EECBG IMPACT EVALUATION

Fall 2013

Massachusetts Department of Energy Resources

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Introduction

The Energy Efficiency and Conservation Block Grant (EECBG) Program, funded for the first time by the American Recovery and Reinvestment Act (ARRA) of 2009, represented a federal priority to deploy the lowest cost, most reliable, and cleanest energy technologies available to units of local government across the country. With more than $14.7 million in ARRA funding for the EECBG program received through the United States Department of Energy (U.S. DOE), the Massachusetts Department of Energy Resources (DOER) provided grants, planning tools and other services to facilitate municipal energy projects throughout the state.

The DOER utilized EECBG funding of $14,752,100 for four program activities:

- Competitive sub-grants for municipalities with populations less than 35,000 to reduce fossil fuel consumption in municipal facilities;
- Training of building code officials offered to all 351 cities and towns;
- Competitive technical assistance consultant services including services for energy savings performance contracts, solar PV, and municipal/district water and wastewater facilities; and
- Establishing an energy use baseline tool for all 351 cities and towns (MassEnergyInsight).

Background/Program Development

In late 2008, in anticipation of the passage of federal stimulus legislation, the Massachusetts Lieutenant Governor's office issued a Request for Information (RFI) to all municipalities to identify infrastructure investments, including energy, which could potentially be completed with a federal economic stimulus package. Municipalities were asked to identify projects that would be "shovel-ready" within 180 days and completed within two years. The responses were due in early January 2009.

ARRA Public Law 111-5, was passed by Congress and the Obama Administration in February 2009 and included energy project funding for states, U.S. territories, units of local government, and Native American tribes under the EECBG Program, which was originally authorized and established in the Energy Independence and Security Act (EISA) of 2007.

In March 2009, the U.S. DOE allocated a total of $42.2 million in ARRA funds to Massachusetts under the EECBG program, including direct grants to 42 communities with populations over 35,000. U.S. DOE provided state energy offices with funding intended to benefit local governments with smaller populations with a minimum of 60 percent of each state's total EECBG award to be distributed through a

sub-grant program. Funding amounts to all awardees was based on population, and the Massachusetts DOER received $14,752,100.

In April 2009, DOER officially launched the newly formed Green Communities Division created under the Green Communities Act of 2008 to serve as the energy hub for all 351 Massachusetts municipalities. Staffing for the Division had begun in January 2009, and, as a result, DOER had a dedicated organization poised to respond to this important federal program.

When the U.S. DOE issued its Funding Opportunity Notice (FON) in March 2009, Green Communities Division staff reviewed the 14 eligible activities identified in light of the specific needs Massachusetts municipalities expressed in the Lieutenant Governor's RFI. The goals of the program as noted in the FON were to:

- Reduce the total energy use of the eligible entities;
- Reduce fossil fuel emissions in a manner that is environmentally sustainable and, to the maximum extent practicable, maximize benefits for local and regional communities; and
- Improve energy efficiency in the building, transportation, and other appropriate sectors.

The vast majority of projects identified by municipalities in response to the RFI were energy conservation/energy efficiency measures, either as individual projects or as part of larger energy savings performance contracts, followed by renewable energy projects (primarily solar PV). These projects readily matched the eligible activities and goals identified by U.S. DOE, and the Green Communities Division created a competitive sub-grant program for municipalities to fund the following:

- Thermal efficiency measures in oil- or propane- heated buildings, as individual projects or as part of an energy savings performance contract (electric energy efficiency measures and thermal efficiency measures in natural gas-heated buildings are eligible for rebates through Massachusetts investor-owned utility energy efficiency programs, so these types of measures were not included);
- Solar PV; and
- Other Clean Energy Technologies: solar thermal, geothermal, Combined Heat and Power (CHP), biomass thermal.

Selection of projects such as these, which did not require environmental impact review under the National Environmental Policy Act (NEPA), was critical to immediately creating and retaining jobs and allowing projects to proceed promptly.

DOER awarded more than 75 percent of total EECBG funding to municipalities through the sub-grant program, exceeding U.S. DOE's minimum 60 percent requirement. The maximum grant award per community was set at $150,000 in keeping with the lowest amount awarded to municipalities receiving EECBG funds directly from U.S. DOE rather than through the sub-grant program. DOER allocated the remaining balance for several programs available at no cost to all Massachusetts cities and towns, all of which matched assistance needs expressed by municipalities:

- Owner's Agent Technical Assistance provided independent third parties to aid municipalities in the negotiation, development and management of energy projects, or to perform studies to support the development of projects.
- Energy Code training for local building code officials addressed municipal needs stemming from recent changes in the Massachusetts energy code, as well as development of the "stretch" energy code, an optional code that is approximately 20 percent more energy efficient than the state's base energy code.
- MassEnergyInsight, a no-cost online tool, enables municipalities to track their energy consumption in order to inform decisions regarding their energy usage.

These planning tools and aides set the stage for Massachusetts to be an early leader in awarding EECBG funds and completing projects.

Implementation

Municipal Sub-grant Program

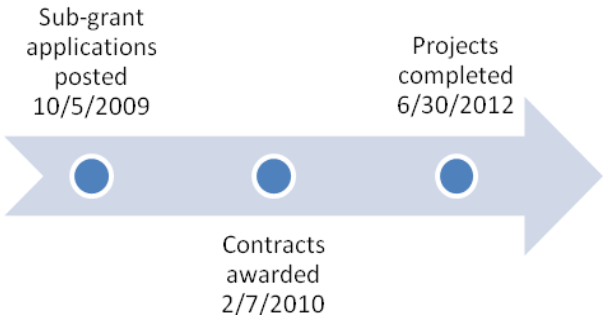
The Competitive Municipal Sub-Grants supported the development of renewable energy projects and thermal energy conservation measures in oil- or propane- heated municipal buildings. The sub-grant program ultimately expended $11,509,711 of Massachusetts' EECBG allocation, representing 78 percent of the total award. After receiving U.S. DOE approval of its EECBG application in September 2009, DOER issued a Program Opportunity Notice (PON) on October 5, 2009, with a deadline of December 7, 2009.

Of the 309 Massachusetts communities eligible for EECBG sub-grants (populations < 35,000), 137 submitted applications in response to DOER's Program Opportunity Notice (PON) requesting a total of approximately $17,400,000 to support energy efficiency and PV projects throughout the Commonwealth. Proposals were evaluated based on projected reductions in energy consumption, greenhouse gas reductions, projected job creation, ability to leverage private capital and expertise from other partners, and overall readiness to proceed.

On February 7th 2010, just one year after the passage of ARRA, Massachusetts Governor Deval Patrick announced the Green Communities Division's selection of 94 projects for 97 municipalities, with grant awards ranging from $13,000 to a maximum of $150,000. Massachusetts was among the first states to award EECBG stimulus funds for cities and towns with populations under 35,000.

The grants helped municipalities pay for shovel-ready projects at municipal buildings and schools, including solar photovoltaic and solar thermal installations; thermal efficiency measures in oil- or propane-heated buildings, such as new high efficiency boilers and furnaces or improved efficiency in existing ones, replacement or improvement of heat delivery systems, and increased insulation or window replacement; and reduction ("buy-down") of the total cost of efficiency measures identified by energy performance contractors. (Ultimately three of the original 94 did not proceed; two chose to withdraw due to challenges with procurement, and one was cancelled due to lack of shovel readiness.) Many of these projects would not have been possible without EECBG funding, which financed replacement of systems at the end of their useful life with current, energy efficient technology. Often, EECGB funds also supported the costs of ancillary work, such as the removal of asbestos associated with old heating systems.

Figure 1: Timeline of Municipal Sub-grants



Owner's Agent Consultants Technical Assistance

DOER expended $1,180,000 of its EECBG funding to provide technical assistance to Massachusetts municipalities in the form of Owner's Agents services for the implementation of solar PV projects and energy performance contracts, two areas of need identified by municipalities. Owner's agents are independent third parties who serve on behalf of municipalities in the negotiation and management of energy projects or perform studies to support the development of projects. Communities frequently do not have the technical expertise on staff for energy projects and these consultants can ensure that a) baseline conditions are accurately defined, b) equipment/systems are correctly specified, budgeted,

designed, installed, and commissioned, c) installed equipment/systems are performing to specification, and d) performance/results are appropriately measured and monitored.

DOER issued a PON on October 5, 2009 with applications due December 7, 2009. DOER accepted applications from municipalities seeking this technical assistance and evaluated the applications based on the number of jobs created, proposed energy saved/renewable energy generated, and proposed greenhouse gas reductions. Fifty-six (56) applications were received and 43 municipalities received awards. Thirteen municipalities did not move forward with their projects and their assistance was cancelled. These funds were reallocated to active projects.

Based on the information presented in the application, a specific value of technical assistance services was allocated to each municipal grantee. DOER conducted a separate solicitation to choose the consultants to provide these services, which resulted in the selection of The American Development Institute (ADI), Beacon Integrated Solutions, and The Cadmus Group. DOER awarded contracts to each team of consultants and provided these consultants' services to the awarded municipalities.

Due to unforeseen additional technical assistance needs for some projects, as well as reduced needs for others, several municipalities received increases in their technical assistance funding allocation so that their consultants could continue to provide vital services throughout project development and implementation. In addition, other municipalities did not move forward with their projects, which resulted in no need for services. Finally, due to savings achieved in other project areas, DOER was able to issue a new PON in May 2012 with awards made on a first-come first serve basis. In total, over the life of the project, DOER provided technical assistance to 15 municipalities for PV projects and 15 municipalities for energy savings performance contracts.

Owner's Agent Energy Evaluations for Municipal Water Facilities

Savings in the other sub-grant categories freed up funding for owner's agent technical assistance in the form of energy evaluations to support project development for municipal drinking water and wastewater treatment facilities. As these types of facilities are the largest municipal energy users after schools, the objective of the studies was to identify specific opportunities to reduce energy use and greenhouse gas emissions. The Municipal/District Drinking Water and Wastewater Facility Energy Evaluation Program provided recommendations to reduce the energy cost and usage at selected water facilities, wastewater facilities, pump stations and associated administrative buildings. The Program Opportunity Notice was issued on May 3, 2012, with applications being accepted beginning on May 11,

2012. Complete applications were placed in a queue, with evaluations provided on a first come-first serve basis until all available funds were allocated. In total, 19 facilities were evaluated: 12 drinking water treatment facilities and seven wastewater treatment facilities for a total cost of $256,654.

DOER conducted a separate solicitation to choose consultants to provide these services, which resulted in the selection of The Cadmus Group and Weston and Sampson. DOER awarded contracts to each team of consultants and provided these consultants' services to the awarded treatment facilities.

Establishing an Energy Use Baseline—MassEnergyInsight

DOER expended $747,070 for the development and delivery of training on a new online energy consumption tracking tool for municipalities, MassEnergyInsight (MEI). Peregrine Energy Group won the contract to develop this user-friendly web-based tool, which is available at no cost to municipalities to help them track their energy consumption and provide data needed to make informed energy decisions.

Before a municipality can take any action to reduce its energy consumption, it must first know what that consumption is. MEI was designed to allow municipalities to easily establish an energy use baseline inventory for all of their buildings, vehicles, and streetlights and then track their energy consumption over time.

MEI provides automatic download of investor-owned utility data and creates standardized energy consumption, cost, and greenhouse gas reports at the municipal, department, and building levels. The tool was designed to integrate with the EPA's Portfolio Manager energy tool. DOER's program included training and support for municipalities in the use of MEI and energy use analysis, fostering among communities a greater commitment to energy efficiency and conservation.

Training of Building Code Officials

DOER expended $387,000 to provide local building code officials with energy code training necessary to promote understanding of and compliance with recent changes in the Massachusetts Energy Code. This training was provided at no cost to municipal officials and at a minimal fee for the building industry. The Green Communities Act requires Massachusetts to adopt the International Energy Conservation Code (IECC) every three years and also provided for the development of energy codes that go above and beyond the baseline energy code. Massachusetts subsequently developed and implemented a Stretch Energy Code, an optional energy code that is approximately 20 percent more aggressive than the baseline code. By choosing to adopt the Stretch Code, municipalities are able to meet one of the criteria for being designated as a Green Community. The EECBG-funded training was critical to implementation

of the Stretch Code, as well as the Base Code, which, through the Green Communities Act, was updated for the first time in nine years.

The objective of this project was to develop curriculum and provide training for building officials and other building professionals (e.g., architects, contractors) in the energy provisions of the Massachusetts building code, thereby leading to a more highly-skilled building official and building professional workforce, and, ultimately, a greater commitment on the part of communities to energy efficiency and more energy efficient buildings. In addition, this training was an integral part of the Commonwealth's strategy for improving energy code compliance and strengthening enforcement. DOER awarded the contract to provide this training to Center for Ecological Technology (CET).

CET developed training that covered the IECC 2009 (including ASHRAE 90.1 2007) and the Stretch Code, 780 CMR Appendix 115.AA, with a focus on building science and how it relates to energy efficiency. The training was organized into two parts: residential and commercial. Each part covered the relevant sections of the building code, and explained how the current code (the 7th edition of the Massachusetts building energy code), the IECC 2009, and the Stretch Code compared with each other. Trainees were Massachusetts building code officials and other building professionals, including builders, designers, architects and subcontractors.

Tools

After U.S. DOE issued its EECBG Funding Opportunity Notice in March 2009, the Green Communities Division conducted a webinar providing advance notice to cities and towns of the program plan for expenditure of the more than $14.7M in EECBG funds. Additional webinars assisted cities and towns with applications, compliance and reporting requirements. DOER also hosted a webinar in April 2009 for cities and towns with populations greater than 35,000 to coach them through the U.S. DOE application process for the direct EECBG grants. DOER also hosted a webinar to help municipalities with populations less than 35,000 apply for sub-grants. In May 2010 DOER hosted a webinar for awardees on compliance and reporting, followed by a June 2010 webinar on the Massachusetts Recovery Office's online jobs reporting database.

National Environmental Policy Act (NEPA) Requirements

The U.S. DOE granted DOER the first categorical exclusion from NEPA review for the types of projects included in the EECBG program. DOER's program served as a model for U.S. DOE's creation of program guidance for providing a categorical exclusion. Essentially, project categories that do not require a NEPA

review were categorically excluded from further review. This included energy efficiency and conservation measures in buildings and solar PV systems 60 kilowatt (kW) and smaller. Eliminating the need for NEPA review allowed projects to proceed more quickly.

Historic Preservation

Prior to the expenditure of federal funds to alter any structure or site, each grant recipient was required to comply with National Historic Preservation Act (NHPA) requirements. In March 2010, DOER executed a Programmatic Agreement with the Massachusetts Historical Commission (the state's historic preservation office) and the U.S. DOE. Allowing DOER to review projects for historic impacts, the Programmatic Agreement adopted procedures DOER had already established for its EECBG application process and was one of the first signed under ARRA, serving as a model for agreements in other states.

ARRA Compliance

The receipt and use of ARRA EECBG funds were subjected to unprecedented levels of transparency and reporting requirements including, but not limited to, reporting on jobs created and retained, payment of prevailing wages, and use of materials that met U.S. DOE-issued "Buy American" guidance. In addition, all projects were subject to inspection by DOER or U.S. DOE.

DOER's Green Communities Division developed a monitoring program in collaboration with the Massachusetts Inspector General's Office consisting of desktop review of monthly reports that included review of documentation of all wages paid and materials meeting "Buy American" requirements, as well as on-site monitoring while projects were under construction and a final inspection of all projects once completed. DOER conducted site monitoring of 42 of the 91 projects, and final inspection of all 91 projects. The site monitoring included programmatic and fiscal reviews, as well as physical inspection of projects. The program for site monitoring was developed to:

- Inspect any project where concerns were noted during the desktop monitoring process;
- Inspect a diverse number of project types;
- Provide for geographic diversity among projects inspected; and
- Inspect only projects with awards greater than $50,000.

Throughout the EECBG program, only one project was found to be in violation of prevailing wages. Since the violation was found during the site inspection, corrective action was able to be made before

completion. There was only one Buy American issue identified requiring one municipality to change out a part in its installation to meet the Buy American requirements.

Lessons Learned

Throughout the course of EECBG program implementation, many lessons were learned that could be carried forward to future state energy programs and community projects. This section will outline some of the most common challenges that were shared among municipal sub-grantees and how these challenges were addressed in collaboration with Green Communities/DOER and the U.S. DOE.

Procurement and Contracting

A small number of projects (fewer than 10) experienced difficulty obtaining bids, or received bids that were far outside of their proposed project budgets. This was particularly noticeable in smaller and more remote communities with sub-grants that were less than $50,000. These projects needed to be re-advertized if bids were not obtained or greatly exceeded the project budget, which resulted in delays from the initially proposed timeline.

Many communities across the Commonwealth must have projects that will result in municipal debt service approved by voters at Town Meeting. This was a challenge for many of the performance contracting projects, which required debt service, as well as a long- term energy services agreement between the municipality and an energy service company (ESCo). If the timeline for a project did not line up with the annual Town Meeting, a Special Town Meeting would need to be called.

Communities who were successful at having their performance contracting projects approved at Town Meeting were heavily engaged beforehand with their DOER-provided owner's agent consultant to help them prepare. Presentation of energy savings payback data for each investment was effective in communicating the project benefits to the community. Communities were able to realize much quicker overall payback periods since they could utilize EECBG funding to improve the project economics and minimize debt to the town for essential upgrades. Municipalities found that their owner's agent consultants were helpful in communicating to key leaders in town (as well as the greater community) the contractual relationship between the municipality and an ESCo and how an energy savings performance contract works.

Unforeseen Challenges

Some municipalities encountered unforeseen obstacles at different points in their projects. In one historic window replacement project, the exterior appearance could not be altered, necessitating

custom built replacement windows that increased the project cost. Other projects encountered asbestos that required abatement prior to commencing construction, causing unanticipated expense and construction delays. The removal of hazardous materials was challenging at school-based project sites, particularly in cases in which removal and handling of these materials needed to take place while students were on site. Unforeseen costs and delays also occurred at some insulation projects in older buildings where workers encountered knob and tube wiring inside wall cavities.

Major weather events during the grant period that resulted in deep snow on the ground and on building roofs, property damage, flooding and loss of power also slowed the progress of some western Massachusetts EECBG projects. These weather events included snowfall of over 80 inches during the winter of 2010–2011, the June 1, 2011 Springfield area tornado, Hurricane Irene on August 26, 2011, and a nor'easter on October 30, 2011.

Finally, scheduling building improvements in a way that minimized disruption of normal building functions was a challenge for some municipalities. For example, it was necessary to complete heating system upgrades during warmer months. Factors such as these contributed to some communities needing to modify their initially-proposed project timelines. Given definitive project progress and unforeseen circumstances, DOER readily approved revised schedules for project completion.

Administrative Capacity

Lack of sufficient municipal staff to handle project management and the federal grant reporting requirements was a common challenge faced by municipal sub-grantees under the EECBG program. Many small towns in Massachusetts do not employ full-time staff members and rely completely on volunteer Select board and committee members to manage town functions. In some towns, a turnover in project managers or town managers resulted in delays for implementation decisions as the new parties were brought up to speed on projects.

To assist with these capacity challenges, communities were allowed to utilize up to 10 percent of their grant funding for costs associated with overseeing projects and required reporting. In addition, Green Communities Division Regional Coordinators were available to provide assistance. Most importantly, the Green Communities Division had two dedicated staff that were available to walk municipalities through the reporting requirements and spent many hours on the phone providing one-on-one assistance. This dedication of staff was a benefit appreciated by many municipalities.

"The assistance provided by the Clean Energy Fellows allowed a small Berkshire County town like Egremont (population 1,300) to participate in projects usually associated with municipalities with larger staffs handling the countless details. We would not have had the successes we've had without them." (Town of Egremont).

Utility Interconnection

Some solar PV projects faced a challenge with the utility interconnection process. The communities that were successful at this process made sure to have all of the required paperwork submitted to their utility in a timely fashion. Most applications that were filed in a complete state did not encounter delays in the interconnection process. Since the completion of the EECBG program, the Commonwealth has conducted a stakeholder process with involvement from the electric utilities in an effort to streamline interconnection of solar PV projects.

Impacts

This section includes both the qualitative and quantitative impacts of the five initiatives of the EECBG program across the Commonwealth.

Municipal Sub-Grant Program

Energy projects in 94 cities and towns (91 projects total) were made possible by more than $11.5 million in ARRA EECBG funds, leveraging an additional $8 million—$5 million for solar PV and $3 million for thermal efficiency measures. Table 1 in the Appendix contains a table of municipalities that implemented projects and their final contracted amounts. Overall, DOER staff completed 42 mid-point site monitoring visits to municipal projects and final inspections of all projects.

Many of these projects would not have been possible without EECBG funding, which financed replacement of systems at the end of their useful life with current, energy efficient technology. Often, EECGB funds also supported the costs of ancillary work, such as the removal of asbestos associated with old heating systems.

A total of almost 1.1 million square feet of public buildings were retrofitted under this program. Energy efficiency retrofits included the installation of building envelope improvements such as insulation and weather sealing, heating and ventilation system upgrades, programmable thermostats, energy efficient windows and energy management systems. The amount of energy savings achieved through energy efficiency and conservation measures that were directly supported by EECBG funding (approximately 27,000 MMBTU annually) is estimated to save $460,000 of energy operating dollars annually. This is

roughly equivalent to the energy use of 209 Massachusetts homes on an annual basis and equivalent to approximately 400 cars taken off the road annually. The value of energy savings for community budgets means that resources that otherwise may have been dedicated to energy costs can now be applied elsewhere. Many communities also leveraged their EECBG funding to implement larger and more comprehensive energy saving projects that included multiple measures across many buildings.

EECBG funding directly supported the installation of approximately 2 megawatts (MW) of solar PV at public buildings in 43 installations. This is expected to produce more than 2,275 megawatt hours (MWh) of clean, renewable energy on an annual basis, providing enough to power 316 Massachusetts homes, reducing greenhouse gas emissions equivalent to removing 167 cars from the road, and avoiding electricity costs of approximately $332,000 in the first year of operation. The value of the electricity savings is expected to increase over time as energy costs increase.

Table 2: Sub-Grant Metrics

	Estimated Annual Energy Impacts		**Estimated Annual $ Savings**
	Home Energy	Cars Removed	
Solar PV Projects (electricity)	316	167	$332,000
Energy Efficiency Projects (heating and electricity)	311	400	$460,000
Totals:	**519**	**567**	**$792,000**

These projects provided great benefit to taxpayers and municipalities by reducing energy operating and maintenance costs at town halls, schools, police stations, fire stations, municipal light plants, senior centers, and public works buildings across the Commonwealth. In addition to the quantifiable value of these projects, there were many benefits that cannot be measured through energy bill savings, such as increased knowledge of new energy technologies, increased use of town buildings that were made more comfortable by efficiency measures, better air quality in schools and more comfortable workplaces for town employees.

Figure 2: Qualitative Benefits of Energy Projects

EECBG funds enabled the construction of the first municipally-owned solar PV project in 26 communities, while funding the very first solar PV project of any type in the town of Norton.

"As this is the first solar project for the town on a municipal building, it has received an extraordinary amount of public attention." (Town of Seekonk)

The Town of Concord used a combination of EECBG and town funds to install a 48.4 kW solar PV system on the Willard Elementary School—the first PV system on a municipal building in that town. "It provided an important opportunity for the Municipal Light Plant and the School Department to gain experience overseeing the contractual arrangements, installation and ongoing operation of the system. Further, the system provides an opportunity for other town building managers, as well as school administrators and facilities directors from other communities, to get a first-hand look at the technology and to hear about the town's experience with it." (Town of Concord)

For many participating towns, EECBG-funded projects allowed them to avoid the high costs of delayed maintenance associated with equipment that was at or near the end of its useful life. "The school was built in 1964 and relied on the original 45-year-old heating system. The oil-based burner and related heating system were responsible for two fire-related incidents in 2009. For several years, the inefficient and dangerously outdated heating unit was the cause for air quality concerns from staff members, parents and residents of the town." (Town of Saugus)

There were also benefits associated with the preservation of historic buildings. Many buildings that were part of the EECBG program were more than 50 years old, requiring consultation with state and local historic preservation commissions before alterations to building exteriors (i.e. window replacements, exterior wall insulation) could proceed. Some of these public buildings were constructed as early as 1892. Several communities were able to leverage Massachusetts Community Preservation Act funding with their EECBG funds in order to accomplish more improvements to their buildings. Such was the case with the Hudson Town Library. "In this economic climate, with virtually no municipal funding available for capital projects, this window replacement would have had to wait at least another 10 or 15 years. Without this grant program, it would be hard to advocate for the window replacement project to our residents who ultimately have to vote on the town's budget and all appropriations." (Town of Hudson)

Many of the public buildings in the western part of the state are heated by #2 heating oil, which is relatively expensive when compared to other heating fuels. In several cases, due to aged and deteriorated windows and poor insulation, communities were unable to afford the heating costs of keeping entire buildings or sections of buildings at a comfortable temperature in the winter and were forced to shut down these facilities for winter months. Some of the projects funded by EECBG were aimed at improving the envelopes of these buildings so that they could once again be utilized for community activities in the winter. "Window replacement was one of the best things we've done in terms of comfort and energy savings here at this town hall." (Town of Erving)

Increased overall comfort of building occupants was another benefit of EECGB-funded improvements. For example, energy management systems installed in schools across the state will allow the students to learn in greater comfort, since the temperature of classrooms will be more closely regulated and ventilation systems will be improved. An example of improved occupant comfort is the EECBG project at Leverett Town Hall. Prior to EECBG, this building was heated using an oil-fired boiler with electric radiant heating that extended to each of the office spaces. The employees who worked in these offices often complained about the uneven heating in their offices and general discomfort. The radiant heating that extended around the baseboards and behind furniture was also not optimal for fire safety reasons. By upgrading to a central high-efficiency oil heating system, these municipal workers now enjoy improved safety and comfort.

Importantly, EECBG ARRA projects have provided cities and towns with data to prove the cost effectiveness and energy savings of energy project investments. Involvement in the EECBG program has

also made municipal staff more knowledgeable about and comfortable with implementing energy projects. Both of these factors help to pave the way for additional clean energy advances at the local level.

"Armed with the recent statistics on the advantages of converting from oil heat to high efficiency gas heating, the town is now looking into updating the heating system at the high school and elementary school and is in the process of soliciting bids to convert the fire station from oil to gas as well." (Town of Saugus).

The Town of Saugus replaced the existing oil-fired boilers, hot water pumps and piping with four new gas high-efficiency condensing hot water boilers, three new hot water pumps and new piping at the Belmonte Middle School.

The Town of Sutton installed a 200 kW solar PV system, consisting of 898 Schott Solar PV panels, on the roof of the Simonian Early Learning Center.

"Throughout the implementation of this project, the town gained valuable experience with designing, funding and conducting a complex vertical municipal construction project; utilizing federal funds and meeting state and federal procurement laws; implementing the Davis Bacon laws; and coordinating multi-professional teams. This experience will be especially useful in implementing future projects." (Town of Lee)

Owner's Agent Consultants Technical Support

A total of 30 communities used grants to support various levels of engagement by an "owner's agent" technical assistance consultant for their energy projects. DOER selected three firms to assist communities that were implementing comprehensive energy savings performance contracts or solar PV projects. The communities receiving technical support frequently expressed how valuable these consultants were to the success of their projects. Through this feedback emerged a best practice that

owner's agents should be integrated into these types of complex energy projects to serve as a consistent advocate for the community's best interest. Table 3 in the Appendix provides a list of municipalities that received owner's agent support for performance contracting or solar PV projects.

From April 2010 through September 15th 2012, a total of 30 communities were assisted by the services of three consulting firms selected to provide owner's agent technical assistance to municipal energy projects. Fifteen of these projects were for energy savings performance contracting projects and 15 were for solar PV projects. The performance contracting projects received assistance with the review of investment grade audits and project feasibility evaluations.

For the 15 solar projects, assistance was provided with conducting procurements, evaluating technical bids, executing contracts, and conducting final site inspections of completed projects. Six of the PV projects have been completed, with approximately 700 kW of installed solar, while the remaining projects are underway.

"An owner's agent is an absolute necessity for a project of this size and complexity. Without the technical knowledge and experience provided by our owner's agent, this project never would have happened." (Town of Gill)

The benefits of the owner's agent services are illustrated in the following examples. The Cadmus Group led Lunenburg through a technical and financial evaluation of diverse proposals for its high school solar PV project and helped the town generate an apples-to-apples comparison of bids. In addition, Cadmus helped to keep the project viable by encouraging the town to invest in a structural analysis. Other assistance included a pre-solicitation site visit to identify potential fatal flaws and recommendations for addressing them, education and understanding of the Solar Renewable Energy Certificate (SREC) market and discussion of the various options available to the town, ensuring the technical details were accurate in the contract and included all ARRA requirements, conducting design review during construction, ensuring the project complied with all aspects of the contract, and conducting a detailed final inspection to ensure the project met electric code requirements and the town's terms and conditions. The technical assistance contributed to an increased comfort with the PV development process and helped build institutional knowledge for future efforts.

Beacon Integrated Solutions provided technical assistance to the town of Charlemont for its performance contract. Charlemont is a municipality in western Massachusetts with a population of approximately 1,300. Beacon worked with the ESCo contracted by the municipality to provide accurate baseline

energy usage in each building and accurate energy savings calculations with sufficient supporting detailed information. Beacon also worked with the ESCo to enhance its engineering to properly assess the interactive energy savings benefits associated with multiple energy conservation measures.

During contract negotiations, Beacon conducted a thorough cost analysis for each of the energy conservation measures for each building, reviewing all of the subcontractor quotations, and calculating the allowed prices to the town based on the agreed upon ESCo markups. This rigorous due diligence resulted in the removal of disallowed extraneous expenses and ultimately resulted in a less costly program and greater value to the town. Moreover, Beacon worked with the ESCo to ensure that one of the projects was competitively sub-bid. This competitive bidding process provided additional cost savings to the Town of upwards of 25 percent.

Owner's Agent Energy Evaluation for Municipal Water Facilities

Savings in the other sub-grant categories opened up a pool of funding to create a new EECBG initiative in summer 2012 to complete energy evaluations of drinking water and wastewater treatment facilities. The Municipal/District Drinking Water and Wastewater Facility Energy Evaluation Program provided

recommendations to reduce the energy cost and usage at selected water facilities, wastewater facilities, pump stations and associated administrative buildings. Table 4 is a list of the facilities that were awarded these services. In total, 19 facilities were evaluated: 12 drinking water treatment facilities and seven wastewater treatment facilities. All evaluations and a meeting with each facility to present the reports were completed by September 20, 2012. A total of 128 energy conservation measures were recommended with a combined projected annual cost savings of $880,710 and projected annual energy savings of 6,004,917 kWh. Additionally, if all recommended measures are implemented, the facilities are projected to save 2,547 therms of natural gas and 1,643 gallons of propane annually, while total electric demand from these facilities would be reduced by 309 kW. The total cost for these projects is $3,439,304 for a simple payback (before available utility incentives) of 3.9 years.

The work from this initiative has continued. On October 11, 2012, the majority of these facilities gathered at a Roundtable meeting sponsored by the U.S. EPA to prioritize the results of their evaluations. DOER has learned

that, as a result of these evaluations, several additional operational measures have already been implemented, resulting in immediate energy and cost savings. DOER will continue to work with these facilities using the Roundtable format approximately quarterly through 2013 to support efforts to implement recommended energy conservation measures.

Establishing an Energy Use Baseline—MassEnergyInsight

DOER contracted with Peregrine Energy Group to develop a web-based energy information management and reporting tool, MassEnergyInsight (MEI) which enabled hundreds of communities to centralize and understand their energy data, often for the first time. Any Massachusetts municipality can use the tool at no cost.

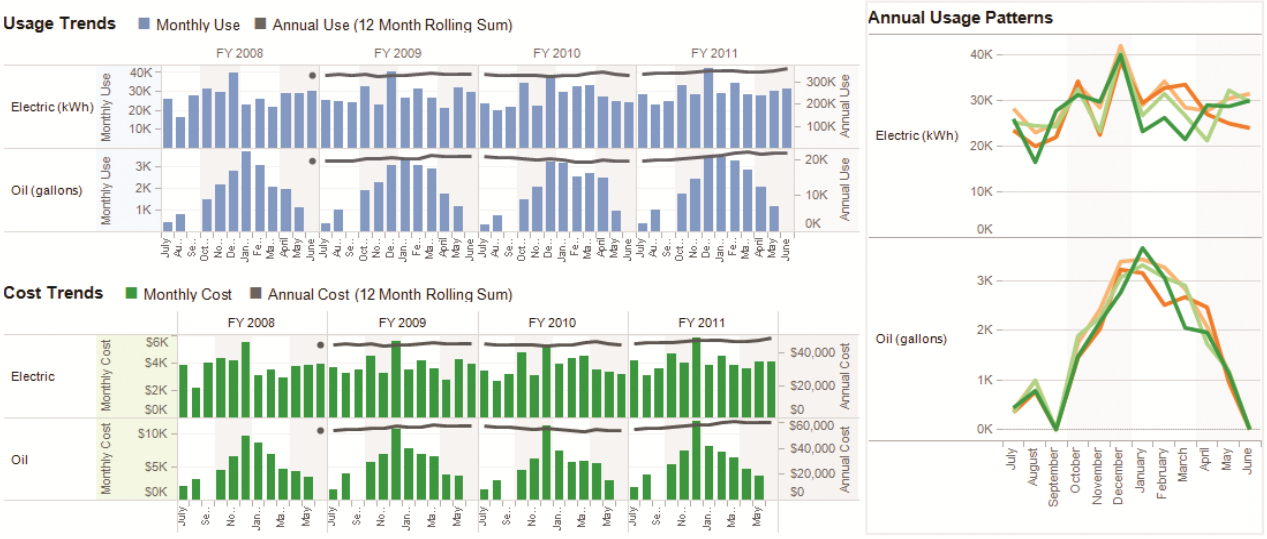
Nearly 250 of the 351 Massachusetts municipalities are using MEI to access the key information they need to develop energy efficiency strategies that lead to long-term cost savings. They use the tool to understand the role of energy in their overall municipal budget; monitor energy use and spending; discover equipment and maintenance issues; and pilot energy efficiency efforts.

Since municipal training on MEI is key to its success, DOER provided 12 EECBG-funded training workshops across the state. To reach a larger audience, webinars replaced classroom training, which were then replaced with 31 on-demand training videos created to provide 24/7 ongoing access to instruction for users.

Users visit www.MassEnergyInsight.net to log in. Their energy data is uploaded automatically from utility data files, and input manually for non-utility data such as oil or propane. MassEnergyInsight integrates fully with EPA's Portfolio Manager.

By viewing dashboards and reports, municipal staff can identify what is most important in municipal data, such as which buildings are least efficient, how use and spending compare with previous years, and whether use and costs are trending upward or downward for the current year. Users can compare energy use to a baseline year; benchmark within a community and against other Massachusetts municipal building types (such as a school); compare use, cost and emissions across facilities; and identify trends.

Figure 3: MassEnergyInsight Dashboard



By June 30, 2012, Peregrine Energy Group completed its ARRA contract for delivering this web-based tool and providing training for municipalities. MEI has helped more than 75 cities and towns successfully receive Green Community designation by allowing them to easily access and control energy usage data in their buildings.

Table 5: MassEnergyInsight Implementation 2010–2012

Users trained in classroom and webinar trainings	420
Total training video views	660
Authorized users	738
Active Green Communities	78
Total active communities	211
Regional entities engaged (regional school districts, water and wastewater districts, etc.)	17
Buildings tracked	8,140
Energy accounts tracked	37,250
Electricity	>2.1 billion kWh/year
Natural Gas	>88 million therms/year
Oil	>4 million gallons/year
Total energy spend	$415 million /year

Training of Building Code Officials

Project partners Center for EcoTechnology (CET), Conservation Services Group (CSG), and Energy and Resource Solutions (ERS) worked with DOER to produce and deliver four types of training as part of the EECBG grant. They included:

Smart Building: High Performance Homes and the Stretch Code: a one-day training for builders, code officials, architects, and other construction professionals that covered the IECC 2009 and Stretch Code requirements for residential construction with a focus on high performance building practices that result in energy efficient and durable homes with good indoor air quality.

Smart Building: High Performance HVAC and the Stretch Code: a three-hour workshop for HVAC contractors, builders, code officials, and other construction professionals that covered the IECC 2009 and Stretch Code requirements for HVAC systems.

Commercial Energy Code: a one-day training for commercial contractors, architects, code officials, and other construction professionals that covered the IECC 2009 and Stretch Code requirements for commercial construction.

Deep Energy Retrofit Workshop: a one-day training for builders, code officials, architects, and other construction professionals that covered industry best practices for retrofitting existing residential structures with deep energy retrofit measures.

Ninety-one energy code training sessions were held from 2009–2012, including 57 Residential - Smart Building workshops, 12 Residential - HVAC workshops, four Residential - Deep Energy Retrofit workshops, and 18 Commercial workshops. Overall, 1,700 code officials and 2,238 non-code officials attended—a total of 3,938 attendees over the three-year program. By providing much needed training for local building code officials, this program has been instrumental in the adoption of the Stretch Code by more than 130 communities.

Table 6: Workshop Attendees by Training Type

Training	Code Officials	Non-Code Officials	All Officials
Residential Code Training	617	499	1116
Residential - Smart Building	344	895	1239
Residential - Smart Building HVAC	65	325	390
Residential - Deep Energy Retrofit	61	260	321
Commercial Code Training	613	259	872
Totals	**1700**	**2238**	**3938**

Jobs Impact

The impact of EECBG on jobs was chronicled throughout the program and reported to the public through the Massachusetts Recovery Office website, www.mass.gov/recovery. The implementation of EECBG projects created and retained jobs and made a significant impact on the economy through the development and construction of energy projects. Overall, 1,082 people worked on projects funded by the EECBG program.

The Town of Rowe implemented an 18.4 kW pole mounted solar PV system at the elementary school and noted the job related impacts in the project's final report. "Rowe was conscious, if possible, to direct this stimulus to jobs in our region. The vendors selected a Rowe excavating firm for the preparation of the holes for the posts that hold the array of panels and the footings for the inverter shed, and for digging the trenches for underground conduits. The company that delivered and poured the concrete was from a neighboring town. The subcontractor Berkshire Photovoltaics is located in nearby Adams, Massachusetts, and the prime contractor Sirois Electric is a Massachusetts firm. Many Massachusetts electricians are out of work and the jobs on this project contributed to sustaining these electricians, and gave work to the solar PV specialists who worked directly with the installation of the posts and panels and Data Acquisition equipment. All equipment was American made, so manufacturers, suppliers, and livery companies for the components of the project benefited with increased sales and worker hours. The National Grid interconnection and metering departments were employed many hours attending to the requirements of the project."

Education and Outreach

Under EECBG, recipient communities were required to include a program of education and outreach. Examples of various programs include articles on town websites and in newsletters, announcements at Town Meeting, and press articles. Three innovative EECBG education and outreach programs are highlighted below, for the towns of Hudson and Sutton and the city of Newburyport.

Town of Hudson

The Town of Hudson completed a window replacement project on the historic town library, which was constructed in 1905 and expanded in 1967. Thirty percent of the building envelope was comprised of metal single pane glass window units. The EECBG grant, combined with Community Preservation Act (CPA) funds, allowed the town to complete this much-needed project, which the town had considered multiple times over the years.

The installation of new energy efficient windows to the historic Carnegie building provided the perfect opportunity for the Library to launch a public awareness campaign around the issues of energy efficiency and conservation, as well as preservation of community landmarks for future generations. This project helped to educate residents on how they can make similar environmentally responsible changes to their own homes. The theme for the children's summer 2010 reading program, "Go Green at Your Library," incorporated entertainers, hands-on creative experiments, science workshops, recycling opportunities, contests and crafts which demonstrated the power of making small, positive changes in everyday life. Summer programming included a trivia contest based on such subjects as reduce/reuse/recycle, conservation, energy and pollution. Through these programs, the library sought to instill in children the knowledge and understanding necessary for making environmentally-responsible decisions throughout their lives.

The adult department displayed "Go Green" books and materials, and offered a green crossword puzzle challenge. The town also increased advertising for the library paper-recycling bin with advertisements on cable TV, newspapers, posters, bookmarks and on the town's website, and town staff kept the public well informed about the Library Window Project through a large informational poster board displayed in the library. A webpage was created on the Town's website highlighting the project.

Town of Sutton

The installation of a 201 kW solar PV system on the roof of the Simonian Center for Early Learning was an excellent opportunity to share the benefits of solar energy with young students. In celebration of their renewable energy triumph, a troupe of fifth grade students performed a solar-themed song of their own creation at the dedication ceremony held in May 2012. The ceremony also featured solar-themed art projects created by the students. Not only is the town saving money that can be

used for other educational purposes, but students at the elementary school level are getting an up-close look at a renewable alternative source of energy. The teachers at the school have begun developing a curriculum on energy using the school's solar PV monitoring system, which shows statistics and graphs displaying the amount of energy produced and how this equates to other non-renewable resources. "The addition of the solar panels has turned our once deplorable roof into a model for any public municipality with green initiatives," said Lauren Dubeau, the center's principal, during the ribbon cutting ceremony.

City of Newburyport

The EECBG grant funded three energy conservation projects aimed at reducing energy use by 43 percent and CO2 emissions by 35 percent annually at the city's Kelley Youth Services Center. The Kelley Youth Services Center was chosen because it is one of Newburyport's least energy efficient buildings. Included with this project was the development of an educational program, entitled "The Newburyport Carbon Challenge for Youth," which was geared not only towards the youth at the Kelley Youth Services Center but also those in the Newburyport middle schools and the general public.

The Newburyport Carbon Challenge for Youth is an energy efficiency initiative that seeks to engage Newburyport youth and their families in estimating their baseline energy use (carbon footprint) by accessing an online calculator and pledging to take one or more simple, personal actions to reduce carbon emissions. This complements the city's designation as a Massachusetts Green Community and the recent energy efficiency work at the Kelley Youth Center provided by the EECBG grant. The city's target energy reduction plan for its buildings aims to reduce consumption by at least 20 percent or 9,938 MMBtus by the end of 2014 and decrease CO2 emissions by 35 percent, and to achieve a 43 percent MMBtu savings in our residential sector. The goals of the "Newburyport Carbon Challenge for Youth" were to: raise awareness of energy-use behavior and energy efficiency actions at the household level; demonstrate that personal actions, when multiplied across a community, can make a significant difference; engage Newburyport youth council and Kelley Youth Center members in the challenge; and reduce total city energy consumption both at the municipal and residential level.

Conclusion

EECBG funding through the American Recovery and Reinvestment Act arrived at a particularly opportune moment for Massachusetts—coming on the heels of Governor Patrick's signing of several landmark clean energy laws, including the Green Communities Act, a major component of which empowers the Commonwealth's municipalities to envision and act upon local initiatives for a clean energy future. Through EECBG-funded projects, scores of Massachusetts cities and towns were able to contribute significantly toward meeting the Governor's nation-leading goals in areas such as renewable power development, greenhouse gas reduction, and expansion of the clean energy economy—including installation of 250 MW of solar power by 2017, a goal that was met and surpassed four years early, and reducing greenhouse gas emissions in Massachusetts by 25 percent by 2020.

Grappling with the worst economic downturn since the Great Depression, the Commonwealth utilized EECBG funding as a valuable opportunity to create partnerships and implement strategies to significantly leverage federal dollars. By providing an important new stream of funding, ARRA and EECBG enabled Massachusetts cities and towns to forge ahead with an ambitious clean energy agenda in difficult economic times.

In part through the smart deployment of ARRA funding such as EECBG, Massachusetts is emerging from the national recession quicker than most other states. And the legacy of EECBG funding has infused Massachusetts cities and towns with the experience, competence, and enthusiasm to keep up the momentum for saving local energy dollars and creating a clean energy future for generations to come.

Appendix

Map of EECBG Sub-grants and Technical Assistance Awards

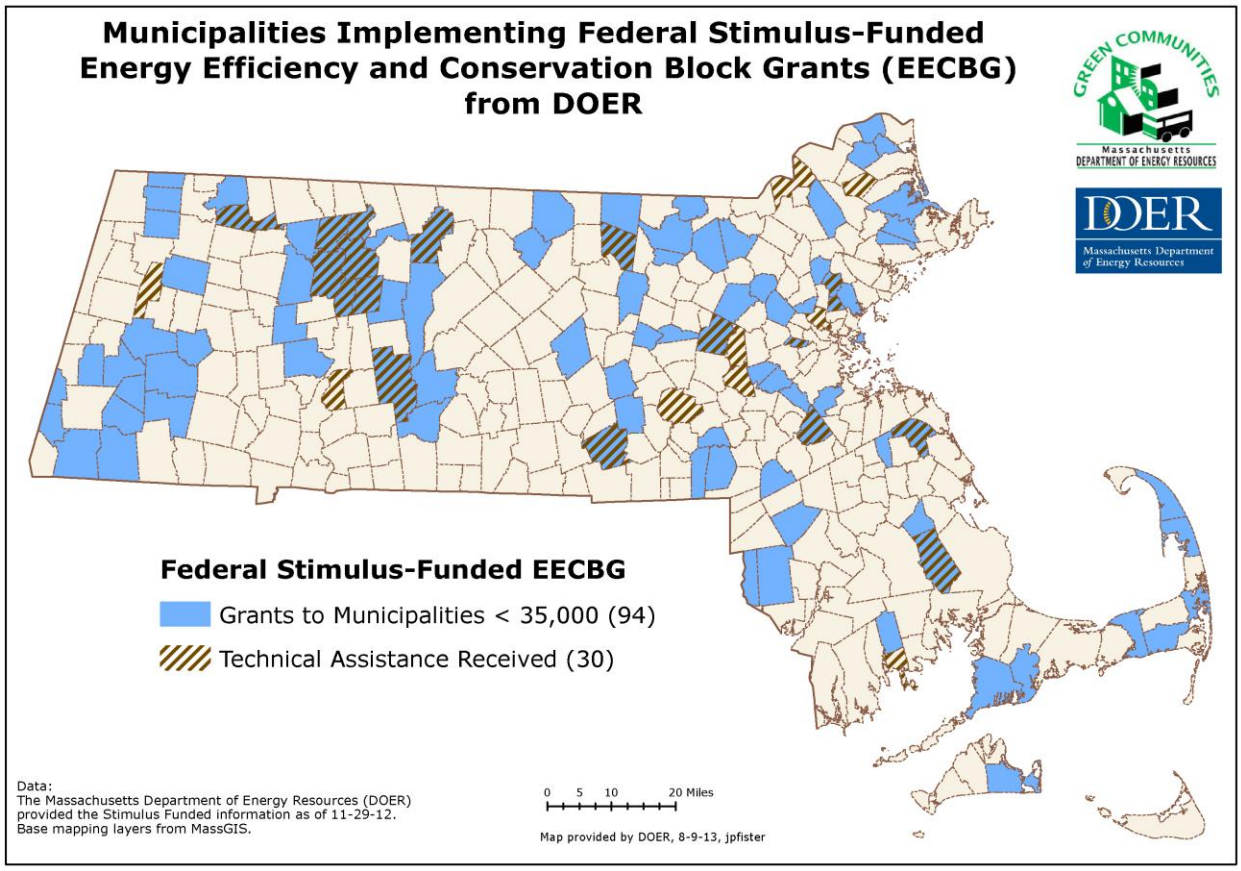


Table 1: EECBG Sub-Grants to Municipalities

Municipality	Project Type	Project Amount
Acushnet	Solar PV	$150,000
Adams	Solar PV	$55,125
Alford, Monterey, Sheffield	Thermal Efficiency	$308,733
Amesbury	Solar PV	$150,000
Ashburnham	Solar PV	$150,000
Ayer	Thermal Efficiency	$128,755
Becket	Thermal Efficiency	$150,000
Bedford	Thermal Efficiency	$150,000
Belchertown	Thermal Efficiency	$149,812
Bellingham	Solar PV & Thermal Efficiency	$135,675
Berlin	Thermal Efficiency	$43,284

Canton	Thermal Efficiency	$150,000
Carver	Solar PV	$150,000
Charlemont	Performance Contract	$150,000
Chelmsford	Solar PV	$150,000
Concord	Solar PV	$150,000
Conway	Thermal Efficiency	$32,037
Dedham	Performance Contract	$150,000
Deerfield	Performance Contract	$150,000
Dennis	Solar PV	$77,423
Dunstable, Groton	Thermal Efficiency	$70,544
Edgartown	Solar PV	$122,900
Egremont	Solar PV & Thermal Efficiency	$144,070
Erving	Thermal Efficiency	$81,000
Falmouth	Solar PV	$147,667
Foxborough	Solar PV	$150,000
Franklin	Solar PV	$99,368
Gardner	Thermal Efficiency	$150,000
Gill	Performance Contract	$150,000
Grafton	Solar PV	$141,200
Greenfield	Thermal Efficiency	$124,241
Hamilton	Performance Contract	$150,000
Harwich	Solar PV	$140,000
Holden	Solar PV	$82,000
Hudson	Thermal Efficiency	$150,000
Ipswich	Solar PV	$150,000
Lancaster	Thermal Efficiency	$79,627
Lee	Thermal Efficiency	$62,000
Leverett	Performance Contract	$150,000
Lexington	Thermal Efficiency	$150,000
Lunenburg	Solar PV	$150,000
Mashpee	Solar PV	$150,000
Medway	Solar PV	$150,000
Melrose	Solar PV	$149,976
Middlefield	Thermal Efficiency	$121,278
Milton	Solar PV	$150,000

Montague	Performance Contract	$150,000
Needham	Thermal Efficiency	$86,345
New Marlborough	Thermal Efficiency	$64,575
New Salem	Thermal Efficiency	$134,685
Newburyport	Thermal Efficiency	$115,233
North Adams, Clarksburg	Solar PV	$257,996
North Andover	Solar PV	$103,846
Northampton	Performance Contract	$150,000
Norton	Solar PV	$150,000
Norwell	Solar PV	$150,000
Orange	Performance Contract	$150,000
Orleans	Solar PV	$103,587
Otis	Thermal Efficiency	$150,000
Palmer	Solar Thermal	$57,282
Plympton	Thermal Efficiency	$150,000
Reading	Performance Contract	$150,000
Rehoboth	Solar PV	$150,000
Rockland	Solar PV	$150,000
Rowe	Solar PV	$148,176
Saugus	Thermal Efficiency	$150,000
Seekonk	Solar PV	$150,000
Sheffield	Thermal Efficiency	$21,200
Shelburne	Thermal Efficiency	$149,994
Shrewsbury	Performance Contract	$150,000
Shutesbury	Solar PV	$56,673
Stockbridge	Thermal Efficiency	$48,058
Sudbury	Solar PV & Solar Thermal	$141,864
Sunderland	Thermal Efficiency	$97,000
Sutton	Solar PV	$150,000
Townsend	Thermal Efficiency	$50,523
Truro	Solar PV	$90,000
Tyringham	Thermal Efficiency	$35,987
Wakefield	Performance Contract	$150,000
Ware	Thermal Efficiency	$53,137
Washington	Thermal Efficiency	$47,632

Watertown	Solar PV	$150,000
Wellesley	Solar PV	$150,000
Wellfleet	Solar PV	$145,000
Wenham	Performance Contract	$150,000
West Newbury	Solar PV & Thermal Efficiency	$79,574
Westford	Solar PV	$149,339
Williamsburg	Thermal Efficiency	$60,093
Winchester	Thermal Efficiency	$150,000
Windsor	Thermal Efficiency	$114,951
Winthrop	Thermal Efficiency	$150,000

Table 3: Projects using Owner's Agent Technical Assistance Consultants

Municipality	Type of Project	Project Description	$ Value of Project	Technical Assistance Consultant
Belchertown	Energy Performance Contract	Energy efficiency upgrades at multiple town buildings	$3,134,235	Beacon Integrated Solutions
Belchertown	Solar PV Power Purchase	Evaluation of multiple town-owned sites for Solar PV systems.	Power purchase agreement	Cadmus Group
Canton	Energy Performance Contract	Energy efficiency upgrades at multiple town buildings	$950,578	American Development Institute
Carver	Solar PV Power Purchase	100 kW ground-mounted system along Route 44 Highway to connect with Wastewater Treatment Plant	Power Purchase Agreement	Cadmus Group
Charlemont	Energy Performance Contract	Energy efficiency upgrades at three town buildings	$172,901	Beacon Integrated Solutions
Dalton	Solar PV Power Purchase	1.3 MW ground-mounted system on capped landfill	20 yr Power Purchase Agreement	Cadmus Group
Deerfield	Energy Performance Contract	Energy efficiency upgrades at 3 town buildings	$497,384	Beacon Integrated Solutions
Fairhaven	Solar PV Power Purchase	Approximately 825 kW of solar at the Alden Road and Wood School sites	Power purchase agreement	Cadmus Group
Georgetown	Energy Performance Contract	Energy efficiency upgrades at multiple town buildings	$2,272,818	Beacon Integrated Solutions

Gill	Energy Performance Contract	Energy efficiency upgrades at the Gill Elementary School	$271,484	Beacon Integrated Solutions
Greenfield	Energy Performance Contract	Energy efficiency upgrades at nine town buildings	$1,992,207	Beacon Integrated Solutions
Hopkinton	Solar PV Power Purchase	Approximately 5.2 MW of ground-mounted solar PV at the sand pit	20 yr Power Purchase Agreement	Cadmus Group
Leverett	Energy Performance Contract	Energy efficiency upgrades at four town buildings	$247,672	Beacon Integrated Solutions
Lunenburg	Solar PV Power Purchase	102 kW system at Turkey Hill Middle School	Power Purchase Agreement	Cadmus Group
Medford	Solar PV Power Purchase	Solar installations on multiple town-owned buildings	Power Purchase Agreement	Cadmus Group
Melrose	Solar PV Power Purchase	Approximately 343 kW of roof mounted solar at two school buildings.	20 yr Power Purchase Agreement	Cadmus Group
Methuen	Solar PV Power Purchase	Approximately 1 MW system on a capped landfill site	Power Purchase Agreement	Cadmus Group
Montague	Energy Performance Contract	Energy efficiency upgrades at three town buildings	$348,979	Beacon Integrated Solutions
Natick	Solar PV Power Purchase	1.08 MW on multiple school rooftops installed in phases	20 yr Power Purchase Agreement	Cadmus Group
Norwell	Solar PV Power Purchase	54 kW system at the Norwell Middle School	$480,000	Cadmus Group
Orange	Energy Performance Contract	Energy efficiency upgrades at 12 town buildings	$1,252,331	Beacon Integrated Solutions
Orange	Solar PV Power Purchase	700 kW ground-mounted solar PV on capped landfill	20 yr Power Purchase Agreement	Cadmus Group
South Hadley	Energy Performance Contract	Energy efficiency upgrades at multiple town buildings	$1,869,680	Beacon Integrated Solutions
Sudbury	Solar PV Power Purchase	1.3 MW ground-mounted solar PV on capped landfill	20 yr Power Purchase Agreement	Cadmus Group
Sunderland	Energy Performance Contract	Energy efficiency upgrades at two town buildings	$382,807	Beacon Integrated Solutions
Sutton	Solar PV Install	202 kW system at the Simonian Early Learning Center	$590,000	Cadmus Group

Wakefield	Energy Performance Contract	Energy efficiency upgrades at Wakefield High School and Greenwood Elementary	$1,347,219	American Development Institute
Watertown	Energy Performance Contract	Energy efficiency upgrades at multiple town buildings	$7,327,680* (estimated)	Beacon Integrated Solutions
Watertown	Solar PV Power Purchase	51 kW system at Department of Public Works	$369,800	Cadmus Group
Wayland	Energy Performance Contract	Energy efficiency upgrades at multiple town buildings	Unknown, project in preliminary stages	Beacon Integrated Solutions

Table 4: Municipal Facilities Using Energy Evaluation Owner's Agent Technical Assistance

Entity	Facility
Abington-Rockland JWW	Great Sandy Bottom Pond WTP
Abington-Rockland JWW	John Hannigan WTP
Abington-Rockland JWW	Myers Ave WTP
Dartmouth	Dartmouth Water Pollution Control Facility
Groton	Baddacook Pond Water Treatment Facility
Hudson	Hudson Wastewater Treatment
Ipswich	Ipswich Water Treatment Plant
Ipswich	Ipswich Wastewater Treatment Plant
Lowell	Lowell Regional Wastewater Utility
Lynn Water and Sewer Commission	Lynn Regional Water Pollution Control Facility
Marlborough	Millham Water Treatment Facility
Millis	George D'Angelis Water Treatment Plant
Needham	Charles River Wellfield Water Treatment Facility
New Bedford	New Bedford Water Pollution Control Facility
Norwell	South Street Water Treatment Plant
Pepperell	Pepperell Water Pollution Control Facility
Woburn	Woburn Water Treatment Plant Complex

Case Study: Town of Hudson Public Library

Energy Recovery Dollars at Work in Massachusetts

DOER
Massachusetts Department of Energy Resources

Town of Hudson Public Library

BACKGROUND

The Hudson Public Library is a three-story brick building that was originally built in 1905. An original Carnegie Library, the building is over 15,500 interior square feet. Single paned windows—some dating back to the original 1905 construction—comprised 30 percent of the building. As a result, south facing windows created a sauna-like effect in summer and, in the winter months, employees reported significant cold spots and uncomfortable drafts. With support from the DOER and federal stimulus funds, the library installed new, historically-appropriate, energy efficient windows.

FUNDING

The Department of Energy Resources (DOER) allocated an Energy Efficiency and Conservation Block Grant (EECBG) of $150,000 to the Town of Hudson. These funds allowed Hudson to leverage an additional $56,245 in a matching grant through the Community Preservation Act. Overall, EECBG funds provided financial assistance to 93 communities in the Commonwealth to bolster energy efficiency and renewable energy projects.

EECBG Spotlight
DOER allocated over $14.5 million in federal stimulus funds through the Green Communities Division to Massachusetts cities and towns to invest in renewable energy and energy efficiency projects.

PROJECT DETAILS

The historic Hudson Public Library project installed 117 double-hung, double-glazed, low-emittance windows throughout 63 window openings. These new historically-appropriate windows are projected to reduce both electricity usage and heating fuel annual consumption by 40 percent and save the town over $7,000 a year in energy bills. The Town of Hudson used the window replacement project to raise community awareness around energy efficiency and conservation issues and the library documented the process online for community members and other municipalities to view.

Left Photo: A worker installing new windows.
Right Photo: Street view of the Hudson Public Library.
**Photos courtesy of the Hudson Public Library*

AT A GLANCE:

- **117 new high efficiency windows installed in a historic public library**
- **40 percent projected reduction in both heating fuel consumption and electricity usage**
- **$7,000 in estimated savings in energy costs per year**
- **Annual carbon dioxide reductions from the installation is equivalent to the carbon offset of four acres of pine trees**

The American Reinvestment and Recovery Act of 2009 invested nearly $70 million into energy efficiency and clean energy programs managed by the Department of Energy Resources in Massachusetts. These funds are being put to work to create jobs, spur innovation, and ensure the development of clean, sustainable energy sources right here in the Commonwealth.

Massachusetts Department of Energy Resources | 100 Cambridge Street, Suite 1020 | Boston, MA 02114 | (617) 626-7300
Creating a Cleaner Energy Future For the Commonwealth

Case Study: Town of Sutton Solar PV at Simonian Early Learning Center

Energy Recovery Dollars at Work in Massachusetts

DOER Massachusetts Department of Energy Resources

Simonian Center for Early Learning

BACKGROUND

The 20-year old roof at the Town of Sutton's Simonian Center for Early Learning leaked so badly that administrators had to place buckets throughout the building each time a rainstorm came through. As a direct result of federal stimulus funds, this education center, which teaches and empowers children from kindergarten to second grade to become lifelong learners, is now the proud owner of a state-of-the-art roof that is both a model of energy efficiency and home to a solar panel installation that generates clean, renewable electricity for on-site use year-round.

PROJECT DETAILS

The 200 kW solar photovoltaic (PV) array is comprised of almost 900 solar panels, making it one of the largest municipally-owned solar systems in the state. With the new super-insulated, reflective white roof, the completed project is expected to save Sutton more than $25,000 each year in energy costs. In addition to the new roof and lower energy costs, the solar panels will also be used by the Simonian Center as a teaching tool to educate students and community members about the importance of energy efficiency and sustainability.

Left Photo: An aerial view of the new roof on the Simonian Center in Sutton, Massachusetts.
Right Photo: State officials celebrate the new solar array.

FUNDING

The Department of Energy Resources (DOER) provided an Energy Efficiency and Conservation Block Grant (EECBG) of $150,000 as well as $20,000 for technical assistance services. These stimulus funds provided grants and financial assistance to bolster energy efficiency and renewable energy efforts in 93 Massachusetts communities with populations below 35,000.

EECBG Spotlight
DOER allocated over $14.5 million in federal stimulus funds through the Green Communities Division to Massachusetts cities and towns to ensure they are investing in renewable energy and energy efficiency.

AT A GLANCE:

- **200 kW solar array is made up of 900 panels and is one of the largest municipally-owned solar projects in the state**
- **Projected to eliminate over 215,000 lbs of carbon emissions annually—equivalent to the consumption of 11,000 gallons of gasoline**
- **Installation will save Sutton more than $25,000 in energy costs each year**

The American Reinvestment and Recovery Act of 2009 invested nearly $70 million into energy efficiency and clean energy programs in Massachusetts. These funds are being put to work to create jobs, spur innovation, and ensure the development of clean, sustainable energy sources right here in the Commonwealth.

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Case Study: Franklin County Regional Performance Contracting Collaboration

Energy Recovery Dollars at Work in Massachusetts

DOER
Massachusetts Department of Energy Resources

Franklin County Regional Cooperation

BACKGROUND

Eight small communities in western Massachusetts collaborated through their regional planning agency to hire an energy services company, Siemens, to evaluate the energy savings potential in their aging municipal buildings. As a direct result of the ability to leverage federal stimulus and utility rebate funds, these projects were able to gain the community support necessary to get off the ground. Goals of these energy performance contracting projects were not only to reduce energy operating costs, but also to preserve the unique character and improve the comfort of these historic buildings, making them usable year-round.

FUNDING

The Department of Energy Resources (DOER) provided an Energy Efficiency and Conservation Block Grants (EECBG) of $990,000 to Franklin Country towns, as well as $250,000 for technical assistance services for the projects. In addition, the projects leveraged nearly $200,000 in utility rebates, approximately $177,000 in customer contributions, and $262,000 in Green Community grant funding.

EECBG Spotlight

DOER allocated over $14.5 million in federal stimulus funds through the Green Communities Division to Massachusetts cities and towns, to ensure they are investing in renewable energy and energy efficiency.

PROJECT DETAILS

The 37 buildings upgraded by Siemens received additional insulation, boiler and lighting upgrades, and energy management systems. In total, these eight communities invested over $5 million dollars and leveraged over $1 million in ARRA funding to make these buildings more comfortable and efficient. Heating oil, propane, and electricity savings generated by these building upgrades resulted in over $262,000 in guaranteed energy operating savings and the avoidance of approximately one million tons of CO2 emissions.

Left Photo: A view of the high-efficient boilers installed at Montague Town Hall
Right Photo: State officials view a boiler upgrade in Gill.

AT A GLANCE:

- **Eight towns upgraded 37 buildings with new lighting, boilers, energy management systems, and more**
- **Projected to avoid nearly 880 metric tons of CO_2 emissions each year, which is equivalent to removing about 184 cars from the road annually**
- **Installation will save these eight small communities more than $262,000 in energy costs each year**

The American Reinvestment and Recovery Act of 2009 invested nearly $70 million into energy efficiency and clean energy programs in Massachusetts. These funds are being put to work to create jobs, spur innovation, and ensure the development of clean, sustainable energy sources right here in the Commonwealth.

Massachusetts Department of Energy Resources | 100 Cambridge Street, Suite 1020 | Boston, MA 02114 | (617) 626-7300
Creating a Cleaner Energy Future For the Commonwealth

Individual Project Savings Summaries

Two separate files containing individual project summaries grouped by energy efficiency or renewable projects augment this report.