



Funding the Sun:

Options for Michigan Philanthropy
to
Support Customer-sited Solar





Mission Statement

The Institute for Energy Innovation (IEI) is a Michigan-based non-profit that works to promote greater public understanding of advanced energy and its economic potential for Michigan, and to inform the policy and public discussion on Michigan's energy challenges and opportunities.

About this Report

This report was prepared by IEI with funding from Cherry Republic to help identify gaps in the deployment of customer-sited solar energy and to identify ways that philanthropic funders can deploy capital to help address those gaps. The report provides information and funding options for small philanthropic funders informed by the needs of Michigan's communities and is grounded in the experience of expert practitioners.

Acknowledgements

IEI is grateful to Cherry Republic for the funding to complete this report. IEI would like to thank our intern, Ari Cohen, for all of his work to research and craft this report. IEI is also appreciative to members of the solar and finance community who spoke with us and detailed their experiences for this report including Mark Cryderman, John D'Agostino, Sam Dunaiski, Bracken Hendricks, Douglas Jester, Andreas Karelak, Brandon Knight, Bali Kumar, Ian Olmstead, Madelyn Schorr, Jamie Scripps, Dave Strenski, Mary Templeton, Tom Woiwode, and Ken Zebarah.



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Executive Summary

Declining renewable energy costs paired with the potential for significant economic, environmental, and community benefits make the deployment of solar energy systems an attractive option to address the climate crisis. However, for distributed solar to drive more rapid carbon reductions beyond the public commitments of companies and government, funding solutions, whether through grants, loans, or other financial tools, must be unlocked to help customers of all types to participate in this transition.

This report focuses on identifying gaps in Michigan's market for customer-sited solar generation and how small philanthropic funders can help address such gaps by deploying their capital. To address these market challenges for customers and funders alike, grants, loans, credit enhancements, and unique payment structures such as power purchase agreements (PPAs) can provide some combination of reduced upfront costs, improved interest, or improved tenor for borrowers and reduced risk or increased returns for lenders.

Based on research, interviews, and a review of case studies, this report highlights three recommended options for small philanthropic funders to consider utilizing with the goal of increasing customer-sited solar deployments in Michigan. These include:

1. Enabling PPAs for nonprofits and schools by providing concessionary debt to cover a portion of the project cost.
2. Establish a solar-specific grant program for nonprofits and schools with participation from multiple philanthropic funders.
3. Leverage existing programs to expand options for farmers such as by pairing a grant program with an existing loan program that leverages a loan loss reserve.

As this report highlights, there are clear opportunities for philanthropic funders to support the further deployment of customer-sited solar in Michigan. In addition to presenting a clear opportunity to support the customer-sited solar market, such use of funds also offers philanthropic funders the opportunity to accelerate the transition to renewable energy beyond current government and private sector commitments.

Introduction

The climate crisis is unfolding across the country and Michigan is no exception. A 2019 report from the National Resource Defense Council found that climate change is already resulting in significant health and economic consequences for individuals throughout the state of Michigan.¹ Michigan’s agricultural industry, outdoor recreation industry, and communities of color across the state are disproportionately impacted by the changing climate. Science indicates that we have until 2030 to curb the most devastating impacts of climate change.²

Until 2017, electricity production represented the largest source of greenhouse gas emissions of any U.S. sector and it is still responsible for over 1,500 million metric tons of CO₂e annually.³ However, this is changing rapidly due to significant cost declines in renewable energy technologies. Over the past decade, utility-scale solar has decreased in price by almost 90%, unsubsidized wind energy has declined by 70%, and residential rooftop solar has declined by approximately 70%.^{4, 5} Bloomberg’s 2019 Energy Outlook predicts that these trends will continue over the coming decades.⁶

With decreasing costs and increasing deployment of renewables come economic opportunities across the country – not just in coastal states. At the end of 2019, before the COVID-19 pandemic, more than 125,000 people in Michigan were employed in clean energy jobs, more than any other state in the Midwest and fifth nationally.⁷ Wind energy now accounts for roughly 5% of the electricity generated in Michigan, with more than 5,800 MW of capacity deployed across the state and solar deployments are rapidly increasing.⁸

On September 23, 2020, Governor Gretchen Whitmer announced a plan to achieve carbon neutrality across Michigan’s economy by 2050.⁹ Consumers Energy and DTE

¹ 2019 NRDC Climate Change and Health in Michigan Report Available at: <https://www.nrdc.org/sites/default/files/climate-change-health-impacts-michigan-ib.pdf>.

² Intergovernmental Panel on Climate Change. “Special Report: Global Warming of 1.5 degrees C.” 2018. Available at: <https://www.ipcc.ch/sr15/chapter/spm/>.

³ U.S. EPA. Available at: <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#electricity>.

⁴ U.S. DOE. Available at: <https://www.energy.gov/eere/solar/sunshot-initiative>.

⁵ Lazard November 2019 LCOE Analysis. Available at: <https://www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-130-vf.pdf>.

⁶ Bloomberg New Energy Finance. “New Energy Outlook 2019.” Available at: <https://about.bnef.com/new-energy-outlook/>.

⁷ Clean Jobs Midwest. 2019. Available at: https://www.cleanjobsmidwest.com/wp-content/uploads/2020/06/Michigan_ExecSum_CJM2020.pdf

⁸ U.S. Energy Information Administration. 2020. Available at: <https://www.eia.gov/state/analysis.php?sid=MI>.

⁹ Executive Directives 2020-10 and 2020-182. September 23, 2020. https://www.michigan.gov/whitmer/0,9309,7-387-90499_90640-540289--00.html.



Energy, the two largest investor-owned utilities in Michigan, have made commitments to achieving carbon neutrality by 2040¹⁰ and 2050¹¹ respectively. While such commitments are encouraging, it is clear that much more must be done in the short-term to stave off the worst effects of climate change. Due to institutional inertia, poorly aligned financial incentives, and legacy infrastructure, targets set by private companies and, in many cases, governments often do not move fast enough and need to be supplemented by consumer driven adoption.

Distributed solar generation provides an opportunity to help address the climate crisis with tangible, local solutions. Despite the declines in cost and increases in deployment for clean energy, the distributed solar market in Michigan needs to grow faster to meet the requirements of the moment. For distributed solar to drive more rapid carbon reductions beyond the public commitments of companies and government, funding solutions, whether through grants, loans, or other financial tools, must be unlocked to help customers of all types to participate in this transition.

In addition to the environmental benefits, many Michiganders would like to site solar energy projects at their homes, businesses, farms, and nonprofit properties to decrease electricity costs, increase reliability and resiliency, and support local businesses. Much of Michigan's success to date in deploying these relatively small-scale solar arrays has been supported by a suite of important funding and financing options. Michigan Saves, a nonprofit that provides financing solutions across Michigan, has done over \$229 million in total financing for energy-saving projects, with a portion of that going toward distributed solar.¹² Lean & Green Michigan has facilitated Property Assessed Clean Energy (PACE) financing for over \$68 million in energy- and water-saving projects, with a handful of projects including distributed solar.¹³ In 2018, the US Department of Agriculture's Renewable Energy for America Program (USDA-REAP) provided just under \$300,000 in grants for renewable energy projects across Michigan.¹⁴ On-bill financing programs, which are enabled throughout the state, have seen limited adoption with the most notable being a partnership between Michigan Saves and the Holland Board of Water & Light. Philanthropic funders have also provided one-off funding for various customer-sited solar projects in Michigan.

¹⁰ Consumers Energy News Release. February 24, 2020. Available at: <https://www.consumersenergy.com/news-releases/news-release-details/2020/02/24/16/03/consumers-energy-commits-to-net-zero-carbon-emissions-takes-stand-for-the-planet>.

¹¹ DTE Energy. 2020. Available at: <https://dtecleanenergy.com>.

¹² Michigan Saves. Available at: <https://annualreport.michigansaves.org/by-the-numbers/>.

¹³ Lean & Green Michigan. Available at: <https://leanandgreenmi.com/market>.

¹⁴ USDA REAP Program. Available at: https://www.rd.usda.gov/files/REAP_NR_CHART_under200000k81919.pdf.

While these programs provide great options for many Michiganders to fund distributed solar, none of these funding programs or initiatives are dedicated specifically to distributed solar. As such, there remain opportunities where additional capital with no other competing demands could accelerate adoption of customer-sited distributed solar, increase access to clean energy, and create more clean energy jobs.

Michigan is home to 2,181 philanthropic foundations, representing \$31.2 billion in total assets and \$1.7 billion in annual giving.¹⁵ While the philanthropic community is typically characterized by large, well-known foundations, such as the Kresge Foundation or the Kellogg Foundation, many philanthropic funders are smaller. These smaller donors include corporate philanthropic giving, individual gifts, family offices, or family foundations.

This report is focused on providing information to support the needs of small philanthropic funders with fewer than seven staff and less than \$50 million in assets.¹⁶ Anecdotally, small funders in Michigan are often interested in how to provide support for clean energy projects, but face challenges. For one, smaller philanthropic funders have fewer resources to deploy for projects, so finding the best ways to leverage their existing funds is more important. At the same time, the distributed solar industry can be complicated and small philanthropic funders may not have the resources to hire consultants or the relationships to help identify the right opportunities. Lack of information and uncertainty on how to best participate has left many small philanthropic funders on the sideline wanting to support clean energy projects, but not sure where or how to start.

This report provides guidance for Michigan's small philanthropic funders by:

- identifying existing gaps in the market where capital can make a difference;
- identifying potential structures and solutions that may be able to address such gaps;
- providing case studies and industry knowledge;
- making concrete recommendations for how a small philanthropic funder or a group of small philanthropic funders can accelerate deployment of clean energy in Michigan.

¹⁵ Council of Michigan Foundations. Available at: <https://www.michiganfoundations.org/facts-and-figures>.

¹⁶ Phone call with Madelyn Schorr from Exponent Philanthropy on 11/9/2020.

Existing Market Challenges

While this report focuses on gaps that can be addressed by funding solutions, there are a variety of other issues that may limit the adoption of solar in any particular property type or community including an unworkable policy environment, lack of information, or low customer interest. For example, if, as is the case in Michigan, there is no enabling legislation for community solar, then no combination of funding tactics will make it possible for communities to adopt community solar. Similarly, putting together a new loan or grant program might not be necessary if the actual barrier to uptake is lack of knowledge regarding an already existing program.

While many customer-sited solar projects will pay for themselves through decreased electricity costs in the long-term, the initial upfront costs of project implementation often remain a barrier in the short-term. As a result, for a customer, the challenges are often related to how to qualify for funding or to pay back financing. For example, a potential customer may face high interest rates, insufficient loan tenor, a lack of capital options, excessive down payments, inability to meet credit requirements, unfavorable conditions based on nonpayment, or other conditions that limit their ability to qualify for funding or to pay back a loan. Many customers seek out third-party funding such as a loan or a grant. Such injections of capital can remove, or decrease, the upfront cost barrier and allow customers to spread a project's expenses over a long period of time or to reduce the upfront cost. However, in the case of a loan, if a customer cannot meet a lender's specific underwriting criteria and capital return requirements, they will have difficulty securing a loan with reasonable interest rates and terms.

Barriers to funding experienced by solar customers and solar developers are mirrored by barriers felt by funders, such as lenders and grantmakers. For lenders, the challenges may include a lack of familiarity with lending in the solar market, lack of familiarity with a particular state market and legal framework, lack of data on a particular market, insufficient volume to justify entering the market, or perceived or real risk concerns related to a customer type. Lenders may also face challenges related to a customer or project's inability to meet underwriting criteria, inability to guarantee sufficient returns or inability to provide sufficient returns relative to another market opportunity. Similarly, a grantmaker may not be able to provide sufficient capital for a customer-sited solar project to go forward and – in general – such grantmakers may face challenges in scalability and in financial sustainability.

This report draws from interviews, desk research, and market experience, to identify conditions that are limiting the funding and subsequent deployment of customer-sited solar projects in Michigan. In interviews, project economics, which are influenced by state policies, utility programs, electricity prices, and solar project expenses, were cited by solar developers and funders alike as a key barrier that spans project size and property type. In one instance, a company estimated that a third of the nonprofit projects they reviewed required some form of grant. Despite declining solar costs, project economics remain challenging because state policies are reducing the compensation that customers receive for providing power to the grid and, in some cases, limit customers' ability to receive any compensation at all. In this context, new financing and funding mechanisms are more important than ever. Another overarching concern across customer-type was customer acquisition and program uptake. Some of Michigan's best financing offerings, such as commercial PACE financing and USDA REAP grants, have limited uptake, largely due to a lack of widespread understanding of the programs. In other discussions with market participants, the ability to reach customers, particularly in low-income demographics, was cited as a concern. Finally, the lack of a dedicated funding facility for customer-sited solar may also contribute to market challenges. Existing programs across Michigan are applicable to many technology types, allowing for solar to lose out relative to the project economics of other upgrades.

These overarching dynamics also cause challenges for potential funders. With poor project economics, many financial products simply don't provide the necessary return on investment. Even in cases where project economics are sufficient to earn a return on an individual project, national lenders have the opportunity to deploy capital in markets all over the country. For example, one interviewed national finance company identified Michigan as a "tier 3" state (out of 3 tiers) for their product. Additional barriers, such as limited volume of transactions, a new legal and policy environment, and challenges building relationships and acquiring customers were cited in interviews as challenges faced by national finance companies and non profits exploring entering Michigan's market.

Beyond these overarching challenges, certain property types in Michigan face specific gaps. These customer types – which include agricultural properties, nonprofit properties, low-moderate income households (LMI), municipalities, universities, schools and hospitals (collectively referred to as the "MUSH" market), and small-scale commercial projects – may face challenges beyond funding. That said, there are specific gaps where funding can be a solution that, if deployed, would increase customer-sited solar deployment in a specific sector.

*Agricultural properties*¹⁷

Members of agricultural communities are often faced with large unexpected costs on top of the already thin margins common in the industry. As a result, many farms do not have, or cannot justify the use of, available funds to be used in the short term for customer-sited solar projects. Furthermore, agricultural properties are often seen as higher risk by lenders, causing farmers to have access to less favorable loan terms. This leads to higher overall project costs, longer return on investment timelines, and, consequently, lower renewable energy adoption rates. Two organizations involved in financing of customer-sited solar projects identified agricultural properties as a challenging sector because of project economics, a lack of information for customers, and limited electricity demand in the sector.

*Nonprofit properties*¹⁸

While solar panels seem like a logical option for mission-based nonprofits, nonprofits – because of their limited budgets – typically require that a system be free or reduced in cost, have a very short payback period, or save them money starting on day one. Even in cases where a grant is provided, finding the additional capital may be challenging. Nonprofits can take advantage of existing programs in Michigan, but these options may require a down payment or may have a long payback period. Upfront costs are particularly challenging for nonprofits since such properties cannot directly take advantage of tax-based incentive programs such as the federal investment tax credit (because nonprofits pay no taxes). A nonprofit's tax status also means that it cannot directly take advantage of the modified accelerated cost recovery system (MACRS), which results in lower tax liability for private entities. The inability to take advantage of these incentives increases the cost for a solar system, meaning that Michigan nonprofit organizations that can often afford the least, must pay the most for a customer-sited solar system. This challenge is significant in nearly all cases across the entire U.S., unless a grantmaker is willing to issue a grant for some or all of the cost of a customer-sited solar project. As a result, certain financial products – namely lease arrangements and power purchase agreements – have been developed in other markets to address these challenges. However, no one is offering those products standard in Michigan. Interviewed solar developers cited limited access to capital for Michigan nonprofits and the lack of a standard PPA offering as barriers, while PPA providers interviewed identified challenging project economics and difficulty with customer acquisition. Essentially, investors need a higher return than what they can receive in Michigan

¹⁷ Harcourt Brown & Carey. "Clean Energy Financing in Colorado: A Gap Analysis." 2016. Available at: <http://www.harcourtbrown.com/wp-content/uploads/Colorado-Clean-Energy-Finance-Gap-Analysis-Final-1.pdf>.

¹⁸ Holloway, D. "The Nonprofit Solar Conundrum." September 1, 2017. Available at: <https://www.renewableenergyworld.com/2017/09/01/the-nonprofit-solar-conundrum/>.

and nonprofits require a lower return than what a PPA provider could offer currently.

*Low-moderate income households*¹⁹

As a result of minimal savings and other competing uses of capital, LMI households often do not have sufficient capital to cover initial project expenditures. Many low-income residents are renters, often in multi-family housing, and do not own their building. For renters, the split incentive between a landlord who does not pay the utility bills and the renter who does not own the building creates no incentive for either party to invest in customer-sited solar projects. Another common struggle among LMI households is a lack of strong credit as a result of real or perceived financial challenges. According to the FDIC National Survey of Unbanked and Underbanked Households, 20% of households in the U.S. do not have access to traditional bank credit products because of poor credit history or an inability for the bank to evaluate the borrower.²⁰ The survey also found that unbanked households are more likely to be low-income households.²¹ However, it does not appear that limited solar adoption in LMI households is due to a lack of interest. Interviewed solar developers identified a desire to serve LMI households, but identified a lack of sufficiently priced financial products and customer acquisition challenges. Interviewed funders similarly identified LMI households as a challenge segment, but cited the failure of contractors to reach LMI households. Lenders also identified a need for credit enhancements (discussed in detail later) to de-risk projects and make such households competitive with other investment opportunities. While some existing financing products could apply to LMI communities, without dedicated product offerings, lenders and developers will likely continue to select more established and familiar markets.

*MUSH market*²²

Municipalities, universities, schools, and hospitals (MUSH) are often large consumers of electricity. While MUSH properties are grouped together, hospitals and universities – for various reasons – are not identified as a segment that needs additional funding options for the deployment of customer-sited solar projects. In contrast, municipalities and schools face more explicit challenges.

¹⁹ Vote Solar. “Sustainable Investment: Working Paper on Using Federal Energy Assistance for Solar.” 2017. Available at: https://votesolar.org/files/2015/1199/4944/Sustainable_Investment_-_A_Working_Paper_on_Using_Federal_Energy_Assistance_for_Solar_Nov_2017.pdf.

²⁰ Apaam, G. et al. “FDIC National Survey of Unbanked and Underbanked Households.” October 2018. Available at <https://www.fdic.gov/householdsurvey/2017/2017report.pdf>.

²¹ *Ibid.*

²² Harcourt Brown & Carey. “Clean Energy Financing in Colorado: A Gap Analysis.” 2016. Available at: <http://www.harcourtbrown.com/wp-content/uploads/Colorado-Clean-Energy-Finance-Gap-Analysis-Final-1.pdf>.

Municipalities and schools can fund projects by issuing bonds, accessing other public funds, or borrowing at favorable rates. Because of this, municipalities can typically access long-term funding at fixed rates. This has resulted in a robust energy service company (ESCO) market that relies heavily on energy performance contracting (EPC). However, many ESCOs do not sell solar projects, largely due to lack of familiarity and business revenue structures. Additionally, local politics and competing expenses may limit solar adoption among municipalities.

In addition, the predominant form of funding in the MUSH market, particularly for schools and municipalities, is not designed to specifically incentivize solar. This leaves schools and municipalities seeking additional funding options, whether that be grants or loans. Like nonprofits, schools, and municipalities cannot take advantage of federal tax incentives or MACRS. What's more, municipalities and public schools are ineligible for PACE financing because a local unit of government cannot levy a special tax assessment against itself or against another local unit of government.

*Small commercial properties*²³

Small commercial properties lack access to attractive capital to invest in customer-sited solar projects. Finance providers and solar developers interviewed for this report overwhelmingly identified small commercial projects as a challenge. Solar developers noted that customer-sited commercial projects have access to limited financing offerings that were attractive and finance providers identified such projects as a challenging customer segment.

While a solar project sited at a commercial property may not be particularly large and while commercial entities may have more capital available, for small commercial projects, upfront costs are still a challenge and – in some cases – even more so than for larger commercial projects. Solar projects have certain fixed costs (permits, contracts, customer acquisition, etc.) that are the same for a 20kw system as they would be for a 500kw system. In addition, it is difficult for small commercial entities to obtain long-term, fixed interest rate financing, because commercial entities are a risky proposition. This is because a lender is not only underwriting the economics of an individual solar project, they are also underwriting the economics

²³ McKinsey Center for Business and Environment. "Financing change: How to mobilize private sector financing for sustainable infrastructure." 2016. Available at: https://www.mckinsey.com/~/media/mckinsey/industries/capital%20projects%20and%20infrastructure/our%20insights/the%20next%20generation%20of%20infrastructure/financing_change_how_to_mobilize_private-sector_financing_for_sustainable-infrastructure.ashx.



of an entire business and the prospects of the company – and its market – still being successful in future years. What is more, no small commercial entity is the same. Different legal structures, debt and equity structures, and other idiosyncrasies make it difficult to underwrite and all but impossible to securitize a loan for resale in the broader capital markets. Given these challenges, when small commercial entities do receive financing, most prefer to invest in their core business rather than in customer-sited solar projects.

Funding Strategies: Grants, Loans, Credit Enhancements, Equity

Michigan's market for customer-sited solar faces a variety of gaps. Some of these are overarching such as challenging project economics, difficulty in customer acquisition, and competition for uses of capital. More specific gaps apply to certain customer types such as challenging project economics and a lack of information for agricultural properties; challenging ownership structures and difficulty qualifying for LMI households; high upfront capital costs and lack of access to key tax benefits for nonprofit properties; limited access to funding options for municipalities and schools; and a lack of access to long-term capital at favorable rates for commercial properties. In the simplest terms, these gaps can be traced back to a lack of access to funding for the customer and an inability to achieve the requisite return or the presence of unacceptable risk for the funder. To address these challenges for customers and funders alike, grants, loans, credit enhancements, and unique payment structures such as PPAs can provide some combination of reduced upfront costs, improved interest, or improved tenor for borrowers and reduced risk and increased returns for lenders.

Below are some of the ways that philanthropic funders can deploy their capital. Within these structures, there are many different ways to achieve the same outcomes. As such, many of these tools that can be used individually or in tandem, with a variety of different design options. In addition to identifying the target community and the gap to address, a funder needs to consider their risk tolerance, return requirements, and the scale of investment to help identify the right strategy.

Grants

Grants are a common, straightforward structure for a small philanthropic funder to support deployment of customer-sited solar projects. A transfer of funds, products or labor can remove the upfront cost barrier for many projects. At the core of a grant is a transfer of capital with no expectation for a monetary return on investment, and thereby minimal risk for the funder. Instead, the funder is measuring success via other metrics (e.g., number of megawatts deployed, emissions avoided, public exposure, etc.). While seemingly simple, a grant will still have target recipients, qualifying metrics, a process for advertising and finding grant applicants, a process and criteria for selecting applicants, an arrangement that dictates the flow of funds, and any reporting requirements. Additionally, some grant programs are perpetual (i.e., granting from the interest earned from a pool of investments), while others are finite with the funds spent down over a period of time. While grantmaking can be straightforward and impactful, it can also be

limited in scalability, can rapidly deplete available funds, and may have limited impact relative other tools that result in more leverage of each dollar.

Matching grants

Grants can be awarded conditional on a matching contribution, whether in-kind or funds. A matching grant provides options for funders to leverage their money by providing a grant that requires some match, which is often communicated as a percentage of the overall project cost or ratio relative to the total grant funds (such as 1 to 1 match). The calculation of the match is based on a combination of available funds and the economic needs of the project. Where funds are limited, it is common to provide a maximum dollar threshold that the grant cannot exceed. In addition, matching grants often have specific stipulations on the funds provided that could result in a need to do slightly more underwriting of the recipient by the grant maker.

Loans

To establish a loan, a capital provider provides funds to a borrower with the expectation that the borrower will repay the original funds and, more often than not, with some type of return. Unlike grants, therefore, loans have a return requirement and as such, typically, are evaluated with a more discerning eye toward the risk or perceived risk of a project. For philanthropic funders, a loan product could be provided at a below market rate, provided to a specific customer or project type, and/or provided with a longer term for repayment. For customers, a low, fixed rate of interest is beneficial because it decreases costs and enables more accurate financial planning. A lender can also provide longer terms, allowing recipients to pay back the loan over a longer period of time, allowing customers to recuperate more energy savings before paying back the loan.

Forgivable loan

A forgivable loan can provide necessary capital to a consumer while generating non-traditional returns for the lender. When giving a forgivable loan, the lender does not expect monetary returns. Instead, the lender recognizes that the loan will likely be used to improve a property, such as with a solar installation, which infers a benefit to the entire community. Furthermore, while recipients are not required to make loan repayments, they may be expected to give back to the community in the form of education, outreach, or economic stimuli. If the conditions of the lender are not met, the loan will need to be repaid.

Revolving loan funds

A revolving loan fund is a pool of capital that is loaned out and, upon repayment, is loaned out again. A fund operator may take some fee, but in general, most, if not all, of the capital is loaned out again or is used to cover anticipated expenses. A revolving loan fund is typically priced in a manner to ensure financial sustainability (i.e., perpetual operation), but not necessarily to make a profit. This generally results in a lower interest loan for the customer.

Warehousing credit facility

Warehousing is analogous to a revolving loan fund in that funds are replenished, but rather than waiting for a loan to be repaid, the fund operator will sell the debt obligation and use the returns to lend again. Often, lenders or investors will not enter a market due to low volume, a lack of familiarity with the market (geographic or otherwise), or insufficient transaction sizes. A warehousing facility helps alleviate these challenges for private lenders, while keeping costs reasonable for borrowers. However, there are additional risks with a warehouse structure given that loans need to be resold, requiring pricing and terms to be competitive in the market. Additionally, a warehouse facility is complicated to structure, requires significant resources and expertise to originate the loans, and requires relationships, expertise, and legal work to be able to securitize and sell into the capital markets. If a small philanthropic funder or a group of such funders wanted to pursue a warehousing strategy, it would be important to hire experts in the field and identify the needs of the capital market before initiating the effort.

PACE loan

PACE loans are designed specifically to address energy- and water-related upgrades. By tying loan repayments to a property owner's property taxes, the property owner can avoid all upfront costs for the PACE-eligible upgrades, and the property owner can also benefit from a loan term of up to 25 years. For the lender and investor, the project is effectively de-risked, allowing for more flexibility in the interest rate and the loan term. Furthermore, the loan is non-recourse, and therefore, repayment can be passed on to a future property owner should the property be sold. Finally, under certain conditions, the property owner may be able to benefit from "off balance sheet" treatment.

Credit enhancements²⁴

According to the U.S. Department of Energy, a credit enhancement is anything that improves the chances that financing will be repaid.²⁵ Credit enhancements help capital providers reduce the risk of losing an investment and result in lower interest rates for the borrower, provide more flexible underwriting criteria to help borrowers better access financing, and encourage capital providers to enter unfamiliar markets. Many credit enhancements are financial tools as described below. Others are non-monetary credit enhancements or credit enhancements that can only be provided by government or entities like utilities, such as on-bill financing, a special assessment agreement (as provided in a PACE loan), a backing of the full-faith and credit of a governmental body, or the holding of a certain amount of capital in escrow by the property owner. While these other credit enhancement options are worth considering as supplemental mechanisms, it is not possible for the funder to directly support or utilize these options.

Loan loss reserve

To reduce risk for a lender – and thereby increase the availability of affordable capital for a borrower – third-party entities may establish a pool of funds (a loan loss reserve) that are available to ensure repayment of a loan. In the case of nonpayment, a loan loss reserve can be drawn upon to limit losses for the lender. In Michigan, Michigan Saves is the most notable example of the deployment of a loan loss reserve. Michigan Saves utilizes its loan loss reserve to induce lenders to provide unsecured financing at rates that would otherwise not be possible. A loan loss reserve may cover all or a portion of losses. It can also be designed to exist in a first loss position, wherein the loan loss reserve is drawn on until it is expended and then the principal loan is drawn on, or to cover a percentage of the losses (e.g., 25% of any losses will be covered by the loan loss reserve). A loan loss reserve allows funders to have a greater impact per dollar spent and reduce risk to the lender. As is the case with any credit enhancement, a philanthropic funder choosing this tool would be supplementing capital provided from another entity and would need to make sure the loan loss reserve is attractive to such an entity, and provides additional benefits to the borrower.

²⁴ State and Local Energy Efficiency Action Network. U.S. Department of Energy/U.S. Environmental Protection Agency. “Credit Enhancement Overview Guide.” January 2014. Available at:

https://www.energy.gov/sites/prod/files/2014/06/f16/credit_enhancement_guide.pdf.

²⁵ U.S. Office for Energy Efficiency and Renewable Energy. Available at: <https://www.energy.gov/eere/slscc/credit-enhancements>.

Loan guarantee

A loan guarantee is similar to a loan loss reserve, but typically covers the entire value of a project and is typically a backing with the full faith and credit of the guaranteeing entity. A philanthropic funder may choose to establish a loan guarantee under certain circumstances, but this can be a risky proposition. Typically, a loan guarantee is provided by governmental entities, such as the U.S. Department of Energy or the U.S. Department of Agriculture. Due to the trustworthiness and financial resources of such institutions, they would not necessarily need to set aside funds as in a loan loss reserve arrangement.

Co-investment/concessionary debt

Co-investment and concessionary debt involves a subordinated/senior capital structure with two or more pools of capital. The senior capital is typically the private capital with higher return requirements and lower risk tolerance. The subordinated or concessionary capital is typically more flexible and is often provided by government, philanthropic funds, or impact investment funds. Subordinated capital can be designed to reduce interest rate, reduce risk, or both. Concessionary or subordinated debt will typically be structured to be in the first loss position. This means, typically, that the senior capital provider will not lose any money until the entirety of the subordinated debt has been lost. Concessionary or subordinated capital can also be offered at a lower interest rate. By offering the lower interest rate and blending the capital, the senior capital receives its required return while the borrower receives a lower interest rate.

Equity

For most customer-sited solar projects, an equity investor is not necessary. Financing can usually cover the entirety of the cost of a solar project or the customer will invest their own equity in the form of a down payment. Equity investment requires higher returns, so is not an ideal fit in a market where margins are thin and poor project economics are a limiting factor. However, certain customer-sited solar projects can see significantly improved economics from the use of equity for tax purposes. This can allow for the capturing of various tax incentives for properties like municipalities, schools, or nonprofits that do not have tax liability or for small commercial properties that may not have sufficient tax liability.

Power Purchase Agreements

A PPA allows for a third-party to finance and own a customer-sited solar system and for the third-party to sell the power generated from the solar project to the site

host. The premise behind a PPA is that by shifting the ownership of an energy system away from the end customer, the overall costs for the project can be reduced by allowing for the monetization of tax benefits for projects and reducing or removing upfront costs. By creating a long-term agreement for the end customer to purchase the power generated from any given system, the customer has the ability to plan for predictable electricity costs for years to come. The potential benefits of a PPA include:

- No maintenance for the customer
- Ability for system owner to sell renewable energy credits
- Ability to lower upfront costs for customer
- Ability to maintain constant electricity rates for customer
- Ability to minimize tax burden

A market rate PPA, for the reasons listed above, may provide sufficient benefits that it provides a funding solution. It is also possible that the PPA may still require additional manipulation to be an economically attractive solution for use in the market. A PPA typically has two key capital contributions: tax equity (or in some cases simply equity), and debt. To influence pricing for a PPA and make it beneficial to customers, a funder could participate with a lower tax equity or equity return requirement, or a lower debt return requirement, or provide a grant to reduce the overall cost of the project.

Case Studies

Below are a variety of case studies from Michigan and midwestern states that highlight one or more of the funding strategies identified above.

Solar for Good Initiative²⁶

Summary: The Solar for Good Initiative, run by Renew Wisconsin, aims to provide grants to nonprofits and houses of worship across the state of Wisconsin. With a strong focus on education and community, the Solar for Good initiative has proven to be a successful means of deploying solar infrastructure throughout Wisconsin.

- **Goods granted:** The Solar for Good initiative has offered two different forms of assistance to eligible recipients, though only one is currently available. The Solar for Good initiative began by offering Technical Assistance Grant ranging from \$250-\$500. These grants were intended to help prospective consumers perform property assessments in preparation for solar installation. The initiative also provided grants covering up to 20% of the project costs, which proved successful in deploying solar, though some nonprofits still found funding the projects challenging. In 2019 the initiative shifted focused away from monetary grants and toward their second form of assistance. The second, is providing an in-kind contribution of physical solar panels. Depending on the size of the project, recipients are eligible to receive up to 150 panels representing a value of roughly \$20,000. Additional infrastructure and labor are not included in this grant. Currently, Solar for Good only grants physical solar panels.
- **Funding source:** The Solar for Good initiative partners with a private donor as well as the Couillard Solar Foundation and the First Unitarian Society of Madison to fund monetary grants and in-kind contributions of solar panels.
- **Applicant qualification:** Potential recipients are encouraged to submit an application during one of Solar for Good's application acceptance periods. Recipients must be a nonprofit organization located in Wisconsin and serving the people of Wisconsin. Applicants are expected to provide a proposal from a solar project contractor. Recipients must also be able to cover all costs associated with the project and have a suitable location for the installation.
- **Project implementation:** At the start, Solar for Good worked with a single donor and offered funding for 20% of a project's cost. The chosen nonprofit was expected to provide the final 80% of the project's costs as a way to ensure project success and interest. A grant making foundation was created to manage this new structure. In the spring of 2019, the donor made the

²⁶ Solar for Good. Available at: <https://www.renewwisconsin.org/solarforgood/>.

decision to purchase a bulk supply of solar panels. The grant structure was then altered to provide physical solar panels instead of funding.

Under the in-kind structure following application approval, a contractor is able to work with Solar for Good to coordinate the shipment and delivery of the panels to the project location. The nonprofit is responsible for the shipping costs. All future costs are handled by the nonprofit as they now maintain ownership of the panels. Upon acceptance of the grant, the nonprofit organization also agrees to engage in community education and outreach.

- **Lessons learned:**

- Recipient Selection: By having potential recipients proactively apply and, once selected, cover a portion of project costs, Solar for Good ensured a higher project completion rate.
- Donated Goods: By supplying physical solar panels, Solar for Good acted as a matching grant for the other funding sources. More importantly, by directly donating the panels, the final project cost was decreased because a profit margin was not required on the cost of the panels.
- Structure: By creating a grant making foundation, Solar for Good could more efficiently distribute panels and funds, providing tax benefits for other funders that may choose to participate.
- Additional Costs: By purchasing a bulk quantity of solar panels, Solar for Good took on the additional costs of storage, maintenance, and risk of technological obsolescence. Additionally, this unique structure may deter contractors who prefer to provide solar panels.

SolarYpsi²⁷

Summary: In 2014, Dave Strenski, the founder of SolarYpsi, received a call from a prospective donor. The donor indicated that they were interested in making a donation in the form of a grant that was to be used for solar projects in Ypsilanti, Michigan. Given that SolarYpsi is not a 501(c)3 corporation, they were not able to take a direct donation without significant tax implications. Instead, SolarYpsi and the donor worked with local nonprofits to fund available projects.

- **Funding source:** Grant from anonymous donor made directly to project site host.

²⁷ Background on SolarYpsi case study from <https://www.ases.org/anonymous-donor-funds-six-solar-installations/>. Additional information available at <http://www.solarypsi.org/>.

- **Applicant qualification:** Nonprofits in Ypsilanti qualified, but there was no formal application process. Rather, projects were vetted by a volunteer and then selected by a donor based on preference.
- **Project implementation:** SolarYpsi compiled a list of potential nonprofits around Ypsilanti that expressed interest, were of a certain size, had a roof that was in good condition, and were visible to the public. The donor reviewed the list and chose six projects to fund. An RFP was put out to local contractors to perform all six installations with maximum cost that a bid could not exceed. These requirements allowed the donor to take advantage of economies of scale and ensure that all costs to the nonprofit would be covered. It also provided a certain amount of control to the donor before making a direct donation to each of the nonprofits in the amount that was predetermined with the RFP. Finally, the individual nonprofits were instructed to contact the chosen contractor to create an individual contract and schedule installation.
- **Lessons learned:**
 - Donated services: By donating their services, SolarYpsi was able to act as a mediator between the donor, the contractor and the nonprofits and did so at no cost to any party. Every dollar went towards the solar project.
 - Local focus: All of the projects were located in Ypsilanti, allowing for local relationships to come into play and for one installer to secure all six of the projects, reducing the cost.
 - Tax benefits: While SolarYpsi was not a 501c3, the donor was able to capture tax deductions because each site host was a 501c3.
 - Economies of scale: By selecting one contractor to install all projects, SolarYpsi was able to achieve economies of scale and keep the cost per watt of installation low.
 - Not to exceed RFP: By requiring the contractor not to exceed their RFP bid, the donor could give grants to the nonprofits in the exact amount needed to pay for their project and keep costs down.
 - Community participation: By carefully compiling a list of potential nonprofits, the installed solar projects were guaranteed to be viewed and enjoyed by the community.
 - Replicability: Given the reliance on volunteer work and the artificially low pricing that is forced by the bid pricing requirements, this model may face challenges being replicated in other places.

Michigan Saves²⁸

Summary: Michigan Saves is a “Green Bank” that works to provide and improve affordable energy infrastructure for Michigan customers by providing funding solutions that leverage loans, grants, and credit enhancements. Michigan Saves manages and runs on-bill financing programs in certain territories and – most notably – operates a loan loss reserve that allows lenders to provide unsecured loans at competitive interest rates, increasing access to financing for customers across Michigan, with particular success in the residential sector, but with successful coverage of other customers segments as well.

- **Applicant qualification:** Depending on the location of the customer, the private lending organization will vary. Michigan Saves does not have a geographic screen and has partner financial institutions all over Michigan. Qualifying measures are maintained on the Michigan Energy Measures Database maintained with oversight from the Michigan Public Service Commission. This list includes, but is not limited to, solar energy. Customers qualify based on credit score and project size loan size, with various fixed rates and term lengths available. These rates range from 4.49% APR-7.9% APR, term lengths range from 60 to 180 months, and the required credit scores range from 600-720.²⁹
- **Funding Source:** Michigan Saves leverages its loan loss reserve to partner with private banks and credit unions. In most cases, Michigan Saves itself does not finance projects, but rather the private bank or credit union will lend directly to the customer and will receive access to Michigan Saves’ loan loss reserve. The loan loss reserve was originally funded through a grant from the state of Michigan and continues to receive grant funding.
- **Project implementation:** The Michigan Saves contractor network consists of contractors who have participated in a Michigan Saves training program and have passed certain quality assurance screens. Michigan Saves contractors can offer Michigan Saves loans to their customers and can be called on when customers inquire to the Michigan Saves staff. By partnering with an extensive network of contractors across the state, Michigan Saves is able to inform potential recipients about their programs.
- **Lessons learned:**
 - Recipient Selection: By supporting a network of contractors Michigan Saves is able to attract a large pool of potential recipients.
 - Services Used: By partnering with multiple lending institutions, including credit unions, Michigan Saves is able to provide local

²⁸ Michigan Saves. Available at: <https://michigansaves.org/>.

²⁹ *Ibid.*

financing to recipients across Michigan and ensure ample access to capital and no bottlenecks in the process.

- Program Structure: By utilizing a loan loss reserve Michigan Saves secures better lending terms for its customers.
- Other Considerations: Michigan Saves funds a breadth of energy related projects, making a database of eligible measures a valuable tool. The breadth of the qualifying projects also offers competing uses of capital for solar projects. For example, a homeowner may be forced to choose between using a Michigan Saves loan for a solar array versus a new boiler.

RE-volv³⁰

Summary: A successful example of a PPA facilitation program comes from RE-volv. RE-volv is an organization committed to engaging with community and education to bring affordable renewable energy to nonprofits.

- **Applicant qualification:** Qualification is based on status as a nonprofit and being in a jurisdiction with favorable project economics for a PPA.
- **Funding Source:** RE-volv's initial source of funding was crowdfunding. RE-volv allowed private individuals and corporations to donate to a general fund. Donors could pledge various amounts that would entitle them to associated perks. These funds were used to facilitate the initial solar projects. As consumers repaid their PPA contracts the money was recycled back into the general fund. In recent years, RE-volv has established a tax equity fund which further helps finance projects.
- **Project implementation:** This process begins either with a nonprofit reaching out to RE-volv, or through RE-volv's Solar Ambassador Program wherein college students recruit suitable nonprofits. To facilitate a PPA, RE-volv partners with a third-party contractor, Trisolaris. The PPA is structured on a \$0 down, 20-year fixed rate schedule. Trisolaris provides the upfront capital and owns the project for 5 years. Over this time, Trisolaris collects the PPA payments and associated tax benefits all while contracting with the nonprofit to provide the clean energy. After 5 years, once the tax benefits have been fully realized by Trisolaris, ownership of the project is transferred to RE-volv which assumes the role that Trisolaris had been playing. Finally, after 20 years, ownership of the project is transferred to the nonprofit and repayments are completed. Generally, for a PPA to be attractive the payments must be less than the utility costs that it is displacing.

³⁰ Background on RE-volv case study from <https://www.cesa.org/wp-content/uploads/Solar-with-Justice.pdf>. Additional information available at <https://www.re-volv.org/>.

- **Lessons learned:**

- PPA Benefits: By using a structured PPA, recipients are able to avoid initial costs, accurately predict long-term energy payments and have a third-party care for operations and maintenance.
- Structure: By using a donor-funded revolving fund, RE-volv is able to continuously raise capital and also recycle capital as their lease or PPA is repaid.
- Community Focus: By putting a strong emphasis on education and community, RE-Volv is able attract project applicants and leverage solar projects to increase knowledge in communities across the country where RE-volv projects are sited.

Recommendations

Michigan’s solar market is vibrant, but is still developing. There are challenges to the widespread and rapid adoption needed to push Michigan’s pace of carbon reduction faster than is envisioned in the plans of utilities and government institutions. Michigan’s solar market is currently limited by policy decisions, customer awareness, project economics, and in some cases a lack of funding. While policy changes are outside the scope of this report, certain policy actions may contribute to or alleviate challenging project economics.

While this report identified a number of overarching lessons, the following were of particular note and were substantiated repeatedly through interviews and desk research:

- Project economics are a challenge for solar developers, property owners, and funders, particularly for nonprofits and schools.
- Michigan has a variety of valuable and successful funding programs, but certain gaps persist. In particular, there are few, if any, programs dedicated specifically to solar.
- Funding programs that do exist are largely operating in siloes or in competition. There is an opportunity to combine and leverage programs for maximum impact.
- Out of state investors, funders, and lenders do not generally see Michigan as an attractive market.
- Simplicity is important for customers and installers.
- If a product is not filling a need, a new funding tool may go unused.

The recommendations below focus on funding strategies that can address challenging project economics with an eye toward successful customer-sited solar project deployment.

Option 1: Enabling PPAs for nonprofits and schools in Michigan

Summary: A funder could provide concessionary debt – as discussed earlier in the report – to enable PPAs for Michigan nonprofits and schools to pursue solar.

- **Qualifying properties:** Michigan nonprofits and schools. Physical building qualifications (such as roof size and shading) would be determined by the solar developer and financial qualifications would be determined in partnership with private finance partners.
- **Funding source(s):** The philanthropic funder would provide a loan to cover a portion of the overall project cost. Once fully levered, the loan would likely

account for between 20% and 40% of the overall funding for the project. Private investors, tax equity investors, and other lenders would provide the remaining capital.

- **Implementation:** A philanthropic funder would need to work with partners – in particular the financial partners in the transaction – to develop a replicable financial product that would be used in the market. To deploy the product, working with outreach partners and solar developers will be necessary.

Further explanation: A PPA in this context would be a mechanism where a third party pays for and owns the solar system on the roof of a building – in this case a nonprofit – and the nonprofit buys the electricity at a predetermined rate over the life of the project. While this allows a nonprofit to access the investment tax credit, it does not solve all of the challenges for nonprofit properties. In Michigan, many solar systems for nonprofits still would not make economic sense even with access to a PPA, in large part because of low electricity costs and low compensation rates for electricity sent back to the grid. When factoring in the return requirements for a typical PPA provider, there is a differential between what a nonprofit in Michigan can often afford and the return that a PPA provider needs. Because other markets (in other states) offer the required return that a PPA provider needs, no private investors are currently offering PPAs in Michigan, other than one-off projects under special circumstances.

A philanthropic funder can help address this gap through participation in a PPA, making a project cost-effective for both the customer and the investor. A typical PPA establishes a special purpose entity (SPE) to own a solar project and then the customer contracts with that SPE. The SPE, which is typically an LLC, is funded through contributions of tax equity/equity and debt.

In conversations with a variety of PPA providers, the need for philanthropic capital to be a catalyst has become clear. As described, PPA providers currently cannot provide the required returns for equity investors and lenders given current market conditions in Michigan. This presents pricing concerns and, because of thin project economics, risk concerns. A philanthropic funder provide a low-interest loan to the SPE. Priced appropriately, this low-interest loan would make the economics of a project work. Such a loan could also be structured in a way to reduce risk for the other investors, by having the philanthropic funder take the first loss position in the transaction.

Solar developers in Michigan have expressed a desire for a PPA product to serve nonprofits and schools. Private market PPA providers have identified the need for a debt contribution accounting for a portion of the overall debt invested in an SPE (20%, for example) with the debt priced below market (3%, for example) though exact details and pricing would need to be developed with industry and expert input. With the right design, private PPA providers have indicated that PPAs would be cost effective in Michigan.

Option 2: Solar grant program for nonprofits and schools

Summary: A funder could create a dedicated fund for solar at nonprofits and schools, recruiting additional donors to leverage further funds.

- **Qualifying properties:** Michigan nonprofits and schools. Applicants would need to provide proof of additional funds, such as 80% of the funds necessary, to qualify for the grant.
- **Funding source(s):** The grant funding would be provided by a combination of philanthropic funds, individual donations, and corporate donations continually raised each year for a certain period of time (e.g., 5 years). Each individual grant would cover a proportion of the project costs. The funding could also be raised to create an endowed fund that would be sustained over time.
- **Implementation:** A funder interested in this approach would reach out to other interested funders – some of which were identified in interviews for this report – to secure commitments for further funds. Foundationally, a 501c3 fund or fiscal sponsor would be needed so that additional donors would be able to provide funds classified as charitable contributions. Deploying the product can be done via contractors, existing state partners, and others.

Further explanation: Building from the Solar for Good case study and the SolarYpsi case study described above, a funder could create a dedicated grant program for solar for nonprofits and schools. Such a program could provide options to reduce project costs for such properties pursuing solar, while also offering a simple donation option for philanthropic funders, individual donors, and private companies. Such a grant program could be managed by a nonprofit such as Groundwork Center or be housed at a community foundation such as the Community Foundation of Southeast Michigan. It could also be a ready vehicle for companies interested in donating to solar projects in Michigan. For example, members of the Michigan Energy Innovation Business Council have expressed an

interest in contributing to a solar grant program and solar developers have expressed an interest in using such a fund.

Option 3: Leverage existing programs to expand solar options for farmers

Summary: A funder could combine an existing grantmaking program for solar projects at farms, such as that managed by Crosshatch, with an existing lending program, such as that provided by Michigan Saves. The result would be a more attractive option for other donors, resulting in better leveraging of private funds and broader reach to more farmers.

- **Qualifying properties:** Agricultural properties throughout the state of Michigan. Properties would qualify for the grant as part of an application for a loan such as through Michigan Saves.
- **Funding source(s):** Grant funding from philanthropic funders paired with a loan program such as Michigan Saves. An appropriate percentage of project costs would be identified in partnership with solar developers, the loan program, and property owners.
- **Implementation:** Expand upon existing grantmaking programs by formalizing through a fiscal sponsor or new 501c3 so that additional donors can receive tax deductions for donations. Pair grants with loan financing for farmers. This will provide farmers with the additional capital needed to complete projects as well as allow for the grant program to reach a broader network, for example through the Michigan Saves contractor network and brand.

Further explanation: Farmers throughout Michigan can benefit from installing solar, but barriers around cost and access to funding have presented additional barriers. There is an existing solar grantmaking program run by Crosshatch and funded by a philanthropic funder. The program provides donations to farmers for solar installations on an ad hoc basis. Formalizing this program by creating a tax-deductible structure will attract other funders, increasing the available funding. Additionally, the funder could reach more farms by partnering with existing loan programs like those provided by Michigan Saves.

Conclusion

The above options are preliminary recommendations with significant optionality in design. Below are key questions for further consideration and to aid in evaluating the above recommendations:

- **Site host:** Who is the site-host? Where will the project be located?
- **Off-taker:** Who is the off-taker (user) of the energy?
- **Structure:** What is the structure of the finance mechanism? What does it require to be successful?
- **Marketing:** How do you attract subscribers/participants to a new financial program offering?
- **Ownership:** Who will own the solar system? Who will own the Renewable Energy Credits (RECs)?
- **Repayment:** Does the funding need to be repaid?
- **Return:** Is there a need or expectation of a specific level of return on investment?
- **Access restrictions:** Are there restrictions on who or what entity can access the funding?
- **Selection:** How will recipients be selected? What will the responsibilities of the recipient be?
- **Flow of Funds:** How will the capital be transferred?
- **Funding sources:** What other funding sources can be leveraged?
- **Partners:** What partners can provide services to improve a program, such as market, vetting of projects, or some other benefit?
- **Fundamental problems:** What problems exist in this work that are not fixable via financing or funding options?
- **Technology:** Should solar adjacent technologies, such as battery storage, be considered?

As this report highlights, there are clear opportunities for philanthropic funders to support the further deployment of customer-sited solar in Michigan. Providing such funding – whether in the form of grants, loans, credit enhancements, or some combination – will benefit solar developers, solar customers, and finance providers. In addition to presenting a clear opportunity to support the customer-sited solar market, such use of funds also offers philanthropic funders the opportunity to accelerate the transition to renewable energy beyond current government and private sector commitments.