Rooftop Solar Challenge: Outreach to Local Massachusetts Financial Institutions

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Prepared for:

Massachusetts Department of Energy Resources (DOER)

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1. Introduction: Overview of the Project

Massachusetts Department of Energy Resources' (DOER) mission includes increasing the development of clean energy resources, such as solar, in Massachusetts. To assist in this goal, DOER was awarded funds through the U.S. Department of Energy's (DOE's) SunShot Initiative Rooftop Solar Challenge to: streamline the solar permitting processes; update codes and ordinances related to solar installation; improve resources for learning about interconnection and net metering; and increase access to financing for solar.

One of the key barriers to the deployment of residential and small commercial solar in Massachusetts is the lack of financing, especially for property owners and businesses uninterested in or unable to pursue third-party ownership models such as turnkey leases and power purchase agreements. Good availability of direct financing for such residential and small commercial customers from traditional, local depository institutions (banks, thrifts, and credit unions) could reduce solar photovoltaic (PV) costs of ownership, provide greater financing choices, and expand the overall market for solar PV systems. This project was focused exclusively on solar PV (i.e., solar electricity) and did not involve solar water heating applications.

DOER engaged consulting firm ICF International to support the outreach to local financial institutions. ICF interviewed local financial institutions about their experience with and perceived barriers to solar PV lending in Massachusetts. Based on the feedback from the interview process, ICF then developed educational materials and co-hosted two regional workshops and a webinar for lenders throughout the Commonwealth. The final portion of the workshops focused on banker's outstanding concerns with solar lending and opportunities for the Commonwealth to encourage more such lending.

During both workshops bankers indicated that there are a number of perceived risks in solar financing, particularly related to Solar Renewable Energy Certificate (SREC) price volatility and regulatory risk, project collateral and warranty guarantees from the manufacturers. Workshop attendees also indicated that the Commonwealth could offer several supports in terms of technical assistance, such as a centralized list of solar lenders (similar to what exists for the HEAT Loan program) as well as a clearinghouse for current solar programs, legislation and regulation. Attendees at both workshops also expressed an interest in having access to case studies for appraisers on how solar systems affect the resale value of properties. In response to banker concerns and in addition to specific items discussed by DOER during the workshops, ICF has provided several programmatic recommendations in this report that the Commonwealth could consider to overcome risk perception and reluctance on the part of Massachusetts bankers to finance solar systems.

2. Outreach: Interviews

2.1. Background

ICF International conducted structured interviews of local financial institutions on behalf of DOER. The roughly 30-minute interviews were conducted throughout October 2012. See **Appendix A**, the Survey Guide Questions. The hypothesis for the interviews was that many local financial institutions were resistant to solar PV lending due to perceptions and misconceptions regarding the complicated nature of PV technology, a lack of familiarity with solar projects, and collateral and cash flow risks. The interviews assessed the current status of solar PV lending in the Commonwealth and identified areas for future development and potential programs to support the financing of solar PV projects. The interview questions were designed to gauge the experience level of local financial institutions with solar PV lending as well as understand familiarity and confusion with policies and incentives related to solar systems and perceived and real barriers to lending. The interviewees were also asked for suggestions to facilitate more lending in the Commonwealth.

Figure 1: Markets served by Interviewees

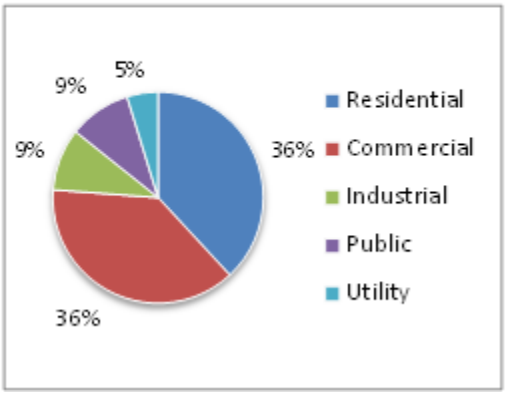
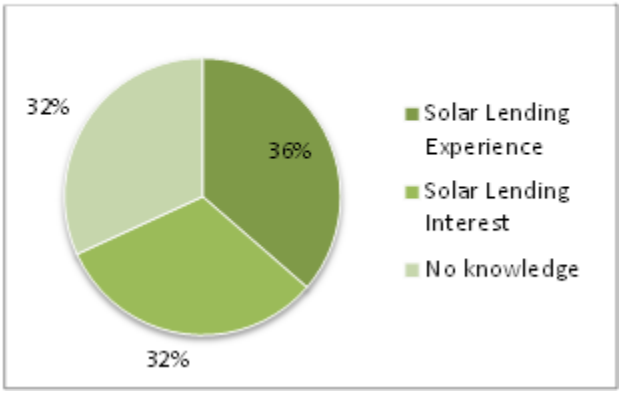


Figure 2: Interviewee Experience with Solar Lending

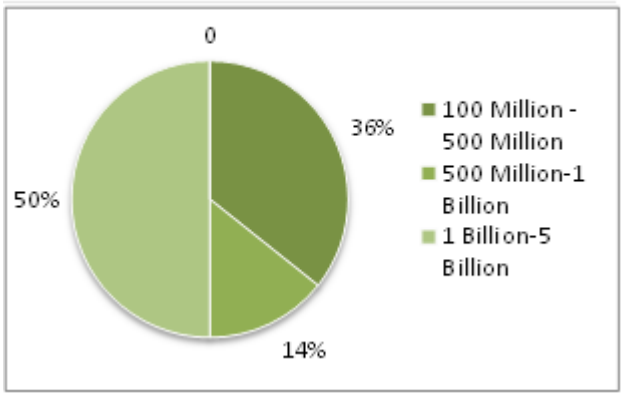


The information obtained during the interviews was used to design regional solar PV lending workshops for bankers that were held in December 2012 and January 2013. Data in this report are provided only in aggregate to preserve the confidentiality of the interviews. The term "banker" is used in this report to refer collectively to officials from banks, thrifts, and credit unions.

Interviewee Profiles

Twenty-two bankers, in total, were interviewed from eastern, central, and western Massachusetts. See **Appendix B** for a list of interview participants. They tended to be senior loan officials from their institutions and served a number of markets including residential, commercial, public, industrial, and utility-scale developers. (See Figure 1) The interviewees experience with solar lending varied; some had many years of experience financing solar PV systems; a number were familiar with the process but had not yet provided a loan; and others

Figure 3: Interviewee Bank Asset Size



were becoming interested in PV for the first time as a result of interest from their borrowers or stakeholders. (See Figure 2)

Solar PV systems financed ranged from several kilowatts (kW), a typical size for a residential system, up to 2,500 kW (or 2.5 megawatts (MW)), a utility-sized system. The interviewees were from various sized institutions, with assets ranging from $100 Million to $4 Billion. (See Figure 3)

Additionally, bankers' experience with any type of green (clean energy) lending varied. The majority of their institutions participated in the MassSave HEAT Loan program, and some of the larger institutions had financed or were seriously considering financing wind power development. Only one institution had a separate loan product for commercial solar lending. Three local institutions had pooled together a $3 million fund to provide loans for renewable energy. This group was very knowledgeable, but had not yet actually provided loans for lack of qualified borrowers.

Interviewees' Solar Loan Terms

For the majority of the residential lenders that were interviewed, solar PV systems were funded through home equity loans with a standard interest rate of 4 to 5 percent. Commercial lenders generally provided loans with interest rates of 4.5 to 6 percent.

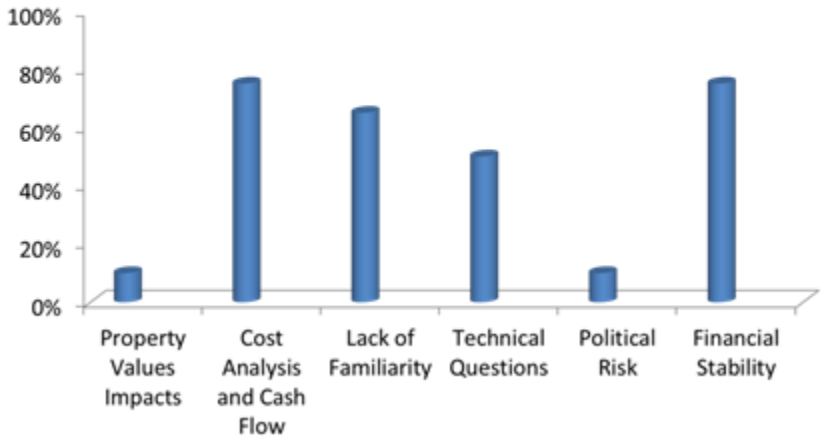
For commercial lenders, the loan terms varied primarily by the collateral and underwriting criteria required by each institution. This variability reflected disparate views of the reliability of the technology and the certainty and value of financial incentives to support it. For example, some bankers considered the value of the solar system as sufficient collateral; others, acknowledging the absence of a solar system resale market, valued the solar system equipment at 50 percent, while others valued it much lower. Some bankers ensured that they had assignment of SRECs and net metering credits in the case of default. All banks required a significant portion of the loan to be backed by real estate or personal guarantees. Financial institutions also varied on how much they required as collateral from 70 to 100 percent of the loan amount. In one case where the bank valued the cash flow from the energy delivered by the solar PV system, the bank required that the cash flow be projected at 140 to 150 percent of the loan payments and in turn, required less collateral.

A general consensus among all commercial lenders was that the cash flow from the solar project must be able to pay back the loan within a ten-year term and that loans were only profitable with the current federal and state incentives.

2.2. Findings

Main Concerns and Barriers

Figure 4: Approximate percentage of interviewees that expressed concern over solar PV lending elements



The interviewees had concerns about solar lending regarding stability of the market and the incentives, the newness of the technology to many bankers and to borrowers, and lack of comfort with the technical elements of the systems. Some of these concerns are well-founded and challenging to manage (e.g., SREC market and collateral valuation) and others are based on misperceptions (e.g., the crystalline-silicon panel technology is very mature) or lack of access to publicly-available information and tools. In this report, banker concerns are simply summarized as stated.

Figure 4 indicates the most commonly expressed concerns from interviewees. The largest distinctions between concerns came from commercial versus residential lenders, those with lending experience and those who had none, and those who had received technical information through seminars or from the Massachusetts Clean Energy Center (MassCEC) or other sources. It is clear that many of these concerns are interrelated.

The top concern among commercial lenders was the stability of the market and of the federal and state incentives, including SRECs, state rebates, and federal and state tax credits. Interviewees expressed confusion about the SREC mechanism, the timing of the payments to the system owner, the price of the SRECs, and the stability of the net auction price of $285. Several interviewees mentioned that the 1603 Treasury Grant program for solar had expired, exacerbating the hesitation to engage in a market that seemed to be changing from year to year or even more frequently. One interviewee expressed concern that the incentives were at the whim of political changes in administration and leadership on the state and federal level. Another potential political risk identified by interviewees was community pushback; some developers had experienced potential derailment of a wind project through community resistance. Sometimes, these “political risks” were reflected in other categories in Figure 4, such as “cost analysis and cash flow.”

There were, however, some lenders who saw the SREC market as relatively reliable. One banker commented that from what he had read and experienced, DOER seemed committed to ensuring market stability through the SREC program and would adjust the program as necessary to meet demand. Several bankers felt confidence in the SREC market and in solar

PV investments. Several bankers also indicated that they did not build their cash flow analysis around the SREC price of $285 and thus were not as concerned with SREC price stability as other factors.

Another common concern of commercial and residential lenders was uncertainty over how to calculate the cash flow of the loan. This includes calculating payback from state and federal incentives over appropriate periods, valuing the energy generated by the solar system, and being clear on costs and payments to developers and the financial institution. A banker may also be dealing with a complex transaction, such as a Power Purchase Agreement (PPA).

All interviewees expressed that the solar market is new to the banking community, even if it is not to them or their institution in particular, and to many borrowers. Lack of case studies and documented experiences on how the bank gets paid back, in what increments and how often, adds to their insecurity. Several bankers lamented that they have had borrowers come to request loans who are not aware of the intricacies involved with permitting, interconnection with the grid, structural requirements, and underwriting criteria. Many lenders for solar development require that a borrower have equity committed to the project and a previous relationship with the lender. This is partially a function of the uncertainty about the reliability and value of the solar system if the borrower defaults.

Many bankers, even those who had experience with solar lending, expressed that they needed more knowledge about the technical components of the systems to be able to really understand the cost analysis. Those who were not familiar with solar lending agreed that technical understanding of the solar system was an area where they lacked knowledge. Several knew the terminology of the system components but needed third-party information on the life of the panels, the inverter, and balance of the system components, so they could assess the appropriate length of the loan. The bankers also asked if there are best practices for requiring warranties for various infrastructure components.

Some lenders were skeptical of depending on the energy cost savings (i.e., reduced physical electricity supply from the utility) as part of their cash flow. They perceived that the performance of the technologies is reliant upon proper maintenance, and one banker expressed concern that panels may be subject to vandalism.

Many residential lenders specifically had concerns over the resale value of the home with a solar PV system. These concerns were related to perceived potential cosmetic issues and curb appeal if the solar system faces the street and the effect on the resale value if the technology were to become obsolete.

Additional Information

There was consensus in terms of what additional information bankers requested. They voiced a need for clear information about existing incentives or changes in legislation. Generally, it would be helpful to make bankers more aware or accepting of venues providing clear and updated information on state and federal incentives for solar projects or for energy development; several

bankers specifically requested information on credit enhancements from SBA and USDA that can be applied to solar projects. For those who would like to dive a little bit deeper, bankers requested resources on the triggers that change the volatility and pricing of SRECs and on legislative changes that will affect the program. One banker suggested a video or diagram on the MassCEC or DOER website that explains timing issues or utility net metering rules that are currently difficult to understand.

Bankers indicated that a useful tool would be a checklist of the steps that a banker would go through to determine if the borrower is a good candidate for a solar loan. In response to this feedback, ICF created the checklist that can be found in **Appendix E**. The checklist prompts a lender to confirm that the borrower has received the necessary permits for the solar project and that the project is in compliance with zoning and other laws. Likewise, bankers would like to be aware of materials to which they could direct interested but unfamiliar borrowers to relieve the burden of explaining the intricacies and steps of solar PV projects. They were also interested in a tool that would allow them to determine payback to the bank. This tool could be a basic cash flow diagram that could be customized to each project. Additionally they requested case studies or documentation on cost recovery. As an example, one banker said that he typically uses 50% for the cost recovery of solar equipment, but that it is hard to estimate since there is no or a very limited resale market for solar PV. He would like to know what other bankers are doing in this area.

Bankers also requested assistance in the form of loan products from MassCEC or DOER. Specifically, several bankers mentioned that a credit enhancement or guarantee from the Commonwealth would be significant in making bankers feel secure in their investments. They also said that the HEAT Loan program for energy efficiency allows for easy participation, and this type of a program would be attractive if extended to solar PV lending.

3. Education: Workshop

3.1. Background

ICF International and DOER organized workshops for bankers and other solar PV industry professionals to provide information and address some of the concerns raised in the interviews. The first workshop was conducted for attendees located in western and central Massachusetts in Springfield, MA on December 4, 2012. The Springfield workshop was attended by 13 bankers and solar and clean energy professionals. The Boston workshop, held on January 22, 2013, was attended by 28 bankers and solar and clean energy professionals. Lastly, ICF and DOER hosted a webinar on January 31, 2013. The webinar covered a condensed version of the materials presented at the workshops. Roughly 70 people attended the webinar. See **Appendix C** for a list of workshop participants.

3.2. Workshop Content

The two four-hour workshops consisted of five main sections: 1) commercial and residential solar PV cash flows; 2) introduction to solar PV systems and project costs; 3) a networking break; 4) solar PV project revenues (tax credits, SRECs, incentives and net metering), and 5) a discussion of perceived barriers and opportunities. Based on feedback from the Springfield workshop, the presentations for the Boston workshop were restructured to center around the cash-flow analysis. Early in the workshop, one commercial cash flow and one residential cash flow were presented; later presentations then focused more deeply on the installation and equipment costs (solar projects) and revenue streams (tax credits, SRECs, incentives and net metering). This revised format worked well to engage participants at the Boston workshop and therefore was used, in condensed form, for the webinar. Details of each section are discussed below.

The workshop information consisted of material presented by bankers, solar installers, state agencies (DOER and MassCEC) and ICF. Both workshops began with an introduction from Dwayne Breger, the Renewables Division Director for DOER. He introduced participants to the U.S. Department of Energy (DOE) SunShot Initiative to make solar energy cost-competitive by 2020 and specifically to the DOER's SunShot Initiative Rooftop Solar Challenge grant to address the soft costs of solar PV. Dr. Breger described the current trends for solar in MA, including the decreasing costs and increasing installed solar capacity. The introduction continued with a brief discussion from Lise Dondy, Expert Consultant for ICF International, on the findings from the Solar PV Financing Survey. She described the purpose of the survey, a summary of the background of the participants, and the findings. Details on the survey and findings are described in Section 2 of this Report.

The five sections of the workshop included:

1) Commercial and residential solar PV cash flows: Robert Wigmore, a Sr. Loan Officer in commercial lending at Farm Credit East, provided examples of solar system projects he had financed. Through these examples, he noted specific financing and cash flow difficulties he has faced, including the replacement of inverters and the cost of reinforcing a roof to support the weight of the system. At the Boston workshop, Mr. Wigmore was joined by Michael Kuhn, Vice President of Corporate Lending at Cambridge Savings Bank. Mr. Kuhn continued the discussion of commercial solar and utility-scale lending. He discussed issues related to lending to large third party solar developers in regard to; a) sources of revenue, focusing on the sale of SRECs and tax equity and b) typical project expenses. He provided examples of his larger-scale commercial solar projects. Lise Dondy presented a residential cash flow example noting the different state and federal incentives for residential solar as opposed to commercial projects.

2) Introduction to solar PV systems and project costs: This section of the workshop was designed to give attendees an introduction to how solar systems work, and the costs associated with them. At the Springfield workshop, Miles Hovis at Borrego Solar presented and for the Boston workshop, Matt Arner, the President of a local solar installer SolarFlair, gave his "Solar

Systems 101" presentation. Presenters gave examples of typical residential, small commercial, and large commercial solar systems, as well as a general overview of how solar PV systems work. One area Mr. Arner covered that was of particular interest to the attendees was warranties of solar systems and parts. The group discussed the reliability of warranties in the volatile solar market, where many companies go out of business during the warranty duration. Finally, Mr. Arner touched briefly on operation and maintenance of the systems, permitting, utility interconnection, and certification of installers.

3) Networking break: Based on feedback from the survey, the workshops included a networking break, allowing attendees to ask additional questions of the presenters and network with other bankers in attendance.

4) Solar PV project revenues: Representatives from MassCEC discussed incentives, rebates, and tax credits associated with solar PV installations. At the Springfield workshop, Andy Brydges, the Senior Director of Renewable Energy Generation presented, while Elizabeth Kennedy, Program Director of Renewable Energy Generation spoke at the Boston workshop. The representatives from MassCEC gave a brief introduction of the rebates they offer, as well as other incentives, and how they lower the cost of electricity for those looking to install solar PV. In particular, they discussed their Solarize Mass program, which utilizes a group purchasing discount model to incentivize local communities to install more solar systems at a reduced price.

Representatives from DOER discussed solar project revenues in terms of net metering and SRECs. At the Springfield workshop, Natalie Andrews, Renewable Energy Project Coordinator presented, while Sarah Cassanego, Solar Coordinator spoke at the Boston workshop. The representatives began by discussing basic information on net metering and how it could translate into energy cost savings for customers. The discussion of SRECs included a brief overview of how SRECs work, basics of the Solar Carve-Out Program, and the SREC auction.

5) Discussion of perceived barriers and opportunities: The workshop concluded with a brief discussion with workshop attendees about perceived barriers and opportunities for the state to provide technical assistance or financial support.

ICF and DOER provided attendees with a number of handouts to facilitate understanding during and after the presentations. All attendees of the Boston workshop were given a glossary of technical terms, a banker's checklist that outlined the solar permitting process, cash flow examples, an explanation of Massachusetts' Solar Carve-Out Program, and a hard copy of DOER's Net Metering and SREC presentation. ICF provided additional handouts during the Boston workshop based on feedback from participants at the Springfield workshop. All presentations and materials used in the workshop were emailed to the participants after the conclusion of the workshop for their future reference. The materials will also be posted on the DOER website and are included in **Appendix D and E**.

3.3. Workshop Evaluation

ICF International distributed evaluation forms at the conclusion of each workshop to gauge how useful the session was to the attendees. Responses to the workshops were overall very positive. In both workshops, one of the most useful portions was the time spent on cash flow examples. This area proved to be particularly popular at the Boston workshop due to additional time spent on the topic. Attendees of the Springfield workshop found the banker case studies and background/permitting sections to be two of the most useful discussions for them. The section cited as the least useful in both workshops was the networking session.

Attendees from both workshops noted that it would be useful to have handouts of the PowerPoint slides, or at least information as to when they would receive the electronic versions to review. Participants at the Springfield workshop noted that they would have enjoyed having more time for questions and discussion, but this was not cited by the attendees of the Boston workshop. Boston attendees were also interested in getting a list of the attendees for future networking purposes.

4. Recommendations

4.1. Feedback from Interviews and Workshop Discussion

The final section of the workshop was designed as a discussion among the attendees and the presenters in order to help DOER understand the key barriers bankers face in solar financing and what DOER could do to encourage bankers to engage in such financing. The feedback can be divided into two major categories of services the participants would find useful; 1)Technical Assistance and Expertise, and 2)Financial Assistance.

As reflected in the discussion and questions by workshop participants, the bankers perceive a number of risks in solar financing. Especially significant were the issues of collateral, warranty guarantees from the equipment manufacturers and SREC price volatility. There was general agreement that there is no track record on resale value of the solar panels and other equipment and that, for now, the collateral should not be given much value as part of the underwriting process. The risk of depending on warranties from solar manufacturers that may not be around over the long term was also discussed. Finally, the situation of the oversupply in the current MA SREC market and the price volatility, at least in the short term, was seen by many as the primary risk in projecting cash flow. Below is a summary of the participant feedback in more detail:

Technical Assistance & Expertise

- Expand data on the SREC program, as this is the aspect of solar lending that creates the most uncertainty in the financial community
- Furnish centralized list of solar lenders (similar to what exists for the HEAT Loan program)

- Model solar program after the HEAT Loan program that brought banks into program, provided training and raised awareness of the program to banks and consumers
- Provide banks with a list of vetted contractors to offer customers
- Provide installers with a list of banks willing to finance projects
- Guide bankers throughout project in understanding the installer's timeline and when funds need to be disbursed
- Do a study on the impact of solar on real estate appraised value similar to one MassCEC is completing on wind development
- Provide assistance assuring that the developer/installer has all of the paperwork and permits in order
- Provide clearinghouse to facilitate communication and outreach between all relevant parties; local bankers, local home builders/real estate community and solar developers.
- Create a checklist for permitting and other requirements that customers would have completed before seeking financing
- Create a clearinghouse of information for bankers including a list of all incentives/programs and regulations that are applicable
- Provide more education on collateral value of solar PV
- Provide more tax information for lenders on projects
- Create a working group to address the problem of too muchdistributed generation seeking interconnection on distribution lines, thereby preventing or increasing costs for additional solar to be installed. (Some bankers have experienced this on the part of their customers.) Communicate with bankers on how this issue might or might not be addressed.

Financial Assistance

In the area of financial assistance, DOER is looking to target $15 million of Alternative Compliance Payment (ACP) funds to stimulate the market growth of small, site-owned PV systems. DOER requested specific feedback from bankers on stimulating solar financing by local financial institutions through;

- Subsidizing a solar PV loan program in coordination with HEAT Loan program banks;
- Creating an SREC Pre-Buy program;
- Creating a competitive solicitation to consider other ideas for financial incentives
- Discussing any other suggestions from the workshop participants

The bankers were very positive about the HEAT Loan program under which they are allowed to set their own guidelines for underwriting and can offer 0% loans with the Commonwealth reimbursing the banks for the interest differential upfront. An SREC Pre-Buy program received an overall positive response from the commercial bankers because of the perceived risk of not receiving the auction price for all SRECs from a project and selling excess SRECs in a lower-priced and more uncertain private market transaction. Residential lenders saw this program as less important and were more favorably inclined to a HEAT Loan type program. A loan loss

guarantee of some type was also viewed as potentially helpful especially in mitigating collateral and SREC risk.

4.2. Broader Recommendations

The DOER is seeking ways to overcome the lending risks discussed above in order to create greater opportunity for local investment in and development of small-scale rooftop PV systems. Based on the survey ICF did as part of this report, the feedback received at the workshops, and ICF's knowledge of successful solar financing models outside of Massachusetts, ICF recommends consideration of the following programs to overcome risk perception and reluctance on the part of Massachusetts bankers to finance solar systems.

Technical Assistance and Expertise

Create a solar financing participating lender program similar to the HEAT Loan program. This program would involve additional training of bankers in solar financing and a clearinghouse of information for bankers on policy, legislation and regulations that impact solar lending including a link to the DSIRE web site. Unlike the existing HEAT Loan program for energy efficiency improvements, commercial bankers ideally would be included on the list of participating lenders. Training would include technical assistance from DOER or another appropriate agency that would help inexperienced local banks with the financial and solar project analysis for their first one or two borrowers under the program. The training of bankers could involve "train the trainers" whereby one designated banker from each bank goes through the training program including specific guidance with actual solar loan applicants and then, in turn, these "trained" bankers could train others from their financial institutions. Those banks that have successfully gone through the Solar PV finance training program would be included on the website as participating solar lenders. While DOER and MassCEC do not certify solar developers/installers, the site could also publish links to the licensing and any other certification required by state law.

Undertake an "appraisal study" on the impact of solar on the resale value of residential and commercial real estate in Massachusetts.

Create an advisory panel of experienced solar lenders to give feedback on a quarterly or semi-annual basis to DOER on technical and policy issues that create barriers to private sector solar lending. For instance, the oversupply of intermittent capacity on certain transmission lines, tax, collateral and default issues were all mentioned as areas where the bankers have significant questions. The advisory panel could provide a feedback loop on training content assuring that it continues to be relevant in addressing the key information gaps.

Host additional workshops or webinars. Lastly, feedback from the workshops and webinars indicated that attendees found the information and Q&A to be very useful. DOER should continue to partner with relevant organizations such as MassCEC and the Mass Bankers Association to offer additional in-person workshops or webinars. This project helped refine the

content and format for both a four-hour workshop and an hour and a half webinar platform and all materials are included in **Appendixes D and E**.

Financial Programs

Interest rate buy down for residential and small multi-family homes. This program would be similar in design to the HEAT Loan program. The HEAT Loan program provides a 0% interest rate with a loan term of 7 years. DOER pays the financial institution the forgone interest upfront (the difference between the lender's typical rate and the HEAT Loan rate). The very positive responses from bankers who participated in the survey and workshops indicated that they liked this program because it was simple, allowed them to do their own underwriting, and was a strong incentive to clean energy borrowing. In many cases, it spurred their interest in seeking other green product lending opportunities such as solar financing.

The net cost of the average 5 kW solar project for homes is approximately $11,500 to $15,000, including tax credits, SRECs and rebates. At the high end of the range, the system with 0% interest would pay back in 7 years. However, at the low end of the price range, the system would pay back within as little as 5 years. With a buydown to 0%, DOER with $5 million could finance approximately 1,770 to 2,320 5 kW systems. We would recommend that DOER consider making its scarce dollars go further by buying down the interest rate only to breakeven over 7 years, with perhaps a small return on investment above breakeven. This could be accomplished with a reduced buydown subsidy over time especially with the average price of solar PV still declining. The goal of this program would be to familiarize local and regional bankers with solar lending and allay their fears of risk by providing some incentive without over subsidizing.

Loan Loss Reserve Fund for small commercial rooftop solar PV systems. Because there is so much concern among commercial bankers about the volatility of the SREC price, the collateral value, and warranty guarantees, we would recommend that DOER create a loan loss reserve pool for participating lenders. Loan loss reserve funds for solar projects typically leverage $10 of private investment for every $1 of public funds[1]. Therefore, with $5 million dollars as a credit enhancement, DOER could leverage $50 million of private dollars and approximately 425 systems at an average size of 40 kW. DOER's funding would cover up to a 10% aggregate loss on a portfolio of solar PV systems. Based on conversations with various solar lenders, it appears that the average default loss in the industry is less than 2%. If over the terms of the loans, the loan loss pool was not fully utilized, then the remaining funding would be returned to DOER for further use.

Loan Loss Reserve Funds can also be used to lower interest rates or extend the term of loans. While there is no set formula of guarantee percentage to loan terms, DOER should explore using the Reserve Fund to extend the length of the loan term. Extending term length has a greater impact on the overall monthly payment than does interest rate reduction.

[1] See Applied Solutions webinar videos at : http://vimeo.com/50543292
http://www.bizjournals.com/phoenix/stories/2009/11/09/daily15.html

Pre-purchase of SRECs for small systems. DOER sought response from the workshop participants about the concept of a pre-purchase of SRECs. While there appeared to be some support for the idea, ICF would caution DOER that such a concept could make a complicated SREC auction system even more complex. Furthermore, a pre-purchase SREC program would stimulate many fewer systems than either an interest rate buy down or a loan loss reserve. To mitigate some of the perceived risk of the SREC market, the Commonwealth should develop a plan for what happens after the 400 MW cap is reached. A quick conclusion on this issue by DOER, the Legislature, and others will be especially important. This is because, as the capacity limit comes near to being filled within the next one to three years, there may be a significant slowdown of solar activity. It is expected that 6-10 months in advance of the cap being reached, project developers, owners, and lenders may pause investment outlays pending clarity on the value of environmental attributes from their potential systems. In addition, while DOER does not track or publish private market SREC prices, it would be helpful to have greater transparency on non-auction, SREC market prices to give a signal to the market on price trends. Any means that DOER might further the transparency of the SREC market as a whole would be beneficial to its efficient functioning.

The broader recommendations directly relate to the barriers and suggestions voiced by interview participants and workshop attendees. The general perception was that there were risks to solar lending, but they could be mitigated by Commonwealth action. Bankers were very complimentary of the HEAT Loan program both in terms of education and technical assistance as well as the marketing boost that it provided for participating banks. Solar case studies and examples of successful projects would also increase understanding and comfort level within the banking community. Lastly, bankers were very supportive of assistance to offset some of the financial risk through interest rate buy-downs, a loan loss reserve fund or other measures.

5. Appendix

Appendix A: Survey Guide

Interview Questions for Outreach to Massachusetts Financial Institutions on Solar PV Financing

Interviewees will be initially divided into three groups based on their experience with rooftop solar photovoltaic (PV) financing to date – (1) have financed solar PV; (2) have seriously considered financing solar PV, but have not done so, and (3) have not seriously considered financing solar PV. Depending on which group the bank official is in, he/she will be asked somewhat different interview questions. However, the questions have been kept as standardized as possible to allow comparisons across participants. The questions for each of these three interview tracks are listed below.

The interviews are expected to be 30 minutes in length. The interviewees will be informed that all of their responses will be kept in strict confidence and no institution nor individual will be identified in materials related to this effort.

Lead-in to interview:
"Hello, this is LG DeSantis calling from ICF International on behalf of the Massachusetts Department of Energy Resources. Thank you for setting aside 30 minutes to discuss your views and experience with financing rooftop solar projects. The information you provide will be used to help the Massachusetts Department of Energy Resources assess the current status of solar photovoltaic lending in the state and identify areas for future development, including the design of regional solar lending workshops for bankers and possible programs to support the financing of residential-scale, site-owned solar.

I will be asking you several questions regarding solar lending, and writing down your responses. Your responses to this interview are confidential and will not be directly associated with your name or your lending institution. You may choose to stop the interview at any time.

Do I have your permission to continue?"

Sorting Questions

A. Has your institution financed solar PV projects in Massachusetts? (If "yes," go to Group 1 interview guide. If "no," go to Sorting Question B below.)

B. Has your institution seriously considered financing solar PV projects in Massachusetts? (If "yes," go to Group 2 interview guide. If "no," go to Group 3 interview guide.)

Group 1: Have Financed SolarPV (for residential or commercial rooftop or ground-mounted systems)

1. To what types of customers does your institution provide solar PV financing?
   a. Residential
   b. Commercial buildings (non-residential) (commercial vs. utility scale)
   c. Solar developer/installers
   d. Tax equity investors
   e. Public

2. For each group selected in question 1 above, what motivated you to lend to that group, what is the typical size of your project, and what major terms are involved (collateral, links to asset value of home/building, length of loan, interest rates, etc.)? What is your approximate volume of solar PV loans to these groups? (probe, if necessary: strong demand from existing clients, ability to reach new clients, perceived as very profitable, enhances value of underlying property, desire to get involved in growth area, company mandate or preference to become involved in green projects, competitive differentiator, personally interesting, government incentives or rebates)

3. For each group not selected in question 2 above, why have you not financed solar PV projects to that group yet? (probe, if necessary: no demand, outside of my area of focus, perceived as too risky, too small a market segment, collateral or other finance risks, implementation time too long, tried but other banks obtained this business, concerns about permitting, cost, and timeliness, public perception/NIMBY issues with specific solar projects, lending amount above/below size threshold of bank)

4. Has your institution's experience to date in financing solar PV been positive, negative, neutral, or too early to tell? Do you think there is a desire by the bank to do more solar financing? If so, is there interest within certain market segments (and which ones)? If not, why not? (probe if necessary regarding specific barriers and how they can be overcome: concerns with bank regulators; general cautiousness about lending to new customers or in newer products by your management; ability to secure the loan; lack of full understanding or confidence in technology, engineering, and/or financial performance of solar projects; lack of certainty or long-term contracts for solar renewable energy credit market; questions on how to monetize tax credits; overall complexity/lack of staff time; time to permit and construct projects; lack of scale/repeatability in this market, regulatory uncertainty, complexity of business ownership structures or SEC reporting requirements, NIMBY concerns within the community)

5. How difficult or easy was it to begin financing solar PV projects? What type of support did you seek out and what would have been more useful? (probe, if necessary: is solar lending approached differently)

6. What types of credits and other incentives are you aware of to support solar financing in Massachusetts? (probe, if necessary: solar renewable energy credits, federal tax credits, Commonwealth Solar rebates, interest rate buydown, etc.)

7. Thinking of a specific solar PV project that you did not finance recently, would support from the state have been helpful in advancing this project? (probe, if necessary: technical validation of project and its equipment, overall due diligence support, more certainty on solar renewable energy credit values, loan guarantee, interest rate buydown, loan loss reserve pool)

8. In your opinion, are solar PV investments profitable for residential and/or commercial customers, and under what conditions? After available incentives are considered? (probe, if necessary: expected time frame and return on investment, life cycle cost; trends in solar lending)

"Now we'd just like to ask a couple of questions regarding your institution's background in solar lending."

9. Is your institution involved in other green energy financing, such as the Mass Save (Heat loan program), wind projects, biomass projects. For regional or national banks: how much direction do you get on solar lending from the corporate office? Is there a larger renewable energy group within your corporate organization?
10. Did you participate in the 2012 Renewable Energy 101 for Community Banks workshop?
    a. If "yes,"
        i. What did you find most useful about the workshop?
        ii. What did you find least useful about this workshop?
        iii. Would you be interested in participating in any future, similar workshops?
            1. If "yes," what would you specifically like to learn?
            2. If "no," is there a particular reason that you would not want to participate that you can share?
    b. If "no," (did not participate in workshop)
        i. Would you be interested in participating in any future, similar workshops?
            1. If "yes," what would you specifically like to learn?
            2. If "no," is there a particular reason that you would not want to participate that you can share?

Group 2: Seriously Considered Financing Solar PV, but have not done so

1. Generally, what barriers have prevented your institution from financing solar PV projects? How could those barriers be overcome? (probe, if necessary: concerns with bank regulators; general cautiousness about lending to new customers or in newer products by your management; too small a market segment; ability to secure the loan; lack of full understanding or confidence in technology, engineering, and financial performance of solar projects; lack of certainty or long-term contracts for solar renewable energy credit market; questions on how to

monetize tax credits; overall complexity/lack of staff time; no staff person who has solar as his/her responsibility; time to permit and construct projects; lack of scale/repeatability in this market; tried, but others banks obtained this business; regulatory uncertainty, complexity of business ownership structures or SEC reporting requirements, NIMBY concerns within the community)

2. How difficult or easy was it to begin evaluating solar PV projects? What type of support did you seek out and what would have been more useful? (probe if necessary: is solar lending approached differently)

3. What types of credits and other incentives are you aware of to support solar financing in Massachusetts? (probe, if necessary: solar renewable energy credits, federal tax credits, Commonwealth Solar rebates, interest rate buydown, etc.)

4. Thinking of a specific solar PV project that you did not finance recently, would support from DOER or MassCEC have been helpful in advancing this project? (probe, if necessary: technical validation of project and its equipment, overall due diligence support, more certainty on solar renewable energy credit values, loan guarantee,interest rate buydown, loan loss reserve pool)

5. In your opinion, are solar PV investments profitable for residential and/or commercial customers and under what conditions? After available incentives are considered? (probe, if necessary: expected time frame and return on investment, life cycle cost; trends in solar lending)

6. Is your institution involved in other green energy financing, such as the Mass Save (Heat loan program), wind projects, biomass projects, etc.? For regional or national banks: how much direction do you get on solar lending from the corporate office? Is there a larger renewable energy group within your corporate organization?

7. Did you participate in the 2012 Renewable Energy 101 for Community Banks workshop?
    a. If “yes,”
        i. What did you find most useful about the workshop?
        ii. What did you find least useful about this workshop?
        iii. Would you be interested in participating in any future, similar workshops?
            1. If “yes,” what would you specifically like to learn?
            2. If “no,” is there a particular reason that you would not want to participate that you can share?
    b. If “no,” (did not participate)
        i. Would you be interested in participating in any future, similar workshops?
            1. If “yes,” what would you specifically like to learn?
            2. If “no,” is there a particular reason that you would not want to participate that you can share?

Group 3: Have not Seriously Considered Financing Solar PV

1. Do you have any major concerns about financing solar projects? If "yes," please explain.

2. Generally, what barriers have prevented your institution from financing solar PV projects? How would those barriers be overcome? (probe, if necessary: concerns with bank regulators; general cautiousness about lending to new customers or in newer products by your management; too small a market segment; ability to secure the loan; lack of full understanding or confidence in technology, engineering, and financial performance of solar projects; lack of certainty or long-term contracts for solar renewable energy credit market; questions on how to monetize tax credits; overall complexity/lack of staff time; no staff person who has solar as his/her responsibility; time to permit and construct projects; lack of scale/repeatability in this market; tried, but others banks obtained this business; regulatory uncertainty, complexity of business ownership structures or SEC reporting requirements, NIMBY concerns within the community)

3. What types of credits and other incentives are you aware of to support solar financing in Massachusetts? What types of other support for solar PV are you aware of in the Commonwealth, from DOER, MassCEC, or others? What would be helpful? (probe, if necessary: technical validation of project and its equipment, overall due diligence support, more certainty on solar renewable energy credit values, loan guarantee, interest rate buydown, loan loss reserve pool)

4. In your opinion, are solar PV investments profitable for residential and/or commercial customers and under what conditions? After available incentives are considered? (probe, if necessary: expected time frame and return on investment, life cycle cost; trends in solar lending)

5. Is solar PV financing approached differently than other types of financing at your institution? If "yes," please explain.

6. Is your institution involved in other green energy financing, such as the Mass Save (Heat loan program), wind projects, biomass projects, etc.? For regional or national banks: how much direction do you get on solar lending from the corporate office? Is there a larger renewable energy group within your corporate organization?

7. Did you participate in the 2012 Renewable Energy 101 for Community Banks workshop?
    a. If "yes,"
        i. What did you find most useful about the workshop?
        ii. What did you find least useful about this workshop?
        iii. Would you be interested in participating in any future, similar workshops?
            1. If "yes," what would you specifically like to learn?

2. If “no,” is there a particular reason that you would not want to participate that you can share?

b. If “no,”

i. Would you be interested in participating in any future, similar workshops?

1. If “yes,” what would you specifically like to learn?
2. If “no,” is there a particular reason that you would not want to participate that you can share?

The interviewer, LG, is familiar with solar photovoltaic technology and lending in the state. If the interviewee needs basic background or clarification on the technology, she will have a short discussion with them to provide an overview, explain the purpose of the upcoming workshops, and what can be gained. After the interview, ICF will email information regarding the workshop to encourage them to attend.

Appendix B: List of Interview Contacts

Name	Organization
Andy Raczka	Abington Bank
Mario Sindone	Abington Bank
Dick Jones	Boston Community Capital
Albert Pinho	Cambridge Portuguese Credit Union
Michael Kuhn	Cambridge Savings Bank
Pat Moran	Century Bank
Demetri Yannopoulos	Commerce Bank
Denise Hawk	Country Bank for Savings
Robert Wigmore	Farm Credit East
John Kelley	Fidelity Bank
Nancy Mirkin	Florence Savings Bank
Bill Ahlemeyer	Greenfield Cooperative Bank
Rosemary Morin	Hampden Bank
Matt Pierce	Leader Bank
Bob Paulson	Middlesex Savings Bank
William Morse	Mutual Bank
John Davison	Rockland Trust
Jeremy Blanche	Salem Five
Rich Kump	UMass Five College Federal Credit Union
James Graziano	Weymouth Bank
Robert Hickey	Winchester Cooperative Bank
Carl Flumerfelt	Winchester Savings Bank
Kerry Bernard	Winchester Savings Bank

Appendix C: List of Workshop Participants

Name	Organization
Springfield Workshop	
Robert Kain	People's United Bank
Michael Mancuso	People's United Bank
Denise Hawk	Country Bank for Savings
Rosemary Morin	Hampden Bank
Hannah Jabiev	Hampden Bank
Anthony Worden	Greenfield Cooperative Bank
Michael Moriarty	United Bank
Brittney Kelleher	Westfield Bank
Robert Wigmore	Farm Credit East
Frank Canning	MassDevelopment
Miles Hovis	Borrego Solar
David Elvin	Pioneer Valley Planning Commission
Christina Petersen	Pioneer Valley Planning Commission
Boston Workshop	
Xiaolei Hua	People's Bank
Scott Szycher	New England Clean Energy Council
Katie O'Malley	Rockland Trust
Joe Beary	Salem Five
Michael Kuhn	Cambridge Savings Bank
Robert Wigmore	Farm Credit East
Susan Fessenden	MassDEP
Rich Kane	Martha's Vineyard Savings Bank
Mark Fisher	Winchester Cooperative Bank
Robert Hickey	Winchester Cooperative Bank
Kathy Watson	Bridgewater Savings Bank
David Floreen	Mass Bankers Association
Dave Costello	Commerce Bank
Rebecca Sullivan	MassDevelopment
James Duff	Bridgewater Savings Bank
Misha Glazomitsky	Munro Electric
Jim Sandagato	Southbridge Savings Bank
Susan McPhee	Town of Winchester
Summer Jackson	Meister Consultants Group
Albert Pinho	Cambridge Portuguese Credit Union
Dick Jones	Boston Community Capital

Meghan Shaw	CEA
Randi Augustine	MassDEP
Jayson Uppal	Meister Consultants Group
John Podgurski	US EPA
Matt Arner	Solar Flair
John Bolduc	Cambridge Community Development Dept
Charles Phillips	TD Equipment Finance

Appendix D: Workshop Presentations (Boston)

Appendix E: Workshop Handout Material