



BACKGROUND

Springfield, the largest city in western Massachusetts, began an effort to increase its energy efficiency in 2007 because Patrick Sullivan, the city's Executive Director of Parks, Buildings and Recreation Management, saw an opportunity to make improvements to aging facilities that would reduce energy consumption and operating costs. When the Green Communities program began, it provided an opportunity for the city to receive additional support to continue these efforts. In the spring of 2010, Springfield was one of the first Green Communities designated by DOER. One of the criteria to earn designation in the Green Communities program is to establish an energy use baseline and develop a plan to reduce energy use by 20 percent within five years.

AT A GLANCE:

- ♦ Population: 154,000
- ♦ Size: 33 square miles
- ♦ Reduction of municipal energy consumption: 23%
- ♦ Annual energy cost savings: \$1,300,000

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- ♦ <http://springfield-ma.gov>

ACTIONS

Springfield has reduced its energy consumption through a range of improvements to city facilities.

Municipal bonds – Springfield issued municipal bonds to fund implementation of energy efficiency measures.

Contract with an energy service company – Springfield hired an energy service company (ESCO) to identify and implement most of the city's energy efficiency measures. The ESCO guaranteed annual energy savings levels over a 20 year contract period.

Energy audits – The ESCO began their work by doing audits to identify and recommend energy efficiency measures.

Energy efficiency measures

Springfield has implemented energy efficiency measures in most city facilities. These were funded through a combination of municipal funds, Green Communities grants from DOER, Mass Save® rebates, funding from the Massachusetts School Building Authority, and federal grants through the 2009 American Recovery and Reinvestment Act. The ESCO has implemented measures primarily related to heating, ventilation and air conditioning (HVAC) and control systems, and the city is using the savings from those measures to implement additional measures.

- ♦ **Interior lighting upgrades and controls** – Springfield has upgraded to energy-efficient lighting in several buildings, first to efficient fluorescent lighting, and recently to higher efficiency LED technology as its cost has come down. Occupancy sensors have been installed on most upgraded lighting to automatically turn the lights on and off as needed.
- ♦ **Exterior lighting upgrades** – The city is in the process of upgrading to LED lighting in school parking lots.
- ♦ **HVAC upgrades and controls** – Several measures have been taken to improve HVAC efficiency, including:
 - Installation of new, high efficiency condensing natural gas boilers in place of outdated oil boilers
 - Upgrades of chillers and air handling units to new, high efficiency models
 - Addition of simple control valves on radiators to provide temperature control in steam heating systems, reducing overheating in buildings
 - Replacement of basic thermostats with smart thermostats that can be programmed to set back heating or cooling based on the occupancy schedule and accessed remotely to make adjustments
 - Installation of energy management systems (EMS) to provide centralized control, scheduling and monitoring of HVAC systems
 - Installation of "smart" circulating pumps, which automatically analyze system usage and continuously adjust operation to optimize performance in hot water heating systems
 - Installation of variable frequency drives to adjust the speed of motors driving fans and pumps to match output requirements
 - Upgrades to high efficiency motors
- ♦ **Domestic hot water system improvements** – In some schools, Springfield separated the space heating and domestic hot water systems by installing two small, high efficiency condensing boilers with indirect storage tanks to provide domestic hot water. The main boilers can now be turned off during the summer months, and only the smaller boilers are used year round.
- ♦ **Steam system maintenance** – The city replaced failed steam traps to avoid wasting steam in several buildings.

"We think about efficiency in everything we do."

- Mike Gibbons, Facilities Engineer

- ◆ **Weatherization** – Springfield did weather stripping to reduce leakage of heated or cooled air from buildings.
- ◆ **Pool covers** – The city installed pool covers to reduce the natural gas used for pool heating and electricity used for ventilation of indoor pools.
- ◆ **Vending machine controls** – Controllers were installed in buildings including City Hall, police and fire stations, and schools, to optimize vending machine energy use by putting the machine's refrigeration compressor into a low power mode when the area is not occupied.
- ◆ **New construction** – The Brookings Elementary School was rebuilt after the original building suffered substantial damage in the 2011 tornado. The new school was designed to be energy efficient, with Eversource and Columbia Gas involved from the beginning. Features include efficient HVAC equipment, an EMS, LED lighting and occupancy sensors. The Collaborative for High Performance Schools has recognized the school as CHPS Verified.

Building maintenance program – In 2011, Springfield received a grant from the U.S. EPA Climate Showcase Communities Program to improve energy efficiency and air quality in the city's schools. The city hired four technicians to review and document electrical and mechanical equipment throughout the buildings; do maintenance, such as recalibrating systems, cleaning coils and replacing filters; and develop preventative maintenance checklists and manuals to help custodial staff integrate these procedures into their normal workload.

Energy efficiency partnership with utility – Springfield staff have been working closely with their utility companies, Eversource and Columbia Gas, throughout these efforts. In 2013, Springfield and Eversource formalized that partnership with a memorandum of understanding (MOU) stating a non-binding commitment to collaborating on energy efficiency over a minimum three year period. The city agreed to make an effort to invest specified amounts in efficiency measures and achieve specified levels of electricity savings each year, reinvest a portion of the resulting cost savings, and involve Eversource early in all major renovation and new construction projects. Eversource agreed to provide the city with preferred support and incentives of \$0.30 per kWh of annual savings.

RESULTS

Springfield was one of the first communities to achieve the Green Communities program's energy reduction goal, reducing municipal energy consumption by 23 percent from their 2007 baseline and reducing annual energy costs by approximately \$1,300,000. Through this process, Springfield modernized its facilities by replacing outdated, unreliable equipment and improving comfort for building occupants. After reaching this goal, the city remains focused on continuing its leadership in energy efficiency.

RECOMMENDATIONS

Develop strong relationships with utilities.

Springfield has benefited from working closely with its utility companies and involving them early on during the design and development of new projects. The MOU with Eversource has been helpful in documenting shared goals and letting the city know the available incentive levels ahead of time.

Consider hiring an ESCO to complete a large volume of work in a short time. While hiring an ESCO can be costly, it is an effective way to implement a large number of energy efficiency measures in a short period of time. Substantial improvements were needed in Springfield school buildings and other municipal facilities, and through the ESCO contract, the city was able to have much of that work completed in just a few years. Springfield facilities staff recommend ensuring that an ESCO has the necessary experience with specific types of systems, such as steam heating, and hiring an independent engineer to assist with review of ESCO plans, commissioning of new equipment and verification of savings.

Train staff on new equipment. Springfield's success has been bolstered by engaging all levels of city staff. Providing sufficient training has been key to gaining the support of maintenance staff and ensuring that new equipment operates and is maintained properly.

Consider and communicate all of the benefits. Springfield's mayor and staff emphasize the wide-ranging benefits of the city's energy efficiency efforts, including increased reliability with the replacement of outdated equipment, increased temperature control and comfort in buildings, and improved air and light quality. These benefits can contribute to a better learning or working environment for building occupants, in addition to the substantial energy and cost savings.

