



Overcoming Barriers to  
Solar+Storage in Affordable Housing:  
*A Survey of Multifamily Affordable Housing Developers*



## Acknowledgements

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# Introduction

The combination of solar photovoltaics and battery storage (solar+storage) is increasingly being explored by multifamily affordable housing providers as a solution to achieve economic returns and energy resilience benefits. While many affordable housing owners and developers have already pursued solar for their properties, battery storage is now emerging to preserve the value of solar under evolving electricity rates and solar policies, to generate revenue through participation in new market opportunities, and to provide essential services to residents during grid outages.

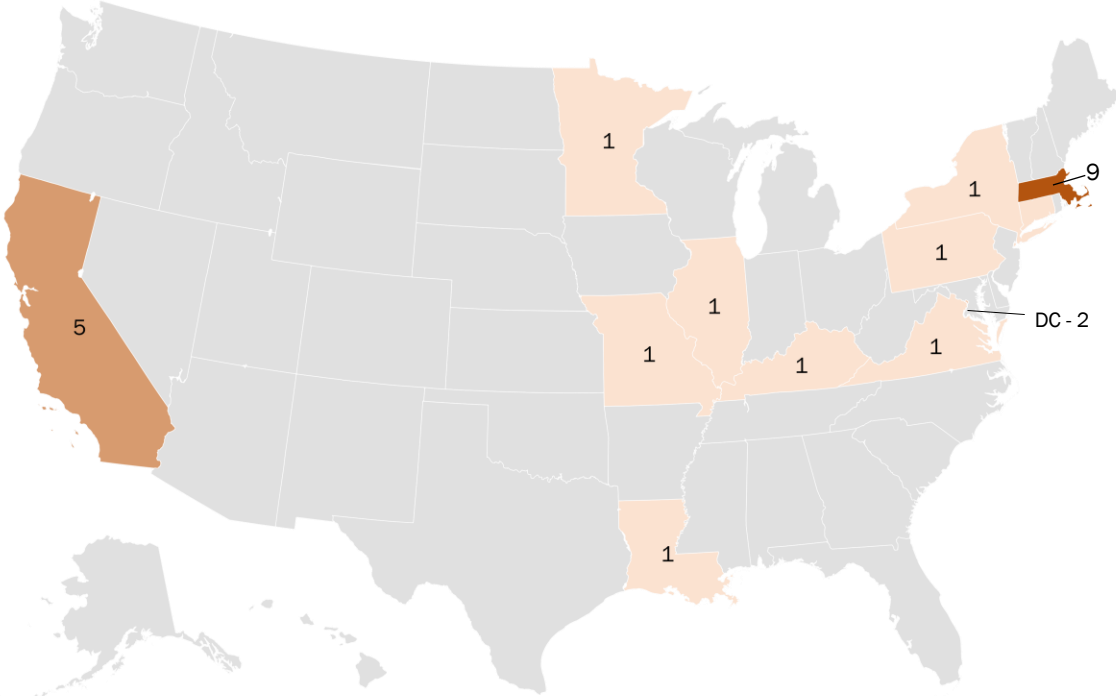
Despite these proven benefits, solar+storage penetration in the affordable housing market remains low. To assess the current landscape of barriers facing solar+storage projects in this sector, Clean Energy Group (CEG), a national nonprofit, conducted a survey of affordable housing owners and developers, technical services providers, and stakeholders from other organizations who have been involved in recent multifamily affordable housing solar+storage projects. This report summarizes the results of this survey and suggests multiple actions to help this sector overcome the barriers to solar+storage development.

# Survey Methodology

In March 2020, CEG conducted several qualitative interviews with multifamily affordable housing developers in Massachusetts. These interviews delved into each organization's experiences with considering solar+ storage for projects in development. Findings from these interviews – including a need to demonstrate the economic case for solar+storage, the lack of knowledge regarding financing options and available incentives, and the gaps in accessing energy data – informed the creation of a survey to engage a broader audience.

Based on these interviews and years of experience working to advance solar+storage projects in underserved communities, CEG prepared a brief survey containing multiple-choice and short-answer questions regarding the development of solar+storage benefiting low- and moderate-income (LMI) communities. Between July and October 2020, the survey was circulated to a network of individuals interested in solar+storage, including affordable housing providers, community organizations, and technical services providers, along with targeted outreach to dozens of organizations actively engaged in investigating solar+storage at affordable housing properties. Out of the more than 60 responses received, 25 responses detailed information from solar+storage projects at affordable housing properties. The findings detailed here reflect data from this subset of 25 responses.

# Geography

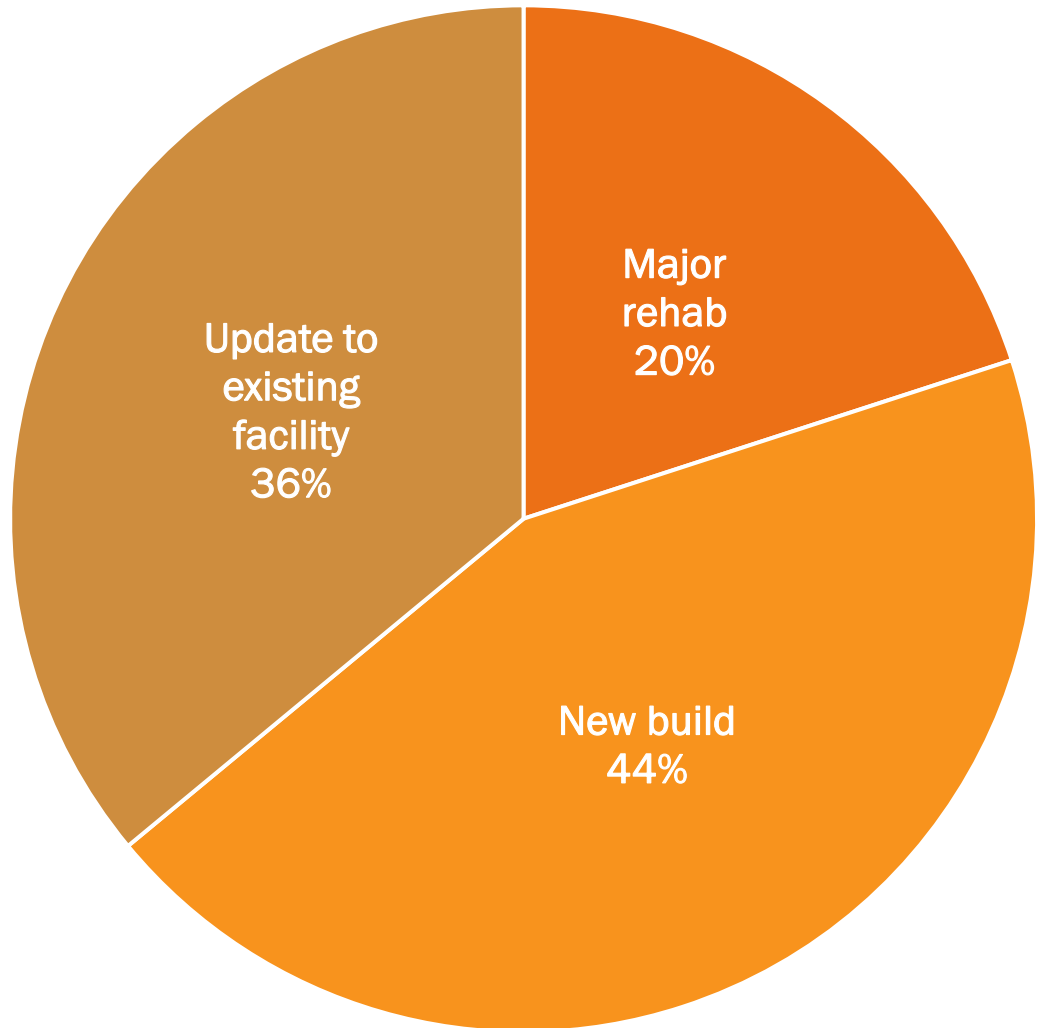


Most affordable housing projects responding to the survey were based in Massachusetts or California, with 9 projects in Massachusetts and 5 in California. The remaining 11 projects were dispersed across 9 states and the District of Columbia. Two projects were based in the District of Columbia. Minnesota, Illinois, Missouri, Louisiana, Kentucky, Virginia, Pennsylvania, New York, and Rhode Island each had one project. This trend reflects the available strong program and incentive support for solar+storage in Massachusetts and California, such as the Connected Solutions program in Massachusetts and Self-Generation Incentive Program (SGIP) in California.

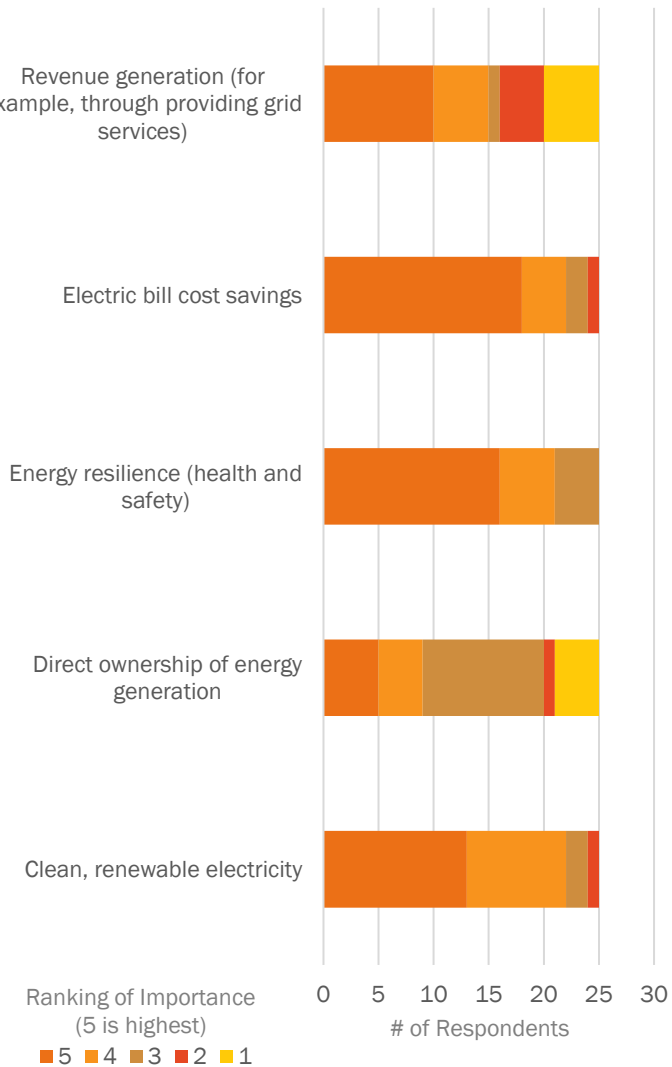
# Project Type

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Most respondents' projects were either new builds or updates to existing facilities. Very few respondents were considering a major overhaul of an existing facility for solar+storage. The affordable housing subset of data mirrored these tendencies, with nearly half of respondents pursuing new builds.



## Motivations for Projects

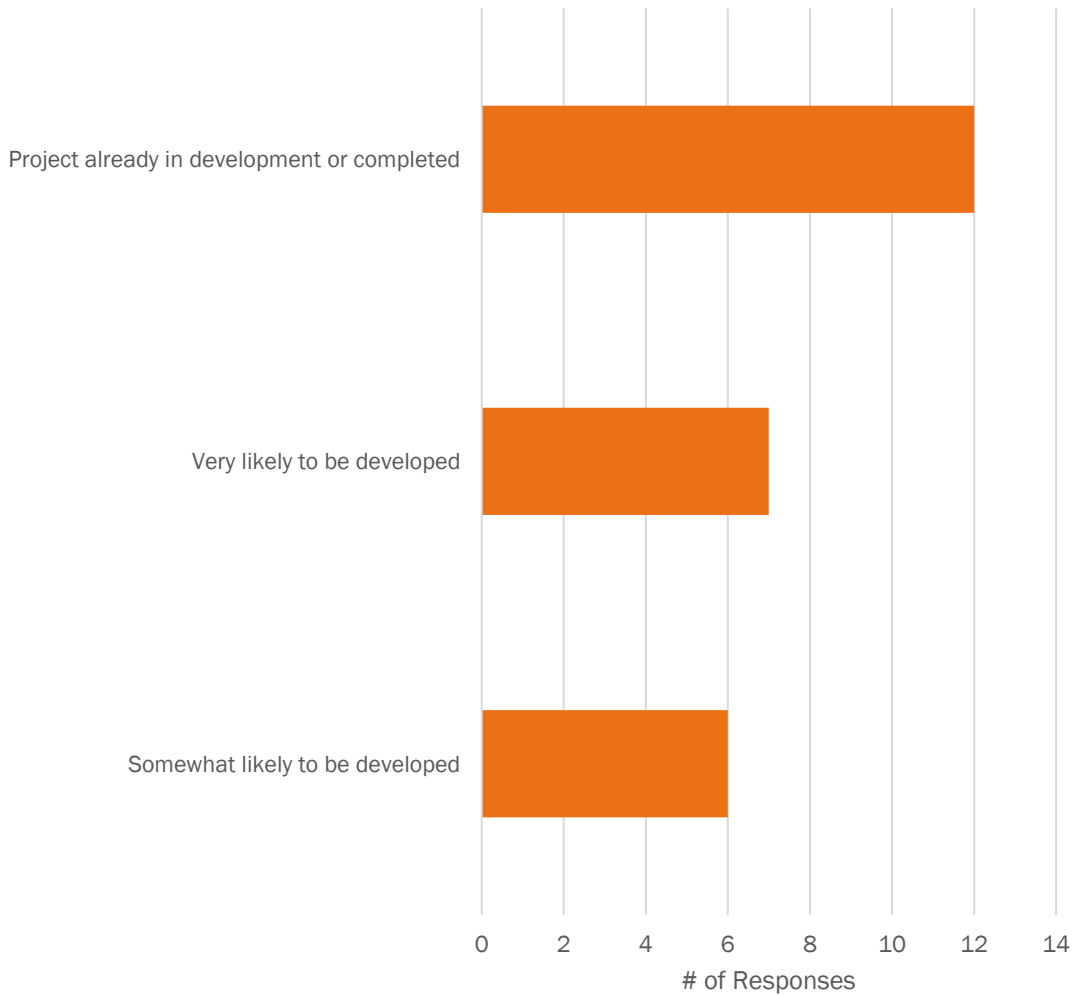


# Project Motivation

One key area where affordable housing survey respondents differed from their counterparts in other LMI sectors was in the motivation for pursuing solar+storage. Respondents were presented with a list of several possible motivations for pursuing solar+storage for a project and asked to rank its importance, with “1” being of little to no importance and “5” being extremely important. Respondents from other sectors ranked energy resiliency as their number one reason for pursuing solar+storage for a property. For affordable housing developers, this was not the case.

Instead, savings on electric bill costs was the number one reason for pursuing solar+storage, with energy resilience ranked second. This suggests that for affordable housing developers, the economic considerations of solar+storage, such as bill savings and revenue generation, is a more important consideration for project feasibility than among other groups. This points to the importance of policy interventions that can maximize the economic benefits of solar+storage for affordable housing.

Do you expect this project to get developed?



# Barriers

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The primary goal of this survey was to unearth the foremost barriers (non-financial and financial) that affordable housing providers are facing when looking to develop solar+storage projects at their properties. Respondents were presented with several potential project development challenges and asked whether they had encountered the barrier, expected to encounter it, or did not expect to encounter it for a specific project. Responses reflect both the stage of development of projects and the prevalence of certain barriers. Despite identifying many challenges, about half of the responses represented projects that are currently in development or already completed. Among projects that had not yet reached the development phase, responses were almost evenly split on if they thought the barriers encountered or expected to be encountered would prevent the project from moving forward.

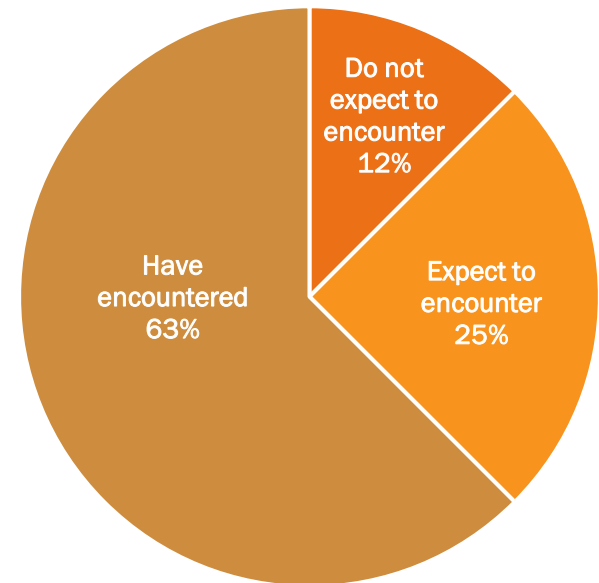


# Early-stage development barrier: Lack of Information

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In the earlier development stages of most projects, lack of information about battery storage, followed by technical issues and a lack of financing options, were the biggest barriers encountered. Lack of information about battery storage was by far the most encountered barrier, with 63% of responses having already encountered this obstacle and another 25% expecting to encounter it. Based on interviews and experience working with affordable housing providers, battery storage information gaps typically relate to 1) the potential of solar+ storage to improve resiliency for a property, 2) the bill savings battery storage can achieve through demand management, 3) battery storage system costs, 4) space requirements for siting systems, and 5) the availability of state and local programs to improve the economic feasibility of storage projects.

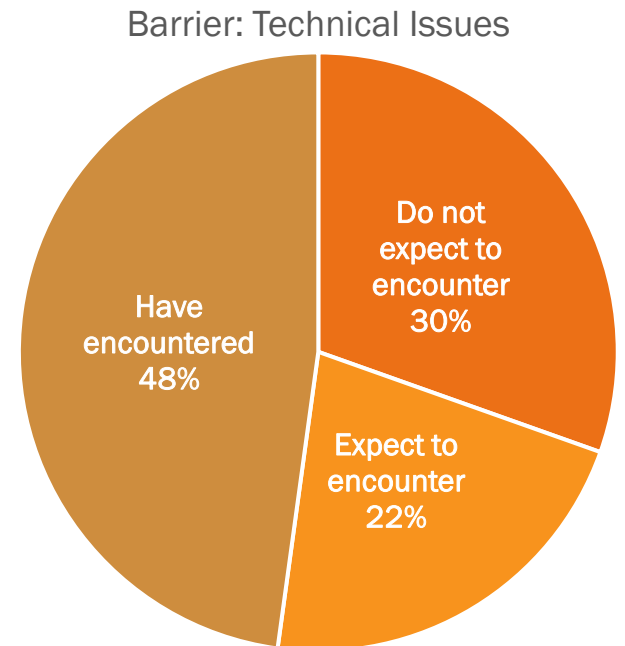
Barrier: Lack of Information  
About Battery Storage



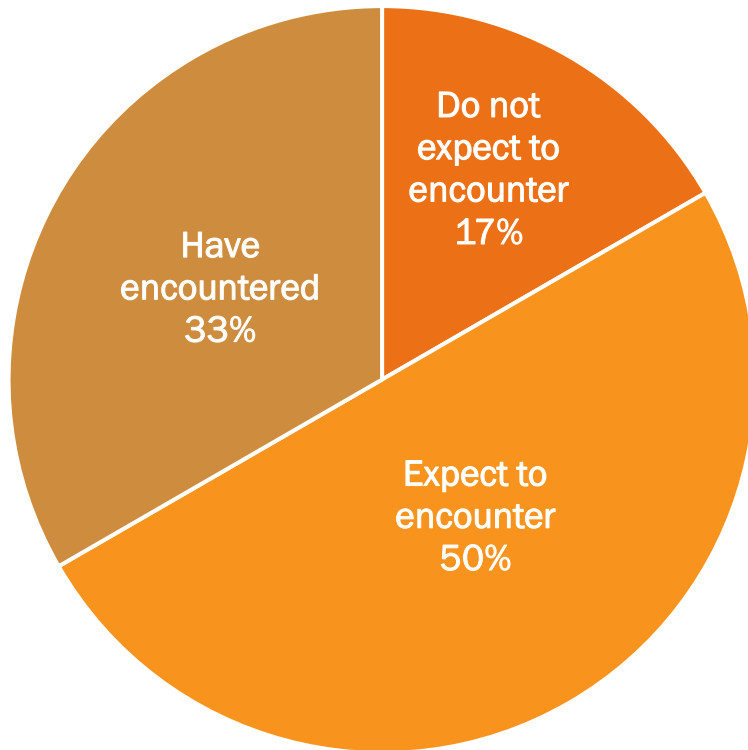
# Technical Barriers

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Technical issues were also a major concern for most developers. This category covers a wide variety of issues that can arise when incorporating solar+storage into a project, from limited roof space to the isolation of critical loads for a resilient system. This data once again reflects what CEG has seen anecdotally: many projects will encounter at least one technical issue when implementing solar+storage. However, as reflected in the number of completed or nearly completed projects represented, these issues are usually surmountable, though they can add additional cost and complexity to the development process. Preliminary feasibility studies are invaluable for affordable housing projects for precisely this reason – they can often highlight technical issues before they occur, saving the developer time and money. Having an experienced solar+storage technical partner the housing provider trusts can help in working through any technical challenges that may arise.



## Barrier: Lack of Financing Options



# Lack of Financing

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While lack of information and technical issues were the biggest early-stage non-financial barriers, financing options were also cited as a major concern for most survey responses. Slightly over half had either encountered or expected to encounter this issue. Many of the responses that identified financing as a barrier were from nonprofit housing developers, which points to the difficulty of accessing some incentives for nonprofit entities. This is true across states – nonprofits cannot directly take advantage incentives like the federal Solar Investment Tax Credit (ITC), for example. While some of these issues are structural and can be avoided through creative ownership management, they can also be addressed through incentives that can be more easily accessed by nonprofits.

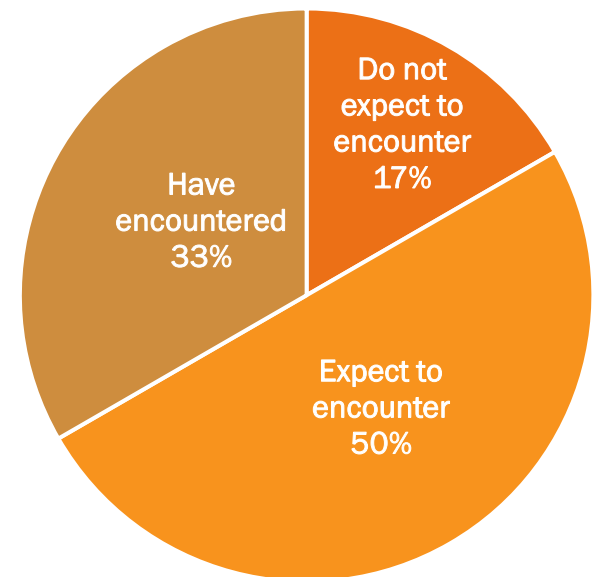
# Mid-stage development barriers: Permitting/Interconnection

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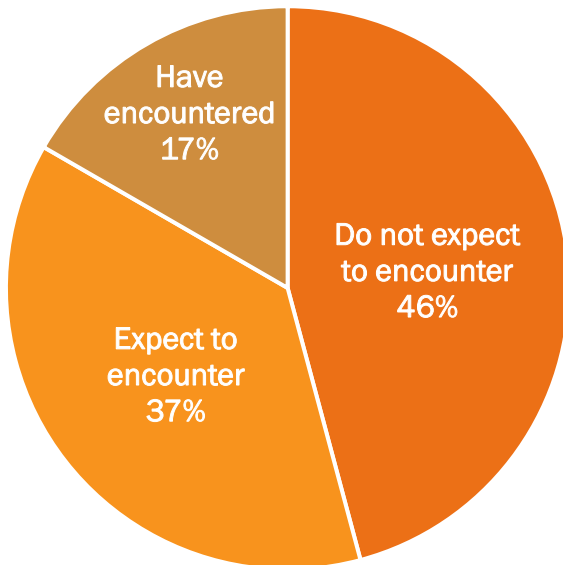
For projects already in development, permitting and interconnection issues, regulatory uncertainty, and issues with vendors were the biggest expected barriers.

Permitting and interconnection issues were identified as a significant barrier, with 83% of responses having encountered them or expecting to encounter them. This was also reflected in the short answer responses. Many responses noted that utilities were difficult to work with when dealing with interconnection for solar+storage, which is still a relatively new technology combination. Some of these issues will be addressed as solar+storage becomes more common, but in the meantime dealing with regulatory uncertainty from utilities adds a huge burden for affordable housing developers. This can also reduce the likelihood that developers will want to pursue additional projects. Although most responses stated that the developer planned to pursue new solar+storage projects in the next two years, the additional regulatory complexity that solar+storage can bring to a project can shift that decision, particularly for smaller nonprofit organizations.

Barrier:  
Permitting/Interconnection  
Issues



Barrier: Regulatory  
Uncertainty



# Regulatory Uncertainty

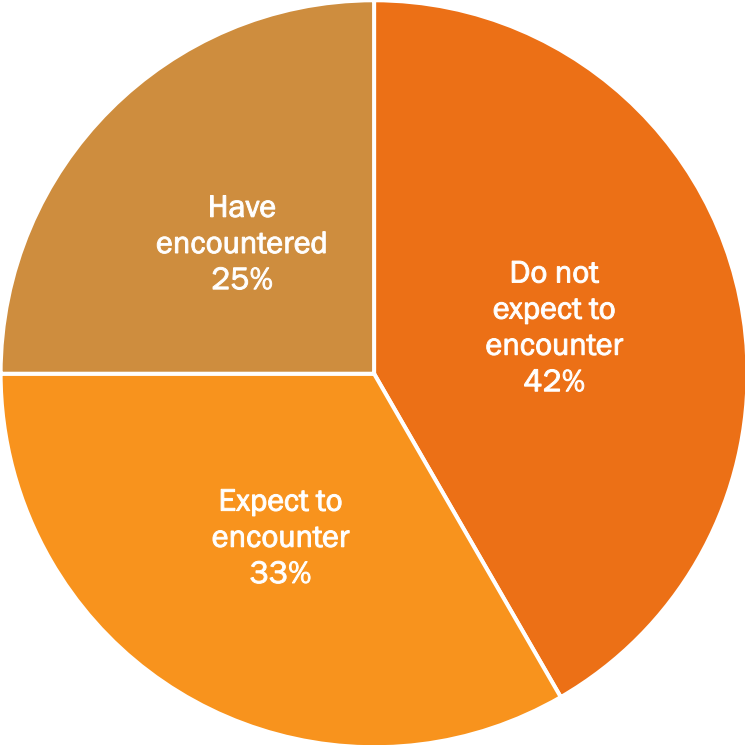
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The high percentage of responses who also expect to encounter or have encountered regulatory uncertainty builds upon the permitting/interconnection barrier outlined above. For many developers, the limited horizon of program opportunities and incentives often clashes with the longer payback period their projects. This, combined with a changing policy landscape and limited feedback from utilities, only heightens the regulatory burden for affordable housing entities. Once again, having an experienced solar and storage development partner can be invaluable in mitigating this issue.

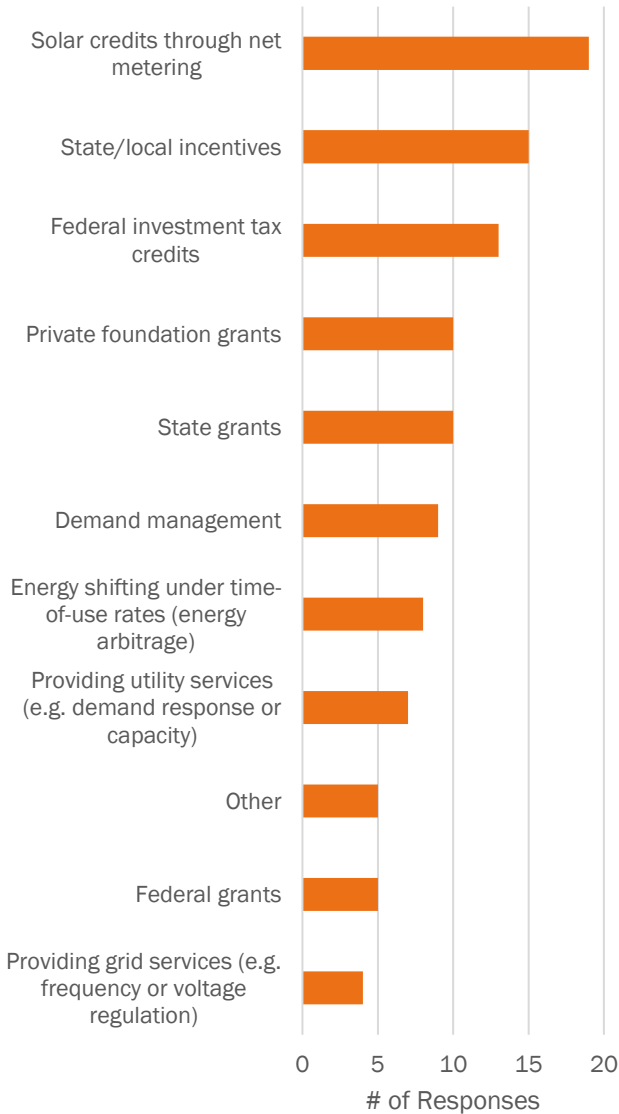
# Difficulties with Vendors

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Barrier: Difficulties with Battery Storage Vendors



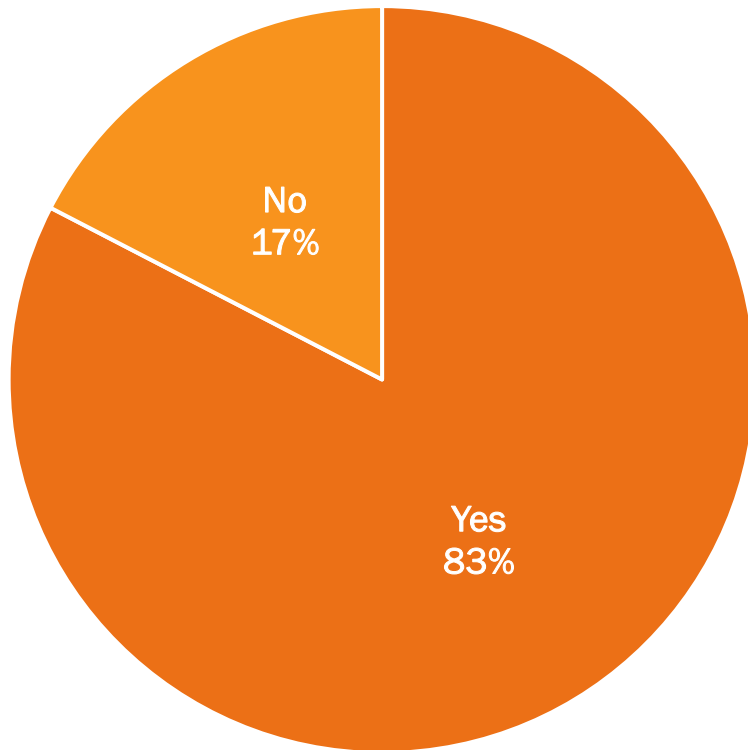
Difficulties with battery storage vendors also topped the list of barriers developers expected to encounter or already have encountered. This data reflects feedback CEG has received from affordable housing developers. Few battery storage vendors have experience with the affordable housing sector, which has unique characteristics that can make battery installation more complex. There is also a lack of battery storage products available to meet the needs of multifamily affordable housing properties, which typically have energy usage profiles with a mix of commercial and residential characteristics. For developers who are considering their first solar+ storage installation, this can add another layer of complications that can impede a project’s chance of success.



# Economic factors and funding considerations

Survey respondents were presented with several potential economic considerations for their projects and asked to select as many as they thought were relevant for their project. Federal, state, and local incentives were the strongest economic factors for most affordable housing projects, followed by grants. All responses indicated multiple funding and economic considerations – 19 out of 25 responses indicated solar net metering credits were a major financial consideration. This speaks again to the need for regulatory certainty for developers, both for the economic viability of projects but also to create a favorable policy environment.

Is Project Self-Financed?



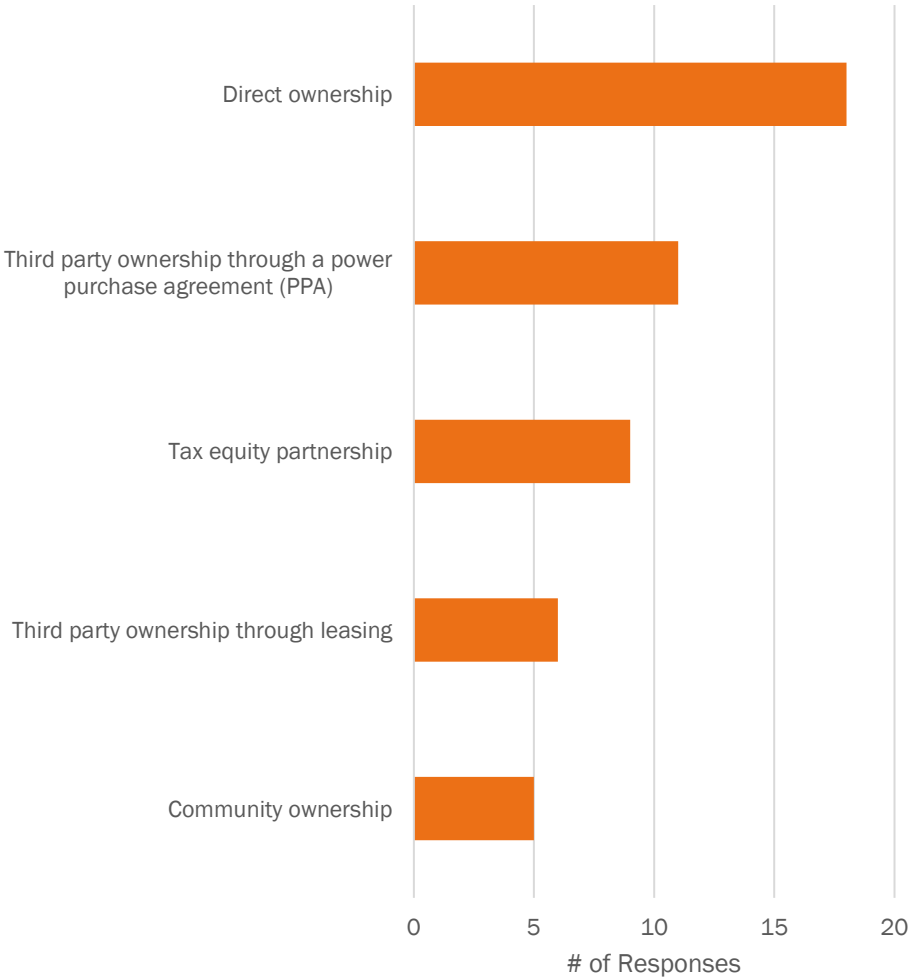
# Self-Financing

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Most affordable housing projects indicated that the solar+storage development would be at least partially self-financed, reinforcing the need for strong project economics. For the four non-self-financed projects represented in the survey, net metering credits and energy arbitrage were the biggest economic factors. Self-financing also points to the need for solar and battery storage incentives that nonprofit developers can access, and the need for suitable financing options.



## Ownership Models



# Ownership

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Direct ownership of the solar+storage system was the most common ownership model being considered by housing developers, followed by third- party ownership through a power purchase agreement (PPA). As many affordable housing providers are nonprofit entities, many projects also reported exploring tax equity partnerships in order to take advantage of the ITC.

# Recommendations

The survey results point to several common barriers for affordable housing developers in pursuing solar+storage. Affordable housing is a challenging and underrepresented sector for solar+storage development, and policies seeking to improve penetration in this market should be tailored fit it. Interventions are needed on several levels to increase solar+storage adoption in affordable housing.

*Recommendation 1*

**Increase  
awareness of  
battery storage**

Lack of information about battery storage technologies was the number one barrier identified by respondents. Generating additional educational materials such as case studies, sample building analyses, and accessible resources explaining the economic and resilience benefits of battery storage can be extremely valuable for affordable housing providers exploring solar+storage for their properties.

CEG has produced and compiled a collection of informational resources to assist affordable housing providers pursuing solar+storage projects, including case studies, webinars, and publications.<sup>1</sup> Many of these resources are cataloged in our Resilient Power Project Toolkit.<sup>2</sup> CEG's recent publication, "Understanding Solar+Storage," addresses commonly asked questions about pairing solar with battery storage to create a foundation of knowledge for individuals and organizations interested in developing the technologies.<sup>3</sup>

In addition to increasing awareness about solar+storage, developers who already know about solar+storage can benefit from additional regulatory and industry tools and resources. Easy to use modeling and mapping platforms can help affordable housing developers grow in-house expertise for identifying good sites for solar+storage and spotting issues before they develop. The REopt Lite optimization tool developed by the National Renewable Energy Laboratory is a good example of a publicly available tool to perform a first-pass assessment of the feasibility of a solar+storage project.<sup>4</sup>

<sup>1</sup> More information about the Resilient Power Project and its publications can be found at [www.resilient-power.org](http://www.resilient-power.org).

<sup>2</sup> The tool kit is available at <https://www.cleaneenergygroup.org/ceg-projects/resilient-power-project/toolkit/>.

<sup>3</sup> Marrielle Mango and Seth Mullendore, "Understanding Solar+Storage: Answers to Commonly Asked Questions About Solar PV and Battery Storage," Clean Energy Group, October 2021, <https://www.cleaneenergygroup.org/ceg-resources/resource/understanding-solar-storage/>.

<sup>4</sup> The tool can be accessed at <https://reopt.nrel.gov/tool>.

## *Recommendation 2*

# **Provide technical assistance support**

Lack of information was closely followed by interconnection and permitting challenges and then technical issues as the solar+storage barriers that projects were most likely to experience. Without access to trusted technical expertise, these types of challenges could easily prevent a project from reaching development. Unfortunately, affordable housing organizations do not often have the in-house expertise to address highly technical energy issues and may not be able to access the financial resources needed to engage an experienced engineering partner during the predevelopment process. Providing technical assistance funding for potential affordable housing projects could help overcome many of the technical and regulatory issues projects may face.

To meet this critical need, CEG established the Resilient Power Technical Assistance Fund. The Technical Assistance Fund provides small predevelopment grants to organizations exploring solar+storage projects serving low-income communities, including multifamily affordable housing. The grants cover the costs of third-party solar+storage technical and economic feasibility studies for a specific property or for a portfolio of properties. Through the Technical Assistance Fund, CEG has supported solar+storage feasibility studies for many affordable housing organizations, providing project developers with the insights and information to address barriers early in the development process. The feasibility studies help demystify the solar+storage development process by identifying potential problem areas ahead of time, before the developer has invested significant resources in the project. The assessment process also establishes a valuable connection to an experienced solar+storage installer who has a working knowledge of incentive programs, policies, and regulatory structures specific to each project. This relationship can continue into the development stage, assisting affordable housing providers as they begin to engage project developers and work with solar and storage vendors.

## *Recommendation 3*

# **Develop innovative financing options**

More than 50 percent of survey respondents expected to encounter financing related issues. Solar+storage is still a relatively new area of investment for many financial institutions, which can make securing financing a challenge even for larger organizations. Additionally, the affordable housing sector faces many unique financial constraints that further complicate the financing process. New, innovative financing options are needed to reduce risks for lenders and developers of affordable housing who want to install solar and battery storage systems.

An example of this is the *Financing Resilient Power* initiative from The Kresge Foundation.<sup>5</sup> The \$3 million initiative uses a loan guarantee that provides the participating lender with a 50 percent payment guarantee for loans made to solar+storage projects – meaning that if a project can't cover a loan payment for any reason, Kresge Foundation will pay up to 50 percent of the project debt service to prevent the project from defaulting. This significantly reduces the risk of a default to the lender, making them more willing to provide solar+storage project financing and offer better terms.

<sup>5</sup> Learn more about the Financing Resilient Power initiative at <https://www.cleangroup.org/ceg-resources/resource/financing-resilient-power-fact-sheet/>.

## *Recommendation 3*

# **Develop innovative financing options**

Respondents indicated a preference for directly owning the systems. It should be noted that PPAs and lease financing agreements often include purchase options as well. With a PPA, an affordable housing organization pays the developer monthly for the actual power produced by the solar+storage system, whereas with a lease agreement, the affordable housing organization makes a fixed monthly payment for the solar+ storage system. In both instances, the agreements often include terms that provide options for the transfer of ownership of the system to the customer at specific times in the agreement subject to the agreement's terms.

Along with financing options, grants and other forms of financial resources that can support solar+storage installations at all stages of development are still very much needed. For example, Southface Institute, a nonprofit organization based in Atlanta, offers the GoodUse program that provides technical assistance and project implementation grants to nonprofit organizations in the Southeast. The GoodUse program greatly offsets the costs associated with energy improvements, including solar and battery storage.<sup>6</sup> In Maryland, the Maryland Energy Administration Resiliency Hub program provides nonprofits, local governments, and businesses with grants that support installing solar+storage in low-to-moderate income, high density communities.<sup>7</sup>

<sup>6</sup> To learn more about the GoodUse program offered by Southface, visit "GoodUse," *Southface*, <https://www.southface.org/our-work/programs/newe-gooduse>, (accessed September 8, 2020).

<sup>7</sup> "Resiliency Hub," *Maryland Energy Administration*, <https://energy.maryland.gov/Pages/Resiliency-Hub.aspx>, (accessed September 4, 2020).

## Recommendation 4

# Establish targeted supportive programs and incentives

Supportive programs such as net metering and incentives were the strongest economic drivers for most respondents. Given the need to make a strong economic case to pursue solar+storage across a portfolio, developers are highly reliant on the policy and regulatory context in which they operate to provide not only strong economic incentives, but timeframes for those incentives that secure benefits over the course of a project's payback period.

One way to achieve greater solar+storage development in affordable housing is by structuring incentives to allocate targeted funding for projects in low-income communities. California and Massachusetts, which had the highest number of respondents to the survey, are notable for having programs which prioritize funds to battery storage development in low-income communities:

- **California Self-Generation Incentive Program (SGIP).** SGIP provides different rebate compensation levels for battery storage based on certain criteria, primarily income and proximity to high wildfire risk areas. The program is split into three main incentive categories: Base, Equity, and Equity Resiliency. The Equity and Equity Resiliency incentives are specifically designed for low-income and high-risk communities. Critical facilities and residences in low-income communities and state-defined disadvantaged communities throughout California are eligible for the Equity incentive, which covers approximately 80 percent of the cost to install a battery storage system. The Equity Resiliency incentive offers the highest compensation rate (\$1,000/kilowatt-hour), enough to offset the entire installed cost of a battery storage system. This incentive is specifically for low-income, disadvantaged, and medically vulnerable customers living in high wildfire threat zones or in areas that have experienced multiple power outages due to wildfire-related utility shutoffs.<sup>8</sup>

<sup>8</sup> To learn more about California's SGIP program, see "Self-Generation Incentive Program," *California Public Utilities Commission*, <https://www.cpuc.ca.gov/sgip>, (accessed September 9, 2020).

## Recommendation 4

# Establish targeted supportive programs and incentives

- **Solar Massachusetts Renewable Target (SMART).** SMART is structured as a production-based incentive program, guaranteeing a certain compensation rate for each kilowatt-hour of solar energy generated by a system. Although the SMART program was primarily launched to incentivize solar, the program includes an “adder” (higher incentive rates) for systems that include battery storage. SMART also offers compensation rate adders for projects in low-income communities. A customer’s SMART incentive rate is dependent on the utility, system size, and project location.<sup>9</sup>
- **ConnectedSolutions.** ConnectedSolutions is a utility-run battery storage program currently available in Connecticut, New Hampshire, Massachusetts, and Rhode Island. Though the program doesn’t include considerations to specifically incentivize battery storage in low-income areas, it serves a good model by providing a five-year contract for storage systems responding to utility signals to discharge during certain times. The program is equally available to all types of facilities, from big industrial customers to small affordable housing properties, and the security of a multi-year, utility-backed contract reduces risks for lenders. Multiple affordable housing providers in Massachusetts are currently in the process of developing solar+storage projects that will participate in both SMART and ConnectedSolutions.<sup>10</sup>

<sup>9</sup> To learn more about Massachusetts’ SMART program, see “Solar Massachusetts Renewable Target (SMART) Program,” *Massachusetts Department of Energy Resources*, <https://www.mass.gov/info-details/solar-massachusetts-renewable-target-smart-program>, (accessed September 9, 2020).

<sup>10</sup> Todd Olinsky-Paul, “ConnectedSolutions First Results: Massachusetts’ groundbreaking efficiency program for customer batteries receives its first report card,” *Clean Energy Group*, July 20, 2020, <https://www.cleanegroup.org/connectedsolutionsfirst-results>.



# About Clean Energy Group

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Clean Energy Group (CEG), a leading national, nonprofit advocacy organization, advances innovative policy, technology, and finance programs in the areas of clean energy and climate change. CEG promotes effective clean energy policies, develops low-carbon technology innovation strategies, and works on new financial tools to advance clean energy markets and an equitable clean energy transition. CEG's projects concentrate on climate and clean energy issues at the local, state, national, and international levels as we work with stakeholders from communities, governments, and the private and nonprofit sectors. CEG created and manages the Resilient Power Project ([www.resilient-power.org](http://www.resilient-power.org)) to accelerate market development of resilient, clean energy solutions in low-income and underserved communities to further clean energy equity by ensuring that all communities have access to the economic, health, and resiliency benefits that solar+storage can provide. Clean Energy Group is headquartered in Montpelier, VT and funded by major foundations, as well as state and federal energy agencies.

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