and a robust pipeline for future solar work. More work is needed to understand what types of incentives are needed and to develop self-sustaining financial tools to help sustain and scale this innovative program.

While we were happy to be able to provide 7 (seven) fully funded rooftop solar installations for LMI households, a total of 175 LMI households across the City of Cleveland indicated an interest in this program—many more than we were able to fund. Although we were not able to fund every eligible household's solar installation, this program has helped us generate more lessons learned, more community partnerships, and more grassroots solar equity advocates who can work toward a longer-term solution that matches the scale of this challenge. We will also continue to monitor





the actual utility savings generated by these solar installations, key to furthering program adoption and scale.

One of the more meaningful takeaways from this pilot program has been the conversations with the families who received the solar arrays. Our initial conversations began with walking families through what solar is, how it works, and answering their questions, then progressed to hearing them talk about how much they are saving after getting solar, and finally, we heard about all the conversations they are having with friends and family about solar.

At the ribbon cutting of the first LMI solar project in December 2022, we had the privilege to hear from the son of one of the solar recipients, 10-year-old Kasen Thomson. Kasen was very proud to have written his own remarks which were very impressive and spoke to the core of why we do these projects, *"This [solar array] allows my mother more money in her pockets to take care of my sister Kamari, my brother Jeff and myself."*

**From the Program Team: "Kamari, Jeff, and Kasen are why we do this. They are the future. A future made brighter by projects just like this."**



Watch the ribbon cutting here: [Cleveland's Low-Moderate Income Rooftop Solar Program](#)



## Appendix

**Table 1.3 CLE LMI Solar Installs**

Table 1.2 - CLE LMI Solar Installs - System Size & Estimates						
First Name	Last Name	System Cost	System Size (kW)	% Usage	Est. Annual Savings	Est. Carbon offset per year (lbs.)
Takeis	Camp	\$11,355.30	4.07	43%	\$547.11	96,415
Kerry	Hudson	\$12,372.80	4.07	94%	\$707.42	104,014
Daniel	Julock	\$12,372.80	4.07	91%	\$648.72	115,6664
Kassy	Allen	\$12,372.80	4.07	69%	\$613.30	93,363
Sadie	Anderson	\$12,372.80	4.07	54%	\$443.21	78,696
Cheryl	Brown	\$12,160.00	4.01	119%	\$459.66	90,171
Megan	Tolliver	\$12,160.00	4.01	100%	\$401.21	76,709
<b>PROGRAM TOTALS/AVERAGES*:</b>		<b>\$85,166.50</b>	<b>28.37</b>	<b>81%*</b>	<b>\$3,820.63</b>	<b>1,696,032.00</b>

**Table 1.4 Program Budget to Actuals**

Program Budget to Actuals			
	Lowenstein	USDN	Total Expense
Installs	\$15,166.50	\$70,000	\$85,166.50
IQ	\$3,500		\$3,500.00
Admin	\$10,000		\$10,000.00
<b>Total Expense</b>			<b>\$98,666.50</b>
<b>Total Budget</b>	<b>\$30,000</b>	<b>\$70,000</b>	<b>\$100,000.00</b>
<b>Remaining</b>	<b>\$1,333.50</b>	<b>\$0.00</b>	<b>\$1,333.50</b>



**Table 1.5 - Example of Monthly Production & Savings Estimates - Kerry Hudson**

Month-by-Month Details					
Month (2023)	Solar Production AC (kWh)	Grid Usage (kWh)	Utility Bill	Net Credits	Savings
Jan	279.8	320.3	\$45.99	0.0 kWh	\$40.17
Feb	333.52	264	\$37.90	0.0 kWh	\$47.88
Mar	474.63	94.9	\$13.63	0.0 kWh	\$68.14
Apr	519.34	0	\$0.00	32.6 kWh	\$69.88
May	560.16	0	\$0.00	58.6 kWh	\$72.01
Jun	546.13	0	\$0.00	134.8 kWh	\$63.94
Jul	581.15	0	\$0.00	95.7 kWh	\$75.48
Aug	574.39	0	\$0.00	199.5 kWh	\$58.28
Sep	506.97	0	\$0.00	198.8 kWh	\$47.90
Oct	405.87	0	\$0.00	80.6 kWh	\$50.57
Nov	289.82	23.3	\$3.35	0.0 kWh	\$41.61
Dec	212.64	283.6	\$40.71	0.0 kWh	\$30.53
<b>Total</b>	<b>5,284.4 kWh</b>	<b>986.2 kWh</b>	<b>\$141.57</b>	<b>\$57.03</b>	<b>\$723.42</b>





## Gallery – Photos of Installed Solar Arrays



*Figure 1: 'Takeis Camp' Residential solar array install*



*Figure 2: 'Kerry Hudson' residential solar install – Hudson (left) shows Cleveland City Councilman Joe Jones (center) his energy savings on his bill with Anand Natarajan – City of Cleveland's Energy Manager and the Solar LMI Program Lead, on the right*





*Figure 3: 'Kassy Allen' residential solar array on install day*



*Figure 4: 'Sadie Anderson' residential solar array electrical post install – pre-meter swap stage.*



*Figure 3: 'Sadie Anderson' residential solar install – Habitat for Humanity constructed home*