

Part I

INTRODUCTION

Welcome to the Town of Belmont Climate Action Plan, the product of several years' work by Sustainable Belmont, a group of Belmont residents organized under the Town's Vision 21 Implementation Committee and concerned with the effects of our living habits on the future of our Town.

Part I provides the setting that calls for responsible changes in response to the coming changes in Earth's climate, and reviews the history of actions Belmont citizens have taken as stewards of our environment.

Part II provides data on our contributions of greenhouse gases, primarily carbon dioxide (CO₂), to the atmosphere from the way we live, travel and do business in Belmont. The data show that there is much we can do to reduce our impact on global climate change.

Part III provides recommendations regarding what town residents, businesses, institutions, and town government can do to make progress toward the goal of achieving an eighty percent reduction of carbon emissions below 2007 levels by the year 2050.

In our every deliberation, we must consider the impact of our decisions on the next seven generations.

—from The Great Law of the Iroquois Confederacy

A Time for Action on Climate Change

The challenge of climate change has quickly become the seminal issue of our time. No other development on the world stage, human or natural, has the same potential to alter the fabric of life on the planet we know today as climate change, with perhaps the exception of an all-out nuclear war. What will be required in mounting a focused and aggressive approach to dealing with the issues of climate change is no less than a global response to a global problem. An effective response will be one that recognizes the urgency

for action and a commitment to build sustainable solutions that will grow and continue to be enhanced well into the future. Change will require enlightened leadership and the involvement of a motivated and educated citizenry, business community, and government at the local, national, and international levels. A Climate Action Plan for the Town of Belmont is a significant step in shouldering the shared responsibility for the challenges that lie ahead.

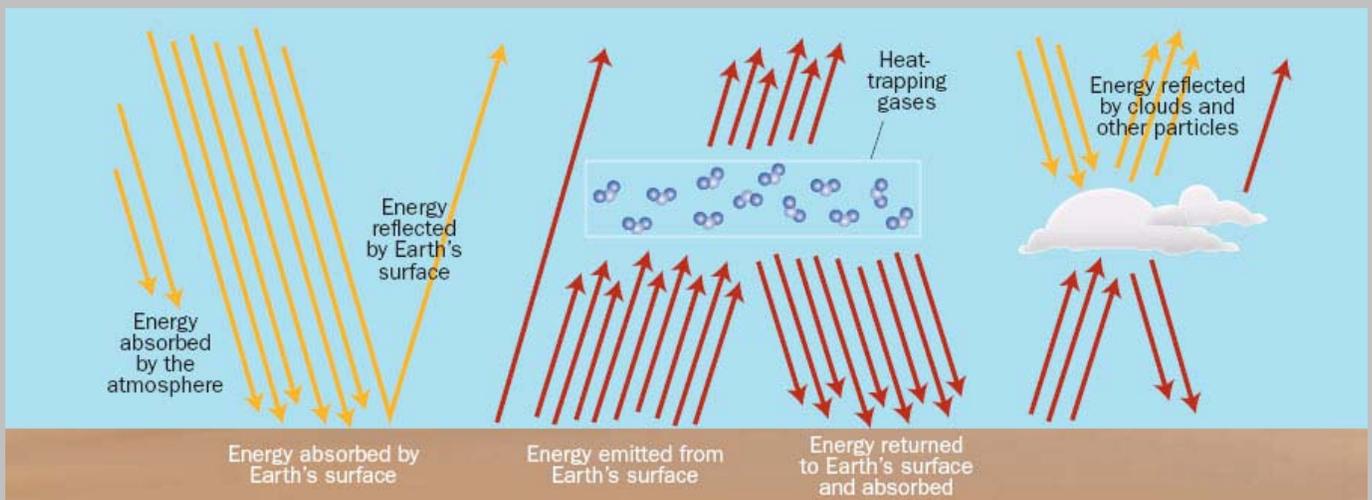
Is There a Consensus that Global Warming is a Problem?

The scientific evidence that Earth's climate is changing abnormally is overwhelming: Temperatures are rising; the polar caps are melting; severe weather events are more frequent. Scientists also have no doubt that climate change is resulting from changes in carbon balance from the burning of fossil fuels and the destruction of tropical forests. In addition to these conclusions, the International Panel on Climate Change (IPCC), in its Third Assessment Report (2001), reviewed scientific studies of climate change throughout the world and concluded:

"There is high confidence that recent regional changes in temperature have had discernible impacts on many physical and biological systems".

Scientists overwhelmingly agree with these findings of the IPCC. Scientific academies around the world have endorsed the IPCC reports, including the U.S. National Academy of Sciences, Chinese Academy of Sciences, Académie des Sciences (France), Deutsche Akademie der Naturforscher Leopoldina (Germany), Science Council of Japan, and Royal Society (United Kingdom).

In addition, United States institutes specializing in the study of the climate endorse the IPCC findings, including: NASA's Goddard Institute of Space Studies, the National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA), National Center for Atmospheric Research (NCAR), and American Meteorological Society (AMS).



About half of the sun's energy (yellow arrows) is absorbed by Earth's surface. However, when this absorbed energy is emitted back to the atmosphere (red arrows), heat-trapping gases prevent most of it from escaping toward space, resulting in higher temperatures. Note: the molecules depicted in the inset box represent heat-trapping gases that are well-mixed throughout the atmosphere, and the number of yellow and red arrows is proportional to the actual balance between incoming and outgoing energy. Diagram: Union of Concerned Scientists.

A Changing Climate

The scientific communities understanding and adoption of the basic tenants of climate change has been well established for many years. Recently, the evidence for anthropogenic (human-induced) climate change, primarily driven by the release of enormous amounts of CO₂ into the atmosphere through the combustion of fossil fuels, has been described as unequivocal.

Simply put, natural variation and well-understood external forcings do not explain the observed increases in temperature or recorded warming patterns of the atmosphere and oceans. These patterns have a uniquely human signature, quite different from those predicted by an increase in solar activity.

The environmental mechanism for the measured increase in global temperatures is well understood and known as the “greenhouse effect.” Since the Industrial Revolution and the widespread adoption of fossil fuels as an energy source, hundreds of millions of years’ worth of sequestered carbon has been re-released into the atmosphere as CO₂. This increase in atmospheric CO₂ traps infrared radiation, or heat, that might otherwise be reradiated into space. As CO₂ levels in the atmosphere increase, so does the temperature of Earth’s atmosphere and oceans with startling consequences.

The Global Picture

Many of the predicted changes associated with scientific climate change models are measurable today and in fact, point to a rate of change more rapid than initial models predicted. As seen from the accelerated rates of melting of the icecaps at the North and South Poles and on the massive ice sheets of Greenland, and the consequent well-documented plight of the polar bear as ice sheets disintegrate—the world is in the midst of profound change.

Scientific models point toward a change in the distribution of rainfall on land—some areas becoming wetter, others drier—and predict an increase in extreme weather events. In other words, storms that are much more dangerous because of their size, intensity, duration, and perhaps frequency, are predicted. Certainly hurricane

Katrina’s ferocity is evidence for the type of extreme weather events that are possible.

Natural ecosystems are changing, animals and plants are migrating to new latitudes and elevations. Invasive species are flourishing and attempts at their eradication are coming at great financial costs to governments and landowners and to the detriment of populations of native plants and animals and some species are predicted to go extinct in the face of dramatic climatic changes coming too rapidly.

Climate change is having an effect on the distribution and reemergence of infectious diseases as peak freezing temperatures are being reached in far fewer areas and warm weather fosters disease growth. Such changes are cause for concern globally as international travel has the potential to rapidly export a pandemic around the world.

In the future, additional changes are predicted. Even geologic processes may be affected by climate change. Quiet volcanoes long dormant under the overburden of a topping ice may awaken and erupt with more frequency as glaciers retreat. As sea-levels rise, the dislocation of huge numbers of people from shoreline communities seems inevitable.

The predictions of the previous paragraphs are subscribed to by the great majority of scientists, including those on the Intergovernmental Panel on Climate Change (IPCC).¹ The IPCC is considered to be the “gold standard” on the subject. The IPCC was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environmental Programme (UNEP). The IPCC was recently awarded the Nobel Peace Prize along with former Vice-President Al Gore for efforts in creating a better public understanding of climate change and its ramifications.²

The IPCC’s formal objective is:

“...to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced

¹ Online at www.ipcc.ch.

² Online at <http://www.ipcc.ch/pdf/press-releases/pr-121007.pdf>.

climate change, its potential impacts and options for adaptation and mitigation. The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters. It bases its assessment mainly on peer reviewed and published scientific/technical literature.”

One main activity of the IPCC is to provide, in regular intervals, an assessment of the state of knowledge on climate change. The *First Assessment Report* was completed in 1990. The *Second Assessment Report* was delivered in 1995 and provided key input to the negotiations that led to the adoption of the Kyoto Protocol by many nations in 1997. A *Third Assessment Report* was completed in 2001, and most recently, the *Fourth Assessment Report on Climate Change*, was delivered in May 2007.³ It represents the work of more than 2,500 scientific expert reviewers, 800 contributing authors, and 450 lead authors from 130 nations and took over six years to complete.

The IPCC 2007 report assessed the probability of certain outcomes of climate change based upon a number of different climate change scenarios. Regardless of the degree of temperature change for each scenario, the planet Earth predicted for the future will be significantly different from the one we know today. The good news is that the scale of changes the climate on Earth is expected to face is still dependent upon humanity’s response to the problem. In other words, by our actions today, humans still have the opportunity to shape the rate and degree of climate change significantly in the future.

The Regional Outlook

While the IPCC report addresses global challenges, other scientific studies have focused on

³ IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22. Online at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf>.

predictions about the effects of climate change on New England and its residents. The Northeast Climate Impacts Assessment (NECIA), a collaboration between the Cambridge-based Union of Concerned Scientists (UCS) and more than 50 scientists and economists, published a report, *Climate Change in the U.S. Northeast*, that brings the effects of climate change closer to home.⁴ Their predictions are based upon models that consider lower and higher carbon emissions scenarios, again reflecting the strength of human response to the issue. The higher carbon emissions scenario reflects a modest change or a “business as usual” approach. The lower carbon emissions scenario assumes an aggressive approach to curtailing our carbon emissions. Here is an excerpt from the Executive Summary of the report:

By mid century and later ... most changes projected to occur depend strongly on the emissions choices we make in the near future and carry through to the rest of the century. Specifically, under the higher emissions scenario, in which the world remains on a pathway of highly fossil fuel intensive economic growth (with heat-trapping emissions from automobiles, power plants, and industries continuing to increase through the end of the century), new projections for the Northeast show that:

By the end of this century, winters could warm by 8 to 12 degrees Fahrenheit (°F) and summers by 6 to °F.

Historically, major cities in the Northeast experience 10 to 15 days per year when temperatures exceed 90°F. By mid-century, cities such as Philadelphia, New York City, and Boston could experience between 30 to 60 days of temperatures over 90°F each summer. By late in the century, most cities in the region are likely to experience more than 60 days with temperatures over 90°F, including 14 to 28

⁴ Northeast Climate Impacts Assessment, 2006. *Climate Change in the U.S. Northeast*. Online at http://www.climatechoices.org/assets/documents/climatechoices/NECIA_climate_report_final.pdf.

days with temperatures over 100°F (compared with one or two days per year historically).

As winter temperatures rise, more precipitation will fall as rain and less as snow. By the end of the century, the length of winter snow season could be cut in half.

The frequency of late summer and fall droughts is projected to increase significantly, with short-term droughts (lasting one to three months) becoming as frequent as once per year over much of the Northeast by the end of the century.

The character of the seasons will change significantly, with spring arriving three weeks earlier by the end of the century, summer lengthening by about three weeks at both its beginning and end, fall becoming drier, winter becoming shorter and milder.

Sea-level rise will continue, reaching anywhere from a few inches to more than one foot by mid-century. By the end of the century, global sea-level could rise from eight inches up to nearly three feet, increasing the risk of coastal flooding and damage from storm surges.

Higher global temperatures also imply a greater risk of destabilizing the Greenland and West Antarctic ice sheets. It is possible, particularly under the higher-emissions scenario, that warming could reach a level during the century beyond which it would no longer be possible to avoid rapid ice sheet melting and a sea-level rise of more than 20 feet over the next few centuries.

Increases in the likelihood and severity of heavy rainfall events, including more than a 10 percent increase in the number of annual extreme rainfall events and a 20 percent increase in the maximum amount of rain that falls in a five-day period each year.

Increases in winter precipitation on the order of 20 to 30 percent, with slightly greater increases under the higher emissions scenario.

A combination of higher temperatures, increased evaporation, expanded growing season, and other factors that will cause summer and fall to become drier, with extended periods of low stream flow. This will reduce the availability of water from northeastern rivers to natural ecosystems, agriculture, and other needs.”

Simply put, the New England of the future may resemble very little of the New England of the past and today. The tourist attractions that attract so many to the Cape, Islands, and mountains, and help to define the New England region, will likely suffer greatly as sea-levels rise, seasonal changes limit “leaf-peeping” opportunities, ski areas experience shortened seasons and need to rely more heavily on manufactured snow, and maple sugar production moving out of the region into Canada as flora and fauna shift because of changing environmental conditions. Such changes have profound negative implications for the regional economy.

The Boston Outlook

A major study known as the CLIMB Report (Climate’s Long-Term Impacts on Metropolitan Boston) was released in 2004.⁵ The study culminated a four-year, one million dollar research effort, funded by the U.S. Environmental Protection Agency (EPA). Taking part in the study were 10 experts from Tufts University, Boston University, and the University of Maryland who worked in consultation with EPA officials, the State of Massachusetts, the Boston Metropolitan Area Planning Council, and local government

⁵ Tufts University, University of Maryland, Boston University and Metropolitan Area Planning Council. *Infrastructure Systems, Services and Climate Change: Integrated Impacts and Response Strategies for the Boston Metropolitan Area*. Online at http://www.clf.org/uploadedFiles/CLIMB_Final_Report.pdf (full report); http://www.clf.org/uploadedFiles/CLIMB_media_summary.pdf (media summary); and http://www.clf.org/uploadedFiles/CLIMB_major_impacts.pdf (impacts summary).

officials throughout the metropolitan region.

“I have been spending quite a bit of time on an island off the coast of Sicily where virtually everything from water to electric power are highly valued commodities and as such are used sparingly. For the most part, wash is done by hand, and the hot water heater is only turned on when hot water is needed. We have no car, since gas is difficult to get and public transportation is more than adequate, otherwise walking works just fine resulting in no need for a planned exercise program. In spite of these limitations, it is one of the most beautiful places on earth.

Having said this, while home in Belmont, we tend to use the cars less, have converted most of our lighting to low energy bulbs, reduce the number of times we operate the dishwasher and washer and dryer, and lower the thermostats in the winter and raise them in the summer.”

—Angelo Firenze, Chair, Belmont Board of Selectmen

Under the heading Major Impacts by 2100 of Climate Change on Metropolitan Boston are the following entries:

“During the 21st century, sea level along metropolitan Boston’s coastline could rise at least 24 inches (0.61 meters).”

“Higher sea levels of just 12 inches or more could give a typical 10-year storm the intensity of the present 100-year storm; similarly, a 100-year storm would hit with the intensity of the present 500-year storm.”

“Property damage from coastal flooding, plus the cost of emergency services, could total \$94 billion during the century.”

“Homeowners in metropolitan Boston’s 100- and 500-year floodplain could sustain flood damage averaging between \$7,000 and \$18,000 per home.”

“Boston could face at least 30 days of temperatures above 90°F, more than double the current number. Mortality rates tend to rise in Boston when temperatures exceed 90°F.”

“By 2030, the average number of days in July requiring air conditioning could increase by over 24% with a corresponding rise in energy use.”

“Global warming will reduce water quality in rivers and streams making parts of them uninhabitable for fish and aquatic plants.”

“During and after extreme weather events, motorists could spend an estimated 80% more hours on the road due to traffic delays; likewise, 82% more trips could be cancelled because of road flooding.”

“River flooding related to global warming is expected to impact twice as many properties and double the overall cost of damage during this century.”

“Water systems relying totally upon local supplies may need to draw on the Massachusetts Water Resources Authority system to supplement their supplies to maintain acceptable local water service affected by climate and demographic changes.”

How will Boston cope? The CLIMB Report poses three possible approaches: “Ride It Out,” “Build Your Way Out,” or a “Green” scenario.

Of the three adaptive strategies analyzed in response to climate change, the “Ride-it-out” approach—do nothing now and simply rebuild in the aftermath of destruction—was the most costly financially and to the environment. This approach also does nothing to minimize the amount of heartbreak, suffering, and dislocation of victims.

The “Build-Your-Way-Out” approach which assumed some pre-emptive actions such as the construction of sea-walls and bulkheads to hold back the ocean was the second most costly analysis.

The “Green” scenario assumes aggressive pre-emptive actions to blunt the effects of climate change by limiting further greenhouse gas emis-

sions through conservation measures, greater efficiency, and the use of alternative energies. The “Green” approach was the least costly of the alternatives, monetarily, to the environment, and certainly in human terms.

Beyond Climate Change

Beyond the issues and challenges climate change presents, there are other important reasons for switching to a more carbon-neutral lifestyle by using less, or finding alternatives to, fossil fuel.

Perhaps there are no reasons more important than our national security, for our economy and way of life is threatened by our dependence on, and the potential disruption of, oil supplies from unreliable sources in nations that are politically unstable and/or openly hostile to the United States.

Other compelling reasons to change course in our approach to energy include limiting waste, reducing pollution, stimulating local economies, improving health, making cities more “livable” and the simple act of galvanizing the citizenry of the United States in a common cause would provide tremendous benefits to our society and promote an improved quality of life.

The Challenge Ahead—Goals Set

The scientific evidence mandates ambitious and aggressive action now and in the future in mitigating the effects of climate change by reducing greenhouse gas emissions. Different groups and governments have set a variety of target goals, but there is a general consensus that by the year 2050 an 80% decrease in CO₂ output will be necessary to put humanity on track with the lower-emissions scenario predictions for changes in the climate.

In an effort to achieve long-term emissions reduction targets in the Northeast, in 2001, the New England Governors and Eastern Canadian Premiers (NEG/ECP) signed an agreement committing to a comprehensive regional Climate Change Action Plan.⁶ This plan includes a long-term goal of reducing regional emissions of heat-trapping gases to 75 to 85 percent below 2001 levels.

Initially, these reductions may seem unrealistic and difficult to meet, however, the 80% reduction goal by 2050 is achievable with an average annual reduction in emissions of only 3%. This gives communities optimism and time to phase-in policies and procedures, innovations and actions to meet the long-term reduction goal. With an average annual 3% reduction target, a measurable and attainable framework is set that can stay on track to meet the long-term goal.

The Role of Towns and Cities

In many regards, cities and towns around the United States are at the vanguard of tackling the challenges of climate change.

In as much as it is the infrastructure of communities that will be tested most by the effects of climate change, municipalities have an obligation to help mitigate these effects now for the long-term health and well-being of the populace. Extreme weather events resulting in flooding, power outages, traffic snarls, accidents and injury will certainly challenge the limits of first responders, police and fire departments and emergency services, and will burden city workers in the aftermath as clean-up of clogged sewers, overflowing effluent, damaged city streets, removal of fallen trees, and a host of other public funded services will be tested under extreme stress.

Certainly the devastation wrought by Hurricane Katrina to the Gulf Coast is a vivid reminder of how quickly a natural disaster can visit a community. This disaster also stands as a reminder of how long it can take communities to recover from such an event and the limits of the state and federal governments in helping that recovery.

Boston on Board

On April 12, 2007, Boston Mayor Thomas Menino put a 15-point plan to counter the effects of climate change into immediate effect for the City of Boston, and in doing so he put the Hub at the fore of cities taking an active approach to the problem. The plan requires the city government to cut its greenhouse gas emissions by 7 percent by 2012 and by 80 percent below 1990 levels by the year 2050.

⁶ *Climate Change in the U.S. Northeast*, 28–29.

To accomplish those goals, policies include plans to exceed federal government efficiency standards on new buildings by at least 14 % and by at least 7% for renovated municipal buildings respectively. At least 15% of the electricity bought by the city will need to come from renewable energy providers in the wind, solar, or hydro-power sectors by 2012. In the next five years, the city has set a goal of increasing the amount of material it recycles by at least 10 % and to reduce total fuel consumption by city vehicles by 5% by 2012. New city vehicles are also required to use alternative fuels, have flexible engines or use hybrid technology—except in those cases in which such options are not available.

Mayor Menino also created a new Community Climate Action Task Force that will study proposals to bring the city’s private sectors on board.

Carbon Tax

A carbon tax is a tax on the carbon content of fuels derived from sequestered carbon—fossil fuels. Currently, the prices of gasoline, electricity and fuels in general include none of the costs associated with devastating climate change. This omission suppresses incentives to develop and deploy carbon-reducing measures such as greater energy efficiency, renewable energy, conservation-based behavior such as bicycling and recycling, and overall mindfulness toward energy consumption. Conversely, taxing fuels according to their carbon content will invigorate these incentives at every chain of decision and action—from individuals’ choices and uses of vehicles, appliances, and housing, to businesses’ choices of new product design, capital investment and facilities location, and governments’ choices in regulatory policy, land use and taxation. A carbon tax could be revenue-neutral, meaning that revenues would be returned to the public in the form of research and subsidies for development of renewable energy sources, and funds to mitigate the impact of carbon taxes on low-income energy users.

“The task force is looking to take these efficiencies citywide, to see how we can engage the private sector, our utilities, businesses, residential, small companies,” according to James W. Hunt, Menino’s chief of environmental and

energy services, who will attend task force meetings on behalf of Mayor Menino.

The new initiative also proposes to deliver low or no-interest loans to households and businesses that decide to install energy-efficient technologies. The loans would come from a fund of \$500 million financed by private investors and venture capitalists interested in green financing technologies as a means of jump-starting research and development by firms in those sectors.

Cities for Climate Protection

In 1990, ICLEI (the International Council for Local Environmental Initiatives) was created. One of ICLEI’s “flagship” initiatives was the creation of Cities for Climate Protection (CCP). The CCP initiative has encouraged more than 800 cities around the world to develop a Climate Action Plan (CAP) to address and reduce greenhouse gas emissions.

The CAP has five basic milestones (goals):

1. Creation of a community baseline inventory of greenhouse gas emissions;
2. Analysis of the inventory and the assignment of reduction targets;
3. Creation of a local plan of action to meet reduction targets;
4. Implementation of policies and procedures and action items to meet the reduction targets and;
5. An ongoing commitment to monitor and verify that reduction targets are being met until the final goal has been met and maintained as sustainable.

In 2005, a team of Tufts graduate students assisted Belmont in an initial greenhouse gas emissions inventory for the town and in 2006–2008, a more formal evaluation was conducted and completed. This document includes analysis of those inventories and recommends target reductions and other steps and opportunities the Belmont community can take to reduce its greenhouse gas footprint. This plan has been created for Belmont by town residents and numerous suggestions from the community are woven throughout.

Cap and Trade Systems

A commonly discussed climate strategy for industry is a “cap-and-trade” system for reducing emissions. These systems draw on the power of the marketplace to reduce emissions in a cost-effective and flexible manner. A cap-and-trade system creates a financial incentive for emission reductions by assigning a cost to polluting. First, an environmental regulator establishes a “cap” that limits emissions from a designated group of polluters, such as power plants, to a level lower than their current average emissions. The emissions allowed under the new cap are then divided up into individual permits—usually equal to one ton of pollution—that represent the right to emit that amount. Because the emissions cap restricts the amount of pollution allowed, permits that give a company the right to pollute take on financial value. Companies are free to buy and sell permits in order to continue operating in the most profitable manner available to them. Those that are able to reduce emissions can sell permits to companies not ready to invest in replacement or improvement of high-emission plants.

Conservation and Environmental Initiatives in Belmont

The Town of Belmont has, for more than a century, played an exemplary role in the stewardship of natural resources in the Commonwealth of Massachusetts. It was in Belmont and neighboring Waltham that the appreciation of the Waverley Oaks inspired the creation of the world’s first land trust, now known as The Trustees of Reservations (TTOR). It was Belmont residents who underwrote the eventual protection of the Waverley Oaks with a gift to the newly formed Metropolitan District Commission in 1893. And, one hundred years later, it was the citizens and Town of Belmont that reached an historic agreement with McLean Hospital to protect a significant part of the towering forest and the beautiful highland fields that rise above Waverley Square and extend onto Belmont Hill. It is entirely appropriate that we continue this proud tradition by taking a leadership role in assuring that, through decisive action on climate change, we help to sustain Belmont’s remarkable natural resources for centuries to come.

In the past 50 years or so, the Town of Belmont has taken a variety of steps that reflect increasing awareness of emerging environmental issues. Although most steps taken were in response to State mandates, some of the Town’s

responses have exceeded the minimal State requirements; and some have been initiatives driven by the twin motives of saving the Town money while intentionally taking environmentally responsible action, understood in recent years especially in the context of climate change.

The following are brief reviews of some of the major environmental efforts by the Town.

Land Conservation, Wetlands Protection, and the Conservation Commission

During the first half of the twentieth century much had been done to conserve our state’s vanishing natural resources. Gradually it became clear that municipalities needed both a municipal conservation agency and specific authorization of conservation as a valid municipal purpose before they could acquire areas for passive use rather than active recreational development. And so the Commonwealth of Massachusetts invented the Conservation Commission. In 1957, the Massachusetts Legislature passed the Conservation Commission Act, enabling municipalities to establish Conservation Commissions through a vote of the local legislative body. These Com-

missions were initially established as the official municipal agencies charged with protection of a community's natural resources.

In 1967, Belmont's Town Meeting voted to establish a Conservation Commission. The following year (1968) a Special Town Meeting voted to purchase Rock Meadow from McLean Hospital for \$550,000.00 (50% federal funds, 25% state funds, and 25% Town funds.) Henceforth Belmont's Commission was responsible for preserving the interests of the Rock Meadow Conservation Land and Victory Gardens, and for advising other town boards and officials on various aspects of conservation and other environmental issues.

Over time, the responsibilities of the Conservation Commission were expanded as the State took steps to further protect its natural resources. In 1972, the Massachusetts Legislature passed the Wetlands Protection Act to protect wetlands, flood plains and waterways, assigning to Conservation Commissions the additional regulatory responsibility for administering the provisions and standards of the Act. Thus Conservation Commissions (including Belmont's) were now responsible for

the protection both of open space and of wetlands. Later, their responsibilities were further expanded to include the protection of wildlife habitat (1987) and river buffers (Rivers Protection Act, 1996).

To further protect and preserve open space in Belmont, a group of residents established in 1999 the Belmont Land Trust, which works with residents to preserve open space through such vehicles as conservation restrictions on privately owned property.

Recycling

In 1956, the Town acquired from Metropolitan State Hospital 15.6 acres of land on Concord Ave., near the Lexington line, for use as an incinerator site. Built by the town, the incinerator opened in 1959 to incinerate Town refuse. In 1966 an additional, adjacent 9.6 acres was acquired from Massachusetts General Hospital for leaf disposal and composting. In 1973 incineration activity was halted and the incinerator closed; seven years later the ash landfill portion of the site was capped and sealed with clay to minimize the possibility of groundwater contamination. At about this time the Conservation Commission

Cap-and-Trade Versus the Carbon Tax

Both cap-and-trade and the carbon tax have the benefit of changing the economic balance to favor reduced use of fossil fuels. Each scheme may have an important role in the fight against climate change. Both approaches will increase the cost to the consumer of using energy derived from fossil fuels.

The carbon tax has the advantage that it naturally applies uniformly over all uses of energy. Its disadvantage is that it appears to the public as a tax whereas cap and trade proposals operate through regulation of industry and have an indirect effect on consumer prices. It is not clear how to apply the cap and trade concept to private gasoline-powered cars which are a major source of emissions. Applying cap and trade to car manufacturers to promote low-emission cars seems fraught with bureaucratic pitfalls. Cap and trade appears to require separate regulations and bureaucracies for each sector of industry that has carbon dioxide or other polluting emissions.

A feature of many carbon tax proposals is their revenue-neutral quality. The revenue would be used to fund development of renewable energy sources and to subsidize energy expense where the cost is a social burden. Thus the carbon tax is a progressive cost recovery method, whereas cap and trade schemes pass the cost equally to all consumers. Of course there is no harm in implementing both schemes. An argument given for cap and trade is that it gives industry more "flexibility" in contrast to regulations that require adherence to a uniform limit on emissions. However, the carbon tax offers the same flexibility.

issued an Order of Conditions to protect the brooks.

The site was converted to a recycling center, permitting residents to drop off glass, newspapers, tin and aluminum. The Town contracted with private companies for recycling these materials. The Highway Department and the Conservation Commission jointly coordinated this first recycling effort.

In 1989, the Board of Selectmen established the Belmont Recycling Advisory Committee (BARC) to negotiate a contract with a waste collection company and to study and oversee the possibility of instituting curbside recycling. In 1991 the Town Meeting passed a bylaw mandating recycling and instituted the alternate-week curbside collection of recyclables. With help from a state grant, a part-time staffer was hired to help promote recycling and educate the community about the newly expanded program. In 2000, the Selectmen established the Solid Waste and Recycling Advisory Committee (SWARAC) to assist in developing a new contract for the procurement of solid waste and recycling collection and marketing services.

Initially only basic recyclables were collected curbside. Gradually other recyclables were added to the collection, significantly improving and expanding Belmont's program over the years. Notable changes were as follows:

1991—Curbside recycling begins: Collection of newspapers, glass containers, aluminum and tin containers, # 1 and 2 plastic containers.

1992—Added: Leaves and yard waste; white goods (appliances).

1994—Added: All recyclable newspaper, including colored inserts; all white paper.

2000—Added CRTs (television and computer monitors)

2002—Added: Plastics # 3–7; all mixed recyclable paper.

2004—Added fees: \$15.00 for CRTs; \$20.00 for appliances.

2007—Added corrugated cardboard, milk and juice cartons (coated paper), aseptic containers (e.g. juice boxes).

Belmont's recycling program was and is managed by the Department of Public Works (formerly the Highway Department). SWARAC was disbanded in 2004, but in 2006 the Selectmen reactivated the dormant committee as interest in and concern for the environment increased, and new volunteers were appointed. The newly reconstituted SWARAC undertook as its first projects to institute recycling of cardboard and to work with the public schools to institute a comprehensive program of recycling and education. In 2007 they commenced with the Chenery Middle School, and expect to expand into the other schools in subsequent years.

Town government buildings participate in the recycling program, though with varying degrees of success; successful recycling appears to depend on the training and commitment of personnel (including personnel from contracted cleaning services) as well as on the availability of various appropriate recycling containers and appropriate disposal systems.

Energy Conservation: Belmont Municipal Light Department

During the 1990s and in the first few years of the twenty-first century, the Belmont Municipal Light Department (BMLD) initiated a variety of programs to help the Town and its residents conserve electricity:

1. Street Lights Conversion: In the early 1990s, the BMLD began to convert the Town's streetlights from mercury vapor to high-pressure sodium. Over several years, all two thousand streetlights in Belmont were converted, cutting the overall load by approximately 50%. At the same time, new cut-off fixtures were installed, directing the light downward, to lessen light pollution.

2. Traffic Signal Conversion: In 2003/2004, the BMLD started a program of converting traffic signal lights to LED bulbs. Belmont has 28 intersections with traffic signals controlling them. The conversion to LED is an expensive one, each light costing \$200–\$400, depending on the color. Over the next several years, all

“red” and “green” lights were converted, though not many “yellow” lights were included, as they are not lit for long and hence consume less energy. The “walk/don’t walk” lights are converted only when new installations are brought in, though bulb size has been reduced in the pedestrian signals.

3. Hybrid Cars: In 2004 the BMLD became the first town agency or department to purchase a hybrid car. BMLD now owns three hybrids—the original Civic hybrid and two Ford Escapes. To date, these are the only hybrid vehicles owned by the Town.

4. Residential Home Energy Conservation Programs: In recent years, the BMLD has developed three programs designed to motivate and assist homeowners to reduce their electricity consumption: the home audit program, introduced around 1995, the Energy Star Appliance Rebate program since about 2002, and the CFL “give-away” program (since 2006). The BMLD anticipates reviewing each of these programs to assess their effectiveness in motivating homeowners to make further changes in their homes. In 2007, BMLD spent approximately \$62,000 on these efforts, the most expensive being the rebate program (\$39,000). The CFL program appears to be increasingly popular: in 2006, the BMLD gave away approximately 1000 CFL light bulbs; in the following year, 4000. Additionally, conservation and energy tips are marketed on the BMLD’s website, calendar, and newsletter. In 2007, the BMLD provided space on its newsletter regularly to Sustainable Belmont for further public education on conservation. The newsletter is provided to every electric customer in Belmont.

5. New programs for residents: In February, 2008, the BMLD announced a program that enables individual residents to purchase renewable energy certificates (RECs) to support alternative, sustainable energy projects in New England. Additionally, the Department is exploring such possibilities as offering rebate

programs for the purchase and installation of solar panels on private homes.

6. Holiday lights replacement program: In December, 2007, the BMLD replaced approximately 6000 feet of light strings and bulbs—half the Town’s “holiday lights”—converting them to LEDs; each new bulb, formerly at seven watts, now consumes one watt, resulting in considerable savings. In 2008 the remaining 6000 feet of strings and bulbs were replaced.

7. Transformer evaluations: Since 1997, the BMLD has completed a loss evaluation in purchasing new transformers. This evaluation provides a method for selecting transformers that minimizes electrical losses, thus reducing energy costs.

8. Renewable energy in BMLD’s portfolio: As of 2008, contracts of the BMLD do not include Renewable Energy Certificates (RECs) or contracts with alternative/renewable energy sources. The Department will continue to investigate contracts with renewable energy generators whenever market considerations prove feasible. Hydropower is included in the Town’s portfolio—1000-megawatt hours/year—although hydropower is not recognized as a renewable source. The BMLD is working with municipal departments from other towns to develop collaborative projects, such as solar ventures, common bid and source programs, smart metering, and other technological changes. Since 2002, the BMLD has been a participant in a co-op project with other municipal light departments seeking to become co-owners of a wind farm. A purchase and sale agreement is pending for the creation of a co-op structure. Legal and permitting issues have been resolved, and the project is scheduled for production in December 2010.

ESCo Project

In 2003 the Town of Belmont took initial steps to address the energy consumption of its municipal buildings and appointed a committee to oversee the effort. This initiative was based on recognition

that energy costs were expected to rise steeply in the near future. In such a project, an ESCo (an Energy Services Company) designs and implements energy-efficiency measures to reduce the energy and water use and operations costs of existing buildings. Such projects are designed to be cash neutral—that is, savings in operating costs for municipal utilities will pay for the infrastructure investments during the agreed-upon life of the project, which in this case was 10 years.

In 2005 Noresco was selected for the project and began conducting energy audits of the proposed municipal buildings in order to develop a plan. Twelve town buildings were selected as suitable for the project: seven school buildings and five municipal buildings. The contract was signed in June 2005. Construction—the installation of the energy-saving modifications—was completed in April 2006. Year 1 of the project was from August 1, 2006 to July 31, 2007. Projected savings from that year were \$202,800 and were exceeded by the actual savings of \$218,581, while CO₂ savings were 1,564 tons. With the first loan payment, the town also began the measurement and verification phase of the project. Appendix A provides more details of the ESCo project.

Other Environmental Initiatives

In recent years, other Town and School Departments have initiated a wide variety of programs aimed to reduce energy use and/or to increase public health and safety. These programs include, from the Health Department, a hazardous waste program, changes in the practice of pesticide spraying, the identification of recycling sites for compact fluorescent lights, and a mercury collection program; from the Public Works Department, the use of natural fertilizer on open spaces, the use of a chemical mix—safer than salt—for icy roads in winter, and use of reclaimed materials in laying road foundations; and from the School Department, stricter surveillance of use of chemicals in school laboratories.

An “Energy/Resource Savings Work Group” was established in June 2006, during a combined meeting of the Selectmen and the Warrant, School, and Capital Budget Committees as one of

10 areas of investigation of ways the Town could save money. The task of the work group was to investigate how the Town could save money through the conservation of electricity, oil, gas, water and other resources. It developed a “Resource Savings Policy Statement” (Appendix D), which was passed by both the Belmont Board of Selectmen and the Belmont School Committee. The policy signified the Town’s commitment to using natural resources wisely to save money and promote environmental responsibility. The group also drafted a job description for a potential Town employee whose responsibility would be to oversee this area; examined issues of implementing such a position; and drafted a set of procedures for all staff and those using town buildings to implement the adopted policy. The group last met in May 2007.

In March 2007 the Town’s Board of Selectmen adopted a “Sustainable Building Resolution,” committing the town to a policy requiring sustainable design principles and energy conservation considerations in the design of municipal and school district buildings, both in new construction and in renovation projects (Appendix D).

The decade between 1995 and 2005 saw significant changes in the curriculum of the schools at all grade levels, reflecting increased interest and concern in environmental and conservation issues and especially in climate change. Courses in Environmental Science were offered at the High School; and modules pertaining to environmental science were included in the lower grades. A variety of co-curricular projects such as the Courtyard Project at Chenery and the establishment of an Environmental Club at the High school also were initiated.

Belmont’s Vision 21 Implementation Committee

“We will be an environmentally responsible community.”

In 2000, the Board of Selectmen appointed a committee to develop a “vision” for Belmont. Soliciting public participation through focus groups, forums, feedback sessions and a town-wide survey, the committee developed a “Work-

ing Vision for Belmont’s Future” (Appendix D) which was adopted unanimously by the Town Meeting in April 2001. The “Vision” is a broad, aspirational statement, covering many facets of town life. One of its “common goals” states, “We will be an environmentally responsible community.”

In 2001, the Board of Selectmen appointed a “Vision Implementation Committee” charged with helping the Town implement the Vision. To help actualize the environmental component of the Vision, the Committee initiated three projects:

“Environmental Conversations” Project: In the summer of 2003 the Vision Implementation Committee invited representatives from town departments, committees and commissions, public advocacy groups and interested individuals to engage in a series of group conversations about what the town was already doing that might be considered “environmentally responsible.” It was felt that this positive approach would lay the groundwork for subsequent efforts. The information that emerged, along with recommendations that were proposed, constitutes the report, “Environmental Conversations.”⁷

Environmental Fair: In October 2004 the Vision Implementation Committee, together with a volunteer Steering Committee, and in collaboration with the Belmont Public Schools, hosted a day long “Environmental Fair” to spark interest in and educate the community about environmental issues. The Fair was held in the Field House of the High School. Approximately 80 exhibitors participated; over 1100 people attended the fair.

The exhibiting tables were organized into four categories: air, water, earth and heat/energy. About 200 residents volunteered to assist during the fair.

Establishment of Sustainable Belmont: Following the Environmental Fair, the Vision Implementation Committee determined that there was sufficient interest in the Town and a growing need to establish a group dedicated to helping the Town become more environmentally responsible. They determined that such a group would be a Task Force of the Vision Implementation Committee, enabling the group to serve as a part of Town government.

Sustainable Belmont (2005–present)

In February 2005 the Vision Implementation Committee established a task force, charged with helping the town implement that part of the Vision that said, “We will be an environmentally responsible community.” Two individuals were appointed by the Vision Committee to serve as co-chairs and were encouraged to recruit volunteers to work with them. In the following three years, the group has worked diligently in a variety of areas. Most significant among these are the following:

Public Education and Outreach: This is an ongoing effort. Sustainable Belmont has organized in-

formational programs on topics such as “phantom energy,” green building practices, organic yard care, and climate change; and sponsored two showings of the movie, *An Inconvenient Truth*.

Town Policies for Belmont: Sustainable Belmont members participated in the Energy Resource

“Our house abuts one of the most unique features of Belmont, Sergi Farm—owned by the Ogilby family, farmed by the Sergis and home to Community Supported Agriculture on a small portion of the farm. This gives us the opportunity to eat a lot of locally grown produce, and we don’t even have to drive to get it! We are lucky to live here.

With our old gas boiler, the service company said that it was 85% efficient. But, an energy auditor said that the boiler was like using a bulldozer to dig a small hole; it was way more than was needed. The efficiency of our new gas boiler is estimated at 96%. And we’ve saving money too. We also use a programmable thermostat to adjust the temperature of the house for different times of day. This keeps the amount of gas we use down as well.”

— David and Miriam Weil

⁷ Online at http://www.town.belmont.ma.us/Public_Documents/BelmontMA_BComm/vision21.

Savings Work Group that developed the Resource Savings Policy (adopted by the Selectmen in 2006 and by the School Committee in 2007); and also encouraged the establishment of and participated in the Green Building Study Group that developed the Sustainable Building Design Policy, adopted by the Selectmen in 2007 (see Appendix D to read these policy statements).

Anti-Idling / Cleaning-the-Air Campaign: This on-going Sustainable Belmont campaign seeks to educate citizens about the State's Anti-Idling law and to reduce automobile idling in Belmont, thereby enhancing residents' health and reducing carbon emissions.

Collaboration with Town Departments: Sustainable Belmont has collaborated with the Belmont Heath Department regarding disposal of CFLs; with the Permanent Building Committee to develop a Sustainable Building Design Policy; with the Municipal Light Department regarding a green power/RECs program and in developing written materials on energy conservation and efficiency; with the BMLD Advisory Board regarding an Energy Efficiency and Conservation Policy; and with the Belmont Public Schools regarding environmental programs.

Affiliation with Other Environmental Groups: Sustainable Belmont is a member of MCAN (the Massachusetts Climate Action Network) and Greater Boston Breathes Better. Sustainable

Belmont encouraged the Town to join ICLEI (a worldwide network of cities and towns committed to addressing sustainability and climate change). The BMLD has paid for the Town's membership in ICLEI, thus enabling the Town to receive computer software critical for the development of the Town's greenhouse gas inventory. Membership in these three organizations offers our residents opportunities to learn from others in the larger environmental community beyond Belmont.

Climate Action Plan: As a task force of the Vision Implementation Committee, Sustainable Belmont has, since its inception, been committed to helping the town become an environmentally responsible community. As part of that goal, and with the support of the Board of Selectmen, it has undertaken to develop a plan by which Belmont can respond to the challenge of climate change. To initiate the project, Sustainable Belmont arranged with Tufts University for five interns who would start the development of a greenhouse gas inventory. Their efforts provide a benchmark from which progress in reducing our carbon emissions can be measured. Members of Sustainable Belmont have refined and extended the work of the interns, solicited additional public input, and conducted surveys of businesses and town employees as they continue the ongoing effort to draft a plan for Belmont. The draft of the CAP will be further vetted by the public (spring 2009) before being brought to the Board of Selectmen for review and consideration of next steps.