



Introduction

In the spring of 2011, as part of Governor Deval Patrick's initiative to install 250 megawatts (MW) of solar power in Massachusetts by 2017, the Massachusetts Clean Energy Center (MassCEC), in partnership with the Green Communities Division of the Massachusetts Department of Energy Resources (DOER), unveiled an innovative program model called Solarize Massachusetts (Solarize Mass).¹ Solarize Mass is a community education, outreach and group purchasing model aimed at driving mass adoption of small-scale solar electricity within a community. The model has proven to be highly successful, reducing the installation costs of solar electricity, saving customers money on their electricity bills and enabling increased sales and job creation for solar electricity Installers. In 2011, four communities were selected to participate as part of a Pilot Program², and, based on tremendous program success, 17 communities (Acton, Arlington, Boston, Hopkinton, Melrose, Mendon, Millbury, Montague, Newburyport, Palmer, Pittsfield, Lenox, Shirley, Sutton, Wayland, Sudbury and Lincoln) were selected to participate in the 2012 Solarize Mass program.³

2012 Solarize Mass Program Results

The community education and outreach efforts during the 2012 Solarize Mass Program identified more than 5,400 residents and business owners who were interested in pursuing solar electricity during the five-month sign up period. By receiving these leads, competitively-selected Installers were able to substantially reduce their customer acquisition costs and pass those cost savings along to customers in the form of tiered pricing reductions. As part of the Solarize Mass program, residents and business owners in the 17 communities signed 803 contracts to install over 5.1 megawatts (MW) of solar electricity as of the November 4, 2012 program deadline. Based on those contracted projects, the number of small-scale solar electricity projects would more than double in almost every participating community as a result of the program.

Figure 1 shows that over 5,400 residents and businesses expressed interest in participating in the 2012 Solarize Mass program. Many of these learned about the program by attending the "Solar 101" or "Solar 201" educational meetings in each community. More than half of the initially interested customers were determined early on to have non-feasible sites for solar electricity, through the Installer's screening process which usually consisted of a review of aerial imagery during a phone conversation or at an event. Even though these customers didn't ultimately contract to install solar electricity, their participation was still valuable, as they could help spread the word about the program to other people in the community. Interested customers that passed the screening evaluation received a site visit from the selected Installer to confirm if their site was suitable for a solar electricity system. Ultimately, 15 percent of the original 5,405 interested residents contracted to install solar electricity as part of the 2012 Solarize Mass program; about 30 percent of the customers that passed the screening evaluation eventually contracted. Installers have told MassCEC that these "closure rates" are significantly higher than their business as usual numbers, again demonstrating the value of the program in eliminating customer acquisition costs for the Installers.

¹ The Solarize Massachusetts Program was partially inspired by the Solarize model established in Portland, Oregon. See the US Department of Energy's Solarize Guidebook for more information: <http://www.nrel.gov/docs/fy11osti/50440.pdf>

² Please see the Solarize Mass Pilot Overview for more information on the 2011 program and results. (<http://www.solarizemass.com/masscec/file/Solarize%20Massachusetts%20Pilot%20Overview.pdf>)

³ Communities had the option to partner together as part of the 2012 Solarize Mass program, and three groups of communities did so: Pittsfield and Lenox, Millbury and Sutton, and Wayland, Lincoln and Sudbury.



Solarize Communities	Installer	Initial Interest Contacts	Site Visit Completed	Contracts Signed	Contracted Capacity (kW)	Average System Size (kW)	Final Tier of Pricing
Acton	New England Clean Energy	435	228	36	188.2	5.23	4
Arlington	SolarFlair	847	471	157	718.3	4.57	5
Boston	SolarCity	411	168	116	522.3	4.50	5
Hopkinton	SolarFlair	366	212	56	367.6	6.56	5
Melrose	Next Step Living / Roof Diagnostics	672	178	79	425.6	5.39	5
Mendon	SolarFlair	260	138	22	170.8	7.76	4
Montague	Northeast Solar Design Associates	213	132	42	179.5	4.27	4
Newburyport	SunBug Solar	425	158	46	423.1	5.12*	5
Palmer	Astrum Solar	162	96	17	150.0	8.82	4
Shirley	New England Clean Energy	237	73	14	69.6	4.97	3
Lenox/Pittsfield	Astrum Solar	395	206	58	465.3	8.02	5
Lenox		128	65	19	151.8	7.99	
Pittsfield		267	141	39	313.5	8.04	
Millbury/Sutton	Second Generation Energy	338	228	23	184.2	8.01	4
Millbury		130	99	7	43.0	6.14	
Sutton		208	129	16	141.2	8.82	
Lin/ Way/Sud	Astrum Solar	644	376	137	1,281.6	9.35	5
Lincoln		119	79	32	313.8	9.80	
Sudbury		137	94	31	308.8	9.96	
Wayland		388	203	74	659.1	8.91	
Total		5,405	2,664	803	5,146.0	6.36	

*Excluding larger commercial systems

Figure 1. 2012 Solarize Massachusetts Program Results⁴

Figure 2 below illustrates the number of residential and small-scale commercial solar electricity projects that were installed within each community or group of communities as far back as 2002 until just prior to the start of the 2012 Solarize Mass program, versus the number of projects that were contracted during the five month sign-up period under Solarize Mass. Figure 2 also shows the Solarize Mass Adoption Multiplier, which demonstrates, as a function of population, that the average adoption rate of small-scale solar electricity projects increased by an average of 18 times from ‘business as usual’ in 2011 to the Solarize Mass Program in 2012. The average Adoption Multiplier for small-scale solar electricity projects across the state that applied for rebates through MassCEC during the same time period increased by a total of 1.5 times.⁵

⁴ Program results are based on information received through 11/4/2012, the end of the 2012 Solarize Massachusetts program. As of 2/4/2013, participating installers identified nine percent (9%) of contracted projects that were not moving forward. Common reasons for contract cancellation included unforeseen roof structural issues, and Lease/PPA customers not meeting the credit requirements of a third party financier. This cancellation rate is comparable with the overall cancellation rate of projects that apply for a rebate through the Commonwealth Solar II rebate program. The contracted capacity as of 11/4/2012 determined the tier pricing in each community, regardless of future attrition, and therefore is used in this document in graphs and tables relative to factors that affected the tier pricing. Other tables and graphs use the 2/4/2013 data, where noted.

⁵ Based on projects that were submitted for a rebate under the Commonwealth Solar II rebate program.

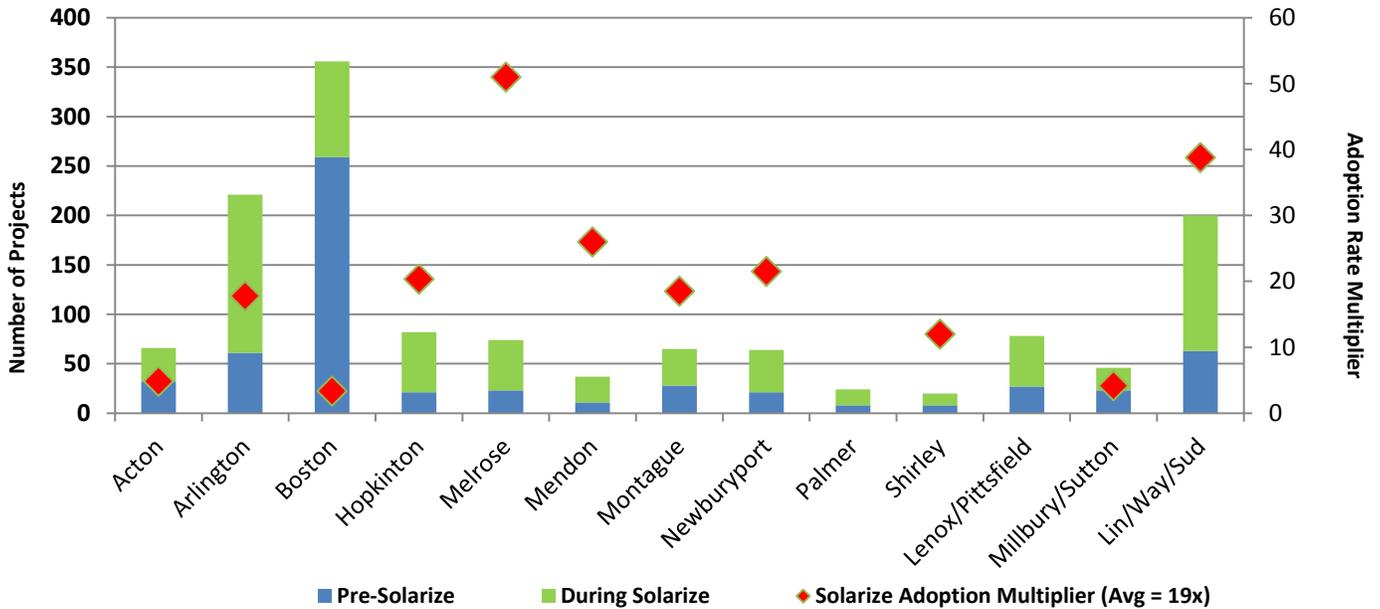


Figure 2. Number of Projects Installed Pre-Solarize Mass vs. Contracts Signed During the 2012 Program (using 2/4/2013 & 5/1/2013 data), relative to the Solarize Mass Adoption Multiplier⁶ within each community.

Figure 3 below illustrates the tier pricing structure and the contracted capacity of solar electricity a community (or group of communities) would need to secure in order to receive the benefit of greater pricing reductions. The contracted capacity of both purchased systems and Power Purchase Agreement (PPA) or Leased systems counted toward the tier pricing. However, because the cost per watt of purchased systems is more easily displayed, many of the graphs and tables below only summarize results for those systems.

Tier Level	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Contracted Capacity (kW)	1-25	>25 – 50	>50 – 150	>150 – 250	250 +

Figure 3. 2012 Solarize Mass Pricing Tiers

At the beginning of the 2012 program, the average cost to purchase a residential or small-scale commercial system in Massachusetts was \$5.23/Watt. Competitively selected installers offered initial discounts of 1-29 percent off the market price, and up to 35 percent reductions based on resident participation. The initial discount was an important advertising tool, and in combination with a tiered pricing structure, enabled Installers to stay well ahead of ongoing industry-wide cost declines during the program.

⁶ The Solarize Mass Adoption Multiplier compares the solar electricity adoption rate as a function of each community or group of communities' population during Solarize Mass, relative to the same time period in 2011 (June 1st – November 4th). The average multiplier was 19x. For Palmer and Lenox/Pittsfield (no red dots) it was "infinite", meaning they submitted no solar electricity applications to MassCEC from June – October 2011.



Figure 4 below shows the tier pricing ranges per community. The red line indicates the cost per watt of solar electricity at the start of the program (\$5.23/watt) and the green bars represent the tier pricing spread for purchased systems that the selected Installer offered within each community. As demonstrated in the figure below, all participating Installers offered tiered pricing that started below the average price for solar in Massachusetts. Of the 17 participating communities, 10 reached Tier 5 pricing during the course of the program, securing the lowest pricing offer from the Installer. An additional six communities reached Tier 4 of pricing.

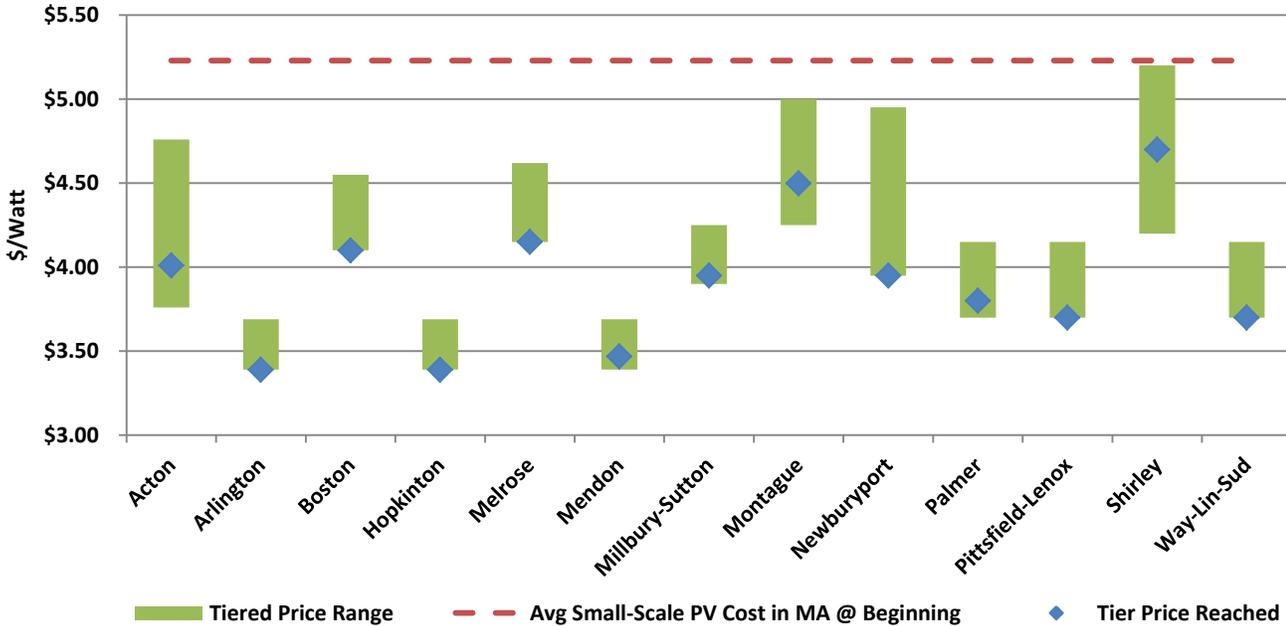


Figure 4. Tiered Pricing Structure for Purchased Systems and Results in 2012 Program

Installers were required to offer a standard base price for each tier, as well as a pre-defined list of cost adders, which could apply based on either certain site conditions or on customer-requested system features. The most frequently applied cost adders implemented during the 2012 Solarize Mass program included customer requests to upgrade to micro-inverters or higher performing panels, the need for a structural engineering analysis, or the addition of system monitoring. The highest cost adders were associated with ground or pole-mounted systems. The total cost of purchased projects was comprised of both the base price and cost adders. Cost adders added an average of 11 percent to the price of a purchased system from the base price. Of all project cost adders applied during the 2012 program, 40 percent were associated with optional system upgrades. Figure 5 below shows the frequency of cost adders that were applied to purchased projects during the 2012 Solarize Mass program, as well as the average cost per-watt for the adders under the program. The asterisk notes cost adders that were an optional system upgrade. It should be noted that this data is relevant for communities that had purchased projects, rather than all leases or PPAs.



Type of Project Adder	Frequency Applied to Projects	Average Adder Price (\$/W)
Micro-Inverters*	57%	\$ 0.22
Structural Engineer Analysis	54%	\$ 0.11
Panel Upgrade*	25%	\$ 0.41
Monitoring*	23%	\$ 0.22
Electrical Line Side Tap	23%	\$ 0.09
Rafter Reinforcement	14%	\$ 0.18
Multiple Roof Arrays	12%	\$ 0.10
Electrical Sub-Panel	10%	\$ 0.10

Figure 5. Frequency of Cost Adders Associated with Purchased Systems (based on 2/4/13 data)

Figure 6 below represents the median purchase price (incorporating project adders) within each community, relative to the base price offered by the Installer. In addition, Figure 6 demonstrates the difference between the average price of purchased projects under the 2012 Solarize Mass program, which was \$4.15 per watt, and the average price of solar PV projects in Massachusetts at the start of the program, which was \$5.23 per watt. This represents roughly a 20 percent reduction in price.

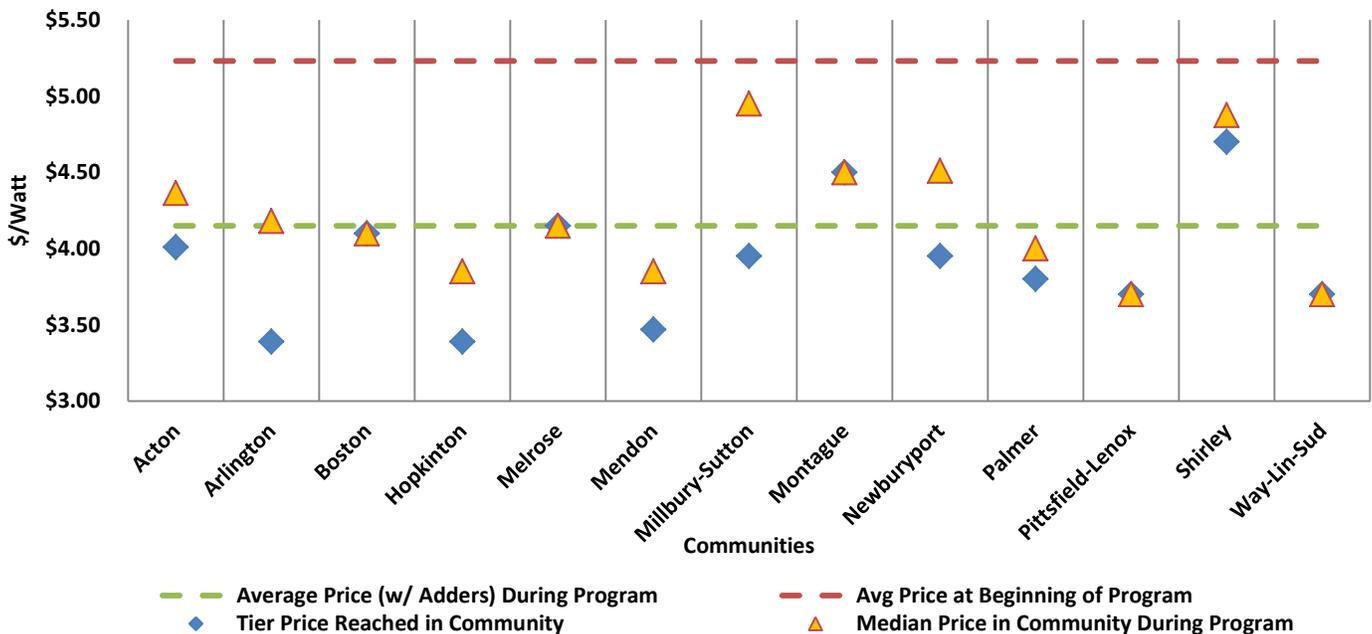


Figure 6. Median price (including project adders) relative to the base tier price reached (which excludes project adders) within each community. The red and green dotted lines show the difference between the average price for purchased projects under the program (including project adders) and the average price of projects in MA at the beginning of the program.⁷

⁷ Solarize Mass numbers based on 2/4/13 data for purchased systems under the 2012 program.



Between communities, the number of purchased systems versus PPA or leased systems varied widely. Figure 7 below shows the percentage breakout between the two ownership models. In order to participate in the program, installers were required to provide tiered pricing associated with both ownership models, in order to provide choice for customers.

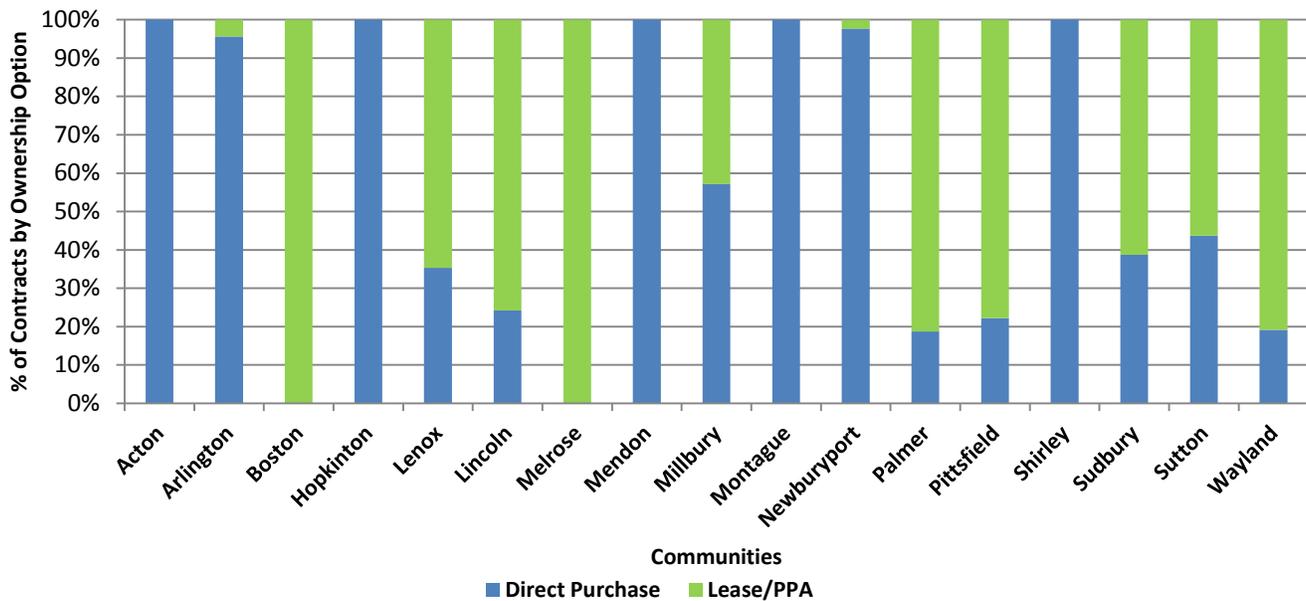


Figure 7. Breakout between percentage of purchased solar electricity projects (Direct Ownership) versus leased or PPA projects (3rd Party) by community (based on 2/4/13 data)

Getting the program up and running and building momentum took time. Figure 8 shows the time that each community spent at each pricing tier. For instance, by Week 10 of the sign-up period, five communities had reached Tier 3 pricing. Communities that had higher percentages of direct purchase systems generally took longer to get through the initial pricing tiers, but ultimately contracted at the same levels as communities with higher percentages of Lease or PPAs.

In addition, as seen in Figure 9, the cumulative contracted capacity among all communities by week 10 (half way through the sign-up period) was only about one fifth of what the final contracted capacity would be under the program. Though some communities got off to a faster start than others, the program ultimately succeeded in all communities. Overall, as momentum built, and particularly as the deadline approached, the rate of contract adoption accelerated dramatically.

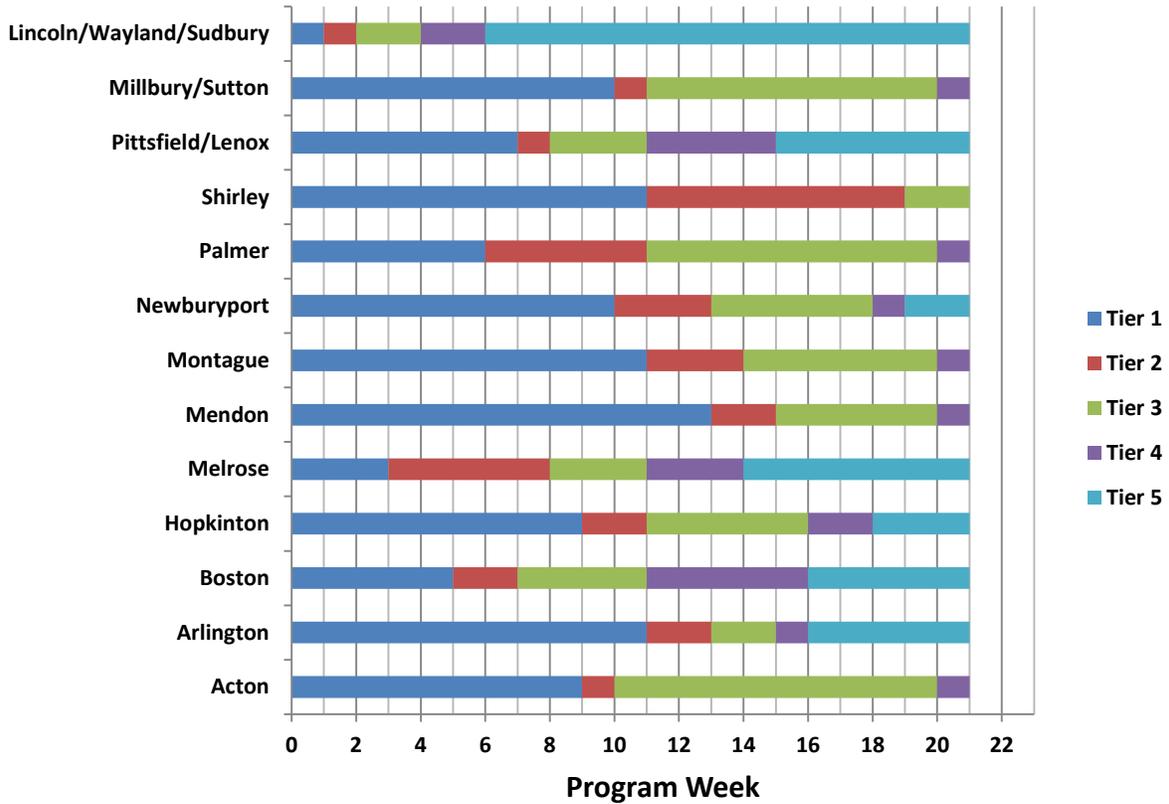


Figure 8. Tier Pricing Threshold timeline during Solarize Mass Sign-Up Period (Based on 11/4/2012 data.)

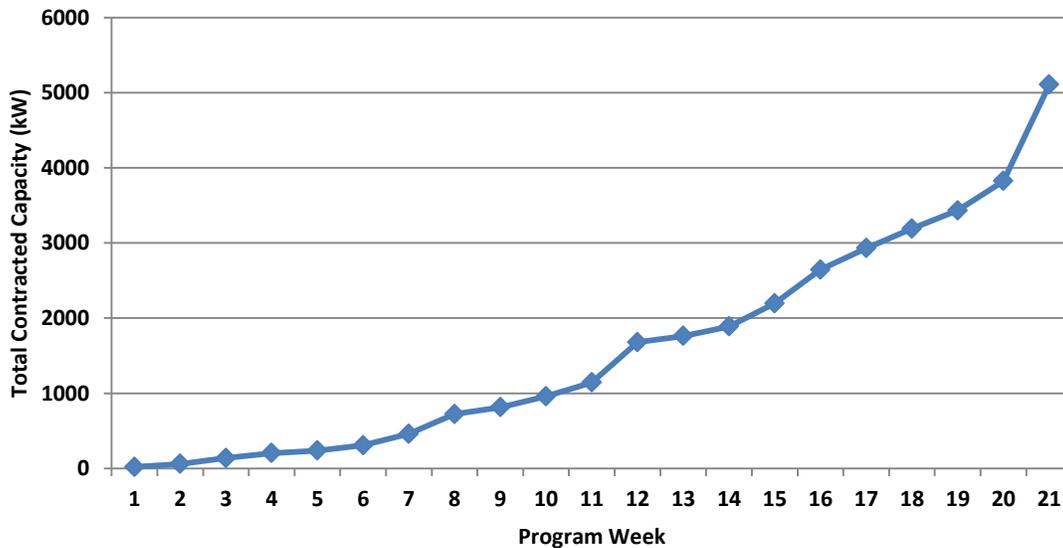


Figure 9. Cumulative Contracted Capacity for all 17 communities under the 2012 Solarize Mass Program. (Based on 11/4/2012 data.)



Solarize Mass Program Feedback

Upon completion of the program, MassCEC conducted separate feedback sessions with the Solarize Mass Program Installers and with town officials and volunteer organizers.

Customer Feedback

In order to better understand the experience of individual residents and business owners, MassCEC conducted a post-program email survey that was sent to every resident and business that provided email contacts over the course of the program. Of the respondents who completed the survey, 70 percent had a very or somewhat positive experience with the program, and most respondents gave high marks on the Solar 101 and Solar 201 programs. Future participating communities should focus heavily on delivering customers to these events. When asked what was the main source of information for residents throughout the Solarize Mass program, the most common response were community meetings or events (20 percent), followed by Solar Coach or Town Official (19 percent), Solarize Installer (16 percent), television, radio or newspapers (12 percent) and Local community or Civic Groups (11 percent).

Town and Community Volunteer Feedback

Town officials and community volunteers that participated in the 2012 Solarize Mass program invested a significant amount of time in driving the success of the program. Volunteer participants estimated that a total of 400 to 600 volunteer hours were dedicated to driving interest during the program's start-up and sign-up periods.

Community Solar Coach feedback:

- A significant time commitment is required to make the program successful
- Communities want to engage volunteers with diverse skill sets
- Establish tasks and areas of responsibility for volunteers early in the program
- Volunteers should be aware of sign and banner bylaws in the community
- Solarize Mass is a great way to expand outreach capacity of the volunteer team

In addition, the communities' volunteer teams outlined some of the outreach efforts that were successful in driving interest in the program. Figure 10 below outlines some of the efforts, categorized by how time intensive they were, that had both high and low impacts in generating customer sign-ups.



Low Impact		High Impact
Non-Time-intensive	<ul style="list-style-type: none"> • Handing out flyers 	<ul style="list-style-type: none"> • Community interest survey before start of program • Newspaper articles • Emails to community org lists, interested resident list • Insert into tax bill – water bill • Support of public officials • Signs and banners in public places • Public library display
Time-intensive	<ul style="list-style-type: none"> • Tabling at events - some communities 	<ul style="list-style-type: none"> • Solar open houses • Tabling at hardware store or other local stores • Door hangers placed at homes with good solar access • Community mailing • Incorporating interested residents and people with signed contracts into community volunteer outreach effort

Figure 10. Time Effort and Impact of Community Outreach Efforts

Installer Feedback

The Solarize Mass program Installers also provided positive feedback. Both installers and the communities felt that communication between the parties was crucial. It is important that participants understand and agree on their roles under the program, and develop a combined outreach plan before the sign-up period is in full swing.

In addition, co-branding the program as a state, community, and installer partnership helped to add legitimacy to the technology and the efforts being made around education and outreach.

In order to combat a general tendency to delay contracting, many installers offered small additional incentives to residents who contracted early in the program. As a result, communities with incentives tended to reach higher tiers faster.

Conclusions

MassCEC has identified several key factors to the resounding success of the program:

- **Education.** Basic education about solar electricity, available incentives, and project economics is a key driver of generating interest and increasing adoption of the technology.
- **Preparation was important.** Communities that developed a detailed marketing and outreach plan at the onset of the program were more successful in generating sustained interest and participation in the program.
- **Tiered Pricing Helps.** Tiered pricing helps to motivate residents to participate, and to sell to each other. This resulted in compounding program success, as further pricing tiers were reached and additional money was saved by all.



- **Timing and Deadlines Drive Participation.** A deadline was important in motivating community members to take action and commit to signing a contract. There was a clear spike in participation as successive pricing tiers and the enrollment deadline approached.
- **Utilizing a variety of outreach methods allows program organizers to reach a broader population.** Although one-time events brought in larger groups of people, sustained information campaigns were equally valuable. Creative uses of media, personal outreach, targeted canvassing and organizing solar open houses proved successful.
- **Installer needs to be ready.** An Installer should be prepared from an operational and staffing perspective to manage the intake and management of an extremely large volume of leads at the onset (and through the duration) of the program. In addition, the community and Installer should work together to create a combined outreach plan at the onset for the course of the program.

About the Massachusetts Clean Energy Center

Created by the Green Jobs Act of 2008, the Massachusetts Clean Energy Center (MassCEC) has as its mission to foster the growth of the Massachusetts clean energy industry by providing seed grants to companies, universities, and nonprofit organizations; funding job training and workforce development programs; and, as home of the Massachusetts Renewable Energy Trust, supporting the installation of renewable energy projects throughout the state.

About the Department of Energy Resources

The Massachusetts Department of Energy Resources develops and implements policies and programs aimed at ensuring the adequacy, security, diversity, and cost-effectiveness of the Commonwealth's energy supply within the context of creating a cleaner energy future.