



BACKGROUND

The City of Cambridge has a longstanding commitment to sustainability and to leading by example by improving the sustainability of municipal operations. Cambridge joined ICLEI's Cities for Climate Protection in 1999. In 2002, the city developed a climate protection plan and set a policy requiring that municipal new construction and major renovations be designed to meet the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) criteria. Two years later, Cambridge's City Hall Annex became the first municipal building in Massachusetts to achieve LEED certification. In 2009, Cambridge formed a Green Communities Committee, which includes the heads of many city departments and meets monthly. Initially the group worked on the program application, and then it transitioned to collaborating on reaching the program goals.

In the spring of 2010, Cambridge was one of the first Green Communities to be designated by DOER. One of the criteria to earn designation as a Green Community is to develop a five year plan to reduce municipal energy use by 20 percent. The same year, the city expanded staffing for sustainability programs, hiring its first full-time Energy and Sustainability Analyst and the school department's first Sustainability Manager.

ACTIONS

Cambridge has taken a range of actions to reduce energy consumption throughout the city's facilities and operations.

Data analysis – Cambridge has made extensive use of MassEnergyInsight (MEI), a web-based tool provided by DOER to all Massachusetts municipalities to help track and analyze their energy consumption. They use MEI to determine the total energy consumption and energy use intensity (annual energy use per square foot) of each municipal building, and then they review the most energy intensive buildings. While it was initially time consuming to set up, the tool has been very helpful in benchmarking building performance and identifying and prioritizing areas of opportunity for energy efficiency.

Energy audits – Cambridge has taken advantage of free energy audits provided through its utility company, Eversource. They have had comprehensive audits of several facilities to identify energy efficiency opportunities, and also used MEI to target specific systems, such as heating, ventilation and air conditioning (HVAC), in selected buildings for in-depth evaluation.

Energy efficiency measures

Cambridge has implemented energy efficiency measures in many of the city's facilities. These were funded through a combination of municipal funds, Green Communities grants from DOER, Mass Save[®] rebates, and federal grants through the 2009 American Recovery and Reinvestment Act. Measures are typically prioritized if the projected simple payback period is less than seven years.

- ♦ **Interior lighting upgrades and controls** – Cambridge has retrofitted the interior lighting and installed lighting controls in more than 20 facilities. In addition to occupancy sensors, some facilities now use daylight sensors to take advantage of natural light when possible.
- ♦ **Exterior lighting upgrades** – The city has substantially improved the efficiency of exterior lighting, including the conversion of 5,000 streetlights to efficient LED technology, ongoing conversion of park lighting, installation of an innovative wireless dimming control system, and improvements to the scheduling of lighting in parks.
- ♦ **HVAC upgrades and controls** – Cambridge has upgraded HVAC equipment, such as boilers, in many facilities. Several new control systems and variable frequency drives have been installed to optimize equipment operation.
- ♦ **Retrocommissioning** – Retrocommissioning has been conducted to review and optimize the operation of existing HVAC equipment in several facilities.
- ♦ **Weatherization** – Cambridge has done weatherization work, such as air sealing, on several facilities.
- ♦ **Water treatment plant retrofits** – The efficiency of the Sullivan Water Purification Facility has substantially improved with the implementation of extensive process and equipment improvements identified in an energy audit.

AT A GLANCE:

- ♦ Population: 109,700
- ♦ Size: 6.4 square miles
- ♦ Reduction of municipal energy consumption: 20%
- ♦ Annual energy cost savings: \$1.4 million

LEARN MORE:

- ♦ <http://cambridgema.gov/CDD/climateandenergy>

- ◆ **Major building renovation** – Sustainability has been an integral part of recent building renovations and new construction. A renovation of the high school, Cambridge Rindge & Latin School, included efficient lighting and plumbing fixtures, daylighting to take advantage of natural light, an efficient chilled beam HVAC system, rooftop solar electric panels, and a monitor in the lobby displaying real-time energy data. The King School has been rebuilt with geothermal heating and cooling, daylighting, and an automated lighting dimmer system. The city has also committed \$5 million annually from FY2015 to FY2020 for capital improvements, such as energy efficiency upgrades, to existing municipal buildings.
- ◆ **Efficient vehicles** – In 2006, Cambridge instituted a policy requiring municipal departments to consider fuel economy and emissions for vehicle purchases. The city has right-sized some vehicles for their tasks, optimized routes for service vehicles, and installed several charging stations for their growing number of electric vehicles.

Energy awareness programs

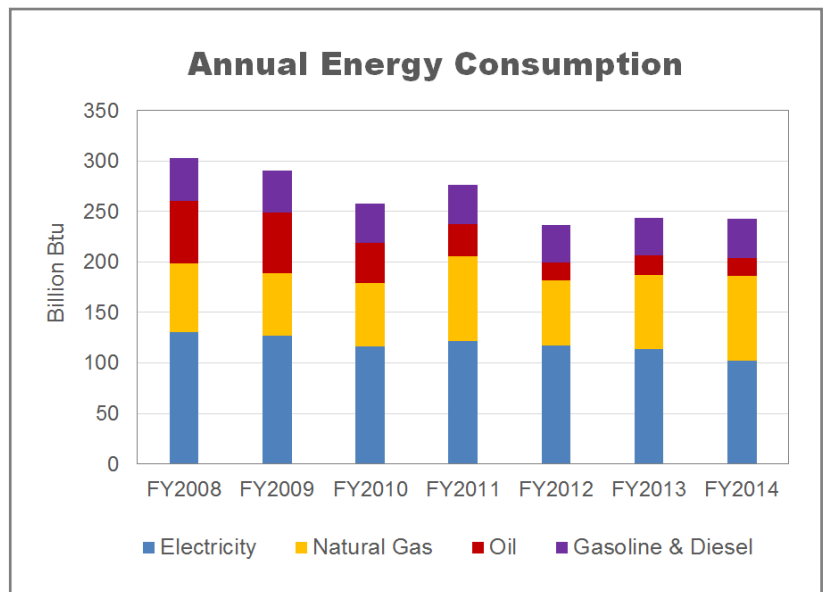
- ◆ Cambridge’s GreenSense program promotes sustainability awareness and engagement among municipal employees. Each year, the program has focused on a different area of sustainability, with the first being energy conservation. This included posters in offices reminding staff to avoid wasting energy by taking actions such as turning off lights and computers when not in use. Every department has at least one designated GreenSense Champion, who works to engage their colleagues in the program.
- ◆ The Cambridge Green Schools Initiative launched in 2011 with the goal of engaging all school building occupants in sustainable practices. The initiative includes a website, a monthly electronic newsletter, and presentations in the schools about environmental topics. In a Go Green Challenge, teachers and their students were asked to commit together to basic behavioral changes in order to green their classrooms.

Energy efficiency fund – In 2010, Cambridge assured an ongoing source of funding for energy efficiency projects by increasing resident parking sticker fees by \$12 and designating \$150,000 of the revenue to these efforts annually.

RESULTS

Cambridge was one of the first communities to achieve the Green Communities program’s energy reduction goal, reducing municipal energy consumption by 20 percent from 2008 to 2014. The city’s annual energy cost savings is approximately \$1.4 million to date.

In 2015, Cambridge was recognized by the U.S. Department of Education with the Green Ribbon Schools District Sustainability Award. The city is actively continuing efforts to reduce its energy consumption and looking to opportunities with new technologies.



RECOMMENDATIONS

Engage staff at all levels. Cambridge’s Energy and Sustainability Analyst, Alexandra Corwin, describes the city’s success in reducing its energy consumption as “both top down and bottom up.” There is a commitment at high levels from the City Manager and elected officials, there are champions for sustainability in every department, and the city has hired dedicated staff to manage ongoing implementation of programs.

Manage expectations. It is important to consider the use of facilities and manage expectations accordingly. After the high school renovation and addition of central air conditioning, operating hours increased because of more community programs and events held in the school throughout the year. The building is substantially more efficient, but the added functionality and use need to be considered when reviewing energy consumption before and after.

Plan for operation and maintenance. New, energy-efficient equipment may operate differently. Expect some time to adapt, and plan staff training on newer technologies such as advanced HVAC controls.

Communicate the benefits. Communication and relationship building have been key to Cambridge’s success. The city has publicized their successes with press releases, staff notifications, and the city website. Promoting additional benefits such as improved occupant comfort is helpful in showing the full value of some energy efficiency measures. Communication should occur before, during and after implementation of changes; engaging and educating facility users throughout the process can help to smooth transitions and address questions about new technologies.