



Solar America Cities – Solar Boston

Market Transformation

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Solar Boston Program

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Timeline

- Solar America Cities Program
 - October 1, 2007
 - August 31, 2010
 - 95 Percent Complete
- Solar America Cities Special Project
 - January 1, 2010
 - December 31, 2011
 - 5 Percent Complete

Budget

- Solar Boston:
 - \$150,000 DOE share
 - \$150,000 cost share
- SAC Special Project:
 - \$1.343 million DOE share
 - \$210,000 cost share

Barriers

- Municipal solar procurement
 - Solar integration in emergency response
 - Workforce development
- Note: This project included 13 separate project tasks each addressing different solar market barriers

Partners

- Lead: Mayor's Office of Environmental and Energy Services
- Massachusetts Technology Collaborative
- Barr Foundation
- National Grid
- NSTAR Electric
- Massachusetts Energy Consumer's Alliance
- Benjamin Franklin Institute of Technology

•Municipal Solar Procurement

- The City of Boston faced significant legal and financial barriers to procuring solar PV systems. These challenges included:
 - New and unfamiliar procurement pathways
 - Capital constraints during a period of declining municipal budgets
 - Inconsistent state incentive programs
 - Unfamiliarity of technology to facilities professionals and challenges with respect to project management

•Solar Integration in Emergency-related Infrastructure

- Cities have not effectively integrated solar technologies into their emergency response infrastructure
 - Little information exists on the use of appropriate technologies increasing the resiliency of emergency response infrastructure using solar technology
 - Solar technology applications are unfamiliar to most members of the emergency response community
 - Sustainability is not a core concern for emergency response professionals

•Workforce Development

- High quality solar installations will be critical for the growth of the PV and SWH markets in the region
- Increasing the size of the solar workforce will increase market competition, drive down installation costs and result in deeper market penetration

- Objective: Develop pipeline of municipal solar projects
 - Drive down installed costs through competitive procurements
 - Support Boston-area solar market during recession
 - Provide opportunities for new installers to enter the solar market
 - Lead by example
- Objective: Integrate solar technologies into emergency infrastructure
 - Research, develop and deploy “Solar Evacuation Route” concept as a national model
 - Pilot new high-value solar applications with high potential market penetration
- Objective: Develop the Boston-area solar workforce
 - Expanding the solar workforce drives down installed costs by increasing competition
 - High-quality installations increase the reputation of solar technologies and improve market penetration

- Municipal Solar Procurement:
 - The Solar Boston program has developed a pipeline of nine solar projects with a capacity of more than 500kW. Solar Boston has:
 - Developed a financing strategy for each of these projects that leverages state and federal funds.
 - Developed stock procurement documents that can be used in future procurements
 - Assisted with the management of the project pipeline and cultivated experienced solar project managers in a number of city agencies
 - Held open procurements that have resulted in significantly discounted installation prices when compared to other projects in the area
 - Eight of the nine City projects are either completed or under construction. Construction of EECBG-funded 140kW solar project on the City's archives building will begin in the summer or fall of 2010
 - Each of these projects will be owned by the City of Boston and not by third-party financiers. For several of these projects, this means that the City will be able to take advantage of the State's new SREC program. The City will have a significant ongoing revenue stream from these solar installations.

- Solar Integration in Emergency Infrastructure
 - Solar Boston convened a series of workshops with City emergency personnel to develop a list of ways to integrate solar into emergency preparedness
 - These brainstorming workshops developed new and innovative ways to integrate solar applications into critical emergency infrastructure
 - Also served to introduce solar technologies to city staff who are not working on sustainability issues
 - Workshops led to stakeholder buy-in and staff interest in pursuing “Solar Evacuation Route” concept
 - These workshops led to Solar Boston’s “Special Project” application
 - Solar Boston is currently coordinating the procurement of the Solar Evacuation Route elements with staff from the City’s Public Works, Transportation and Emergency Preparedness agencies
 - This cross-cutting pilot project will serve as a national model for integrating solar into emergency infrastructure

- Workforce Development
 - Solar Boston has organized several installer education programs. These include:
 - RETScreen Solar Hot Water trainings
 - RETScreen is a free software package that allows installers to complete quick and accurate analysis of potential solar installations. Solar Boston has completed three free RETScreen trainings during the program. These trainings trained more than 40 local installers on the software. Solar Boston is in the process of developing an ongoing training program with the Benjamin Franklin Institute of Technology.
 - Solar Hot Water Training
 - Solar Boston organized a two-day solar hot water installer training with the Florida Solar Energy Center. More than twenty local installers attended this training.
 - Train-the-Trainer
 - Solar Boston sponsored a PV trainer from the Benjamin Franklin Institute of Technology to attend a week-long PV training course at the Florida Solar Energy Center. This training resulted in BFIT developing a solar specific training curriculum that will be started in the fall of 2010. This curriculum will allow students at the two-year college to develop the skills necessary to enter the green workforce.

- **Internal City Collaborations Include:**
 - Boston Public Health Commissions, Boston Water and Sewer Commission, Boston Public Schools, Mayor's Office of Emergency Preparedness, Department of Public Works, Transportation Department
- **Massachusetts Technology Collaborative**
 - \$50,000 cost share grant to support Solar Boston staff
- **National Grid**
 - \$50,000 cost share for solar hot water system rebates, co-training of SWH workforce
- **NSTAR Electric**
 - In-kind staff support for interconnection issue review
- **Barr Foundation**
 - \$10,000 in in-kind support for the City of Boston's Green Affordable Housing Program
- **Massachusetts Energy Consumer's Alliance**
 - Project management of Solar Roxbury C&I buying pool
- **Benjamin Franklin Institute of Technology**
 - Use of training space, co-development of solar training programs, Solar Boston sponsored "train-the-trainer" program

- Significant increase in Solar Capacity during Solar Boston Program
 - Original baseline survey found just over 500kW of solar city-wide
 - By the end of 2011, there will be more than 600kW of solar on City-owned buildings
 - Given the current pipeline of know projects, Solar Boston expects there to be more than 5 MW of PV in the City by the end of 2011.
 - Represents a 10-fold increase in City-wide solar PV capacity over the life of the Solar Boston program

City Owned Systems	Size (kW)
Boston Water and Sewer Commission Headquarters	240
Archives Building	140
Boston Latin Academy	34.8
FDR School	19.6
Boston Latin School	5.4
Murphy School	52.2
Madison Park School	7.7
Boston Public Health Commission (SHW equiv.)	19.3
Camp Harborview	16.7
Evacuation Route Projects (expected)	71
2011 City Total	607 kW

- The \$150,000 in federal grant funds has leveraged more than \$2.5 million in non-federal funds for solar-related projects in the City of Boston
 - This is a non-federal to federal leverage ratio of 15.6 to 1
 - Without the staff capacity funded under the Solar America Cities grant, the city would not have been able to access these non-federal resources
 - Leveraged funds highlights include:
 - \$900,000 in Boston Water and Sewer Commission capital funds
 - \$235,000 in Clean Energy Choice-Low Income funds
 - \$100,000 in USGBC grant funds
 - \$85,000 in funding from the State Department of Energy Resources for SWH projects and studies
 - \$200,000 in City of Boston capital budget
 - \$240,000 from the Commonwealth Solar rebate program
 - \$50,000 in National Grid solar hot water rebates
 - \$50,000 in MTC Solar Boston direct program support
 - \$81,000 in Clean Energy Choice funds
 - The solar strategy developed under Solar Boston has also leveraged other sources of federal funds including:
 - \$1.343 million for the SAC Special Projects
 - \$400,000 in EECBG funds for a 140kW solar installation
 - \$300,000 for a residential solar PPA buy-down program
- Including other federal funding, the original \$150,000 Solar America Cities grant will result in more than \$4.5 million in solar investment in the City of Boston between 2007 and 2011
 - This is **30.7 to 1** leverage ratio

- **Project Funds:**
 - \$150,000 in federal funds
 - \$150,000 in cost share
 - \$50,000 in cash from MTC
 - \$50,000 in SWH rebates from National Grid
 - \$10,000 in-kind from Barr Foundation
 - \$40,000 in-kind from National Grid and NSTAR Electric
 - As originally planned, the Solar Boston program is under-budget. The City and DOE have expanded the term of the original award and added several elements to the scope of work. This includes an effort to reform the City's solar permitting fees and process.
 - Additional funding would be used to hire staff. This staff position would:
 - Coordinate future municipal solar projects
 - Expand the City's C&I solar buying pool
 - Increase marketing efforts as part of the Renew Boston initiative
 - Complete a solar hot water roadmap
 - Pursue expansion of the Solar Evacuation Route pilot beyond the initial corridor
 - Pursue funds to expand the City's residential solar PPA buy-down program
 - Continue to update the Solar Boston map and track solar installations in the City
 - Assist businesses and residents wade through the complex incentives available to them from both the federal government and the new state SREC program

- Explain project plans for the rest of FY10:
 - Complete municipal solar projects
 - Change City solar permitting fees to align with national best practices
 - Implement solar curriculum for City schools with solar installations
- Upcoming key milestones:
 - Implementation of Solar Evacuation Route special project
 - Completion of 240kW Boston Water and Sewer Commission installation

- Solar Boston Program Key Points:
 - The Solar Boston program focused on a number of City-sponsored initiatives including:
 - Workforce development
 - Solar applications deployment for emergency applications
 - Municipal solar projects
 - Many other market barrier were addressed under this program, but are not part of this brief presentation
 - Significant increase in both City-owned and City-wide solar capacity during the life of the program
 - By the end of the program, the City will own more than 600kW of solar PV capacity
 - The City-wide solar capacity is anticipated to be around 5 MW by the end of the program
 - This is a ten-fold increase in Boston's solar capacity during the life of the program
 - Original \$150,000 in federal funding resulted in more than \$4.5 million in solar-related activity in the City of Boston over the course of the project
 - Developed and will pilot the Solar Evacuation Route concept that could be a cross-cutting national model for integrating solar applications into emergency preparedness