

City of Cambridge

CLIMATE

ACTION STATUS report
2011



Genzyme Center - LEED Platinum



Green buildings come in all shapes and sizes.

REPORT SUMMARY

In 2002, the Cambridge City Council adopted a climate protection plan, which made the case for local action to reduce Cambridge's greenhouse gas emissions. The plan looked at where the city's emissions came from and presented an emissions reduction goal, with strategies and proposed actions by all sectors of the community to reach the goal. The target year was 2010. This report summarizes what has happened since 2002, some lessons learned, and some future directions.

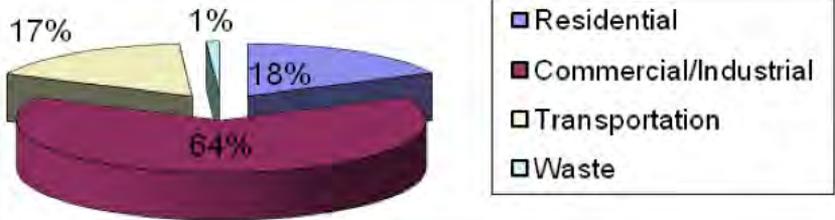
The strategies laid out in the plan turned out to be useful tools to help us plan actions and should be helpful in the future. Future planning and strategy would also benefit from more attention to outreach and to developing effective tools to motivate people to act.

The plan looked to federal action to help us meet our goals, and much of that anticipated action did not happen; however, much is happening on the state level that was not anticipated.

The plan's goal of reducing greenhouse gas emissions by 20% from 1990 levels by 2010 was not met, primarily because of new development, especially in the biotechnology sector, which uses a lot of energy. The impressive amount of energy efficiency work that has been carried out was not sufficient to counterbalance that growth. However, that this job growth happened in Cambridge rather than in a less urban area is positive from a climate perspective. Looking ahead, the dramatic increase in awareness and activism throughout the city puts us in a strong position to partner with people in all sectors to carry out current and new initiatives.

WHAT HAS HAPPENED

The plan's adoption signaled that the City was committed to taking action. The emissions inventory showed that over 80% of Cambridge's greenhouse gas emissions are related to buildings, which prompted the City to focus more on measures to reduce building energy use. The plan included ways in which the City government as well as residents, businesses, and institutions could reduce emissions and showed that action in all sectors of the community is necessary.



The plan included seven strategies for reducing greenhouse gas emissions, using existing and emerging technologies and programs in the areas of energy use, transportation, land use, and waste management. All of the strategies have been employed, and most of the actions proposed in the plan were undertaken.

Some of the actions have had substantial emissions reduction benefits, and some have laid the groundwork for positive results later on. Some proposals did not prove feasible, while others did not produce the kinds of reductions we'd hoped for.

While the plan helped guide municipal activity, opportunities and circumstances led us in some unanticipated new directions. Thus, when the City had an opportunity to partner with the Henry P. Kendall Foundation to start a grant-funded nonprofit to deliver energy conservation services to a lot of customers, the resulting Cambridge Energy Alliance (CEA) became a major focus of City activity. The state's 2008 Green Communities Act provided an opportunity to strengthen the building code, and in 2010 federal funding became available to reduce municipal energy consumption.

Despite substantial efforts and a cleaner electricity supply as the region shifted away from coal-fired power plants to natural gas, emissions grew. The primary reason is new building construction in Cambridge. A modest trend toward more efficient buildings and more efficient building systems has been more than offset by the large amount of new construction—over 10.5 million square feet of new construction in the commercial sector alone since 1990, much of it related to energy-intensive biotech labs. For overall regional greenhouse gas emissions, there are benefits to development being concentrated in Cambridge rather than in the suburbs—less regional sprawl preserves land and vegetation, makes trans-



portation and infrastructure more efficient, and reduces commuting. This growth factor, plus difficulties in accurately measuring and comparing emissions, complicates our ability to assess progress toward reducing emissions.

In addition, on the national level there was much less action on climate change than anticipated in the plan. Federal action on automobile emissions standards has been slower and more timid than anticipated; funding for widespread building retrofits for residents has been inadequate; and funding for utility-based weatherization programs has not met demand. While Massachusetts has seen substantial state action, which promises to show significant results, the impacts of these new programs and initiatives are only beginning to be felt.

There are important positive local trends. Community awareness and organizing efforts have grown dramatically, spurring action by residents and support for new municipal initiatives. Harvard University and MIT, the city's largest employers, have stepped up their efforts. Harvard has pledged to reduce emissions by 30% from 2006 levels by 2016, including growth; this is especially significant in light of its long-term expansion plans. While MIT has not set a reduction goal, it is investing in Energy Forward, a \$13 million initiative to reduce its emissions. Several other major employers have undertaken significant energy efficiency measures. As a Massachusetts Green Community, the City has pledged to reduce greenhouse gas emissions associated with municipal operations by 20% from 2008 levels by 2013. Though municipal operations represent only 3% of total Cambridge emissions, City action is important given its role in the community.

WHAT LIES AHEAD

Future climate plans may look different, as we set new goals. Some municipalities that, like Cambridge, set an initial goal with a single target number, are shifting to project- or sector-specific goals, which may be easier to measure and evaluate. With the increased certainty of major effects from climate disruption, preparing for climate change will become more of a priority, and initiatives that both reduce greenhouse gas emissions and make the community more resilient are taking on new importance. We know that the ultimate goal needs to be to achieve carbon neutrality. Understanding what that means and how to get there will be a monumental task shared by communities worldwide.

Areas in which projects are underway or being explored include creating a building energy labeling system, promoting renewable energy, developing green leases, car-share zoning, revised parking policies, and planning for electric vehicle infrastructure. Work on reducing municipal emissions is underway; the City has pledged to cut its municipal government emissions by 20% from 2008 levels by 2013. CEA's community outreach campaign will continue. It will be important to remain flexible so that new opportunities can be seized as they arise. With the universities and many businesses, community groups and individual residents engaged, there is potential to undertake more dramatic mitigation action.



Energy fairs provide residents with information about actions they can take.



WHAT IS THE CLIMATE PLAN, AND HOW DID IT COME ABOUT?

While City staff and community members had been concerned about climate change for some time, it was a combination of a small group of activists pushing for greater municipal engagement and the Henry P. Kendall Foundation's offer of a free intern to help with the initial steps that persuaded the City to join ICLEI's Cities for Climate Protection in 1999 and begin the process of looking at emissions and developing a plan.

ICLEI is an international organization that links communities worldwide, offering technical assistance and an opportunity to share ideas and insights. In joining Citizens for Climate Protection, Cambridge agreed to carry out a five-step process: Conduct an emissions inventory, set a goal, develop a plan, carry it out, and monitor the results. The inventory, which was done using ICLEI's software, measured emissions from electricity, natural gas, and heating oil, as well as motor vehicle emissions and emissions from trash. It showed that emissions from transportation, an area in which the City has concentrated considerable effort since 1992, accounted for less than 20% of the emissions. Trash, another priority area--the City was an early adopter of curbside recycling--accounted for about 1%. The rest—over 80% — came from buildings, an area where the City had directed less attention. This became the focus for setting new priorities.

Nineteen individuals, many with expertise in some aspect of dealing with climate change, joined a task force to help create the plan. Drawing on the work of other communities, the task force proposed seven strategies to approach emissions reductions, with a particular focus on energy use as the leading source of emissions and the least developed action area. A goal was set of 20% reductions in total emissions from 1990 levels by 2010, which seemed both modest in the face of the challenge of climate change and ambitious in light of the pace of growth in Cambridge. Based on the strategies, the plan included about 100 actions in the areas of energy, transportation, land use, and waste to be carried out by the municipal government, institutions and businesses, and residents.

In 2002, the City Council adopted the plan, and the City Manager appointed the Climate Protection Advisory Committee (CPAC) to help City staff carry it out. CPAC, which meets monthly, has overseen progress reports, advised on strategies and actions and proposed some new directions.

ENERGY

Building energy conservation became a major focus of the plan because it represented the great majority of the city's emissions, mostly from the commercial sector. NSTAR's existing energy efficiency programs were producing only modest results. Significant barriers were identified, notably the problem of split incentives. Most Cambridge residents and businesses are renters, and typically, it is the tenant who pays utility bills, and it is the landlord who needs to fund energy conservation work. Also, for many large businesses, energy bills, even when recognized as unnecessarily high, are nonetheless a small part of their operating cost, compared, for example, to personnel costs, and the connection between personnel productivity and building comfort is not always clear. Developers of new major buildings tend not to be the future occupants, and many were not interested in construction beyond the minimum building standards. Funding for building retrofits was sometimes hard to get. Many residents belonged to recently established condominium associations, which often failed to put aside funds for maintenance and capital projects. It became clear to City staff that their efforts related to current building stock were not going to achieve the significant reductions needed, and they approached the Kendall Foundation for ideas about new directions. The result was the creation of the Cambridge Energy Alliance, a nonprofit set up to encourage widespread and deep energy efficiency measures in both the commercial and residential sectors. CEA put together a team of experts that developed a model of providing consulting services, including financing, to help businesses and individuals carry out efficiency measures. The model did not produce the hoped-for results, partly because of the national economic slowdown, and since 2010 CEA has focused its services on encouraging residents and small businesses to take efficiency measures and helping them navigate the systems of incentives and rebates available. NSTAR has been upgrading its energy efficiency offerings, but its programs have been limited in some sectors, notably multi-family housing.

In 2009, the City Council adopted the Massachusetts stretch building code as part of becoming a green community under the State's Green Communities Act. This code has stronger energy efficiency standards for new construction and major residential renovation. The code should have positive long-term effects, though it will not immediately affect most of the city's buildings. In 2010, Cambridge zoning was amended to require that new buildings that are larger than 25,000 square feet be LEED certifiable and removed barriers to renewable



energy installation. (LEED is a green building rating and certification program of the U.S. Green Building Council).

STRATEGY:

IMPROVE EFFICIENCY OF ELECTRICITY USE BY 12.5%

Electric energy efficiency has been a major focus of the plan. Gains in energy efficiency can be measured in various ways--measuring energy use per square foot or per product produced, or as an absolute number of kilowatt hours.

There has been action on efficiency in every sector of the community. For municipal operations, the City has installed LED traffic signals, instituted an employee awareness program, and replaced much of its building lighting. Some residents have upgraded their appliances to more efficient models and their lighting to CFLs (compact fluorescent lights) or LEDs (light-emitting diodes). Some businesses have also undertaken lighting and other upgrades on HVAC systems and operational controls. The Cambridge Energy Alliance has gone door to door to talk with residents and businesses about efficiency measures and swapped incandescent light bulbs with CFLs.

FUTURE TRENDS

Lighting will continue to become more efficient as new, more efficient, products become available. Appliances and electronics are also becoming more energy efficient. The challenge will be ensuring that gains from efficiency are not offset by increases in the use of electronics.

CURRENT ACTIONS

- Continue the work of the Cambridge Energy Alliance and community groups to promote more efficient lighting and other systems, including outreach to businesses and residents.
- Continue to work with NSTAR to create stronger incentives for residents to take efficiency measures.

STRATEGY:

REDUCE NATURAL GAS AND FUEL OIL USE BY 10%

Accurately measuring the trend in fuel oil use is not currently possible. The many companies that distribute it are not required to report how much they distribute and where, and the City does not have access to information about how much fuel oil is used. We believe that there is a trend toward replacing fuel oil with natural gas for heating; because gas is a cleaner fuel, this would mean fewer greenhouse gas emissions.

Weatherization, upgrading heating systems, and operational changes are the major approaches. In the residential sector, it appears that natural gas use has gone down, probably because as buildings are renovated, owners are also installing insulation and adding other measures. The Cambridge Energy Alliance has done extensive outreach to property owners in both the residential and commercial sectors to persuade them to undertake comprehensive energy audits, including audits of heating and cooling systems, with limited results.

FUTURE TRENDS

More utility incentives for efficiency measures are planned. The state's 2010 energy plan includes expanding utility efficiency programs to include residences that use oil heat, more funding for weatherization, and a pilot program with the utilities to do deep retrofits of residential buildings.

CURRENT ACTIONS

- Do outreach to residents and businesses about the benefits of receiving an energy audit and taking the recommended actions and the resources available for audits and actions.
- Work with state officials to create and implement a building energy labeling system
- Develop a green lease pilot program that addresses the problem of split incentives, where a property owner must pay for building upgrades and the tenants receive the savings in lower energy bills.

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- Create City-funded incentives for energy efficiency actions, using Energy Efficiency Community Block Grant funds.
 - Help property owners finance efficiency measures as new opportunities arise.
 - Continue measures to make municipal operations more energy efficient.

STRATEGY:

REDUCE EMISSIONS ASSOCIATED WITH ELECTRICITY GENERATION BY 40%

The greenhouse gases emissions in the Massachusetts electricity supply decreased by about 22% between 1990 and 2008.

FUTURE TRENDS

New EPA regulations may make it more difficult financially to operate the most polluting power plants. In addition, the state clean energy plan calls for measures to continue to reduce emissions. One possibility is a clean energy performance standard, which would require suppliers to give preference to lower emissions sources.

CURRENT ACTION

- Continue to track progress and advocate for emissions reductions.

STRATEGY:

PURCHASE 20% OF ENERGY FROM GREEN POWER SOURCES

Utilities have been required to increase the percentage of electricity they purchase from green power sources, from a .5% annual increase to a 1% annual increase; this means that in 2010, 5% of the electricity they purchased was from renewable energy sources or from renewable energy certificates. Beyond this, a number of local efforts have taken place. The City purchases renewable energy equivalent to 20% of its electricity use, Harvard purchases green power equal to 10% of its energy use. On-site electricity generation from photovoltaic installations in Cambridge amounted to about 900 kW.



The Museum of Science, Harvard, and MIT have installed small building-mounted wind turbines for research purposes, and the City has installed a wind gauge at Danehy Park to determine whether there is sufficient wind to warrant installing a wind turbine.

Cambridge was a leading proponent of NSTAR Green, through which residents and businesses can opt to pay a premium to purchase wind power equivalent to either 50% or 100% of their electricity. However, to date only a relative handful of residents have chosen this option.

FUTURE TREND

New possibilities for installations may open up, through legislation, tax breaks, lower prices for purchasing renewables, or new technologies. The state is launching a pilot program to help fund solar thermal installations.

CURRENT ACTIONS

- Publicize and promote opportunities for renewable energy installations.
- Continue to look for cost-effective opportunities on City property.
- Promote resident and business purchase of wind power from NSTAR to offset electricity emissions.



TRANSPORTATION

In 1992 the City Council passed the Vehicle Trip Reduction Ordinance, establishing the bicycle and pedestrian programs and other measures to reduce motor vehicle travel and emissions. In the years since, traffic calming and other planning to accommodate cyclists and pedestrians have become a routine part of roadway planning, reconstruction and maintenance, including improving accessibility, keeping sidewalks free of ice and snow, bicycle lanes and bike parking and pedestrian-friendly traffic signals. Because transportation issues are often state and regional issues, City staff play leadership roles in regional and state transportation planning. Cambridge has seen significant growth in the use of sustainable modes of transportation by both city residents and workers since 1990 and will continue to grow and refine its efforts to support walking, biking and transit use.

STRATEGY:

INCREASE AVERAGE FUEL ECONOMY TO 40 MPG

Fuel economy is almost entirely within the scope of the federal government. When the plan was written, we anticipated much stronger and faster federal action. In 2009 the fuel economy standards were raised, with increases to be gradually phased in. Local opportunities to increase fuel economy, beyond encouraging residents and businesses to buy more efficient vehicles, are limited. The City has adopted a green fleet policy for its own vehicles and has instituted the Cambridge Clean Air Cab program, which subsidizes purchase of hybrid cabs.

FUTURE TREND

Federal fuel efficiency standards will become somewhat stronger in 2016. It is expected that California will adopt higher standards for future years, and Massachusetts has opted to adopt California standards.

CURRENT ACTION

- Continue researching options for promoting and creating some of the infrastructure needed for electric vehicles, to support plug-in hybrid and all-electric vehicle ownership.

STRATEGY:

REDUCE VEHICLE MILES TRAVELED BY 10%

While there is no direct measure of vehicle miles traveled in Cambridge, the available information suggests a small downward trend. US Census Bureau data indicates a 7.2 % decrease in Cambridge residents commuting by single-occupancy vehicles between 1990 and 2006-2008 in contrast to increases on the state and federal levels. The number of resident parking permits issued has also dipped in recent years. Bicycling has more than doubled since 2006. The City's infrastructure projects and transportation policies, which prioritize creating comfortable conditions for walking and biking, have received national recognition. These, along with extensive outreach, including the CitySmart neighborhood-based social marketing program, likely contributed to creating a local culture shift.

The City and the MBTA have worked together to improve service, including installing bus shelters and bus information. Directly targeting commuters, in 2002, the City partnered with the Charles River Transportation Management Association to create the EZRide shuttle, which takes commuters from North Station to East Cambridge and Kendall Square and now carries more than 1,500 passengers a day. In addition, the City's parking and transportation demand management program requires employers that want to add parking to make and carry out a plan for reducing drive-alone traffic to their site to 10% below what would otherwise be expected based on use and census data.

Notable private sector efforts include ZipCar, which began in Cambridge and is now an international company with over 150,000 members. Other car-sharing companies are starting up as well. GreenStreets is a local nonprofit that encourages walking, biking, and transit through its walk/ride days.

FUTURE TREND

Much depends on the cost of gas; when gas prices go up, driving tends to go down. Continued interest in car-sharing and health issues may help continue the Cambridge trend toward less driving.

CURRENT ACTIONS

- Continue with the PTDM and bicycle, pedestrian and traffic calming programs, including a bike share service, bike parking and promotional efforts.
- Help the MBTA improve bus service.
- Work on developing changes to the parking policy that would encourage the use of more sustainable modes of travel.



Winthrop Street is one of two shared streets in Harvard Square.

WASTE MANAGEMENT

The emissions inventory attributes only about 1% of Cambridge's emissions to waste. However, this is probably an underestimate, since businesses and institutions use private haulers, and the inventory was only able to measure residential waste and recycling. Also, since the plan was written, the role of methane in climate change has become better known, and scientists estimate it is over twenty times more potent as a greenhouse gas than is CO₂. Much of the methane for which Cambridge is directly responsible comes from organic waste from households and restaurants deposited in the garbage and sent to landfills.

Waste reduction has implications far beyond the impacts that goods have once they enter the waste stream. Every ton of waste created post-consumer is estimated to represent about 71 tons of waste created during the production of products, from manufacturing, mining, fossil fuel use, among others.

STRATEGY:

INCREASE RECYCLING RATE TO 60%

The Cambridge recycling rate for residents was 35% in fiscal year 2010 (July 1, 2009-June 30, 2010). Commercial rates aren't known, as businesses employ private trash haulers.

Single stream recycling began in October 2010 for all residences and municipal buildings. In the first two months of the program, recycling tonnage increased by 12% compared to November and December of 2009. Results at the end of the first year of the program will provide a better understanding of the impact of this switch.

The Department of Public Works has established several initiatives for organics, including selling home compost bins (over 3,300 to date), giving worm composting workshops, and lunchroom composting programs at three Cambridge schools. Seventy businesses participate in an organics collection program, and DPW accepts food scraps from residents, as does Whole Foods on Prospect St.

CURRENT ACTIONS

- Continue to work on options for a more widespread program for composting garbage. At present, there is not a local facility that can handle the potential volume that a municipal curbside program would generate.



LAND USE

Though it was not directly linked to a strategy, land use was addressed in the plan because it is a key element of strategies related to both energy and transportation. Some significant actions:

ZONING. Along with strengthening building standards, zoning changes have encouraged mixed use development and density around transit.

THINKING REGIONALLY. Transportation planning, open space, preventing more sprawl, dealing with large-scale water issues, regional agriculture, and decisions about where industry, housing, and commercial centers should be located are among the issues that require looking beyond the city's borders. Regional planning is especially challenging in the metropolitan Boston area with its 101 separate cities and towns and the regional planning agency's lack of statutory power. City staff are active in regional planning efforts.

URBAN HEAT ISLAND. Cambridge has an active tree planting program for public spaces. There are many places where more trees could be planted, and there is a program to encourage abutters to water newly planted trees until their roots have taken hold. The City has a program to encourage people to plant trees on their property as well. Given that many places in the city lack space for trees, or have conditions that are unfavorable for their thriving, it is also important to look at other kinds of vegetative solutions, such as green walls and green roofs.

GREEN BUILDINGS. Since 2002, 74 facilities in Cambridge have been designed to meet LEED standards. Cambridge's zoning ordinance requires that major new construction and rehabilitation that need a special permit or development consultation must meet LEED certification standards if over 25,000 and under 50,000 square feet, and meet LEED silver standards if over 50,000 square feet. Recent zoning changes also make it easier to construct green roofs and install solar and wind energy systems. See <http://www.cambridgema.gov/cdd/cp/zng/grn-bldg/index.html> for details. While it is important that buildings are as energy efficient as possible, it is also important to consider efficiency of use—how more can be done in less space.

WATER ISSUES. The Public Works Department has continued to carry out a sewer separation project that is designed to reduce pollution of waterways and help prevent flooding. Other initiatives include promoting on-site capturing of

storm water (with measures such as vegetated roofs, holding tanks, bioswales, and permeable pavement.) For details, see <http://www.cambridgema.gov/theworks/ourservices/stormwatermanagement.aspx>.

CURRENT ACTIONS

- Investigate policies to promote green and light-colored roofs, shading for parking lots (maybe with solar), and use of lighter-colored paving.



Green roof on the Robert W. Healy Public Safety Facility.



ADAPTATION—PREPARING FOR CLIMATE CHANGE

Adaptation planning is crucial; it is also, in part, an exercise in uncertainty. While we know that climate disruption is already producing significant local effects, the complex interplay of so many global forces and local factors makes it impossible to know for sure which scenario best fits the reality the community will face, and when. It is important that we have the best possible assessment tools; a well-designed decision-making process; the participation of many different stakeholders, including the residents and businesses; and that adaptation measures, as much as possible, are compatible with existing priorities and programs.

Adaptation and mitigation overlap in many areas. Building weatherization projects against heat as well as cold. Trees help absorb rainfall and keep streets and sidewalks cooler. When neighbors help each other with planting or weatherization projects they create connections that could help in heat or storm emergencies.

Much of the most important and difficult adaptation planning needs to take place on the regional and/or state level—dealing with sea level rise, with Charles River and Alewife Brook flooding, with climate-related infestations that threaten vegetation, and with public health issues. Adaptation will need to involve both the physical infrastructure and social structures.

Adaptation planning was not part of the 2002 climate action plan. Back then, many climate activists were reluctant to consider adaptation because they felt it might lead to giving up on significant mitigation. More recently, activists have considered adaptation planning important both because change is happening more rapidly than predicted and getting ready for it will take a long time and because talking concretely about local climate effects may make the issue more real and prompt more action.

In 2010, Cambridge was one of eight U.S. cities chosen as inaugural communities for ICLEI's Climate Resilient Communities program. The first step will be downscaling anticipated impacts to the local level and conducting a vulnerability assessment. Based on the assessment, goals and an action plan will be developed. ICLEI will provide on-line tools and technical help.

CONCLUSION

The actions taken since adopting the climate action plan in 2002 have provided lessons in what works and what is less effective. While the reductions goal was not met, probably an impossibility given the amount of new construction in the city, many of the actions taken—by residents, businesses, institutions and municipal government— have been effective and will continue to pay off in the future.

The City Council has adopted the state’s goal of 80% reductions in greenhouse gas emissions by 2050. In December 2010 the state issued the Massachusetts Clean Energy and Climate Plan for 2020, which laid out policies and programs designed to meet a goal of 25% reductions from 1990 levels by 2020. The state plan has some potentially powerful elements that could help us develop and carry out new initiatives. On the local level, we can take advantage of the many benefits of measures to reduce emissions—they strengthen the economy and help us prepare for the inevitable disruptions of climate change, and they can create a stronger, healthier, more just and more livable city.



Members of Sprouts of Hope receive the City’s 2008 GoGreen Community Organization Award.

RESOURCES

Climate change information and actions - www.climatechoices.org

State programs and policies - www.mass.gov/envir

Energy efficient appliances - www.energystar.gov

Energy efficiency audits and utility programs - www.cambridgeenergyalliance.org

Car ratings - www.epa.gov/greenvehicle

Renewable energy opportunities in Massachusetts - www.masscec.com

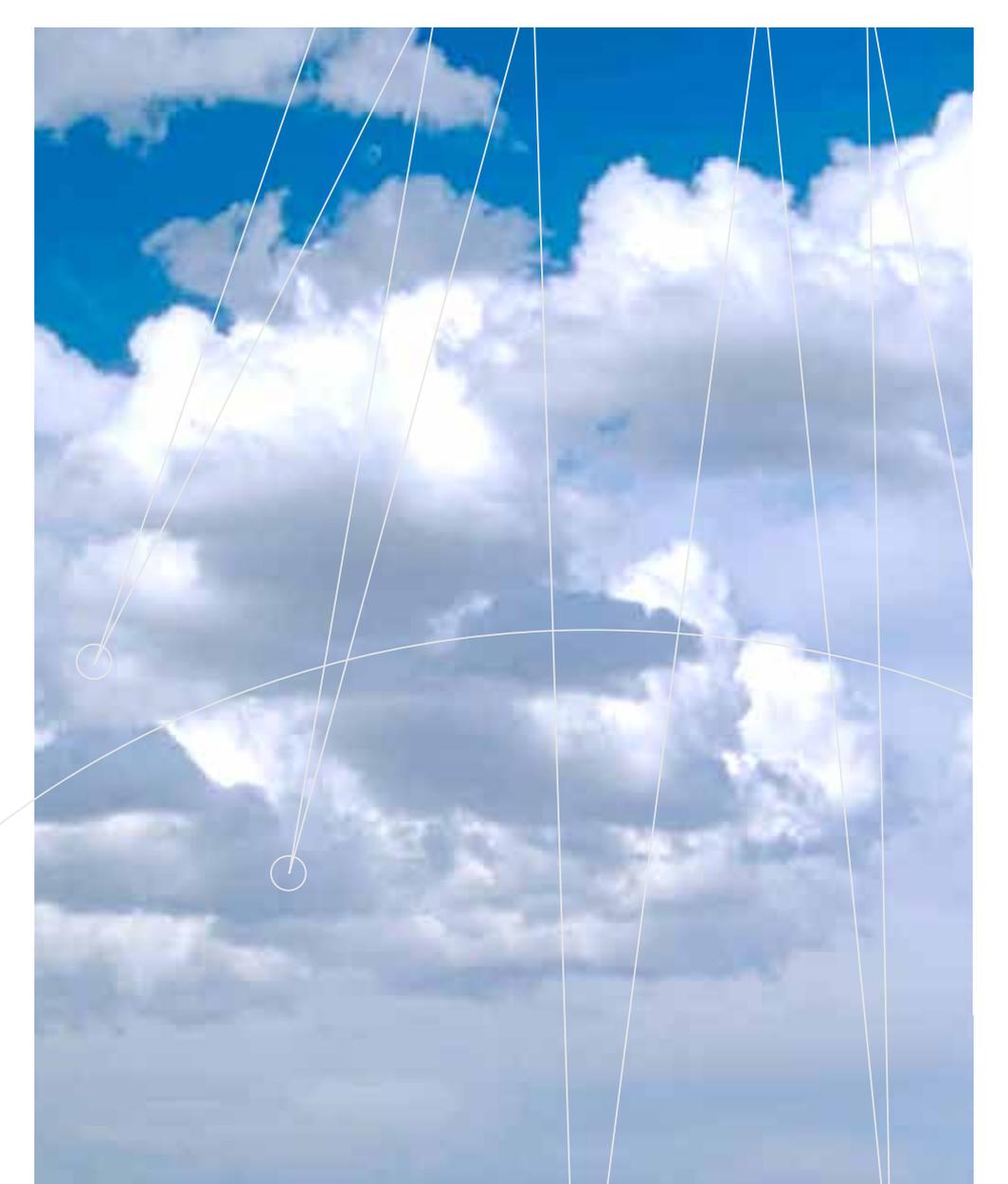
For a more comprehensive listing, see cambridgema.gov/climate



Solar photovoltaic panels to generate electricity and a solar hot water installation helped a housing rehab at 95-97 Pine St. earn a LEED platinum rating. Homeowners Rehab and Cambridge Neighborhood Apartment Housing Services did the project.



Harvard converted this former NSTAR facility into a LEED Platinum office building.



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