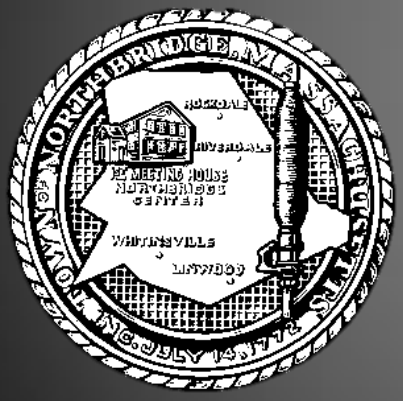

Town of Northbridge

Energy Reduction Plan

Adopted 11/07/2016

This Energy Reduction Plan (ERP), in accordance with Criteria 3 of the Massachusetts Green Communities Program, outlines proposed energy efficiency measures to reduce costs and environmental impacts of municipal energy use in the Town of Northbridge, Massachusetts. The intent of this plan is to assist Northbridge in its energy reduction goals and help the Town achieve Green Communities designation through the Massachusetts Department of Energy Resources (DOER) Green Communities Program.

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I. PURPOSE AND ACKNOWLEDGEMENTS

This Energy Reduction Plan (ERP), in accordance with Criteria 3 of the Massachusetts Green Communities Program, outlines proposed energy efficiency measures to reduce costs and environmental impacts of municipal energy use in the Town of Northbridge, Massachusetts.

The intent of this plan is to assist the Town of Northbridge in its ongoing green efforts, particularly in the Town's current goal to become a designated Green Community through the Massachusetts Department of Energy Resources (DOER) Green Communities Program. This plan satisfies Criterion 3 of the program, which requires a community to establish a baseline benchmark for energy use and to develop a plan to reduce its energy use by twenty (20) percent within five (5) years. Northbridge's energy baseline is computed from FY2015 energy usage and will be discussed in Section III of this plan.

The purpose of this Energy Reduction Plan is to identify opportunities and establish a timeline with specific targets to reduce energy use in Northbridge's municipal facilities and vehicles by twenty (20) percent over a five-year period. The action plan draws upon information from energy audits performed by Energy Conservation Incorporated and the Central Massachusetts Regional Planning Commission (CMRPC). It provides a realistic but flexible path for implementation, as the conservation opportunities identified within the plan exceed twenty (20) percent of baseline use. The decreased energy use realized as a result will reduce energy usage, greenhouse gas emissions, and municipal operating costs.

A. Letters from Both General Government and School District Verifying Adoption of the ERP

- General Government – Please see attached documents (Appendix A).
- Public School District – Please see attached documents (Appendix A).

B. List of Contributors that Participated in the Baseline and ERP Process

- Theodore Kozak, Northbridge Town Manager
- Sharon Susienka, Executive Assistant to the Town Manager
- Catherine Stickney, Northbridge Public Schools Superintendent
- Melissa Walker, Northbridge Public Schools Business Manager
- Kelly Brown, Central Region Green Communities Coordinator, DOER
- Jim Barry, Western Region Green Communities Coordinator, DOER
- Chris Collins, Energy Conservation Incorporated (ECI)
- Central Massachusetts Regional Planning Commission (CMRPC)

II. EXECUTIVE SUMMARY

A. Narrative Summary of the Town

The Town of Northbridge is situated in the western part of Worcester County and is bordered by Sutton on the west, Grafton on the north, Uxbridge on the south, and Upton and Mendon on the east. According to the latest US Census, there are 15,707 residents in Northbridge. The Town comprises 18.1 square miles of contrasting landscapes, including historical manufacturing and mill districts, settled villages, and suburban communities.

B. Summary of Municipal Energy Uses

Total Number of Municipal Buildings

The Town of Northbridge has fourteen (14) municipal and school buildings. Of these building, nine (9) are heated exclusively with natural gas (Northbridge Primary School, Northbridge High School, Aldrich School Town Hall Annex, Northbridge Middle School, Memorial Town Hall, Northbridge Senior Center, the School Administration building, 11 Fletcher Street, and the Police Department). The Main Fire Station and W. Edward Balmer School are heated with oil and natural gas. The remaining buildings (Hill Street, Whitinsville Social Library, and the Rockdale Fire Station) are heated exclusively with oil. All of Northbridge's schools utilize dual burners and have the capacity to heat with gas or oil. All buildings have electricity.

Building Additions and New Construction

In May of 2016, Northbridge residents appropriated funds to construct of a new DPW garage and office space. The building is in the design phase and will comprise 6,000- 8,000 sf. Northbridge will ensure the project complies with 780 CMR 115.AA, the Massachusetts Stretch Energy Code.

School Feasibility Study

On November 9, 2016 the Board of the Massachusetts School Building Authority (MSBA) voted to invite the Town of Northbridge to partner with the MSBA on a Feasibility Study for the W. Edward Balmer Elementary School. The Feasibility Study is intended to find the most fiscally responsible and educationally appropriate solutions to deficiencies identified at the Balmer Elementary School. As part of this Feasibility Study, the Town and MSBA will explore options for the Grade 2 – Grade 4 student grade span which Balmer currently houses. In addition, the study will explore options for the Pre-School through Grade 5 student grade span, where PK-1 is currently housed at the Northbridge Elementary School and Grade 5 is currently housed at the Middle School.

Upon commencement, the Feasibility Study/Schematic Design Phase for a building renovation or replacement project is expected to take approximately two years to complete. If the findings from the Feasibility Study are approved by the MSBA to move forward, additional time will be needed to communicate the recommendations from the Feasibility Study to the town citizens and secure a vote to authorize funding for a building project. As the status of the elementary schools will be up in the air for the next two to three years, investments in energy projects that impact the High School and Middle School may be given more consideration and a higher priority for the earlier part of this plan as the longevity of the elementary buildings is unknown at this time.

Total Number of Vehicles

Northbridge is responsible for fifty-nine (59) vehicles, fifty-one (51) of which are exempt. The Town's non-exempt vehicles include sidewalk plows, a detective vehicle, the Police Chief's administrative vehicle, and other vehicles over 8,500 GVWR. The Town's police cruisers are outfitted with power patrol modules that limit the use of fuel while idling.

Total Number of Street Lights and Traffic Lights

There are 1,118 streetlights and (3) blinking traffic lights in the Town of Northbridge.

Water and Sewer
Northbridge owns and operates a Wastewater Treatment Plant, four (4) wastewater pumping stations, and one (1) drinking water pumping station. The four buildings located at the sewer complex are heated by oil. The Marston Road sewer pump station and Upton street water pump station are heated by gas.

Table 1. Summary of Municipal Energy Users

	Number	Ownership
Buildings		
Oil Heat	3	Town of Northbridge
Natural Gas Heat	9	Town of Northbridge
Oil and Natural Gas Heat	2	Town of Northbridge
Electric Heat	0	Town of Northbridge
Vehicles	59	
Non-Exempt	8	Town of Northbridge
Exempt	51	Town of Northbridge
Street Lights	1,118	
	64	Town of Northbridge
	1054	National Grid
Traffic Lights	3	Town of Northbridge
Water and Sewer	6	
Wastewater Treatment Plant	1	Town of Northbridge
Drinking Water Treatment Plant	0	N/A
Water Pumping Stations	1	Town of Northbridge
Sewer Pumping Stations	4	Town of Northbridge

C. Summary of Energy Use Baseline and Plans for Reductions

During the baseline year, the total energy use in municipal vehicles and facilities in the Town of Northbridge was 68,562 MMBtu. Tables 3A and 3B present energy use for each municipal facility in Native Units and MMBtu, respectively. The majority of energy consumed in FY 2015 in the Town of Northbridge was used by buildings (81.50%) The Northbridge High School used thirty-three (33) percent of the total energy used by buildings in Northbridge. Municipal vehicles represented the second largest energy consumption (8.86%). Water and sewer facilities accounted for 7.72 percent while street and traffic lights only accounted for 1.72%

At the request of the Town of Northbridge, Energy Conservation Incorporated (ECI) assessed and documented potential energy conservation measures at a number of Northbridge facilities. ECI's analysis included several site visits, inspections, staff interviews, and data collected through the course of ASHRAE Level 2[1] audits. In conjunction with behavioral and vehicular

[1] An **ASHRAE Level** 1 assessment determines how much energy a building uses and how that compares to other similar buildings, includes a short walk-through of the facility and identifies potential efficiency measures. The costs and savings of the measures are usually identified with low precision. An ASHRAE Level 1 assessment is often referred to as a scoping audit. An **ASHRAE Level 2** assessment expands on a Level 1 by identifying much more accurate costs and savings for the recommended efficiency measures. Note that these costs are still not bid-level construction costs but generally are within 15-20 percent of accuracy. Cost and energy savings from operational and behavioral measures are also quantified in an ASHRAE Level 2 assessment. For more complex facilities, an end-use breakdown of how a facility uses its energy (i.e., 30 percent of electricity use is for lighting, 60 percent for HVAC, and 10 percent for plug load) is typically included.

changes, the measures will reduce Northbridge's municipal energy use by more than twenty (20) percent from the baseline year. Specific actions are detailed in Section IV of this report. Prism's full report is included as Appendix C

Figure 1. Baseline Dashboard from MEI (FY 2015)

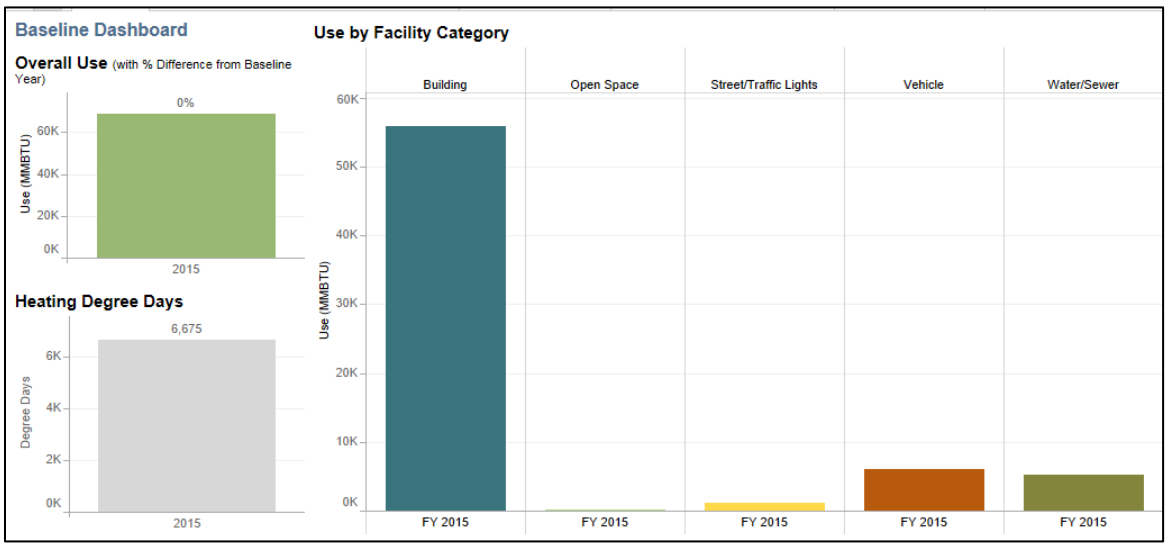


Table 2: Summary of Municipal Energy Use Baseline

BASELINE YEAR 2015	**MMBtu Used**	**% of Total MMBtu Baseline Energy Consumption**	**Projected Planned Documented MMBtu Savings[1]**	**Savings as % of Total MMBtu Baseline Energy Consumption**
Buildings	55,881	81.50	15,741	22.96
Open Space	131	0.19	0	0.00
Vehicles	6,074	8.86	513.29	.75
Street/Traffic	1,179	1.72	474	0.69
Water/Sewer	5,296	7.72	1,373	2.00
Total	68,562	100	18,101	26.40

III. ENERGY USE BASELINE

A. Identification of the Inventory Tool Used

The Town of Northbridge used the Department of Energy Resources (DOER) MassEnergyInsight (MEI) web-based energy use analysis tool (which is provided at no cost to Massachusetts communities by the Massachusetts Department of Energy Resources (DOER) as part of the Massachusetts Green Communities Program) for this energy reduction plan.

MassEnergyInsight tracks energy using one million British thermal units (MMBtu) as the

standard unit of measurement. This allows energy use from the various units of measure to be combined to show overall energy consumption. MMBtu are therefore used as the common unit of measure of energy in this report.

MMBtu Conversion
Fuel Energy Content of Common Fossil Fuels per DOE/EIA (for more information visit mass.gov/energy/greencommunities

BTU Content of Common Energy Units – (1 million Btu equals 1 MMBtu)

- 1 kilowatt hour of electricity = 0.003412 MMBtu
- 1 therm = 0.1 MMBtu
- 1 ccf (100 cubic foot) of natural gas = 0.1028 MMBtu (based on U.S. consumption, 2007)
- 1 gallon of heating oil = 0.139 MMBtu
- 1 gallon of propane = 0.091 MMBtu
- 1 cord of wood = 20 MMBtu
- 1 gallon of gasoline = 0.124 MMBtu (based on U.S. consumption, 2007)
- 1 gallon of E100 ethanol = 0.084 MMBtu
- 1 gallon of E85 ethanol = 0.095 MMBtu
- 1 gallon of diesel fuel = 0.139 MMBtu
- 1 gallon of B100 biodiesel = 0.129 MMBtu
- 1 gallon of B20 biodiesel = 0.136 MMBtu[2]
- 1 gallon of B10 biodiesel = 0.137 MMBtu[9]
- 1 gallon of B5 biodiesel = 0.138 MMBtu[9]
- 1 barrel of residual fuel oil = 6.287 MMBtu

B. Identification of the Baseline Year
Fiscal Year 2015 will serve as the baseline year. FY15 ran from July 1, 2014 to June 30, 2015.

D. Municipal Energy Consumption for the Baseline Year (FY 2015)
Northbridge's FY15 energy use is detailed in Table 3a- fuel units and Table 3b- MMBtu. Overall, the Town of Northbridge consumed 68,562 MMBtu of energy in FY15, including:

- 4,614,840 kWh of electricity
- 34,112 gallons of heating oil
- 420,003 therms of natural gas
- 24,021 gallons of gasoline
- 22,269 gallons of diesel

Buildings
Northbridge's fourteen (14) municipal and school buildings used a total 55,881 MMBtu in FY15, accounting for 81.50% of all municipal energy use. The building with the largest energy consumption was the Northbridge High School (18,926 MMBtu) followed by the Northbridge Middle School (17,831 MMBtu), W. Edward Balmer School (6,478 MMBtu), Northbridge Primary

School (3,979 MMBtu), Main Fire Station (1,979 MMBtu) and the Memorial Town Hall (1,387 MMBtu).

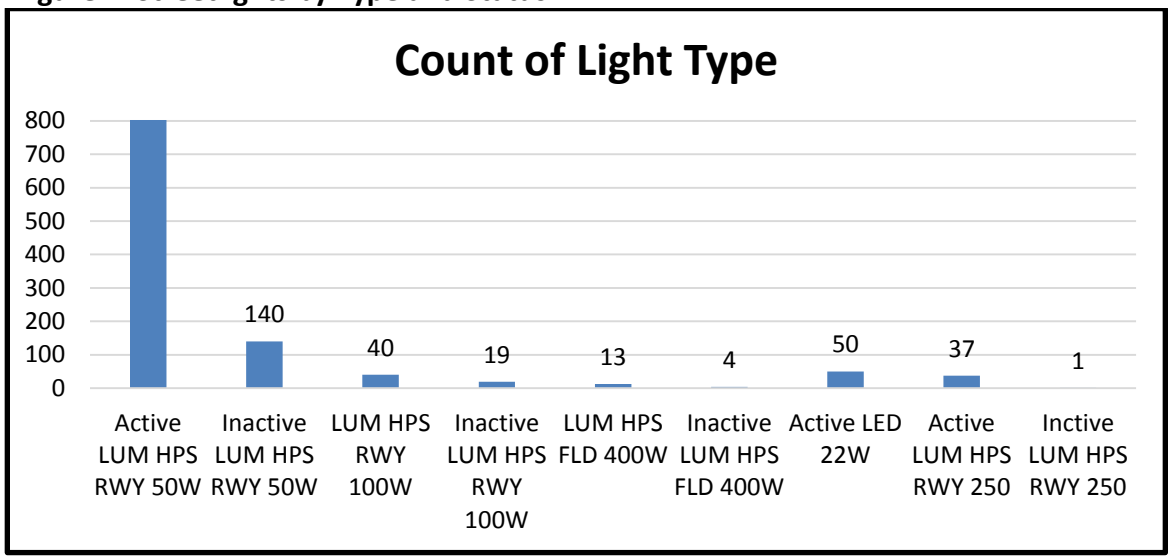
Vehicles

Municipal vehicles are the second largest users of municipal energy in Northbridge, accounting for 8.86% of the baseline total, which is the equivalent of 6,074 MMBtu. Nearly sixty-four (64) percent of this energy use is in the form of diesel fuel.

Street/Traffic Lights

Of Northbridge's 1,118 streetlights, 954 (85.3%) are active. 164 street lights are inactive. A majority of the streetlights (98%) are owned by National Grid. The remaining 2% are owned by the Town of Northbridge. Largely, these streetlights use 50 Watt High-Pressure Sodium bulbs. In FY16, the Town replaced fifty (50) 100-watt streetlights with 22-watt LEDs. In May of 2016, Northbridge submitted a streetlight Purchase Price Inquiry to National Grid. In FY16, the Town's street and traffic lights utilized 345,601 kWh or 1,179 MMBtu, the equivalent of 1.72 percent of baseline energy use).

Figure 2. Streetlights by Type and Status



Water/Sewer Facilities

The Town of Northbridge has nine (9) water/sewer facilities. The combined use of these facilities accounted for 5,296 MMBtu of energy in FY15. Four (4) of the facilities are wastewater pumping stations, which account for 2.7% of all energy used by water and sewer facilities. There is one (1) drinking water pumping station, which accounts for 3.1% of the energy used by water and sewer facilities. The sewer complex includes the Wastewater Treatment Plant, two (2) garages, and the Sewer Admin Building. Collectively, the Sewer Complex utilized 4,979 MMBtu or ninety-four (94) percent of all energy consumed by water and sewer facilities in Northbridge. In total, water and sewer facilities accounted for 7.72% of the Town's overall energy use in FY 2015.

Renewable Energy

Currently, the Town of Northbridge includes one (1) privately operated large-scale solar facility.

The Town has a Purchase Power Agreement with this facility, which provides the municipality with (1) Megawatt of electricity. A second large-scale solar facility is under construction. The facility's siting will be split between Northbridge and the neighboring Town of Sutton. Northbridge expects to enter into a Purchase Power Agreement with this vendor as well.

Table 3A: Municipal Energy Consumption for Baseline Year FY 2015 (Native Fuel Units)

ERP Guidance Table 3a - Municipal Energy Consumption for 2015 (Native Fuel Units)

		2015				
		Electric (kWh)	Gas (therms)	Oil (gallons)	Gasoline (gallons)	Diesel (gallons)
Building	Northbridge Primary School	163,274	34,219			
	W. Edward Balmer School	282,120	50,983	3,000		
	Northbridge High School	1,356,750	142,966			
	Aldrich School Town Hall Ann..	21,204	12,807			
	Northbridge Middle School	849,942	149,306			
	Hill Street Building	4,064		1,932		
	Whitinsville Social Library	48,088		4,200		
	Memorial Town Hall	76,520	11,255			
	Northbridge Senior Center	69,231	4,885			
	School Administration	61,429	1,766			
	11 Fletcher St	23,108	5,616			
	Main Fire Station	37,708	359	13,034		
	Rockdale Station	3,213		2,249		
	Police	103,046	4,954			
	Total	**3,099,697**	**419,116**	**24,415**		
Open Space	Parks/Playgrounds	10,674				
	Pine Grove Cemetery	1,525		646		
	Total	**12,199**		**646**		
Street/Traffic Lights	Street Lights & Traffic Signals	345,601				
	Total	**345,601**				
Vehicle	School Department				1,090	905
	Sewer				339	1,768
	DPW				3,485	13,520
	Fire Department				49	4,151
	Ambulance				418	1,925
	Police Department				15,616	
	Code Enforcement				284	
	Council on Aging				2,740	
	Total				**24,021**	**22,269**
Water/Sewer	Sewer Complex	1,090,600		9,051		
	Adams Circle Pump Station	8,788				
	Marston Rd Pump Station	9,580	51			
	Shannon Dr Pump Station	22,795				
	Upton St Water Pump Station	25,110	836			
	Plummer Park Pump Station	470				
	Total	**1,157,343**	**887**	**9,051**		
Grand Total		**4,614,840**	**420,003**	**34,112**	**24,021**	**22,269**

Table 3B: Municipal Energy Consumption for Baseline Year FY 2015 (MMBtu)

ERP Guidance Table 3b - Municipal Energy Consumption for 2015 (MMBTU)

Please make sure that any data submitted to DOER contains complete Data!

		2015					
		Diesel	Electric	Gas	Gasoline	Oil	Total
Building	Northbridge Primary School		557	3,422			3,979
	W. Edward Balmer School		963	5,098		417	6,478
	Northbridge High School		4,629	14,297			18,926
	Aldrich School Town Hall Ann..		72	1,281			1,353
	Northbridge Middle School		2,900	14,931			17,831
	Hill Street Building		14			269	282
	Whitinsville Social Library		164			584	748
	Memorial Town Hall		261	1,126			1,387
	Northbridge Senior Center		236	489			725
	School Administration		210	177			386
	11 Fletcher St		79	562			640
	Main Fire Station		129	36		1,812	1,976
	Rockdale Station		11			313	324
	Police		352	495			847
	Total		10,576	41,912		3,394	55,881
Open Space	Parks/Playgrounds		36				36
	Pine Grove Cemetery		5			90	95
	Total		42			90	131
Street/Traffic Lights	Street Lights & Traffic Signals		1,179				1,179
	Total		1,179				1,179
Vehicle	School Department	126			135		261
	Sewer	246			42		288
	DPW	1,879			432		2,311
	Fire Department	577			6		583
	Ambulance	268			52		319
	Police Department				1,936		1,936
	Code Enforcement				35		35
	Council on Aging				340		340
	Total	3,095			2,979		6,074
Water/Sewer	Sewer Complex		3,721			1,258	4,979
	Adams Circle Pump Station		30				30
	Marston Rd Pump Station		33	5			38
	Shannon Dr Pump Station		78				78
	Upton St Water Pump Station		86	84			169
	Plummer Park Pump Station		2				2
	Total		3,949	89		1,258	5,296
Grand Total		3,095	15,746	42,000	2,979	4,742	68,562

IV. ENERGY REDUCTION PLAN

A. Narrative Summary

Overview of Goals for years 1-3

The first three years of this energy reduction plan runs from FY 2015 to the end of FY 2018. The conservation measures identified in this plan exceed twenty (20) percent. Consequently, the Town has flexibility in its selection of measures. The Town's anticipated strategy will be to focus on high-return, lower cost measures at municipal buildings, the Middle School and High School, and vehicle fuel economy. As the longevity of the elementary schools is being examined, investments in energy projects that impact these schools will likely occur in subsequent years.

In FY16, the Town replaced fifty (50) 100-watt streetlights with LEDs. This project will be counted toward Northbridge's twenty (20) percent reduction goal.

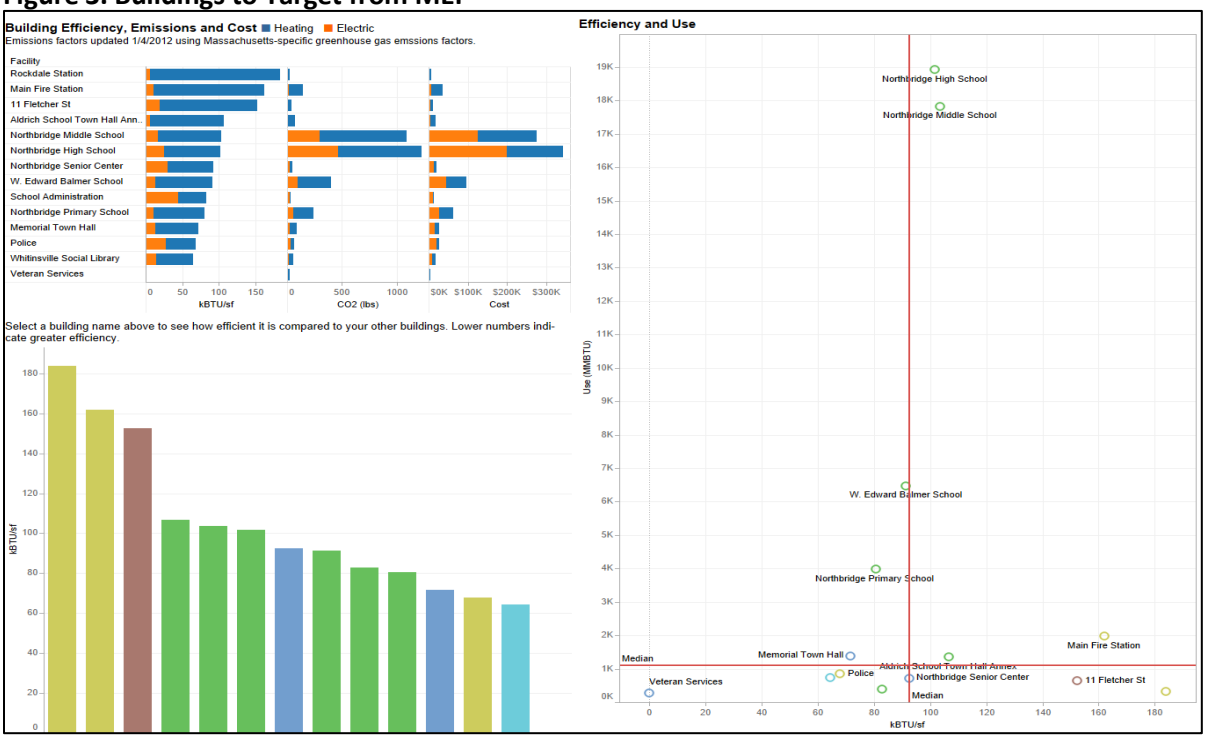
Overview of Goals for Years 4-5

The goals for FY 2019 and FY 2020 are to complete unfinished projects that will bring the Town to its twenty (20) percent energy reduction goal. Potential measures include higher cost opportunities at the schools, as well as elementary school projects determined appropriate by the feasibility study.

Identify Areas of Least Efficiency/Greatest Waste

It is very useful to gain an understanding of how municipal facilities, namely buildings, perform compared to each other. Figure 2, *Buildings to Target*, compares the energy consumption to the building's efficiency for all the buildings in Northbridge. As shown in this Figure, the Northbridge High School is the largest user (of the buildings) of energy in Town. Its efficiency, expressed in energy consumption per square foot, falls slightly above the median for Town buildings. However, the High School is less than a decade old and audits by ECI indicate the building is adequately weatherized and that measures such as VFDs are already in place. Thus, no this plan includes no measures at the High School. The Northbridge Middle School is the next highest user of energy and also falls slightly above the median for efficiency. Energy-saving strategies are outlined for each of these locations. The Main Fire Station is also a building to target as it shows a below average result for efficiency.

Figure 3. Buildings to Target from MEI



B. Getting to a 20% Energy Use Reduction Within the 5 Year Period Following the Baseline Year

Overview

The Town of Northbridge is committed to reducing baseline (FY 2015) energy consumption by 20% over the five year period from FY 2015 to the end of FY 2020. A list of specific and documented strategies is presented in Table 4 (Appendix B), and accounts for 26.40 percent of total projected savings.

Program Management Plan for Implementation, Monitoring and Oversight

The Town Manager and Select Board will be responsible for securing the funds and general oversight of the energy efficiency projects. The Town Administrator and Energy Conservation Inc. will be responsible for maintaining energy use data in MEI as well as DOER Green Communities Annual Reporting requirements.

Summary of Energy Audit(s) or Other Sources for Projected Energy Savings

A series of Energy Audits was conducted in several municipal facilities in Northbridge by Energy Conservation Inc. as part of the DOER Energy Audit Program. Energy audits were conducted in FY2017 at fourteen (14) municipal facilities (see Table 4 and *Appendix C, Energy Audit* for a list of audited facilities). Complementing these audits are assessments by CMRPC; the organization assessed vehicular energy usage, costs, and savings, as well as policy changes that impact energy use.

Energy Conservation Measures
A list of documented and itemized energy conservation measures is presented in Table 4. These measures account for a 26.40 percent reduction from the baseline year. This table contains detailed information such as project status, projected annual energy savings, projected annual cost savings, total project cost, incentive and financing information, funding sources as well as a reference source for all information. Projects include:

- Interior Lighting and Mechanical Measures (15,741 MMBtu)
- Streetlights (474 MMBtu- 58 complete, 416 planned)
- General Vehicular Fuel Economy Measures (361 MMBtu)
- Anti-Idling Policy (331 MMBtu)

Methodology
The Town of Northbridge will proceed with the recommendations made by Energy Conservation Incorporated and CMRPC. These firms identified energy conservation strategies that will reduce Northbridge's energy use projected energy savings amounting to 18,101 MMBtu or 26.40% of the baseline (specific strategies identified through this exercise are discussed in more detail below).

- **Buildings**
  Detailed audits were conducted at all municipal and school facilities. These audits entailed data collection, walkthroughs, review of utility bills and discussions with administration officials, staff, and building occupants. The data presented in these audits includes specific Energy Conservation Measures (ECMs) with detailed information about baseline energy use, projected usage savings and annual cost information. Each of these reports is contained in Appendix C. Annual usage, cost estimates, and annual cost savings were taken directly or derived from these reports to estimate energy savings.

- **Streetlights**
  As previously noted, Northbridge's streetlights largely utilize high pressure sodium lamps. CMRPC identified savings opportunities through replacing such lamps with LEDs. The projected savings of these measures are 121,807 kWh or 416 MMBtu. The Town is aware that in order to convert all of its streetlights to LEDs it needs to purchase the 1,054 National Grid-owned streetlights from the utility.

  Additionally, the Town completed a streetlight conversion project in FY16. The project entailed replacement of fifty (50) 100-watt streetlight lamps with 22-watt LEDs. The annual savings from this project is estimated at 17,035 kWh or 58 MMBtu. Savings were derived as shown in Table 4a on page 13.

Table 4a. FY16 LED Streetlight Savings (complete)

FY16 LED Streetlight Savings (complete)	
Hours running per day	12
Days per week	7
Hours run per year	4,368
Original wattage	100
New wattage	22
Wattage reduction	78
Hours per year x wattage reduction	34,0704
Number of units	50
Total annual watt savings	1,703,5200
Total annual kWh savings	17,035.2
Total annual MMBtu savings	58

- **Vehicles**
  The Central Massachusetts Regional Planning Commission (CMRPC) audited Northbridge's vehicular energy usage, projected usage savings, and annual cost information. CMRPC identified opportunities for energy savings in the following vehicle-specific areas: (1) general fuel economy measures and (2) anti-idling policy and implementation. Savings projections were derived as follows:

  - **General Vehicle Fuel Conservation Measures (all departments)**
    Generally, applicable fuel economy measures can help reduce fuel consumption without any additional cost or investment. Table 4b on page 14 details actions that will conserve fuel across all departments. The rightmost column represents the minimum savings that the Town of Northbridge will strive to achieve. These goals should be quite achievable and the three (3) percent MMBtu reduction assumed is a small fraction of the estimated savings typically found (US DOE: fueleconomy.gov).

  - **Anti-idling Policy (non-police)**
    The Town of Northbridge will adopt an Anti-Idling Policy for Town-owned vehicles (excluding police vehicles, which are often better-suited to other fuel-saving measures). After an initial thirty day educational period, it will be the responsibility of supervisors to enforce this policy. Department Heads will be asked to monitor compliance and report to the Town Manager after six (6) months of this policy taking effect in order to make suggestions for improvements or changes. Table 4c on page 14 presents the fuel savings anticipated as a result of this measure.

Table 4b. General Vehicular Fuel Conservation Measures

Key	Action	Source for Measure	US Gov Estimate Range	ERP Estimate Used	Gas Saved (gal.)	Diesel Saved (gal.)	MMBtu Saved
Drive sensibly	Avoid aggressive driving (e.g., rapid acceleration/ braking).	*1	5-33%	**1.00%**	**240.21**	**222.69**	**120.31**
Remove excess weight	Avoid storing unnecessary items in your vehicle. An extra 100 pounds could reduce mpg by up to 2% especially in smaller vehicles	*1	1-2%	**0.50%**	**120.11**	**111.34**	**60.15**
Keep engine tuned	Fixing a vehicle that is out of tune or has failed an emissions test can improve gas mileage by an avg. of 4%.	*2	4%	**0.50%**	**120.11**	**111.34**	**60.15**
Keep tires inflated	Improve gas mileage by up to 3.3% by inflating to proper pressure.	*2	Up to 3%	**0.50%**	**120.11**	**111.34**	**60.15**
Use correct grade of oil	Improve gas mileage by 1%-2% by using manufacturer's recommended grade of motor oil.	*2	1-2%	**0.50%**	**120.11**	**111.34**	**60.15**
			Total Gallons Saved	**3.00%**	**720.65**	**668.05**	**361**

Table 4c. Anti-idling Fuel Savings

Anti-Idling Policy Fuel Savings	
Fleet 1 (total fleet minus police)	50 vehicles
Fleet 1 vehicle fuel, gasoline	8,405 gallons
Fleet 1 vehicle fuel, diesel	22,269 gallons
Estimate fuel savings	8%
Fleet 1 gasoline saved	672.40
Fleet 1 diesel saved	1,781.52
Conversion Rate MMBtu, Gasoline	0.124
Conversion Rate MMBtu, Diesel	0.139
MMBtu Saved, Gasoline	83.38
MMBtu Saved, Diesel	247.69
Total MMBtu Saved	**331**

- **General Conservation**
  In addition to the above referenced projects, the Town will also implement general energy conservation measures. Such measures can be grouped by three categories: equipment use, heating/cooling, and lighting. Savings from these measures are not accounted for in the 26.40 percent energy reduction strategy.

    - **Equipment**
      Related to equipment use, municipal employees will be instructed to turn off or set computers and other electronic equipment to hibernation mode when not in use. Additionally, school equipment should be turned off when not in use during summer months.

    - **Heating and Cooling**
      Regarding heating and cooling, building and zone thermostats shall be set to the highest comfortable temperature in summer and the lowest in winter. Employees shall be encouraged to keep warmer clothes on hand so that heating can be set at a lower level. Northbridge will also establish specific guidelines for open window air exchange as may be feasible and practicable. Automatic thermostats will be considered where feasible and employees will be encouraged to dial down thermostats when leaving room or building for non-automatic systems. The Town will also evaluate energy efficient strategies for keeping IT equipment cool.

    - **Lighting**
      Regarding lighting systems, the town will ensure that public buildings are not lighted unnecessarily when in use, that buildings be upgraded to automatic light switches, and that employees be encouraged to turn off lights when exiting building or room.

Summary of Long-Term Energy Reduction Goals – Beyond 5 years

1. **Municipal Buildings**
   Town buildings are the largest energy users. Consequently, our municipal buildings will continue to be an area of focus into the future. After the priority work identified in Table 4 is complete, smaller but still significant projects can be undertaken in all buildings. Such projects would include energy conserving window treatments for smaller area windows where appropriate, upgrading storm windows and creating double door entrances where appropriate. We also view training and education of building occupants as an ongoing energy reduction strategy.

2. **Vehicles**
   The Town of Northbridge has eight (8) non-exempt vehicles. When these vehicles are taken out of service and, if the decision is made to replace them, they will be replaced with models meeting the current energy efficient guidelines. The Town's vehicle fleet includes no electric vehicles. The Town intends to assess the feasibility of acquiring electric vehicle charging stations and adding electric vehicles to its fleet when existing vehicles reach the end of their lifespan.

3. **Perpetuating Energy Efficiency**
The Town of Northbridge has considered creating an energy conservation savings reinvestment plan to help finance future EE/RE projects. The Town Manager will initiate discussions with the Select Board.

V. ONSITE RENEWABLE ENERGY PROJECTS & RENEWABLE ENERGY

As previously noted the Town of Northbridge has a solar Power Purchase Agreement with a private, Northbridge-based facility and expects to enter into another agreement in the near future. Otherwise, the Town has no immediate plans for on-site renewable energy. Northbridge has an interest is further expanding its use of renewable energy. The field located adjacent to the Wastewater Treatment Plant may present an opportunity raised solar arrays. Northbridge intends to assess the feasibility of such an installation.

VI. LIST OF RESOURCES

The Town of Northbridge used the following people and resources to create this ERP:

- Kelly Brown: Regional Green Communities Coordinator, Massachusetts Department of Energy Resources (DOER). Kelly.Brown@state.ma.us

- Green Communities Grant Program Information and Guidance: MA DOER, www.mass.gov/energy/greencommunities

- Idling Informational Presentation, *Idling Reduction Makes $ense*: U.S. Department of Energy (DOE) – Energy Efficiency & Renewable Energy, www1.eere.energy.gov/cleancities/pdfs/idle_reduction.pdf

- Energy Walkthrough Audit Reports, Energy Audit Reports, and Energy Audit Summary: Prepared by Energy Conservation Incorporated as part of the MA DOER Energy Audit Program (2016)

APPENDIX A

Adoption Verification Letters

TOWN OF NORTHBRIDGE
OFFICE OF THE TOWN MANAGER
NORTHBRIDGE TOWN HALL
7 MAIN STREET
WHITINSVILLE, MASSACHUSETTS 01588
Phone- (508) 234-2095 Fax- (508) 234-7640
www.northbridgemass.org

Theodore D. Kozak
Town Manager

November 9, 2016

MA Department of Energy Resources
Green Communities Resources
100 Cambridge Street - Suite 1040
Boston, MA 02114

To Whom It May Concern:

Please be advised that on November 7, 2016, the Northbridge Board of Selectmen met at a duly noticed and regularly scheduled meeting and voted to approve the Energy Reduction Plan for Criterion 3 of the Green Communities Application for Designation. The Board of Selectmen was given copies of the plan for review prior to the meeting.

The Board of Selectmen voted unanimously to support the plan and the minutes of that meeting include that vote.

Thank you very much for your consideration.

Sincerely,

Theodore D. Kozak
Town Manager

cc: Central Mass Regional Planning Commission

The Northbridge Public Schools
Town of Northbridge

87 Linwood Avenue, Whitinsville, Massachusetts 01588 (508) 234-8156 FAX (508) 234-8469 www.nps.org

Dr. Catherine Stickney, Superintendent
Kathleen Perry, Director of Pupil Personnel Services
Amy McKinstry, Director of Curriculum
Melissa Walker, Business Manager

November 17, 2016

Kelly Brown
Regional Coordinator
Green Communities Division- Central Region
Department of Energy Resources
8 New Bond Street,
Worcester, MA 01608

Dear Ms. Brown,

This letter is to inform you that the Northbridge School District has adopted the Town of Northbridge's Energy Reduction Plan and Fuel-Efficient Vehicle Policy at the November 15, 2016 meeting of the Northbridge School Committee.

Sincerely,

Catherine A. Stickney

Catherine A, Stickney, Ed.D.
Superintendent of Schools

APPENDIX B

Table 4, Energy Conservation Measures

Criterion 3 Step 4: Complete Table 4 - ECMs

Click here to view a sample version of this table

Table 4
Energy Conservation Measures Data

ECMs			Status		Energy Data						Financial Data					Reference Data	
Building/Site Name	Energy Conservation Measure Name	ECM Type (select one from drop-down)	Status (select one from drop-down)	Status Date (Completed with month/year or planned Qtr/year)	Projected Annual Electricity Savings (kWh)	Projected Annual Natural Gas Savings (therms)	Projected Annual Oil Savings (gallons)	Projected Annual Propane Savings (gallons)	Projected Annual Gasoline Savings (gallons)	Projected Annual Diesel Savings (gallons)	Projected Annual Cost Savings ($)	Total Installed Cost ($)	Green Community Grant ($)	Utility Incentives ($)	Net Cost ($)	Funding Source(s) for Net Costs	Source for Projected Savings
Village Centers (50 units)	Exterior Lighting	Exterior Lighting	Complete	9/15/2015	17,035						$3,407	$5,000		$0	$5,000	Town	*1
All departments except police	Anti-idling	Vehicles	Planned	1/15/2017					672	668	$3,257	$0		$0	$0	N/A	*2
All departments	Gen. Fuel Economy	Vehicles	Planned	1/16/2017					721	1,782	$5,878	$0		$0	$0	N/A	*2
Northbridge Middle School	Pump/Motor/Drive	Pump/Motor/Drive	Planned	7/15/2017	120,041						$22,808	$77,100	$49,200	$27,900	$0	N/A	ECI Audit
Aldrich School Town Hall Annex	Interior Lighting	Interior Lighting	Planned	7/15/2017	13,060						$2,432	$32,947	$27,347	$5,600	$0	N/A	ECI Audit
Aldrich School Town Hall Annex	Hot Water	Hot Water	Planned	7/15/2017	1,688						$253	$9,000	$8,500	$500	$0	N/A	ECI Audit
Aldrich School Town Hall Annex	Boiler Controller Replacement, Steam	Building Control	Planned	7/15/2017		1,281					$1,217	$6,600	$6,375	$225	$0	N/A	ECI Audit
Hill Street Building	Interior Lighting	Interior Lighting	Planned	9/15/2017	2,595						$565	$4,903	$4,068	$835	$0	N/A	ECI Audit
Hill Street Building	Boiler Controller Replacement, Steam	HVAC	Planned	9/15/2017			194				$213	$5,640	$5,415	$225	$0	N/A	ECI Audit
Hill Street Building	Programmable thermostats	HVAC	Planned	9/15/2017			155				$171	$4,320	$4,320		$0	N/A	ECI Audit
Whitinsville Social Library	Interior Lighting	Interior Lighting	Planned	12/15/2017	16,975						$6,259	$42,017	$34,027	$7,990	$0	N/A	ECI Audit
Whitinsville Social Library	Hot Water	Hot Water	Planned	12/15/2017	3,845						$577	$6,600	$6,100	$500	$0	N/A	ECI Audit
Whitinsville Social Library	Boiler Controller Replacement, Steam	Building Control	Planned	12/15/2017			420				$462	$6,600	$6,375	$225	$0	N/A	ECI Audit
Whitinsville Social Library	Programmable thermostats	Building Control	Planned	12/15/2017			336				$370	$4,320	$4,320		$0	N/A	ECI Audit
Whitinsville Social Library	Programmable thermostats	Building Control	Planned	12/15/2017			336				$370	$4,320	$4,320		$0	N/A	ECI Audit
Northbridge Middle School	Building Control	Building Control	Planned	12/15/2018	74,370	26,129					$35,978	$159,360		$23,904	$135,456	Town or GC Competitive	ECI Audit
Whitinsville Social Library	Air Handler Economizer	HVAC	Planned	12/15/2018	2,403						$360	$3,000			$3,000	Town or GC Competitive	ECI Audit
Memorial Town Hall	Interior Lighting	Interior Lighting	Planned	12/15/2018	21,725						$2,544	$42,431		$8,265	$34,166	Town or GC Competitive	ECI Audit
Memorial Town Hall	HVAC	HVAC	Planned	12/15/2018		2,252					$2,139	$78,000		$15,000	$63,000	Town or GC Competitive	ECI Audit
Memorial Town Hall	Hot Water	Hot Water	Planned	12/15/2018	3,836						$575	$7,200		$500	$6,700	Town or GC Competitive	ECI Audit
Memorial Town Hall	Boiler Controller Replacement, Steam	Building Control	Planned	12/15/2018		1,126					$1,070	$6,600		$225	$6,375	Town or GC Competitive	ECI Audit
Memorial Town Hall	Steam Trap Replacement	HVAC	Planned	12/15/2018		1,126					$1,070	$8,100		$225	$7,875	Town or GC Competitive	ECI Audit
Northbridge Senior Center	Interior Lighting	Interior Lighting	Planned	12/15/2018	14,736						$2,841	$30,463		$7,155	$23,308	Town or GC Competitive	ECI Audit
School Administration	Interior Lighting	Interior Lighting	Planned	12/15/2018	13,067						$2,378	$18,073		$6,145	$11,928	Town or GC Competitive	ECI Audit
11 Fletcher Street (DPW)	Interior Lighting	Interior Lighting	Planned	12/15/2018	10,051						$1,813	$13,478		$2,935	$10,543	Town or GC Competitive	ECI Audit
11 Fletcher Street (DPW)	Infrared Heaters	HVAC	Planned	12/15/2018		562					$534	$24,000		$1,250	$22,750	Town or GC Competitive	ECI Audit
11 Fletcher Street (DPW)	Furnace Replacement	HVAC	Planned	12/15/2018		674					$640	$7,800		$2,500	$5,300	Town or GC Competitive	ECI Audit
Police Station	Interior Lighting	Interior Lighting	Planned	12/15/2018	26,312						$4,681	$55,686		$18,245	$37,441	Town or GC Competitive	ECI Audit
Police Station	Air Handler Economizer	HVAC	Planned	12/15/2018	5,158						$774	$12,000			$12,000	Town or GC Competitive	ECI Audit
Police Station	Hot Water	Hot Water	Planned	12/15/2018	5,158						$774	$9,000		$500	$8,500	Town or GC Competitive	ECI Audit
Sewer Complex	Interior Lighting	Interior Lighting	Planned	12/15/2018	45,327						$5,984	$47,354		$12,030	$35,324	Town or GC Competitive	ECI Audit
Sewer Complex	Pump/Motor/Drive	Pump/Motor/Drive	Planned	12/15/2018	271,024						$40,653	$137,424		$49,900	$87,524	Town or GC Competitive	ECI Audit

Sewer Complex	Boiler Controller Replacement, Steam, North Building	HVAC	Planned	12/15/2018			905				$996	$6,600		$225	$6,375	Town or GC Competitive	ECI Audit
Sewer Complex	Steam Trap Replacement	HVAC	Planned	12/15/2019			1,086				$1,195	$4,200		$225	$3,975	Town or GC Competitive	ECI Audit
Sewer Complex	Air Handler VFD, South Building	Pump/Motor/Drive	Planned	12/15/2019	4,801						$720	$5,400		$1,600	$3,800	Town or GC Competitive	ECI Audit
Aldrich School Town Hall Annex	Radiator Valves	HVAC	Planned	12/15/2019		641					$609	$32,400		$500	$31,900	Town or GC Competitive	ECI Audit
Aldrich School Town Hall Annex	Radiator Air Vents	HVAC	Planned	12/15/2019		641					$609	$4,500		$250	$4,250	Town or GC Competitive	ECI Audit
Whitinsville Social Library	Circulator pump	Pump/Motor/Drive	Planned	12/15/2019	2,403						$360	$15,120			$15,120	Town or GC Competitive	ECI Audit
Northbridge High School	Interior Lighting	Interior Lighting	Planned	12/15/2019	395,580						$61,315	$511,733		$232,033	$279,700	Town or GC Competitive	ECI Audit
Northbridge Middle School	Interior Lighting	Interior Lighting	Planned	12/15/2019	263,564						$40,852	$362,870		$148,842	$214,028	Town or GC Competitive	ECI Audit
Northbridge Primary School	Interior Lighting	Interior Lighting	Planned	12/15/2019	85,908						$14,175	$116,623		$46,575	$70,048	Town or GC Competitive	ECI Audit
Northbridge Primary School	Building Control	Building Control	Planned	12/15/2019	8,162	3,422					$4,475	$38,400		$5,760	$32,640	Town or GC Competitive	ECI Audit
Northbridge Primary School	Pump/Motor/Drive	Pump/Motor/Drive	Planned	12/15/2019	17,692						$2,742	$9,324		$3,390	$5,934	Town or GC Competitive	ECI Audit
Northbridge Primary School	HVAC	HVAC	Planned	12/15/2019		9,582					$9,103	$128,287		$30,000	$98,287	Town or GC Competitive	ECI Audit
W. Edward Balmer School	Interior Lighting	Interior Lighting	Planned	6/15/2020	110,193						$18,182	$159,427		$69,473	$89,954	Town or GC Competitive	ECI Audit
W. Edward Balmer School	Hot Water	Hot Water	Planned	6/15/2020		4,078					$3,874	$32,805		$1,000	$31,805	Town or GC Competitive	ECI Audit
Streetlights	Exterior Lighting	Exterior Lighting	Planned	6/15/2020	121,807						$44,590	$277,383		$30,452	$246,931	Town or GC Competitive	ECI Audit
W. Edward Balmer School	HVAC	HVAC	Planned	12/15/2020		14,274					$13,560	$458,277		$30,000	$428,277	Town or GC Competitive	ECI Audit
Northbridge Middle School	HVAC	HVAC	Planned	12/15/2020		41,807					$39,717	$1,101,285		$45,000	$1,056,285	Town or GC Competitive	ECI Audit
Main Fire Station	Radiator Valves	HVAC	Planned	12/15/2020			1,565				$1,722	$118,800		$225	$118,575	Town or GC Competitive	ECI Audit
Main Fire Station	Interior Lighting	Interior Lighting	Planned	12/15/2020	12,669						$2,377	$21,353		$3,935	$17,418	Town or GC Competitive	ECI Audit
Main Fire Station	Boiler Controller Replacement, Steam	HVAC	Planned	12/15/2020			1,304				$1,434	$6,600		$225	$6,375	Town or GC Competitive	ECI Audit
Main Fire Station	Steam Trap Replacement	HVAC	Planned	12/15/2020			1,304				$1,434	$16,500		$225	$16,275	Town or GC Competitive	ECI Audit
			TOTAL Projected Savings		**1,691,185**	**107,595**	**7,605**	**0**	**1,393**	**2,450**	**$ 321,494**	**$ 4,297,223**	**$ 160,367**	**$ 842,714**	**$ 3,294,142**		
		TOTAL MMBtu SAVINGS	**18,100**		**5,770.32**	**10,759.50**	**1,057.10**	**0**	**172.732**	**340.55**							

APPENDIX C

Town of Northbridge

Energy Reduction Audits and Summary

Energy Conservation, Inc.
P.O. Box 726
Hanson, MA 02341
ECI-NE.com

Town of Northbridge

Energy improvements proposals summary

Location	ECM Description	ECM Type	Estimated Electric kWh Savings	Estimated Natural Gas Therm Savings	Estimated Oil Gallons Savings	Estimated annual $ savings	Total cost	Estimated Utility Incentive	Net cost to the Town of Northbridge	Simple payback period (in years)
Northbridge Primary School	Interior Lighting	Interior Lighting	85,908			$14,175	$116,623	$46,575	$70,048	4.94
Northbridge Primary School	Building Control	Building Control	8,162	3,422		$4,475	$38,400	$5,760	$32,640	7.29
Northbridge Primary School	Pump/Motor/Drive	Pump/Motor/Drive	17,692			$2,742	$9,324	$3,390	$5,934	2.16
Northbridge Primary School	HVAC	HVAC		9,582		$9,103	$128,287	$30,000	$98,287	10.80
W. Edward Balmer School	Interior Lighting	Interior Lighting	110,193			$18,182	$159,427	$69,473	$89,954	4.95
W. Edward Balmer School	Hot Water	Hot Water		4,078		$3,874	$32,805	$1,000	$31,805	8.21
W. Edward Balmer School	HVAC	HVAC		14,274		$13,560	$458,277	$30,000	$428,277	31.58
Northbridge High School	Interior Lighting	Interior Lighting	395,580			$61,315	$511,733	$232,033	$279,700	4.56
Aldrich School Town Hall Annex	Interior Lighting	Interior Lighting	13,060			$2,432	$32,947	$5,600	$27,347	11.24
Aldrich School Town Hall Annex	Hot Water	Hot Water	1,688			$253	$9,000	$500	$8,500	33.57
Aldrich School Town Hall Annex	Boiler Controller Replacement, Steam	Building Control		1,281		$1,217	$6,600	$225	$6,375	5.24
Aldrich School Town Hall Annex	Radiator Valves	HVAC		641		$609	$32,400	$500	$31,900	52.39
Aldrich School Town Hall Annex	Radiator Air Vents	HVAC		641		$609	$4,500	$250	$4,250	6.98
Northbridge Middle School	Interior Lighting	Interior Lighting	263,564			$40,852	$362,870	$148,842	$214,028	5.24
Northbridge Middle School	Building Control	Building Control	74,370	26,129		$35,978	$159,360	$23,904	$135,456	3.76
Northbridge Middle School	Pump/Motor/Drive	Pump/Motor/Drive	120,041			$22,808	$77,100	$27,900	$49,200	2.16
Northbridge Middle School	HVAC	HVAC		41,807		$39,717	$1,101,285	$45,000	$1,056,285	26.60
Veteran Services	Interior Lighting	Interior Lighting	2,595			$565	$4,903	$835	$4,068	7.20
Veteran Services	Boiler Controller Replacement, Steam	HVAC			194	$213	$5,640	$225	$5,415	25.37
Veteran Services	Programmable thermostats	HVAC			155	$171	$4,320		$4,320	25.34
Whitinsville Social Library	Interior Lighting	Interior Lighting	16,975			$6,259	$42,017	$7,990	$34,027	5.44
Whitinsville Social Library	Hot Water	Hot Water	3,845			$577	$6,600	$500	$6,100	10.58
Whitinsville Social Library	Boiler Controller Replacement, Steam	Building Control			420	$462	$6,600	$225	$6,375	13.80
Whitinsville Social Library	Circulator pump	Pump/Motor/Drive	2,403			$360	$15,120		$15,120	41.95
Whitinsville Social Library	Programmable thermostats	Building Control			336	$370	$4,320		$4,320	11.69
Whitinsville Social Library	Air Handler Economizer	HVAC	2,403			$360	$3,000		$3,000	8.32
Memorial Town Hall	Interior Lighting	Interior Lighting	21,725			$2,544	$42,431	$8,265	$34,166	13.43
Memorial Town Hall	HVAC	HVAC		2,252		$2,139	$78,000	$15,000	$63,000	29.45
Memorial Town Hall	Hot Water	Hot Water	3,836			$575	$7,200	$500	$6,700	11.64
Memorial Town Hall	Boiler Controller Replacement, Steam	Building Control		1,126		$1,070	$6,600	$225	$6,375	5.96
Memorial Town Hall	Steam Trap Replacement	HVAC		1,126		$1,070	$8,100	$225	$7,875	7.36
Northbridge Senior Center	Interior Lighting	Interior Lighting	14,736			$2,841	$30,463	$7,155	$23,308	8.20
School Administration	Interior Lighting	Interior Lighting	13,067			$2,378	$18,073	$6,145	$11,928	5.02
11 Fletcher Street (DPW)	Interior Lighting	Interior Lighting	10,051			$1,813	$13,478	$2,935	$10,543	5.82
11 Fletcher Street (DPW)	Infrared Heaters	HVAC		562		$534	$24,000	$1,250	$22,750	42.61
11 Fletcher Street (DPW)	Furnace Replacement	HVAC		674		$640	$7,800	$2,500	$5,300	8.28
Main Fire Station	Interior Lighting	Interior Lighting	12,669			$2,377	$21,353	$3,935	$17,418	7.33
Main Fire Station	Boiler Controller Replacement, Steam	HVAC			1,304	$1,434	$6,600	$225	$6,375	4.44
Main Fire Station	Radiator Valves	HVAC			1,565	$1,722	$118,800	$225	$118,575	68.88
Main Fire Station	Steam Trap Replacement	HVAC			1,304	$1,434	$16,500	$225	$16,275	11.35
Police Station	Interior Lighting	Interior Lighting	26,312			$4,681	$55,686	$18,245	$37,441	8.00
Police Station	Air Handler Economizer	HVAC	5,158			$774	$12,000		$12,000	15.51
Police Station	Hot Water	Hot Water	5,158			$774	$9,000	$500	$8,500	10.99
Streetlights	Exterior Lighting	Exterior Lighting	121,807			$44,590	$277,383	$30,452	$246,931	5.54
Sewer Complex	Interior Lighting	Interior Lighting	45,327			$5,984	$47,354	$12,030	$35,324	5.90
Sewer Complex	Pump/Motor/Drive	Pump/Motor/Drive	271,024			$40,653	$137,424	$49,900	$87,524	2.15
Sewer Complex	Boiler Controller Replacement, Steam, North Building	HVAC			905	$996	$6,600	$225	$6,375	6.40
Sewer Complex	Steam Trap Replacement	HVAC			1,086	$1,195	$4,200	$225	$3,975	3.33
Sewer Complex	Air Handler VFD, South Building	Pump/Motor/Drive	4,801			$720	$5,400	$1,600	$3,800	5.28
Totals	**Air Handler VFD, South Building**		**1,674,150**	**107,595**	**7,269**	**$ 404,176**	**$ 4,287,903**	**$ 842,714**	**$ 3,445,189**	**8.52**

Town of Northbridge

Energy Reduction Plan

Energy Conservation Measures (ECM)

Primary School

ECM1 – Lighting

Existing fluorescent lighting throughout the Northbridge Primary School interior consists mainly of recessed, 3-lamp troffers in classrooms and office areas. Surface wrap-style systems are also located throughout the building in back-of-the-house areas and are intermingled with recessed troffers in hallways. The hallways also feature natural light skylights. Proposed new Light Emitting Diode (LED) lighting systems in hallways will work with an active dimming system to facilitate the light emitted from the skylights to dim the artificial lighting to maintain a proper footcandle level in the halls.

Exterior lighting at the School features metal halide high intensity discharge lamped systems proposed to be replaced with new LED systems one-for-one. A summary spreadsheet and supporting product cutsheets are attached in a following appendix.

Total measure cost:	$ 116,623
Estimated utility incentive:	$ 46,525
Net Cost:	$ 70,048
Projected Annual Energy Savings:	85,908 kWh
Projected Annual Cost Savings:	$ 14,175
Simple Payback Period:	4.94 years

Primary School (continued)

ECM2 – Building Control – Wireless Addressable Thermostats

Replace the existing pneumatic thermostats with a wireless building control system. The Wireless Pneumatic Thermostat (WPT) system will allow control and scheduling wherever the thermostats are installed without having to rewire every room as well as retrofit each unit with digital valves and dampers. It can also be done to refit the building in zones instead of the entire building at once. The project is also future proof, as it has capabilities to interface with almost any Building Management System giving the opportunity to integrate with future systems.

The proposed improvements will include replacing the thermostats in the Northbridge Primary School with a new WPT System. This will include installation of 40 new wireless pneumatic thermostats and all equipment; setting up and programming the user interface; calibrating all thermostats; and providing training for staff on new system.

Total measure cost:	$ 38,400
Estimated utility incentive:	$ 5,760
Net Cost:	$ 32,640
Projected Annual Electric Energy Savings:	8,162 kWh
Projected Annual Natural Gas Savings:	3,422 Therms
Projected Annual Cost Savings:	$ 4,475
Simple Payback Period:	7.29 years

ECM 3 – Circulator Pump VFDs

Replace all existing drives on hot water circulating pumps which exceed 1.5 HP. The existing motors will be removed and replaced with high efficiency motors which will be equipped with variable frequency drives (VFD). Each VFD will be provided with a Honeywell T775 controller and differential pressures sensors. The proposed improvements include the replacement of (2) 3 HP motors, including all equipment.

Total measure cost:	$ 9,324
Estimated utility incentive:	$ 3,390
Net Cost:	$ 5,934
Projected Annual Energy Savings:	17,692 kWh
Projected Annual Cost Savings:	$ 2,742
Simple Payback Period:	2.16 years

Primary School (continued)

ECM4 – HVAC – Boiler replacement

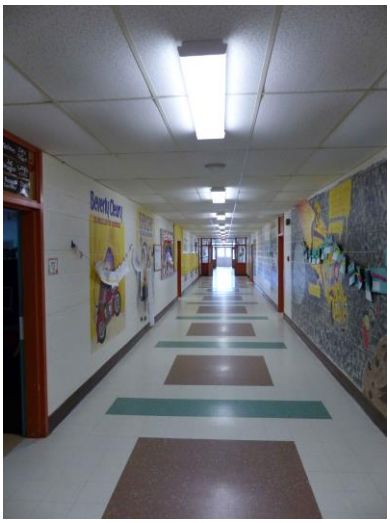
The existing boiler system at the school is inefficient and is proposed to be replaced with a new high-efficiency condensing boiler system.

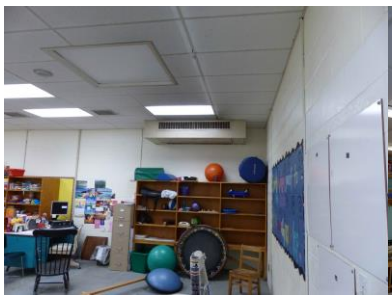
Total measure cost:	$ 128,287
Estimated utility incentive:	$ 30,000
Net Cost:	$ 98,287
Projected Annual Energy Savings:	9,582 therms
Projected Annual Cost Savings:	$ 9,103
Simple Payback Period:	10.80 years

W. Edward Balmer School

ECM1 - Lighting

The W. Edward Balmer School existing interior fluorescent lighting consists of a mix of recessed 2'x4' troffers and surface mount wrap-style fixtures located throughout the building. These are all proposed to be replaced with new LED systems of the same fixture type, one-for-one.





W. Edward Balmer School (continued)

ECM1 – Lighting (continued)

Exterior lighting at the School consists of metal halide lamped and high pressure sodium lamped floodlights and canopy-mount systems. The main parking lot is illuminated by utility rental pole-mounted cobra head systems. All systems are proposed to be replaced with new LED systems.



Total measure cost:	$ 159,427
Estimated utility incentive:	$ 69,473
Net Cost:	$ 89,954
Projected Annual Energy Savings:	110,193 kWh
Projected Annual Cost Savings:	$ 18,182
Simple Payback Period:	4.94 years

ECM2 – Hot Water

Replacement of the existing 1,235 gallon hot water tank with a new high efficiency hot water heater is proposed. The existing hot water heater is extremely oversized for the size and use of the building and will be replaced with a 400K BTU high efficiency hot water heater, which is an appropriately sized water heater to the size and use of the building. Proposed improvements will include installation of a new 400K BTU high efficiency hot water heater. This will include all necessary piping, equipment, and set up.

Total measure cost:	$ 32,805
Estimated utility incentive:	$ 1,000
Net Cost:	$ 31,805
Projected Annual Energy Savings:	4,078 Therms
Projected Annual Cost Savings:	$ 3,874
Simple Payback Period:	8.21 years

W. Edward Balmer School (continued)

ECM3 – HVAC – Boiler replacement

The existing boiler system at the school is antiquated and inefficient and is proposed to be replaced with a new high-efficiency condensing boiler system.

Total measure cost:	$ 458,277
Estimated utility incentive:	$ 30,000
Net Cost:	$ 428,277
Projected Annual Energy Savings:	14,274 therms
Projected Annual Cost Savings:	$ 13,560
Simple Payback Period:	31.58 years

Northbridge High School

ECM 1 – Lighting

Interior fluorescent lighting at the newer High School consists of suspended rows of indirect systems throughout the classrooms. Office areas and halls are illuminated with recessed 2'x2' systems. All systems throughout the School are proposed to be changed to new LED systems.

Exterior lighting at the High School consists of metal halide lamped wall packs and pole mounted decorative systems. Replacement of these fixtures with new LED systems is proposed.

Total measure cost:	$ 511,733
Estimated utility incentive:	$ 232,033
Net Cost:	$ 279,700
Projected Annual Energy Savings:	395,580 kWh
Projected Annual Cost Savings:	$ 61,315
Simple Payback Period:	4.56 years

Aldrich School Town Hall Annex

ECM1 - Lighting

The Aldrich School Town Hall Annex interior lighting consists of mostly fluorescent lamped suspended "ice cube tray" baffle fixtures in old classrooms and surface mount strips in hallways, all proposed to be replaced with new LED wrap systems.


Exterior lighting is comprised of metal halide lamped wall packs and floodlights. These are proposed to be replaced with new LED systems.


Total measure cost:	$ 32,947
Estimated utility incentive:	$ 5,600
Net Cost:	$ 27,347
Projected Annual Energy Savings:	13,060 kWh
Projected Annual Cost Savings:	$ 2,432
Simple Payback Period:	11.24 years

Aldrich School Town Hall Annex (continued)

ECM2 – Hot Water

Replacement of the existing hot water heater with a hybrid electric heat pump hot water heater is proposed. Hybrid water heaters function extremely efficiently by capturing the heat from the heated air, which is a product of the heat loss from the tank and heating process, and using the heat to supplement heating the water. The proposed scope of work will include the installation of a new hybrid electric heat pump 80 gallon hot water heater, including all piping and removal of the existing hot water heater.

Total measure cost:	$ 9,000
Estimated utility incentive:	$ 500
Net Cost:	$ 8,500
Projected Annual Energy Savings:	1,688 kWh
Projected Annual Cost Savings:	$ 253
Simple Payback Period:	33.60 years

ECM 3 – Building Control – Boiler Controller Replacement - Steam

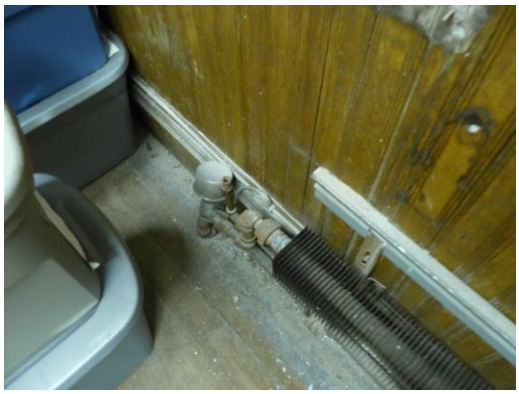
Replace the boiler controller with a Tekmar Steam Boiler Controller with Outdoor Reset. The controller uses sensors to measure the outdoor air temperature then changes the heating system run time to compensate for the building heat loss. The controller also can be programmed with a warm weather shutdown which is an efficient and effective way to shut off the heating system in warm weather. The proposed improvements will include replacing the existing boiler controller with a Tekmar Steam Boiler Controller, including all necessary wiring and programming.

Total measure cost:	$ 6,600
Estimated utility incentive:	$ 225
Net Cost:	$ 6,375
Projected Annual Energy Savings:	1,281 Therms
Projected Annual Cost Savings:	$ 1,217
Simple Payback Period:	5.24 years

Aldrich School Town Hall Annex (continued)

ECM4 – HVAC – Replace Radiator Valves

Install radiator valves on the existing radiators. Radiator valves regulate the steam flow through each individual radiator by utilizing thermostats and allowing for zoned temperature controls. Proposed improvements include the installation of fifteen (15) radiator valves on each radiator, including all necessary controls, piping, and wiring.



Total measure cost:	$ 32,400
Estimated utility incentive:	$ 500
Net Cost:	$ 31,900
Projected Annual Energy Savings:	641 Therms
Projected Annual Cost Savings:	$ 609
Simple Payback Period:	52.38 years

ECM5 – HVAC – Radiator Air Valves

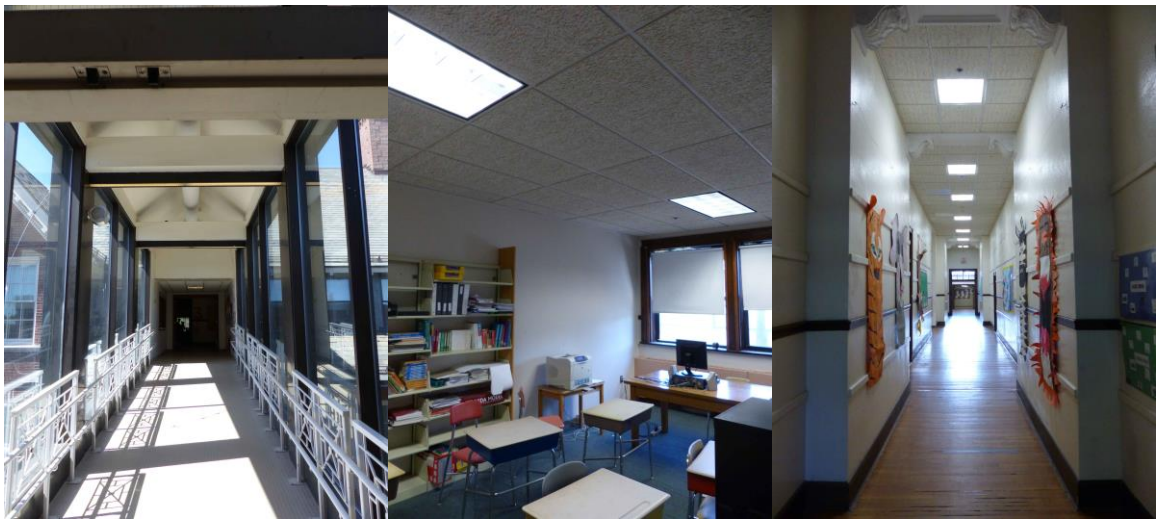
Replace existing air vents in the heating system. Air vents are automatic valves which regulate the flow of steam through the system. As the valves age they become prone to failure which can either result in overheating of the building or steam leaks, which can result in significant steam loss from the system. Replacing these valves can help to ensure that the existing system functions effectively and efficiently. The proposed scope of work will include the replacement of all fifteen (15) air vents.

Total measure cost:	$ 4,500
Estimated utility incentive:	$ 250
Net Cost:	$ 4,250
Projected Annual Energy Savings:	641 Therms
Projected Annual Cost Savings:	$ 609
Simple Payback Period:	6.98 years

Northbridge Middle School

ECM1 - Lighting

The Northbridge Middle School interior lighting is a mix of a variety of fixture types, relative to different eras of construction. There are many recessed 2'x2' and 2'x4' troffers throughout hallways and some office areas. All fixtures are proposed to be replaced with new LED troffers and surface wraps.



Exterior lighting is made up of metal halide lamped floodlights. These fixtures are proposed to be replaced with new LED floodlights.

Total measure cost:	$ 362,780
Estimated utility incentive:	$ 148,842
Net Cost:	$ 214,028
Projected Annual Energy Savings:	263,564 kWh
Projected Annual Cost Savings:	$ 40,852
Simple Payback Period:	6.45 years

Northbridge Middle School (continued)

ECM2 – Building Control – Thermostat Replacement with Wireless Digital Control

Overview:

Replace the existing pneumatic thermostats with a wireless building control system. The Wireless Pneumatic Thermostat (WPT) system will give you control and scheduling wherever the thermostats are installed without having to rewire every room as well as retrofit each unit with digital valves and dampers. It can also be done to refit the building in zones instead of the entire building at once. The project is also future proof as it has capabilities to interface with almost any Building Management System giving the opportunity to integrate with future systems.

Scope of Work:

The scope of work will include replacing the thermostats with a new WPT System. This will include installation of one hundred sixty six (166) new wireless pneumatic thermostats and all equipment; setting up and programming the user interface; calibrating all thermostats; and providing training for staff on new system.

Total measure cost:	$ 159,360
Estimated utility incentive:	$ 23,904
Net Cost:	$ 135,456
Projected Annual Energy Savings:	263,564 kWh
Projected Annual Cost Savings:	$ 35,978
Simple Payback Period:	3.76 years

ECM3 – Pump/Motor/Drive

Replacement of all existing motors on hot water circulating pumps which exceed 1.5 HP, including replacement of (4) 1-1/2 HP, (2) 2 HP, (6) 3 HP, and (2) 7.5 HP motors. The existing motors will be removed and replaced with high efficiency motors which will be equipped with variable frequency drives (VFD). Each VFD will be provided with a Honeywell T775 controller and differential pressures sensors.

Total measure cost:	$ 77,100
Estimated utility incentive:	$ 27,900
Net Cost:	$ 49,200
Projected Annual Energy Savings:	120,041 kWh
Projected Annual Cost Savings:	$ 22,808
Simple Payback Period:	2.16 years

Northbridge Middle School (continued)

ECM4 – HVAC – Boiler Replacement

The existing boiler system at the school is antiquated and inefficient and is proposed to be replaced with a new high-efficiency condensing boiler system.

Total measure cost:	$1,101,285
Estimated utility incentive:	$ 45,000
Net Cost:	$1,056,285
Projected Annual Energy Savings:	41,807 Therms
Projected Annual Cost Savings:	$ 39,717
Simple Payback Period:	26.60 years

Veteran Services

ECM1 – Lighting

The Veteran Services building interior lighting is mostly recessed 2'x4' fluorescent lamped troffers, along with decorative suspended systems with screw-in fluorescent lamps. LED replacements of all existing fixtures are proposed throughout the building.

Total measure cost:	$ 4,903
Estimated utility incentive:	$ 835
Net Cost:	$ 4,068
Projected Annual Energy Savings:	2,595 kWh
Projected Annual Cost Savings:	$ 565
Simple Payback Period:	7.20 years

ECM2 – HVAC – Boiler Controller Replacement, Steam

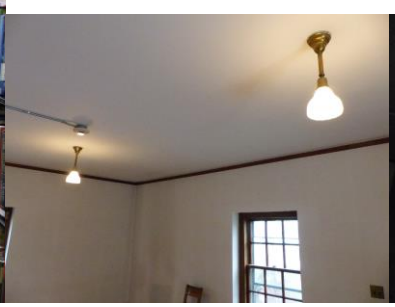
Proposed replacement of the boiler controller with a Tekmar Steam Boiler Controller with Outdoor Reset. The controller uses sensors to measure the outdoor air temperature then changes the heating system run time to compensate for the building heat loss. The controller also can be programmed with a warm weather shutdown which is an efficient and effective way to shut off the heating system in warm weather. These improvements will include replacing the existing boiler controller with a Tekmar Steam Boiler Controller, including all necessary wiring and programming.

Total measure cost:	$ 5,604
Estimated utility incentive:	$ 225
Net Cost:	$ 5,415
Projected Annual Energy Savings:	194 Therms
Projected Annual Cost Savings:	$ 213
Simple Payback Period:	25.42 years

Whitinsville Social Library

ECM1 – Lighting

Proposed interior lighting improvements include the replacement of existing fluorescent lamped 4'wrap systems throughout the building with new LED wrap systems. Decorative screw-in lamped systems are proposed to be retrofit with new LED screw-in lamps. Surface mount circular fluorescent lamped systems are proposed to be replaced with new LED decorative half-moon systems. The aesthetics of the proposed new lighting improvements will also be dramatically improved with the installation of the proposed lighting systems.


Proposed exterior lighting improvements include the replacement of metal halide lamped wall pack systems with new LED wall pack systems.


Total measure cost:	$ 42,017
Estimated utility incentive:	$ 7,990
Net Cost:	$ 34,027
Projected Annual Energy Savings:	16,975 kWh
Projected Annual Cost Savings:	$ 6,259
Simple Payback Period:	5.44 years

Whitinsville Social Library

ECM2 – Hot Water

Recommendation to replace the existing hot water heater with a hybrid electric heat pump hot water heater. Hybrid water heaters function extremely efficiently by capturing the heat from the heated air, which is a product of the heat loss from the tank and heating process, and using the heat to supplement heating the water. The scope of work will include the installation of a new fifty (50) gallon hybrid electric heat pump hot water heater, including all piping and removal of the existing hot water heater.

Total measure cost:	$ 6,600
Estimated utility incentive:	$ 500
Net Cost:	$ 6,100
Projected Annual Energy Savings:	3,845 kWh
Projected Annual Cost Savings:	$ 577
Simple Payback Period:	10.57 years

ECM3 – HVAC – Boiler Controller Replacement, Steam

Proposed replacement of the boiler controller with a Tekmar Steam Boiler Controller with Outdoor Reset. The controller uses sensors to measure the outdoor air temperature then changes the heating system run time to compensate for the building heat loss. The controller also can be programmed with a warm weather shutdown which is an efficient and effective way to shut off the heating system in warm weather. These improvements will include replacing the existing boiler controller with a Tekmar Steam Boiler Controller, including all necessary wiring and programming.

Total measure cost:	$ 6,600
Estimated utility incentive:	$ 225
Net Cost:	$ 6,375
Projected Annual Energy Savings:	420 gallons (oil)
Projected Annual Cost Savings:	$ 462
Simple Payback Period:	13.80 years

Whitinsville Social Library (continued)

ECM4 – HVAC – Circulator Pump

Proposed replacement of the existing circulator pumps on the heating system with high efficiency pumps with variable frequency drives. The pump is capable to automatically adjusting in order to work at optimum efficiency based on the immediate needs of the system. Improvements include replacing the existing circulator pumps with high efficiency circulator pumps which are equipped with self-adjusting variable frequency drives. The scope of work will include the installation of the pumps including all plumbing and electrical. The scope will include the installation of two Grundfos Magna 3 pumps and two Grunfos Alpha pumps.

Total measure cost:	$ 15,120
Projected Annual Energy Savings:	2,403 kWh
Projected Annual Cost Savings:	$ 360
Simple Payback Period:	42.00 years

ECM5 – Building Control – Programmable Thermostats

Replace the existing conventional thermostats with programmable thermostats. Programmable thermostats are beneficial as they allow you to set a program to raise and lower the heat at times that the building is occupied and unoccupied.

Scope of Work:

Replace the existing thermostat with a programmable thermostat. The scope of work will include installation and programming of the new thermostat.

Total measure cost:	$ 4,320
Projected Annual Energy Savings:	336 Gallons (oil)
Projected Annual Cost Savings:	$ 370
Simple Payback Period:	11.68 years

Whitinsville Social Library (continued)

ECM6 – HVAC – Air Handler Economizer

Proposed improvements include the installation of economizers on the existing air handlers.

Scope of Work:

The scope of work would be to install new economizers on all the fans in each rooftop air handler. This would include the installation and all wiring.

Total measure cost:	$ 3,000
Projected Annual Energy Savings:	2,403 kWh
Projected Annual Cost Savings:	$ 360
Simple Payback Period:	8.33 years

Memorial Town Hall

ECM1 – Lighting

Interior fluorescent lamped lighting throughout the Memorial Town Hall is a majority of 2'x4' recessed troffers with some suspended old wrap-style fixtures in areas with plaster ceilings. All linear fluorescent lamped systems are proposed to be replaced with new LED systems of the same fixture type. The retrofit of the existing suspended decorative glass fixtures with new LED lamps is also proposed, including the large meeting hall upstairs.

Exterior lighting consists of small decorative wall packs and some metal halide lamped floodlights. New LED wallpacks and floodlights are proposed to replace the existing systems one-for-one.

Total measure cost:	$ 42,431
Estimated utility incentive:	$ 8,265
Net Cost:	$ 34,166
Projected Annual Energy Savings:	21,725 kWh
Projected Annual Cost Savings:	$ 2,544
Simple Payback Period:	13.43 years

Memorial Town Hall (continued)

ECM2 – HVAC – Boiler Replacement

The existing boiler system at the Memorial Town Hall is antiquated and inefficient and is proposed to be replaced with a new high-efficiency condensing boiler system.

Total measure cost:	$ 78,000
Estimated utility incentive:	$ 15,000
Net Cost:	$ 63,000
Projected Annual Energy Savings:	2,252 Therms
Projected Annual Cost Savings:	$ 2,139
Simple Payback Period:	29.45 years

Memorial Town Hall (continued)

ECM3 – Hot Water

Replacement of the existing hot water heater with a sixty (60) gallon hybrid electric heat pump hot water heater is proposed. Hybrid water heaters function extremely efficiently by capturing the heat from the heated air, which is a product of the heat loss from the tank and heating process, and using the heat to supplement heating the water. The scope of work will include the installation of a new hybrid electric heat pump hot water heater, including all piping and removal of the existing hot water heater.

Total measure cost:	$ 7,200
Estimated utility incentive:	$ 500
Net Cost:	$ 6,700
Projected Annual Energy Savings:	3,836 kWh
Projected Annual Cost Savings:	$ 575
Simple Payback Period:	11.65 years

Memorial Town Hall (continued)

ECM4 – HVAC – Boiler Controller Replacement, Steam

Proposed replacement of the boiler controller with a Tekmar Steam Boiler Controller with Outdoor Reset. The controller uses sensors to measure the outdoor air temperature then changes the heating system run time to compensate for the building heat loss. The controller also can be programmed with a warm weather shutdown which is an efficient and effective way to shut off the heating system in warm weather. These improvements will include replacing the existing boiler controller with a Tekmar Steam Boiler Controller, including all necessary wiring and programming.

Total measure cost:	$ 6,600
Estimated utility incentive:	$ 225
Net Cost:	$ 6,375
Projected Annual Energy Savings:	1,126 Therms
Projected Annual Cost Savings:	$ 1,070
Simple Payback Period:	5.95 years

ECM5 – HVAC – Steam Trap Replacements

Overview:

Replacement of the existing steams traps in the heating system is recommended. Steam traps are automatic valves which regulate the flow of steam through the system. As the valves age they become prone to failure which can either result in overheating of the building or steam leaks, which can result in significant steam loss from the system. Replacing these valves can help to ensure that the existing system functions effectively and efficiently.

Scope of Work:

The scope of work will include the replacement of all existing twenty-seven (27) steam traps.

Total measure cost:	$ 8,100
Estimated utility incentive:	$ 225
Net Cost:	$ 7,875
Projected Annual Energy Savings:	1,126 Therms
Projected Annual Cost Savings:	$ 1,070
Simple Payback Period:	7.36 years

Senior Center

ECM1 – Lighting

Fluorescent interior lighting at the Senior Center consists of recessed 2'x4' troffers and suspended "ice-cube tray" baffled systems and 8' strips. All are proposed to be replaced, one-for-one, with new LED lighting systems.

Total measure cost:	$ 30,463
Estimated utility incentive:	$ 7,155
Net Cost:	$ 23,308
Projected Annual Energy Savings:	14,736 kWh
Projected Annual Cost Savings:	$ 2,841
Simple Payback Period:	8.20 years

School Administration Building

ECM1 – Lighting

Existing fluorescent lamped suspended and surface wrap fixtures are proposed to be replaced with new LED wrap systems. Compact fluorescent lamped drums are proposed to be replaced with new LED decorative drums. New LED 2'x4' troffers are proposed to replace existing fluorescent lamped fixtures of the same type.



Total measure cost:	$ 18,073
Estimated utility incentive:	$ 6,145
Net Cost:	$ 11,928
Projected Annual Energy Savings:	13,067 kWh
Projected Annual Cost Savings:	$ 2,378
Simple Payback Period:	5.02 years

11 Fletcher Street (DPW)

ECM1 – Lighting

Lighting at the 11 Fletcher Street DPW Building garage consists of metal halide low bay systems proposed to be replaced with new LED high bay systems. The garage is also illuminated by fluorescent lamped 8' strip fixtures which are proposed to be retrofit to LED kits. Office areas have fluorescent recessed 2'x4' troffers that are proposed to be replaced with new LED recessed troffer systems.

Exterior lighting features metal halide and high pressure sodium lamped wall packs and floodlights, all proposed to be replaced with new LED systems of the same fixture type.

Total measure cost:	$ 13,478
Estimated utility incentive:	$ 2,935
Net Cost:	$ 10,543
Projected Annual Energy Savings:	10,051 kWh
Projected Annual Cost Savings:	$ 1,813
Simple Payback Period:	5.82 years

11 Fletcher Street (DPW)

ECM2 – HVAC - Infrared Heating

Install new infrared heaters in the garage bays. Infrared heaters function by using radiant heat which heat objects and indirectly heat the air, therefore work effectively in spaces such as garages which have lower ambient temperatures or may be subject to sudden decreases in temperature, such as when a garage door opens. They are capable of maintaining a comfortable environment with lower air temperatures.

Scope of work:

Replace existing gas unit heaters with new infrared heating units. The scope of work will include all necessary piping and wiring. This would include installation of two 60,000 BTU infrared heaters in the West Garage Bay, and four in the East Garage Bay.

Total measure cost:	$ 24,000
Estimated utility incentive:	$ 1,250
Net Cost:	$ 22,750
Projected Annual Energy Savings:	562 Therms
Projected Annual Cost Savings:	$ 534
Simple Payback Period:	42.61 years

ECM3 – HVAC – Furnace Replacement

Replace the existing furnace servicing the office area with a new high efficiency gas furnace. The new furnace would be provided with a modulating gas valves which automatically adjusts the gas flow allowing for optimum efficiency and quieter low fire settings. The fan would be provided with a variable frequency drive which permits it to adjust speed based on heating needs and operate more efficiently.

Scope of Work:
Replace the existing furnace with a high efficiency 120 BTU gas furnace. This will include all wiring and piping necessary.

Total measure cost:	$ 24,000
Estimated utility incentive:	$ 1,250
Net Cost:	$ 22,750
Projected Annual Energy Savings:	562 Therms
Projected Annual Cost Savings:	$ 534
Simple Payback Period:	42.61 years

Main Fire Station

ECM1 – Lighting

Interior lighting at the Main Fire Station consists of 8’ fluorescent “ice cube tray” baffle and 8’ & 4’ industrial style fixtures in the engine bay areas and suspended fluorescent systems throughout the rest of the building – all proposed to be replaced with new linear LED systems.

Exterior lighting consists of a metal halide lamped wall pack system recommended for replacement with a new LED wall pack.

Total measure cost:	$ 21,353
Estimated utility incentive:	$ 3,935
Net Cost:	$ 17,418
Projected Annual Energy Savings:	12,669 kWh
Projected Annual Cost Savings:	$ 2,377
Simple Payback Period:	7.33 years

Main Fire Station (continued)

ECM2 – HVAC – Steam Trap Replacement

Replace existing steams traps in the existing heating system. Steam traps are automatic valves which regulate the flow of steam through the system. As the valves age they become prone to failure which can either result in overheating of the building or steam leaks, which can result in significant steam loss from the system. Replacing these valves can help to ensure that the existing system functions effectively and efficiently.

Scope of Work:

The scope of work will include the replacement of all existing fifty-five (55) steam traps.

Total measure cost:	$ 16,500
Estimated utility incentive:	$ 225
Net Cost:	$ 16,275
Projected Annual Energy Savings: 1,304 Gallons (Oil)	
Projected Annual Cost Savings:	$ 1,434
Simple Payback Period:	11.35 years

Police Station

ECM1 – Lighting

The interior lighting at the Police Station consists mainly of fluorescent lamped 2'x2' & 2'x4' recessed systems throughout the building office areas, proposed to be replaced with new LED systems. Prison cells have tamper-proof, corner mounted fluorescent systems that are proposed to be retrofit with new LED systems. Decorative wall mounted, incandescent lamped systems are located at entries. These fixtures are proposed to be replaced with new decorative LED wall mount systems. All other fluorescent systems throughout the building are proposed to be replaced with new LED linear systems of the same fixture type.

Exterior lighting at the Police Station is made up of pole mounted metal halide lamped decorative fixtures, proposed to be retrofit to LED lamps. Metal halide lamped high-mount pole fixture heads are proposed to be replaced with new LED fixture heads. Metal halide lamped wall pack systems are proposed to be replaced with new LED fixtures of the same type.

Total measure cost:	$ 55,686
Estimated utility incentive:	$ 18,245
Net Cost:	$ 37,441
Projected Annual Energy Savings:	26,312 kWh
Projected Annual Cost Savings:	$ 4,681
Simple Payback Period:	8.00 years

Police Station (continued)

ECM2 – HVAC – Air Handler Economizer

Overview:

Install economizers on the existing air handlers.

Scope of Work:

The scope of work would be to install new economizers on all the fans in each rooftop air handler. This includes the installation and all wiring.

Total measure cost:	$ 12,000
Projected Annual Energy Savings:	5,158 kWh
Projected Annual Cost Savings:	$ 774
Simple Payback Period:	15.51 years

ECM3 – Hot Water

Overview:

Replace the existing hot water heater with hybrid electric heat pump hot water heater. Hybrid water heaters function extremely efficiency by capturing the heat from the heated air, which is a product of the heat loss from the tank and heating process, and using the heat to supplement heating the water.

Scope of work:

The scope of work will include the installation of a new eighty (80) gallon hybrid electric heat pump hot water heater, including all piping and removal of the existing hot water heater.

Total measure cost:	$ 9,000
Estimated utility incentive:	$ 500
Net Cost:	$ 8,500
Projected Annual Energy Savings:	5,158 kWh
Projected Annual Cost Savings:	$ 774
Simple Payback Period:	10.98 years

Street Lighting

Existing street lighting throughout Town is comprised of a mix of utility-owned, predominantly 50 Watt high pressure sodium lamped cobra head lighting, with higher wattage systems located in the center of Town. There are also some metal halide lamp decorative systems in the center of Town. It is proposed that the Town purchase the street lighting from the utility in order to save monthly charges currently charged by the utility and install LED street lights throughout Town. Operational costs associated with the proposed new LED lighting are minimal in comparison to the current monthly charge paid to the utility.

Total measure cost:	$ 277,383
Estimated utility incentive:	$ 30,452
Net Cost:	$ 246,931
Projected Annual Energy Savings:	121,807 kWh
Projected Annual Cost Savings:	$ 44,590
Simple Payback Period:	5.54 years

Sewer Complex

ECM1 – Lighting

The Sewer Complex interior lighting consists of surface mount cans mounted to the ceiling in the concrete form ceiling squares lamped with incandescent lamps. These fixtures are proposed to be retrofit with new LED lamps. Office areas are illuminated with fluorescent lamp recessed 2'x2' & 2'x4' systems, proposed to be replaced with new LED systems of the same fixture type. Existing fluorescent vaportight fixtures throughout the shop areas are proposed to be retrofit with new LED lamps and drivers. All other linear fluorescent systems throughout the building are proposed to be replaced with new LED lighting systems of the same fixture types.



Exterior lighting at the complex features metal halide lamped wall packs & pole mounted floodlights, proposed to be changed to new LED fixtures. Explosion-proof fixtures are proposed to be retrofit with new LED lamps.



Total measure cost:	$ 47,354
Estimated utility incentive:	$ 12,030
Net Cost:	$ 35,324
Projected Annual Energy Savings:	45,327 kWh
Projected Annual Cost Savings:	$ 5,984
Simple Payback Period:	5.90 years

Sewer Complex (continued)

ECM2 – HVAC – Boiler Controller Replacement, Steam (North Building)

Proposed replacement of the boiler controller with a Tekmar Steam Boiler Controller with Outdoor Reset. The controller uses sensors to measure the outdoor air temperature then changes the heating system run time to compensate for the building heat loss. The controller also can be programmed with a warm weather shutdown which is an efficient and effective way to shut off the heating system in warm weather. These improvements will include replacing the existing boiler controller with a Tekmar Steam Boiler Controller, including all necessary wiring and programming.

Total measure cost:	$ 6,600
Estimated utility incentive:	$ 225
Net Cost:	$ 6,375
Projected Annual Energy Savings:	905 gallons (oil)
Projected Annual Cost Savings:	$ 996
Simple Payback Period:	6.40 years

ECM3 – HVAC – Steam Trap Replacement (North Building)

Replace existing steams traps in the existing heating system. Steam traps are automatic valves which regulate the flow of steam through the system. As the valves age they become prone to failure which can either result in overheating of the building or steam leaks, which can result in significant steam loss from the system. Replacing these valves can help to ensure that the existing system functions effectively and efficiently.

Scope of Work:

The scope of work will include the replacement of all existing fifty-five (55) steam traps.

Total measure cost:	$ 4,200
Estimated utility incentive:	$ 225
Net Cost:	$ 3,975
Projected Annual Energy Savings:	1,086 Gallons (Oil)
Projected Annual Cost Savings:	$ 1,195
Simple Payback Period:	3.33 years

Sewer Complex (continued)

ECM4 – HVAC – Air Handler VFD (South Building)

Replace the motor on the existing air handler in the boiler room with a high efficiency motor with a variable frequency drive (VFD). The VFD allows the fan to operate at speeds less than 100 percent, and automatically adjusts the speed of the fan based on the system requirements.
Scope of Work:
Replace the existing motor on the air handler with a high efficiency motor equipped with a variable frequency drive and differential pressure sensors. This will include all parts and labor.

Total measure cost:	$ 5,400
Estimated utility incentive:	$ 1,600
Net Cost:	$ 3,800
Projected Annual Energy Savings:	4,801 kWh
Projected Annual Cost Savings:	$ 720
Simple Payback Period:	5.28 years

Town of Northbridge Lighting Audit Summaries

Energy Conservation, Inc.
P.O. Box 726
Hanson, MA 02341
ECI-NE.com

Energy Saving Lighting Improvements for:
Northbridge Primary School
30 Cross St
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
s41 - S4R	1 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	106	48" Channel 2' Light bar 12.5w	106	3,302
2x43 - 2x4R	3 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	285	Retrofit 2x4 Kit 15w	285	46,006
1x42 - 1x4R	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	10	Retrofit 1x2 Kit 8w	10	1,133
s41t - I4R	1 Lamp 4 Ft T12 40W Standard Lamp - Standard Ballast	3	48" Channel 2' Light bar 12.5w	3	374
br40 - BR40	75 Watt Incandescent Lamp	27	BR40 Lamp 13w	27	4,741
FL250wMH - FloodM	250 Watt Metal Halide	1	Flood 62w	1	1,021
Area400wMH-T4M - AreaL	400 Watt Metal Halide CWA Ballast	2	Flood 137w	2	2,786
WP150wMH - WallPackM	150 Watt Metal Halide	13	Wall Pack Full Cutoff 67w	13	7,004
jja - A-Lamp	65 Watt Incandescent Lamp	1	A19 Lamp 7w	1	164
HB2x43T5 - HighBayS	3 Lamp 4 Ft 54W T5 High Output Lamp - Electronic Ballast	16	High Bay 88w 4k	16	4,033
s82 - I8R	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	2	96" Channel 4' Light bar 25w	2	130
w42 - WrapN4	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	19	Wrap 4ft 12w	19	1,937
DrumA - Drum11	60 Watt Incandescent Lamp	2	Drum 11in 12w	2	272
s42 - I4R	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	2	48" Channel 2' Light bar 12.5w	2	198
w84 - WrapN8	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	57	8' Wrap 36W	57	9,363
ACFL - A-Lamp	1 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	1	A19 Lamp 7w	1	59
DRUMT12 - DSUR	2 Lamp 32-40 Watt Circline Compact Fluorescent Hard Wired Fixture - Standard Ballast	2	Downlight 7in 10w	2	396
A150 - DSUR	150 Watt Incandescent Lamp	1	Downlight 7in 10w	1	396
WP70wMH - WallPackS	70 Watt Metal Halide	8	Wall Pack 21w	8	2,593
		558		**558**	**85,908**

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Energy Saving Lighting Improvements for:
W. Edward Balmer School
21 Crescent St
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
S84 - S8R	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	7	96" Channel 4' Light bar 25w	7	1,368
W42 - WrapN4	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	185	Wrap 4ft 12w	185	18,861
W84 - WrapN8	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	196	Wrap 8ft 24w	196	38,855
ACFL - A-Lamp	1 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	10	A19 Lamp 7w	10	595
HB2X44T5 - HighBayS	4 Lamp 4 Ft 54W T5 High Output Lamp - Electronic Ballast	23	High Bay 88w 4k	23	9,510
2X22U - 2x2R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	4	Retrofit 2x2 Kit 13w	4	532
2X44 - 2x4R	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	12	Retrofit 2x4 Kit 16w	12	2,651
2X42 - 2x4R	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	99	Retrofit 2x4 Kit 16w	99	8,972
WW44 - WrapN4	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	2	Wrap 4ft 12w	2	464
D8142 - D8R	1 Lamp 42 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	11	Downlight 8in 26w	11	685
PENDCFL - D6	1 Lamp 28 Watt 2D Compact Fluorescent Hard Wired Fixture - Electronic Ballast	2	Downlight 6in 8w	2	113
W82 - TLED42	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	18	TLED Retrofit	18	1,121
DRUM126 - Drum11	1 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	8	Drum 11in 12w	8	362
WW88 - WrapN8	6 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast High Lumen	2	Wrap 8ft 24w	2	1,133
2x22BX - 2x2R	2 Lamp 2 Ft F40 Biax Lamp - Electronic Ballast	19	Retrofit 2x2 Kit 13w	19	3,175
W41 - TLED41	1 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	2	TLED Retrofit	2	62
FL175wMH - FloodS	175 Watt Metal Halide	6	Flood 19w	6	4,888
FL400wMH - FloodL	400 Watt Metal Halide	1	Flood 137w	1	1,393
FL150wMH - FloodS	150 Watt Metal Halide	1	Flood 19w	1	749
HIHAT70MH - CCLampS	70 Watt Metal Halide	7	Post Top Retrofit 30w	7	1,993
Canopy70wMH - CanopyS	70 Watt Metal Halide	4	Canopy 22w	4	827
WP150wMH - WallPackS	150 Watt Metal Halide	1	Wall Pack 21w	1	740
COBRA400 - AreaL	400 Watt Metal Halide	8	Flood 137w	8	11,143
		628		**628**	**110,193**

Energy Conservation, Inc.
P.O. Box 726
Hanson, MA 02341
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Energy Saving Lighting Improvements for:
Northbridge High School
427 Linwood
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
2X22U - 2x2R	2 x 2 Recessed Prismatic Lensed Fixture 2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	368	Retrofit 2x2 Kit 9w	368	53,151
D6226 - D6R	2 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture -Electronic Ballast	148	Downlight 6in 9w	148	18,861
2X43 - 2x4R	3 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	257	Retrofit 2x4 Kit 15w	257	53,131
W42 - WrapN4	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	87	Wrap 4ft 12w	87	11,826
S42 - I4R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	20	48" Channel 2' Light bar 12.5w	20	2,662
S22 - TLED22	2 Lamp 2 Ft 17W T8 Standard Lamp - Electronic Ballast	76	TLED Retrofit	76	3,659
D/I42 - D/I42-R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	1142	48" Channel 4' Light bar 25w	1142	113,195
W84 - WrapN8	4 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	84	Wrap 8ft 24w	84	20,934
HB2X44T5 - HighBayS	4 Lamp 4 Ft 54W T5 High Output Lamp - Electronic Ballast	21	High Bay 88w 4k	21	8,683
S41 - S4R	1 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	3	48" Channel 2' Light bar 12.5w	3	144
1X42 - 1x4R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	24	Retrofit 1x2 Kit 8w	24	3,534
HB2X45T5 - HighBayM	5 Lamp 4 Ft 54W T5 High Output Lamp - Electronic Ballast	45	High Bay 130w 4k	45	20,900
HB2x46 - HighBayS	6 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast High Lumen	12	High Bay 88w 4k	12	4,622
D8PAR120 - PAR38	120 Watt Incandescent Lamp	29	PAR38 Lamp 12w	29	8,870
V42 - VaporR4	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	1	48" Channel 4' Light bar 25w	1	99
MH70CYL - Drum11	70 Watt Metal Halide	4	Drum 11in 12w	4	940
WP175wMH - WallPackM	175 Watt Metal Halide	25	Wall Pack Full Cutoff 67w	25	15,111
SCONCE100 - CanopyS	100 Watt Metal Halide	21	Canopy 22w	21	5,828
DECORATIVE250wMH - CCLampM	250 Watt Metal Halide	39	Post Top Retrofit 55w	39	40,997
DECORATIVE175wMH - CCLampS	175 Watt Metal Halide	11	Post Top Retrofit 30w	11	8,432
		2,417		**2,417**	**395,580**

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P.O. Box 726
Hanson, MA 02341
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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge Town Hall Annex Building
14 Hill St
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**W828T-Pend - Wrap8**	1 x 8 Pendant	43	Wrap 8ft 24w	43	6,407
2	**W42T-Pend - Wrap4**	1 x 4 Pendant Mount	11	Wrap 4ft 12w	11	902
3	**Drum2A - Drum11**	Ceiling Surface Mount	5	Drum 11in 12w	5	540
4	**ACFL - A-Lamp**	Ceiling Surface Mount	4	A19 Lamp 11w	4	68
5	**S828T - S8R**	1 x 8 Strip Fixture	3	8ft Strip/Industrial Retrofit 32w	3	423
6	**S42 - S4R**	1 x 4 Strip Fixture	2	4ft Strip/Industrial Retrofit 16w	2	88
7	**W84 - Wrap8**	1 x 8 Wraparound Fixture	4	Wrap 8ft 24w	4	352
8	**W42-Pend - Wrap4**	1 x 4 Wrap Pendant Mount	4	Wrap 4ft 12w	4	192
9	**W22 - TLED22**	2 x 2 Wraparound Fixture	1	TLED Retrofit	1	25
10	**W84-Pend - Wrap8**	1 x 8 Wrap Pendant Mount	17	Wrap 8ft 24w	17	1,496
11	**2x22U - 2x2Adaptive**	2 x 2 Recessed Prismatic Lensed Fixture	2	2x2 Adaptive 12w	2	96
12	**W42T - Wrap4**	1 x 4 Wraparound Fixture	1	Wrap 4ft 12w	1	82
13	**A60 - A-Lamp**	Ceiling Surface Mount	8	A19 Lamp 11w	8	392
14	**A150 - A21-Lamp**	Ceiling Surface Mount	6	A21 Lamp 16w	6	804
15	**WallPack400wMH - WallPackL**	Wall Pack - Exterior	2	Wall Pack Full Cutoff 89w	2	732
16	**Flood175wMH - FloodS**	Flood Light	2	Flood 22w	2	366
17		No Occupancy Control	0	Adaptive Control	2	25
			115		**117**	**13,080**

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P.O. Box 726
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Energy Saving Lighting Improvements for:
Northbridge Middle School
171 Linwood Ave
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
2X22US - 2x2S	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	10	2x2 Surface Mount 16w	10	1,246
D/I42 - D/I42-R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	712	48" Channel 4' Light bar 25w	712	70,573
2X43 - 2x4R	3 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	200	Retrofit 2x4 Kit 15w	200	41,347
S42T - I4R	2 Lamp 4 Ft T12 40W Standard Lamp - Standard Ballast	2	48" Channel 2' Light bar 12.5w	2	459
2X22U - 2x2R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	219	Retrofit 2x2 Kit 9w	219	31,631
BRCFL - BR30	1 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	19	BR30 Lamp 10W	19	969
M6682 - TLED42	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	19	TLED Retrofit	38	430
S84 - S8R	4 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	50	96" Channel 4' Light bar 25w	50	12,319
S41 - S4R	1 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	97	48" Channel 2' Light bar 12.5w	97	4,670
S82 - I8R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	50	96" Channel 4' Light bar 25w	50	4,956
2X42S - 2x4S	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	4	2x4 Surface Mount 24w	4	408
M6642 - Stair4	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	4	Sensored Stairwell Fixture	4	1,437
D8218 - D8R	2 Lamp 18 Watt Compact Fluorescent Hard Wired Fixture -Electronic Ballast	44	Downlight 8in 26w	44	1,745
M6641 - TLED41	1 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	4	TLED Retrofit	4	193
2X43S - 2x4S	3 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	2	2x4 Surface Mount 24w	2	362
S31 - Stair4	1 Lamp 3 Ft 25W T8 Standard Lamp - Electronic Ballast	2	Sensored Stairwell Fixture	2	88
S42 - I4R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	32	48" Channel 2' Light bar 12.5w	32	4,259
W42 - WrapN4	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	3	Wrap 4ft 12w	3	408
S31 - TLED31	1 Lamp 3 Ft 25W T8 Standard Lamp - Electronic Ballast	9	TLED Retrofit	9	612
D8PAR - D8R	75 Watt Incandescent Lamp	25	Downlight 8in 26w	25	3,469
M6641 - Stair4	1 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	9	Sensored Stairwell Fixture	9	867
PAR500W - PAR38	500 Watt Incandescent Lamp	8	PAR38 Lamp 12w	8	11,056
D10PAR - D12R	75 Watt Incandescent Lamp	1	Downlight 12in 26w	1	139
D6BR - D6R	60 Watt Incandescent Lamp	2	Downlight 6in 9w	2	289
M6662 - TLED32	2 Lamp 3 Ft 25W T8 Standard Lamp - Electronic Ballast	4	TLED Retrofit	4	532

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Energy Saving Lighting Improvements for:
Northbridge Middle School
171 Linwood Ave
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
HB2x44T5 - HighBayS	4 Lamp 4 Ft 54W T5 High Output Lamp - Electronic Ballast	30	High Bay 88w 4k	30	12,404
FL400wMH - FloodL	400 Watt Metal Halide	7	Flood 137w	7	9,750
V84 - VaporR8	4 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	39	96" Channel 4' Light bar 25w	39	9,609
V42 - VaporR4	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	16	48" Channel 2' Light bar 12.5w	16	2,130
SCONCE2A - Drum11	120 Watt Incandescent Lamp	4	Drum 11in 12w	4	1,223
WW84 - Wrap8	4 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	2	Wrap 8ft 24w	2	498
CANOPY142 - Drum11	1 Lamp 42 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	15	Drum 11in 12w	15	1,529
DRUM318 - Drum11	3 Lamp 18 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	2	Drum 11in 12w	2	272
FL200Q - FloodS	200 Watt Incandescent Lamp	1	Flood 19w	1	793
4X46 - 2x4	6 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	18	2x4 24w	36	6,423
W84 - WrapN8	4 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	1	8' Wrap 36W	1	215
M6642 - TLED32	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	1	TLED Retrofit	1	170
DRUMA - Drum11	60 Watt Incandescent Lamp	2	Drum 11in 12w	2	272
D8126 - D8R	1 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture - Standard Ballast	12	Downlight 8in 26w	12	68
S32 - TLED31	2 Lamp 3 Ft 25W T8 Standard Lamp - Electronic Ballast	6	TLED Retrofit	6	799
D6PAR - D6R	75 Watt Incandescent Lamp	2	Downlight 6in 9w	2	374
PAR30 - D6R	60 Watt Incandescent Lamp	11	Downlight 6in 9w	11	1,589
JJA - A-Lamp	65 Watt Incandescent Lamp	12	A19 Lamp 7w	12	1,971
WP70wMH - WallPackS	70 Watt Metal Halide	1	Wall Pack 21w	1	324
WP250wMH - WallPackM	250 Watt Metal Halide	1	Wall Pack Full Cutoff 67w	1	999
FL100GIMBLE - FloodS	100 Watt Metal Halide	2	Flood 19w	2	885
FL100wMH - FloodS	100 Watt Metal Halide	1	Flood 19w	1	442
FL400wMH-YKE - FloodL	400 Watt Metal Halide	5	Flood 137w	5	6,964
PAR38 - PAR38	75 Watt Halogen Lamp	2	PAR38 Lamp 12w	2	357
I84 - S8R	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	15	96" Channel 4' Light bar 25w	15	2,931

Energy Conservation, Inc.
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Energy Saving Lighting Improvements for:
Northbridge Middle School
171 Linwood Ave
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
PAR30 - Par30	60 Watt Incandescent Lamp	1	PAR30 Lamp 12w	1	136
I41 - I4R	1 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	2	48" Channel 2' Light bar 12.5w	2	62
I42 - I4R	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	5	48" Channel 2' Light bar 12.5w	5	496
I82 - I8R	2 Lamp 4 Ft T8 Standard Lamp - Electronic Ballast	16	96" Channel 4' Light bar 25w	16	1,586
ACFL - A-Lamp	1 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture - Electronic Ballast	1	A19 Lamp 7w	1	59
D6213 - D6R	2 Lamp 13 Watt Compact Fluorescent Hard Wired Fixture -Standard Ballast	21	Downlight 6in 9w	21	1,249
D6132 - D6R	2 Lamp 13 Watt Compact Fluorescent Hard Wired Fixture -Standard Ballast	8	Downlight 6in 9w	8	476
DRUM3A - Drum11	150 Watt Incandescent Lamp	3	Drum 11in 12w	3	1,172
	No Occupancy Control	0	Stairwell Fixture Occupancy Sensor	15	874
		1,796		**1,833**	**263,564**

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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge Vetrans Hall
875 Hill St.
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**Acfl - A-Lamp**	Ceiling Surface Mount	1	A19 Lamp 11w	1	17
2	**2x44 - 2x4R**	2 x 4 Recessed Prismatic Lensed Fixture	14	2x4 Door Retrofit Kit 19w	14	1,302
3	**S32T - TLED32**	1 x 3 Strip Fixture	1	TLED Retrofit	1	80
4	**D6V-PAR - BR30**	6 Inch Recessed Can	4	BR30 Lamp 10W	4	320
5	**A60 - A-Lamp**	Ceiling Surface Mount	10	A19 Lamp 11w	10	490
6	**S42T - S4R**	1 x 4 Strip Fixture	1	4ft Strip/Industrial Retrofit 16w	1	78
7	**Globe - Globe**	Wall Mount - Sconce	3	Globe Lamp 4.5w	3	165
8	**Flood150wHPS - FloodS**	Flood Light	1	Flood 22w	1	168
9	**PAR38 - PAR38**	Ceiling Surface Mount	1	PAR38 Lamp 12w	1	63
			36		**36**	**2,595**

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Energy Saving Lighting Improvements for:
Town of Northbridge MA
Northbridge Whitinsville Social Library
17 Church St
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**WW828T - WrapW8**	2 x 4 Wraparound Fixture	14	Wide Base Wrap 8ft 40w	14	2,085
2	**WW848T - WrapW8**	6 Inch Recessed Can	2	Wide Base Wrap 8ft 40w	2	930
3	**S41T - S4R**	1 x 4 Strip Fixture	46	4ft Strip/Industrial Retrofit 16w	46	2,867
4	**Sconce142 - SconceR**	Wall Mount - Sconce	4	DrumRetro 7w	4	249
5	**Acfl - A-Lamp**	Ceiling Surface Mount	3	A19 Lamp 11w	3	78
6	**S818T - S8R**	1 x 8 Strip Fixture	2	8ft Strip/Industrial Retrofit 32w	2	207
7	**A60 - Dsur**	Ceiling Surface Mount	4	Downlight 7in 10w	4	304
8	**W42 - Stair4**	1 x 4 Wraparound Fixture	1	Sensored Stairwell Fixture	1	62
9	**Drum-Circ - Drum11Occ**	Ceiling Surface Mount	19	DrumRetro 9w Occ	19	722
10	**Globe - Globe**	Wall Mount - Sconce	11	Globe Lamp 4.5w	11	920
11	**Candle - Candle**	Pendant Mount	23	Candleabra Lamp 4.5w	23	1,224
12	**1x42S - Stair4**	1 x 4 Recessed Lovered Fixture	1	Sensored Stairwell Fixture	1	62
13	**S42 - Stair4**	1 x 4 Strip Fixture	4	Sensored Stairwell Fixture	4	249
14	**W42 - Wrap4**	1 x 4 Wraparound Fixture	31	Wrap 4ft 12w	31	2,262
15	**A90 - A21-Lamp**	Ceiling Surface Mount	5	A21 Lamp 16w	5	562
16	**1x42S - TLED42**	1 x 4 Recessed Lovered Fixture	2	TLED Retrofit	2	103
17	**A60 - A-Lamp**	Ceiling Surface Mount	4	A19 Lamp 11w	4	298
18	**S42 - I4R**	1 x 4 Strip Fixture	1	4' Strip Retrofit 18w	1	64
19	**w42T - Wrap4**	1 x 4 Wraparound Fixture	29	Wrap 4ft 12w	29	3,615
20	**WallPack400wMH - WallPackL**	Wall Pack - Exterior	1	Wall Pack Full Cutoff 89w	1	556
21	**Canopy-CFL - CanopyS**	Canopy Mount - Exterior	1	Canopy 22w	1	40
22	**WallPack175wMH - FloodM**	Wall Pack - Exterior	1	Flood 80w	1	190
23	**Flood100wHPS - FloodS**	Flood Light	2	Flood 22w	2	328
			211		**211**	**16,975**

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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge Town Hall
7 Main St
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**W84-Pend - Wrap8**	1 x 8 Wrap Pendant Mount	11	Wrap 8ft 24w	11	1,220
2	**W42-Pend - Wrap4**	1 x 4 Wrap Pendant Mount	8	Wrap 4ft 12w	8	484
3	**WW44 - WrapW4**	1 x 4 Wraparound Fixture	3	Wide Base Wrap 4ft 20w	3	340
4	**2x43 - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	34	2x4 Adaptive 20w	34	2,913
5	**1x42S - TLED42**	1 x 4 Recessed Lovered Fixture	16	TLED Retrofit	16	685
6	**ACFL - A-Lamp**	Ceiling Surface Mount	4	A19 Lamp 11w	4	86
7	**ww44 - TLED44**	1 x 4 Wraparound Fixture	6	TLED Retrofit	6	454
8	**2x42 - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	12	2x4 Adaptive 20w	12	605
9	**A60 - A-Lamp**	Ceiling Surface Mount	29	A19 Lamp 11w	29	1,790
10	**S21T - Stair2**	1 x 2 Strip Fixture	3	Sensored Stairwell Fixture	3	91
11	**1x42S - Stair4**	1 x 4 Recessed Lovered Fixture	1	Sensored Stairwell Fixture	1	52
12	**S41T - I4R**	1 x 4 Strip Fixture	1	4' Strip Retrofit 18w	1	49
13	**Pend500W - CCLampM**	Pendant Mount	15	CCLamp 25w	15	8,978
14	**Drum2A - Drum11**	Ceiling Surface Mount	5	Drum 11in 12w	5	680
15	**ww84 - WrapW8**	2 x 4 Wraparound Fixture	3	Wide Base Wrap 8ft 40w	3	272
16	**S42 - I4R**	1 x 4 Strip Fixture	8	4' Strip Retrofit 18w	8	423
17	**W41 - Stair4**	1 x 4 Wraparound Fixture	2	Sensored Stairwell Fixture	2	28
18	**S84 - I8R**	1 x 8 Strip Fixture	1	8' Strip Retrofit 25w	1	110
19	**S84 - S8R**	1 x 8 Strip Fixture	1	8ft Strip/Industrial Retrofit 32w	1	101
20	**W84 - Wrap8**	1 x 8 Wraparound Fixture	12	Wrap 8ft 24w	12	1,331
21	**W42 - Wrap4**	1 x 4 Wraparound Fixture	6	Wrap 4ft 12w	6	363
22	**BR40 - BR40**	Flood Light	3	BR40 Lamp 12w	3	238
23	**WallPack42wCFL - WallPackS-90B**	Wall Mount - Sconce	5	Wall Pack 21w	5	170
24	**Flood175wMH - FloodS**	Flood Light	1	Flood 22w	1	231
25	**Flood42wCFL - FloodS-LW**	Flood Light	1	Flood 22w	1	33
			191		**191**	**21,725**

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P.O. Box 726
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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge Senior Center
20 Highland St
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**2x42T - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	13	2x4 Adaptive 20w	13	1,597
2	**2x22T - 2x2Adaptive**	2 x 2 Recessed Prismatic Lensed Fixture	4	2x2 Adaptive 12w	4	485
3	**2x22U - 2x2Adaptive**	2 x 2 Recessed Prismatic Lensed Fixture	9	2x2 Adaptive 12w	9	717
4	**2x42 - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	15	2x4 Adaptive 20w	15	996
5	**ICE-8-2-8 - Wrap8**	1 x 8 Pendant	15	Wrap 8ft 24w	15	2,117
6	**ICE-8-2-8T - Wrap8**	1 x 8 Pendant	7	Wrap 8ft 24w	7	1,731
7	**ICE-4-2-4T - Wrap4**	1 x 4 Pendant Mount	4	Wrap 4ft 12w	4	544
8	**A60 - A-Lamp**	Ceiling Surface Mount	11	A19 Lamp 11w	11	895
9	**DRUMT12 - Drum14**	Ceiling Surface Mount	2	Drum 14in 18w	2	206
10	**BR40 - BR40**	Flood Light	8	BR40 Lamp 12w	8	837
11	**ICE-4-2-4 - Wrap4**	1 x 4 Pendant Mount	4	Wrap 4ft 12w	4	319
12	**W42 - Wrap4**	1 x 4 Wraparound Fixture	1	Wrap 4ft 12w	1	80
13	**I42T - I4R**	1 x 4 Strip Fixture	2	4' Strip Retrofit 18w	2	252
14	**S42T - I4R**	1 x 4 Strip Fixture	2	4' Strip Retrofit 18w	2	252
15	**S828T - I8R**	1 x 8 Strip Fixture	5	8' Strip Retrofit 25w	5	1,228
16	**WW44 - WrapW4**	1 x 4 Wraparound Fixture	1	Wide Base Wrap 4ft 20w	1	149
17	**WW42 - WrapW4**	0	1	Wide Base Wrap 4ft 20w	1	63
18	**I828T - I8R**	1 x 8 Strip Fixture	5	8' Strip Retrofit 25w	5	623
19	**W42 - Stair4**	1 x 4 Wraparound Fixture	1	Sensored Stairwell Fixture	1	68
20	**Flood150wMH - FloodS**	Flood Light	4	Flood 22w	4	1,116
21	**Drum226 - Drum12EX**	Ceiling Surface Mount	4	Drum EX 18w	4	239
22	**Flood42wCFL - FloodS-LW**	Flood Light	1	Flood 22w	1	43
23	**Drum2A - Drum11**	Ceiling Surface Mount	1	Drum 11in 12w	1	179
			120		**120**	**14,736**

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Energy Saving Lighting Improvements for:
Northbridge School Administration Building
87 Linwood Ave
Northbridge, MA 01588

Summary

Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
W84P - WrapN8	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	12	Wrap 8ft 24w	12	2,379
W42P - WrapN4	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	9	Wrap 4ft 12w	9	918
SconceA - Drum11	60 Watt Incandescent Lamp	8	Drum 11in 12w	8	1,087
W42 - WrapN4	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	17	Wrap 4ft 12w	17	1,733
A60 - A-Lamp	60 Watt Incandescent Lamp	5	A19 Lamp 7w	5	750
DRUM226 - Drum11	2 Lamp 26 Watt Compact Fluorescent Hard Wired Fixture -Electronic Ballast	1	Drum 11in 12w	1	119
2X42 - 2x4R-M20	2 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	4	Retrofit 2x4 Kit 16w	4	362
S42T - I4R	2 Lamp 4 Ft T12 40W Standard Lamp - Standard Ballast	21	48" Channel 2' Light bar 12.5w	21	4,817
W84 - WrapN8	4 Lamp 4 Ft 28W T8 Energy Efficient Lamp - Energy Efficient Electronic Ballast	3	Wrap 8ft 24w	3	595
DRUM2A - Drum11	120 Watt Incandescent Lamp	1	Drum 11in 12w	1	306
		81		**81**	**13,067**

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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge DPW
11 Fletcher St
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**S828T - S8R**	1 x 8 Strip Fixture	2	8ft Strip/Industrial Retrofit 32w	2	497
2	**Acfl - A-Lamp**	Ceiling Surface Mount	4	A19 Lamp 11w	4	120
3	**Drum2A - Drum11**	Ceiling Surface Mount	2	Drum 11in 12w	2	381
4	**2x44 - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	8	2x4 Adaptive 20w	8	1,298
5	**I828T - I8R**	1 x 8 Strip Fixture	6	8' Strip Retrofit 25w	6	794
6	**HB2x46 - HighBayS**	2 x 4 Surface Prismatic Lensed Fixture	6	High Bay 120W	6	1,101
7	**S42 - S4R**	1 x 4 Strip Fixture	4	4ft Strip/Industrial Retrofit 16w	4	310
8	**HB250 - HighBayS**	High Bay	3	High Bay 120W	3	926
9	**Par38 - PAR38**	Ceiling Surface Mount	3	PAR38 Lamp 12w	3	333
10	**A60 - A-Lamp**	Ceiling Surface Mount	6	A19 Lamp 11w	6	519
11	**A150 - A21-Lamp**	Ceiling Surface Mount	8	A21 Lamp 16w	8	1,891
12	**WallPack150wMH - WallPackS**	Wall Pack - Exterior	1	Wall Pack 21w	1	298
13	**Flood150wHPS - FloodS**	Flood Light	3	Flood 22w	3	889
14	**Flood400wMH - FloodL**	Flood Light	1	Flood 137w	1	561
15	**JJCFL - JellyJar**	Wall Mount - Sconce	2	Jelly Jar Small Wall 14w	2	49
16	**Flood250wMH - FloodM**	Flood Light	1	Flood 80w	1	379
17		No Occupancy Control	0	Adaptive Control	8	99
			60		**68**	**10,051**

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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge Fire Department Headquarters
193 Main St.
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**I828T - I8R**	1 x 8 Strip Fixture	24	8' Strip Retrofit 25w	24	2,722
2	**I43T - I4R**	1 x 2 Strip Fixture	2	4' Strip Retrofit 18w	2	402
3	**Sconce2A - SconceR**	Wall Mount - Sconce	1	DrumRetro 7w	1	171
4	**Acfl - A-Lamp**	Ceiling Surface Mount	101	A19 Lamp 11w	101	2,596
5	**I842T - I8R**	1 x 8 Strip Fixture	2	8' Strip Retrofit 25w	2	209
6	**1x42T - Wrap4**	1 x 4 Recessed Lovered Fixture	12	Wrap 4ft 12w	12	1,488
7	**S828T - S8R-HL**	1 x 8 Strip Fixture	17	8' Strip Retrofit 60w	17	2,905
8	**Drum2A - Drum11**	Ceiling Surface Mount	2	Drum 11in 12w	2	327
9	**I44T - I4R**	1 x 4 Strip Fixture	1	4' Strip Retrofit 18w	1	257
10	**W42T - Wrap4**	1 x 4 Wraparound Fixture	14	Wrap 4ft 12w	14	1,736
11	**WallPack70wMH - WallPackS**	Wall Pack - Exterior	1	Wall Pack 21w	1	104
			177		**177**	**12,669**

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Energy Saving Lighting Improvements for:

Town of Northbridge MA
Northbridge Police Station
1 Hope St
Whitinsville, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**2x232 - 2x2Adaptive**	2 x 2 Recessed Prismatic Lensed Fixture	85	2x2 Adaptive 12w	83	6,190
2	**2x222 - 2x2Adaptive-88A**	2 x 2 Recessed Parabolic Cell Fixture	22	2x2 Adaptive 12w	22	970
3	**2x43 - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	15	2x4 Adaptive 20w	15	1,799
4	**S84 - I8R**	1 x 8 Strip Fixture	1	8' Strip Retrofit 25w	1	153
5	**V42 - S4R-LG**	1 x 4 Vaportight	12	LED 2-Board Retrofit 14w	12	974
6	**Van-6-4 - TLED32**	1x6 Vanity	4	TLED Retrofit	8	621
7	**S42 - I4R**	1 x 4 Strip Fixture	6	4' Strip Retrofit 18w	6	445
8	**2x22UT - 2x2Adaptive**	2 x 2 Surface Prismatic Lensed Fixture	61	2x2 Adaptive 12w	61	8,824
9	**A60 - A-Lamp**	Ceiling Surface Mount	4	A19 Lamp 11w	4	346
10	**W84 - Wrap8**	1 x 8 Wraparound Fixture	4	Wrap 8ft 24w	4	621
11	**W42 - Wrap4**	1 x 4 Wraparound Fixture	2	Wrap 4ft 12w	2	169
12	**S84 - TLED44**	1 x 8 Strip Fixture	6	TLED Retrofit	6	635
13	**S42 - TLED42**	1 x 4 Strip Fixture	1	TLED Retrofit	1	60
14	**S32T - TLED32**	1 x 3 Strip Fixture	2	TLED Retrofit	2	282
15	**A150 - A21-Lamp**	Ceiling Surface Mount	4	A21 Lamp 16w	4	946
16	**DECORATIVE100wMH - CCLampS**	Decorative	2	CCLamp 12w	2	381
17	**WallPack175wMH - WallPackM**	Wall Pack - Exterior	4	Wall Pack Full Cutoff 67w	4	974
18	**Area150wHPS - AreaS**	Pole Top	1	Area 50w	1	247
19	**A90 - A21-Lamp**	Ceiling Surface Mount	2	A21 Lamp 16w	2	261
20		No Occupancy Control	0	Adaptive Control	181	1,415
			238		**421**	**26,312**

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Energy Saving Lighting Improvements for:
Town of Northbridge MA
Northbridge Sewer Department
123 Main St
Northbridge, MA 01588

Line Number	Combined Fixture Type	Existing system description	Existing Quantity	Proposed Retrofit - New system description	Proposed Quantity	Total kWh Savings
1	**2x23U - 2x2Adaptive**	2 x 2 Recessed Parabolic Cell Fixture	28	2x2 Adaptive 12w	28	4,826
2	**VAN41 - TLED41**	1 x 4 Wallmount Fixture	2	TLED Retrofit	2	200
3	**D6H-1-32 - D6V-1-LED**	6 Inch Recessed Can	2	LED V-CFL 4-Pin 12w	2	82
4	**I42 - I4R**	1 x 4 Strip Fixture	26	4' Strip Retrofit 18w	26	2,477
5	**v43 - S4R-LG**	1 x 4 Vaportight	13	LED 2-Board Retrofit 14w	13	2,182
6	**WallPack150wMH - WallPackS**	Wall Pack - Exterior	9	Wall Pack 21w	9	3,450
7	**Flood100wHPS-EXP - CCLampS**	Explosion Proof Flood	20	CCLamp 12w	20	5,352
8	**A90 - A21-Lamp**	Ceiling Surface Mount	5	A21 Lamp 16w	5	839
9	**Area250wMH - AreaS**	Pole Top	2	Area 50w	2	1,111
10	**Par38 - PAR38**	Ceiling Surface Mount	14	PAR38 Lamp 12w	14	2,000
11	**2X22U-CLOUD - 2x2R-LG**	2 x 2 Surface Prismatic Lensed Fixture	26	LED 1-Board Retrofit 9w	26	3,007
12	**Van42 - TLED42**	1 x 4 Wallmount Fixture	2	TLED Retrofit	2	154
13	**V42 - S4R-LG**	1 x 4 Vaportight	61	LED 2-Board Retrofit 14w	61	6,364
14	**2x44 - 2x4Adaptive**	2 x 4 Recessed Prismatic Lensed Fixture	4	2x4 Adaptive 20w	4	835
15	**S42T - I4R**	1 x 4 Strip Fixture	9	4' Strip Retrofit 18w	9	1,551
16	**S41T - I4R**	1 x 4 Strip Fixture	1	4' Strip Retrofit 18w	1	88
17	**Canopy150wMH - CanopyS**	Canopy	2	Canopy 22w	2	762
18	**S84T - S8R-HL**	1 x 8 Strip Fixture	3	8' Strip Retrofit 60w	3	980
19	**I42T - I4R**	1 x 4 Strip Fixture	7	4' Strip Retrofit 18w	7	1,207
20	**V42T - S4R-LG**	1 x 4 Vaportight	12	LED 2-Board Retrofit 14w	12	2,177
21	**A150 - A21-Lamp**	Ceiling Surface Mount	13	A21 Lamp 16w	13	3,951
22	**WallPack70wHPS - WallPackS**	Wall Pack - Exterior	3	Wall Pack 21w	3	469
23	**Flood400wMH - FloodL**	Flood Light	1	Flood 137w	1	721
24	**I84T - I8R**	1 x 8 Strip Fixture	1	8' Strip Retrofit 25w	1	370
25		No Occupancy Control	0	Adaptive Control	28	171
			266		**294**	**45,327**