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ABOUT SEPA
SEPA’s mission is to facilitate the electric power industry’s smart transition to a clean and modern energy future through education, research, standards and collaboration.

AUTHOR
Jared Leader, Senior Associate

ABOUT THE AUTHOR
Jared joined SEPA in June 2017, where he joined SEPA’s Advisory Services team of experts in utility business and distributive energy to provide strategic and operational planning that drives integration of distributed energy resources into utility resource portfolios. Prior to joining SEPA, Jared spent three years as a consultant at Arcadis US. Jared was responsible for the design, implementation, and management of several environmental programs for both municipal and commercial clients in the energy and water sectors. Jared holds a bachelor’s degree in civil and environmental engineering from the University of Virginia, where he conducted research on algae-based bio-fuels and focused in sustainable practice. He is currently earning his MS in Energy Policy and Climate from Johns Hopkins University in Washington, DC.

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SOLAR IN YOUR COMMUNITY CHALLENGE

For more information on the SYC, visit: https://www.solarinyourcommunity.org/
This research is a part of the technical assistance provided by the Solar in Your Community Challenge (SYC). SYC is a program managed by the U.S. Department of Energy Solar Energy Technologies Office and administered by the State University of New York (SUNY) Polytechnic Institute. SYC’s goal is to support innovative and replicable community-based solar business models and programs that bring solar energy to underserved communities, including low- and moderate-income (LMI) customers, state, local, and tribal governments, and nonprofit organizations. SYC intends to foster collaboration between developers and consultants in order to usher solar into the community.

For more information about SYC and its participants, please visit www.solarinyourcommunity.org.

This report is intended to help solar developers and utilities understand the potential options to secure project financing for community-based solar. Our goal is to share the stories of community-based solar project financing of SYC participants that may be replicable in other communities.

SEPA interviewed three utilities, two nonprofit developers, and one for-profit developer to gather real-world accounts and insights into project financing (see the Appendix for details). These organizations previously developed community-based solar projects and financed their projects despite limited availability of funding sources. These case studies focus on the implementation strategies and variety of financial options explored to ensure favorable avenues to access low-cost capital. The case studies are meant to clearly illustrate the mechanics of project development and finance.
Executive Summary

Today, the demand for community-based solar projects is growing faster than available financing options. Due to the size of these projects and the risk of financing an unfamiliar project, utilities, nonprofits, and other developers have a difficult time accessing traditional low-interest bank loans. Knowing that this is a challenge for communities across the country, the Smart Electric Power Alliance (SEPA) identified lessons-learned through interviews with six different organizations to pinpoint what financing strategies ultimately resulted in the successful development of community-based solar projects.

Strategies to secure financing included using federal funding, such as the investment tax credit (ITC) for solar energy and Clean Renewable Energy Bonds (CREBs), leveraging relationships in the finance community for favorable loan structures, and partnering with community nonprofits to optimize project value, to name a few. The tactics pursued by these organizations helped them overcome the hard, soft, and financing costs of community-based solar projects. Strategies used by each organization are summarized in Table 1 and expanded in the subsequent case studies contained in this report. Based on the findings of the case studies, SEPA identified four key recommendations that organizations should consider when evaluating community-based solar financing options:

- **Develop private and public partners** within the community to drive capital costs down; these could include strategic partnerships with local businesses, developers, and government agencies
- **Leverage relationships** with state and federal regulatory agencies to access and understand grant funding opportunities
- **Build a robust network** of tax-equity investors to access the federal investment tax credit (ITC) if your organization does not have high tax liability
- **Engage community stakeholders** to establish a unified vision for the project to build support and potentially reduce costs through donations, permitting support, and volunteer hours.

For more information about community solar, we encourage readers to access other SEPA reports, webinars, and articles at www.sepapower.org.
# TABLE 1. STRATEGIES FOR IMPLEMENTING SOLAR FINANCING TECHNIQUES

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>競争的取得</th>
<th>土地</th>
<th>合作</th>
<th>預售</th>
<th>建立與金融機構和政府代表的關係</th>
<th>建立稅收權益投資者的網路</th>
</tr>
</thead>
<tbody>
<tr>
<td>西波士顿市政電力公司</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>市長府蒙特</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>巴克電力合作社</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>密歇根能源選擇</td>
<td></td>
<td></td>
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<tr>
<td>RE-VOV</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>RENOVUS SOLAR</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Source: Smart Electric Power Alliance, 2018
Learning from Utilities, Nonprofits, and For-Pros

Community-based solar projects are gaining popularity, but funding opportunities in the finance community are still limited. These projects have sparked the interests of electricity customers, but not those of private investors or lending agencies.

For example, a community solar program in the town of Fremont, Nebraska had customers lining up at the door to subscribe -- the project size had to be expanded twice -- but no options for financing in sight. After multiple efforts to obtain external financing, the town was forced to dig into its own internal reserves.

Despite the many federal and local subsidies and incentives¹ available to utilities and developers interested in developing community-based solar projects, the current financial options are not meeting the growing demand. With an average size of about 2 megawatts (MW) or less, these projects do not attract the financiers who invest in utility-scale projects. This lack of traditional funding sources has resulted in growing pressure on electric utilities and solar developers to come up with creative and sophisticated approaches to financing community-based solar projects.

In its role as technical adviser to the U.S. Department of Energy’s Solar in Your Community Challenge (SYC), SEPA set out to explore financing models through a series of in-depth interviews with utilities and developers. The resulting detailed accounts in this report contain stories and insights from utility general managers and solar developer executives about their experiences acquiring financing for community-based solar projects. They discussed their challenges, the innovative strategies they employed, and lessons learned along the way.

COMMUNITY-BASED SOLAR VS. COMMUNITY SOLAR

SYC defines community-based solar as a photovoltaic (PV) solar installation that falls within 100 miles of its electricity offtakers and is grid connected in the same utility service territory of these offtakers. Community-based solar differs slightly from a community solar program, as defined by SEPA.

SEPA defines a community solar program, also known as shared solar, as a voluntary business model where multiple subscribers pay for a share of a specific offsite solar project and receive credit on their electricity bill for their portion of power produced.

¹ See www.dsireusa.org for more information on state and local policies and incentives for renewable energy.
Pooled Loan Assistance: West Boylston Municipal Light Plant

The West Boylston Municipal Light Plant (WBMLP) is a municipal utility with a diverse energy portfolio serving more than 7,000 residential and nonresidential customers. WBMLP made its first solar power investment in 2010, with the development of a 370-kilowatt (kW) system to reduce peak demand. Their second solar investment was a 2-MW community solar project on a capped landfill. The project took less than a year to construct and became fully operational in December 2016.

As a Massachusetts municipal utility that operates solar farms, WBMLP was able to use certain techniques to secure favorable financing and maximize profits. The strategies for successful financing were to:

- maximize the value of solar via regulatory incentives
- leverage city relationships to cut the time and costs associated with the permitting process
- conduct an open bidding process
- partner with a joint action agency to gain access to capital

In Massachusetts, through the Department of Energy Resources (DOER) Solar Carve-Out II program, solar renewable energy certificates (SRECs) -- representing environmental attributes -- are produced for every megawatt-hour (MWh) of solar power generated from any qualifying project. The program has different SREC factors for different types of solar projects, which then determine the market-based value of each SREC.

Community solar projects, for example, have a SREC factor of 1.0, which is the maximum value for an SREC in Massachusetts. WBMLP structured their 2-MW solar project to maximize the amount of credits generated from the system. In other words, for every 1 MWh of solar power generated, WBMLP would receive one SREC that holds a market-based value attached to the additional value of generated electricity. According to SRECTrade, the marketplace that sets the price of SRECs, valued one SREC II at $268 -- or $0.268 per kilowatt-hour (kWh) -- as of May 1, 2018. Throughout the course of developing the project, owning the SRECs was a top priority for WBMLP.

The SREC II program is currently being phased out and the DOER is in the process of developing another market-based solar incentive in the state, called the Solar Massachusetts Renewable Target program.

---

Once WBMLP applied for the state incentive program, it shifted its focus toward obtaining land and interconnection permits. It also pursued a special permit for capped landfills -- called Post-Closure Permits -- administered by the Department of Environmental Protection (DEP). Jonathan Fitch, the General Manager of WBMLP, knew permitting his system on top of the landfill would not be easy. However, Fitch felt it was worth the extra effort because of the landfill's low cost of land.

Fitch used the DOER guidebook on developing solar projects at Massachusetts landfills and their relationship with other city departments to drive down costs and fees associated with the staff hours and resources necessary to secure permits.

To control costs and quality of work, WBMLP next developed bidding documents and engineering plans in-house to begin the request for proposals (RFP) process. Seven competitive bids (see Table 2) were submitted -- three lump sum bids and four power purchase agreements (PPAs). Although WBMLP is a tax-exempt municipality, Fitch wanted to explore the indirect impact of the ITC by purchasing power from a private energy provider. Fitch explained, “PPA bids, although incorporating the ITC, can come in higher due to inflated costs.”

His approach was to secure the lowest cost bid while retaining ownership of the SRECs. Thus, he awarded the least cost lump-sum bid to Greenskies Renewable Energy to develop the 2-MW project for $4.14 million ($2.07 per watt (W)).

With roughly $4.2 million needed for the project, Fitch and WBMLP initiated the search for financing. Lacking a tax appetite, WBMLP tapped into its membership in the municipal joint-action agency, Massachusetts Municipal Wholesale Electric Company (MMWEC). The agency delivers wholesale power supply and provides financing bonds for projects to 20 municipal utility members in the state. WBMLP obtained a 15-year construction loan for the entire $4.2 million through the agency’s Pooled Loan Program, which offers MMWEC members the opportunity to access capital for utility projects.

The type of borrower determines the makeup of the loan. If the borrower is a high-risk entity, the loan may come with a higher interest rate and shorter term. In order to guarantee the most favorable terms possible, WBMLP demonstrated to the lender that it is a low-risk borrower. By state law, Massachusetts municipal utilities must set electric rates to meet expenses and loan obligations - a guarantee that automatically categorized WBMLP as a low-risk borrower. By state law, Massachusetts municipal utilities must set electric rates to meet expenses and loan obligations - a guarantee that automatically categorized WBMLP as a low-risk borrower and led to favorable loan specifics. WBMLP borrowed the money and agreed to make monthly repayments, starting in March 2017, for 15 years at a 3.2% interest rate. The loan was for $4.184 million (a value slightly elevated from the original bid due to a change order) to cover construction (56% of total costs), material (37%), and engineering design (7%) costs.

The project has been a success, with the project being fully-subscribed among 350 customers. According to Fitch, WBMLP has a waiting list, but is accepting applications on an ongoing basis as spots open up.


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# Table 2. Bids for Developing West Boylston Municipal Light Plant’s 2-MW Project

<table>
<thead>
<tr>
<th>Developer</th>
<th>Type of Bid</th>
<th>Offer</th>
<th>Term Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenskies Renewable Energy (Selected Bidder)</td>
<td>Lump Sum</td>
<td>$4.137 million</td>
<td>N/A</td>
</tr>
<tr>
<td>Developer A</td>
<td>Lump Sum</td>
<td>$4.887 million</td>
<td>N/A</td>
</tr>
<tr>
<td>Developer B</td>
<td>Lump Sum</td>
<td>$5.287 million</td>
<td>N/A</td>
</tr>
<tr>
<td>Developer C</td>
<td>PPA</td>
<td>$0.132/kWh</td>
<td>15 year</td>
</tr>
<tr>
<td>Developer D</td>
<td>PPA</td>
<td>$0.1569/kWh</td>
<td>20 year</td>
</tr>
<tr>
<td>Developer E</td>
<td>PPA</td>
<td>Declining PPA rate schedule; starting at $0.3115/kWh</td>
<td>20 year</td>
</tr>
<tr>
<td>Developer F</td>
<td>PPA</td>
<td>$0.0875/kWh (SRECs not included)</td>
<td>20 year</td>
</tr>
</tbody>
</table>

Source: Smart Electric Power Alliance, 2018
The City of Fremont, Nebraska is a municipal utility with a service territory that covers 60 square miles and provides power to over 14,000 homes and businesses. Brian Newton, a Nebraska native, took over as the general manager in October 2015. At the time, the town produced 100% of its power from two coal-fired generation plants. To hedge against potential increases in coal costs, Newton focused on diversifying the generation mix. Newton hired SEPA to survey the community to gauge interest in community solar. Following an overwhelming response in favor of participating in a community solar farm (70%), the Board of Public Works moved forward with the idea. After an extensive search for loans or other financial options, the municipality successfully self-financed a 1.55-MW community solar project.

Similar to other municipal utilities in the report, Fremont issued an RFP to solar developers and received both lump-sum bids and PPAs. Despite the PPA bids incorporating the ITC, they were still too expensive for the municipality, which instead awarded the project to GenPro, the solar developer that submitted the least cost lump-sum bid. According to Newton, the cost of the project was almost $2 million ($1.29/W). Once the developer was chosen, Fremont was prepared to begin the financing phase.

The road to project financing for Fremont was long and tough as it navigated options to incorporate the ITC and other subsidized loan programs, such as clean renewable energy bonds (CREBs) (see the call-out box on page 13). First, Fremont went to National Rural Utilities Cooperative Finance Corporation (CFC) to apply for a loan. CFC is a bank that only works with electric cooperatives, but Fremont tried nonetheless and the bank could not come up with a viable option for Fremont.

The town’s second attempt was to reach out to state agencies that provide financial resources for community developers, such as the Nebraska Investment Finance Authority (NIFA), which provides financial resources for homeownership, rental housing, agricultural, and community development endeavors. “NIFA gives housing type grants that are identical to CREBs,” said Newton, “but they didn’t feel they were permitted to finance a community solar project.” NIFA’s inability to finance the project demonstrates a glaring opportunity in the finance community to leverage existing community based financing tools for solar projects.

Newton’s persistence next led him to issue a formal RFP to local lending banks. The winning bid came from First National Bank of Omaha in Fremont, but according to the Newton the terms were more than double of those available from CREBs, should Fremont find a way to use them. The failure to secure favorable loans led the City of Fremont to self-finance the $2 million project through internal reserves.

7 https://www.nifa.org/lender/loan-programs
This example highlights the many challenges municipal utilities and solar developers are facing today to finance community solar and community-based solar projects. Few financing options work with their structure and size. In the case of Fremont, local agencies and banks were not willing to take the risks of financing an unfamiliar project. Given a last-case scenario, Fremont took financing into its own hands.

According to Newton, the town's 1.55-MW community solar project “will accommodate 200 subscribers” and be operational in March 2018. A second solar farm⁹ is being planned, and Newton is still searching for a way to access alternatives to CREB financing. Fremont has applied for a $300,000 grant from the Nebraska Community Energy Alliance.

Public power utilities have historically struggled with taking advantage of the CREBs program. According to a representative from the American Public Power Association (APPA), the biggest challenge facing public power (or municipal utilities) was the method of allocation for the $800 million of bonding authority available to public power utilities. Rather than being allocated on a first-come, first-serve basis, CREBs were awarded on a pro-rata basis for all qualified applicants, meaning the whole pot was split evenly between the municipal utility applicants.

WHAT ARE CLEAN RENEWABLE ENERGY BONDS?

Clean renewable energy bonds (CREBs)⁸ were a financing mechanism for renewable energy projects established under the federal Energy Policy Act of 2005. Old CREBs refer to the $1.2 billion allocation made by the U.S. Congress prior to 2008 and 2009. New CREBs refer to the $2.4 billion allocation under the Energy Improvement Act of 2008 and the American Recovery and Reinvestment Act of 2009. CREBs were designed to benefit tax-exempt entities that could not directly benefit from tax credits available to for-profit entities. Available bonds are split evenly between public power utilities, electric cooperatives, and governmental bodies other than public power utilities. CREBs interest is taxable to the bondholder, but the issuer receives a direct payment from the U.S. Treasury proportional to the amount of interest paid. The Tax Cuts and Jobs Act of 2017 prohibited the issuance of all CREBs after Dec. 31, 2017, and there are no current efforts to reinstate them.

Source: City of Fremont, 2018

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8 https://www.energy.gov/savings/clean-renewable-energy-bonds-crebs
9 https://www.apnews.com/c4cc40498a5c4281b01c3a5e4c2a6eae
Government Grants and Bond Bundling: BARC Electric Co-op

CASE STUDY

BARC Electric Cooperative serves the Bath, Alleghany, Rockbridge, Augusta, and Highland counties in the Commonwealth of Virginia. It is a small electric cooperative utility with over 225 miles of distribution lines, serving just under 13,000 members. BARC is home to the first community solar project in Virginia. In 2010, Mike Keyser was hired to lead BARC and brought a philosophy to foster the clean energy transition through community solar to give members access to economically viable solar.

Due to the financing constraints, the size of the community solar project remained in flux throughout the development process. Regardless of the final project size, Keyser wanted to also build a solar classroom as an extension to the project to advance solar awareness and education. In order to initiate the project, BARC first selected a skilled developer - Affordable Energy Concepts - through a competitive procurement process and then identified financing options. BARC’s strategy was to aggressively seek grant funding opportunities. Ultimately, three innovative financing sources provided the upfront capital of roughly $1.4 million for the solar array and the onsite solar classroom.¹⁰ BARC’s financial package consisted of a Rural Energy for America Program (REAP) grant from the U.S. Department of Agriculture (USDA), a Community Infrastructure (ARC), a CREBs rebate, and a very small portion from the co-op’s own internal reserve funds.

REAP grants¹¹ provide “guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements.” Before applying for the grant, Keyser built relationships with representatives in the local USDA office in Richmond and reviewed the application book. As a result, BARC’s project received a favorable score and a grant of $250,000, with a 75% match from the cooperative. Keyser attributed much of his success in securing the grant to his efforts building relationships. He noted that “contacting your State Rural Development Energy Coordinator¹² in your local USDA offices initiates the process of exploring eligibility and is the first step to obtaining financing through this avenue.”

In addition, Keyser attended local workshops where he could find out about other prospects for financing the community solar project. At an ARC workshop in July 2014, he learned that his project could qualify for up to $500,000 in funding, with a 50% match. Keyser then strategically leveraged external relationships with consultants for technical support.

For example, in the fall of 2014, BARC contracted SEPA for technical assistance on the grant application and program design. ARC grants are administered by the state, with the ultimate decision on individual.

¹⁰ The solar array alone cost $1.144 million ($2.08/W)
projects coming from the Governor’s office. Working with SEPA, BARC outlined a strategic plan and drafted the project budget and narrative. The co-op was approved for a community infrastructure ARC grant and was awarded a $500,000 check from the Governor of Virginia.¹³

With a total of $750,000 in combined federal and state grant funding and a project cost lined up at $1.4 million, BARC still had to find $650,000. It was a decision point for Keyser. “Do you try to make the ITC work for the remaining investment or do you explore alternative loan or bond options to borrow the remaining capital,” he said. Nonprofit, tax-exempt organizations such as cooperative utilities are able to take advantage of ITCs, for example, by setting up a for-profit subsidiary. BARC modeled that option and found that the benefits of the ITC did not outweigh the costs of the administrative and legal fees that would be needed to form the subsidiary.

The next choice for Keyser and BARC was to pursue what he calls the “ITC for non-profits,” or CREBs. The bonds available to BARC in 2014 were part of the New CREBs allocations. Financial institutions that lend to electric cooperatives are often able to provide boilerplate loan structures to the co-op that incorporates the New CREBs rebate.

CFC issued a 29-year, 4.15% loan of $600,000 to BARC. From CFC’s perspective, it is a traditional loan where BARC pays the full interest expense through its regular debt service payments. BARC submits quarterly IRS forms for the life of the loan to receive quarterly New CREBs rebate checks from the U.S. Treasury. The rebated amount effectively gives the co-op a discounted net interest rate of 0.846%.

Taking advantage of New CREBs financing is a complex process, requiring close work with the financial institution issuing the loan, and significant legal and administrative work. CFC facilitated the entire process, including a recommendation for an attorney that specializes in these kinds of financial transactions -- to advise the co-op. Keyser stressed the importance of finding a bank that is willing to work with you.

The CFC “really helped us navigate through this financing process, which can be a bit more complicated than a run-of-the-mill loan, but it’s certainly worth the extra effort,” he said. The remaining $50,000 balance was self-financed through internal reserve funding. A breakdown of the funding resources for the project is illustrated below (Figure 1).

The 550-kW solar garden became operational in late 2016. The project is fully subscribed and was named the Community/Shared Renewables Project of the Year by the Interstate Renewable Energy Council (IREC). ¹⁴

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**FIGURE 1. SOURCES OF FUNDING FOR BARC ELECTRIC CO-OP’S 550-KW PROJECT**

Source: Smart Electric Power Alliance, 2018

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Community Partnerships: Michigan Energy Options

CASE STUDY

Michigan Energy Options (MEO) is a nonprofit organization with a mission of helping communities toward a sustainable and resilient future through the adoption of energy efficiency and renewable energy. The striking characteristic of MEO is its collaboration with local governments, businesses, and community stakeholders.

The organization’s involvement with community solar began in 2014, when the Lansing Board of Water & Light (LBWL) issued an RFP for a larger-scale utility solar project coupled with a smaller 300-kW community solar project. MEO with partners including Patriot Solar Group were awarded the community solar project.

As the team put together the financials for designing and constructing the community solar “park,” as it came to be known, John Kinch, Executive Director of MEO, realized that the size of their project was less attractive to tax-equity investors than he had realized earlier. “At the time, projects under 2 or 3 million [dollars] or 1 MW wasn’t that attractive to investors,” Kinch said. He cited the various legal and administrative fees associated with investing in solar as the primary reason for the lukewarm response they got. Fortunately, Patriot Solar Group, on a parallel track was seeking an investor. This company, which historically had primarily been an EPC (Engineer, Procure and Construct) was able to use its industry connections to secure an investor to finance approximately $300,000 of the project—but this search took a number of months before the team was successful.

The collaboration between Patriot Solar, MEO, and LBWL allowed the team to significantly drive down costs and opened the door to go after the smaller 300-kW project, which was estimated to cost $700,000 ($3.00/W). The costs for subscribers was a low $1.33/installed watt, thus, a 300 W-panel had a one-time cost of $399.

Pre-selling subscriptions to the project will finance the remaining $400,000 of the project costs (see Figure 2), bringing financial streams straight from the customers to the project. This direct form of finance can, however, pose a potential risk to the project, if subscriptions do not sell out.

WHAT IS A TAX-EQUITY INVESTOR?

Solar developers often partner with tax-equity investors in order to take direct advantage of the ITC. Companies with sufficient tax-liability have an appetite for tax credits and can provide tax-equity investments toward the project to receive the ITC. They invest a percentage of funds for the solar installation and receive 100% of the tax incentives plus a share of the value of electricity generated. Tax-equity investors are an important partner for solar developers who do not have the tax appetite available to take advantage of the ITC. Banks and insurance companies often have sufficient tax liability and are common tax-equity investors.
For MEO, strategic partnerships not only led to successful financing, they also allowed for innovative ways to cut project costs and ensure profitability.

“Everybody involved in the project—the solar company, the city, the utility and MEO—looked for ways to drive down the cost of the project and make it as affordable as possible for the community to participate in,” Kinch said.

Because the host site was a capped landfill, the city’s Department of Public Works provided expertise on environmental impact, stormwater remediation, and permitting prior to construction. Kinch also noted the importance of partnering with a solar developer with racking and engineering expertise to drive down installation costs. Without the successful collaboration of city, utility, and private industry, the project most likely would not have moved forward. “I cannot emphasize enough the need for good collaboration and communication when tackling a community solar project,” Kinch said.

MEO’s community solar project in Lansing illustrates the importance of (1) having public and private partners willing to work together, (2) monetizing the ITC, and (3) pre-selling subscriptions to minimize risk.

The project was currently under construction at the time of publication.

"I cannot emphasize enough the need for good collaboration and communication..."

- John Kinch, Executive Director of Michigan Energy Options
Community-Financed Solar: RE-volv

CASE STUDY

RE-volv is a 501(c)(3) nonprofit organization based in San Francisco, California. The organization is a fully functioning crowdsourcing campaigner, fund manager, project developer, operator and maintainer, and project manager of small-scale solar projects for nonprofit organizations.

Traditionally, nonprofits customers have limited access to solar, being unable to claim the ITC. RE-volv developed a crowdsourcing and revolving fund model that provides financing options to underserved nonprofit customers. It allows community members and charity foundations the opportunity to give back to the community in the form of solar energy.

The revolving fund platform raises donations for small-scale solar projects for nonprofit customers and then feeds the revenue from the customer's lease payments into a fund to finance future projects.

Although its projects are not community solar, by definition, RE-volv falls under the umbrella of community-based solar. It gives customers -- who otherwise would be left out -- the ability to reduce their carbon footprint and the potential of getting to net-zero energy usage.

RE-volv conducts outreach in the community to connect with potential nonprofit customers before determining a project's location. It analyzes prospective nonprofit solar customers' electricity bills, properly sizes the solar system, and develops a 20-year lease agreement. The lease requires no initial down payment or upfront capital to the customer. The nonprofit acts as the host site for the array and pays a monthly lease payment to RE-volv at a rate guaranteed to provide a 15% savings on its current electricity rates. All of the revenues from the lease payments feed the ongoing, revolving fund.

RE-volv finances, develops, operates, and maintains the project for the customer throughout the 20-year lease agreement. After the 20-year lease agreement, the project reverts back to the nonprofit organization.

RE-VOLV AND INFORMATION TECHNOLOGY (IT)

Often overlooked, IT development efforts for such platforms can be a big lift for many utilities and developers. Creating a platform that can handle multiple users and functionalities can not only be a big time commitment for developers, but prohibitively expensive. RE-volv made it a priority to maintain high quality design and functionality for their platform. RE-volv initially worked with computer science students from the University of California, Berkeley to lay down the framework and get the site up and running. RE-volv leveraged a grant from the U.S. Department of Energy Solar Energy Technologies Office through the SunShot Catalyst program to continue working on the design and functionality of their site.¹⁵ Organizing customers and managing payments for community-based solar projects can require a big and ongoing lift from platform developers and IT staff. RE-volv illustrated how to acquire external resources to meet the IT demand.

¹⁵ See [www.energy.gov/eere/solar/sunshot-catalyst-energy-innovation-prize](http://www.energy.gov/eere/solar/sunshot-catalyst-energy-innovation-prize) for more information on the SunShot Catalyst program.
term is up, the customer owns the system outright. If in any given year the system underperforms and its energy output is less than expected, RE-volv reimburses the customer the difference.

Once the lease is set, the RE-volv team announces the financial target and initiates the crowdsource campaign to raise money. After RE-volv reaches its financial target, it locks in the solar installation subcontractor and proceeds with the construction.

The funding breakdown between cash donations and revolving fund contribution varies by project. Currently, the tax-deductible donations from the campaign cover the majority of the upfront costs of the solar installation.¹⁶ However, as more solar projects come on-line, providing revenues to feed the revolving fund, it will represent a greater proportion of the money for future projects (Figure 3).

To date, RE-volv installed a total of 10 projects (including Faith Baptist Church). It is a current participant in the SYC challenge and promised to install 10 projects during the challenge period. So far during the challenge, RE-volv has installed five and is on track to install the remaining projects by the October 2018 deadline.

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16 RE-volv typically adds 10% to the total project costs for in-house project management, operation, and maintenance fees.
17 The proportion of donation funding varies from project to project.
Faith Baptist Church is an integral part of the community in East Oakland, California. RE-volv explored the viability of a 6-kW solar array onsite to benefit the church and determined it was a good candidate for a solar installation. RE-volv and the church executed a 20-year lease agreement. RE-volv chose Sunwork Renewable Energy Projects – a local non-profit that brings volunteers to the installation site – as the solar installation subcontractor. Jinko Solar’s donation of panels helped shave off about 25% of the total cost, according to RE-volv. With the local work and donated solar equipment, the installation costs accounted for $12,000 ($2/W) of the project’s cost.

Generally, RE-volv hires a turnkey developer for installation and manages all aspects of the system’s warranties, operations, and maintenance in-house, adding roughly 10% to the installation cost. In the case of Faith Baptist, the contract and the total estimated cost for the project was $14,400.

RE-volv educated the community about the prospective project at the church and launched a crowdsourcing campaign to raise the total amount. In a gesture of support for the innovative project, the Leonardo DiCaprio Foundation matched all donations in one day to satisfy the campaign goal in November 2017. Andreas Karelas, Executive Director of RE-volv, said, “Usual crowd funding takes six weeks, but after Leonardo DiCaprio tweeted out in support of the solar system, it only took one day.”
For Profit Business Models: Renovus Solar

Renovus Solar is a for-profit solar developer active in upstate New York around the Finger Lakes. Renovus currently has four community solar farms in operation, with a cumulative capacity of 2.4 MW, serving roughly 200 customers.

Renovus has two funding models -- a retail model and a standard PPA for commercial and industrial (C&I) customers. Both models rely on skillful relationships with local credit unions and on internal expertise to drive down installation costs. However, the standard PPA model is not relevant for community-based solar or community solar projects, and thus is not included in the case study.

The retail model gives the customer access to the ITC and to an innovative loan structure with considerably favorable financing terms for both the developer and the customer. Renovus owns the land; the customer owns the panels. In the retail model, Renovus sells the panels directly to residential and commercial customers who are able to use the ITC (if they have the tax liability).

Renovus has developed a generic pathway to financing these types of projects (see Figure 4). One financial institution, often a local credit union, provides two different loans. One loan is issued to Renovus for financing the construction. The other is issued to the customer for financing the purchase of the panels. The customer’s panel purchase loans are used to pay off Renovus’ construction loans. This twofold loan structure offers the bank two avenues of business and helps expand their customer base. This cycle allows the credit union to provide favorable loans to both Renovus and its prospective community solar customers.

In addition to the four community solar projects in operation, Renovus currently has one project under development and is pre-fielding subscribers.

FIGURE 4. SOURCES OF FUNDING FOR A TYPICAL RENOVUS SOLAR PROJECT

Source: Smart Electric Power Alliance, 2018

18 The proportion of panel purchase loans to construction loans funding varies from project to project.
FINANCING COMMUNITY-BASED SOLAR PROJECTS

A Pathway Forward

Building relationships and establishing partnerships is critical for success. Those who keep capital cost down with strategic partnerships – through facilitating permits or cutting costs through volunteering and/or equipment donations, for example – have an increased rate of success.

Utilities and solar developers must also leverage relationships to gain access to capital. A utility or developer who is engaged with state and federal regulatory agencies -- by attending meetings and workshops -- has higher visibility into potential grant funding opportunities. Developers and utilities must continue to build out their networks of tax-equity investors to access the ITC.

The baked in value of community multipliers – community outreach, education, awareness, and land reuse – can be leveraged to add value to community stakeholders and outside investors. They are valuable pieces to the puzzle that must not be forgotten. Relationships and optics inhibit or prohibit a developer or utility’s success on finding community-based solar financing.

As community-based solar projects become more economic and profitable, utilities and developers should encourage the finance community to streamline financing options, make loans more accessible, and replicate financing packages to the extent possible.

While this report does not begin to address these issues, the larger community should identify solutions to the following questions: Could other community-based financing approaches be merged to community-based solar projects? Should incentive programs, such as the Old CREBs, be reinstated? With new changes in federal corporate tax code, what strategies should utilities and developers take to leverage and maximize the federal ITC for community-based solar projects? What financing options available to utility-scale developments could be applicable to community-scale projects? How could utilities and developers gain access to community financing by developing projects in LMI communities?

As solutions to these questions begin to emerge, we anticipate the community-based solar industry will continue to expand, offering new clean energy options for customers everywhere. To access SEPA’s large body of community solar reports, webinars, and articles, we encourage readers to go to www.sepapower.org. SEPA members are also welcome to join SEPA’s Community Solar Working Group.
# Appendix

## SUMMARY OF CASE STUDY PARTICIPANTS

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>ORGANIZATION TYPE</th>
<th>ELECTRICITY MARKET</th>
<th>STATE</th>
<th>PROJECT SIZE</th>
<th>PROJECT COST</th>
<th>FINANCING METHOD(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEST BOYLSTON MUNICIPAL LIGHT PLANT</td>
<td>Municipal Utility</td>
<td>Competitive Suppliers</td>
<td>MA</td>
<td>2 MW</td>
<td>$4.184 million</td>
<td>Loan</td>
</tr>
<tr>
<td>CITY OF FREMONT</td>
<td>Municipal Utility</td>
<td>Regulated</td>
<td>NE</td>
<td>1.55 MW</td>
<td>$2 million</td>
<td>Self-Financed</td>
</tr>
<tr>
<td>BARC ELECTRIC CO-OP</td>
<td>Cooperative Utility</td>
<td>Competitive Suppliers</td>
<td>VA</td>
<td>550 kW</td>
<td>$1.4 million</td>
<td>Grant Funding, Loan, Self-Financed</td>
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<tr>
<td>MICHIGAN ENERGY OPTIONS</td>
<td>Nonprofit</td>
<td>Competitive Suppliers</td>
<td>MI</td>
<td>300 kW</td>
<td>$900 thousand</td>
<td>Tax-Equity Investments, Pre-Sold Subscriptions</td>
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<td>RE-VOLV</td>
<td>Nonprofit</td>
<td>Competitive Suppliers</td>
<td>CA</td>
<td>6 kW</td>
<td>$14.4 thousand</td>
<td>Crowdsource / Revolving Fund</td>
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<td>RENOVUS SOLAR</td>
<td>For-Profit</td>
<td>Competitive Suppliers</td>
<td>NY</td>
<td>N/A</td>
<td>N/A</td>
<td>Self-Financed, Tax-Equity Investments, Pre-Sold Subscriptions</td>
</tr>
</tbody>
</table>

Source: Smart Electric Power Alliance, 2018