

Building Pathways to Solar Access in Northeast Houston

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Summary

Between September 2022 and September 2023, Solar United Neighbors and community partners in Northeast Houston worked together with a group of 10 households to deploy rooftop solar installations on 10, single-family homes. The Hive Foundation for Climate and Gender Justice funded this pilot project as part of their grantmaking priorities for Texas. The purpose of the project was three-fold: to make direct investments in an energy-burdened community; to identify barriers to rooftop solar access and adoption; and to uncover opportunities to improve and scale access to solar in Texas. After installation, interviews were conducted with all project participants to gather feedback. This report describes the process of developing and deploying the project, including barriers the project team encountered along the way and suggestions for improvement; it summarizes themes from interviews, policy and regulatory barriers, recommendations for overcoming barriers, and opportunities presented by the 2022 Inflation Reduction Act.

Introduction

In September 2022, nonprofit Solar United Neighbors (SUN) received funding from the Hive Fund for Climate and Gender Justice to install 10, 5.2kW installations in Northeast Houston annually for two years. SUN combined grant funds with incentives from the Hard to Reach energy efficiency program at CenterPoint, the Transmission and Distribution Utility (TDU) for much of the Houston metro area. This incentive was part of CenterPoint's suite of energy efficiency programs designed to mitigate peak load through reduction strategies, such as home energy efficiency upgrades and distributed generation. CenterPoint's Hard to Reach Program is specifically for households at or below 200% of Federal Poverty Guidelines.¹ The purpose of the project was to get solar on rooftops within a community that experiences high energy burdens that would not otherwise be able to access solar, thereby directly investing in the community, socializing the concept of solar, and learning collectively about how to make solar more accessible.

As a project-based organization dedicated to building a clean and equitable energy system with rooftop solar at the cornerstone, SUN is committed to learning by doing. One of the organization's primary organizing tactics is solar co-ops, or bulk purchasing programs. Solar co-ops are proven and effective at educating people about renewable energy, helping them go solar, and empowering them as advocates for a clean and equitable energy future. Since 2007, we have helped to take over 6,900 people solar and avoid over 1.4 billion pounds of carbon emissions. By giving people a direct stake in the success of clean energy policies and uplifting lived experiences with rooftop solar, we have created a network of passionate, dedicated, and informed individuals who can help push for clean energy legislation. To date, SUN has facilitated 20 Solar Equity Pilots. These pilot projects aim to improve access to solar among low to moderate-income (LMI) families. SUN takes big ideas and implements them by starting with small pilot projects to learn about local considerations, identify barriers, and create pathways for expansion.

While the cost of solar in the US has dropped approximately 52% since 2010,² it remains out of reach for many moderate and low-income families.³ This barrier is partly due to how solar is sold, as well as state and federal policies that drive solar adoption. The literature also suggests that education, income, homeownership status, and language preference are all factors that influence solar adoption.⁴ Even though rooftop solar has the potential to save families thousands of dollars over the lifetime of the system, upfront costs and lack of access to credit pose significant barriers. For example, a solar system generating approximately 12,000

¹ "2022 Hard-to-Reach Standard Offer Program | CenterPoint Energy," June, 2022.

https://visionelements.programprocessing.com/framework/CenterPointTX/612022143851.2022_HTR_Manual.pdf.

² "Solar Energy Research Data | SEIA," Accessed August 12, 2023.

<https://www.seia.org/solar-industry-research-data>.

³ Galen L Barbose, Sydney Forrester, Eric O'Shaughnessy, et al. "Residential Solar-Adopter Income and Demographic Trends: 2022 Update | Electricity Markets and Policy Group." February 2022.

<https://emp.lbl.gov/publications/residential-solar-adopter-income-0>.

⁴ *ibid*, Naim Darghouth, Eric O'Shaughnessy, Sydney Forrester, et al, 2022. "Characterizing Local Rooftop Solar Adoption Inequity in the US." *Environmental Research Letters* 17 (3): 034028.

<https://doi.org/10.1088/1748-9326/ac4fdc>.

kWh of electricity per year (average consumption for a single-family home in Texas) would cost about \$24,000 before tax credits, assuming an 8kW system priced at \$3/W. The majority of solar sales are made with financing,⁵ often through national solar financial institutions that come with origination fees and require a credit score of 650 or greater.⁶ With a financed system, families make a loan payment that may replace the amount they would otherwise spend on a utility bill; however, there will always be a utility bill of varying amounts for grid-tied systems. While solar bulk purchase programs like SUN's solar co-ops have the potential to reach middle and moderate-income families by bringing down overall costs, without funds to further offset costs and/or inclusive financing mechanisms, low-income households are unlikely to get solar, meaning that families who most need relief from high utility bills are also cut out of the clean energy transition.

Context: Texas Electricity Market & Considerations for Northeast Houston

In Texas, the state's unbundled electricity market further complicates the value proposition of solar. The Texas electricity market, governed by the Electricity Reliability Council of Texas (ERCOT), may be broadly divided into three separate entities: 1. the generators, 2. the poles and wires utilities, 3. the companies that sell customers electricity.⁷ In the retail choice market, Retail Electricity Providers (REPs) sell electricity plans to consumers. In municipally owned utilities and Rural Electric Cooperatives, the poles and wires, and sales interface are owned by the local utility, though not necessarily all of the generation. Most Texans get electricity in the retail choice electricity market and therefore must choose a REP to sell them electricity for their home. Only a handful of REPs offer solar buyback plans that credit solar customers on their electric bill for the excess solar generation that solar customers contribute to the grid.⁸ What's more, without a statewide net metering policy, the value of the excess generation is subject to change year over year and, in some cases, month over month—at the discretion of the REP and their contract terms. Buyback plans mimicking net metering disappeared after winter storm Uri and are unlikely to make a comeback. This price volatility makes for a murky payback rate on a solar system representing a 25-year investment, which further disincentivizes middle, moderate, and low-income households from switching to solar.

The gap between the need for clean energy solutions and access to rooftop solar is particularly large in Northeast Houston. This part of the Houston metro area is majority Black and Latine and has borne the brunt of climate-related impacts due to poor drainage infrastructure, poor housing stock, and consistent divestment from disaster relief funding. People in Northeast Houston also experience a high energy burden, meaning that residents

⁵Gaston, Zoë. "Will Rising Interest Rates Curb the Dominance of the US Residential Solar Loan Market?" Wood Mackenzie. October 26, 2022.

<https://www.woodmac.com/news/opinion/will-rising-interest-rates-curb-the-dominance-of-the-us-residential-solar-loan-market/>.

⁶ Sirull, Ellen. 2022. "Can You Go Solar with Low Credit?" *EnergySage Blog*, November.

<https://news.energysage.com/going-solar-with-low-credit/>.

⁷ <https://www.electricchoice.com/blog/guide-texas-electricity-deregulation/>

⁸ "Texas Solar Buyback Plans - Texas Power Guide." 2023. Texas Power Guide. August 2023.

<https://www.texaspowerguide.com/solar-buyback-plans-texas/>.

have to divert more of their relative income to pay for energy than other parts of the city and country. In fact, households in Northeast Houston spend upwards of 7% of their income to pay energy bills, while the median US household spends 3% on these expenses.⁹ Northeast Houston is also a nexus of community organizing, where residents and grassroots coalitions have been banding together to fight for local policies that improve living conditions and infrastructure resiliency.

Methods: Partners, Participants, Installer, and Processes

For the purpose of this pilot project, SUN chose to work with two local Community Benefit Organizations anchored in Northeast Houston: West Street Recovery (WSR) and Launch Point CDC. Because SUN had never worked in this region of Houston, local partnerships were critical for project success and provided deep knowledge of the area and strong relationships with participants. By partnering with organizations that have long-term investments in the community's flourishing, we were able to quickly develop and deploy a program that would have otherwise taken years of trust-building to execute. SUN provided technical expertise and overall program and solar installer management. The local CBOs provided strategic guidance based on local knowledge, recruited participants, and did the bulk of one-on-one "customer support;" this included collecting paperwork for permitting, interconnection, and other digital documents that were hard for participants to access, fill out, and understand.

For year one of the project, all participants were members of the Northeast Action Collective, a coalition that West Street Recovery participates in, and many had lived in their homes for decades. Additional communication barriers arose for several participants. Three out of the 10 participants were visually impaired, and one participant only fluently spoke Spanish. Additionally, we served a participant who was over 80 years old. All participants demonstrated a willingness to move forward with the project despite personal constraints. While we had anticipated needing a waiting list of people who were interested in the program, everyone who initially signed up ended up getting solar, perhaps because they had a high level of trust in the partner organizations and commitment to the process.

Project partners aimed to keep the sign-up process as simple as possible and developed a communication and qualification plan ahead of the project launch. Signing up for the project entailed expressing interest in the project to WSR and providing contact information, name, and address. All participants were at or below 200% of Federal Poverty Guidelines and were income-qualified by Centerpoint. Preference was given to homes that had recently had their roof replaced. Most of the participants had also undergone disaster repair with WSR. SUN staff would then call participants and verify that they understood what would happen: that this was a grant-funded opportunity to receive a free, 5.2kW solar array on their home and that it was possible that not everyone who wanted the free solar would ultimately be eligible to receive an array. SUN staff explained the basics of how rooftop solar works, and that a solar installer would do a site visit to verify that their roof was suitable. After the call, names were released to an

⁹ "Energy Burdens in Houston | American Council for an Energy-Efficient Economy," September, 2020. https://www.aceee.org/sites/default/files/pdfs/aceee-01_energy_burden_-_houston.pdf

installer to start the process of permitting, design, site surveys, and installation. In general, we strove to provide regular communication either over the phone or in person.

The installer for the project was selected through a competitive bidding process. We wrapped this pilot project into the end of a bulk-buy program for solar panels that SUN was running in the Houston area. Through the standard solar co-op process, a group of homeowners expresses interest in purchasing a rooftop solar system along with others in their city or county. SUN convenes a competitive bidding process for the group, and the members select the company to provide the installations. For this project, SUN approached the solar installation company that a Houston-area solar co-op had chosen to ask if the company would be willing to serve this group of 10 participants in Northeast Houston. SUN asked if the company would be willing to provide installations with extended warranties, in addition to operations and maintenance support, and how much additional cost they would charge to do so. The company serving this project, Icon Power, agreed to do the installations at no extra cost.

While rooftop solar systems are usually sized to offset a percentage of a home's energy use over the course of a year, we used a standard system size of 5.2kW for all participants to control for costs and avoid overproduction. Solar is priced per watt, and in order to set an installation budget, we needed to know roughly how much 10 systems would cost long before participants were selected. Furthermore, because Texas does not have a state-wide net metering policy, homes that produce more energy than they consume do not provide any additional economic benefit to the families; this is especially true for solar homeowners who purchase their systems. All households participating in this project had homes under 1,700 square feet, and the homeowners were careful about their energy use. Depending on the home's square footage, energy efficiency, and family size, the 5.2kW arrays offset between 45-95% of each home's energy use per year, with a median offset of 72%.

Because infrastructure resiliency is a priority for Northeast Houston residents, all solar systems were installed to be "battery-ready," and three homes received donated batteries. "Battery-ready" means that the inverters used in the system are compatible with a battery and would not need to be retrofitted should a battery be added at a later time. The participants who received solar and storage had already volunteered to be resiliency "Hub Homes" within the community that will serve as heating or cooling and charging centers in the event of a grid outage. Because of recurrent flooding issues in Northeast Houston, the batteries were also lifted above the manufacturer's minimum installation requirements to prevent water damage.

The installation process took approximately seven months to complete, and the vast majority of that time was spent in different permitting processes. Each participant had to sign upwards of five different documents from the installer, City of Houston, and TDU, and all had to be submitted electronically. The actual installations each took a matter of hours.

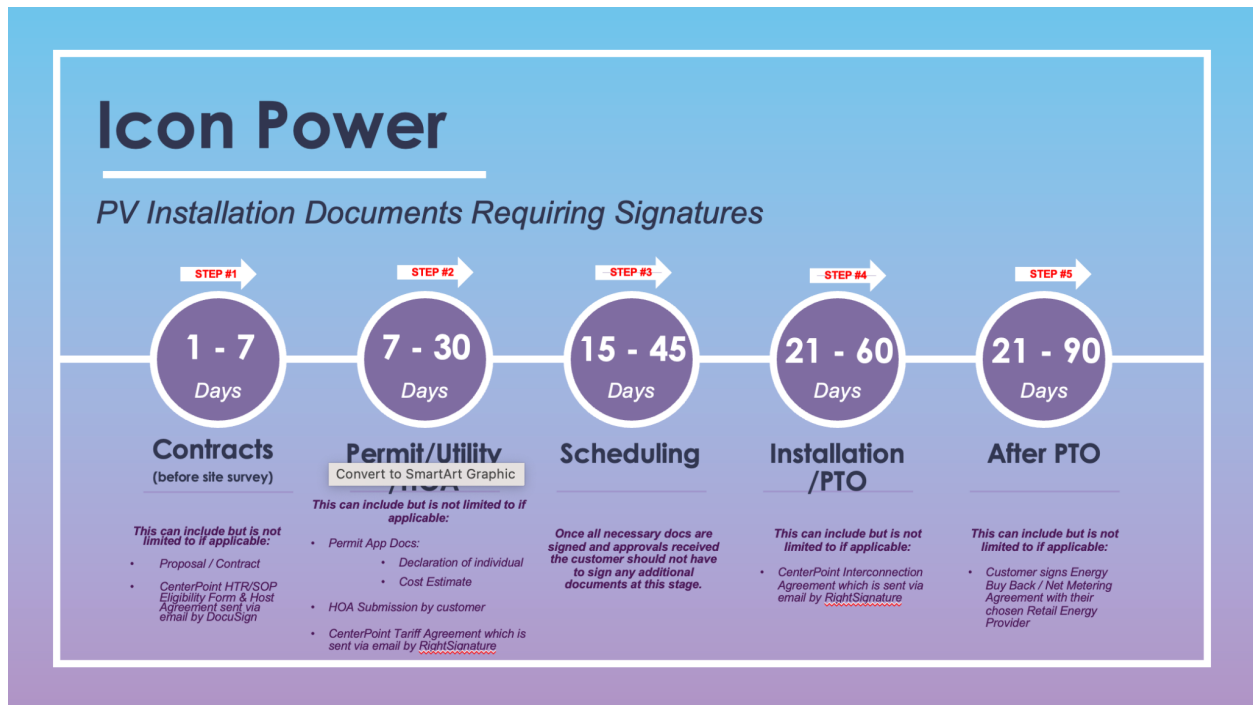


Figure 2: Icon Power’s Document Timeline for the Project, provided by the company.

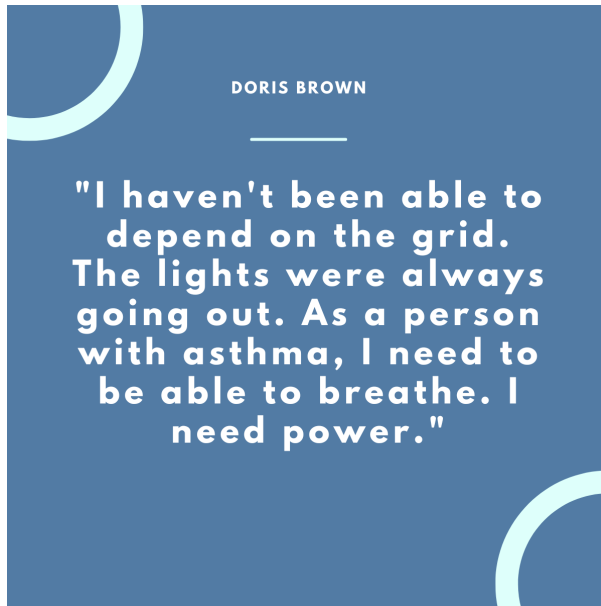
After installation, SUN worked with participants to switch electric plans in order to maximize solar savings. SUN did this by collecting utility bill information from participants and requesting a report from Texas Power Guide to map the home’s energy consumption patterns against all available REPs in the market.

SUN collected feedback from participants by developing a set of questions, along with partners, to ask during semi-structured interviews that took place 30 days after each system received permission to operate from the utility (began generating electricity). A SUN representative conducted each interview in person between June and July of 2023, and each interview lasted between half an hour and an hour, depending on whether or not additional support was needed to verify utility bills, check on system production, test a battery, etc.

Findings:

Several themes emerged from the interviews with participants. See Appendix 1 for sample questions. Seven out of 10 participants cited the paperwork (forms, emails, or permitting) as the hardest part of the process of getting solar. We also heard this from our partners at West Street Recovery, who had to help each of the participants fill out the forms. The amount of paperwork coupled with the digital format proved to be difficult to execute and required much more staff support and time than anticipated. Half of the participants mentioned environmental reasons as either a motivating factor in their desire to participate in the program or the best part of getting solar. Of the eight people who had homeowners insurance, most had to find a new plan that didn’t charge them significantly more for adding solar. Eight out of 10

participants indicated that they would be willing to take out a low-interest loan for a solar system if it were cash flow positive in year one.



While the incentive money offered by CenterPoint allowed the grant to be stretched further and established clear parameters for income qualification, it also added more forms and checkpoints to an already paperwork-heavy process. Participants had to submit an eligibility form to the solar installer who then filed the paperwork with CenterPoint. Eligibility was determined by either self-attestation combined with a screen grab of address in a HUD census tract or proof of enrollment in another program such as WIC, food stamps, CHIP, or another program requiring income verification, outlined in the Hard to Reach program manual.¹⁰

From SUN and partner perspectives, the contingency fund proved to be essential. While

most of the houses had roofs in good condition due to previous reroofing or repair work, two homes needed to be reroofed prior to adding solar. One home had a tree leaning over towards the house that had to be removed for safety and shading issues. Additionally, one of the homes had a permitting fee from years ago that had never been paid by the contractor who had done the work, which meant that new electrical permits could not be pulled for solar until the old fee was paid. The older nature of the housing stock, coupled with frequent exposure to hurricane conditions in an under-resourced community, means that many of the homes in Northeast Houston are not suitable for solar without significant investment in repair.

Lifting the three batteries above minimum manufacturer installation specifications added a small amount of additional costs to the battery projects but was deemed necessary by project partners to improve infrastructure resiliency. Tesla Powerwalls may be mounted either on a wall or on the ground.¹¹ While the batteries should be able to take on some water and still function, many of the homes involved in this project experienced between two to four feet of flooding during Hurricane Harvey in 2017. We asked that all batteries be installed two or more feet off the ground to improve infrastructure resiliency.

Houston's fire code requires three feet of clearance for pathways to the roof ridge as well as setbacks from the roof ridge, which consequently reduces available roof space for a solar array.¹² Due to this code requirement, two homes were installed with a stranded panel on a less-than-optimal orientation rather than being installed with the bulk of the panels. Breaking up

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https://visionelements.programprocessing.com/framework/CenterPointTX/612022143851.2022_HTR_Manual.pdf

¹¹

https://www.tesla.com/sites/default/files/pdfs/powerwall/Powerwall%20AC_Datasheet_en_northamerica.pdf

¹² <https://www.houstonpermittingcenter.org/media/6111/download?inline>

an array in this manner adds cost to the installation and reduces performance. In general, the code requirement reduces the amount of roof area available for solar.

As SUN has anticipated, the retail choice electricity market added a layer of complexity to the project. Since most REPs have hefty termination fees for those who cancel their plan before the contract period ends, SUN is working with each participant to track individual electricity plan expiration and renewal dates. SUN is also working with Texas Power Guide to run reports for each participant to see which plan would help maximize their savings. Even with this added support, one participant accidentally authorized his REP to switch him over to a different “solar” plan that was not as beneficial as his old plan, which had a very low import rate but didn’t credit him for excess generation. Tracking electricity plan prices, renewal dates, and consumption patterns is cumbersome, and the lack of fair and consistent buyback plans poses a significant barrier to equitable solar access.

Suggestions and next steps

While the Inflation Reduction Act (IRA), which passed in August 2022, set the stage for new rules to be written, processes to be developed, and investments to be made, practical guidelines for implementation were just coming out when this report was written. The IRA presents several new opportunities for improving access to solar, including: elective pay for non-profit institutions, renewed and enhanced tax benefits for solar, while also making \$27 billion available for direct investment in greenhouse gas reduction strategies.¹³ The IRA renewed the federal tax credit for solar at 30% until 2032, and the IRS has recently come out with guidance about how non-profit institutions can take this tax credit in the form of direct payment or “elective pay.”¹⁴ This development helps bring down the cost of solar for institutions like churches, school districts, rural electric cooperatives, and community benefit organizations. What’s more, the EPA has recently announced funding opportunities for states to apply for federal funding to invest in solar locally. The local organizing, lived experiences, and project deployment that has been building in Northeast Houston for years is invaluable to spurring further action through opportunities that are being made available at the federal level. Projects such as this one collectively build neural pathways, muscle memory, and community insight to adapt and scale up.

For year two of the project, we intend to repeat the activities that worked well while making several actionable improvements based on participant and partner feedback. We plan to install solar for 10 new single-family homes in Northeast Houston between the fall of 2023 and September 2024. Since batteries add much-needed resiliency benefits, unused contingency funds may go towards more batteries. While we are still processing the IRS guidelines for non-profits and elective pay, we are exploring avenues for a community partner to own the arrays and take the elective pay to reduce the system costs and potentially open future projects to more participants. Since so many participants expressed an appetite for a loan—assuming it

¹³ Solar United Neighbors. “How the Inflation Reduction Act Helps You and Your Community Go Solar.” March 8, 2023.

<https://www.solarunitedneighbors.org/learn-the-issues/solar-incentives/how-the-inflation-reduction-act-helps-you-and-your-community-go-solar/>.

¹⁴ “Elective Pay Overview | IRS,” Accessed August 2023. <https://www.irs.gov/pub/irs-pdf/p5817.pdf>.

was cash-flow positive and without a strict credit score requirement, we have also had several conversations with Green Banks to explore a loan component. Ensuring cash-flow positivity is difficult without consistent buyback plans and amid rising interest rates, so while we may not be able to iron out a financing option for the second year of the pilot, SUN and partners are eager to explore inclusive financing options for future projects. Finally, a few small adjustments that may have a big impact include providing an overview of all documents that must be signed as part of both individual calls with participants and group information sessions and wrapping participants into an even larger group buy program (Solar Switch Houston) to secure competitive rates.

While the IRA opens up several potential pathways to scaling solar access and adoption, regulatory barriers remain due to the way that electricity is sold to consumers and the lack of opportunities for public participation in ratemaking processes. In the aftermath of winter storm Uri, REPs stopped offering buyback plans that mimic net metering due in part to rising TDU rates that REPs must pay for all of their customers, even rooftop solar customers that are providing a service to the grid by generating electricity close to where it is consumed. This makes solar customers the lowest value customer to a REP, meaning there is currently a lack of market signals to incentivize REPs to make more solar-friendly plans. Opportunities for changing the regulatory environment are slim. The PUC does not account for the value that distributed generation brings to the grid in their ratemaking processes, and each TDU has a separate Transmission and Distribution Cost Recovery rate case, which rarely has intervenors. While changing these parameters is an uphill battle, SUN is committed to continue tracking opportunities for engagement.

Recommendations:

Based on the feedback we received from participants and the project team, we offer the following policy recommendations to improve solar access and scale-up adoption in the Houston Metro Area.

- **On-bill loan servicing (i.e., inclusive financing with consumer protections):** One opportunity for expanding access to solar would be in the form of very low-interest loans. Paying one bill for a solar system and a utility bill is easier than paying two bills and reduces the paperwork burden. With on-bill loan servicing, the utility collects payment from the customer and passes the payment on to a third-party lending provider.
- **Consider revisiting the minimum clearance required in Houston's Fire Code:** 1204.2.1.1 Pathways to ridge and 1204.2.1.2 Setbacks at ridge to be in line with current best practices in fire safety while maximizing available roof space for solar.
- **A policy to study the value of distributed generation** to the transmission and distribution grid and/or the value of solar, taking into account avoided substation costs, ancillary service uplifts, and reduction in coincidence factors. Quantifying the value that solar brings to the grid could help stabilize buyback plans, clarify the value proposition of rooftop solar, and add certainty to any investment in solar.

Appendix

1. Semi-structured interview questions

A. Questions for participants:

What motivated you to get solar for your home?

What were your concerns (if any) about getting solar?

How was your experience working with the installer?

What lingering questions or concerns do you have now that your system has been installed and turned on?

What was the hardest part about the process of getting solar?

What was the best part?

How do you think we could make solar available to more people?

How do you think we could improve our solar education and outreach?

Thinking about the neighborhood that you live in, what's your favorite part of your community and what do you hope to see for your community 10 years from now?

Would you have considered taking out a ~\$5K low-interest, 10-year loan to get solar?

Do you have home insurance and if so how much did it increase in cost? How was the process of adding solar panels to your insurance?

B. Questions for partners

How do you think the pilot went overall?

What was the biggest success?

What was the biggest challenge or sticking point?

What opportunities do you see for process improvement?

What opportunities do you see for pilot expansion?

What are the biggest hurdles for program expansion?

What are the main issues you think will exclude people from the program? For example, roof condition, shading, language, etc.

How much staff time did it take per person enrolled? Do you think this should go up or down and if so how?