Rooftop Solar in Lawrence, MA: Community Perspectives, Deceptive Practices, and Financing Options

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List of Terms and Acronyms

CEE	Clean Energy Extension
CESA	Clean Energy States Alliance
Communities LEAP	Communities Local Energy Action Program
LMI	low- and moderate-income
LSC	Lawrence Stakeholder Coalition
NREL	National Renewable Energy Laboratory
PPA	power purchase agreement
PV	photovoltaics
SEIA	Solar Energy Industry Association
UMass	University of Massachusetts Amherst

Executive Summary

Introduction

This report was prepared as part of the U.S. Department of Energy's Communities LEAP (Local Energy Action Program) pilot. The Lawrence Stakeholder Coalition (LSC) includes the City of Lawrence, All In Energy, MassDevelopment, Mill City Community Investments, BlocPower, and Groundwork Lawrence, and is led by Browning the Green Space.

The LSC identified rooftop solar photovoltaics as a top priority for Communities LEAP to analyze. Lawrence, Massachusetts, faces high energy burden (i.e., the percentage of income a given household spends on energy bills) and electricity prices, thus rooftop solar can be a tool to help lower those costs. However, the coalition received feedback that some solar companies were using deceptive and unfair practices when marketing, selling, or financing solar energy, costing residents more money than utility rates and increasing their energy burden.

This analysis sought to address rooftop solar community priorities through two pathways:

1. Facilitating community engagement to understand community perspectives and experiences with rooftop solar development.
2. Conducting a financial cash-flow analysis highlighting the varying fiscal outcomes for rooftop solar adopters based off rooftop solar leasing, nonprofit power purchase agreement (PPA), subsidized ownership, or buying electricity from the utility (National Grid).

DEFINITION OF DECEPTIVE PRACTICES

Deceptive practices are those involving a material representation, omission or practice that is likely to mislead a consumer acting reasonably in the circumstances (Federal Trade Commission 2021).

Community Engagement

On October 25, 2023, in collaboration with local Lawrence community organizations, the National Renewable Energy Laboratory held a community feedback session with residents of Lawrence, Massachusetts, to identify motivations, level of understanding, information sources, barriers, and successes in solar energy adoption. The group of residents was made up of both solar energy adopters and non-adopters and the session was held in a discussion-style format with 10 participants in each group. The discussion was conducted entirely in Spanish.

NON-ADOPTERS KEY FINDINGS:

Level of understanding

Most non-adopters in the community show a limited understanding of solar energy technology, lack an understanding of how the technology works and how solar energy billing and contracts work, and perceive it as an untested energy source based on negative anecdotes from peers.

Sources of information

When asked where participants sought information about solar energy, non-adopters placed the highest trust in peer-to-peer exchanges. Social media and YouTube emerged as potential information sources. Participants said they would trust elected officials and the City of Lawrence and expressed mistrust in energy-related companies.

Key concerns with solar energy

The concerns of non-adopters encompass various dimensions including perceived high costs of solar energy adoption and lack of qualifications for assistance programs in their income range, anecdotes of deceptive loan and lease agreements, the longevity and maintenance of the technology, the myriad options of unregulated solar energy suppliers, and mistrust of nonprofit organizations.

ADOPTERS KEY FINDINGS:

Reasons for solar energy adoption
A commitment to clean energy and environmental consciousness and the promise for reduced energy bills stood out as common priorities and drivers for initial interest.

Issues with their installation and other concerns
Participants found that the solar system often fell short of their consumption needs, created damage to their roofs from the installation, and that the monthly payments increased annually for the leased solar panels. The constant personnel changes at the solar companies made it unfeasible to get these issues resolved.

Benefits of installation
Two out of the ten participants considered themselves as successful solar energy adopters and experienced tangible benefits, most notably in the form of lower to no energy bills.

Avenues of information
Like non-adopters, peer recommendations emerged as a powerful influence. Other sources were representatives from solar energy providers at home improvement stores, traditional advertising methods like door-to-door sales, news coverage, and advertisements, as well as online sources, including government announcements and forums.

The participants identified possible next steps, including city-led education efforts, energy technology and bill literacy campaigns, and opportunities for dialogue and information-sharing.

Rooftop Solar Financial Analysis

To complement the rooftop solar community engagement, the University of Massachusetts Amherst Clean Energy Extension (UMass CEE) completed a residential rooftop solar financial cash flow analysis using representative lease terms from a sample of real contracts data provided by the City of Lawrence, Massachusetts. While these lease terms represent the predominant lease structures that the City of Lawrence has been processing, there are other lease structures not represented here that can provide different outcomes.

UMass CEE developed the following cash flow models for the baseline analysis:

1. Solar lease vs. projected utility payments.
2. Alternative nonprofit or co-operative ownership with PPAs offered to homeowners.
3. Solar system ownership for homeowners with a subsidized loan.

KEY FINDINGS:

Net value of residential solar energy sales offerings to households
Primarily due to the solar contract price escalation terms assumed in the modeled solar 25-year lease (based on representative contract terms provided by the City of Lawrence) compared with more modest escalation rates projected for utility electricity, a residential rooftop lease arrangement poses a significant risk to increase homeowner energy burden as the required payment exceeds the utility energy costs by year 5, and this burden continues to increase over the 25-year contract. By year 19, the homeowner is projected to pay over $500 annually (or $42/month) more than the utility rate for their solar energy through the end of the lease until year 25.

Potential pathways to equitable solar energy for Lawrence homeowners

There are potential options that have been shown to save residents money across the country. For example, in the past, Mass Solar Loan provided interest rate buy-downs, income-based loan support, and loan loss reserves that reduced risks to lenders and enabled financing for borrowers with lower credit scores, facilitating a path to ownership of the solar system. These programs utilize various mechanisms to facilitate or ensure savings for low-income residents. Other models have also demonstrated effectiveness for low- and moderate-income (LMI) communities including co-operative and nonprofit solar energy providers. These programs can offer agreed upon discounts from the utility price, access to community solar options, and other benefits.

Analysis of other solar energy financing models

Two non-standard models were analyzed, namely, a solar energy PPA through a nonprofit or co-operative program and solar system ownership through a direct, subsidized loan.

- In the modeled co-operative or nonprofit PPA, the system is installed for no upfront cost, and the PPA price paid by the resident is always set to 20% less than the utility price. This guaranteed discounted rate is used as an illustrative number in the model to show how this type of financing can work and still yield a 5% rate of return. This results in discounted net-energy cost savings of about $368 to $529 per year over a 25-year term to the residents.
- In a solar system ownership model through a direct, subsidized loan, the household is assumed to access a solar loan for the full cost of the solar system (or share of a community solar project) at a loan interest rate of 3% per year (an assumed rate based on historic Massachusetts state programs) for a loan term of 15 years. During the years that the household is repaying the solar loan, the household experiences minimal change in energy burden because the cost of the loan repayment is roughly the same as the utility energy rates each month. After the loan is repaid, the household experiences substantial savings each month because all the solar energy generated is accessed at no cost, leading to meaningful savings and wealth creation for the household.
- The desktop cash flow analysis and assumptions made across these models are strictly for illustrative and comparative purposes, and to provoke further discussion on business models and incentive programs to support equitable access to solar and wealth creation for low-income communities. Hence, the lease, PPA, and ownership models presented here are not exhaustive and, importantly, lease, PPA, and ownership models with different terms should be evaluated on their own to determine their advantages and disadvantages. These three solar adoption pathways (lease, PPA, and ownership) can provide favorable or unfavorable financial outcomes depending on the specific contract terms.

Takeaways and Pathways Forward

To understand the landscape of rooftop solar in Lawrence, Massachusetts, the LSC sought to understand community perspectives and corroborate known concerns regarding deceptive practices in solar energy financing. Both analyses provided evidence to support the coalition's concerns: (1) the community engagement highlights residents' experiences with deceptive practices and (2) the financial analysis showed that the sample lease offerings in Lawrence leave homeowners with greater energy burden. Both analyses point to solutions: (1) implementing education and literacy campaigns to provide trusted information, and (2) expanding options to solar energy adoption that are equitable. Furthermore, the analyses amplify the potential need for consumer protection policies to safeguard residents' interests and avoid deceptive practices. One potential option to provide

trusted information may be a solarize campaign which could pre-approve financing terms and contractors for better consumer protection and household savings opportunities.

Conclusion

This report documents the current solar energy landscape in Lawrence and the barriers the community is facing to accessing equitable solar energy. Lawrence is an illustrative example of the challenges of deploying rooftop solar in low- and middle-income communities. The findings from this work set a baseline for the current rooftop solar energy landscape in Lawrence and can help inform future program design, decision-making, and community outreach.

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1. Introduction to Rooftop Solar in Lawrence, MA

1.1 Lawrence, MA Communities LEAP Coalition

The Communities Local Energy Action Program (LEAP) pilot aims to facilitate sustained community-wide economic empowerment through clean energy, improved local environmental conditions, and opening the way for other benefits primarily through the U.S. Department of Energy's clean energy deployment work.

The Communities LEAP Lawrence Massachusetts Stakeholder Coalition (LSC) members include:

- Browning the Green Space
- City of Lawrence, Massachusetts
- All in Energy
- MassDevelopment
- Mill City Community Investments
- BlocPower
- Groundwork Lawrence

1.2 Solar Energy in Lawrence

The LSC identified rooftop solar photovoltaics (PV) as a top priority for this technical assistance program. Rooftop solar has the potential to serve as an important piece of the energy transition in Lawrence. Lawrence faces high energy burden (the percentage of income a given household spends on energy bills) and electricity prices, thus rooftop solar can be a tool to help lower those costs. However, the coalition received feedback that some solar companies were using deceptive and unfair practices when marketing, selling, or financing solar energy, costing residents more money than utility rates and increasing their energy burden.

This study sought to address the two rooftop solar community priorities including:

- Facilitating community engagement to understand community perspectives and experiences with rooftop solar development.
- Conducting a financial analysis highlighting the varying fiscal outcomes for rooftop solar adopters based off rooftop solar leasing, ownership, or buying electricity from the utility (National Grid).

To address these priorities, this report is organized by two key focus areas. First, a summary of the results from the community engagement conducted by Elevate Energy, the National Renewable Energy Laboratory (NREL), and local partners. Second, an evaluation of residential solar energy offerings and homeowner net savings, conducted by the University of Massachusetts Amherst's Clean Energy Extension (UMass CEE).

1.3 Definition of Deceptive Practices

Deceptive Practices are those involving a material representation, omission or practice that is likely to mislead a consumer acting reasonably in the circumstances (Federal Trade Commission 2021). The Federal Trade Commission (FTC) evaluates deception cases for three elements (Federal Trade Commission 1983):

1. First, there must be a representation, omission or practice that is likely to mislead the consumer.

2. Second, the FTC examines the practice from the perspective of a consumer acting reasonably in the circumstances. If the representation or practice affects or is directed primarily to a particular group, the Commission examines reasonableness from the perspective of that group.
3. Third, the representation, omission, or practice must be a "material" one. The basic question is whether the act or practice is likely to affect the consumer's conduct or decision with regard to a product or service.

2. Community Engagement

It was important to the LSC to obtain feedback on the community's lived experiences with solar energy, with a particular aim to understand if community members were dealing with deceptive development and sales practices. On October 25, 2023, in collaboration with local Lawrence community organizations, NREL held a community feedback session with residents of Lawrence, Massachusetts, to identify motivations, level of understanding, information sources, barriers, and successes in solar energy adoption. The session was held at the Lawrence Public Library and participants were compensated for their time with a $200 grocery store gift card, provided by local community organizations. The group of residents was made up of both solar energy adopters and non-adopters and the session was held in a discussion-style format with 10 participants in each group. The discussion was conducted entirely in Spanish.

This document details what participants shared as their experience with solar energy and recommends next steps based on what was identified as gaps to successful solar energy adoption.

2.1 Non-Adopters

"Non-adopters" are Lawrence residents who have not adopted solar energy. This group was made up of 10 homeowners, 9 of which are aware of solar energy as an option but who have not taken the step toward adding any solar installation to their property. One participant from this group does have a solar system installed on their property, but the solar company unsuccessfully wired the system—making it inoperable—and the participant has not seen any benefits. This participant is seeking a solution with the solar company and filed a complaint via the City of Lawrence to have this issue rectified.

In this section we outline three topic areas that summarize what participants shared. The first section discusses the level of understanding that the group had around solar energy and related areas such as billing. The second section highlights where residents tend to receive information about solar energy, and who they might look to as a reliable source. Finally, the third section describes what participants conveyed as concerns and barriers with solar energy systems that have prevented them from adopting this technology.

2.1.1 Level of Knowledge on Solar Energy Adoption

Most non-adopters in the community show a limited understanding of solar energy technology. When asked to share what they did know, more than half the participants simply said "nothing" while the other half of participants noted solar energy to reduce energy costs and as a clean form of energy. The group did acknowledge that they all lacked an understanding of how the technology worked and noted this to be an important part of deciding to adopt. For many, solar energy is perceived as "a novel and untested energy source, lacking proven success in their community."

Every participant had an anecdote about an acquaintance who had adopted solar energy; not all of the anecdotes were negative, but most participants shared a skepticism to positive experiences. Negative anecdotes from neighbors, friends, and family were perceived as the more accurate description of the technology's effectiveness, further hindering adoption.

One participant said that:

"*It is clean energy, but from what I have heard from those around me, it is not worth it, in one case I worked with someone who would call the solar company and complain all the time. She would say that it was not how they said it would be, you told me it would be one way, but it is another. They put a lot of obstacles because they deceive you by not telling you all the details. Look, I do not know anything about solar energy, all that I have heard was that it is expensive, you have more bills, all negative, that is all I know*."

Moreover, a notable gap in bill literacy exists, preventing a comprehensive understanding of how solar energy integrates with energy bills. A substantial portion of the conversation included discussing energy suppliers, distribution costs, and how to understand usage as it relates to charges on a bill.

2.1.2 Sources of Information

When asked where participants sought information about solar energy, non-adopters placed the highest trust in peer-to-peer exchanges. Specifically, they looked at their friends and family for advice when making any decision related to home repairs or upgrades. The stories shared in their community surrounding solar energy were overwhelmingly negative, ranging from not having the funding to start adoption to having solar companies supply and install systems that never worked. Participants also felt overwhelmed with the variety of stories.

One participant shared that:

"*A lot of people have different stories about solar energy. One person says they never pay a bill, then I go to talk to a cousin, and they say their bill stayed the same and someone else would say theirs went up. I do not know who to believe or what is true*."

Participants said that they use social media and YouTube as information sources, although many said they found it difficult to gauge if the information was trustworthy.

Participants also expressed an overall lack of trust in traditional energy-related companies like utilities and alternative retail energy suppliers, describing them as "opportunistic and only worried about making money." When asked about other organizations or entities that work within the space of renewable energy or energy assistance, no participants could name a group they would trust to provide or disseminate information on this topic.

2.1.3 Key Concerns with Solar

The concerns of non-adopters encompass various dimensions. Chief among these concerns is the perceived high cost of solar energy adoption. Although most participants listed cost as the main barrier for adoption, when asked if they knew what a typical system costs or what resources are available for mitigating cost, they said they did not know. Although they were unclear about specificities of funding mechanisms available, participants had anecdotes about deceptive loan and lease agreements and a vague understanding of PPAs, which they described as "unreasonable." Additionally, there is a lack of understanding regarding the technology itself, particularly in terms of maintenance and longevity. Participants showed an eagerness to learn more, but the lack of reliable information and the negative experiences that they have encountered add to their hesitation to adopt solar energy. The community also feels "burned" by experiences with alternative energy suppliers and this contributes to hesitation around pursuing solar energy. One participant said:

"*The reality is that the community feels betrayed if you come to their home and tell them their bill will be less and it is not. Our community, specifically the Hispanic community, does not forget that because you said it would be a certain way and it is not*."

The presence of countless suppliers further complicates the decision-making process, as residents felt that the companies providing solar energy in their community are unregulated and lack guidelines for their practices. Residents are unsure of who to trust among the myriad options, as participants shared their frustration with practices implemented by these solar energy suppliers, door-knocking being described as the most "unsavory." Participants shared their experiences of door-knocking occurring at inappropriate hours and the individuals doing the door-knocking lacking credentials to identify themselves. Participants also mentioned that representatives were not from their area, so a lack of community, identity, cultural or other relatable connection to representatives of these solar organizations could also play a role in the disconnect and distrust.

Participants expressed distrust, saying:

"Without exaggerating, at least 10 different alternative energy suppliers have come to my house. Often, they are young kids that come and knock on the doors and promise cheaper prices. When they come to knock on doors, it is not trustworthy because it could be anyone, it has been known that even some people have had their identity stolen."

Participants in this group also described a previous negative experience with deceptive practices in environmental health, which has fostered a deep-seated fear of a similar outcome with solar energy. In this environmental health case, the community was promised a full home water filtration system along with a year's worth of maintenance materials. Many community residents never received any of the incentives and were left with a high-cost maintenance system in their home and high monthly payments.

Trust issues extend to local nonprofit agencies, which residents perceive as having poor customer service and a lack of willingness to assist in navigating available options for bill assistance programs. Many participants fear that if financial assistance for solar energy becomes available through nonprofits, their communities will not receive enough assistance as prior funding for bill assistance has failed to impact their communities. Moreover, residents often find the costs of solar energy excessive and income constraints on state assistance for programs targeting LMI communities seem out of reach. Most of the group expressed that they do not qualify for LMI programs, falling just out of the income requirements, and that future programming could better target their income range.

2.2 Solar Energy Adopters

"Solar energy adopters" are Lawrence residents who have adopted residential rooftop solar systems. This group was made up of 10 homeowners, who have either taken the steps to add solar energy to their property or acquired a property with an existing installation. In this section, we discuss five topic areas that summarize what participants shared. The first section outlines the reason participants acquired solar energy on their property. The second section highlights any issues that participants had with their solar installation. The third section covers what participants conveyed as benefits of having adopted solar energy. The fourth section discusses what avenues of information participants used to find information on solar energy and the provider that installed the solar system on their residence.

2.2.1 Motivations for Solar Energy Adoption

Participants who have adopted solar energy cite various motivations for their decision. A commitment to clean energy and environmental consciousness stands out as a common driver for initial interest. Some participants noted an alignment with renewable goals set by the government as playing a pivotal role in encouraging adoption.

One resident shared what made them initially consider solar energy:

"I am pro-clean energy so I support what is clean energy and care for the planet, so I was told I would be helping the planet with clean energy and reduce the costs on my energy bill. I obviously would want to pay less, and I was told it would be a benefit to my finances."

One participant entered solar energy adoption through a home purchase with existing installations. The promise of reduced energy bills was at the top of the list for everyone, both in the form of reduced per kilowatt-hour costs offered through contractual agreements, and the installation providing most of their electricity use.

2.2.2 Sources of Information

Although their outcomes have been distinct, the paths through which solar energy adopters discover solar energy options are similar to non-adopters. Peer recommendations emerge as a powerful

influence, indicating the significance of community connections in the decision-making process. Participants admitted to not vetting the information received from family members and discovered that often only the positives of the solar energy experience were shared. One participant explained:

"*A cousin and her husband told me and my wife that it was a good idea, that their bills were always zero, but they also struggled with getting to low bills initially which is not something they shared with us upfront*."

Many of the participants shared stories of acquaintances or family members who worked at solar companies and provided that solar energy service. Similarly, many solar energy providers leverage referrals, tapping into existing customer networks to expand their reach: "W*ord of mouth, so and so sends a representative to you and they ask you to send them to more homeowners,*" said one participant. Residents shared that companies offer incentives to refer new clients but no one in the group mentioned having participated in these programs. Many of the participants that found their solar energy provider via these methods did not look for a second option, trusting that family and friends had already vetted the company as reliable.

Solar energy provider representatives who are in home improvement stores contribute to awareness through in-store interactions, providing some of the participants a space to ask questions and gauge whether solar energy was right for them and the ability to shop around for the most suitable provider. One participant found their installer during one of these interactions:

"*For me, I was at Home Depot, because almost everyone at Home Depot is a homeowner, they had representatives there speaking to people. They approached me and my husband and scheduled an appointment for an assessment at our home. They were very polite and provided information around clean energy and the process*."

Traditional advertising methods like door-to-door sales, news coverage, and advertisements also played a role in participants making the decision to adopt solar energy. One participant remembered solar commercials being plentiful during the Obama campaign and how that aligned with some of the policies of the time.

Online sources, including government announcements and forums, came up as examples of reliable sources for news and information on new technologies. One participant even mentioned seeing sustainability goals and wind energy generation when exploring these types of sites.

The multitude of communication channels reflects the varied and dynamic ways residents encounter information about solar energy options. Both groups of participants—solar energy adopters and non-adopters—communicated a sense of being overwhelmed with options.

2.2.3 Issues with Their Installation and Other Concerns

A recurring issue that this group's participants faced was the failure of an adequately designed system to meet their full demand. Solar energy generation fell short of expectations for most participants due to insufficient panels, poor installation, or lack of maintenance. Most participants thought that the solar system would cover their full consumption and replace their utility bill, thus were confused to receive both a solar and utility bill. Only one resident shared that installers promised the panels would cover a certain percentage of their usage and not 100% savings, yet the energy generated still fell short of that:

"*I was sold the idea and told that I would have up to 80% of the energy I used paid for by the solar panels, they said I would not be able to put 100% of my use because the panels had to have a percentage, in this case 20%, for them. That is why I installed the solar panels; the only thing is that they did not install the amount I needed for what I consume*."

Ambiguities in billing, including a lack of clarity between credits and amounts due, create confusion. The complexity of multiple bills overwhelmed the participants, making them unsure of what they

signed up for and if they are receiving any benefits. Like non-adopters, this group did not fully grasp the idea of delivery and supply cost on their energy bill. Participants expressed a disconnect with the initial promise and the reality of their situation:

"*I was sold on the idea because of the kilowatt per hour (kWh) price, that drove me crazy, they said National Grid kWh price was some amount, I don't know, and that kWh price with them would come out to this much and I said, wow, this is it?!… But I have solar panels that do not produce enough for my usage, and I have 2 bills to Sunrun and National Grid*."

Moreover, participants demonstrated a lack of understanding of their solar agreements, saying they were confused as to why their charges changed over time and were unaware of how charges for solar equipment were determined. The reputation among participants of National Grid as a problematic actor had them raising questions about billing accuracy, potentially stemming from a broader lack of understanding.

Incorrect installations compound problems by failing to cover energy costs, while increasing prices for solar panel installments raise financial concerns as most of the participants faced increased lease payments as the life of the system progressed. Participants who had issues with the number of panels installed were often required to receive an upgrade to meet the needs of their energy consumption with costs coming out of their pocket.

One participant tried to find a solution through the contractor that installed their system, but found that individual no longer worked there:

"*When I tried to contact the contractor that worked on my system, they no longer worked at Sunrun. So now they went to the home and analyzed, because they do a plan, and told me that the system installed was not enough for the demand of the home. So, the solution, they said, was I must buy a new system so they can upgrade it and that they cannot just install the missing panels but that I need to buy a whole new system on my own. Now the prices of solar panels are more than when I first got them installed. So, I feel like I pay more with solar panels than when I was just with National Grid*."

Structural damage to the roof during installation further adds to the list of challenges faced by this group, with two participants citing damage to their roofs upon installation. One of these participants noted that they have had few complaints about billing, but the damage caused by their installation was a "sore" in an otherwise positive situation. Participants who have dealt with issues during installation noted that contractor accountability becomes a significant issue when trying to rectify mistakes made, particularly when those responsible for installations are no longer associated with the company. Participants shared experiences of calling for customer service and being told that the company that initially provided the service had been sold or that the contractor no longer worked there. Rapid changes in ownership among solar companies contribute to uncertainties, leaving adopters with no reliable point of contact for addressing issues.

This constant change in personnel made it frustrating and sometimes unfeasible for participants to find a solution to problems. Participants sought other avenues to mend their damages, looking at the insurance policies provided by the solar system installer in their contract, but the insurance provided by solar companies often falls short of covering installation issues, leaving adopters with unresolved problems and a lack of customer service support. Understanding how home insurance policies interact with solar installations adds another layer of complexity. Participants who had damage to their roof because of installation had a challenging time working with their home insurance to remedy issues, and the solar installation made them hesitant to explore that option in the first place.

One participant is actively trying to solve an insurance issue. His roof was completely redone 3 years prior to installing the solar system but was damaged in the installation process. He has had difficulty having the damage repaired by the solar company responsible and because the previous roof repairs

were done through his home insurance, he is still in the timeframe window of responsibility for new repairs to come out of his pocket:

"W*hen those panels cause a problem on the roof, that company does not resolve the issue, that has to come out of your pocket. They do offer you an insurance policy for one million dollars for the roof, but it does not cover anything, and they come with stories trying to make you believe that the problem does not stem from the panels, that your roof was damaged to begin with. That is where I am now, I explain to the company, I try to communicate with them, I send emails, I call. They sent their technician, and I told him, logically my roof is damaged where the panels are, when you installed the panels, you knew that my roof was good and new. The side that does not have any panels is perfectly fine and never gives me any issues… They are not responsible when they say they will install the panels and say they will cover any damage caused by the panels. When you have damage to the home, you report it to the (home) insurance, and they cover the roof, but with a contract that you have to sign and guarantee that the roof will be good for 30 years. And whatever happens to the roof (after the home insurance has made repairs), if you did not pay a reputable company to do the labor and something is wrong, you have to list the company, or if you did the work yourself and kept the money you are responsible for any damage. So that is where I am because I replaced the roof entirely and three years later added the solar panels and, now, I have issues and the solar installer should be responsible for that*."

Beyond contractor accountability and insurance policy issues, a prevailing attitude persists that solar companies are opportunistic, prioritizing contracts over genuine environmental and financial benefits to consumers.

2.2.4 Benefits of Installation

Amid these challenges, two participants considered themselves successful solar energy adopters and experienced tangible benefits, most notably in the form of low to no energy bills. This highlights the potential for benefits in solar energy adoption when executed correctly and presents an opportunity to extend those benefits to a wider range of community members seeking energy bill reductions.

2.3 Possible Next Steps

As a part of the community engagement session, participants suggested potential next steps to advance equitable solar energy in their community. They also hoped that this convening might lead to better representation of their interests as a community, noting that:

"*Here in Lawrence, we do not have a person or group that we are confident in to speak about solar energy because I feel like everyone here just wants to sell and make money. There should be someone who can lobby for the interest of community residents not for their pockets, because that is what we are missing*."

The following potential next steps are summarized based on what the community deemed would be most useful in navigating solar energy adoption in Lawrence.

2.3.1 City-Led Education Efforts

Participants in the non-adopters group were eager to learn more about solar energy technology and both groups (non-adopters and adopters) expressed a desire for more guidance for finding reliable and accurate information.

One participant saw the issue of lack of knowledge as unique to their community but was eager to change that, noting that "*Solar energy is something new for us Hispanic communities, there are other people that know about it, but we are blind to it. That is why I am here, to learn more*."

When asked who they would trust to accomplish this, participants thought elected officials or the City of Lawrence should play a role in seeking vetted information and recommendations to navigate the complex landscape of solar energy.

2.3.2 Energy Technology/Bill Literacy Campaign

Participants expressed a need for more resources and tools to better inform their decisions, which can be delivered through a campaign focusing on energy technology understanding and bill literacy.

One of the participants in the non-adopters group noted that he previously studied electrical engineering and worked for Tesla and spoke about his experience finding the best rates through alternative retail energy suppliers and how to calculate your usage. Although this was off agenda, participants were keen to learn from one of their neighbors and expressed a need for this type of conversation and education for their communities.

Collaborating with local organizations, schools, public libraries, and the city to conduct workshops can empower residents with the knowledge needed to engage effectively with energy-related decisions. Increased literacy can serve as a foundation for more informed choices, dispelling myths and fostering confidence.

2.3.3 Continue Holding Discussions

Participants expressed a clear desire for continued dialogue and information-sharing opportunities. Participants in the non-adopters group expressed the need for a safe space to learn more and share opinions. One expressed that "*An open community forum is better to speak about topics like solar energy and a trusted group could educate us on the topic.*"

The participants ended the community engagement session having an open dialogue with each other. Those who had installed solar systems shared their stories, and the participants of the non-adopter group asked questions and were very engaged.

Peer learning should be considered as an effective method of targeting Lawrence residents. Establishing and maintaining spaces for these discussions, such as neighborhood clubs, parent groups, and school council meetings, can provide a platform for residents to engage with experts and representatives of solar technology. These spaces should be designed to facilitate open conversations without the pressure of sales, allowing residents to freely discuss their experiences and concerns, contributing to a more informed community.

3. Rooftop Solar Financial Analysis

A key priority for the LSC during the Communities LEAP program is identifying and gathering more information on unfair or deceptive solar energy sales practices happening in and around Lawrence, Massachusetts. According to information provided by the City of Lawrence, solar companies have been soliciting Lawrence homeowners with opportunities to install solar systems on their roofs at little to no cost to the homeowner under lease agreements and PPAs. Lease and PPA offerings are common in the Massachusetts residential rooftop solar market but can be subject to deceptive and unfair sales practices when the agreement does not provide homeowners with significant cost savings, or if the contract is not written with clear terms.

To complement the solar community engagement conducted with the LSC and Elevate Energy, UMass CEE completed a desktop spreadsheet solar financial cash flow analysis using lease terms provided by the City of Lawrence. The lease terms were based on observed residential solar energy sales practices being processed through the City of Lawrence for permitting. The analysis considers the terms of these leases, as provided by the City, in comparison with the alternative of staying on the utility electricity offering. The City of Lawrence also provided the utility electricity price projection which reflects a continuation of escalations of utility prices. The analysis also highlights financial cash flows of non-standard financing options. While these lease terms represent the predominant lease structures that the City of Lawrence has been processing, there are other lease structures not represented here that can provide different outcomes. UMass CEE developed the following cash flow models for the baseline analysis:

1. Solar lease vs. projected utility payments.
2. Alternative nonprofit or co-operative ownership with PPAs offered to homeowners.
3. Solar system ownership for homeowners with a subsidized loan.

These scenarios provide a range of outcomes for homeowners considering different financing options for installing rooftop solar installations.

3.1 Overview of Rooftop Solar Financing Mechanisms

For most people, especially in LMI communities, a solar energy project will require financing to pay for the solar installation. There are several methods used to finance solar energy for homeowners including, most prominently, solar leases, PPAs, and loans (Clean Energy States Alliance [CESA] 2018).

- **Rooftop Solar Power Purchase Agreement (PPA):** A PPA is an agreement between a homeowner or building owner and a solar company in which the solar company installs a solar system on the home and the homeowner only pays for the power they use at a contracted price. There can be a gap in energy supply which is, then, supplied by the utility. In a PPA, the third-party company owns and maintains the panels. However, these contracts can include price escalations over time (CESA 2018).
- **Rooftop Solar Lease:** A solar lease requires homeowners to pay a scheduled monthly bill for solar energy on their homes. Homeowners pay the same amount no matter how much electricity is produced. This can leave a gap in supply that the homeowner must pay for from the grid to the utility. These can have varying terms and are often structured with escalating rates similar to PPAs (CESA 2018). The system in a lease structure is owned by a third party. Solar leases were the primary contract type supplied by the City of Lawrence for this analysis.

- **Solar Loan:** When issued a solar loan, homeowners borrow funds to pay for the solar system and own that system. Homeowners then pay back the loan based on the agreed upon interest rates (CESA 2018). Once the loan is repaid, the homeowner only has to pay for maintenance costs of the solar panels while receiving all of the power generated from the system.

3.2 Net Value of Residential Solar Lease Offerings to Households

3.2.1 Model Assumptions

Based off a sample of numerous contracts from real Lawrence customers provided by the City of Lawrence, representative contract terms in this analysis were developed based on the following data:

- The City looked at 330 new solar lease and six PPA contract terms submitted for solar installation permits. In 2021, the City issued 171 permits for solar installations, out of which 87% (149) were for residential systems. In 2022, the City looked at 159 issued solar installation permits, out of which 96% (153) were for residential systems.
- The contract terms ranged from $0.215 to $0.265 per kWh in the first year. The median rate of $0.22 is used in this analysis.
- The median contract escalation rate of 2.9% annually is used in this analysis.
- The contract terms are for 25 years.
- System sizes range from 3.5 kW to 16 kW. The mean size of 8 kW is used in this analysis.

Based on these sample contracts, this financial cash flow analysis models a solar lease payment of $1,760 for the first year that escalates at 2.9% annually. The annual lease payments are compared with utility prices. The utility's electric price was taken from recorded utility costs in Massachusetts (YCharts 2024), starting with utility price in December 2007 of $0.16/kWh and ending with a utility price in December 2022 of $0.22/kWh, resulting in approximately a 2.03% escalation rate.

Representative terms from Lawrence used for this evaluation are provided in Table 1.

Table 1. Lease Contract Terms Used in Rooftop Solar Analysis

Key Lease Contract Terms	Value	Explanation
Solar System Capacity	8 kW	Total size of solar system installed.
Projected Solar Energy Generation (first year)	8,000 kWh	Over a year, the system is expected to generate this amount of energy, which will displace utility electric purchase.
Solar System Generation Degradation	0.5%/year	The solar system energy generation is set to degrade at 0.5% annually.
Initial Annual Lease Price	$1,760	Contracted price that homeowner pays for solar lease in the first year.
Annual Lease Price Escalation Rate	2.90%	Each year, the contracted lease price the homeowner must pay increases by this rate.
Lease Contract Terms	25 years	Homeowner is obligated to pay solar lease throughout the lifetime of the contract.
Utility's Electric Price	0.23 $/kWh ($1,840/year)	The amount the homeowner pays the utility for the initial kWh rate. In the first year, the homeowner saves $80 on the energy bill.
Utility's Annual Electric Price Escalation	2.03%	The percentage utility prices are projected to increase at this rate each year (actual rates are uncertain).

3.2.2 Lease Offerings and Lifetime Value to Lawrence Homeowners

Under the lease offerings reported in Lawrence and described above, homeowners can be attracted to the opportunity to support solar energy and achieve energy costs savings right away. However, due to the terms of the leases—specifically the escalation rates and projected utility prices—homeowners risk paying more for the solar energy generation over the long term than if they bought electricity from their utility. The top chart in Figure 1 compares the projected lease payments from homeowners to the solar company (yellow bars) and what the homeowner would have paid for the same electricity from the utility company (green bars) over the 25-year life of the lease contract. The undiscounted net savings (positive) or cost (negative) are shown in the green bars in the lower graph.

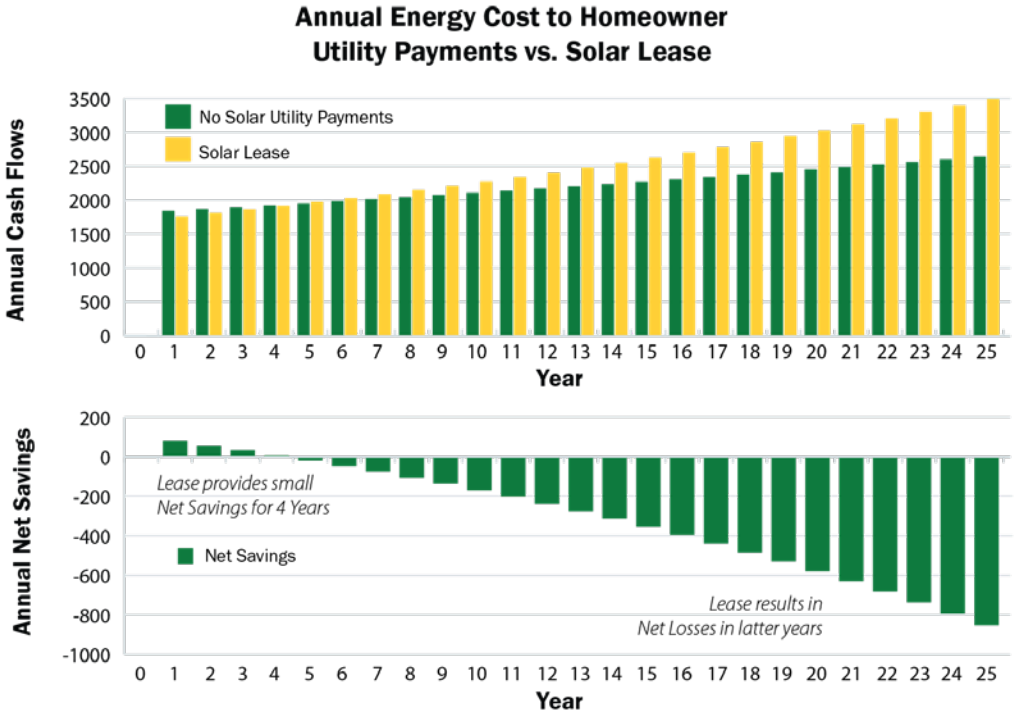

Figure 1. Annual undiscounted energy cost to homeowner: utility payments vs. solar lease

3.2.2.1 KEY TAKEAWAYS AND RISKS ASSOCIATED WITH SOLAR LEASE

The solar lease cash flow modeling highlights the importance of public understanding of how solar leases and other financing methods are constructed and what that will mean for their energy costs. The solar lease offers homeowners energy cost savings in the first year of about $80, or only $7 per month, and then declines over time. These near-term cost savings are minimal when compared to the significant energy cost burden in low-income communities like Lawrence.

Due primarily to the solar lease escalation terms assumed in the modeled solar lease (compared with more modest escalation rates assumed in this analysis for utility electricity), the lease poses a significant risk to increase homeowner energy burden since the required payment exceeds the utility energy costs by year 5, and this burden continues to increase over the 25-year contract. By year 19, the homeowner is projected to pay over $500 (or $42/month) more than the utility rate for their solar energy through the end of the lease until year 25. It is important to note that utility rates are uncertain in the future while the lease escalation rate will be set at the start of the contract. Thus, the homeowner faces risk that utility rates are even lower than modeled in this analysis, which would further increase net losses due to a larger gap between a higher solar lease payment and a potential lower utility payment versus the scenario in which solar is not installed. However, there is also potential for net savings if utility rates are higher than modeled, making the solar lease payment lower than utility electricity payments. Due to the escalation terms in the lease used in this model (based on representative terms provided by the City of Lawrence), there is significant risk to homeowners who sign contracts with similar terms, which is not aligned with the goals of the Lawrence Communities LEAP coalition to provide solar energy access (and cost savings) to low-income and underserved communities, reduce the energy burden, and reduce emissions. Many solar leases will save residents money and lower energy burden, however, in the Lawrence context and the types of leases (with lease escalation rates higher than historical utility rate escalation rates) that have been observed, most residents would not see cost savings.

The cash flow analysis results and many of the experiences of Lawrence community members amplify the importance of understanding the specific risks associated with the solar lease model beyond understanding solar lease terms such as escalation rates and having access to projections for utility rates. In a solar lease, some risks can shift to residents if contract terms are unfair or deceptive. An important consideration for any resident considering a solar lease is understanding if their contract has any performance guarantees. According to NREL, a performance guarantee is "a commitment by the lessor to compensate the homeowner if the PV system fails to produce a certain minimum level of electricity" (NREL 2014). When a performance guarantee is not included in the contract, homeowners could be responsible for paying the lease even if the solar system is not generating electricity. These performance guarantees are essential because many rooftop solar companies have gone out of business or have been acquired by other companies (Semuels 2023). Another critical consideration emphasized by the Solar Energy Industry Association (SEIA) is home resale. It can be difficult to sell a home with solar panels that are not fully repaid. There are various pathways for handling home resale with leased solar panels, but these options should be discussed and understood with the leasing company before solar system installation (SEIA 2021). Beyond a full understanding of solar contract terms and other risk implications, both the financial analysis and community feedback also amplify the potential need for consumer protection policies that safeguard residents' interests, avoid deceptive practices, and ensure the benefits of solar energy are passed down to communities.

3.3 Potential Pathways to Equitable Solar Energy for Lawrence Homeowners

Although some solar energy financing options are not cost-effective for Lawrence residents, there are potential options that have been shown to save residents money across the country. For example, in the past, Massachusetts had a popular solar energy program administered by the state, Mass Solar Loan, that provided interest rate buy-downs, income-based loan support, and loan loss reserves that reduced risks to lenders and enabled financing for borrowers with lower credit scores, facilitating a path to ownership of the solar system (Massachusetts Clean Energy Center 2024). Similar programs exist across the country, including but not limited to Connecticut, California, and New York (CESA 2018). These programs utilize various mechanisms to facilitate or ensure savings for low-income residents. Common government structures include, but are not limited to, direct grants and incentives, fixed interest rates or interest rate buy-downs, and approved vendors/vendor requirements (CESA 2018).

There are other models that have also been shown to be effective for LMI communities including co-op and nonprofit solar energy providers. These models will soon be more feasible with the addition of direct pay provisions in the Inflation Reduction Act. Direct pay, also known as elective pay, allows entities that are not eligible for tax refunds, like nonprofits and co-operatives, to get a rebate in lieu of tax savings (White House 2023). In Massachusetts, organizations like Co-Op Power offer co-operative pathways to equitable solar energy adoption. These programs can offer agreed upon discounts from the utility price, access to community solar energy options, and other benefits (U.S. Department of Agriculture 2021).

3.4 Analysis of Other Solar Energy Financing Models

With government or nonprofit financing programs, homeowners in Lawrence could seek or support local solutions that can offer either solar energy with meaningful energy cost savings or opportunities for residents to take ownership of their solar systems. To compare the presented solar lease financial outcomes with other ownership and financing options, this financing analysis examines the following two pathways:

- Solar PPA through a nonprofit or co-operative program.
- Solar system ownership through a direct, subsidized loan.

3.4.1 PPA with Nonprofit or Co-Operative Solar Businesses

In this case, a solar system is owned by a community-based nonprofit or cooperative business entity, which offers a PPA to local residents. This is akin to the more common PPA offerings of third-party ownership offered by national solar companies, but the owner, in this case, accepts a lower rate of return, and therefore additional benefits to offtakers are manifested as greater savings. The system is installed for no upfront cost to the residents and, in this analysis, the PPA price paid by the resident is set to always be 20% less than the utility price, roughly twice the discount typically found in solar PPAs. This guaranteed discounted rate is used as an illustrative number in the model which demonstrates that with this offering, the nonprofit or cooperative owner is still able to derive a rate of return of about 5% while providing net energy cost savings to the resident between $368 to $529 per year throughout the lifetime of the project. These cash flows are shown in Figure 2.

3.4.1.1 ASSUMPTIONS FOR NONPROFIT OR CO-OPERATIVE SOLAR BUSINESS PPA

To evaluate the value of these non-standard PPAs to Lawrence residents, the following analysis included an additional assumption, a guaranteed discount rate from the utility price, detailed in Table 2. This guaranteed discount rate is a non-standard PPA structure used here to illustrate a model that offers meaningful savings to customers.

Table 2. Additional Assumptions for Nonprofit/Co-Operative Solar Business PPA

Additional Terms and Assumptions	Value	Explanation
PPA Price – Discount off utility rate	20%	Contracted PPA price set at a 20% discount off the customer's utility rate. This is an illustrative, non-standard PPA structure.

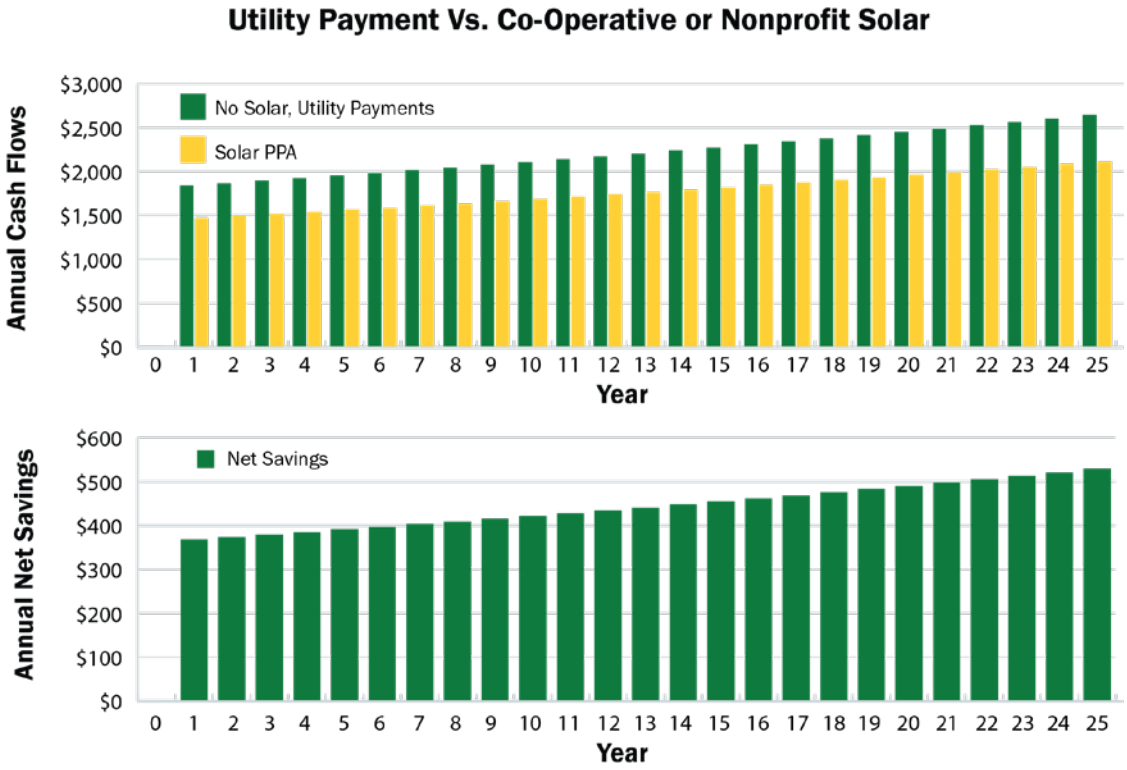

Figure 2. Annual undiscounted energy cost to homeowner: utility payment vs. co-operative or nonprofit PPA

For the owner of the solar system (the co-operative or nonprofit), the project investment followed by tax (or direct pay) incentives and revenues from selling the electricity (net-metering), provides the owner with a rate of return estimate of 5% over the 25-year term. Adjusting the PPA discount rate of 20%, or assuming a greater direct pay from the Inflation Reduction Act for low-income offtakers, can further balance or improve these results for the solar system owner and residents.

3.4.2 Solar System Ownership by Homeowner/Resident

While solar energy system ownership comes with risks, increasing access to direct ownership for Lawrence residents can increase lifetime savings and household wealth, both impactful factors for low-income and underserved communities. Like the co-operative and nonprofit PPA options, solar system ownership can also be achieved without upfront investment capital through access to solar loans that can be used to pay for the cost of the solar system and installation.

3.4.2.1 ASSUMPTIONS FOR SOLAR SYSTEM OWNERSHIP MODEL WITH SUBSIDIZED LOAN

The solar system subsidized loan ownership analysis included several updated assumptions to illustrate the type of loan that would ensure the projects provide a positive financial return for customers. The type of loan modeled in this analysis is a subsidized loan in which the interest rate is lower than market-rate options to illustrate a pathway to solar system ownership for low-income homeowners (or residents taking stake in a community shared project) that provides meaningful savings to customers. This model considers the previous Massachusetts solar energy program, Mass Solar Loan, and its incentives for low- and moderate-income borrowers, to set the interest rate at 3%. While a 3% interest rate may not be achievable today, this and other subsidized rates may depend on the current rate environment and available state and federal offerings.

Table 3. Additional Assumptions for Solar System Ownership Model with Subsidized Loan

Additional/Alternative Terms and Assumptions	Value	Explanation
Solar System Capacity	8 kW	Total size of solar system installed.
Projected Solar Energy Generation (first year)	8,000 kWh	Over a year, the system is expected to generate this amount of energy, which will displace utility electric purchase.
Solar System – Install Cost	$4/W	For an 8-kW system, this would be an investment cost of $32,000, based on Massachusetts residential solar installations data gathered by UMass CEE.
Solar System Operation and Maintenance Costs	$200/year	Solar system maintenance costs are low, but monies should be set aside to pay for inverter replacements every 10 years.
Federal/State Tax Credit	30%/$1,000	Assumes a federal tax credit equal to 30% of the solar system investment cost, and a state credit for residential projects of $1,000. Eligibility for these credits would need to be verified for any specific project.
Loan Interest Rate	3%	Based off the previous Massachusetts solar energy program, Mass Solar Loan, and its incentives for low- and moderate-income borrowers, the analysis sets the interest rate at 3%. This "subsidized" rate is lower than under a traditional loan.
Down Payment	$0	Assumes no down payment.

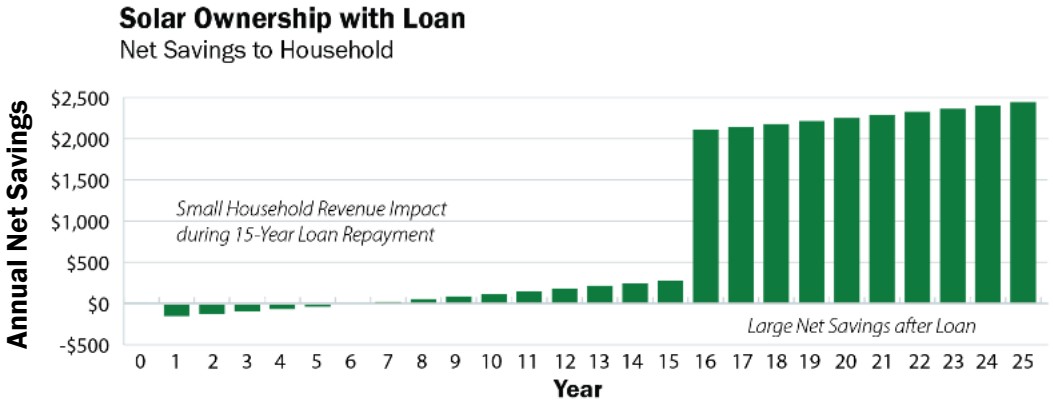

Figure 3. Household savings (undiscounted) from solar system ownership with a subsidized, low-interest loan

A Lawrence homeowner can own a solar system that is on the roof of their house, or if a community shared solar project is developed, homeowners and other residents can own shares of the community project. With ownership, the household usually needs to access money to pay for the project in the form of upfront capital (which could be limited to a down payment if the system is financed) or a loan, and then repay the loan back to the lender based on the loan terms. As owner, the household does not have to pay for the solar energy generated, and, hence, saves the full value of the electricity cost that otherwise would have been paid to the utility company.

For this analysis, the household is assumed to access a subsidized solar loan for the full cost of the 8-kW solar system (or share of a community solar project) at a loan interest rate of 3% per year (the 3% per year is an assumed rate based on the recently completed Mass Solar Loan program. Such rates may not be available in the future). The household would now be responsible for the operation and maintenance cost of the solar system, which is assumed to be $200 annually, mainly used to escrow for periodic payments for an inverter replacement.

Under this alternative, the impact of the solar loan and ownership on household savings is shown in Figure 3. During the years that the household is repaying the solar loan, the household experiences minimal change in energy burden because the cost of the loan repayment is roughly the same as the utility energy rates each month. After the loan is repaid, the household experiences substantial savings each month as all the solar energy generated is accessed at no cost, leading to meaningful savings and wealth creation for the household. Despite the delayed monthly rate benefits of this cash flow, the homeowner receives a rate of return of over 27% over the 25-year life of the system. Better loan terms, reductions in the assumed solar system cost of $4/Watt, or availability of other subsidies for low-income solar access will further improve the cash flow benefits to the household.

3.5 Financial Analysis Key Takeaways

This financial cash flow analysis looked at three models of solar energy adoption with the following takeaways.

1. Solar lease vs. projected utility payments: This model demonstrated that the analyzed representative contract terms for solar energy leases in comparison to the assumed projections for utility energy prices are disadvantageous for the homeowner since the lease payment exceeds the utility payment by year 5 of the 25-year contract, increasing annually thereafter.

2. Non-standard nonprofit or co-operative ownership with PPAs: Under this approach, where the project owner serves the community and requires lower rates of return than standard third-party owners, the financial model demonstrates that residents can be afforded 20% PPA discounts below the utility rate for the solar energy generated by the solar system installed at no upfront cost, resulting in net energy bill savings for the residents.

3. Solar system ownership with a subsidized loan: This model shows the most advantageous potential benefits for homeowners under a solar loan with a subsidized interest annual rate of 3% with no down payment requirement. When repaying the loan during the 15-year term, the household pays an amount similar to the displaced utility bill, but once the loan is repaid, the household experiences substantial savings, accessing the solar energy generated at no cost.

3.5.1 Solar Adoption Pathway Outcomes

The solar lease terms utilized in the first model are based on lease terms that the City of Lawrence processed during solar installation permitting. The other models analyzed here illustrate non-standard and subsidized terms, namely, (1) ownership by a community-serving nonprofit or co-operative which provides a rate that is 20% less than that of the utility, and (2) a pathway to solar

system ownership by a low-income resident with access to a subsidized loan which offers a 3% interest rate. The desktop cash flow analysis and assumptions made across these models are strictly for illustrative and comparative purposes, and to provoke further discussion on business models and incentive programs to support equitable access to solar and wealth creation for low-income communities.

The models and assumptions provided here are not sufficient to evaluate any specific project, nor does the analysis consider issues of financial risks to project owners, or legal and social barriers that can prevent low-income communities from investing and borrowing. Hence, the lease, PPA, and ownership models presented here are not exhaustive and, importantly, lease, PPA, and ownership models with different terms should be evaluated on their own to determine their advantages and disadvantages. These three solar adoption pathways (lease, PPA, and ownership) can provide favorable or unfavorable financial outcomes depending on the specific contract terms. For example, solar lease options could offer low payments and low escalation rates compared to utility prices, there can be PPA terms with escalation rates, and ownership models with market-rate interest rates.

4. Takeaways and Pathways Forward

One of the LSC's community priorities for Communities LEAP was to understand the landscape of rooftop solar PV in Lawrence, Massachusetts, to find equitable pathways for residents of Lawrence to adopt and benefit from solar energy. To achieve this, the LSC sought to understand community perspectives through community engagement and corroborate known concerns regarding deceptive practices in solar energy financing through a financial cash flow analysis. While these qualitative and quantitative analyses were performed separately, they complement each other and illuminate a core concern identified by the LSC: unfavorable contract terms leading to negative financial outcomes for solar energy adopters. In addition, the quantitative analysis illustrates the potential benefits of non-standard financial solutions that may address this primary concern.

Elevate Energy's and NREL's community engagement sessions highlight that residents of Lawrence have a negative perspective of and experience with solar energy adoption due to deceptive practices in the rooftop solar industry, whether through direct experience or the experience of peers; hence, residents are not receiving the full advantages of the potential benefits of solar energy adoption. The community's experience is supported by the financial analysis. UMass CEE's evaluation demonstrates that the sample lease offerings in Lawrence may leave homeowners with greater energy burden over 25 years compared to utility electricity purchases.

The financial outcomes of the three financial models presented (lease, nonprofit PPA, and subsidized ownership), and whether the electricity bill remains the same, decreases, or increases, depend on specific contract terms.

Both analyses point to the following broad, potential pathways forward to address deceptive practices and its effects:

1. To reduce the negative impacts of deceptive or unfair practices implemented by solar companies, residents of Lawrence could benefit from education initiatives, literacy campaigns, and peer-to-peer exchanges. These strategies could empower them to make informed decisions about solar energy adoption, use tools and resources to evaluate potential solar energy offerings, and learn about vetted, trusted solar companies. Participants of the community engagement sessions expressed a strong preference for the City to take a leading role in education initiatives, building partnerships with the community and respected organizations to provide accurate and trustworthy information. This collaboration can enhance residents' confidence in navigating the complexities of solar technology and making informed decisions.

2. To facilitate equitable adoption of solar energy so that energy burdened and LMI residents of Lawrence can access and fully benefit from rooftop solar, residents of Lawrence could be supported with expanded options for solar system ownership. This includes loans that provide fair or subsidized interest rates and do not require upfront investment capital, as well as solar contracts with nonprofit or co-operative solar energy providers through a PPA that has a set, discounted energy price that is lower than the utility price. Although subsidized interest rate loans from the State for low-income borrowers are currently not available in Massachusetts, programs like these could provide a clear pathway to equitable solar energy deployment in communities like Lawrence.

3. While empowering residents to evaluate solar energy contracts and providing equitable pathways to solar energy access may address identified concerns, both analyses further

highlight the potential need for policies and regulations that prevent solar companies from using deceptive practices.

4. Although not suggested in the community engagement sessions or modeled in the financial analysis, another alternative pathway to solar adoption that could leverage participants' trust in the City of Lawrence could include a city-sponsored solarize campaign, which could pre-approve financing terms and contractors for better consumer protection and household savings opportunities. Some examples of solarize campaigns in Massachusetts include the Solarize Mass campaign and the Solarize Natick campaign.

5. Conclusions

In communities like Lawrence, with high energy burden, solar energy can be a powerful tool to lower energy costs if programs are designed to serve LMI communities. This report documents the current solar energy landscape in Lawrence and the barriers the community is facing to accessing equitable solar energy. Lawrence is an illustrative example of the challenges of deploying rooftop solar in LMI communities. The community engagement conducted in partnership with Elevate Energy and the UMass CEE cash flow analysis as part of the LSC technical assistance highlight the potential benefits of alternative pathways to solar system ownership and financing options. Both the community feedback and the financial analysis demonstrate that, in many cases, rooftop solar leases do not benefit households, and new financial pathways are only part of the solution. Further actions would be needed to earn the trust of the community, including fostering more robust dialogue and education around solar energy and financing options, community engagement by trusted sources such as peers, elected officials, and experts in the industry, and finally, considering policies that prevent deceptive practices and elevate equitable solar providers in communities like Lawrence.

The LSC is well positioned to work with the community as new funding and opportunities become available for solar energy in LMI communities. The findings from this work set a baseline for the current rooftop solar energy landscape in Lawrence and can help inform future program design, decision-making, and community outreach.

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