

Project Description:

The Fairbank Community Center (FCC) Solar project includes a 480 sf solar thermal array for domestic hot water production, and a 6.7 kWdc solar electric array to offset electricity use. The Fairbank Community Center is a multi-use facility of three major sections: a former elementary school, currently utilized as office space for the Sudbury Public Schools, constructed in 1951; the Parks and Recreation Department, including the Atkinson Pool (and associated showering facilities), constructed in 1987; the Senior Center, constructed in 1990



Street Address: *40 Fairbank Road*
City/Town: *Sudbury, MA, 01776*

The FCC was chosen for these solar systems since it has significant electricity and hot water usage and is used year round, as well as being used by a wide range of Sudbury residents. It is also located on a busy corner, so provides lots of visibility to residents of the systems installed, as they go about their daily lives.

Project Timeline:

Initial work for the FCC project began in May, 2009 with evaluation of where a solar installation might have the maximum benefit, and original schematic design in response to the EECBG grant announcement. Budget pricing and assembly of relevant documents proceeded on schedule for the October, 2009 EECBG proposal date. Upon receiving notice of the award of the \$141,864 grant in February 2010, the town issued an RFQ for designers of record for the systems. In September 2010 construction documents were issued, and bidders returned their bids in October 2010. Construction began in March 2011 and was completed on June 2011, with systems running on June 2011.

Project Budget:

The total amount of the grant award was \$141,864. The 32 solar PV collectors and 12 hot water collectors are expected to save annually 7440 kWh's and 1518 therms. The PV cost was \$37,900 and the hot water cost was \$78,877.

The grant award was \$141,864. Cost of materials and the installation of the solar panels and hot water collectors totaled \$116,777; Engineering costs were \$9,950, post construction clean-up costs were \$951, and administrative costs were \$14,186.

Project Team:

Sudbury's Green Ribbon Committee spearheaded the grant proposal process, coming up with a proposed project and location, and assembling relevant paperwork for the grant process. Once Sudbury was notified of the award, the project was handed off the Sudbury's Permanent Building Committee (PBC) for execution. The PBC issued an RFQ for designers of record, and subsequently bid the project under the relevant constraints. BLW Engineers of Littleton, MA won the RFQ for designers, and Ostrow Electric won the contract for the solar electric system, while LittleFoot Energy of Wayland, MA won the bid for the solar thermal system, which they then subcontracted to New England Solar Hot Water. The project was overseen by the PBC and Sudbury's Building Department, and conformed to criteria set forth in the EECBG documents and State and town bidding laws.

Since the solar systems were to be installed on a roof scheduled for adding insulation, the town-funded roof insulation project was accelerated to be completed prior to installation of the solar systems.

There were no hazardous or sanitary wastes created that would require special handling procedures.

The Town of Sudbury Building Department will be the record holder for all project documents and will comply with the Mass Public Records Law retention schedule. This is a 6 year retention requirement. These records will be retained at the Sudbury Building Department and will be available for public review.













Challenges Encountered:

The main challenges for this project were conceptualizing it, preparing bid documents, and finding qualified bidders for the solar hot water portion of the project. The intent of the project was to demonstrate solar technologies at a highly visible public location as well as appropriately served building utility loads. The Sudbury Energy and Sustainability Committee decided that domestic hot water preheating, as well as, photovoltaic were desirable solar technologies to include in the EECBG. However, this concept increased the difficulty of the EECBG's design and procurement because the trades involved in each technology are completely separate. The Committee spent a considerable amount of its in-house technical resources developing a schematic scope of work that would fit the grant budget and set clear parameters for outside designers, thereby reducing the bid document preparation risk and time. The project was conceptualized as two independent sets of design documents and bid processes by Sudbury's Permanent Building Committee, the body responsible for construction administration.

The Committee was nervous when only two interested bidders could be found for the solar hot water system. Fortunately, the low bidders for both technologies were qualified and within the budget.

Sudbury's Energy and Sustainability Committee and its Permanent Building Committee communicated and worked together effectively to accomplish this project.

Overall the project went smoothly with no major challenges. Minor challenges occurred in integrating the installation of the solar mounting system with the re-roofing process, the disconnect between the times when payments are due to vendors and funds can be disbursed under the grant, and the administrative time needed for generation of the project documents, reports and other documentation required because the project is funded by an EECBG grant.

Lessons Learned:

Many details regarding the diverse trades and considerations involved in accomplishing a solar energy project. Both solar electric and solar thermal require a structural analysis and that should be undertaken at the outset before much time is consumed with mechanical or electrical design. The diverse aspects of solar projects mean that they require more inter-trade coordination than utility-fueled equivalents. The solar thermal involved structural, mechanical and control systems designers and tradesmen.

The project went smoothly thanks to effective planning, communication and collaboration among all the participants, including DOER, the engineers and contractors. This reinforced the lesson of the importance of planning and communication.

Project Metrics: Table 1 – Solar PV and Solar Hot Water

Two solar systems have been installed on the same building. One solar hot water system for domestic hot water that will produce 1518 therms of energy to pre-heat hot water and save approximately \$2,632 per year.

The second solar system installed is a PV array consisting of 32 Evergreen Solar Panels. The system will save \$893 per year in electrical costs.

The Town of Sudbury is utilizing MassEnergy Insight for determining its baseline and for the tracking of its energy consumption. The DOER has provided MassEnergy Insight training and webinars for town staff as well as the Sudbury Green Energy Committee.

Projections of energy use and savings were calculated by manufacturer's product specifications, details of system installation, and projections for cost of the utilities. The Energy Committee and the System Engineer developed the plans and calculated the

projected savings. Going forward, the actual savings will be tracked by the Sudbury Building Department utilizing MassEnergy Insight.

TABLE 1. – Solar Systems – PV and Hot Water

Project NAME	Projected Annual Cost Savings (\$)	Actual Cost Savings since date in service (if available)	Projected Annual Renewable Energy Produced (kWh/therms)	Actual Renewable Energy Produced since date in service (if available)
FCC PV	\$893	N/a	7440 kWh	N/a
FCC SHW	\$2632	N/a	1,518 therms	N/a

PTS info attached

Contact: Jim Kelly, Sudbury Building Inspector, (kellyj@sudbury.ma.us)
Sudbury Building Department 978-443-2209 x1361
275 Old Lancaster Rd
Sudbury, MA 01776

- 1.5 jobs, as determined by the USDOE, for the Sudbury Project were created.

TABLE 2. – Energy Conservation Measures

Project NAME (Eg, New Insulation in Town Hal)	Provide energy consumption for building one year prior to implementation of project ^{1,2} (Native units)	Projected Annual Energy Savings ³ (Native Units)	Actual Energy Savings since date in service ⁴ (if available)	Projected Annual Cost Savings (\$)	Actual Cost Savings since date in service ⁴ (if available)
Solar Thermal & Solar PV	62,395 Therms 217,840 kWh's	1,518 Therms 7440 kWh's	N/A	\$3,285	\$108

- Final costs for the project were as follows:

Little Foot Energy:	\$78,877
Ostrow:	\$37,900
BLW Engineering:	\$ 9,950
Complete Industrial Cleaning	951
Town Administration:	<u>\$14,186</u>
Total Project Cost	\$141,864

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Actual final costs are provided in the template as Attachment C.

- Program for Education and Outreach
 - The solar arrays were placed in a highly visible location. The Fairbank Center is a busy facility, housing the Atkinson Pool, the Sudbury Senior Center, the Sudbury Teen Center and the Sudbury Public Schools Administration offices. The solar collectors were located by design on a segment of the roof facing the main parking lot and readily visible from the extensively used pool entrance.
 - Signage alerting the public to the presence of the solar system and the source of the funding to be located in a visible location near the building entrance.
 - A notice posted on the Town website, with a link to the web-based energy readout from the PV system.
 - Publication in the Sudbury Town Crier and the Sudbury Patch Webpage.
 - Notification via e-mail through the Sustainable Sudbury Network.
- Future Projects Planned
 - The school department has a proposal to perform a \$140,000 lighting controls upgrade project through Nstar.
 - Lighting upgrades at Curtis School to LED lamps.

- A capital request is in process to upgrade the heating system controls in the Fairbanks Community Center.
 - MTC is providing funding for a 2 kW demonstration PV array on the Peter Noyes School.
 - MSBA Green Repair Project for the Peter Noyes elementary school, including roof, window, premium efficiency boiler, and energy management system.
 - Installation of vending machine timers.
 - Replace pool HRV.
 - Install solar PV on High School Roof and Atkinson Pool Building Roof.
 - The Energy and Sustainability Green Ribbon Committee is discussing potential plans for a large PV installation sited at the former landfill.
 - Future plans to replace the police station with a more efficient building that better meets the needs of the community.
 - Hybrid vehicle purchase for the Sudbury Fire Department
- See the following press releases regarding this project
 - 1) Recent article in the Sudbury Town Crier:
www.wickedlocal.com/sudbury/features/x169903118/Energy-and-sustainability-committee-s-progress-report#axzz1Qfu7kKOC
 - 2) Recent article in the Sustainable Sudbury Newsletter:
<http://sustainablesudbury.org/files/2011Summer.pdf>

3) Town of Sudbury Website

Fairbank Community Center goes Solar



Photo courtesy of Robert Morrison

Thanks to the *American Recovery and Reinvestment Act (ARRA)* and the *Mass Department of Energy Resources (MA DOER)*, the Town of Sudbury has obtained an *Energy Efficiency and Conservation Block Grant (EECBG)* and installed two solar systems on the roof of the Fairbank Community Center.

Under the guidance of Sudbury's Energy and Sustainability Green Ribbon Committee, town personnel and the Permanent Building Committee the \$141,864 grant was used to install both a photovoltaic (PV) system to generate a portion of the buildings electricity requirements and a solar thermal system to supplement the domestic hot water production for the pool showers.

The PV system includes thirty-two photovoltaic panels and is expected to provide in excess of 7,400 kWh per year to reduce electric costs.

The solar thermal system will use its twelve panels to preheat domestic hot water for the pool showers and is estimated to save over 1,500 therms per year in natural gas consumption.

The operation and output of both of these systems will soon be viewable over the web.

The Fairbank Community Center was chosen because it is a heavily utilized multi-generational municipal building; it houses the Atkinson Pool, the Council on Aging, the Sudbury Senior Center, **Jean Lind Teen Center**, and Sudbury Public School Administration along with providing a location for a host of other recreational and citizen

uses. Furthermore, the gymnasium roof provided an excellent ‘solar window’ location with its southerly orientation and moderate pitch.

The end result is Sudbury consuming (and paying for) less electricity and natural gas and significantly reducing the town’s carbon footprint; *all at no cost to the Town*.

Edward Lewis, Sudbury Energy and Sustainability Green Ribbon Committee

ATTACHMENT C:
Final Accounting Template

	Budgeted Cost	EECBG Funded Amount	Other Sources of Funding Amount	Final ACTUAL Cost
<u>PERSONNEL:</u>				
Project Management	13,105	13,105		13,105
Installation	4,500	4,500		4,500
Administration (10% limit)	14,186	14,186		14,186
<u>MATERIALS:</u>				
PV Panels	18,000	18,000		18,000
Racks	5,000	5,000		5,000
Inverters	8,000	8,000		8,000
Conduit/Wire	2,400	2,400		2,400
Thermal Tank	9,465	9,465		9,465
Pump Station	15,775	15,775		15,775
Solar Panels & Rack	30,762	30,762		30,762
Piping	11,832	11,832		11,832
Insulation	1,578	1,578		1,578
Wiring	6,310	6,310		6,310
<u>OTHER:</u>				
Cleaning	951	951		951
<u>TOTAL:</u>	141,864	141,864		141,864