

USE OF MUNICIPAL ASSISTANCE PROGRAMS TO ADVANCE THE ADOPTION OF SOLAR TECHNOLOGIES

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ABSTRACT

This paper is intended to serve as a tool for municipalities and organizations examining programs to facilitate the installation of solar energy technologies at the local level – no specific program design is prescribed. Readers will be informed about program design considerations, valuable lessons learned, and recommendations to consider when designing a municipal assistance program. Recommendations should be customized to serve the needs of a specific market.

1. INTRODUCTION

Municipalities across the country offer a wide range of services to its citizens from trash removal to urban planning. To promote local solar energy development, municipalities can provide assistance to citizens contemplating the purchase and installation of a solar energy system for their home or business. In most areas of the country, gathering the information necessary to decide whether or not to install a solar energy system requires a dedicated and somewhat sophisticated consumer. First, multiple organizations are involved in the installation process (e.g., installer, utility, city permitting and inspection offices), and each organization has their own processes and procedures pertaining to solar energy installations. Second, consumers must understand a range of available financial incentives and financing options to make an educated financial decision. Furthermore, consumers must be confident that the proposed solar installation will produce the amount of energy estimated by a sales representative from an installation firm. All of these factors make the information-gathering and decision-making process quite daunting.

Municipalities are uniquely positioned to decrease the uncertainty and time involved in contemplating a solar energy installation by providing credible, unbiased information about solar energy installations to consumers contemplating “going solar.” As consumer interest in solar energy increases, local governments are designing these types of programs broadly referred to in this paper as “municipal assistance programs.” These programs can vary considerably in scope but typically coincide with stages of the information-gathering and decision-making processes. Some municipal programs address all stages of these processes while others focus in specific areas.

Specifically, this paper discusses various approaches taken in Madison, Wisconsin and San Francisco, California, with a preview of a program to come in Berkeley, California. Much of the information was provided through the U.S. Department of Energy’s (DOE) Solar America Cities program, a partnership between DOE and 25 large U.S. cities to accelerate solar adoption in the nation's electricity load centers. Through this program, DOE created teams of national lab experts and consultants from CH2M Hill to work with the 25 cities to design and implement a plan to build a sustainable local solar market. Municipal assistance programs are a part of building sustainable solar markets in Madison, San Francisco, and Berkeley. The planning and implementation experiences of these three locations provide many of the recommendations presented in this paper.

The suggestions included here are the sole opinion of the author and do not express the opinion of DOE, any municipality, or any organization. This paper is intended to serve as a tool for municipalities and organizations examining programs to facilitate the installation of solar energy technologies at the local level – no specific program

design is prescribed. Readers will be informed about program design considerations, valuable lessons learned, and recommendations to consider when designing a municipal assistance program. Recommendations should be customized to serve the needs of a specific market.

2. OVERVIEW OF MUNICIPAL ASSISTANCE PROGRAMS

Municipal assistance programs are increasing in popularity across the country as more and more individuals and organizations become interested in purchasing and installing solar energy systems. The overarching purpose of these programs is to accelerate the adoption of solar energy and facilitate installations, but the depth and breadth of each program varies depending on specific program objectives and local needs.

Municipal assistance programs help prospective consumers decide whether to pursue the installation of a solar energy system by providing unbiased and credible information. The main component of each program discussed in this paper is a technical site survey, which includes a comprehensive site analysis performed by a trained professional. Such education and outreach efforts serve to accelerate the adoption of solar energy in a community.

Municipal assistance programs generally offer one or more services that can be grouped into four major areas: basic solar education, technical site survey, decision-making information, and procurement assistance. These programs are often part of a broader government or utility outreach initiative to facilitate efficient photovoltaic (PV) and solar water heating (SWH) installations in a community. Municipal assistance programs can be co-aligned with broader economic development programs to train a green workforce and stimulate demand for solar technologies and industry locally; likewise, they can be used as a tool towards meeting larger-scale climate and environmental goals.

2.1 Basic Solar Education

Basic solar education can be delivered to a group of potential solar system owners through a workshop, website, or one-on-one meeting. Many site assessments begin with basic solar education through a telephone consultation that identifies the caller's energy needs. Cost and installation information for relevant solar solutions are discussed on the call to assist the consumer in making informed decisions.

2.2 Technical Site Survey

At first, a technical site survey can be conducted remotely, using aerial photography to determine whether a specific

location will receive adequate sunlight for solar energy technologies to be effective. The next step, an on-site evaluation, results in information about a solar energy technology (PV or SWH) installed at a specific location (home or business). During the on-site survey, a trained assessor analyzes specific site conditions that affect the output and installation of solar energy systems. The amount of sunlight and shading, orientation (tilt and azimuth) of the panels or collectors, proximity to the energy load center, and available area for the installation all affect system output. Once this information is gathered and analyzed, the site assessor can make recommendations on specific technologies. Some programs are beginning to require an energy efficiency (EE) consultation as a part of the site survey.

2.3 Decision-Making Information

Some municipal assistance programs offer additional information to prospective solar system owners that may include a financial and environmental analysis. The financial cost-benefit analysis is based on the solar energy system's estimated installed cost and expected electricity output over the life of the system. These calculations, in combination with locally available financial incentives such as rebates and tax credits, should give the customer an accurate ballpark estimate of financial returns and payback periods. Environmental benefits are included in a comprehensive analysis and are usually determined by quantifying the "avoided emissions" from the amount of energy produced by the proposed solar technology system.

While an independent site assessor provides an accurate estimate of system costs and benefits using average installation prices in the industry, it does not replace the need for a site assessment from a PV or SWH installation company. Prospective owners should seek bids from several solar installers when ready to move forward with the purchase of a solar energy system. Each solar contractor will perform their own a site assessment and provide a bid for installing a system based on the equipment they typically install and local market conditions.

2.4 Procurement Assistance

Procurement assistance helps prospective owners through the installation process once they make the decision to move forward. Municipal services could include assistance with evaluating proposals, understanding and selecting financing options, or helping with permitting procedures.

3. PROGRAM DESIGN CONSIDERATIONS

Some of the most common program design considerations are described in this section. Program designers should

identify local needs and market barriers when choosing the building blocks of a municipal assistance program.

3.1 Scope of Services

Municipalities considering a municipal assistance program should make efforts to understand the needs of potential participants and the local solar industry before determining the scope of services required to facilitate transactions between consumers and the solar industry. Group workshops that cover the basics of solar energy, the installation process, available financial incentives, and local permitting requirements are well suited for communities with few solar installations and little experience with solar energy technologies. Municipalities can further expand their services to include a technical site survey, decision-making information, and procurement assistance. Many programs offer advice on EE, SWH, and PV technologies, and some may segment their target audiences by customer type (e.g., residents, businesses), or geographic area.

3.2 Program Providers

Many organizations are well positioned to administer a site assessment program. Municipalities, non-profit organizations, and utilities are all potential program administrators. The scope of services and associated full-time employee (FTE) hours necessary to adequately support the program will determine what type of organization is most appropriate. Most importantly, a provider's assessors should have the appropriate training to uphold a successful, high-quality program. Since site assessment certification is not required currently, program designers should take responsibility to ensure that site surveyors are properly trained through either industry experience or a combination of coursework and fieldwork taught by a reputable establishment. In some cases, electrical and/or structural building upgrades are necessary prior to a solar energy installation. Program designers should be specific about how site assessors will evaluate these items during a site survey.

3.3 Site Assessor Qualifications

In many areas, site assessment training takes place on the job at solar installation firms. However, organizations outside of the solar installation industry are beginning to offer training specifically for site assessors. One such organization is the Midwest Renewable Energy Association (MREA). As the result of a statewide initiative to promote solar energy in Wisconsin, MREA began to offer training specifically for PV and SWH site assessments in 2002. To date, the organization has produced 62 PV and 32 SWH certified solar site assessors located in Wisconsin, Illinois, Iowa, Michigan, Indiana, New Jersey, Colorado and Texas. The Institute for Sustainable Power Quality offers accreditation for organizations such as MREA and

certification for individual instructors offering site assessment training.

3.4 "Hand-off" to the Solar Industry

Program designers should carefully consider when and how to enter and exit the consumer decision-making process. Input gathered from local installers and industry groups can be used to help design a program that meets the needs of prospective solar system owners, the industry, and local governments. Working together to define municipal and industry roles ensures the program is successful in facilitating and accelerating solar energy installations. Involving stakeholders early in the planning process optimizes the scope of services, uses funding sources most effectively, and secures the necessary buy-in to bolster the program's success.

3.5 Program Costs and Benefits

When weighing the costs and benefits of a municipal assistance program, program designers must consider the needs of the local community, quantify the benefits the program can provide, identify the various scopes of services it could offer, determine the availability of funding sources, and determine start-up and operational requirements.

Municipal assistance programs benefit many groups:

- (1) *Consumers.* By providing objective information, municipal assistance programs increase consumer education, confidence and protection.
- (2) *Utilities.* By encouraging high-quality installations through an informed consumer base, municipal assistance programs promote the judicious use of ratepayer-funded programs that support solar installations.
- (3) *Municipalities.* By aligning a municipal assistance program with broader economic development or environmental goals, municipalities can get larger impact per dollar spent than developing a program on its own.
- (4) *Solar industry.* Municipal assistance programs educate prospective solar customers, bringing them closer to a buying decision. As a result, industry spends less time informing potential buyers and more time selling, designing, and installing systems.

3.6 Program Requirements

Municipalities should carefully consider whether or not to impose fees or requirements on consumers and solar industry program participants. Consumers could be required to pay a fee for the technical site survey or to attend a general knowledge workshop before scheduling a site survey. In order to be eligible to participate in a program, solar industry participants could be required to pass a solar

knowledge or local codes test or to be approved by a state or local entity.

4. SOLAR AMERICA CITIES’ APPROACHES

Each of the Solar America Cities participants highlighted here takes a different approach to facilitating the purchase of solar energy systems through the implementation of a municipal assistance program. Examples from programs underway include a table with "snapshot" information along with narrative that describes each municipality’s approach and experience, lessons learned, and keys to success. Integral program design considerations are specifically noted. By discussing the experiences of municipalities in various stages of program implementation, other program designers can benefit from the lessons learned and can improve design choices for the local community. Each of the featured programs is customized to meet the objectives of its respective municipality in a manner that serves local needs with maximum impact for each dollar spent.

4.1 Madison, WI: Prospective Solar Owner’s Agent

4.1.1 Program Description

TABLE 1: PROGRAM SNAPSHOT (MADISON, WI)

Program Objective	To offer a simple, yet comprehensive service that assists Madison residents and businesses in the decision and process to “go solar” at no cost to the participant
Program Inception	June 2008
Target Audience	<ul style="list-style-type: none"> • Residential • Commercial (small and large) • Government
Scope of Services	<ul style="list-style-type: none"> • Basic solar education • Technical site survey (PV, SWH, some EE) • Decision-making information • Procurement assistance
Start-Up Requirements	<ul style="list-style-type: none"> • Lead time: 6 months • FTE equivalent: 0.50 • Marketing & administrative costs: minimal
Operational Requirements	<ul style="list-style-type: none"> • FTE equivalent: 1.25 • Marketing & administrative costs: minimal
Funding Sources	<ul style="list-style-type: none"> • DOE Solar America Cities award • Focus on Energy • City of Madison

Through the Solar America Cities grant, the City of Madison contracted with an MREA-certified consultant to

guide home and business owners through the process of “going solar” in Madison. The objective of the Prospective Solar Owner Agent (PSOA) program is to increase the knowledge, understanding, and confidence regarding the purchase of a solar system by offering a free, comprehensive suite of services (from basic education and site survey through installation). The contracted PSOA works for the city, lending credibility to the program and giving the PSOA consultant direct access to city departments associated with the required permitting procedures.

The PSOA performs remote site surveys using aerial photography and GIS mapping, discusses ballpark installed-cost figures, and arranges an on-site assessment for each property found suitable for solar technology installation. Following the assessment process, the PSOA prepares a financial analysis using a third-party template provided by Focus On Energy, an independent organization that promotes renewable energy and energy efficiency projects in Wisconsin. The PSOA offers an independent analysis of the specific customer site; he or she does not design the solar technology system or make recommendations of specific installation companies. The PSOA will assist residents in gathering and understanding quotes from certified contractors. This service has proven to be extremely popular among Madison residents, eliciting more than 300 inquiries during the first seven months of availability.

4.1.2 Lessons Learned

Demand for Madison’s PSOA service continues to be higher than anticipated. In addition to contracting with the PSOA for more hours, program implementation will be adapted to include two levels of service that will be divided between two agents. One agent will be responsible for pre-screening tasks that are administrative or educational in nature. This agent should handle incoming inquiries, conduct the pre-screening evaluations through aerial photography, educate the public about solar energy, collect necessary energy data, and schedule site visits. The second agent will handle field work and therefore be responsible for conducting site visits, providing energy analyses, preparing follow-up documentation, and assisting customers with the purchase process as needed.

4.1.3 Keys to Success

- (1) *Aerial and digital photography.* The City of Madison makes its database of GIS aerial photography available to the solar agent. This resource, in combination with Google Street View, has been very helpful to complete the pre-screening process.

- (2) *Solar site assessment equipment.* The City of Madison uses the Wiley asset camera to perform shade studies and system output estimates. This camera has software embedded to evaluate shading and system performance using the PV Watts database and costs approximately \$600.
- (3) *Use of an independent financial analysis tool.* The Madison solar agent relies upon Focus On Energy’s financial tool when evaluating payback and return on investment.
- (4) *Easy participation.* The City of Madison makes it easy for its citizens and business owners to “go solar” by implementing a program that is simple to use at no cost to the participant.
- (5) *Ample lead time.* Madison allowed enough lead time to solicit, select, and contract with a qualified local site assessor.
- (6) *City-contracted site assessor.* Contracting directly with the PSOA creates trust and comfort in the Madison community and allows the PSOA to access to city officials for relevant information about permitting or other installation requirements.

4.2 San Francisco, CA.: Mayor’s Solar Founders’ Circle

4.2.1 Program Description

TABLE 2: PROGRAM SNAPSHOT (SAN FRANCISCO, CA)

Program Objective	To encourage as many businesses as possible to install solar energy systems by September 2009 in an effort to help meet the city’s carbon reduction goals and bolster economic development
Program Inception	September 2008
Target Audience	Largest 1,500 commercial rooftops
Scope of Services	<ul style="list-style-type: none"> • Technical site survey (PV, SWH, EE) • Decision-making information • Procurement assistance
Start-Up Requirements	<ul style="list-style-type: none"> • Lead time: 3 months • FTE equivalent: 1.00 • Marketing & administrative costs: minimal
Operational Requirements	<ul style="list-style-type: none"> • FTE equivalent: 1.25 • Marketing & administrative costs: minimal
Funding Sources	<ul style="list-style-type: none"> • DOE Solar America Cities award • San Francisco Department of the Environment

	<ul style="list-style-type: none"> • San Francisco Energy Watch (funded through Pacific Gas & Electric’s System Benefits Charge)
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San Francisco Mayor, Gavin Newsom, challenged owners of the 1,500 largest rooftops for solar technologies to join the Mayor’s Solar Founders’ Circle in September 2008. The city now offers a \$1.50/W rebate (up to \$10,000/meter) and a free solar site survey to businesses who responded to the challenge. Independent experts from the San Francisco Department of the Environment perform a site surveys to discuss energy usage and efficiency measures, confirm the solar potential of the roofs, estimate PV and/or SWH installation costs, and identify the incentives available to the building owner. A press release issued by the mayor’s office says the 1,500 rooftops identified have the potential to supply 170 MW of solar energy, which is more than 30 times the amount installed in San Francisco now. To date, more than one hundred businesses have signed up to receive free site assessments.

In advance of the site assessments, the city sends a unique Web link for each location to building owners and obtains aerial photos of each building. Using an aerial photo as a rooftop map, the survey teams are able to note the condition and type of roof and to outline possible rooftop locations for a solar energy installation. The city also coordinates with building owners in advance to secure a history of electricity usage and cost, estimate of the roof age, and estimate of hot water usage. On site, each survey team gathers data using a kit containing a shade analysis tool, roller wheel for measuring large distances, and camera for taking photos of the proposed array. The surveyors also collect information from electrical panels and water heating equipment.

The City of San Francisco partnered with the National Renewable Energy Laboratory (NREL) to train city employees to perform site assessments. The training took place on rooftops of 3 of the 1,500 best-suited buildings, which were identified using solar mapping technology developed by CH2M Hill. The lab experts were able to train seven city employees and five consultants to conduct solar site assessments. To help streamline the process for generating reports, a team of national lab experts developed a spreadsheet tool to analyze data gathered during the site surveys and facilitate the development of individual reports for each building. In the future, the city plans to integrate the solar site assessments with its building efficiency evaluations.

4.2.2 Lessons Learned

It is difficult to estimate demand for pioneering programs such as the Mayor’s Solar Founders’ Circle. Demand for the San Francisco program is strong, eliciting more than 100 requests for site surveys since the program’s inception in

September 2008. The City of San Francisco relied upon its Solar America Cities partnership to handle the 85 site survey requests it received by the end of the 2008 calendar year. Through this partnership, experts from the NREL and Sandia National Laboratories joined efforts to conduct a week of assessments in January 2009. Working in pairs, the assessors were able to survey over 40 buildings and produce reports that help business owners determine whether to move forward with energy improvements. This level of demand shows that San Francisco building owners are very interested in independent site assessment and analysis provided by the city.

4.2.3 Keys to Success

- (1) *Ability to respond quickly.* Responding quickly is an essential part of providing high-quality services.
- (2) *Integrating EE with PV and SWH.* Integrating energy audits and efficiency recommendations with a solar energy analysis that includes PV and SWH is attractive to building owners because it offers a comprehensive, whole-building view with many energy improvement options. The cash flow from energy efficiency projects in the shorter term helps offset the upfront cost of installing solar energy systems.
- (3) *Qualified trainers and assessors.* Using a qualified trainer from NREL to teach the local workforce about site assessments was a key to the success of the San Francisco program.
- (4) *Targeting a specific audience with a specific message.* Challenging a targeted section of the community to act in the near term fostered friendly competition, a sense of immediacy, and a sense of community among local businesses, building owners, and the City of San Francisco.

4.3 Berkeley, CA: Smart Solar Program

In order to identify the barriers to implementing energy efficiency and solar energy technologies, the City of Berkeley partnered with the University of California to administer a survey of residents and business owners. The survey found that the most common reasons for not implementing energy efficiency and solar energy upgrades were the installation costs, the hassle of the information search, financial uncertainty, and the disparity in the information accessible by consumers versus equipment installers. The city used the results of the survey to design a program that directly addresses these barriers: the Smart Solar Program. Smart Solar will provide access to accurate, trustworthy information in one location through general education events, site-specific assessments, assistance in collecting bids and choosing a contractor, and quality control after the upgrades are complete. Slated to launch in April 2009, the program will offer personalized

consultations to home and business owners, guiding them through the various energy efficiency and solar energy options and incentives available in Berkeley. Although the program has yet to be launched, Smart Solar program designers feel confident that the program goals and structures are well informed. An 18-month planning process that cost approximately \$50,000 included extensive stakeholder engagement and resulted in a needs-based program design that puts Berkeley in an optimal position for success. The Smart Solar program is administered by the Community Energy Services Corporation, a private non-profit organization under contract with the City of Berkeley. The program will target residential and small commercial customers in Berkeley and expects to operate with two full-time employees and a \$223,000 annual budget.

5. RECOMMENDATIONS

General recommendations for consideration when designing a municipal assistance program follow. These recommendations should be customized to serve the needs of the local community and solar market.

- (1) Assess the knowledge base of local consumers (residential and commercial) to determine the scope of services to be offered by a new program.
- (2) Schedule ample time for planning and reshaping the program.
- (3) Design the program with local solar industry input in order to facilitate installations.
- (4) Set specific goals and objectives for the program.
- (5) Consider offering consumer workshops in addition to technical site surveys and project analyses, especially if the local community is unfamiliar with solar energy technologies.
- (6) Carefully consider when the program ‘hands off’ prospective solar system owners to the solar industry.
- (7) Build flexibility into the program design to account for changing market conditions and higher-than-expected demand.
- (8) Secure sufficient resources to support all aspects of a robust customer assistance program including start-up and operational costs (Table 3). Resources allocations may vary based on the scope of the program.

TABLE 3: RESOURCES FOR PROGRAM SUPPORT

Basic Consumer Education	<ul style="list-style-type: none"> • Adequate space to hold workshops • Trained instructors to lead consumer education workshops • Staff to update educational website
Technical Site Survey	<ul style="list-style-type: none"> • Trained site assessors to perform the site surveys • Shade analysis tool

	<ul style="list-style-type: none"> • Digital camera • Aerial photography or mapping software
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TABLE 3 (CONTINUED): RESOURCES FOR PROGRAM SUPPORT

Decision-Making Information	<ul style="list-style-type: none"> • Reputable financial analysis tool for project analysis • Reputable environmental calculator
Procurement Assistance	<ul style="list-style-type: none"> • Transparent process for contractor selection assistance • Clear channels for communication between city departments and site assessors

- (3) Personal interview with Johanna Partin, Renewable Energy Manager, San Francisco Department of the Environment, March 2009
- (4) Personal interview with Chris Bradt, Smart Solar Program Manager, Community Energy Services Corporation, March 2009

6. SUMMARY

Because most municipal site assessment programs are in the first year of service, it is very difficult to determine the cost-effectiveness of these programs in terms of kW installed. However, the exceptional demand for these services in Madison and San Francisco (as well as survey results from Berkeley) show that consumers value independent information about solar system installations tailored to their specific site location. Municipalities are in a unique position to offer unbiased, credible information to potential solar system owners, clearing the way for a solar industry to flourish.

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8. REFERENCES

- (1) Personal interview with Clay Sterling, Education Director at the Midwest Renewable Energy Association, March 2009
- (2) Personal interview with Jeanne Hoffman, Facilities and Sustainability Manager, City of Madison, March 2009 and Larry Walker, Prospective Solar Owners Agent for the City of Madison, September 2008