City of Holyoke Energy Reduction Action Plan

Submitted by the

City of Holyoke, Massachusetts

to

Massachusetts Department of Energy Resources

In fulfillment of Criteria 3 of the
Massachusetts Green Communities Program

May 14, 2010

(Revised May 20, 2010)

PLAN PURPOSE AND ACKNOWLEDGEMENTS

The City of Holyoke, powered primarily by hydroelectric power generated by municipally-owned hydro turbines driven by the Connecticut River, is committed to the ongoing greening of the City and its operations, as part of its long term vision for the City. In that context, we seek the Commonwealth of Massachusetts Green Community designation.

Over the last year, at the behest of former Mayor Sullivan's administration and the Holyoke City Council, and supported now by Mayor Pluta and the current City Council, government officials representing the City's Planning Department, School Department, Department of Public Works, and the Holyoke Gas and Electric Department have been working together to address the requirements for Green Community designation. With specific respect to Criteria 3, Energy Baseline development and the creation of its Energy Reduction Plan, we have been assisted by the Massachusetts Municipal Association and its sub-contractor Peregrine Energy Group, Inc., who were brought in as consultants using Holyoke's Energy Efficiency and Conservation Block Grant (EECBG).

Since 2009, Holyoke also has been an active participant in Pioneer Valley Planning Commission's regional Energy Management Services solicitation and the final selection of an energy services contractor. Holyoke plans on entering into a Memorandum of Understanding with Siemens, the selected contractor, and is gathering information that will be used for preliminary energy assessments (PEAs) of municipal buildings. We hope these PEAs will lead to specific projects we pursue to implement this Energy Reduction Plan.

The Plan that follows describes how and where energy is used today by the City of Holyoke, in buildings, for vehicular travel, and for other City purposes. We have audited our major end users, looked at equipment in place, and identified opportunities not only for replacing equipment and systems with more energy efficient technology, but also for conserving energy by scheduling equipment and operating our buildings more carefully. We have created a roadmap for a 20 percent reduction in energy use on an MMBtu basis against our baseline (FY2009) over a period of five years. This will significantly reduce our consumption of both electricity and natural gas and replace altogether our inefficient and out-of-date district steam generation and distribution system with on-site high efficiency hot water boilers in individual buildings.

Finally, in submitting this Plan to Department of Energy Resources (DOER), we acknowledge the hard work and support of City departments and staff, Holyoke's City Council, the School Committee, and the Holyoke Gas and Electric Department in its creation.

EXECUTIVE SUMMARY

The City of Holyoke is seeking Green Communities designation from the Massachusetts Department of Energy Resources as part of a larger goal to brand Holyoke as a truly green City. On the supply side, in 2008, over 75% percent of our electric supply came from carbon-free resources and our carbon footprint from electricity supply was 90% lower than the average New England city. This is the legacy of Holyoke's early history as a planned, water-powered industrial city and its decision to continue to operate and maintain its clean, green hydroelectric generation facilities for the benefit of City residents under the Holyoke Gas and Electric Department (HG&E). Continuing this tradition, HG&E is presently in the midst of an effort to expand its renewable energy generation capacity by exploring a potential commercial scale wind project totaling 9 MW on the ridge line at the City's western border. Along with wind technology, photovoltaics have also been an interest of the city, and HG&E is soliciting private parties to develop utility-scale ground-mounted systems within the city.

Our task now, in terms of our Green identity, is to take steps necessary to ensure that future energy use meets the highest standards for energy efficiency.

We have chosen our Fiscal Year 2009 as our baseline year for energy reduction planning. For the base year, The City of Holyoke's energy use on an MMBtu basis totals 214,501, of which 40.94 % is attributable to electricity use, 27.06% to natural gas, 16.23% to district steam, 2.59% to fuel oil, and the remaining 13.18% to transport fuel.

Our Energy Reduction Plan identifies total savings over the five years covered of 20.16% of the combined base year total. On a fuel source basis in MMBtu's, the largest percentage reductions will come from elimination of the municipal district steam (33%) and the installation of on-site high efficiency boilers in the buildings that had been served by the steam system. Savings will come from increased combustion efficiency as well as elimination of distribution losses in steam lines. The largest absolute MMBtu reductions will be in electricity use (19,550).

On an end use basis (buildings, street lighting, and vehicles), the greatest MMBtu reductions will be in buildings, both as a percentage of total energy reductions anticipated (80.74%) and on an absolute basis (34,917). This total is a 21.3% reduction in energy use in buildings.

INTRODUCTION AND BACKGROUND

The City of Holyoke seeks the Commonwealth of Massachusetts' designation as a Green Community by the Massachusetts Department of Energy Resources. Over the past year, City officials and departments have worked together to implement the range of criteria that are required for this designation. Herein, in response to ***Criteria 3: "Energy Baseline / 20% Energy Reduction Plan"***, we provide our energy use baseline inventory and lay out the comprehensive 5 year plan we are putting in place to reduce this baseline by 20 percent.

Holyoke Land, People, and Municipal Infrastructure

Holyoke is located in the Connecticut River valley adjacent to the Connecticut River. It was the first planned industrial city, at one time boasting the greatest paper production in the world. The City was laid out to locate all interactive land uses in close proximity to each other. Manufacturing is located next to housing and near retail, with parks and schools in between. The western and northern most portions of the city are more rural with some farmland. Approximately, 90% of the City's population is located between the Mt. Tom / East Mountain ranges and the Connecticut River, approximately one third of the total land area of the City.

As of the census of 2000, there were 39,838 people, 14,967 households, and 9,474 families residing in the city. The population density was 1,871.4 people per square mile (722.5/km²). There were 16,210 housing units at an average density of 761.5/sq mi (294.0/km²). The racial makeup of the city was 65.76% White, 3.71% African American, 0.38% Native American, 0.81% Asian, 0.12% Pacific Islander, 26.41% from other races, and 2.81% from two or more races. Hispanic or Latino of any race was 41.38% of the population.

The City has 103 municipal buildings, including buildings managed by the Department of Public Works, School Department, Water Works, United Water (a contractor responsible for operation and maintenance of wastewater facilities), and the municipal Holyoke Gas and Electric Department (HG&E, described below). A list of City buildings by Department with addresses is provided in Table A in the Appendix to this Plan.

Currently, the City operates 4,013 street lights, 1,345 contract lights, and 706 individual traffic signals. Also, relevant to our energy reduction goal, the City vehicle fleet includes 318 vehicles operated by the various City Departments. This number does not include school buses which are leased. Our vehicle inventory is provided in Table C.

Non-Vehicular Energy Supply and Use

Holyoke's electricity and natural gas (and historically steam, though that service is being phased out by September 2010) is provided by a municipal utility, the Holyoke Gas and Electric Department (HG&E). HG&E is not only responsible for supplying energy to customers, but it has also had the lead in providing services to assist customers to use energy more efficiently. HG&E has offered efficiency services to customers for a number of years and is using its U.S. Department of Energy (DOE) EECBG allocation to design a new generation of services. The City

has also opted in to participate in the Renewable Energy Trust and is in the pre-permitting phase of a commercial scale wind project within the city limits.

With respect to its energy source profile, Holyoke has been, through much of its history and continues to be today, primarily a producer and consumer of clean renewable energy. Holyoke's location on the Connecticut River resulted in the birth and development of local industries that were powered by the flow of water. Today, hydropower produced from generators on the Connecticut River and throughout the 4.5 mile canal system, owned by the City and operated by HG&E, supply over 50% of the electricity consumed.

From HG&E's most recent 2008 Annual Report covering the period ending December 31, 2008:

> The Department's ownership of the Holyoke Dam and Canal System has helped to transform Holyoke into a truly green City. In 2008, over 78% percent of our electric supply came from renewable energy resources. In addition, Holyoke's electric supply enjoyed a carbon footprint that was 90% lower than the average New England city.
>
> In Holyoke, electricity is not only green, but it is also affordable. In 2008, HG&E customers enjoyed electric rates that were 40-60% lower than those in neighboring communities that are served by an investor owned utility company.
>
> The Department also takes a leadership role with respect to our environmental stewardship of these green generation resources. In 2008, our Hydroelectric Division concluded a very successful 5-year eagle nest monitoring project, during which 16 eaglets were fledged in nests that were constructed by the Department. In addition, the Barrett Fishway provided upstream passage over the Holyoke Dam this year to over 200,000 anadromous fish.

For many years, HG&E also operated a steam plant that provided district heating to private and public buildings. In recent years, the City has been phasing out this steam service, and HG&E will cease production and provision of steam to customers in late 2010. Conversion of public buildings from steam to high efficiency gas heating systems will be resulting in significant increases in energy efficiency, cost savings, and reduction in greenhouse gas emissions.

One result of Holyoke having an inexpensive, locally generated electricity supply and municipally-owned utility, has been to keep prices for energy low and to reduce financial incentives for investment in energy efficiency improvement. While there have been instances of lighting technology upgrades to more energy efficient equipment, in some of HG&E's own buildings for instance or at the Wastewater Treatment facility, which is operated by a contractor to the City, there has not been until now, a comprehensive energy reduction plan in place.

Within municipal owned buildings, the primary occasion for installing more efficient energy conversion technology has been end-of-life replacement, equipment failures, or incorporation of state-of-the-art energy systems in building rehabilitation, renovation, and new construction.

Further, like other municipal utilities that were not covered by the state mandates on investor owned utilities for investment in customer energy efficiency and were not collecting and applying public benefits charges for this purpose, all energy efficiency initiatives were voluntary.

City Energy Goals

In 2009, Holyoke chose to apply to U.S. EPA Region 1 to participate in EPA's Clean Energy Challenge, adopting the 5-year goal of reducing energy use by 10%. Now, with Holyoke's commitment to achieving Commonwealth of Massachusetts Green Community designation, Holyoke is embarking on a more aggressive effort to reduce our municipal energy use in buildings, street lighting, water pumping, and vehicles by 20% or more. **We are confident that we will be able to meet this hurdle, based on information we have already gathered about current equipment and systems in place and the availability of significantly more efficient alternatives and replacements.**

Of course, one of the unique aspects of Holyoke's energy reduction goals is that a significant portion of the electricity use we will be reducing is power supplied from Holyoke's own clean hydropower generation. This will enable the City to continue to make the best use of this valuable resource. Holyoke is already able to export a portion of its hydropower during certain times of year. Any additional clean hydropower that will be generated will be available to new businesses moving to Holyoke or for export to other communities. Holyoke is planning to expand its renewable energy supply through development of commercial scale municipally owned wind turbines on the mountain ridges to the north, along with the addition of conventional and non-conventional hydro-electric generation, and utility-scale photovoltaic project(s).

This historic reliance on renewable power generation is a significant part of the Holyoke story and of how the City intends to brand itself in the future: as a Green city with extensive physical assets suitable for business start-ups and relocations, supplied primarily by inexpensive, carbon-free energy sources.

Overview of the City's Plan to Achieve a 20% Energy Reduction

As part of the process of preparing to become an EPA Community Energy Challenge participant and to seek designation as a Massachusetts Green Community, the City of Holyoke, led by the Department of Public Works and HG&E, began to gather information about the full range of municipal energy use. This information had not been tracked in any coordinated fashion prior to this as energy costs were viewed as inevitable and known to be significantly lower than other communities that purchase supplies from investor owned utilities. There has been no individual with overall energy management responsibilities for energy use city-wide. This responsibility has been loosely assumed by members of individual departments. This is a situation we plan to remedy, using the EnergyInsight tool and other internal reporting and tracking procedures for individual projects initiated and completed.

Specific strategic elements that have been recently put in place to bring Holyoke to its 20% reduction goal include:

1. **EECBG Allocations:** The City allocated $87,800 of its EECBG allocation to consultant support that would address two major objectives:
   - ***Reducing Municipal Energy Use*** by confirming opportunities for energy consumption reductions across all energy end uses, identifying specific recommendations to achieve a 20% reduction over five years, and creating a blueprint that the City will use to achieve reductions.
   - ***Supporting City-wide Energy Efficiency Improvements, Adoption of Innovative Load Management Strategies, and Growth of Local Green Businesses*** through a review of current energy efficiency service offerings, consideration of how they can be expanded and enhanced, integrating energy efficiency into smart grid initiatives under consideration, and attracting and supporting businesses that want to green their operations.
2. **Elimination of Inefficient District Steam:** The remaining $87,800 of the EECBG grant was obligated to installing two new high efficiency gas boiler plants in City properties that had been served by inefficient gas/oil fired district steam. These installations once completed will result in an increase in operating efficiency from approximately 65% to 88%+. Additional high efficiency boiler installations are planned using other funding sources as part of the total phase out of municipal steam supply by September 2010.
3. **Energy Management Oversight:** We established a Green Community Task Force in December 2009 from the Holyoke Energy Committee that was established by the Mayor in August 2009. The Task Force is made up of representatives of the Planning Department, Department of Public Works, Schools, and the Holyoke Gas and Electric Department to address the Green Communities Criteria for Designation and work to secure necessary commitments and approvals from departments and elected officials. As of the date of this application, all necessary commitments have been secured.
4. **Performance Contracting:** Holyoke opted in to participating in the Pioneer Valley Planning Commission's regional RFQ to secure Energy Management Services through a single performance contracting solicitation. With the selection of Siemens as the regional service provider, Holyoke is now organizing itself to enter into a Memorandum of Understanding with Siemens for Preliminary Energy Assessments (PEAs).
5. **LEED Standard for New Construction:** The Department of Public Works is committed to have all new construction designed based on life cycle cost considerations and to have the final result LEED certifiable, in terms of building operations, even if the City elects to not commit to the expense of LEED certification. Buildings being designed and completed under this policy include the Jones Ferry River Access Center that is complete and the Holyoke Library expansion and Senior Center new construction that are in design stages.

6. **Energy Reduction Blueprint:** The City went through an RFP process and has selected and contracted with a consulting team to support the development of an Energy Blueprint to guide energy reduction activities moving forward.
7. **MassEnergyInsight:** Both the Holyoke Gas and Electric Department and the Department of Public Works have registered as MassEnergyInsight users and have been trained to use the DOER tool. All municipal building information has been entered and matched to utility accounts so we can track and benchmark the performance of City buildings.
8. **Energy Audit/Implementation Contracting:** HG&E contracted with RISE Engineering to perform thorough energy audits at eight of its buildings between November 2009 and April 2010, to lead by example of its commitment towards energy efficiency. The audits identified a potential total 99.63 kW demand savings and 488,905 kWh of annual consumption savings from various energy efficiency projects. HG&E has already completed the recommended lighting retrofits at its main administrative office building and is reviewing the balance of completed audits to initiate additional improvements this summer in its buildings.
9. **Lighting and Traffic Signal Improvements:** HG&E had begun a review of the feasibility of converting its High Pressure Sodium (HPS) street and contract lights to more efficient technologies, including, but not limited to state-of-the-art light emitting diodes (LEDs) and high-efficiency pulse-start metal halide type lamps. HG&E has developed a matrix of existing technologies together with manufacturer contact and technical information and we have also obtained data on trial results from several other communities that have tested various technologies over the past two years or so. Traffic signal lamp replacements also have been identified, and HG&E is working with the City's Fire Alarm Division to ensure that weather-related concerns (i.e., they do not give off heat and melt snow like incandescent lamps) identified by other communities as potential problems with LED replacements are addressed prior to City-wide installation. HG&E is committed to field testing and finding best solutions for specific situations during the 2010-2011 timeframe, with installation City-wide for all selected energy efficient technologies to occur within the 2012-2013 timeframe.

ENERGY USE BASELINE INVENTORY

Holyoke began inventorying and tracking energy use prior to the advent of DOER's MassEnergyInsight tool using electronic spreadsheets of consumption information imported from the HG&E customer information system (largely a billing system). Staff then reconciled differences in service addresses and billing addresses with actual building addresses to match specific municipal buildings with the consumption data. Similarly, vehicle energy consumption has been tracked using the pumping records maintained for fill-ups from the City's pumps.

The spreadsheet-based building and energy inventory is serving the City well as it rolls this energy consumption information into DOER's MassEnergyInsight tool. The City will use the MassEnergyInsight information going forward to determine and set the baseline for measuring the success of our energy saving performance contracting. We anticipate significant reductions in energy use when measured against prior performance periods.

Existing Municipal Energy Use

Our baseline annual energy consumption (electricity, natural gas, fuel oil, steam, and transportation fuel) in MMBtu equivalents, based on Fiscal Year 2009, is summarized below. Additional detail of overall energy use in Buildings and for Street Lighting is provided in Table A (see Appendix).

HOLYOKE MMBtu BASELINE

	Baseline Total	Electricity	Natural Gas	District Steam	Fuel Oil	Transport Fuel
Buildings	163,959	65,542	58,047	34,810	5,560	-
Street Lights	22,271	22,271	-	-	-	-
Vehicles	28,271	-	-	-	-	28,271
City of Holyoke	214,501	87,813	58,047	34,810	5,560	28,271
PERCENT	100.00%	40.94%	27.06%	16.23%	2.59%	13.18%

As noted above, the City of Holyoke owns a number of hydroelectric generation stations on the Connecticut River operated by HG&E. In addition to the portion of this generation consumed in the City, a large fraction of this "green" power is sold for a premium to customers outside of the City. For purposes of assessing MMBtu reductions under this plan as well as greenhouse gas impact of energy reductions, standard fossil fuel-based power generation equivalents for electricity have been assumed, using National Grid's conversion factors for western Massachusetts.

Buildings

As noted earlier in this Plan, the City has been organizing its energy use information via spreadsheets and sorting it to target those buildings that are the largest users of electricity and natural gas (and steam). This energy use is summarized in the series of tables that follow.

School Department

Electricity

The City's 12 school buildings are far and away the City's principal consumers of electricity. In fiscal 2009, school buildings consumed 42% of the electricity by all City buildings. The following table presents school department electric accounts sorted by kilowatt hours (kWh) consumed. Electricity use percentages provided are against total electrical use by municipal accounts (including buildings and street lighting) of over 25,000,000 kWh annually. MMBtu percentages are against the total combined MMBtu baseline for the City for Electricity, Natural Gas, Fuel Oil, and District Steam.

School Department Electricity Use as a Percent of City Total[1]

Department / Facility	KWh	% of use	Baseline MMBTUs
School Department			
Peck Jr. High School	2,761,200	10.73%	9,421
Dean Technical High School	2,217,600	8.62%	7,566
Maurice Donahue School	1,795,640	6.98%	6,127
Holyoke High School	1,052,520	4.09%	3,591
Kelly School	919,040	3.57%	3,136
EN White School	471,520	1.83%	1,609
Morgan School	456,160	1.77%	1,556
Sullivan School	453,120	1.76%	1,546
Lawrence School	276,320	1.07%	943
McMahon School	222,800	0.87%	760
Metcalf School	85,407	0.33%	291
Lynch Jr. High School	56,795	0.22%	194
	10,768,122	**41.84%**	**36,741**

Natural Gas and District Steam

67.5% of the natural gas use in City buildings is for schools, for space heating and domestic hot water end uses. The schools also account for 62.4% of the City's district steam bill. The school department's gas usage will be increasing in the 2010 – 2011 heating season as the remainder of the city's steam generation capacity goes off-line and the High School and Lawrence School start-up new local high-efficiency gas boilers. Natural gas use is measured in hundreds of cubic feet (CCF) and steam use in measured in millions of pounds (MLBs). Again, building consumption is by account, sorted by size. Some buildings have more than one account. Percentages provided are the portion of total City energy use.

School Department Natural Gas / Steam Use as a Percent of City Total

	Gas (CCF)	% of use	MMBTUs	Steam (MLBs)	% of use	MMBTUs
Dean Technical High School	88,366	15.65%	9,084	-		-
Sullivan School	63,026	11.16%	6,479	-		-
Kelly School	44,955	7.96%	4,621	-		-
McMahon School	40,088	7.10%	4,121	-		-
Morgan School	36,970	6.55%	3,801	-		-
Lynch Jr. High School	30,903	5.47%	3,177	-		-
EN White School	28,982	5.13%	2,979	-		-
Metcalf School	21,336	3.78%	2,193	-		-
Holyoke High School	12,136	2.15%	1,248	8,907.00	42.65%	14,845
Peck Jr. High School	9,941	1.76%	1,022	-		-
Lawrence School	4,737	0.84%	487	4,119.00	19.72%	6,865
TOTAL	**381,440**	**67.55%**	**39,212**	**13,026**	**62.37%**	**21,710**

On an MMBtu basis, electricity, natural gas, and steam use by School Department buildings alone accounted for 51.46% of the City's FY2009 baseline total.

[1] Peck and Donahue Schools both are electrically heated with unit heaters throughout the buildings. Holyoke will use our anticipated performance contract to determine if conversion to a natural gas system is economically viable.

Wastewater Treatment Facilities

Wastewater treatment facilities, including pumping stations, are also major electricity users. These buildings account for 15% of the electricity used in buildings. They also consume natural gas. While these buildings are included in the City's total energy use for baseline development purposes, they are, in fact, independently operated by the United Water division of Suez Environmental under a long term contract with the City. Under the terms of this contract, Suez has total responsibility for paying all operating costs including energy for these wastewater facilities. They also have the right, responsibility, and incentive to implement improvements to energy efficiency that reduces the cost operations. Their obligation is to leave the combined facilities in as good or better condition at the end of their City contract than they were at the beginning. To date, Suez has already implemented a number of measures that improve both energy efficiency and operations performance and additional measures are under consideration.

Holyoke Gas and Electric Department

Electric accounts attributed to HG&E, for hydro-generation facilities, gas distribution plant, telecom, the steam plant, offices, storage, etc. are equal to just over 7% of the City building total. This excludes all HG&E station service for production. HG&E is overseen by an independent Board of Commissioners. Much of the use is industrial process-like in nature, given HG&E's mission and its function as a generator of electricity and steam, and provider of natural gas. It also accounts for 10.5% of natural gas consumed (not including the gas used for steam production which is accounted for in District Steam use at the point of sale in the baseline).

Improvements that reduce energy use in supporting functions have in the past been deferred because energy was essentially free for them. In recent years, HG&E has started a program of infrastructure improvements that are replacing older equipment with more efficient newer systems. This process will accelerate greatly as part of the implementation of the Energy Reduction Plan.

Water Department

Water Department facilities, including water treatment, pumping and offices account for 3.5% of electricity consumed. It also consumes 5.5% of natural gas use identified in the baseline. The Water Department is overseen by an independent Board of Water Commissioners.

While much of the infrastructure that is in place for water treatment and pumping is relatively new and very well maintained, the system as a whole is operating today at 1/3 of the output capacity that it was constructed for, and metered use of water has been declining regularly, creating shortfalls in revenues expected to retire construction bonds and be available for system improvements. There is great interest within the Water Department in proceeding with a comprehensive strategy for energy use and cost reduction.

Additional City Buildings

The remainder of the City's buildings, including Fire and Police Stations, City Hall and the City Hall Annex, Parking Decks, the Public Library, War Memorial Building, Children's Museum and the Wistariahurst Museum, and Public Works Department facilities, account for the relatively minor remainder of electricity and natural gas consumption. City Hall and the Annex are the only city buildings heated with fuel oil. Also, in FY2009, the War Memorial building used District Steam for heating, though a new high efficiency natural gas fired boiler is being installed this year.

Vehicles

The fuel economy of the Holyoke fleet varies with the different classes of vehicles represented and required by individual departments and for specific functions. Historically, fuel economy has not been a major criterion in vehicle selection. The total volume of transportation fuel for all 318 City vehicles during the baseline year was 227,991 gallons (equivalent to 28,271 MMBtu's).

Street and Traffic Lights

Municipal lighting accounts for just over 4,442,000 kWh per year, equivalent to almost 20% of the total kWh in municipal electric accounts. Street lighting, almost exclusively high pressure sodium fixtures, accounts for 83.5% of this total and traffic signals (mostly incandescent) are 7.5%, with the remaining 9% classified by the city as "decorative lighting." In addition the City owns and provides 1,345 "contract" lights for parking and security lighting. These account for an additional 2,104,879 kWh in electricity use that the City (HG&E) manages.

Areas of Least Efficiency and Greatest Waste

Holyoke will initially focus its energy reduction activities on the least efficient buildings and energy end uses that offer greatest opportunity for cost-effective energy reductions; however achieving the 20% energy reduction goal will require energy efficiency improvements in all City buildings, in street lighting, and in vehicle use.

In this context, "least efficient" will be determined by comparing the efficiency of the current energy equipment, systems, and/or technology in use in Holyoke to provide a specific benefit (e.g. light, space heat, space cooling, hot water, pumping), compared to technologies that are currently available for new construction or retrofit installations. The "greatest opportunity" for waste reduction will be a function of the total energy used for a specific end use or in a single department or at a single site, the efficiency of that use compared to alternatives available, the cost of implementing a change, and the availability of financing needed to realize the opportunity.

While a detailed energy assessment of all energy use will be required to fully describe least efficient areas and best opportunities, we anticipate that lighting, space heating, mechanical systems, pumping functions, and cooling are all energy end uses that are served by older and relatively inefficient equipment, compared to newer equipment and systems currently

available. In addition, energy conversion systems (i.e. lamps) for existing street lights and traffic signals are outdated compared to alternative technologies available today for new installations.

Lighting will be the technology that we address most easily, because the savings potential is great and the disruption to ongoing operations by lighting retrofits are minimal, with projects able to be divided into small pieces and work proceeding during off hours. Schools will likely be a major focus of overall energy reduction effort, because of the large percentage of total energy consumption by School Department Buildings and because of the cost-effectiveness of available technology updates.

Through the City's Energy Committee, building operation guidelines and energy training will be developed for all City personnel with goal of reducing energy consumption that is left on off-hours within the various City buildings. This action will be supplemented with lighting sensors, programmable thermostats for controlling heating and cooling hours and levels, as well as energy management systems where determined feasible.

Again, reducing energy use by 20% will need to go beyond addressing “least efficient” energy users and will require modifications across the City’s entire energy using portfolio. Completion of this effort will require the full five years.

ENERGY AUDIT

The City has undertaken a high level energy audit of major energy consuming buildings and systems as part of the development of its Energy Reduction Plan to determine more precisely where there are specific opportunities for energy reductions as well as what the potential magnitude of these reductions are. This work has been undertaken by the Massachusetts Municipal Association team and relied heavily on the expertise of a consulting professional engineer for cost reduction estimates.

This is only the first step in the auditing and assessment process that the City will pursue to evaluate and implement individual energy reduction projects. As the City moves forward with Siemens selected through Pioneer Valley Planning Commission's regional Energy Management Services initiative, it will receive preliminary energy assessments (PEAs) of buildings from Siemens. Efforts are already underway to gather information needed for these PEAs. Investment Grade Audits will then be developed for Energy Service Agreement(s) that provide executable installation contract(s) for specific projects.

The findings of the Energy Audit completed for the Energy Reduction Plan are summarized in the set of tables that follow, which describe Existing Conditions, Potential Improvements that can be implemented quickly, and the savings that can be anticipated. Based on these findings in larger energy using buildings and facilities (which collectively account for over 75% of the electricity, natural gas, and steam consumed in buildings), potential for energy reductions in smaller facilities have been extrapolated. Savings anticipated were also converted to MMBTUs to facilitate summarizing projected total energy reductions for electricity, natural gas, and steam against the 20% goal.

Existing Conditions and Potential Improvements

Buildings

School Department

As noted earlier, the School Department is the largest combined energy user in the City, accounting for 42% of electricity use and 67.5% of natural gas use. The High School and Lawrence School were also significant district steam users, but these facilities will both be operating with local high efficiency boilers by next winter. Fortunately, in terms of the overall energy reduction goal for the city, schools offer the largest potential for significant energy savings as well as energy cost reductions.

The audit determined that many of the City's school buildings still have the original inefficient equipment from when the buildings were constructed, expanded, or received major renovations. This is most readily apparent in the case of lighting, which is a primary electrical end use in schools, but also is the case with building controls, mechanical systems and boilers.

Lighting. Most of the schools have early generation fluorescent lamps and ballasts, at least two generations behind what is available today and typically installed as retrofits. These newer lamps and ballasts not only use less electricity, but the resulting more effective light output will

allow elimination of numbers of lamps and fixtures in many cases as part of a lighting redesign. The current High School renovation includes such lighting replacement and redesign, and the City will implement similar projects in all the other schools as part of the Energy Reduction Plan.

T12 LIGHTING IS FOUND IN MOST SCHOOLS [PECK SCHOOL]

INEFFICIENT LIGHTING IN KELLY SCHOOL CAFETORIUM

Mechanical Systems. Air handling systems are generally old, often beyond expected service life with plethora of age related issues including failed dampers, valves, leaks and compressor/burner problems. Motors are generally standard efficiency and lacking variable frequency drive controls.

FAILING ROOFTOP UNIT AT PECK SCHOOL

Air Conditioners. AC is generally provided by window units for offices. Existing systems are older and inefficient, compared to systems now available.

Boilers. While some boilers have been replaced as they have failed over time or approached the end of their life, almost all schools will benefit from installation of new high efficiency boiler systems. The audit also found that two of the schools have electric heat. Conversion of these systems to natural gas might be considered to reduce operating cost, but may have negligible impact on overall energy reduction goals.

1989 SECTIONAL BOILER AT DONAHUE SCHOOL; NOTE PNEUMATIC CONTROLS ON WALL

Controls. HVAC control systems in the schools are typical of the period of the schools' original construction, primarily pneumatic and electro-mechanical time clocks that have questionable functionality. These controls do not provide the level of control that modern systems do and are likely to be operating outside of optimal set points and scheduling. Two schools were noted to have newer direct digital controls (DDC), but neither had external communications and did not appear to be optimally setup as an energy management tool. A fully functional and well managed control system is essential to achieving high building performance. New DDC systems are recommended with central control and standardized energy efficient control strategies.

The two tables on the following pages summarize existing conditions in the schools and proposed improvements.[2]

[2] Note: Lynch Jr. High School has been decommissioned and therefore was not included in the site visits so no information on existing equipment and systems is included in these tables.

EXISTING SCHOOL BUILDING CHARACTERISTICS AND SYSTEMS

Facility	Sq. Footage	Age	Occupants	Use	Lights	HVAC	Air Conditioning	Boilers	Controls
Morgan School	62,397	1963/79/90	575	K-8	T12s and T8s (new section)	UVs + Gas-fired RTUs	Window DX - offices	Sectional HW (gas)	Pneumatic + time clock
Kelly School	86,302	1974	690	K-8	Halls =MV or MH, CFLs	Htg only UVs	Window DX - PC labs	Sectional HW (dual)	Limited
Holyoke High School	199,560	1964	1380	9-12	Being renovated	New 2-pipe UVs + RTUs (4 or 5)	New chiller to be installed	(4) Hydrotherms (gas)	TAC - being updated
Lawrence School	59,116	1930	170	Alternative	T12 U-lamps	UVs + radiators in halls	Window DX (~12)	Conversion from city to local boilers	Pneumatic
EN White School	63,965	1955/58/90	575	K-8	T12's, MH in gym		Window Dx (~18), Office RTU	Sectional HW (gas)	Pneumatic + time clock
Metcalf School	34,684	1911	170	Preschool	T12s	Radiant steam	None	New sectional STM (gas)	Radiator valves
Sullivan School	112,000	1960/69/89	630	K-8	T12s, some T8s, MHs gym and occ therapy, inc in hallways	UVs and fin tube	Window DX (~12)	Sectional STM (gas)	Boiler resets + time clock
McMahon School	56,102	1960/66	530	K-8	T12s, inc at cafetorium	Steam UVs, AHU gym + cafetorium	Window DX	87 sectional STM (gas)	Boiler resets + time clock
Peck Jr. High School	158,198	1971	800	K-8	New T8s. Excessive fixtures	Electric UVs and RTUs	Halls and library only	None	Tridium overlay
Maurice Donahue School	70,550	1972/89	575	K-8	T12s, MH in gym, inc stage	Electric UVs and RTUs	12 classrooms	None	
Dean Technical High School	212,000	1989	920	9-12	T12s, MH in shops and gym	RTUs (9) + reheat	All but shops	Sectional HW (gas)	Pneumatic + time clock

SUGGESTED SCHOOL ENERGY EFFICIENCY IMPROVEMENTS

Facility	Replace Lamps and Ballasts	Change High Bay MH to T5	Comprehensive Lighting Upgrade	Lighting Controls	PE Motors	Add Fan VFDs	Add Pump VFDs	RCxing & Centralize Controls	Radiator Valves	Add New DDC Controls	Kitchen Hood Control	Replace Boiler with High Efficiency	New HVAC Units	New Chiller	Add Gas Service	Airseal and/or Insulation	Isolate Zones in Summer/Winter	Pool Cover
Morgan School	•	•	•	•	•	•	•			•	•	•	•			•		
Kelly School		•	•	•			•			•	•	•				•		
Holyoke High School			•[3]		•	•		•		•[4]	•			•[5]		•		•
Lawrence School		•	•	•						•	•	•				•		
EN White School		•	•	•						•	•	•				•		
Metcalf School		•	•	•						•	•	•				•		
Sullivan School	•	•	•	•	•	•			•	•	•	•				•		
McMahon School	•	•	•	•					•	•	•	•				•		
Peck Jr. High School			•	•	•	•		•			•		•		•			
Maurice Donahue School	•	•	•	•	•	•	•			•	•	•	•		•	•		
Dean Technical High School	•	•		•	•	•	•			•	•	•				•	•	

[3] Currently underway
[4] Currently underway
[5] Currently underway

Wastewater Treatment Facilities

Our wastewater treatment facilities are operated by United Water, a division of Suez Environmental, under a 20-year contract. Facilities include pumping stations, and the main wastewater treatment plant, which has office areas, a garage, and a number of interconnected operations that contribute to the treatment process. Under the terms of our contract, United Water has a financial incentive to adopt procedures and make investments that reduce all operating costs, including energy, which is purchased from HG&E and paid for by United Water, so long as these changes keep the plant in compliance with state and federal regulations and all performance requirements of the contract.

The Holyoke Wastewater Treatment Plant was originally built in 1980 to provide primary wastewater treatment and subsequently expanded to provide secondary treatment. The plant was designed to handle up to 17 million gallons per day (MGD) and typically processes 7 - 8 MGD. The main facility totals 59,512 square feet in building area. Since taking over the plant in 2005, United Water has implemented a number of energy improvements that have already resulted in reductions in energy use through increased efficiency. These include modernization of most processes and the addition of processing capacity to handle storm water.

However, there remain a number of additional energy reduction projects that they could pursue. These include lighting upgrades and controls, replacing older electric motors with premium efficiency motors, new DDC controls, replacing boilers with high efficiency equipment, and new HVAC units. Our consultant estimates that these additional energy reduction measures could lower electrical use by 5% and thermal energy requirements by as much as 15%.

Unfortunately, the City is not in a position to drive these changes given the terms of the outsourced contract.

Holyoke Gas and Electric Department

With 25 individual facilities, HG&E is a major consumer of electricity, natural gas, and district steam among all City buildings. HG&E's district steam use will end in September 2010, and HG&E's Riverside facility has already installed an on-site high efficiency boiler which is currently in operation. Also, over the past year, HG&E has begun to look at lighting upgrades for some of its buildings, using services available through RISE Engineering.

Our consultant was able to visit only a few of these buildings, which are described as representative. Overall, the buildings audited revealed opportunities for reductions of 35% for electricity and 25% to 30% (and even 50% in one instance) for thermal energy savings. Measures recommended include lighting controls and comprehensive lighting upgrades, new DDC controls, new HVAC units, envelope improvements, and isolating zones in summer and winter to provide better separation of occupied and unoccupied areas in buildings.

CLOSE-UP OF INEFFICIENT GAS-FIRED ENGINE DRIVING CHILLER AT HG&E HEADQUARTERS

Water Department

The Holyoke Water Department operates seven buildings, including a business office, laboratory, water treatment plant, and a number of pump stations. The audit conducted by our consultants focused on the Water Treatment Plant which is the largest energy user among Water Department buildings. It accounts for almost 2% of municipal electricity use and 4% of natural gas use.[6]

The Treatment Plant was built in 1997 as part of a major upgrade to the City's water delivery capability. The design capacity of the Plant is 15 million gallons per day (MGD), though recent water demand has been between 4 and 5 MGD, and has been declining. The result of this loss of revenue loss is a strong desire to identify strategies that can reduce operating costs. The audit found older lighting (T12s), process pumps with variable frequency drives, air conditioning

[6] The Water Department's Business Offices use 4% of the municipal District Steam. This use will be converted to an on-site natural gas-fired boiler in September 2010, resulting in a 33% efficiency improvement.

and dehumidification in the silo room (to prevent caking of chemicals), HVAC roof top units, and a sectional gas boiler which operates year-round.

Opportunities at the Plant include lamp/ballast replacement and lighting controls, adding variable frequency drives on fans, retro-commissioning and centralizing controls, and a new HVAC strategy for the silo room that does not require continuous simultaneous heating and cooling. Potential electric savings were estimated to be 35% and thermal savings would also approach 35% from a comprehensive energy reduction program at the Plant.

WATER TREATMENT PLANT BOILER RUNS YEAR-ROUND

WATER TREATMENT PLANT ROOFTOP UNIT PROVIDES NON-STOP COOLING AND REHEATING TO SILO ROOM

Additional City Buildings Audited

In addition to the buildings and departments described above, our auditor looked at the newer Fire Department Headquarters on High Street (the largest of the four fire stations), City Hall on Dwight Street (built in 1873) and the City Hall Annex at Korean Veterans Plaza (built in 1915), the Dwight Street Parking Deck (one of two parking garages in the City), and the Children's Museum (which also houses the National Volleyball Hall of Fame). The City Hall and Annex are the only buildings that still use fuel oil for heating.

OLDER OIL-FIRED CAST IRON BOILER IN HOLYOKE CITY HALL

NO STEAM PIPE INSULATION [CITY HALL ANNEX]

With the exception of the Fire Department Headquarters, the auditor found that all of these buildings have antiquated lighting systems and require comprehensive lighting upgrades. Heating systems should be replaced with high efficiency gas boilers. Direct digital controls should be installed to replace time clocks and thermostats in the Museum and City Hall buildings.

Based on these findings, we anticipate that savings in the range of 25% of electricity consumption and 20% or more of natural gas consumption are likely in the remaining buildings which were not visited, most of which are of an older vintage and, like the audited buildings, do not have modernized systems.

The following charts summarize findings in the non-School Department buildings audited:

EXISTING SYSTEMS IN NON-SCHOOL BUILDINGS AUDITED

Customer Name	Sq. Footage	Age	Occupants	Use	Lights	HVAC	Air Conditioning	Boilers	Controls	Other
Childrens Museum Inc.	27,930	? / 1980	?	Musuem	T12s, CFL, and MH	(4) RTUs w/ reheats	All	Sectional HW (gasl)	Timeclocks	
Holyoke City Hall	50,864	1873	100	Office, meeting	Older T8s, T12s, CFLs	Radiators (no valves)	Window DX and split	Sectional steam (oil)	Electric TSTAT	Original windows not bad
City Hall Annex	30,720	1915	100	Office	T12s	Radiators (no valves)	City water cooled splits	Sectional steam (oil)	Electric TSTAT	
Dwight St. Parking Deck				Parking + police	HPS					
Fire Headquarters	31,974		24	Firehouse	T8s and MHs	AHUs, radiant floor	Occupied space only	Sectional HW (gasl)	Yankee Tech (DDC)	
HGE - Main Office	11,875	1920's / 80's	50	Office	Super T8's, CFLs	RTU (1), AHUs (4), fin tube	Throughout	High Efficiency HW (6)	Programmable TSTATs	Engine driven chiller
HGE - Telecom	11,976	1840's	25	Office	8' T8s, T12s	AHU splits (3)	Throughout	Furnace section in AHUs	Programmable TSATs	Elec snow melt
HGE - Gas Distribution	33,322	?	7	Garage & Shops	T12's, some T8	Gas UHs, gas-fired RTU, window DX / splits	Office only	None	None	No insulation
Water Treatment Plant	10,692	1997	5	Water treatment	T12s and MH	RTUs (2). Office unit is gas-fired	Office and silo room	Sectional HW (gas)	Electric/ no access	3 process pumps on VFDs (15 hp, 2 x 20 hp)
WWTP - Main	59,512				T8s, T12, inc, MH	Splits, window, UHs	Office	Sectional gas-fired HW (2)	None	Processes are mostly modernized

SUGGESTED ENERGY EFFICIENCY IMPROVEMENTS

Customer Name	Replace Lamps and Ballasts	Change High Bay MH to T5	Comprehensive Lighting Upgrade	Lighting Controls	PE Motors	Add Fan VFDs	Add Pump VFDs	RCxing & Centralize Controls	Radiator Valves	Add New DDC Controls	Kitchen Hood Control	Replace Boiler with High Efficiency	New HVAC Units	New Chiller	Add Gas Service	Airseal and/or Insulation	Isolate Zones in Summer/Winter	Pool Cover	Estimated Elec Savings Potential	Estimated Thermal Savings Potential	
Childrens Museum Inc.			•	•	•	•	•			•		•				•			35%	25%	
Holyoke City Hall			•	•					•	•		•				•			25%	20%	
City Hall Annex	•		•	•					•	•		•	•			•			25%	20%	
Dwight St. Parking Deck			•																10%	0%	Light level needs to be increased
Fire Headquarters	•	•		•				•				•							20%	15%	
HGE - Main Office				•		•				•				•		•			-10%	50%	
HGE - Telecom			•	•						•						•			35%	25%	
HGE - Gas Distribution			•	•						•			•			•	•		35%	30%	
Water Treatment Plant	•			•		•		•					•						35%	35%	
WWTP - Main	•	•	•	•	•					•		•	•			•			5%	15%	

ENERGY REDUCTIONS PLANNED

As noted at the beginning of this document, the City of Holyoke is seeking Green Communities designation as part of a larger goal to brand Holyoke as a truly green City. On the supply side, in 2008, over 75% percent of our electric supply came from carbon-free resources and our carbon footprint from electricity supply was 90% lower than the average New England city. This is the legacy of Holyoke's early history as a planned, water-powered industrial city and its decision to continue to operate and maintain its clean, green hydroelectric generation facilities for the benefit of City residents under the Holyoke Gas and Electric Department.

Continuing this tradition, HG&E is presently in the midst of an effort to expand its renewable energy generation capacity by exploring a potential commercial scale wind project totaling 9 MW on the ridge line at the City's western border. Along with wind technology, photovoltaics have also been an interest of the city, and HG&E is soliciting private parties to develop utility-scale ground-mounted systems within the City. Further, HG&E also intends to add capacity by installing additional hydroelectric generation throughout its Dam and Canal System in the near future.

Our task now, in terms of our Green identity, is to take steps necessary to ensure that future energy use meets the highest standards for energy efficiency. Our short term goal is to use the performance contracting financing mechanism to replace our aging and out-of-date building equipment and energy conversion systems with state of the art lighting, heating, cooling, and controls technologies. Energy cost savings will pay for these improvements carried out by Siemens or by installation contractors working directly for the City.

Projects will be financed using the City's bonding capability, and performance guarantees will ensure that over the term of these bonds, there will be sufficient savings to service debt payments out of operating budgets. The Holyoke School Committee is currently petitioning the legislature for a waiver from Chapter 70 restrictions on school spending that would preclude the schools from reallocating their utility line item to pay towards the bonds. As part of this initiative, we will take steps to convert our street lighting to LED or other high efficiency technology (such as Pulse Start HID), but on a phased basis, creating significant energy and maintenance savings, though at considerable cost.

Longer term, we will implement new standards for vehicle fuel efficiency whereby we accelerate the retirement of older vehicles to replace them with more fuel efficient ones and we make fuel use an important criteria for new vehicle selection. Further, with respect to new construction, we will continue to make sure that new municipal buildings and major renovations undertaken meet Energy Star standards.

Planned Reductions by End Use and Energy Source

For the base year, The City of Holyoke's energy use on an MMBtu basis totals 214,501, of which 40.94 % is attributable to electricity use, 27.06% to natural gas, 16.23% to district steam, 2.59%

to fuel oil, and the remaining 13.18% to transport fuel. Our Energy Reduction Plan identifies total savings over the five years covered that total 20.16% of the combined base year total.

The following table summarizes these anticipated savings. Details are provided in Table B in the Appendix.

		Projected 5-Year Energy Reductions (MMBtus)						
	Baseline Total	Total Reduction	Electricity	Natural Gas	District Steam	Fuel Oil	Transport Fuel	Percent of Total
Buildings	163,959	34,917	12,637	9,681	11,487	1,112	-	80.74%
Street Lights	22,271	6,913	6,913					15.99%
Vehicles	28,271	1,414					1,414	3.27%
City of Holyoke	214,501	43,244	19,550	9,681	11,487	1,112	1,414	100.00%
PERCENT	100.00%	20.16%	22.26%	16.68%	33.00%	20.00%	5.00%	

On a fuel source basis in MMBtu's, the largest percentage reductions will come from elimination of the municipal district steam (33%) and the installation of on-site high efficiency boilers in the buildings that had been served by the steam system. Savings will come from increased combustion efficiency as well as elimination of distribution losses in steam lines. The largest absolute MMBtu reductions will be in electricity use (19,550).

On an end use basis (buildings, street lighting, and vehicles), the greatest MMBtu reductions will be in buildings, both as a percentage of total energy reductions anticipated (80.74%) and on an absolute basis (34,917). This total is a 21.3% reduction in energy use in buildings.

Immediate Energy Reduction Goals

Municipal Buildings (including schools)

As noted above, energy reductions in municipal buildings will comprise the largest single portion of the total energy reduction forecast for the City. And schools, which account for the largest portion of total energy consumed and which have had little if any meaningful energy efficiency improvements since their original construction, primarily in the 1960s, 70s, and 80s, will contribute the greatest share of total savings in buildings.

We believe that our greatest short term opportunities will be through retrofits and renovations over the next 5 years, rather than new construction and additions. All major energy using and energy conversion equipment and systems are ripe for replacement or upgrading. This includes lighting systems (comprehensive upgrades including lighting controls), heating systems (replacement of district heating and older on-site boilers with new high efficiency systems),

cooling systems (replacing older inefficient window units as well as central systems), mechanical systems (adding VFDs and even replacing failing rooftop units), and controls and retro-commissioning (installing DDC systems where appropriate and ensuring that equipment has appropriate temperature settings and scheduling). Some of these improvements have already begun, as with the major lighting, heating and cooling, and controls upgrades now underway at Holyoke High School that will not only lower energy use but also result in significant increases in building comfort and reductions in future maintenance expense.

Building improvements will be, for the most part, implemented through the City of Holyoke's anticipated performance contracting relationship with Siemens. Preliminary Energy Audits of buildings will begin this spring and we anticipate that these PEAs will lead to Investment Grade Audits in the fall of 2010. With the usual timeframe for negotiation and finalization of scope for construction, implementation of the first building projects will likely begin in spring 2011, though it may be possible to accelerate the lighting projects.

Vehicles (including schools)

All department and divisions have agreed to purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable. The City will maintain an annual vehicle inventory for non-exempt vehicles and a plan for replacing these vehicles that meet the proper fuel efficiency ratings[7]. A vehicle with a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pounds will be exempt. Nevertheless, we will also make every effort to improve the efficiency of the exempt fleet as well, both as we replace vehicles at the end of their useful life and through more careful attention to energy efficiency improving operations and maintenance practices.

Currently, the City of Holyoke's fleet has twenty (20) non-exempt vehicles that are fifteen (15) years or older whose MPG's range from 14-18. These vehicles, which account for 18% of the non-exempt fleet, would be the first to be replaced with newer, more efficient models. Many of these vehicles are constantly on the road. With this replacement, a significant usage of gasoline can be avoided. Out of the entire non-exempt municipal fleet, 75% of vehicles do not fall within the US EPA's guidelines for fuel efficient vehicles. This percentage implies that the fleet has much room for improvement which would decrease the consumption of gasoline yearly.

HG&E is researching the technology and benefits of electric vehicles and their charging stations, however due to high capital costs per vehicle and station(s), the payback is not feasible at this date. This technology is still young and has room for improvement; however HG&E sees this transformation happening within the decade, as electricity is much less expensive to use to run a car than gasoline, on a per mile basis.

[7] US EPA regulations for combined MPG for fuel efficient vehicles -- 2WD car: 29 MPG, 4WD car 24 MPG, 2WD small pick-up truck: 20 MPG, 4WD small pick-up truck: 18 MPG, 2WD standard pick-up truck: 17 MPG, 4WD standard pick-up truck: 16 MPG.

Street and Traffic Lighting

Conversion of street and traffic lighting to LED technology represents a significant opportunity for energy reduction, though implementation of such a program will likely prove expensive.

We will be phasing the traffic lighting replacement over the five years of this initiative, accelerating the replacement of incandescent lamps with LEDs upon burnout that was our philosophy in the past. These traffic signals are being illuminated with 116 watt incandescent traffic signal rated bulbs. Pedestrian lights are being illuminated with 69 watt incandescent bulbs. These have a mean time to failure of 8000 hours or approximately 18 months at current operating cycles, compared to the LEDs that use approximately 10 watts of electricity, have a five year warranty, and a design life up to 100,000 hours (typical operating life is seven to ten years). The long life will reduce maintenance by approximately 90% and the low electricity requirement results in as much as an 87% reduction in energy usage at each intersection. Concerns on winter snow and ice formation with LED use will need to be addressed first as LED's do not throw off similar heat as the incandescents they will replace.

Our street lighting is a mix of traditional street lighting (predominantly tall, cobra-style high pressure sodium (HPS) pole lamps), HPS decorative lighting, and HPS contract lighting. All likewise could use 35% less energy with LEDs installed. Unfortunately, the cost of replacing the all these lamps with LEDs across the City would be cost prohibitive in a short period of time at a cost of between $700 and $900 per replacement ballast. Therefore we are proposing to use a combination of more energy efficient technologies, including LEDs ver the five years covered by this plan. We hope that over this time, the cost for such conversions will decline. LED technology may be suited for replacements of 100 and 150 watt HPS lamps and possibly 250 watt but a different solution may be identified for 400 watt HPS energy efficiency replacements. Similarly, since HG&E uses various styles of lighting (cobra-head roadway, floodlight, and decorative), all may or may not have good LED replacement alternatives.

Timelines for Energy Reductions

Our plan is to implement energy reductions over a five year period, following the baseline year of FY2009. The following year by year account summarizes the specific activities we are planning to undertake each year, to achieve our 20% energy reduction goal.

YEAR ONE: FY2010, JULY 2009 – JUNE 2010

Baseline Development. This first year of our energy reduction program has been devoted to establishing widespread support for Green Community designation and creating our energy use baseline and inventories.

Energy Reduction Targets. We have used our baseline, coupled with on-site audits by Rise Engineering and by Peregrine Energy Group to begin to determine the magnitude of opportunities available to us for energy reductions, which technologies will yield the greatest

savings, and where in our building portfolio we should focus our attention to achieve the most immediate results. Those findings are reflected in this five year Energy Reduction Plan.

Elimination of the District Steam Service to Municipal Buildings. HG&E and the City determined that elimination of the old District Steam system that served many municipal buildings as well as private consumers had become a necessity as loss of customers on the system had reduced its operating efficiency and maintenance costs were rising. The plan is for an end to steam service in September 2010. In anticipation of this change, a major municipal user has already installed high efficiency boilers on-site and additional installations are proceeding in preparation for the 2010-2011 heating season. Overall, the energy reduction in MMBtu's attributable to this change for historic steam users will be on the order of 33%.

Initial Building Retrofits and Renovations. The first retrofits that Holyoke is undertaking to achieve its energy reduction goal have already begun, most notably with the major renovations that are now occurring at Holyoke High School. In addition, HG&E commissioned a series of building audits by RISE Engineering in its Administrative Buildings. Lighting upgrades were initiated in the first of these buildings in early Calendar 2010.

Performance Contracting. Critical to achievement of our proposed energy reduction goal has been Holyoke's participation in the Pioneer Valley Planning Commission's competitive RFQ to secure Energy Management Services, the subsequent selection of Siemens as the preferred contractor, and Holyoke's planned execution of a Memorandum of Understanding with Siemens to begin Preliminary Energy Assessments

YEAR TWO: FY2011, JULY 2010 – JUNE 2011

Performance Contracting in Buildings. Siemens will carry out Preliminary Energy Assessments for major energy consuming buildings starting in the summer, and we anticipate that this will lead to development of priorities and a timeline for Investment Grade Audits (IGAs), which will likely begin in the fall. It is likely that **schools** will be a primary target for these first energy projects with lighting retrofits at the top of the list, due to the significant immediate savings that will result, the ease of deployment of contractors during off-hours, and the relatively minor disruptions to operations by construction activity. (Renovations in the High School have proceeded as school has been in session.) Additional heating and controls projects will likely begin at the end of the heating season.

Another focus for Year Two will likely be the **Water Treatment Plant**. As noted above, declining revenues due to lower than anticipated water sales have put significant financial pressures on the Water Department as it meets its payment obligations on construction bonds. We will look at what energy reductions can be implemented in this building due to changes to operating procedures, alternative equipment configurations, and replacement of select equipment with more efficient alternatives.

HG&E will mount an aggressive program of retrofits and energy upgrades in **Gas and Electric Department facilities** during this year, establishing a detailed inventory of equipment and systems that should be replaced and initiating energy reduction projects across its portfolio.

Traffic and Street Lighting. The City will establish specific targets and begin the phased retrofits of both traffic and street lighting with LEDs and/or high efficiency alternatives. As noted earlier, the savings from both of these upgrades derived from energy reductions of 35% or more per lamp, as well as maintenance cost reductions is significant, though the cost is considerable. Our plan is to complete the conversion of all traffic signals and street lights over the period of the plan.

Vehicles. Replacement of the older and the least efficient vehicles covered by this plan with more energy efficient vehicles will begin this year and continue over the course of the multi-year plan and beyond as vehicles approach the end of their useful life. Initial targets for vehicle replacement will be former police cruisers that are being used by the various city departments for day-to-day passenger travel.

YEAR THREE: FY2012, JULY 2011 – JUNE 2012

Measured Savings. We anticipate that we will be seeing measurable energy reductions in Year 3 against the baseline for buildings and end uses where projects were completed in prior years.

Performance Contracting in Buildings. **Schools**, our largest energy users and among our least efficient buildings, will continue to be targeted and renovated to achieve energy reductions. Again, the focus on school projects will result in the greatest short term savings on a project deployed basis. Larger capital projects will likely be implemented in Year 3 in the **Water Treatment Plant** and in **Gas and Electric Department buildings**.

We anticipate that we will develop detailed plans during the year for energy reduction projects in other City buildings, including, but not limited to **Public Works facilities and garages, City Hall and the Annex, parking garages, and fire houses**. We expect that lighting projects will be the first retrofits undertaken, given their rapid return, but the goal will be to take a comprehensive approach in developing energy efficiency upgrades.

Traffic and Street Lighting. The replacement program will continue.

Vehicles. The replacement program will continue.

YEAR FOUR: FY2013, JULY 2012 – JUNE 2013

Measured Savings. In Year 4, Measurable energy reductions should persist and grow for the increased numbers of buildings and end uses where projects have been completed. We anticipate that energy reductions of 12% or more will be apparent by mid-year.

Performance Contracting in Buildings. **Schools** will continue to be targeted and renovated to achieve energy reductions. Implementation of projects identified in Year 3 in other smaller **City buildings (e.g. public works, City Hall, etc.)** will likely be mounted as well. Projects in the many **Gas and Electric Department Buildings** will continue.

Traffic and Street Lighting. The replacement program will continue.

Vehicles. The replacement program will continue.

YEAR FIVE: FY2014, JULY 2013 – JUNE 2014

Measured Savings. In Year 5, we anticipate that energy reductions of 16% or more will be apparent by mid-year. These persistent savings will continue to increase during the year with additional projects being completed. The full impact of the energy reduction program will not be apparent until the next year.

Performance Contracting in Buildings. **School** projects, **municipal building** projects, and Gas and Electric Department building upgrades will be brought to a close.

Traffic and Street Lighting. All traffic signals and street lights, including decorative and contract lights, will have been converted to more energy efficient technologies by the end of this year.

Vehicles. The fuel efficient vehicle program will continue through this year and beyond.

Program Management Plan

Management of Holyoke's Energy Reduction Plan will be in the hands of our Energy Committee, representing the major city departments, with leadership being provided by Bill Fuqua, General Superintendent for the Department of Public Works, Whitney Anderson, the School Department's Maintenance Administrator, and Brian Beauregard, Superintendent of the Electric Division of Holyoke Gas and Electric Department.

We will prepare quarterly reports of actions taken and results achieved for review with City department heads, the City Council, and the School Committee. MassEnergyInsight will serve as the platform to track ongoing energy use and compare energy performance over time against our 20 percent reduction goal. This effort will also integrate our ongoing contractual relationship with Siemens and the measurement and verification protocols that are put in place under our performance contract.

Measurement and Verification Plan for Projected Reductions

Our plan to contract with Siemens as our performance contractor will require detailed measurement and verification protocols and procedures to ensure that promised savings are achieved. We anticipate that the guaranteed savings from individual measures installed will be both proscriptive and measured, depending on the nature of the measure implemented. In our larger buildings, we plan to install DDC building management systems that will be capable of scheduling operations and tracking building performance.

We also will be using MassEnergyInsight to track metered energy use in individual accounts, and we anticipate seeing the energy reduction in the system month to month and year to year for individual buildings and accounts.

The City will establish a series of tracking reports that compare actual reductions achieved against the baseline in individual buildings and departments with reductions that were

projected in this Energy Reduction Plan. These reports will draw on information in MassEnergyInsight, as well as the measurement and verification analysis that Siemens provides.

APPENDIX

TABLE A CITY BUILDINGS AND LIGHTING, WITH ENERGY CONSUMED IN NATIVE UNITS AND MMBTUS

TABLE B CITY BUILDINGS AND LIGHTING, PLANNED ENERGY REDUCTIONS IN MMBTUS

TABLE C CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

TABLE A

CITY BUILDINGS AND LIGHTING, WITH ENERGY CONSUMED IN NATIVE UNITS AND MMBTUS

		Fuel Oil			Electric			Gas			Steam			Total MMBTUs
Department / Facility	Address	Gallons	% of use	MMBTUs	KWh	% of use	MMBTUs	CCF	% of use	MMBTUs	MLBs	% of use	MMBTUs	
Childrens Museum Inc.					275,809	1.07%	941	8,774	1.55%	902	-			**1,843**
Holyoke City Hall	536 Dwight Street	25,000	62.50%	3,475	148,240	0.58%	506							**3,981**
City Hall Annex	0 City Hall Court	15,000	37.50%	2,085	123,600	0.48%	422							**2,507**
								18.0	0.00%	2	-			
Suffolk St. Parking Deck	18 Suffolk Street				55,052	0.21%	188							**188**
								-			-			
Dwight St. Parking Deck	485 Dwight Street				146,880	0.57%	501							**501**
								-			-			
Department of Public Works														
DPW Garage, Lyman St.	41 Lyman Street				83,520	0.32%	285	14,657	2.60%	1,507	-			**1,792**
DPW Garage, Canal St.	63 Canal Street				33,871	0.13%	116	-			-			**116**
DPW Garage, East St.	12 East Street				6,741	0.03%	23	-			-			**23**
Elmwood Engine House	490 South St.				13,952	0.05%	48	3,253	0.58%	334	-			**382**
Jones Ferry River Access Center	0 Jones Ferry Rd.				-			781	0.14%	80	-			**80**
Holyoke Police Department														
Headquarters	138 Appleton St.				54,880	0.21%	187	872	0.15%	90	-			**277**
Impound Garage	505 Dwight St.				120,197	0.47%	410	-			-			**410**
														-
Holyoke Fire Department														
Fire Headquarters	600 High St.				299,495	1.16%	1,022	14,709	2.60%	1,512	-			**2,534**
Station #3	1579 Northampton St.				101,680	0.40%	347	4,014	0.71%	413	-			**760**
Station #5	33 Whiting Farms Rd.				95,531	0.37%	326	4,931	0.87%	507	-			**833**
Station #6	640 Homestead Ave.				21,921	0.09%	75	5,440	0.96%	559	-			**634**
Wistariahurst Museum	238 Cabot St.				43,525	0.17%	149	15,745	2.79%	1,619	-			**1,767**
								-			-			
Holyoke Public Library	335 Maple St.				**109,267**	0.42%	373	13,540	2.40%	1,392				**1,765**
War Memorial Building	316 Appleton St.				114,800	0.45%	392	859	0.15%	88	597.00	2.86%	995	**1,475**
													-	
Holyoke Water Department													-	
Business Offices	20 Commercial St.				129,191	0.50%	441	641	0.11%	66	1,052.00	5.04%	1,753	**2,260**
Garage	0 Rock Cut Rd.				36,392	0.14%	124							**124**
Holyoke Water Department	0 Daly Rd.				78,720	0.31%	269	2,582	0.46%	265	-		-	**534**
Pump Station	870 Homestead Ave.				1,577	0.01%	5	833	0.15%	86	-		-	**91**
Laboratory	45 Upland Rd.				22,475	0.09%	77	1,978	0.35%	203	-		-	**280**
Water Treatment Plant	600 Westfield Rd.				364,912	1.42%	1,245	23,927	4.24%	2,460	-		-	**3,705**
West Heights Pump Station	555 Homestead Ave.				284,480	1.11%	971	1,115	0.20%	115	-		-	**1,085**
													-	
Wastewater Treatment Facilities													-	
Jones Ferry Pump Station	0 Jones Ferry Rd.				72,960	0.28%	249	781	0.14%	80	-		-	**329**
Waste Water Treatment Plant - MAIN	1 Berkshire St.				3,469,102	13.48%	11,837	681	0.12%	70	-		-	**11,907**
Waste Water Treatment Plant - Garage	1 Berkshire St.				-			2,672	0.47%	275	-		-	**275**
Jackson St. Pump Station	0 Jackson St.				134,880	0.52%	460	755	0.13%	78	-		-	**538**
Cabot St. Pump Station	0 Cabot St.				11,360	0.04%	39	-			-		-	**39**
Mosher St.Pump Station	0 Mosher St.				31,857	0.12%	109	-			-		-	**109**
Highland Pk Pump Station	0 Prospect St.				26,440	0.10%	90	-			-		-	**90**
Smiths Ferry Pump Station	0 Smiths Fry.				35,805	0.14%	122	-			-		-	**122**

TABLE A [continued]

CITY BUILDINGS AND LIGHTING, WITH ENERGY CONSUMED IN NATIVE UNITS AND MMBTUS

		Fuel Oil			Electric			Gas			Steam			Total MMBTUs
Department / Facility	Address	Gallons	% of use	MMBTUs	KWh	% of use	MMBTUs	CCF	% of use	MMBTUs	MLBs	% of use	MMBTUs	
School Department													-	
Morgan School	587 Summer Street				456,160	1.77%	1,556	36,970	6.55%	3,801	-		-	**5,357**
Kelly School	216 West Street				919,040	3.57%	3,136	44,955	7.96%	4,621	-		-	**7,757**
Holyoke High School	500 Beech Street				1,052,520	4.09%	3,591	12,136	2.15%	1,248	8,907.00	42.65%	14,845	**19,684**
Lawrence School	156 Cabot Street				276,320	1.07%	943	4,737	0.84%	487	4,119.00	19.72%	6,865	**8,295**
EN White School	1 Jefferson Street				471,520	1.83%	1,609	28,982	5.13%	2,979	-		-	**4,588**
Lynch Jr. High School	1575 Northampton Street				56,795	0.22%	194	30,903.00	5.47%	3,177	-		-	**3,371**
Metcalf School	2019 Northampton Street				85,407	0.33%	291	21,336.00	3.78%	2,193	-		-	**2,485**
Sullivan School	0 Jarvis Avenue				453,120	1.76%	1,546	63,026.00	11.16%	6,479	-		-	**8,025**
McMahon School	0 Kane Road				222,800	0.87%	760	40,088.00	7.10%	4,121	-		-	**4,881**
Peck Jr. High School	1916 Northampton Street				2,761,200	10.73%	9,421	9,941.00	1.76%	1,022	-		-	**10,443**
Maurice Donahue School	222 Whiting Farms Road				1,795,640	6.98%	6,127	-			-		-	**6,127**
Dean Technical High School	1045 Main Street				2,217,600	8.62%	7,566	88,366.00	15.65%	9,084	-		-	**16,650**
													-	
Gas & Electric Department													-	
HG&E Main Office	99 SUFFOLK St.				398,000	1.55%	1,358	18,900	3.35%	1,943				**3,301**
HG&E - Elec. Distribution	80 JACKSON ST				82,290	0.32%	281	9,893	1.75%	1,017	-		-	**1,298**
HG&E - Gas Distribution	91 Walnut St.				286,553	1.11%	978	4,870	0.86%	501	-		-	**1,478**
HG&E - Gas Distribution	91 Walnut St.							8,176	1.45%	840	-		-	**840**
HG&E - Gas Distribution	91 Walnut St.				-			89	0.02%	9	-		-	**9**
HG&E - Riverside A/B	30 Water St.				267,223	1.04%	912	640	0.11%	66	3,776.00	18.08%	6,293	**7,271**
HG&E - Canal Fountains	Canal St.				114,113	0.44%	389							**389**
HG&E - Telecom	1 Canal St.				87,120	0.34%	297	4,541	0.80%	467	2,435.00	11.66%	4,058	**4,822**
HG&E - Hadley Falls Station	25 Gatehouse Rd.				123,161	0.48%	420	2,507	0.44%	258	-		-	**678**
HG&E - Cabot St	102 Cabot St.				444,787	1.73%	1,518							**1,518**
HG&E - Mueller Rd.	91 Mueller Rd.				88,751	0.34%	303	10,043	1.78%	1,032	-		-	**1,335**
Street Lighting														
Traffic					334,217	1.30%	1,140							**1,140**
Street					4,058,921	15.77%	13,849							**13,849**
Contract light					2,104,879	8.18%	7,182							**7,182**
Decorative					29,320	0.11%	100							**100**

TABLE B

CITY BUILDINGS AND LIGHTING, PLANNED ENERGY REDUCTIONS IN MMBTUS

		Fuel Oil			Electric			Gas			Steam			TOTALS		
Department / Facility	Address	Baseline MMBTUs	% Reduced	MMBTU Reduced	Baseline MMBTUs	% Reduced	MMBTU Reduced	Baseline MMBTUs	% Reduced	MMBTU Reduced	Baseline MMBTUs	% Reduced	MMBTU Reduced	Baseline MMBTUs	MMBTUs Reduced	Percent Reduced
Childrens Museum Inc.					941	35%	329	902	25%	225				**1,843**	**555**	**30.11%**
							-			-						
Holyoke City Hall	536 Dwight Street	3,475	20%	695	506	25%	126			-				**3,981**	**821**	**20.64%**
							-			-						
City Hall Annex	0 City Hall Court	2,085	20%	417	422	25%	105			-				**2,507**	**522**	**20.84%**
								2	0%	-						
Suffolk St. Parking Deck	18 Suffolk Street				188	10%	19			-				**188**	**19**	**10.00%**
										-						
Dwight St. Parking Deck	485 Dwight Street				501	10%	50			-				**501**	**50**	**10.00%**
										-						
Department of Public Works							-			-						
DPW Garage, Lyman St.	41 Lyman Street				285	30%	85	1,507	30%	452				**1,792**	**538**	**30.00%**
DPW Garage, Canal St.	63 Canal Street				116	20%	23			-				**116**	**23**	**20.00%**
DPW Garage, East St.	12 East Street				23	20%	5			-				**23**	**5**	**20.00%**
Elmwood Engine House	490 South St.				48	20%	10	334	10%	33				**382**	**43**	**11.25%**
Jones Ferry River Access Center	0 Jones Ferry Rd.						-	80	0%	-				**80**	**-**	**0.00%**
							-			-						
Holyoke Police Department										-						
Headquarters	138 Appleton St.				187	15%	28	90	10%	9				**277**	**37**	**13.38%**
Impound Garage	505 Dwight St.				410	10%	41			-				**410**	**41**	**10.00%**
							-			-				**-**		
Holyoke Fire Department										-						
Fire Headquarters	600 High St.				1,022	20%	204	1,512	15%	227				**2,534**	**431**	**17.02%**
Station #3	1579 Northampton St.				347	25%	87	413	15%	62				**760**	**149**	**19.57%**
Station #5	33 Whiting Farms Rd.				326	25%	81	507	15%	76				**833**	**158**	**18.91%**
Station #6	640 Homestead Ave.				75	25%	19	559	15%	84				**634**	**103**	**16.18%**
							-			-						
Wistariahurst Museum	238 Cabot St.				149	20%	30	1,619	15%	243				**1,767**	**272**	**15.42%**
										-						
Holyoke Public Library	335 Maple St.				373	20%	75	1,392	15%	209				**1,765**	**283**	**16.06%**
							-			-						
War Memorial Building	316 Appleton St.				392	20%	78	88	15%	13	995	33%	328	**1,475**	**420**	**28.47%**
							-			-	-		-			
Holyoke Water Department											-		-			
Business Offices	20 Commercial St.				441	20%	88	66	15%	10	1,753	33%	579	**2,260**	**677**	**29.94%**
Garage	0 Rock Cut Rd.				124	10%	12							**124**	**12**	**10.00%**
Holyoke Water Department	0 Daly Rd.				269	10%	27	265	10%	27	-		-	**534**	**53**	**10.00%**
Pump Station	870 Homestead Ave.				5	10%	1	86		-	-		-	**91**	**1**	**0.59%**
Laboratory	45 Upland Rd.				77	10%	8	203		-	-		-	**280**	**8**	**2.74%**
Water Treatment Plant	600 Westfield Rd.				1,245	35%	436	2,460	35%	861	-		-	**3,705**	**1,297**	**35.00%**
West Heights Pump Station	555 Homestead Ave.				971		-	115		-	-		-	**1,085**	**-**	**0.00%**
							-			-	-		-			
Wastewater Treatment Facilities											-		-			
Jones Ferry Pump Station	0 Jones Ferry Rd.				249		-	80		-	-		-	**329**	**-**	**0.00%**
Waste Water Treatment Plant - MAIN	1 Berkshire St.				11,837	5%	592	70		-	-		-	**11,907**	**592**	**4.97%**
Waste Water Treatment Plant - Garage	1 Berkshire St.						-	275	15%	41	-		-	**275**	**41**	**15.00%**
Jackson St. Pump Station	0 Jackson St.				460		-	78		-	-		-	**538**	**-**	**0.00%**
Cabot St. Pump Station	0 Cabot St.				39		-			-	-		-	**39**	**-**	**0.00%**
Mosher St.Pump Station	0 Mosher St.				109		-			-	-		-	**109**	**-**	**0.00%**
Highland Pk Pump Station	0 Prospect St.				90		-			-	-		-	**90**	**-**	**0.00%**
Smiths Ferry Pump Station	0 Smiths Fry.				122		-			-	-		-	**122**	**-**	**0.00%**

TABLE B [continued]

CITY BUILDINGS AND LIGHTING, PLANNED ENERGY REDUCTIONS IN MMBTUS

	Fuel Oil	Electric		Gas			Steam			TOTALS		
Department / Facility	**Baseline MMBTUs**	**% Reduced**	**MMBTU Reduced**	**Baseline MMBTUs**	**% Reduced**	**MMBTU Reduced**	**Baseline MMBTUs**	**% Reduced**	**MMBTU Reduced**	**Baseline MMBTUs**	**MMBTUs Reduced**	**Percent Reduced**
School Department							-		-			
Peck Jr. High School		30%	2,826	3,801	20%	760	-		-	**13,222**	**3,586**	**27.13%**
Dean Technical High School		30%	2,270	4,621	15%	693	-		-	**12,188**	**2,963**	**24.31%**
Maurice Donahue School		5%	306	1,248	15%	187	14,845	33%	4,899	**22,219**	**5,392**	**24.27%**
Holyoke High School		30%	1,077	487	20%	97	6,865	33%	2,265	**10,943**	**3,440**	**31.44%**
Kelly School		25%	784	2,979	15%	447	-		-	**6,115**	**1,231**	**20.13%**
EN White School		20%	322	3,177	15%	477	-		-	**4,786**	**798**	**16.68%**
Morgan School		25%	389	2,193	15%	329	-		-	**3,750**	**718**	**19.15%**
Sullivan School		25%	387	6,479	15%	972	-		-	**8,025**	**1,358**	**16.93%**
Lawrence School		35%	330	4,121	25%	1,030	-		-	**5,064**	**1,360**	**26.86%**
McMahon School		15%	114	1,022	15%	153	-		-	**1,782**	**267**	**15.00%**
Metcalf School		25%	73			-	-		-	**291**	**73**	**25.00%**
Lynch Jr. High School		30%	58	9,084	15%	1,363	-		-	**9,278**	**1,421**	**15.31%**
			-			-	-		-			
Gas & Electric Department						-	-		-			
HG&E Main Office		10%	136	1,943						**3,301**	**136**	**4.11%**
HG&E - Elec. Distribution		10%	28	1,017		-	-		-	**1,298**	**28**	**2.16%**
HG&E - Gas Distribution		10%	98	501	50%	250	-		-	**1,478**	**348**	**23.55%**
HG&E - Gas Distribution				840	15%	126	-		-	**840**	**126**	**15.00%**
HG&E - Gas Distribution			-	9		-	-		-	**9**	**-**	**0.00%**
HG&E - Riverside A/B		10%	91	66		-	6,293	33%	2,077	**7,271**	**2,168**	**29.82%**
HG&E - Canal Fountains										**389**	**-**	**0.00%**
HG&E - Telecom		10%	30	467	15%	70	4,058	33%	1,339	**4,822**	**1,439**	**29.84%**
HG&E - Hadley Falls Station			-	258		-	-		-	**678**	**-**	**0.00%**
HG&E - Cabot St		48%	728	-						**1,518**	**728**	**48.00%**
HG&E - Mueller Rd.		10%	30	1,032	15%	155	-		-	**1,335**	**185**	**13.87%**
Street Lighting						-						
Traffic		80%	912			-				**1,140**	**912**	**80.00%**
Street		25%	3,462			-				**13,849**	**3,462**	**25.00%**
Contract light		35%	2,514							**7,182**	**2,514**	**35.00%**
Decorative		25%	25			-				**100**	**25**	**25.00%**
										186,228	**41,831**	**22.46%**

TABLE C

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
FIRE		**38,714**
Maxim 750 GMP	1935	
Maxim 1500 GPM	1978	
Maxim SLT Aerial	1978	
Dodge W40 Cab	1979	
Ford F384XL	1986	
Pierce Arrow 1500 GPM	1987	
Ford Econo E250	1991	
Pierce Arrow Pumper	1993	
Pierce Arrow Pumper	1994	
Ford F80	1995	
Chevy Suburban	1995	
Chevy Caprice	1995	
Chevy Suburban	1996	
Pierce Arrow	1997	
Pierce Arrow	1997	
Load Rite Trailer	1997	
Chevy Lumina	1998	
Scotty Trailer	1998	
Sutphen	2000	
Pierce Dash	2002	
Inter Travel Trlr	2002	
Belmont Flat Bed	2003	
Ford Expedition	2004	
Stuphen Fire Mini Tower	2005	
Ford F550 CABCH	2005	
Ford F550 CABCH	2005	
Ford Expedition	2006	
Ford Escape Util.	2007	
Ford Escape Util.	2007	
Seagrave Pumper	2007	
Ford F350	2009	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
POLICE		**59,803**
Kubota Tractor	1973	
Tiltster Trailer	1980	
Ford Tractor Truck	1983	
Homemade Trailer	1984	
Ford *K74* CABCH	1990	
Rayco Stump Cutter	1994	
Kubota Tractor	1994	
Brush Bandit	1994	
Ford Crown Vic.	1995	
Ford Taurus Wgn	1996	
Crafo Trailer	1996	
Ford Taurus Sedan	1997	
Speed Control Monitor	1999	
Dodge Ram Van	1999	
Ford Taurus	1999	
Ford Explorer	2000	
Nissan Maxima	2000	
Ford Crown Vic.	2000	
Ford Focus	2000	
Ford Crown Vic.	2001	
Ford E250 Van	2002	
Lexus ES300 Sedan	2002	
Cross Country Flat Bed Trailer	2002	
Cross Country Flat Bed Trailer	2002	
Ford Crown Vic.	2003	
Ford Crown Vic.	2003	
Ford E350 Van	2003	
Ford Taurus Sdn	2003	
Ford Cro. Vic.	2004	
Ford Crown Vic.	2005	
Ford Crown Vic.	2005	
Ford Crown Vic.	2005	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
POLICE (continued)		
Ford Crown Vic.	2005	
Ford Crown Vic.	2005	
Chrysler 300C Sdn	2005	
Ford Crown Vic.	2006	
Ford Taurus	2006	
Ford F350 PU	2006	
Ford Crown Vic.	2006	
Ford Crown Vic.	2006	
Ford Crown Vic.	2006	
Ford Crown Vic.	2006	
Ford Freestyle Wgn	2007	
Ford Freestyle Wgn	2007	
Carry-On- Trailer	2007	
Ford Crown Vic.	2007	
Ford Crown Vic.	2008	
Dodge Caravan	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Crown Vic.	2008	
Ford Focus StaWgn	2009	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
SCHOOLS		**9,019**
GMC Cab/Chassis	1980	
Chevy Cutaway	1986	
Ford F350	1986	
Chevy G20 Van	1989	
International Van	1990	
Ford Econo. Van	1990	
Ford Dump	1990	
Ford Truck	1992	
Ford Aerostar	1994	
Ford Crown Vic.	1994	
Ford E350 Van	1995	
Ford E250 Van	1995	
Ford E250 Van	1996	
Ford E350 Van	1997	
Ford E250 Van	1997	
GMC Safari Van	1997	
Intl. Dump	1998	
Ford Explorer	1998	
Wells Cargo Trlr	1999	
Genie Utility	2000	
Ford Escape	2002	
Ford Explorer	2004	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
PUBLIC WORKS		**59,582**
Custom Utility Water Buffalo	1967	
Sicard Snowmaster	1973	
GMC Tank Truck	1978	
Champ Grader	1978	
Beck Utility Trailer	1979	
GMC Bucket	1982	
Oshkosh Snow Plow	1982	
Ford Ranger Pick up	1984	
Atlas Worthington Compressor	1985	
Ford Backhoe	1986	
Custom Flatbed	1987	
John Deere Tractor	1987	
I.H. Dump Truck	1988	
I.H. Dump Truck	1988	
Harben Trailer	1988	
Skidsteer	1988	
Chevy Pick up	1988	
In tern a tio nal	1990	
International 4900	1990	
Ford LN8000	1993	
Hamm Utility Trlr	1993	
Ford Carlow Sweeper	1993	
Chevy GMT400 Pick up	1993	
International	1994	
International	1994	
936 F Wheel Loader	1994	
Ford Styleside F250 Pickup	1994	
Mercury Sable	1994	
Mobile Sweeper	1995	
Intl. Packer	1995	
Intl. Dump Truck	1995	
Ray- Tech Trailer	1995	
Intl. Side Loading	1995	
L & B Landscape	1995	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
PUBLIC WORKS (continued)		
Intl. Dump	1996	
Wells Cargo	1996	
Brush Utility	1996	
Ford Lgt. Com. Pick up	1996	
Ford Pick up	1996	
Chevy GMT400 Pick up	1996	
International Dump	1997	
Madvac	1997	
Atlas Comp Trlr	1997	
NewHo Loader	1997	
Trackless Tractor	1997	
Hyundie Accent	1997	
Chevy K2500 Pickup	1998	
Intl. Cab Chassis	2000	
Intl. Packer	2001	
Inti. Packer	2001	
Chev Silverado Pick up	2001	
Tennant Madvac	2003	
JohnDeere Loader	2003	
Giant Vac Trailer	2003	
Ford Escape	2003	
Ford Escape	2003	
Ford Cutvan	2003	
Intl. 7400 Dump	2004	
Frtl. Condor Truck	2004	
Homemade Trailer	2004	
Int. Refuse	2004	
Caterpillar Loader	2004	
Chevrolet Silverado Pickup	2004	
Intl. CABCH Refuse	2006	
Chevrolet Silverado P/U	2006	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
PUBLIC WORKS (continued)		
Chevrolet Silverado P/U	2006	
Int. Recycling	2008	
Groundmaster Mower	2008	
Ford Escape Hybrid	2008	
Chevrolet Silverado	2008	
Chevrolet Silverado	2008	
COUNCIL ON AGING		**3,279**
Dodge Ram Van	1999	
Ford Taurus Wgn	2003	
Ford Flex Wgn	2009	
GAS & ELECTRIC		**38,714**
Trailer - Vacumm Pump	1957	
Trailer - Cable Reel - Elec	1958	
Trailer W/Concrete Saw	1959	
Hotline Tool Trailer - Elec	1968	
Gray Aluminum 16' Boat	1980	
Trenching Machine Trailer	1981	
Line Truck - Gas/Spare	1982	
Lincoln Welder	1982	
Forklift	1983	
Green Aluminum 18' Boat	1983	
Backhoe/Loader	1985	
Backhoe/Loader	1985	
Corner Mount Line Truck	1986	
JD 210 Yellow Backhoe	1986	
F800 Flat Bed Dump Truck	1986	
Trailer - Cable Reel - Elec	1987	
Underground Line Truck	1988	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
GAS & ELECTRIC (continued)		
Material Trailer - Elec	1988	
Cable Reel Trailer - Elec	1989	
Air Compressor	1989	
Trenching Machine Trailer	1990	
Fork Lift - Hydro	1990	
Aerial Bucket Truck	1991	
Line Truck - Gas	1991	
Dump Truck W/Plow	1992	
Aeromate Utility Van	1992	
Green Aluminum 19' Boat	1992	
Aeromate Utility Van	1992	
Pole Trailer - Electric	1993	
Utility Trailer	1994	
Utility Trailer #2 air compressor	1994	
White Caravan Van	1995	
F250 4x4 Pick-Up	1995	
Puller-Tensioner Trailer	1996	
Line Truck - Gas	1997	
Trencher-Trailer	1997	
Coil Cager Trailer	1997	
White Caravan Van	1997	
F250 4x4 Pick-Up	1997	
Corner Mount Line Truck	1998	
Air Compressor Gas/Spare	1998	
Ford F150 Pickup	1999	
White F350 Pick-Up	1999	
Yellow Landscape Trailer	1999	
Ford Explorer	2000	
Homemade Utility Trailer	2000	
Line Truck - Gas	2001	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
GAS & ELECTRIC (continued)		
Ford E250 Service Van	2001	
Ford E250 Service Van	2001	
Mat'l Handling Bucket Truck	2001	
F250 3/4 Ton Pickup w/Plow	2002	
Ford Explorer XLT 4-WD SUV	2002	
Ford Windstar Van	2002	
F150 1/2 Ton Pickup	2002	
Aerial Bucket Truck	2002	
F350 3/4 Ton Crew Cab	2002	
White Taurus SES Mid Size	2002	
Ford Super Duty E350 Van	2002	
Backhoe/Loader	2003	
Explorer	2003	
Ford E250 Series 2 Pass Van	2003	
Ford Explorer XLS 4-WD SUV	2003	
Gray Boat Trailer	2003	
Ford Freestar Van	2004	
Explorer - Gas Distribution	2004	
Aerial Bucket Truck	2004	
Pneumatic Forklift	2004	
Ford Explorer XLS 4-WD SUV	2004	
Ford F250 Pickup	2004	
Ford Freestar (Meter Dept)	2004	
Black Dump Trailer	2004	
Ford Explorer XLS 4-WD SUV	2004	
Trailer	2004	
Ford E250 Van	2005	
Ford Taurus Sedan	2005	
Taurus - Gas Division	2005	
Utilimaster Body	2005	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
GAS & ELECTRIC (continued)		
3 Reel Turret Trailer	2005	
Ford Taurus	2005	
Chevy Silverado Pickup	2005	
Ford Ranger Compact Pickup	2005	
Service Truck	2006	
400 Ser	2006	
Service Truck	2006	
Service Truck	2006	
Ford E150 Van	2006	
White Caravan Van	2006	
Cargo Van	2006	
Ford Explorer XLS 4X4 4DR	2006	
Ford Pickup F350	2006	
2007 Ford E250 Van	2007	
2007 Ford E250 Van	2007	
Dump Truck - Diesel	2007	
2007 Ford E250 Van	2007	
Ford F350 PU	2008	
Underground Line Truck	2009	
Concrete Mixer	n/a	

TABLE C [continued]

CITY VEHICLES COVERED BY ENERGY REDUCTION PLAN

Model	Model Year	Department Annual Fuel Consumption (gallons)
WATER		**18,880**
Custom	1988	
Centerville	1988	
Hustler	1988	
International Flatbed	1990	
Ford Dump	1991	
Case	1992	
Ford Explorer	1994	
Custom	1995	
International Utility Van	1996	
International Utility Van	1997	
NewHoll	1997	
Ford Utility Van	1997	
Ford Econoline Van	1998	
Loadrite	2000	
Ford Pickup	2000	
Ford Explorer	2000	
Ford Dump	2001	
Ford Dump	2001	
Ford Pickup	2003	
Ford Pickup	2003	
Ford Pickup	2003	
Ford Van	2003	
Ford Van	2003	
Ford Utility Van	2003	
John Deere	2003	
Ford Pickup	2004	
Ford Explorer	2005	
Ford Dump	2007	
Ford Pickup	2007	
John Deere	2007	
International Dump	2010	
International Dump	2010	