APPENDIX 2

TOWN OF WELLESLEY SUSTAINABLE ENERGY PLAN

EFFICIENT BUILDINGS AND INFRASTRUCTURE

INTRODUCTION

This chapter describes how we can achieve improved energy efficiency in our buildings and supporting infrastructure. Heating, cooling, lighting and all other energy-consuming activities in our buildings and infrastructure account for about 62 percent of Wellesley's total energy use and production of greenhouse gas emissions. Wellesley has significant untapped potential to improve its energy efficiency, not only to help the Town achieve its greenhouse gas (GHG) reduction goals, but also to achieve significant economic benefit through energy cost savings, including the deferral of costly improvements to the Town's electrical infrastructure. Energy efficiency is often the most cost-effective means of achieving emissions reductions.

Our buildings include residential homes and apartments, stores and offices, libraries and other public buildings, public and private schools, colleges, and places of worship. The Town is also supported by infrastructure such as roads and streets that are lit at night, Town department vehicles, and water and sewer systems. The Town's residential, municipal, and commercial/institutional sectors all can take advantage of modern efficient technologies and practices that can reduce the amount of energy needed to provide necessary services. In the process, the quality of service provided (e.g., interior and exterior lighting, heating, cooling) and affected environment (e.g., indoor air) are often improved, healthier, and more productive. This section outlines the actions the Town of Wellesley can undertake to promote energy efficiency across all sectors of the community. To the extent possible, it also provides an estimate of the energy savings potential and the associated GHG reductions and energy cost savings.

STATUS AND TRENDS IN BUILDING ENERGY USE

As noted earlier, buildings and infrastructure account for about 62 percent of Wellesley's energy use and emissions. Recent statistics describing municipal, residential, and commercial and industrial energy use can help us target where we can best reduce energy use.

Municipal energy use

Municipal buildings and infrastructure (government, public works, and community and school facilities) accounted for about 2 percent of Wellesley's total GHG emissions in 2007. School buildings account for 52 percent of total municipal GHG emissions. For FY 2011, about $1.4 million is budgeted to supply energy to Wellesley's schools (electricity, natural gas, and heating oil).

In general, school energy use has trended up due to space added to serve both increased enrollments and new curriculum requirements. For example, new elementary schools have been constructed (Sprague and Bates), the middle school was renovated, and several modular add-on trailer units were added to existing schools. Another important factor is that our aging school buildings may be considered as relatively energy inefficient (e.g., old boilers, poor insulation and windows).

Residential energy use

Residential energy use (homes, apartment buildings, condominiums) accounted for approximately 30 percent of Wellesley's total GHG emissions in 2007. According to 2005 statistics from the U.S. Department of Energy's Energy Information Administration, about 65 percent of all the energy used by an average household in New England goes to space heating (63.4 percent) and cooling (1.4 percent). Presumably energy use for residential air conditioning in Wellesley is higher than the New England average. Another 18 percent goes to refrigerators, other appliances, and lighting and 16 percent to water heating. According to the International Energy Agency, electrical use for consumer electronics alone (televisions, home computers) is expected to triple in 20 years. In terms of the local trend in residential energy use, Wellesley residents are using more energy than ever before: according to MLP data, the average annual electricity use per household rose by 15 percent in only 5 years, from 860 kWh per month in 2002 to 990 kWh per month in 2007, which is now almost twice the usage of an average residence in Massachusetts (526 kWh per month).

Perhaps most significant is the increasing size of homes. According to Town building permit records, the median living area of new homes increased 30% from 4,500 square feet in 2005 to more than 6,000 square feet in 2009.

Commercial and institutional energy use

Commercial and institutional energy use in buildings (stores, offices, colleges, places of worship) accounted for approximately 30 percent of Wellesley's total GHG emissions in 2007. Wellesley businesses are also increasing their energy consumption, mirroring the residential trend: total electric use rose about 2 percent annually between 1995 and 2007.

Institutions in particular consume large shares of the energy in Wellesley. For example, Wellesley and Babson Colleges account for about 34 percent of total commercial electric use. These institutions will continue to increase their demand while expanding their facilities and providing more services and amenities to their students.

MAJOR MUNICIPAL SUCCESSES TO DATE

Although municipal activities account for a relatively small portion (2 percent) of total GHG emissions in Wellesley, they present excellent opportunities for the Town to reduce its own energy budget and lead by example, and should therefore be a primary focus, if the Town is to achieve its overall GHG reduction targets. The Town already has accomplished much in recent years to reduce emissions in the municipal sector, and we recount some of these accomplishments as a foundation for making future recommendations.

- Municipal Energy Efficiency Committee (MEEC): In the Summer of 2009, the Town established the MEEC, which is made up of representatives from various Town departments, to develop and evaluate municipal policies to reduce energy use. The Town through this committee established a target reduction in municipal energy use of 20 percent by 2013, even more aggressive than the target reduction of 10 percent established in the Town's Sustainable Energy Plan.

- Wellesley Municipal Light Plant (MLP)
  - Municipal Energy Conservation Fund: In 2006, the MLP established a self-replenishing fund of $500,000 to support municipal initiatives such as lighting retrofit projects in municipal buildings. To date, approximately $185,000 has been spent on various projects that have resulted in an annual reduction of almost 390,000 kWh, or about 150 tons of e-CO_2.
  - Line loss reduction program: Through this program, MLP decreased its line losses (power lost during transmission) from a rate of 6.2 percent in 1995 to 4.3 percent in 2008. The annual savings achieved by this reduction are approximately 5.0 million kWh, or about 1,900 tons of e-CO_2.
  - Hybrid car meter reader: In March 2008, MLP replaced its meter reader van with a hybrid Toyota Prius, which has resulted in an annual savings of about 600 gallons of gasoline.
  - Conducted time-of-use pilot program: From November 2008 through May 2009, 15 local families participated in a time-of-use pilot program sponsored by the MLP. Each of these families was provided with a smart meter and in-home display which allowed each family to monitor its individual electrical usage in real time. This pilot program was designed to test if homeowners would achieve greater awareness of their electrical use through this technology and make conscientious decisions to reduce or adjust that usage to conserve energy or reduce utility costs (e.g., to off-peak hours). The MLP recently instituted a higher summer-tier rate for residential customers using more than 1,000 kWh per month.

    The results were very promising. Over the period of the pilot test, all participants decreased electrical usage from 16 percent to 62 percent, averaging 37 percent from an average use of 827 kWh per month to 517 kWh per month. The decrease in on-peak usage ranged from 23 percent to 64 percent, averaging 45 percent from an average use of 433 kWh to 237 kWh per month. Participants achieved these reductions partly by identifying and eliminating phantom loads and deferring laundry machine and dryer use until the weekend.

- The Town's new high school was designed to meet the Massachusetts Collaborative for High Performance Schools (MA-CHPS) standards and includes such elements as green vegetated roof, geothermal heating and cooling, solar photovoltaic panel, and rainwater recovery systems.

RECOMMENDATIONS

Wellesley has an abundance of opportunities to reduce its greenhouse gas emissions and utility expenditures through energy efficiency measures. We describe some of the more promising opportunities below.

Adopt the Massachusetts stretch building code

Estimated annual e-CO_2 reduction by 2013: 7,000 tons
Estimated implementation costs: For the Town, $10,000 for building inspector training plus $55,000 annually for an additional building inspector specializing in energy efficiency. For homeowners, builders, and developers, additional building and home energy performance testing and certification costs are variable but would be recovered through and exceeded by the resulting energy cost savings achieved.

In Wellesley, residential, municipal, and commercial buildings and infrastructure account for about 62 percent of total energy use and GHG emissions. Given the lack of industry, the contribution of buildings is higher than other communities. Therefore, it is imperative to ensure that new buildings and major renovations/additions incorporate the most recent energy efficient related code. Training requirements should be set for the Town's building inspectors in the relevant residential efficiency code and require that they be able to properly review the installation of high efficiency residential HVAC equipment and other similar upgrades. Ensuring that new construction/renovation meets the latest energy code is the best way to "lock in" energy savings, achieve meaningful reductions, and avoid the need for costly and less effective retrofits in the future.

However, by state law municipalities are not allowed to deviate from the state building code. As a result, some cities and towns have adopted voluntary green building standards such as those from the Leadership in Energy and Environmental Design (LEED) program developed by the U.S. Green Building Council.[1] However, energy efficiency is just one of the factors in

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[1] Various LEED initiatives including legislation, executive orders, resolutions, ordinances, policies, and incentives are found in 45 states, including 202 localities (138 cities, 36 counties, and 28 towns), 34 state governments, 14 federal agencies or departments, 17 public school jurisdictions and 41 institutions of higher education across the United States (http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1779). In May 2003, the **Town of Arlington** adopted a requirement that all construction of new Town buildings and major renovations and additions to existing Town buildings meet or exceed LEED "Silver Certification" level (e.g., at least 50 out of a possible 100 points). On April 5, 2004, the **Town of Acton** adopted a zoning bylaw allowing for a density bonus of 0.05 for buildings achieving LEED certification in the East Acton Village District. In December 2004, the **City of Boston** approved a zoning amendment requiring LEED Silver certification for all city-owned new construction and major renovation projects and LEED certification for all city supported development projects. In January 2007, the City of Boston approved a zoning amendment requiring all public and private development projects over 50,000 square feet to be designed and planned to meet LEED "Certified" level (at least 40 out of a possible 100 points). In April 2007, **Governor Deval Patrick issued Executive Order (No. 484) requiring all state agencies** involved in the construction and major renovation projects of over 20,000 square feet to meet LEED certification, demonstrate energy performance 20% better than the existing state energy code, and commissioning by an independent third party. The **City of Cambridge** requires that all new construction and major renovation of municipal buildings meet LEED certification and encourages private developers to use the LEED rating system under the Project Review guidelines of its Zoning Ordinance.

determining whether a project is LEED certifiable.[2] Fortunately, Massachusetts has formally adopted a statewide "stretch" building code that provides a single, uniform option for communities that want to require higher efficiency standards. We recommend the Town of Wellesley adopt this stretch code to ensure that new residential and commercial buildings are energy efficient and the Town's target reduction (10 percent by the year 2013) is met and sustained.

Under the Green Communities Act, the comprehensive energy reform bill signed by Governor Patrick in July 2008, Massachusetts is required to incorporate the latest version of the International Energy Conservation Code (IECC) in its building code within one year of its adoption.[3] The IECC approved its 2009 standards in September 2008, and the Board of Building Regulations and Standards (BBRS) is updating the Massachusetts building code (to a forthcoming 8th edition) to include these standards by January 2010. The new law also allows the BBRS to adopt standards even more stringent than the IECC, and the Governor proposed the Board do so by creating a second, super-efficient "stretch" code that officials could adopt as a local option. On May 12, 2009, the BBRS approved such a stretch code ("Appendix 120AA") as an optional amendment to the existing Massachusetts building code (7th edition Massachusetts Building Code 780 CMR). This stretch code is similarly based on the IECC 2009 energy code, but with approximately 20 percent greater efficiency requirements and third party testing and certification of building energy performance (Home Energy Ratings System or "HERS") based on established national voluntary above-code efficiency standards that have demonstrated to be cost-effective in producing energy savings, such as the USEPA's ENERGY STAR® for Homes program and the New Building Institute's (NBI) "Core Performance" program for commercial buildings. With the state's approval, Wellesley can now adopt the stretch code as a general bylaw through a vote of Town Meeting.[4] In November 2009, the City of Newton became the first municipality in Massachusetts to adopt the stretch code, followed by Cambridge. Other cities and towns considering adoption of the stretch code include Lexington, Sudbury, Carlisle, Acton, and Brookline.

The State estimates that under the stretch building code, the annual energy costs for an average new home (2,672 square feet, 3 bedroom) would decrease by $1,360 (or 44%) from $3,100.[5] The extra construction cost (for insulation, high efficiency windows, furnace, and air

[2] Other factors include site sustainability, water efficiency, materials and resources, indoor environmental quality, and innovation in design.

[3] "Patrick pushes solar for big-box stores," Boston Globe, November 20, 2008.

The IECC is a model energy building code produced by the International Code Council that contains minimum energy efficiency provisions for residential and commercial buildings, offering both prescriptive- and performance-based approaches.

[4] The BBRS advises towns to seek adoption of the stretch code as a general bylaw through a vote of Town Meeting. The Green Communities Division of the Massachusetts Department of Energy Resources has provided guidance with sample article and bylaw language.

[5] Estimates of energy cost savings and implementation costs obtained from "Massachusetts 'Stretch Code' Offers Higher Efficiency Building Code" (ICLEI), available at http://www.icleiusa.org/news-events/massachusetts-stretch-code-offers-higher-efficiency-building-code/, "Summary of 'Stretch' Appendix to Mass. Energy Code, Adopted by BBRS May 2009" (Massachusetts Climate Action Network), "Cash-Flow Scenarios for Stretch Code: 2,672 square-foot, 3-bedroom home, New construction and gut

conditioner, programmable thermostat, fluorescent lighting) would be about $8,100, which would mean about $530 a year when rolled into a 30-year mortgage. Some of these extra costs may be covered by subsidies or rebates from the utilities. With the estimated annual savings in energy costs of $1,360, the net savings would be about $830 a year to the homeowner.

Based on projections on the number and size of new homes, residential additions, and commercial space in the Town from 2009 through 2013, we estimate that the total savings in CO_2 emissions would be about 7,000 tons annually, or about 2.5 percent of the total residential, commercial, and municipal emissions in Town (see Table below). *With the stretch code in place, further annual reductions would be achieved as additional projects are constructed beyond 2013.*

Estimate of e-CO2 savings achieved with adoption of MA Stretch Code, 2009 - 2013

	Projected Number, 2009 - 2013	Increase in e-CO2 emissions over 2007 baseline (tons)		Net savings
		w/o Stretch code	w/ Stretch code	
Larger replacement homes[1]	250	3,800	1,140	2,660
Residential additions[2]	1,700	5,168	3,618	1,550
New commercial space (sf)[3]	370,000	2,733	2,186	547
New housing units[4]	400	6,080	3,952	2,128
TOTAL		**17,781**	**10,896**	**6,885**
Percent of total residential, commercial, and municipal emissions (2007), 280,551 tons		**6.3%**	**3.9%**	**2.5%**

[1] 15.2 tons per existing home, 30.4 tons per replacement home, HER 65

[2] 20% * 15.2 tons (or 3.0 tons) per addition, HER 70

[3] 99 kBTU per sf, 13,403.8 kBTU per ton, 20% reduction

[4] 15.2 tons per new housing unit, HER 65

Other benefits of adopting the stretch building code include improving the affordability of new residential housing because of lower life-cycle costs of the home and opportunity for homeowners and buyers to qualify for lower cost energy efficiency mortgages; improving indoor air quality, occupant comfort, and building quality; increasing worker productivity in commercial buildings; and contributing towards qualifying the Town as a "Green Community," which would make it eligible for a variety of grants and loans for additional energy efficiency and renewable energy projects.

There will be some implementation costs associated with the training of the five Town building inspectors in understanding and reviewing the compliance of new and renovated buildings with the requirements of the stretch code. Under the Green Communities Act, the BBRS and Massachusetts Department of Energy Resources are required to develop a program for training building inspectors on the Massachusetts state energy and stretch code.[6] Federal stimulus

rehab," and "Proposed Massachusetts Stretch Energy Code: Question and Answers (Q&A) on Commercial Building Requirements."

[6] Massachusetts Department of Energy Resources, "Stimulus Program Notice: New Funding Opportunities for Massachusetts Cities and Towns," issued May 11, 2009, revised May 22, 2009.

funds will be used to initiate this training for all local building officials. As a conservative estimate, we estimate a training cost to the Town of $10,000.

There may be additional costs associated with the ongoing administration, inspections, and review of new and renovated buildings for compliance with the stretch code. In most cases, however, project oversight and verification of residential energy measures would be provided by a third party acting on behalf of the builder or homeowner, who would submit a report to the Town building inspector for review prior to the issuance of a certificate of occupancy.[7] In this way the local building inspectors retain their oversight role but the additional energy requirements would not place a significant additional burden on their time. As a conservative estimate, however, we estimate an annual cost of $55,000 (midpoint of the Town's salary range for an assistant building inspector) for an additional building inspector who preferably specializes in energy efficiency.

Develop a program that encourages and motivates homeowners to conduct energy audits

Estimated annual e-CO_2 reduction by 2013: 1,100 to 1,500 tons (assumes 2% to 4% of residences are sold and audited by 2013, with each one achieving 15% energy savings; and 5% of remaining homes are audited by 2013, with each one achieving 10% energy savings)
Estimated implementation costs: Variable costs to homeowners, depending on the extent to which upgrades are implemented, which would be recovered through and exceeded by the resulting energy cost savings achieved

The Town should explore and develop a program that encourages and motivates homeowners to conduct energy audits to improve the energy efficiency of their homes. Currently, not many Town residents are taking advantage of the audit program offered by the MLP. In a 2008 survey of 600 residents commissioned by the MLP, only 10 percent had participated in the MLP's home energy audit program, 45 percent of respondents were aware of the program, but 56 percent were not aware of the program. One local commercial home energy auditor estimates that a homeowner can achieve energy savings of between 10 percent and 20 percent following an audit and implementation of upgrades (e.g., install more efficient light bulbs, insulate exposed hot water pipes, install low flow plumbing fixtures, seal large air leaks).

A number of cities and towns across the country have and are enacting legislation *requiring* home energy audits before real estate transactions can take place. The city of Austin, Texas recently passed an Energy Conservation Audit and Disclosure Ordinance, which took effect on June 1, 2009. This ordinance requires residents selling single-family homes more than 10 years old to obtain an audit and provide the information to potential buyers, but does not require them to make the recommended upgrades. The cities of San Francisco and Berkeley, California, however, mandated home energy audits back in the 1980s and do require that the homeowners complete the recommended upgrades. The estimated cost of an audit is about $200 to $300. To pay for the required upgrades, residents may be able to tap into any available tax credits or rebate or loan programs offered by federal and state government or utility companies. The U.S. Congress is also considering a provision for home energy audits and disclosure of home energy performance as part of forthcoming "cap and trade" legislation on climate change.

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[7] "Proposed Massachusetts Stretch Energy Code: Question and Answer (Q&A)," available at (www.mass.gov/Eeops/docs/.../stretch_code_q_and_a_03_19_09.pdf).

Such legislation helps ensure that the energy use and building performance of homes are *periodically* (i.e., upon their sale) evaluated, optimized, and maintained at the most efficient levels as they age, and informs both current and prospective homeowners of the energy use and building quality of the homes they are considering for sale or purchase. Over time, a familiarity with home energy performance and a market demand for energy efficient homes will be created. Home buyers would reward those who have made energy performance improvements and pay a premium for homes that score well on energy audits.

Local sellers and realtors, however, may express concerns that a home's energy-related flaws could drive down prices and hurt sales. To allay these concerns, the Town may want to consider approaches that are less compulsory or are based on incentives. We do not recommend that the Town require a specific index (e.g., HERS) to be achieved. Instead, realtors will begin to understand that this measurable and objective information on individual homes is available. Buyers can look for the HERS index before purchasing new homes, in much the same way people look for the miles-per-gallon (MPG) measure when buying a car. Another good example is the radon test as realtors have increased awareness of radon by demanding and providing the results of the radon test. We have much the same hope for the HERS index as an objective measure of building quality and energy performance that current and prospective homeowners can use when evaluating homes.

Conduct expanded time-of-use/smart meter pilot program

Estimated annual e-CO_2 reduction by 2013: 400 tons (assumes 5% of residences eventually participate, with each one achieving 20% energy savings)
Estimated implementation costs: About $25,000 for the pilot program, but considerably higher to implement smart metering technology throughout Town, with potentially substantial energy cost savings to participants and the Town

As discussed previously, MLP's time-of-use pilot program in which 15 local families participated over a period of seven months from November 2008 through May 2009 showed promising results. We therefore recommend that the Town conduct another pilot program expanded to include municipal and commercial buildings and more residential homes to evaluate whether smart metering technology coupled with a time-of-use utility rate scheme could become a viable, permanent approach to engage, motivate, and empower consumers to achieve deeper, more persistent, and verifiable energy savings. The Town has engaged a vendor, GroundedPower, Inc., that has the capability to provide increased automation as well as web-based interactive features so that observations, feedback, and comparative results and measures can be readily shared to motivate and foster competition amongst participants. Provided that the results of this expanded pilot program once again prove positive, we suggest that the Town undertake a campaign to publicize the results to encourage other residents to pay more attention to how they use electricity throughout the day and the relative ease with which such usage can be adjusted and reduced. The Town can also use the results of the expanded pilot program to determine whether households are likely to sustain long-term, meaningful reductions or changes in energy use and whether the adoption of higher rates for on-peak use would further encourage or incentivize them to do so. Diverting electrical use to off peak would lessen the strain on the Town's electrical infrastructure and capacity, which are essentially designed to accommodate peak use.

The Town can also use results of the expanded pilot program to determine the economic and technical feasibility and effectiveness of adopting a smart metering system throughout the Town. Such a system would give each homeowner a robust tool with which to actively monitor and manage their individual electrical usage in real time and reduce or adjust their usage to a time period when the demand for power is most advantageous both for the user and the Town (i.e., to off-peak hours). Smart metering would also allow MLP to automatically monitor usage for individual residences (i.e., eliminates the need for manual meter readers) and quickly detect and troubleshoot service outages and interruptions.

Engage a service provider (e.g., energy services company (ESCO)) to audit municipal buildings and implement meaningful energy efficiency improvements

Estimated annual e-CO_2 reduction by 2013: 1,500 tons (assumes a 15% reduction in municipal building energy use)
Estimated implementation costs: Should be no cost to the Town as the upfront costs for implementing the upgrades would be financed by the resulting energy cost savings achieved over a period of less than 10 years

A number of cities and towns have enlisted the services of an energy services company (ESCO) to audit their buildings and finance and implement meaningful improvements and upgrades to make them more energy efficient and less costly to operate. Under the supervision of the Town's Executive Director, we recommend that the Town conduct a comprehensive energy audit of all municipal buildings using the services of an ESCO or similar service provider. The Town should then rank each building according to its level of efficiency so that buildings with lower levels of efficient technology are prioritized for upgrades. Should the Town decide to implement these upgrades, the Town could then execute an energy performance contract with the service provider, under which the service provider will engineer, plan, finance, and execute them at no upfront cost to the Town. The service provider would guarantee a certain level of improved energy performance and recover its costs by the energy cost savings the Town would achieve for a specified period of time (e.g., 10 years). Alternatively, financing can be provided through a tax-exempt lease provided by a bank, rather than by the Town issuing new bonds which would add to the municipal debt burden. Monthly lease payments are then made by the Town to the bank from the energy cost savings achieved.

In 2005, Belmont became the first town in Massachusetts to contract with an ESCO for a project that involved both school and government buildings.[8] The contract cost the city $1.7 million, and guaranteed the town at least $200,000 in cost savings over each of the next 10 years. In 2009, the City of Newton awarded a multimillion dollar contract to an ESCO to provide energy efficient retrofits of its municipal and school buildings and expects a reduction in energy use of 25 percent to 30 percent. In September 2009, the ESCO reported the results of its audit of several municipal and school buildings and recommended an improvement program consisting of comprehensive energy management system improvements (HVAC controls), new lighting systems in the school auditoriums, weatherization of doors and roof penetrations, attic insulation, thermostatic radiator valves, comprehensive lighting improvements and occupancy sensors, and low flow plumbing retrofits and new fixtures, at an estimated cost of more than

[8] Hahn, Jill, "Energy Efficiency Makes Cents," Newton Tab, November 1, 2006.

$3.6 million.[9] The ESCO estimates the energy cost savings would be about $365,000 a year, equivalent to a simple payback period of 10 years.

Continue street light replacement program (LEDs)

Estimated annual e-CO_2 reduction by 2013: 200 tons
Estimated implementation costs: $300,000, with a payback period of about 6 years from the expected energy cost savings

To achieve further reductions in streetlight electrical usage, MLP is evaluating options for the Town's 4,000 streetlights, including removal, deploying timers to shut-off lights after midnight, and replacing the about 700 ornamental lights with light-emitting diodes (LEDs). Almost all of the more than 3,300 non-ornamental streetlights have already been replaced with more efficient lights. [10]

Some towns such as Andover and Fitchburg are turning off some street lights to save energy and money. However, in order to achieve meaningful energy savings (i.e., another 14.6 percent beyond the 5.4 percent already achieved), the Town would have to remove more than 1,200 streetlights from service, which would present concerns with traffic and pedestrian safety. The deployment of timers to shut-off lights after midnight was also considered, but because of the relatively low electric rates of the Town (about one-third the amount charged to Massachusetts municipalities by investor-owned utilities), the payback period is more than 7 years.

As a result, MLP is initiating a retrofit program over the next four to five years involving the replacement of about 500 ornamental street lights (210 watt metal halide bulbs, or 924 kWh) with LEDs (40 watt bulbs, or 176 kWh). LEDs are relatively expensive (20 to 30 times more expensive), but pay off in the long run because they consume one-fifth of the energy and last about five to nine times longer than traditional lights. The energy savings (about 350,000 kWh or $50,000 annually) and reduced labor costs would pay for the upfront costs (about $300,000) in about six years and following that, an approximately 15 percent permanent savings in streetlight energy costs to the Town. In addition, LED lights are favored for the lower level of light pollution they emit.

Develop municipal policies for computer, thermostat, and lighting use

Estimated annual e-CO_2 reduction by 2013: 500 tons (assumes 5% reduction in municipal building energy use)
Estimated implementation costs: Low

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[9] Newton School Committee Meeting Agenda Item, ESCO – Noresco Presentation, September 14, 2009.

[10] As of Spring 2009, MLP has replaced almost all of the Town's more than 3,300 non-ornamental street lights with more efficient sodium or, on a pilot program basis, LED lights (5 LEDs on Donizetti Street and 4 LEDs on Washington Street), resulting in a savings of about 135,000 kWh per year, or 5.4 percent of the total streetlight electrical usage in FY 2007 (2.5 million kWh). Streetlight usage represents about 18 percent of total municipal electrical use.

We recommend that the MEEC continue to develop and promote uniform municipal policies regarding computer purchase and use, thermostat setting, and lighting use that will reduce energy use and emissions. Town employees can be motivated to follow these policies through the use of incentive, recognition, and reward programs.

SUMMARY

To the extent possible, the following Table summarizes the potential GHG emission reductions, costs, and cost savings for each of our recommendations.

Recommendation	Estimated Annual e-CO_2 Reduction by 2013	Estimated Costs and Cost Savings	
		To the Town	To Others
Adopt MA stretch building code	7,000 tons	$10,000 for building inspector training plus $55,000 a year for one additional building inspector	Additional building and certification costs which would be recovered through and exceeded by the resulting energy cost savings achieved
Conduct home energy audits	1,100 to 1,500 tons	Low	Variable (depending on upgrades implemented), which would be recovered through and exceeded by the resulting energy cost savings achieved
Expanded time-of-use/smart meter pilot program	400 tons	$25,000 for pilot program, considerably higher should smart metering be deployed throughout Town	Potentially substantial energy cost savings to participants
Engage service provider (e.g., ESCO) to audit and improve municipal buildings	1,500 tons	Very little cost to the Town as the upfront implementation costs would be financed through the resulting energy cost savings achieved	N/A
Street light replacement program (LEDs)	200 tons	$300,000, with a payback period of about 6 years from the expected energy cost savings	N/A
Municipal policies	500 tons	Low	N/A