

November 2013



LOCAL LENDING FOR SOLAR PV: A GUIDE FOR LOCAL GOVERNMENTS SEEKING TO ENGAGE FINANCIAL INSTITUTIONS



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ACKNOWLEDGEMENTS

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About Meister Consultants Group, Inc.

Meister Consultants Group, Inc. (MCG) is an international sustainability consulting firm based in Boston specializing in renewable energy policy, energy efficiency, climate adaptation, corporate sustainability and international green growth. MCG is a member of the SunShot Solar Outreach Partnership (SolarOPs), a U.S. Department of Energy funded program designed to help accelerate solar energy adoption on the local level by providing timely and actionable information to local governments. In this capacity, MCG has engaged thousands of municipal officials, planners, utility officials and others at over two dozen national and regional workshops across the country. MCG also provides customized technical assistance to local governments working to streamline and standardize permitting processes, improve planning and zoning codes and regulations, and expand access to financing options for solar technologies.

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This material is supported by the following team of organizations: ICLEI-USA; International City/County Management Association (ICMA); Solar Electric Power Association (SEPA); Interstate Renewable Energy Council, Inc. (IREC); North Carolina Solar Center (NCSC); Meister Consultants Group, Inc. (MCG); The Solar Foundation (TSF); American Planning Association (APA); and National Association of Regional Councils (NARC).

This material is based upon work supported by the U.S. Department of Energy under Award Number DE-EE0003525.

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ACRONYMS

Annual Percentage Rate (APR)
Department of Energy (DOE)
Department of Housing and Urban Development (HUD)
Energy Efficient Mortgages (EEM)
Environmental Protection Agency (EPA)
Federal Energy Regulatory Commission (FERC)
Federal Housing Authority (FHA)
Feed-in tariff (FIT)
Gainesville Regional Utilities (GRU)
Home energy rating system (HERS)
Home equity line of credit (HELOC)
International Electro-technical Commission (IEC)
Investment Tax Credit (ITC)
Kilowatt (KW)
Megawatt (MW)
Megawatt-hours (MWh)
Modified Accelerated Cost Recovery System (MACRS)
Pennsylvania Keystone Home Energy Loan Program (HELP)
Power Purchase Agreements (PPAs)
Photovoltaic (PV)
Renewable Energy Certificates (RECs)
Renewable Portfolio Standard (RPS)
Solar Renewable Energy Certificates (SRECs)
Terawatt-hours (TWh)
Underwriters Laboratories (UL)
Veterans Administration (VA)

1. INTRODUCTION

There is a growing opportunity for residents and small businesses to save money and mitigate the risks of fluctuating energy prices through the installation of on-site solar photovoltaic (PV) systems. However, the associated high upfront equipment and labor costs can prohibit more widespread adoption of the technology. Lending institutions have a significant opportunity to provide competitive debt financing options that offset this upfront cost and make solar installations accessible to a wider customer base. While some local and regional banks have in recent years taken advantage of this market by launching lending programs for small and medium-sized solar PV projects, most markets across the country are still largely underserved. A recent survey of 22 lending institutions in Massachusetts (the sixth largest U.S. state in terms of PV installation capacity) found that while the market has grown to over \$475 million invested in solar installations in 2012, only 36% of the surveyed lenders had provided solar project debt financing (Solar Energy Industries Association, 2013a). Of these 22 lenders, 17 listed unfamiliarity with the benefits and risks of the technology as a major barrier to lending, including uncertainty around how to value and structure a loan for a solar installation and stated a lack of understanding of the expected system performance.

The market opportunity for residential and small commercial solar PV projects presents an opportunity for not only local lending institutions but for local governments as well. Communities can benefit from the economic development and job creation that coincides with a growing solar market. The US solar market was valued at almost \$12 billion in 2012 and accounted for over 119,000 jobs (Solar Energy Industries Association, 2013b) (The Solar Foundation, 2012). A vast majority of these jobs have been created close to where solar projects are being developed. To the extent that local lending institutions can play a role in financing solar PV development, communities can capture the maximum economic value from the growing solar market.

Local governments are therefore in a unique position to engage local lending institutions on the solar opportunity. Governments can offer education and resources on solar PV technology and best practices for building financial models. Additionally, governments can facilitate programs that connect these institutions to customers in the community. This guide has six sections and aims to assist local governments in engaging lending institutions on financing residential and small commercial solar PV projects.

- Section 2 of the guide offers a broad summary of the current solar PV industry landscape in the U.S.
- Section 3 makes the case for solar lending and discusses how local ownership can maximize the economic value created through solar PV development.
- Section 4 reviews different financing options for residential and small commercial solar installations.
- Section 5 provides examples of federal, state and local level solar lending programs and case studies of lending institutions that have implemented solar loan programs.
- Section 6 outlines actionable next steps for local governments interested in expanding the availability of debt financing for solar projects in their community.

2. UNDERSTANDING SOLAR MARKET TRENDS

Spurred by steep declines in solar panel prices and favorable regulatory policies in a number of leading states, the U.S. residential and commercial solar market has grown substantially over the past five years. In 2012 the U.S. market grew by 76% and the total installed solar PV capacity exceeded 7.2 GW (Solar Energy Industries Association, 2013a). It is estimated that more than \$7.3 billion was invested in residential and commercial solar projects in the U.S. in 2012 and that an additional \$54 billion will be needed to finance new projects from 2013 to 2017 (GreenTech Solar, 2013).

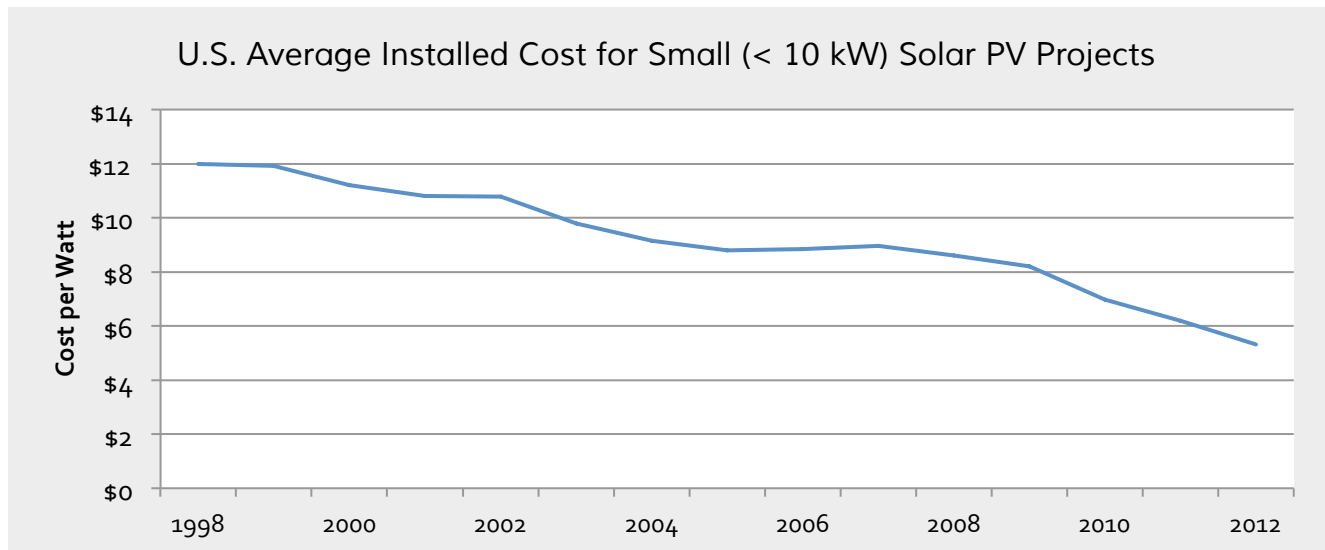


Figure 1: The U.S. average installed cost for small (< 10 kW) solar PV installations. (Barbose, Darghouth, Weaver, & Wisser, 2013)

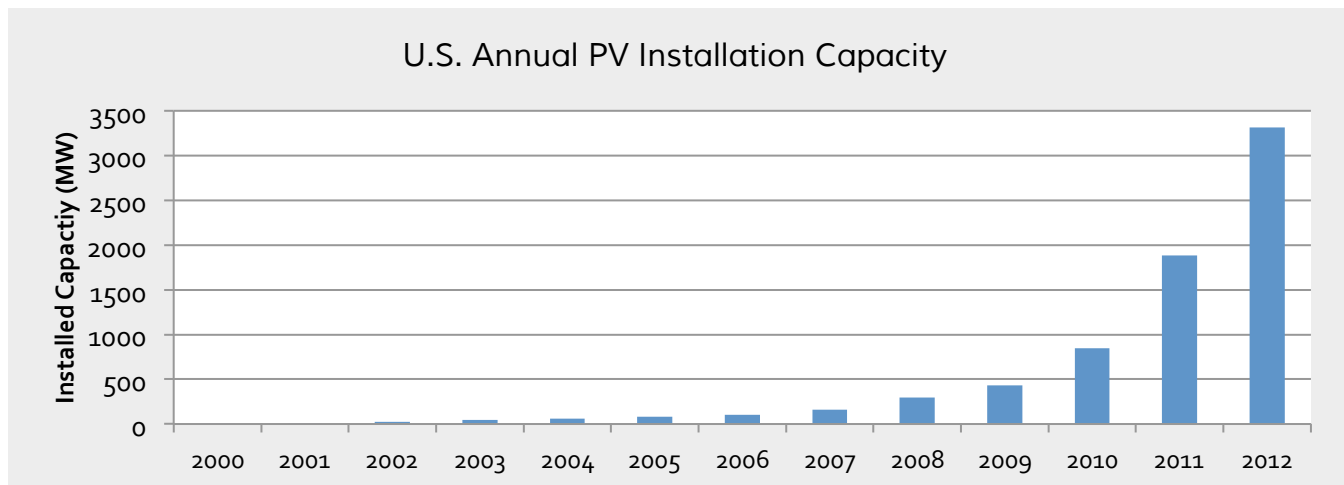


Figure 2: Annual PV installation capacity (MW) in the U.S. (Solar Energy Industries Association, 2013b)

In many communities, solar installations are now commonplace. Attracted to favorable project economics, residents and businesses are installing rooftop solar systems as a long-term, predictable investment. See Appendix A for details on how federal, state and municipal policies have shaped the solar market.

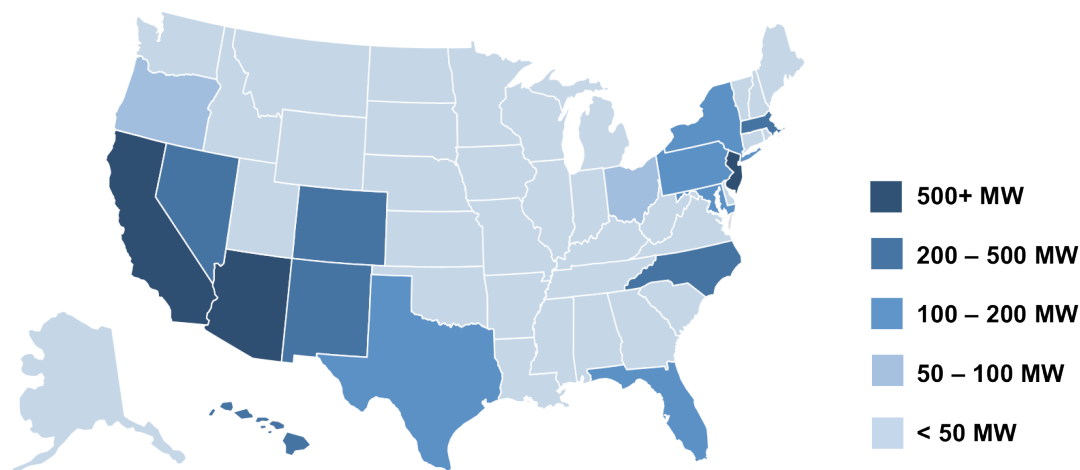


Figure 3: Total PV Installation Capacity (MW) by state in 2012 (Sherwood, 2013)

As illustrated in Figure 3, solar is being widely adopted by electricity customers across the country. States with favorable regulations and incentives tend to have stronger market demand. The rate of adoption is expected to sustain the growth trajectory demonstrated in Figure 2 as installed costs continue to decline and solar projects become increasingly financially viable. One recent study estimates that electricity generated from solar is currently cost competitive with retail electricity in 10 states and predicts that this will expand to 36 states by 2016 (Parkinson, 2013).

3. UNDERSTANDING LENDING FOR SOLAR

As development costs continue the downward trend, solar is expected to become an increasingly attractive investment option for more customers. This presents a significant financial opportunity for traditional lenders who are well positioned to serve these growing markets. Since loans for solar PV projects are similar to other debt products lenders currently provide, with a few modifications lenders can expand their offerings to finance solar PV projects and generate additional revenue for their institution. This section presents an overview of the business case for solar PV lending, including a discussion of the opportunities available for financial institutions to satisfy the growing demand for financing and of the local economic opportunity for solar PV projects.

3.1 Current Financing Landscape

Historically, residents have self-financed solar PV projects by paying in full upfront; a survey of 489 residential projects installed in 2007 and 2008 found that over 67% of those projects were cash financed (Feldman, 2011). However, in recent years, an expanding pool of interested customers has turned to alternative financing methods. These customers, aware of the compelling economic opportunity, may not have the cash available to make this investment on their own, and instead seek financing options that spread the cost burden over a more manageable payment schedule.

One such financing option that has seen significant growth in popularity is the power purchase agreement (PPA)¹ and solar lease under a third-party ownership structure. By Q4 of 2012, more than 50% of new residential solar projects were financed by third-parties in California, Colorado, and Arizona, as illustrated in Figure 4 below.

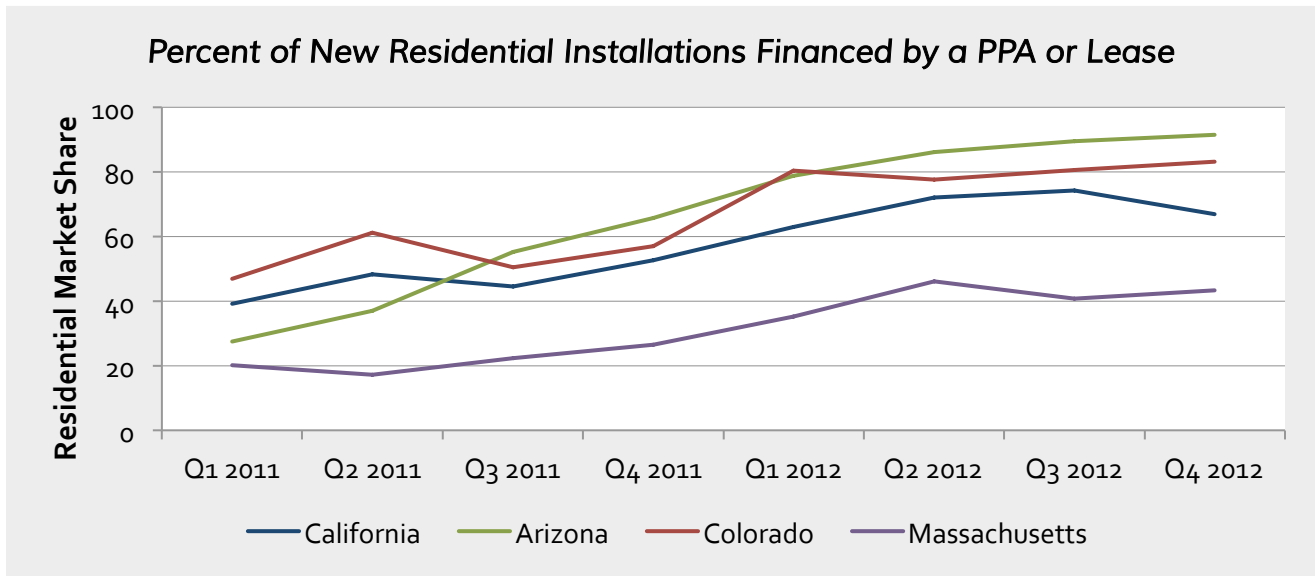


Figure 4: Percent of new residential installations financed by a PPA or lease (GreenTech Media Inc and Solar Energy Industry Association, 2013)

The growing popularity of the PPA and solar lease can be attributed to a few key advantages this financing option offers over a standard upfront cash payment. Third-party ownership spreads the payments over the life of the system (about 25 years), reducing the upfront cost barrier and making an investment in solar PV more accessible for many homeowners and business owners. Furthermore, national lease and power purchase agreement providers have simplified the adoption process by handling the complexity of procuring state and federal permits and incentives. Finally, third-party ownership structures manage the long-term operation and maintenance of the installation, integrating these costs into the lease or power purchase payments.

3.2 The Opportunity for Lenders

Even with the growth in demand for alternative financing methods that alleviate the upfront cost barrier, there are few lending institutions that offer competitive loan products focused on solar PV installations. The truSolar working group, a consortium of 16 banking and solar industry leaders developing an industry standard for project credit screening, estimates that less than 5% of the 6,500 banks in the U.S. are actively involved in financing solar PV projects (truSolar, 2013). The lack of participation in the solar market from a vast majority of U.S. banks is particularly surprising when considering the size of the market; in 2012 alone over 90,000 solar PV projects were installed across the U.S.

Lending institutions have an opportunity to offer residents and businesses similar benefits as third-party ownership providers. Like the third-party ownership model, a debt-financed project eliminates the upfront cost

¹ A PPA is a contract between a seller who generates electricity and a buyer seeking to purchase electricity. See section 4.4 for more details.

barrier by spreading the cost over a manageable payment schedule. Lenders can also simplify the process of purchasing and installing solar by partnering with trusted local solar installation companies to offer a turnkey package in which the installer manages all aspects of the installation, permitting, incentive procurement, construction, operation, and maintenance of the PV system. With a clearly defined payment schedule, lending institutions can offer a competitive solar PV loan product that makes it easy for customer to invest in the technology and enables their institution to capitalize on a growing market opportunity. A number of solar service companies, partnering with local lending institutions, are seeking to offer debt financing solutions that provide similar benefits as third-party ownership as described in Box 1 below.

Box 1: Examples of Solar Services Companies

There are several companies that offer one-stop-shop solutions for selecting, ordering, financing and installing a solar PV system. Similar to many third-party finance companies, these businesses aim to simplify the process and make it easy for consumers and businesses to own solar.

Sungage

Sungage, a Massachusetts-based solar lender, has partnered with Connecticut's green bank, the Clean Energy Finance and Investment Authority (CEFIA), to offer a consumer loan designed to finance the installation of solar electric systems on primary residences in Connecticut. The CT Solar Loan program provides homeowners with a 15-year labor and production warranty to protect their solar investment. The loan is pre-payable at any time with no penalty. Qualifying homeowners will pay 6.49% over a 15-year term. There is no limit on the loan size and no lien on the home. Upon sale of the home, the borrower may assign the loan to the new homeowner pending credit approval. Homeowners may apply for the CT Solar Loan at their convenience on-line through Sungage.

In addition, Sungage makes it easy for its customers to install and finance solar by working with an approved list of installers, relying on tools and partners to help its customers decide whether it makes financial sense to own solar. Sungage also provides support to owners throughout the life of their PV system by sending reminders to ensure that the owner takes advantage of available tax incentives (Sungage, 2013).

Sun Valley Solar Solutions²

Since March 2006 Sun Valley Solar Solutions has been providing its customers a complete solar solutions package that includes product options, installation and financing. Focused on the Arizona market, the company has strategic partnerships to deliver its services: EnerBank USA offers two loan options for customers who purchase Bosch or SunPower panels (EnerBank USA) (Sun Valley Solar Solutions, 2012).

² Disclaimer: Loans provided by EnerBank USA (1245 Brickyard Rd. Suite 600, Salt Lake City, UT 84106) on approved credit, for a limited time. 12 Month Same-As-Cash Loans repayment terms vary from 24 to 132 months. Interest waived if repaid in 365 days. 16.75% fixed APR, effective as of February 2013, subject to change. 12- year loan repayment term is 144 months. 2.99% fixed APR, effective as of February 2013, subject to change. The first monthly payment will be due 30 days after the loan closes.

12 Month Same-As-Cash Flex Loan

Some customers can pay for their solar system once they receive the federal and state solar tax credit. However, the tax credit is only received after the owner files their taxes (i.e. after the PV system is purchased, installed and commissioned). For many customers, this lag time between buying the solar installation and receiving the tax credits can be a major barrier to purchasing a solar system. The Same-As-Cash Flex loan is an equity bridge loan for customers who need financing to cover the tax credit gap. As a hypothetical example, a homeowner may want to purchase a \$30,000 system, which could be eligible for a \$9,000 tax credit. If the homeowner has only \$21,000 cash then he or she can borrow \$9,000 through Sun Valley Solar Solutions and EnerBank. The borrower can use the federal and state government tax credit to pay back the loan interest free and without a prepayment penalty within 365 days. If the borrower is unable to repay the loan within 365 days then the balance must be paid off at a 16.75% fixed APR with additional retroactive interest, within two to eleven years.

12 Year 2.99% Reduced Interest Combo Loan

The combo loan combines the Same-As-Cash option, a 365-day interest free loan, with a separate low-interest loan at a fixed APR of 2.99% for the balance of the system costs not covered by the tax credits and utility incentives (rebates). The combo loan has a loan tenor³ of up to twelve years. It also allows participation in federal and state tax credits and does not have a prepayment penalty. This financing option is for customers who may need more time to repay their loan and therefore can benefit from a lower interest rate. This loan option could also be for Arizona customers who expect their tax credit to be paid back over multiple years. Sun Valley Solar Solutions typically adds a small premium to the purchase price of the solar panels (about \$0.10 per Watt) to customers who receive the combo loan to cover the additional cost of the low interest capital.

3.3 Understanding Solar Lending

Lending institutions will find this market familiar as it closely mirrors other investment opportunities that carry high upfront costs such as a property mortgage or car loan. From the perspective of the lending institution, a solar PV project can be viewed in the same category as other property improvements. Unlike other more traditional home improvements, however, a customer with a solar PV installation can use the electricity produced by the system in lieu of purchasing electricity from the utility to satisfy their energy needs, generating long-term savings. In addition, many state governments, local governments, and utilities offer performance-based incentives, which are granted on a continual basis as the customer generates electricity from the solar facility. These incentives create an additional revenue stream, improving the customer's return on investment.⁴ In more and more markets this combination of savings and revenue can fully cover the loan repayment costs. A cash flow analysis for a hypothetical residential solar installation in Boston, Massachusetts in Box 2 below

³ Loan tenor is the amount of time left for the repayment of a loan or contract or the initial term length of a loan. Tenor can be expressed in years, months or days.

⁴ Solar Renewable Energy Certificates (SRECs) are a common example of a performance-based incentive. More information on SRECs can be found in Appendix B section B.2.2.

illustrates an example of how electricity cost savings and revenue from incentives can fully cover the debt service and interest payments for a solar loan.

Box 2: Residential Solar Cash Flow Case Study

A hypothetical 5 kW residential solar installation in Boston, Massachusetts with an upfront cost of \$17,500 before rebates and incentives⁵ can be expected to offset more than \$900 of a home’s annual electricity demand for the life of the system. If a lender were to debt finance this installation through a loan with a 20-year term and 5% interest rate, the homeowner is expected to see a net cumulative cash flow of over \$27,500 in year 25. Compare this to the alternative scenario where purchasing the same electricity from the utility will result in a net loss of over \$28,000 over the same 25 year period. Figure 4 below shows the estimated cumulative cash flows for both financing scenarios (see Appendix B for assumptions).

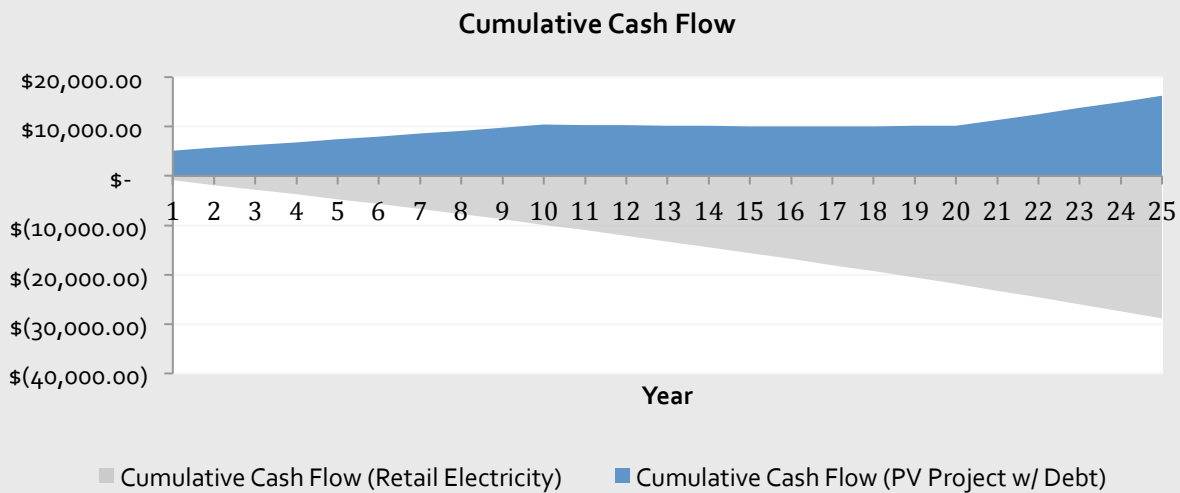


Figure 5: Cash flow analysis for hypothetical 5 kW residential installation in Massachusetts

As illustrated in the cash flow analysis, the upfront federal and state tax incentives combined with the annual electricity savings and incentives exceed the cost of the debt payments, result in positive cash flow for the customer.

Because a solar PV system creates immediate savings, financing institutions may consider loans for these types of projects to have a lower risk profile than other lending opportunities. The savings or additional income enables the customer-generator to more easily service their debt, differentiating the customer from other types of residential loans that may not produce a direct savings or revenue stream.

⁵ The incentives included in the analysis were Massachusetts Solar Renewable Energy Certificates (SRECs), the Commonwealth Solar II rebate, the Federal Tax Incentive, and the State Tax Incentive. More details can be found in Appendix A.

3.4 Community Benefits from Local Lending

The solar market is growing at a rapid pace, with the value of solar installations in the U.S. rising from \$6 billion in 2010 to \$11.5 billion in 2012 (Solar Energy Industries Association, 2013b). This market expansion has resulted in over 119,000 jobs in the solar industry in 2012 (The Solar Foundation, 2012). Much of this value and job creation is concentrated in regions where solar is installed and financed, providing local governments with a substantial opportunity for economic development. It is therefore in the best interest of municipal governments to lower barriers of adoption when possible in order to drive the growth of their local solar market. With limited financing options currently available for many residential and small business customers, local governments should consider working with community lending institutions to offer competitive financing options for solar PV projects. Additionally, by financing more projects with capital from local banks and credit unions, a local government can maximize the economic and job creation benefits in their market. Section 5 of this report expands on ways local governments have collaborated with community lending institutions to facilitate the availability of solar PV financing.

4. CURRENT FINANCING OPTIONS

Depending on the size, type, and risk profile associated with a project, there are a number of different methods used to finance solar PV installations in the U.S. This section covers the typical financing options available for residential and small business solar PV projects, including cash, home equity loans, unsecured loans, and third-party financing. Section 5.1 provides some examples of federal mortgage programs that encourage lending for solar PV.

4.1 Cash

The simplest method of financing a solar installation is through a direct upfront purchase. In this case, the project is paid in full at the time of commissioning and there are no long-term financial obligations. Assuming the household has the cash available, paying for the entire project upfront is the cheapest way to finance the project and returns the most value for the investment. However, given that a typical small-scale solar installation can cost in the range of \$10,000 to \$30,000 before incentives, this may not be an option for many households. Furthermore, a customer with available resources may still want to consider using outside investment to finance a solar PV installation if they need to invest their own capital elsewhere.

4.2 Home Equity Loans

Homeowners that are not able to, or choose not to, purchase the system with an upfront payment can consider financing the system through a home equity loan or a home equity line of credit. Under a home equity loan, a household can take out a second mortgage or refinance, using the capital to cover the cost of installation. With a low cost of capital and a fixed rate, a home equity loan can be a competitive option for homeowners and compatible with the project life and expected returns of a residential solar PV project. The fixed rate structure of many home equity loans not only allows debt to be stretched out across the lifetime of the system but also ensures predictable payments for project cash-flow analyses. However, this financing option is not readily available to many borrowers and may involve a complex process to secure. A household will likely need a high credit score and have enough available equity in their home to qualify for a refinance or second mortgage, and

fewer households are eligible today as a result of the 2009 housing crisis and new, more stringent lending standards.

Homeowners can also finance a solar PV system through a home equity line of credit (HELOC), which is a revolving line of credit in which the home serves as collateral. A HELOC functions similar to a credit card—a homeowner may withdraw the money as needed, up to a pre-approved credit limit, and pay back the debt over a specified time period (The City of Pasadena, 2013). The bank calculates the credit limit by taking a percentage of the home's appraised value and subtracting the balance owed on the existing mortgage. A HELOC is typically used to finance traditional home improvement projects, and like a home equity loan they can offer competitive rates. Unlike a home equity loan, however, the interest rate is often variable, introducing additional risk and uncertainty about the expected return on investment.

4.3 Unsecured Loans

An unsecured loan, a loan product not collateralized by a lien or other specific assets and often called a personal or consumer loan, may be an option for customers who do not qualify for secured loan products. An unsecured loan is a riskier financing option for lenders because they have limited recourse in the event of default. To compensate for this risk, lenders will often require higher returns, resulting in higher interest rates than a secured loan. Unsecured loans are available from traditional retail banks, solar product manufacturers, and specialized renewable energy home improvement bank lending programs. Section 5.1 discusses some examples of federally sponsored loan program offered through the U.S. Department of Housing and Urban Development available to lenders.

4.4 Third-Party Ownership

Homeowners or small businesses that decide they do not want the responsibilities associated with the ownership of a solar installation may consider a third-party ownership structure.⁶ Under this arrangement, the third-party will design, finance, install, own, and operate an installation located on the residential or small business property. The customer can contract with the third-party either through a lease agreement, where the system host pays a monthly fee for access to the electricity generated from the installation, or through a power purchase agreement, where the customer purchases the output generated at a predetermined rate. This ownership structure has become increasingly popular in recent years, particularly because the third-party provides upfront financing that covers the installation costs. Additionally, third-party ownership is lower risk and is less complex than many of the direct ownership financing options.

4.5 Considerations for Homeowners and Small Businesses

Homeowners and small businesses have a wide range of options available to them when financing an on-site solar PV installation. The decision process is driven by a number of factors, including risk appetite, cash availability, cost of capital, discount rate, state and local incentives and policies, and tax appetite, among others. Customers that have a low risk appetite and minimal available cash may choose to go for the third-party ownership option, despite the involvement of an additional entity that shares the financial benefits of the

⁶ It is important to note that third-party ownership structures are not allowed in every state due to regulatory hurdles in defining what types of electricity sale arrangements fall under the purview of utility regulation. See the Database of State Incentives for Renewable & Efficiency website (<http://www.dsireusa.org>) to find out whether third-party ownership is allowed in your state.

system. Customers that have available capital or access to debt financing may elect to wholly own the system, taking advantage of all available benefits but also assuming the risks associated with ownership. The direct ownership model in many cases may ultimately be more cost effective over the life of the system than the third-party ownership option, as the third-party developer typically requires a higher return on their investment than a customer paying cash or a lender.⁷ The direct ownership model may also be the only option for customers that live in states that do not currently support third-party ownership. Understanding these considerations is critical for lenders interested in entering the small-scale solar market to ensure that their products meet the needs of their target customers.

5. EXAMPLES OF NATIONAL AND LOCAL SOLAR FINANCING PROGRAMS⁸

Residential solar PV financing programs are emerging across the U.S. From the federal level to the local level, there are an increasing number of agencies and lending institutions offering financing products tailored to the residential solar market. In some communities, state or local governments are partnering directly with local banks and credit unions to offer a range of financing options for residential solar PV. In other instances, local banks and credit unions are recognizing the business opportunity of solar PV and are independently developing solar loan programs or offering federally supported lending products to finance residential solar PV.

The first section of this chapter details federal loan and insurance programs that support lending for residential solar. The second section provides examples of local governments partnering with local lending institutions to offer low cost financing for residential solar PV. The third section presents examples of solar loan programs lending institutions have developed to reduce the financial barriers and scale-up the deployment of residential solar PV. The last section provides an example of a State led initiative to develop a residential solar loan program. Finally, Table 3 provides a summary of these different approaches.

5.1 U.S. Federal Financing Programs Supporting Residential Solar PV

U.S. federal government agencies including the Federal Housing Authority, the Veterans Administration, Fannie Mae, Freddie Mac, the Department of Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA) offer several lending and insurance products that can be used to finance residential

⁷ A third-party ownership structure will typically include a direct equity investor who will typically have a hurdle rate between 12-15% and a will also include a tax equity investor (to monetize tax incentives) that may require up to a 16% return on their investment. These high return-on-investment requirements can add a significant cost to the project, reducing the value passed onto the customer. Compare this to a debt-financed project, where the investor typically can be expected to have a hurdle rate closer to 7-8% and a customer with sufficient tax liability can directly monetize the tax incentives (Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., 2012). One analysis looking at residential solar installations in Arizona estimates that a third-party lease can add up to \$0.25 per watt onto the installed cost (Lacey, Trabish, & Wesoff, Portraits of a Maturing Solar Market: How Key States Are Faring, 2013). Another analysis from NREL found that financing related transaction costs and indirect corporate costs can add on average between \$0.77 - \$0.82 per watt to the installed project cost (Friedman, Ardani, Feldman, Citron, & Margolis, 2013).

⁸ All of the loans described in this section are subject to customer credit approval. The rates listed in this section are effective as of July 2013.

solar PV. These products include the *Energy Efficient Mortgage*, the *Energy Improvement Mortgage*, the *HUD Title I Improvement Loan*, the *HUD PowerSaver Program* and the *EPA Energy Star Mortgage*. Local lending institutions can apply to participate in these programs and once approved can offer these options to qualified customers interested in home energy improvements. The following section details these lending products.

5.1.1 Energy Efficient Mortgages

An *Energy Efficient Mortgage (EEM)* helps homebuyers or homeowners finance the cost of a home that is energy efficient, or can be made efficient through energy-saving improvements as part of a home purchase or refinance. The U.S. federal government supports *EEMs* by insuring them through the Federal Housing Authority (FHA), the Veterans Administration (VA) and the conventional secondary mortgage market through Fannie Mae (Database of State Incentives for Renewable and Efficiency (DSIRE)). While Freddie Mac does not have a formal *EEM* program, it allows lenders to take the projected savings from home upgrades into account when setting the loan amount (Stinson, 2009). *EEMs* provide borrowers the opportunity to finance cost-effective, energy saving measures, including solar PV systems, as part of a first mortgage and stretch debt-to-income qualifying ratios on loans thereby allowing borrowers to qualify for a larger loan amount and a newer, more energy-efficient home. Homeowners can also use an *EEM* to finance energy improvements to an existing home during a refinance. The savings from the energy efficiency upgrades must offset any increase in mortgage payments as a result of the larger mortgage loan. Homeowners can also take advantage of the *FHA EEM* when refinancing or remodeling their current home. The *FHA EEM* can also be used in conjunction with FHA section 203(b), 203 (k), 221 (d) (2), 234 (c), and 203 (h) loans for both purchases and refinances (U.S. Department of Housing and Urban Development, 2013a).

The cost of the energy upgrades that are eligible for financing will depend on the government agency insuring the mortgage. In order to be included in the mortgage, the energy efficient improvements must be cost effective.⁹ The cost of the energy improvements and estimate of the energy savings are determined by a home energy rating system (HERS). The cost of the energy rating report and inspection may be financed as part of the cost effective package. The energy improvements are usually made after the loan closes. The lender places the money in an escrow account and the funds are released to the borrower after an inspection verifies the improvements were made (U.S. Department of Housing and Urban Development, 2013a).

The maximum amount of the mortgage varies and is based on income, outstanding debts, the value of the home, and the borrower's credit history. Mortgage lenders approved by the FHA and VA can offer *EEMs* to homeowners and homebuyers as a 15 or 30 year fixed rate mortgage or as an adjustable rate mortgage. The interest rate will vary depending on the lender, product and term. A list of approved FHA and VA mortgage lenders by state can be accessed through the Department of Housing and Urban Development's (HUD) website. The *EEM* is created separately from the primary mortgage, but is ultimately rolled into the primary mortgage allowing the homeowner to make one monthly payment (Database of State Incentives for Renewable and Efficiency (DSIRE)).

While residential solar PV installations may be covered under an *EEM*, it is not guaranteed. HERS determines the eligible energy improvements. If installing a solar PV system is not recommended as a cost-effective

⁹ Cost effective is defined as the total cost of the improvements, including maintenance costs, is less than the value of the energy savings for the energy improvements over their useful life.

improvement, then it will not be covered under the *EEM*. Additionally, depending on the *EEM*, it will likely only cover a portion of the total cost of a home PV system.¹⁰ Moreover, *EEMs* can be difficult for homeowners or homebuyers to access. *EEMs* tend to require more paperwork and processing time and are more difficult to sell into the secondary mortgage market, and as a result many lenders are reluctant to offer them. Additionally, borrowers rarely know about or request *EEMs* and real estate agents are frequently unfamiliar with them (Stinson, 2009). Thus, there may be significant potential for banks, credit unions, and mortgage lenders to create solar specific mortgage products to tap the growing residential solar market.

For more information visit:

http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r

5.1.2 Energy Improvement Mortgage

Fannie Mae offers an *Energy Improvement Mortgage (EIM)* that helps finance upgrades to an existing home through a purchase or refinance. To qualify for an *EIM* a home must be a single-family residence and must undergo a home energy rating systems by an energy rater. The recommended energy improvements must be cost effective of up to 10% of the value of the home. The appraiser is responsible for determining the “as completed” value of the home based upon the energy improvements that will be made. This amount is subject to standard Fannie Mae LTV, CLV and HCLTV ratios. The cost of the home energy rating can be included in the cost of the energy improvements. The energy improvements are usually made after the loan closes. The lender places the money in an escrow account and the funds are released to the borrower after the appraiser verifies the energy improvements that were financed were completed (RESNET- Residential Energy Services Network, 2011).

For more information visit: <https://www.fanniemae.com/content/announcement/sel1015.pdf>

5.1.3 HUD Title 1 Home Improvement Loan

Approved *HUD Title 1* lenders can issue loans to finance small to moderate improvements to single family homes, manufactured houses, and multi-family structures. This program reduces the risk for financial institutions to make loans on property improvements by insuring them against losses incurred on qualifying energy efficiency and solar loans. The *Title 1* program offers secured and unsecured options. The maximum loan amount and terms vary depending on the type of home. For a single family home, the maximum loan amount is \$25,000 and the maximum loan term is 20 years. The interest rate is fixed and is generally based on the most common market rate¹¹ in the area; however this is negotiable between the lender and the borrower and may vary between lenders. Any loan over \$7,500 must be secured by a mortgage or a deed of trust on the property. There is no loan prepayment penalty in this program. HUD provides a list of approved Title I lenders in each state (U.S. Department of Housing and Urban Development, 2013b).

¹⁰ The FHA program allows homebuyers and homeowners to finance energy efficiency improvements by adding up to 5% of the property value, 115% of the median area price of a single family dwelling or 150% of the Freddie Mac conforming loan limit to the mortgage amount; The VA may finance up to \$3,000 in upgrades based solely on documentation of improvement costs or up to \$6,000 if the improvements are projected to produce more savings than the cost of the upgrades.¹⁰

¹¹ The market rate is the average interest rate on a loan product being offered by lenders in a specific area.

For more information visit: http://www.hud.gov/offices/hsg/sfh/title/ti_about.cfm

5.1.4 HUD FHA PowerSaver Program

PowerSaver is a new insurance program from the FHA providing federal loan insurance and other incentives to participating lenders to deliver low-cost home energy improvement loans to single-family homeowners. Homeowners can borrow up to \$25,000 for terms of 15 years (up to 20 years for certain improvements) from participating lenders to make proven home energy improvements of their choice based on a list developed by FHA and the U.S. DOE. The list includes energy efficiency improvement and renewable energy options such as solar PV and geothermal systems (U.S. Department of Housing and Urban Development, 2011a).

Loan interest rates are between 5-7% and are secured by a mortgage or deed on the home that is subordinate to any existing first mortgage. The FHA backs the loans with federal mortgage insurance covering up to 90% of the loan amount in the event of default. Lenders maintain the remaining risk on each loan. The FHA selects participating lenders who are required to target markets that have already taken steps to expand home energy improvements. Homeowners must meet specific criteria in order to qualify for a *PowerSaver* loan including a minimum credit score of 660 and a maximum total debt to income ratio of 45%. The combined loan to value ratio (first mortgage loan balance & *PowerSaver*) must not exceed 100% (U.S. Department of Housing and Urban Development, 2011b).

The pilot program was started in May 2011 and will extend through May 4, 2015 (Federal Register, 2013). It overcomes some of the limitations of the traditional *FHA EEMs* by allowing homeowners to choose the energy improvements that best meet their needs. While FHA encourages consumers to utilize an energy audit to determine the most cost effect improvements for their home, they are not required (U.S. Department of Housing and Urban Development, 2011a).

For information please see the U.S. Department of Housing and Urban Development press release from April 21, 2011¹² or the *PowerSaver* Fact Sheet.¹³

5.1.5 Environmental Protection Agency: Energy Star Mortgages

The Environmental Protection Agency (EPA) launched the *ENERGY STAR Mortgage*, designed to work with lenders to provide financing for buyers of Energy Star Certified homes. The loans offer homebuyers the opportunity to purchase homes with mortgages 10% to 24% higher than they would have qualified for otherwise (Hessler, 2013).

To qualify for financing, the home must be either ENERGY STAR Certified, undergo a Home Performance with ENERGY STAR assessment and improvement process that yields at least a 20% total energy savings, or achieve at least 20% total energy savings via participation in a Weatherization Assistance Program. Properties must be a single-family home and owner-occupied. The mortgage amount is capped at the Fannie Mae and Freddie Mac maximum. Qualified upgrades include measures that increase energy efficiency 30% above code and the installation of solar thermal and solar PV systems. The interest rate tends to be a market rate with discounts available for *ENERGY STAR Mortgages*. The program is currently underway in Maine and Colorado and the EPA

¹² http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2011/HUDNo.11-062

¹³ <http://portal.hud.gov/hudportal/documents/huddoc?id=FHAPowerSaverFactSheet.pdf>

is working to expand the program to Massachusetts, New York, New Jersey, Pennsylvania, and the District of Columbia (ENERGY STAR, 2013).

For more information visit: http://www.energystar.gov/index.cfm?c=mortgages.energystar_mortgages

5.2 Local Government and Lending Institution Solar Financing Programs

There are numerous examples of local governments partnering with local banks to provide customers with low-cost financing for residential solar PV systems. For local banks, this partnership provides an opportunity to build stronger ties with local government and reach a wider range of customers growing their overall business. This section provides several examples of emerging partnership models between local governments and lending institutions. These different approaches are also summarized in Table 3.

5.2.1 Milwaukee Shines Program

The City of Milwaukee, Wisconsin partnered with Summit Credit Union to create *Milwaukee Shines* a special loan program for city residents. With a \$2 million budget, the program offers eligible customers up to \$20,000 at a low-interest fixed rate with flexible terms. Rates could be as low as the prime rate plus 2.0% for a term of up to 15 years or the prime rate plus 1.25% for a term of up to 5 years. An important feature of the financing agreement is that there are no penalties for early payment, no fees, and a down payment is not required. The loan is also unsecured and therefore does not require a lien on the property. However, if the home is sold before the loan is paid off, the seller is still responsible for paying down the remaining balance of the loan.

Homeowners of an owner-occupied single-family residence or a multi-family residence (up to 3 units) are eligible for the program as long as they reside in the City of Milwaukee and are current on their property tax payments. Homeowners must also meet Summit Credit Union's specific loan underwriting criteria and obtain City approval for the project.

Milwaukee Shines financing can be applied to solar electric systems up to 6 kW and solar hot water systems of 1-8 panels in size. Eligible expenses include all equipment, labor, permits, and interconnection fees, as well as structural re-enforcement and re-roofing expenses, if needed. Along with standard qualifying conditions to obtain a loan, customers financing a project through *Milwaukee Shines* financing must have the system installed by a solar installer approved by Focus on Energy, the statewide energy efficiency and renewable energy resource program managed by Wisconsin's utilities (City of Milwaukee) (Summit Credit Union, 2013).

5.2.2 Austin Energy Power Saver™ Program

The eighth largest community-owned public electric utility in the U.S., Austin Energy, has an exclusive partnership with Velocity Credit Union to offer their customers current market interest rate loans to install solar PV systems. Under the *Power Saver™ Program*, single-family residences in Austin, Texas are eligible for up to \$20,000 of financing, either secured or unsecured depending on their credit, with up to a 10-year tenor. There are no fees and borrowers will only pay closing costs greater than \$400. The program does not penalize customers for prepayment or require a lien if the loan is less than \$15,000. Solar installers can participate in the

program as long as they meet specific criteria outlined by the *Power Saver™ Program* (Austin Energy, 2013) (Velocity Credit Union) (Database of State Incentives for Renewables and Efficiency (DSIRE), 2012).¹⁴

5.2.3 Solarize Programs in Massachusetts, Connecticut, and North Carolina

Group purchasing programs, often branded as Solarize programs, have gained popularity in the past few years for accelerating local solar market growth and driving installation prices down by as much as 40% (Utah Clean Energy). Under such a model, a lead organizer usually selects a single solar developer through a competitive bidding process for the purchase and installation of solar equipment for residents or business owners within a community. The lead organizer then arranges a limited time registration period, during which community members commit to participate in the program. The bulk purchase of solar systems allows the community to take advantage of economies of scale and realize cost-savings in the procurement and installation of solar systems. Furthermore, by engaging the entire community at once, Solarize programs offer a “safety in numbers” to community members and have been shown to reduce the sales cycle from one-year to 3-6 months (Irvine, Sawyer, & Grove, 2012).

Admirals Bank, a Boston based bank active in lending for residential solar projects, has partnered with local governments and non-profits administering Solarize programs in Connecticut, Massachusetts and North Carolina to provide financing options for participants. In 2012, Admirals was selected as the financier for the Solarize Connecticut - Durham Pilot Project. Admirals worked with the selected installer, BeFree Solar, to provide financing for Solarize participants. BeFree Solar referred customers to Admirals Bank. Admirals worked with homeowners to put together a loan package that allowed customers to participate in the program and purchase the system. The availability of residential financing played a key role in the success of the program resulting in 117 homes participating in the program (Northeast Sustainable Energy Association, 2013). Based on the success of the program, Admirals is providing financing options for the four towns selected for the 2013 Solarize Connecticut Program including Bridgeport, Canton, Coventry and Mansfield/Windham (Energize Connecticut, 2013a).¹⁵

Admirals Bank is also a participating lender in the Solarize Massachusetts Program. In 2012, they provided financing options for 9 out of 17 towns and in 2013 they will work with Bourne, Brookline, Chelmsford and Carlisle, Lee, Medford, Medway, Newton, Northampton and Williamstown. During the outreach portion of the Solarize Massachusetts program, Admirals Bank’s Relationship Managers and Solar Financing Experts attended multiple town information sessions educating homeowners on the different solar lending products. The information sessions served as an opportunity for homeowners to gain financing information, ask questions and meet one-on-one with Bank experts. The participating installers in the 2012 Solarize Mass program also referred customers to Admirals Bank for financing advice. Admirals will continue to work with participating towns and serve as a resource to help homeowners better understand the financing options for solar ownership during the 2013 Solarize campaigns (Admirals Bank, 2012).

¹⁴ Criteria include having at least one employee with a certificate verifying they have passed the NABCEP (North American Board of Certified Energy Practitioners) test and providing a certificate of insurance listing Austin Energy as the certificate holder. Additionally, installers must maintain a certain number of continuing education hours and have the following coverage: \$500,000 combined single limit, bodily injury and property damage/\$500,000 general aggregate.

¹⁵ Information provided by discussions with Admirals Bank staff

Most recently, Admirals Bank forged a partnership with Asheville, North Carolina's Solarize program to serve as one of the lenders for participating residents. While this program is still in its early stages of development, it is scheduled to launch in late 2013.¹⁶

5.3 Local Lending Institution Solar Financing Programs

Local lending institutions such as banks, credit unions and mortgage brokers are independently developing loan products specifically tailored for residential solar PV markets. These lending products range from low-cost to high-cost financing options for a wide range of income earners. As consumer interest in residential solar PV grows, local lending institutions have an increasing opportunity to widen their reach. Lenders are beginning to recognize the significant business opportunity to increase their customer base through residential solar PV lending. This section highlights a few lending institutions that are providing local financing for residential PV systems and partnering with local governments to advertise and grow these loan programs. These loan programs are also summarized in Table 3.

5.3.1 Admirals Bank

Admirals Bank is a Boston-based bank that has been especially active in solar lending and has 25 years of experience offering *HUD's FHA Title I Home Improvement Loan* nationwide. Over the last few years, Admirals has experienced increasing demand for personal loans that can be used for purchasing residential solar PV systems. In response, in April 2013, Admirals Bank officially launched Admirals Alternatives—a new division offering financing options for residential renewable energy systems such as solar PV, where federal, state or utility credits, rebates or incentives are available. One of the major objectives of the program is to help borrowers own rather than lease solar PV systems.

The loan program is modeled after *HUD's FHA Title I Home Improvement Loan*, but finance offerings are specifically tailored to residential solar and renewable energy systems. Admirals Bank currently offers three main loan products nationwide through its Renewable Energy Lending division including the *Solar Step Down Loan*, the *Pay As You Go Loan* and the *Save Now, Pay Later Loan*. The *Solar Step Down Loan* can be combined with the *Pay As You Go Loan* or the *Save Now, Pay Later Loan* to provide up to \$40,000 in financing for residential renewable energy systems. An attractive feature of the loans is that the borrower's savings from installing the solar PV systems are almost always greater than the loan payments. The three loan products are detailed below.

Solar Step Down

The *Solar Step Down Loan* does not require equity and is a secured loan for homeowners seeking to finance renewable energy or energy efficiency home improvements such as solar PV where federal, state or utility incentives are available. The unique loan product allows qualified borrowers to direct any credits, rebates or incentives towards the principle amount of the loan. Qualifying homeowners then have 24 months to request a one-time re-amortization of the loan. The loan can be up to \$25,000 and includes no prepayment penalties (Admirals Bank, 2013b). The loan terms are flexible with 5, 7, 15 and 20-year terms available and a fixed interest rate ranging from 4.95% to 9.95%, depending on the borrower's credit score and the loan term. The loan includes origination and closing fees that are rolled into the total loan allowing the homeowner to take

¹⁶ Information provided by discussions with Admirals Bank staff.

advantage of tax deductions rather than paying for the fees out of pocket.¹⁷ Additionally, there are no seasoning requirements¹⁸ for existing homes. However, new residential structures must be completed and occupied for a minimum of 90 days. Unlike other loan products, borrowers can receive 100% of the financing before the contractor begins work. The loan is secured by a first or second position lien on the property (Admirals Bank, 2013b).

Plus I Home Improvement Loan

Qualifying *Solar Step Down* customers can borrow up to an additional \$15,000 through Admirals Bank's unsecured *Plus I Loan Program* amounting to a total loan of up to \$40,000 for home improvements.^{19,20} This program has two types of loans, described below.

- **Pay As You Go Loan:** This loan is intended for eligible homeowners making Title I qualified home improvement projects²¹ such as installing solar PV systems. This is an unsecured loan requiring no additional lien or collateral with no prepayment penalties. The loan offers interest rates of 9.99% or 11.99% based on the borrower's credit score and the term of the loan can be up to 10 years as long as it does not exceed the term of the *Solar Step Down Loan*. The borrower receives 100% of the financing upfront before the contractor begins work and monthly payments start 30 days from disbursement of the loan to the borrower (Admirals Bank, 2013a).
- **Save Now, Pay Later Loan:** This loan is a bridge loan for homeowners interested in financing home renewable energy projects. The loan recognizes that some borrowers cannot afford the entire system cost upfront but once available federal and state incentives have been paid (usually a few months later), they are quickly able to pay off the rest of their loan. After receiving the incentives, homeowners can either pay down the principal balance within 18 months interest-free or can go 18 months before making his or her first payment. If the principle balance is not paid off completely in the first 18 months from the date of disbursement, the interest rate of the loan will revert to 18.00%. All accrued interest due from the note date will be capitalized and added to the outstanding principal balance due. This loan is unsecured loan, requires no collateral and has no prepayment penalties. The borrower receives 100% of the financing upfront before the contractor begins work (Admirals Bank, 2013c).

5.3.2 Citizens Bank²²

Citizens Bank branches across the U.S. are offering two unsecured loans that are below the market interest rate²³ to help low-to-moderate income residents improve the energy efficiency of their homes and finance

¹⁷ Information provided by discussions with Admirals Bank staff.

¹⁸ Seasoning conditions usually require the homeowner to show proof of ownership of a property for a specific amount of time, such as 12 months.

¹⁹ The term of the *Plus I Loan* cannot exceed the term of the *Title I Loan* - each loan is subject to separate credit approval.

²⁰ The *Plus I Loan* program is a Bank program that is not affiliated with or sponsored by FHA.

²¹ The eligible projects include renewable home energy systems such as solar PV, roofing, siding, sunrooms, garages, basements, kitchens and bathrooms. See the HUD website for a full list of qualified projects.

²² Information on Citizens Bank loan options provided by Jamie Hart, Senior Planner, Madison County Planning Department, NY.

²³ These loans are part of housing-related programs that offer loans to qualified applicants at interest rates that are lower than prevailing market interest rates.

energy technologies such as solar PV. To be eligible, borrowers must live in a low or moderate-income neighborhood, or have income that is less than 80% of the HUD median income guidelines; however, the income amount may vary depending on the actual place of residence. Citizens Bank offers two loan products: an *Energy Efficiency Loan* and an *EZ Home Improvement Loan* through Citizen Financial Group's EnergySense initiative.

Energy Efficiency Loan

Homeowners with low or moderate income can borrow \$1,000-\$3,000, at a fixed APR of 3% with a three-year term and no fees or closing costs to finance weatherization and energy projects including solar PV installations. For larger home improvements, qualified borrowers are also eligible for a 5% APR on loans up to \$10,000, payable up to 7 years. This is an unsecured loan and therefore does not require a lien on the property. However, if the home is sold before the loan is paid off, the customer remains personally responsible for paying down the remaining balance of the loan.

EZ Home Improvement Loan

Through the *EZ Home Improvement Loan*, borrowers are eligible for a \$1,000, 3% fixed APR loan for home improvements. For a larger home improvement project, Citizens Bank offers 6% APR on loans up to \$10,000 payable up to 7 years under the same terms and conditions. This is an unsecured loan and therefore does not require a lien on the property. Similar to the *Energy Efficiency Loan*, if the home is sold before the loan is paid off, the customer remains personally responsible for paying down the remaining balance of the loan.

Local governments have partnered with Citizens Bank to offer these existing lending products to local residents interested in financing solar PV installations. For example, in 2012 the Madison County Planning Department in New York State partnered with Citizens Bank Oneonta to offer the *Energy Efficiency Loan* and *EZ Home Improvement Loan* to residents participating in the Solarize Madison program. Representatives from Citizens Bank attended the informational meetings held throughout Madison County, giving them an opportunity to present options for financing residential solar PV and for attendees to ask questions about the financing programs. The partnership helped overcome some of the financing barriers associated with residential PV programs.

5.3.3 AFC First

AFC First is a home energy improvement lender and is considered one of the nation's leading lenders in true fixed-rate residential energy-efficiency and renewable lending as well as rebate programs. AFC First has two core portfolios that are led in partnership with states, utilities, manufacturers, and municipalities and with a network of over 5,000 approved contractors (AFC First Financial Corporation, 2013c). Their first main program is the *National Energy Loan Program*, which provides fixed-rate energy efficiency loans to homeowners in all 50 states and Washington D.C. AFC also offers financing options through a number of state programs including the *Pennsylvania Keystone HELP Program*, the *Illinois On Bill Financing Program*, the *Philadelphia EnergyWorks Program*, the *Efficiency Maine Financing Program*, the *Greater Cincinnati Energy Alliance*, the *Richmond Regional Energy Alliance*, the *Connecticut Solar Lease Program* and the *Kentucky Home Performance Program* (AFC First Financial Corporation, 2013d).

AFC's partnership with the State of Pennsylvania is highlighted to provide a detailed example of how a national lender is working with state government to offer residential solar PV loans.

Pennsylvania's Keystone Home Energy Loan Program (HELP)

AFC First Financial Corporation, in partnership with the Pennsylvania Treasury, Department of Environmental Protection and Pennsylvania Housing Finance Agency, has administered *Pennsylvania's Keystone Home Energy Loan Program (HELP)* since its creation in 2005. *Keystone HELP* provides homeowners with special, low rates to improve household energy efficiency and finance energy saving upgrades such as solar PV (AFC First Financial Corporation, 2013a)

The main loan option for financing residential solar PV through the *Keystone HELP* is the *FHA PowerSaver* and *Secured Loans for Solar and Larger Energy Improvements*. HUD and DOE selected AFC First to be one of the 18 national *FHA PowerSaver* pilot lenders. The loans range from \$5,000 to \$35,000 with terms of 10, 15, or 20 years and an APR from 6.375% to 8.875% depending on the home's equity and the loan terms. The property secures the loan through a first, second or third position lien that can be up to 120% of the home's value. The loan is a true fixed-rate loan meaning the interest rate and monthly installment payments will remain the same throughout the lifetime of the loan. There are nominal closing costs, no penalty for pre-payment and 100% financing is available. Homeowners may also combine the *PowerSaver* loan with other available federal, state and utility rebates or incentives to reduce the price of the project and the total amount of the loan (AFC First Financial Corporation, 2013b)

Homeowners in Pennsylvania are eligible for the loan if they are making a qualified improvement to a 1 or 2 unit primary residence on a permanent foundation. New homeowners are also eligible for the loan. Good credit and ability to repay are required and income level requirements will depend on the program selected; however, there is no restriction on maximum household income. In general AFC requires a homeowner to have a minimum credit rating of 620, a 45% debt to income ratio and no bankruptcy within the past 2 years (AFC First Financial Corporation, 2012). Other eligibility criteria require the homeowner to work with an AFC First approved contractor (AFC First Financial Corporation, 2013b).²⁴

5.4 State Led Solar Financing Programs

State governments are also launching clean energy initiatives to make it easier for residents to finance solar PV projects. This section discusses Connecticut's residential solar lending program. A summary of the program can be found in Table 3.

5.4.1 Connecticut Solar-E Program

Through its Energize Connecticut initiative, the state of Connecticut has partnered with local lenders to develop the *Smart-E Loan Program*. *Smart-E Loans* provide long-term, low-interest financing to help homeowners invest in solar PV systems and other energy improvements. The initiative has partnered with CorePlus Federal Credit Union, Eastern Savings Bank, Ion Bank, Liberty Bank, Nutmeg Federal Credit Union, Patriot National Bank, Quinnipiac Bank and Trust, Thomaston Savings Bank and Union Savings Bank to offer the *Smart-E Loan* (Energize Connecticut, 2013b). The program assists the State in meeting its clean energy goals and provides an opportunity for local lenders to widen their reach (Energize Connecticut, 2013c).

²⁴ The contractor provides a cost estimate of the qualifying improvements, which is then submitted to AFC First. Once the work is approved, the contractor begins installation. When the work is completed to the homeowner's satisfaction, the homeowner notifies AFC First, who then pays the contractor directly. The monthly loan payments begin thirty days from when the payment is disbursed to the contractor.

To be eligible for financing, 80% of the total cost of the energy upgrades must be directly related to energy savings, with the remaining 20% of the total cost of improvements available for other energy and environment-related measures such as asbestos or lead remediation, roof repair, or ENERGY STAR appliances (Energize Connecticut, 2013c).

To participate, Connecticut residents must live in a 1-4 unit home or condominium that is individually metered, owner-occupied, and is their primary residence. Homeowners may borrow up to \$25,000 and have several options for initiating the *Smart-E Loan* process. One option is for eligible borrowers to first apply for a pre-approved *Smart-E Loans* with a participating lender before starting work with a *Smart-E* eligible contractor. Alternatively, homeowners can first sign up for a *Smart-E* eligible contractor to conduct an energy assessment that identifies the desired energy improvements and then seek pre-approval with a participating lender. The contractor then works through the *Smart-E Loan* program to ensure the improvements meet the loan eligibility requirements. The *Smart-E Loan* program outlines the terms available and the maximum interest rates allowed by the program, though some lenders may offer lower rates (Energize Connecticut, 2013c). The terms are as follows:

Loan Term and Rates				
Number of Years	5	7	10	12
Maximum Rate (varies by lender)	4.49%	4.99%	5.99%	6.99%

Table 1: Smart-E Program loan terms and rates²⁵

The Energize Connecticut initiative has partnered with a number of local banks to offer *Smart-E Loans*. A list of these banks can be found on their website at www.energizect.com.

Table 3: Summary of Financing Programs Supporting Residential Solar PV

Sponsored By	Program Name	Lender Name	Partner(s)	City and/or State	Max Loan Amount	Loan Terms	Interest Rate	Origination or Closing Fees	Secured or Unsecured	Eligibility Criteria
Summary of Federal Financing Programs Supporting Residential Solar PV										
Federal Housing Authority (FHA), Veterans Administration (VA), Fannie Mae	Energy Efficient Mortgages	Mortgage lenders approved by FHA and VA	Varies	Nationwide	Varies	Up to 30 yrs.	Varies	Varies	Varies	<ul style="list-style-type: none"> - Varies based upon lender but generally depends on income, outstanding debts, the value of the home, and the borrower's credit history - Must be used to finance an energy efficient home or a home that can be made efficient through planned improvements during purchase or refinance - The energy efficient improvements must be cost effective - Lender places the money in an escrow account and the funds are released to the borrower after an inspection verifies the improvements were made.
Sponsored By	Program Name	Lender Name	Partner(s)	City and/or State	Max Loan Amount	Loan Terms	Interest Rate	Origination or Closing Fees	Secured or Unsecured	Eligibility Criteria

Cont. Summary of Federal Financing Programs Supporting Residential Solar PV

Fannie Mae	Energy Improvement Mortgages	Mortgage lenders approved by Fannie Mae	Varies	Nationwide	Varies	Varies	Varies	Varies	Varies	<ul style="list-style-type: none"> - Must finance upgrades to an existing home through a purchase or refinance - Single-family residence - Must undergo a home energy rating systems by an energy rater. -Recommended energy improvements must be cost effective of up to 10% of the value of the home - Usually lender places funds in an escrow account and the funds are disbursed to the homeowner once the appraiser verifies the energy upgrades were made.
Department of Housing and Urban Development (HUD)	HUD Title 1 Home Improvement Loan	Mortgage lenders approved by HUD	Varies	Nationwide	Depends on home type	Depends on home type	Depends on home type	Depends on home type	Unsecured and secured loans	<ul style="list-style-type: none"> - Single family homes, manufactured houses, and multi-family structures -Financing for small to moderate home improvements
Sponsored By	Program Name	Lender Name	Partner(s)	City and/or State	Max Loan Amount	Loan Terms	Interest Rate	Origination or Closing Fees	Secured or Unsecured	Eligibility Criteria

Cont. Summary of Federal Financing Programs Supporting Residential Solar PV

HUD, FHA	HUD FHA PowerSaver Program	FHA selects participating lenders in target markets that promote home energy improvements and insures up to 90% of loan	Varies	18 approved lenders nationwide	Up to \$25,000	Up to 15 or 20 yrs.	5-7 %	Varies	Secured by mortgage or deed on residence; subordinate to any existing first mortgage	-Minimum credit score of 660 -Maximum total debt to income ratio of 45%. - Combined loan to value ratio (first mortgage loan balance & PowerSaver) must not exceed 100%
Environmental Protection Agency (EPA)	EPA Energy Star Mortgages	Participating lenders	Varies	Maine, Colorado with plans to expand to Massachusetts, New York, New Jersey, Pennsylvania, and the District of Columbia	Varies	Varies	Varies	Varies	Varies	- Home must be ENERGY STAR Certified <i>or</i> undergo a Home Performance with ENERGY STAR assessment and improvement process that yields at least a 20% total energy savings <i>or</i> achieve at least 20% total energy savings via participation in a Weatherization Assistance Program. - Single-family home and owner-occupied. - Qualified upgrades only

Sponsored By	Program Name	Lender Name	Partner(s)	City and/or State	Max Loan Amount	Loan Terms	Interest Rate	Origination or Closing Fees	Secured or Unsecured	Eligibility Criteria
Summary of Local Government and Lending Institution Solar Financing Programs										
City of Milwaukee	Milwaukee Shines Program	Summit Credit Union	Summit Credit Union	Milwaukee, WI	\$20,000	Up to 15 yrs.	As low as prime rate plus 1.25% for 5-year fixed	None	Unsecured	<ul style="list-style-type: none"> - Single family residence owner occupied - Multi family residence (up to 3 units) owner occupied - Must live in the City of Milwaukee - Real estate taxes are up to date - Meet specific loan underwriting criteria - City approves project
Austin Energy	Austin Energy PowerSaver Program	Velocity Credit Union	Velocity Credit Union	Austin, TX	\$20,000	Up to 10 yrs.	Current market interest rate	Closing fees if greater than \$400	<ul style="list-style-type: none"> - Secured or unsecured, depending on customer credit - Unsecured if loan is less than \$15,00 	<ul style="list-style-type: none"> - Must be an Austin Energy customer - Single family residence - Must be installed by a Power Saver approved installer - Solar equipment must meet the guidelines of the California Energy Commission
Summary of Local Lending Institution Solar Financing Programs										
Citizens Bank	Energy Efficiency Loan	Citizens Bank Oneida, NY	Solarize Madison, NY	Nationwide	\$1,000 - \$3,000 \$10,000	<ul style="list-style-type: none"> - Up to 3 yrs. - Up to 7 yrs. 	3%, fixed 5%, fixed	None	Unsecured	<ul style="list-style-type: none"> - Low to moderate income earners - Living in low to moderate income neighborhood - Income less than 80% of HUD median income guidelines, however may vary by location
	EZ Home Improvement Loan				\$1,000 \$10,000	<ul style="list-style-type: none"> - Up to 3 yrs. - Up to 7 yrs. 	3%, fixed 6%, fixed			

Sponsored By	Program Name	Lender Name	Partner(s)	City and/or State	Max Loan Amount	Loan Terms	Interest Rate	Origination or Closing Fees	Secured or Unsecured	Eligibility Criteria
Cont. Summary of Local Lending Institution Solar Financing Programs										
Admirals Bank	Solar Step Down	Admirals Bank	-Solarize CT: Durham -Solarize Mass: Hopkinton, Millbury, Sutton	CT: Durham Mass: Hopkinton, Millbury, Sutton	\$25,000	Up to 20 yrs.	4.95% to 9.95%, fixed	Yes, rolled into the total loan amount	Secured: lien on the property	- Homeowner is eligible for federal, state or utility incentives - Money must go directly to home improvements - New residential structures must be completed and occupied for 90 days
	Plus I Home Improvement Loan: Pay As You Go				\$15,000	Up to 10 yrs., can't exceed terms of Solar Step Down Loan	0%	None	Unsecured	- Must qualify for the Solar Step Down Loan - Must be making Title I qualified home improvements
	Plus I Home Improvement Loan: Save Now, Pay Later				\$15,000	18 months	- 0%, but must pay principle balance within first 18 mos. - If don't pay principle balance w/in 18 mos. Increases to 18.00%	None	Unsecured	- Must qualify for the Solar Step Down Loan

Sponsored By	Program Name	Lender Name	Partner(s)	City and/or State	Max Loan Amount	Loan Terms	Interest Rate	Origination or Closing Fees	Secured or Unsecured	Eligibility Criteria
Cont. Summary of Local Lending Institution Solar Financing Programs										
AFC First	Pennsylvania Keystone Home Energy Loan Program (HELP): FHA PowerSaver and Secured Loans for Solar and Larger Energy Improvements	AFC First	Pennsylvania Treasury - Department of Environmental Protection - Pennsylvania Housing Finance Agency	Pennsylvania, State Wide	\$5000 - \$35,000	10, 15, 20 yr. terms available	6.375% to 8.875%, fixed	- Origination: \$0 - Closing: \$400-\$600	Secured: lien on the property up to 120% of home's value	- Must live in Pennsylvania - Making a qualified home improvement - 1 or 2 unit primary residence on a permanent foundation - New homeowners are also eligible for the loan - Minimum credit rating of 620 - 45% debt to income ratio - No bankruptcy within the past 2 years - Use an AFC First approved contractor
Summary of State Led Solar Financing Programs										
State of Connecticut: Energize Connecticut	Smart-E Loans	Eastern Savings Bank*	Eastern Savings Bank*	Connecticut, State Wide	\$25,000	5, 7, 10, 12 yr. terms available	4.49%, 4.99%, 5.99%, 6.99%		Unsecured	- 80% of the total cost of improvements must be directly related to energy savings - 20% of the total cost of improvements can go to other energy and environment-related measures such as asbestos or lead remediation - Must live in Connecticut - Must line in a 1-4 unit home or condo that is individually metered that is owner occupied and is the primary residence. - Must use a Smart-E approved lender - Must use a Smart-E eligible contractor

*Eastern Savings Bank is one of six Connecticut lenders participating in the Smart-E Loans Program

6. WHAT LOCAL GOVERNMENTS CAN DO

As policy leaders, municipal governments can play an integral role in convening stakeholders and facilitating a dialogue with local lending institutions to develop programs and opportunities to expand the market and lower financing costs for solar PV. By investing in solar PV, promoting the technology among local home and business owners, and reducing local barriers to solar development, municipal governments can help deliver a number of benefits to residents and businesses across their region. Solar PV deployment creates local jobs and stimulates investment in the community, promotes energy security, protects the environment, and reduces emissions that contribute to air and water pollution and climate change.

6.1 Host Forums, Dialogue, and Workshops for Local Banks

Local governments have the opportunity to host or sponsor events that educate lenders on the local solar market and lending opportunities. These forums and workshops can serve as a starting point to develop alternative financing options for solar PV. Workshops help local lending institutions understand the current opportunities and barriers to solar PV financing and provide useful information regarding the technology, market, and current financing landscape. Workshops can be accompanied by webinars and other online educational portals. These forums can collect insights and feedback from the lending community on how the local government can facilitate additional lending opportunities and financing options for residents and businesses.

Well-structured dialogues can identify innovative solutions and impact-oriented action plans. Dialogue provides an opportunity for installers to discuss barriers and solutions, provide education and awareness for local lenders, and identify areas where local governments can provide incentives and policies that help meet community solar PV goals.

6.2 Support Lending Initiatives

Local governments can support private sector lending by providing a loan loss reserve or credit enhancement programs.²⁶ These programs can allow more borrowers to qualify for loans or help lenders offer more competitive rates. In addition, these programs can help underserved sectors such as small businesses or less credit-worthy borrowers qualify and participate in the solar market. Local governments can also collect and analyze data for these programs which can determine the risk associated with solar loans. This in turn helps local lenders justify offering more competitive terms or innovative lending products.

6.3 Conduct Outreach to Local Lenders and Provide Educational Materials

Local lenders may be wary to offer new solar loans if there is a lack of interest or demand from borrowers. Outreach and education can help drive demand for solar loans and therefore increase the need for lending products. Higher demand encourages additional lenders to enter the market and offer solar lending options to residents and businesses. Local governments can work with advocates, non-profits, and experts to develop educational materials on solar PV and solar lending. These can include materials such as this financing guide, local guides to permitting and interconnection processes, solar PV approval processes, and basic information

²⁶ See the U.S. Department of Energy's Guidance on Loan Loss Reserve Funds (U.S. Department of Energy, 2012).

about solar technology, its benefits and market opportunities. In addition, local governments can make available materials from local lenders and encourage residents and businesses to seek out these lenders when they are considering adopting a solar PV system.

6.4 Administer a Solarize Program

Solarize programs administered by local governments or community groups have proven to be an effective strategy to rapidly expanding a local market for residential solar projects.²⁷ The demand for residential solar projects enabled by successful Solarize programs drives the need for financing, attracting lenders to the solar market. Admirals Bank, for example, has partnered with local governments and non-profits in Connecticut, Massachusetts and North Carolina to provide financing options for Solarize program participants. For more information on how to set up a Solarize program, see the Solarize Guidebook published by the U.S. Department of Energy (Irvine, Sawyer, & Grove, 2012).

6.5 Work to Reduce Soft-Costs and Facilitate a Streamlined Permitting Process

Soft costs—including permitting, interconnection, customer acquisition and installation labor—currently account for almost half of the total cost of installing a residential PV system (Residential, Commer, 2012). Local governments have jurisdiction over a number of processes that contribute to soft costs and thus can help reduce soft costs in a number of ways. By addressing these soft costs local governments can lower barriers to adoption, further expanding the market opportunity for local lenders. Local governments should work to find ways to:

- Streamline and standardize permitting processes;
- Create solar friendly zoning and planning policies;
- Facilitate interconnection best practices with the local utility;
- Implement group purchasing or Solarize programs; and
- Create local training programs for installers.

An in-depth discussion of these soft-cost reduction strategies is beyond the scope of this report. These topics are covered in more comprehensive detail in the *Solar Powering Your Community Guidebook*,²⁸ and in the resources available at www.solaroutreach.org

²⁷ See section 5.1.3 for more details on the Solarize model

²⁸ Solar Powering Your Community: A Guide for Local Governments. U.S. Department of Energy, Energy Efficiency and Renewable Energy. Second Edition. January 2011. Available at:

http://www4.eere.energy.gov/solar/sunshot/resource_center/sites/default/files/solar-powering-your-community-guide-for-local-governments.pdf

APPENDIX A

A. MARKET/POLICY DRIVERS

With high costs and complexity of the electricity market being significant barriers to solar PV development, the growth of the market is reliant on incentives and policies that make it easier for customers and investors to recoup their investment. While the federal government has implemented important incentives, the size of a market is largely driven by state and local government policy, particularly when defining how rooftop and small-scale distributed solar projects integrate with large privately owned utilities. This section provides an overview of current federal solar policies and offers examples of standard policies that state and local governments have implemented to enable healthy solar markets.

A.1 Federal Solar Policy

There are several different policy measures at the federal level to support investment in solar power in the U.S. The section below provides an overview of the most important measures, including the Solar Investment Tax Credit (ITC), the Modified Accelerated Cost Recovery System (MACRS), and the Loan Guarantee Program.

A.1.1 Solar Investment Tax Credit

The Solar Investment Tax Credit (ITC)²⁹ is a 30% tax credit for solar systems both on residential and commercial properties. Extended in 2008, the ITC will remain in effect until the 31st December 2016. The extension of the ITC until 2016 has provided significantly more market certainty than the solar industry had previously, and has helped fuel competition, technological innovation and the emergence of new business models. For instance, this includes models that make use of the tax incentives through various forms of partnerships and third-party ownership arrangements. While other policies have played a significant role, the ITC is one of the most important federal policy mechanisms to support the deployment of solar energy in the United States.

A.1.2 Modified Accelerated Cost Recovery System

Established in 1986, the Modified Accelerated Cost Recovery System (MACRS)³⁰ is a method of depreciation in which a business' investments in specified property are recovered, for tax purposes, over a certain time period through annual deductions. Under MACRS, the accounting period over which the depreciation of the asset occurs is shortened, enabling solar projects to depreciate on a 5-year schedule. In turn, this reduces tax liability and increases the rate of return on solar investments. In the case of equipment on which the ITC has been claimed, the owner must reduce the project's depreciable basis by one-half the value of the ITC. This means that 85% of their tax basis can be deducted. MACRS has been a stable part of the solar financing landscape in the US, and contributes directly to increasing the attractiveness of solar investments.

²⁹ See 26 USC § 48 for statute

³⁰ See 26 USC § 168 for statute

A.1.3 Loan Guarantee Program

Through the Loan Guarantee Program³¹, the U.S. Department of Energy provides a guarantee on the debt of privately-held energy generation and manufacturing projects, guaranteeing to a private lender that in the case of the company's default on a loan related to the project, the government will repay the outstanding balance. The Loan Guarantee Program therefore facilitates access to low-cost, long-term financing for large solar energy projects.

A.2 Typical State Solar Policies

In addition to the various federal measures described above, a number of U.S. states have introduced complementary policies and measures to support the development of solar power, including the Renewable Portfolio Standard (RPS), Solar Renewable Energy Certificates (SRECs), net metering, feed-in tariffs (aka CLEAN contracts), and interconnection standards.

A.2.1 Renewable Portfolio Standard

The Renewable Portfolio Standard requires electricity suppliers (or load-serving entities) to increase the share of renewable energy in their overall supply mix over time. This is typically based on a percentage of supply, and applies primarily to investor-owned utilities, though public utilities, municipal utilities (munis) and cooperatives are sometimes included. Percentages generally range between 10% and 25% by 2020, or by 2025, and increasingly, they include carve-outs for particular technologies, such as solar PV. RPS policies are widely used at the state level in the U.S.: as of 2012, 29 states and the District of Columbia have implemented binding RPS targets, while an additional 7 states have adopted non-binding targets.

A.2.2 Solar Renewable Energy Certificates

In conjunction with the RPS targets, many states have introduced tradable renewable energy certificates (RECs): certified RE generators earn certificates for every Megawatt-hour of electricity produced and can sell these together with their electricity to supply companies, or separately as an unbundled product. Some states have also introduced special Solar Renewable Energy Certificates (SRECs). SRECs exist in states that have RPS legislation with specific requirements for solar energy through a "solar carve-out." The additional income received from selling SRECs increases the economic value of a solar investment and can assist with the financing of solar technology. Together with state and federal incentives, solar system owners can recover their investment in solar by selling their SRECs through an SREC aggregator, spot market sales or long-term sales. Certificates are ultimately intended to be retired by utilities and provided to a regulatory body to demonstrate compliance with the renewable energy targets.

A.2.3 Net Metering

Net metering is a billing mechanism that credits commercial and residential solar energy system owners for the electricity they feed into to the grid. During the day, most solar customers produce more electricity than they consume—net metering allows them to feed that power to the grid and receive a credit on their electric bills. Generally the credits are valued at the utility's retail rates allowing customers that produce as much or more energy they produce to zero out their electric bill. Rules vary widely about how much power can be exported, whether it can be banked and for how long, whether two separate meters are required, and what the purchase price is for any excess. Broadly speaking, net metering increases demand for solar energy systems by providing

³¹ See Department of Energy 10 CFR-609 for regulation

access to the grid, and enabling homeowners as well as business-owners to install systems on their homes and businesses. Many U.S. states have passed net metering laws while in some cases where state regulations do not exist, utilities have chosen to offer net metering programs voluntarily. While the designs vary widely, net metering policies have proven very important in enabling small and medium-scale solar power development in the U.S. in recent years.

A.2.4 Feed-in Tariffs

Feed-in Tariffs (also called Performance-Based Incentives or CLEAN contracts) (FITs) are a policy mechanism that offers long-term, performance-based contracts to renewable energy producers. The purchase prices are typically based on the cost of generation, based on the resource potential in a given geographic area, and are structured like standardized power purchase agreements (PPAs). California's FIT allows eligible customer-generators to enter into 10-, 15- or 20-year standard contracts with their utilities to sell the electricity produced by small renewable energy systems (up to 3 megawatts (MW)); other states with FITs, or FIT-like policies, include Maine, Hawai'i, Rhode Island, Oregon, California and Vermont. FITs have proved very effective around the world at driving renewable energy market growth by creating stable conditions for investment by offering bankable long-term contracts for electricity production. While the policy designs have been limited in the U.S., FITs remain a growing part of the policy landscape.

A.2.5 Interconnection Standards

Interconnection standards specify the technical, legal and procedural requirements that customers and utilities must abide by when a customer seeks to connect a renewable-energy system to the grid. In the U.S., states may regulate the interconnection of electricity-generating systems to distribution systems, while the Federal Energy Regulatory Commission (FERC) regulates the interconnection of systems to interstate transmission lines.

More than 30 U.S. states have adopted comprehensive interconnection standards that apply to customer-sited systems. Around 10 other states have adopted standards or guidelines that only apply to smaller, net-metered systems. For example, Virginia has adopted two separate sets of interconnection standards – one for net-metered systems (applying to residential systems up to 10 kW and commercial systems up to 500 kW), and one for systems that are not net-metered. Clear, transparent interconnection standards are essential to facilitating a scale-up in solar investments – they also help reduce administrative and other related costs.

A.3 Example Municipal Solar Policies

Some municipalities complement the above support policies by introducing additional measures to support solar power. These include municipal utility feed-in tariffs, solar tax exemptions, community solar projects, and expedited solar permitting.

A.3.1 Municipal Utility Feed-in Tariffs

Since 2009, Gainesville Regional Utilities (GRU) in Florida offers a feed-in tariff (FIT) specifically for solar photovoltaic (PV) systems. GRU purchases energy from qualified PV systems via a standard offer contract at predetermined rates for a period of 20 years. The program is limited to 4MW per year, and is available to all residents of Gainesville. Similar policies have recently been launched in Los Angeles, California, throughout the

Long Island Power Authority territory, in River Falls, Wisconsin, and in Austin and San Antonio, Texas among others.

A.3.2 Solar Tax Exemptions

Solar tax exemptions include both property and sales tax exemptions provided by state and local governments to individuals and companies that install solar energy property. For tax purposes, businesses and homeowners may exclude the added value of a solar system from the valuation of their property. Additionally, some states have granted local taxing authorities the option of allowing a property tax incentive for solar. There are 38 states in the U.S. that offer property tax exemptions for renewable energy.

APPENDIX B

B. CASH FLOW ANALYSIS ASSUMPTIONS

The following tables outline the assumptions used for the cash flow analysis found in Box 1 of this report.

Table A1: System overview

System Size	5 kW
\$/Watt Cost	\$3.50
Total Installed Cost	\$17,500

Table A2: Incentives

Federal Investment Tax Credit	30% of Project Cost
State Tax Credit	\$1,000
Commonwealth Solar Rebate	\$0.80 per Watt
Renewable Energy Certificates (RECs)	\$200 per MWh
Total Upfront Incentives	\$10,245
10 Year REC Revenue	\$11,750

Table A3: Electricity rate assumptions

Electricity rate	\$0.15
Annual rate increase	3%

Table A4: Loan assumptions

Loan amount	\$17,500
Annual interest rate	5%
Loan term	20 years

BIBLIOGRAPHY

- Admirals Bank. (2012, July 20). *Admirals Bank to Sponsor Local Educational Events for Solarize Massachusetts Program*. Retrieved July 2013, from Admirals Bank: <http://www.admiralsbank.com/news/press-releases/Admirals-Bank-to-Sponsor-Local-Educational-Events-for-Solarize-Massachusetts-Program>
- Admirals Bank. (2013a). *Renewable Energy Lending- Loan Programs: Plus 1 Pay As You Go Loan*. Retrieved July 2013, from Admirals Bank: <https://www.admiralsbank.com/renewable-energy-lending/for-homeowners/plus-one-pay-as-you-go>
- Admirals Bank. (2013b). *Renewable Energy Lending- Loan Programs: Solar Step Down*. Retrieved July 2013, from Admirals Bank: <http://www.admiralsbank.com/renewable-energy-lending/loan-programs/solar-step-down>
- Admirals Bank. (2013c). *Renewable Energy Lending- Loan Programs: Plus 1 Save Now Pay Later Loan*. Retrieved July 2013, from Admirals Bank: <https://www.admiralsbank.com/renewable-energy-lending/for-homeowners/plus-one-save-now-pay-later>
- AFC First Financial Corporation. (2012, 10 07). *Special Energy Works Energy Efficiency Home Improvement Financing In Southeastern Pennsylvania*. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=oCC8QFjAA&url=http%3A%2F%2Fwww.keystonehelp.com%2Fthemes%2Fsite_themes%2Fkeystonehelp%2Fpdfs%2FKeystone_HELP_Energyworks_100712.pptx&ei=XLrIUa7lIOP-4APtmoGQDg&usg=AFQjCNEMfDMdqKP-
- AFC First Financial Corporation. (2013a). *Keystone HELP*. Retrieved July 2013, from Keystone HELP: Home Energy Loan Program: <http://www.keystonehelp.com/info/financing-programs>
- AFC First Financial Corporation. (2013b). *True Fixed Rate Financing for Energy Efficient Solar*. Retrieved July 2013, from Keystone HELP: Home Energy Loan Program: <http://www.keystonehelp.com/info/statewide-solar>
- AFC First Financial Corporation. (2013c, June 1). *AFC First and Direct Learning Systems Launch Online Green Energy Training Academy™ with Home Performance 101 Course*. Allentown, PA, US. Retrieved from http://www.afcfirst.com/themes/site_themes/keystonehelp/pdfs/Geta-release.pdf
- AFC First Financial Corporation. (2013d). *History*. Retrieved July 2013, from AFC First Financial Corporation: <http://www.afcfirst.com/info/history>

- Austin Energy. (2013). *Power Saver™ Program Solar Photovoltaics—Loans*. Retrieved July 2013, from Austinenergy.com- Energy Efficiency: <http://www.austinenergy.com/Energy%20Efficiency/Programs/Loans/Residential/Solar/index.htm>
- Barbose, G., Darghouth, N., Weaver, S., & Wiser, R. (2013). *Tracking the Sun VI: An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2012*. Lawrence Berkely National Laboratory.
- City of Milwaukee. (n.d.). *Milwaukee Shines Solar Financing*. Retrieved 2013, from City of Milwaukee: Milwaukee Shines for a Sustainable Future: <http://city.milwaukee.gov/SolarLoans>
- Database of State Incentives for Renewable and Efficiency (DSIRE). (n.d.). *Federal Incentives for Renewable Energy and Energy Efficiency*. Retrieved July 2013, from Energy Efficient Mortgages: http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US36F
- Database of State Incentives for Renewables and Efficiency (DSIRE). (2012, May 3). *Texas Incentives/Policies for Renewable Energy: Austin Energy - Residential Solar Loan Program*. Retrieved 2013, from DSIRE: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TX140F&re=1&ee=0
- EnerBank USA. (n.d.). *EnerBank USA*. Retrieved 2013, from Strategic Business Partner Solution: <http://www.enerbank.com/solution2.php>
- Energize Connecticut. (2013a). *Our Towns*. Retrieved from Solarize Connecticut: <http://solarizect.com/our-towns/>
- Energize Connecticut. (2013b). *Participating Lending Institutions*. Retrieved October 2013, from Energize Connecticut- Programs: Smart-E Loans: http://www.energizect.com/sites/default/files/uploads/Smart-E%20Lender%20List%20for%20Website_1.pdf
- Energize Connecticut. (2013c). *Programs: Smart-E Loans*. Retrieved July 2013, from Energize Connecticut: <http://www.energizect.com/residents/programs/smart-e>
- ENERGY STAR. (2013). *ENERGY STAR Mortgages: Frequently Asked Questions for Consumers*. Retrieved July 2013, from ENERGY STAR: http://www.energystar.gov/index.cfm?c=mortgages.faqs_consumers
- Federal Register. (2013, February 12). Federal Housing Administration (FHA): PowerSaver Home Energy Retrofit Loan Pilot Program: Extension of Pilot Program. Washington D.C.
- Feldman, D. (2011, April 18). *Sunny Money: How are People Paying for their Solar Systems?* Retrieved October 4, 2013, from Renewable Energy Project Finance: <https://financere.nrel.gov/finance/content/sunny-money-how-are-people-paying-their-solar-systems>

- Friedman, B., Ardani, K., Feldman, D., Citron, R., & Margolis, R. (2013). *Benchmarking Non-Hardware Balance-of-System (Soft) Costs for U.S. Photovoltaic Systems, Using a Bottom-Up Approach and Installer Survey – Second Edition*. National Renewable Energy Laboratory.
- GreenTech Solar. (2013, June 13). *The Coming US Distributed Solar Boom: Opportunities and risks in a cost-competitive market*. Retrieved 2013, from GreenTech Solar: <http://www.greentechmedia.com/articles/read/the-coming-u.s.-distributed-solar-boom>
- Hessler, R. (2013). *Rich Hessler Solar Sales Training*. Retrieved July 2013, from A List of Residential Solar Financing: <http://articles.pvsolarsalestraining.com/articles.php?ALISTINGOFRESIDENTIALSOLARFINANCING>
- Irvine, L., Sawyer, A., & Grove, J. (2012). *The Solarize Guidebook: A Community Guide to Collective Purchasing of Residential Solar PV Systems*. Northwest SEED. Portland: U.S. Department of Energy.
- Lacey, S., Trabish, H., & Wesoff, E. (2013, April 23). *Portraits of a Maturing Solar Market: How Key States Are Faring*. Retrieved 2013, from GreenTech Solar: <http://www.greentechmedia.com/articles/read/portraits-of-a-maturing-solar-market-how-states-are-advancing>
- Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. (2012, January). *Renewable Energy Project Finance in the U.S.: 2010-2013 Overview and Future Outlook*. Retrieved from <http://www.mintz.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=231&PortalId=0&DownloadMethod=attachment>
- Northeast Sustainable Energy Association . (2013, May 20). *Admirals Bank Expands Support of Solar, Wind With New Lending, Solarize Programs in New England*. Retrieved July 2013, from Northeast Sustainable Energy Association (NSEA): <http://www.nsea.org/renewable-energy/admirals-bank-expands-support-of-solar-wind-with-new-lending-solarize-programs/>
- Parkinson, G. (2013, September 4). *Deutsche Bank says US solar boom to reach 50GW by 2016*. Retrieved October 4, 2013, from Renew Economy: <http://reneweconomy.com.au/2013/deutsche-bank-says-us-solar-boom-to-reach-50gw-by-2016-18298>
- RESNET- Residential Energy Services Network. (2011, April 25). *FANNIE MAE ADOPTS NEW ENERGY IMPROVEMENT FEATURE FOR MORTGAGE LOANS*. Retrieved from RESNET- Residential Energy Services Network: <https://www.resnet.us/blog/fannie-mae-adopts-new-energy-improvement-feature/>
- Sherwood, L. (2013). *US Solar Market Trends 2012*. Interstate Renewable Energy Council. Interstate Renewable Energy Council.
- Solar Energy Industries Association. (2013a). *State Solar Policy: Massachusetts*. Retrieved 2013, from Solar Energy Industries Association: <http://www.seia.org/state-solar-policy/massachusetts>

- Solar Energy Industries Association. (2013b). *Resources and Research: U.S. Solar Market Insight 2012 Year in Review*. Retrieved 2013, from Solar Energy Industry Association: <http://www.seia.org/research-resources/us-solar-market-insight-2012-year-review>
- Stinson, S. (2009, March 30). *Green mortgages save on energy, loan costs*. Retrieved 2013, from bankrate.com: <http://www.bankrate.com/system/util/print.aspx?p=/finance/mortgages/green-mortgages-save-on-energy-loan-costs-3.aspx&s=br3&c=mortgage&t=story&e=1&v=1>
- Summit Credit Union. (2013). *Milwaukee Shines (Solar)*. Retrieved 2013, from Summit Credit Union: http://www.summitcreditunion.com/money/loans/milwaukee_energy_efficiency_loans/milwaukee_shines_solar.html
- Sun Valley Solar Solutions. (2012). *Bosch*. Retrieved 2013, from Sun Valley Solar Solutions: www.svssolutions.com/residential-products/bosch/
- Sungage. (2013). *www.sungage.net*. Retrieved 2013, from www.sungage.net
- The City of Pasadena. (2013). *Solar Financing Options*. Retrieved 2013, from The City of Pasadena: http://www.ci.pasadena.ca.us/WaterAndPower/PSI_Financing/
- The Solar Foundation. (2012). *National Solar Jobs Census 2012*. Washington DC.
- truSolar. (2013, January 14). truSolar™ Working Group Established to Set Solar Project Standards. Newport Beach, CA, USA. Retrieved from http://www.distributedsun.com/docs/ITEC_truSolar_Consortium_Launch%20_FINAL%20to%20release%201-13.pdf
- U.S. Department of Housing and Urban Development. (2011a). *FHA Power Saver: Frequently Asked Questions (FAQs) for Consumers*.
- U.S. Department of Housing and Urban Development. (2011b). *Factsheet: FHA PowerSaver Pilot Program*.
- U.S. Department of Housing and Urban Development. (2013a). *Energy Efficient Mortgage Program*. Retrieved July 2013, from HUD.GOV: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r
- U.S. Department of Housing and Urban Development. (2013b). *About Title I Home Improvement Loans*. Retrieved July 2013, from HUD.GOV: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/title/ti_about
- U.S. Department of Energy. (2012, January 17). *U.S. Department of Energy Guidance on Loan Loss Reserve Funds*. Retrieved October 3, 2013, from Clean Energy Finance Guide for Residential & Commercial Building Improvements:

http://www4.eere.energy.gov/wip/solutioncenter/finance_guide/content/us_department_energy_guidance_loan_loss_reserve_funds

Utah Clean Energy. (n.d.). *Salt Lake Community Solar: The Pilot Project*. Retrieved 10 24, 2013, from My Community Solar: <http://mycommunitysolar.org/component/k2/item/48>

Velocity Credit Union. (n.d.). *Loans: Austin Energy Solar Photovoltaic/Water Heater Program*. Retrieved 2013, from Velocity Credit Union: <https://www.velocitycu.com/loans#solar>