

Energy Action Plan for the Town of Pelham, NH



Community Profile

Pelham, New Hampshire is located in the southeastern portion of the Nashua Region and is bordered by the NH communities of Hudson, Windham, and Salem as well as Tyngsborough, Dracut, and Methuen, MA. According to 2008 Census estimates, Pelham is home to 12,581 residents, which places it 24th among NH's incorporated cities and towns. At the time of the 2000 Census, per capita income was \$25,158 and median household income was \$68,608. Pelham's 2009 Municipal Budget Appropriations were \$10,589,830. Zoning ordinances were first established in 1955 and most recently updated in 2009. Pelham's most recent Master Plan was adopted by the Planning Board in August 2002. Pelham voters elect representatives to the Board of Selectmen and Planning Board, while Conservation Commission and Zoning Board members are appointed.

Pelham Energy Inventory Background

In the fall of 2008 the Nashua Regional Planning Commission (NRPC) received grant funding from the NH Charitable Foundation and the US Environmental Protection Agency (EPA) to assist communities in the formation of Local Energy Committees, coordinate networking opportunities and workshops to help them learn from one another's experience, and conduct baseline energy and greenhouse gas emissions inventories. The goal of NRPC's Energy Program is to help communities establish a thorough understanding of their energy use and develop an accompanying action plan.

The first step taken in Pelham was to conduct an inventory of the Town's municipal energy usage. Energy inventories help communities to assess their current energy use and track their energy reduction progress. The results are also beneficial in helping communities to prioritize potential energy reduction projects. Pelham's energy inventory was conducted using the Environmental Protection Agency's (EPA) Portfolio Manager. Portfolio Manager is an online, interactive energy management tool that allows users to track and assess energy consumption across a portfolio of buildings.

The Nashua Regional Planning Commission was responsible for conducting the inventory. Pelham Selectmen Harold Lynde provided electricity, propane, and fuel oil usage data for each municipal building for the period beginning January 1, 2009 through December 31, 2009.

The following municipal buildings were included in Pelham's Energy Inventory:

Table 1.

Building Name	Size (ft²)	Portfolio Manager Building Type Category	Fuel Types
Cemetery Building	333	Other—other	Electricity, Propane
Fire Station	6,656	Other—fire station/police station	Electricity, Propane
Highway Dept. (heated	600	Other—service (vehicle repair/service)	Electricity, Propane

portion)			
Historic Society	3,350	Other—entertainment/culture	Electricity, Fuel Oil
Library	9,807	Other—library	Electricity, Propane
Muldoon Park Field House	2,352	Other—recreation	Electricity
Municipal Complex	30,464 17,230	Other—fire station/police station Office	Electricity, Fuel Oil
PTV Studio	3,234	Other—other	Electricity, Fuel Oil
Raymond Park Scout Lodge	2,547	Other—recreation	Electricity, Fuel Oil
Senior Center	5,346	Other—social/meeting	Electricity, Fuel Oil, Propane
Transfer Station	3,650	Other—other	Electricity, Fuel Oil, Propane
Veteran's Memorial Park	3,520	Other—recreation	Electricity

Utility Providers in Pelham

- Electricity—National Grid
- Propane—Energy North
- Fuel Oil—Fred Fuller

Pelham Energy Inventory Results

The table below provides an overall summary of Pelham's Energy Inventory results. A more detailed analysis by measurement type follows.

Table 2.

Building Name	Total Energy Use (kBtu)	Current Site Energy Intensity (kBtu/ft ²)	Current Source Energy Intensity (kBtu/ft ²)	Annual Energy Cost	Energy Cost/ft ²	Total Greenhouse Gas Emissions (MtCO _{2e})
Cemetery Building	53,915.29	161.9	238.4	\$989.89	\$2.97	4.07
Fire Department	599,971.08	90.1	184.7	\$12,547.21	\$1.89	54.36
Highway Department	85,540.81	142.6	277.3	\$1,752.9	\$2.92	7.52
Historical Society	124,147.63	37.1	45.1	\$2,380.55	\$0.71	9.69
Library	769,960.3	78.5	153.3	\$16,625.54	\$1.70	67.81
Muldoon Park Field House	89,943.73	38.2	127.7	\$2,925.92	\$1.24	11.18
Municipal Complex	4,822,656.98	101.1	162.2	\$86,302.74	\$1.81	417.19
PTV Studio	158,863.4	49.1	88.6	\$3,517.76	\$1.09	14.43
Raymond Park Scout	144,310.76	56.7	70.9	\$2,997.19	\$1.18	11.38

Lodge						
Senior Center	398,169.27	74.5	124	\$7,836.36	\$1.47	34.76
Transfer Station	269,116.08	73.7	163.3	\$6,943.45	\$1.90	26.09
Veteran's Memorial Park	24,863.24	7.10	23.6	\$336.3	\$0.10	3.09

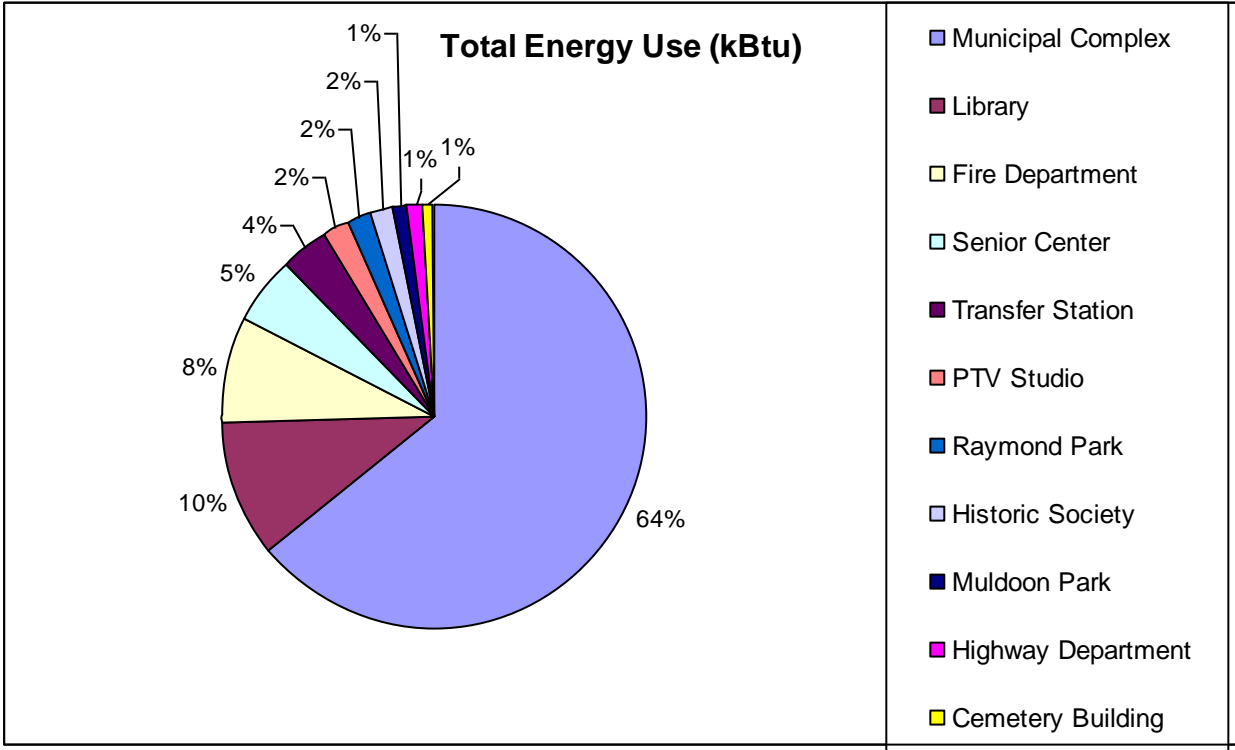
Energy Inventory Measurement Definitions:

- **Site Energy Intensity**—amount of energy expended per ft² on site to heat, cool, and electrify the area. This measurement fluctuates directly with actions such as how much lighting is being use and how the thermostats are set.
- **Source Energy Intensity**—amount of energy expended per ft² based on the type of fuel and the efficiency of that fuel type.
- **MtCO₂e**—metric ton carbon dioxide equivalent, allows emissions of greenhouse gases of different strengths to be added together.

Energy Use by Building

The Portfolio Manager Energy Inventory clearly demonstrates that energy use is not evenly distributed across Pelham’s municipal buildings. For example, the Municipal Complex consumes 64% of the total energy used across the entire portfolio of buildings. The Library accounts for 10% of the total energy use and the Fire Department accounts for 8%. These results are illustrated in Graph 1 below.

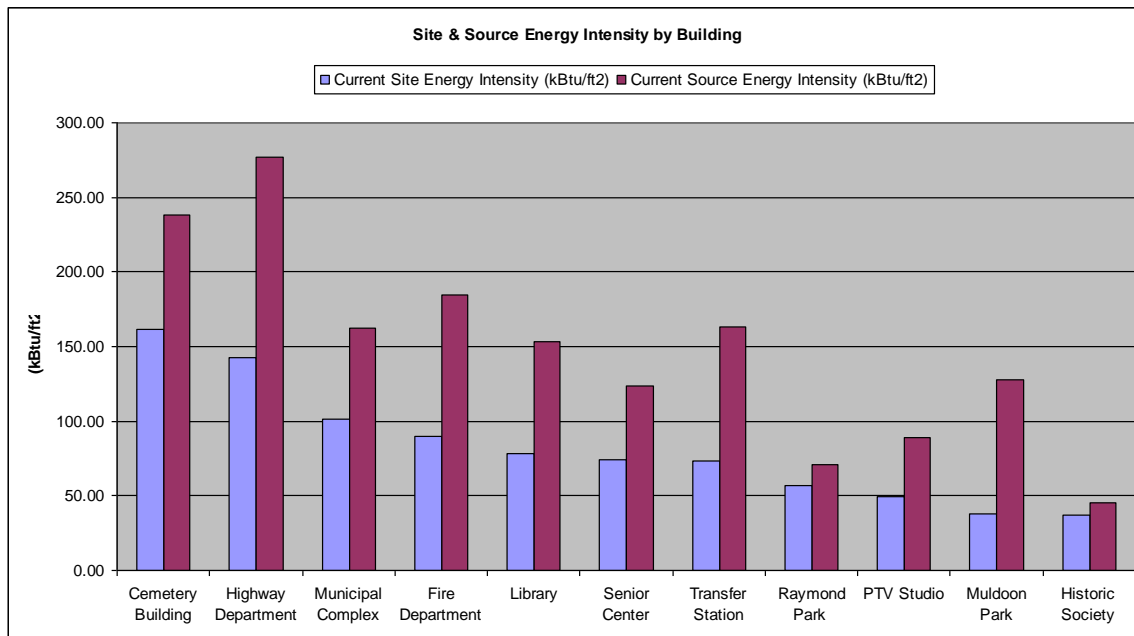
Graph 1



In addition to Total Energy Use, it is important to examine Energy Intensity, which provides a measure of the relative energy efficiency of a particular building. As mentioned above, site energy intensity is the amount of energy expended per square foot on site to heat, cool, and electrify the area. This measurement fluctuates directly with actions such as how much lighting is being use and how the thermostats are set. Thus, reductions in site energy intensity can be addressed through changes in behavior (ex. shutting computers off at night, turning down the thermostat) and through energy conserving technologies (ex. motion sensor lighting). Source Energy Intensity refers to the amount of energy expended per square foot based on the type of fuel used and the efficiency of that fuel type. Measures to reduce source energy intensity would involve changing the type of fuel being used to heat or cool the space.

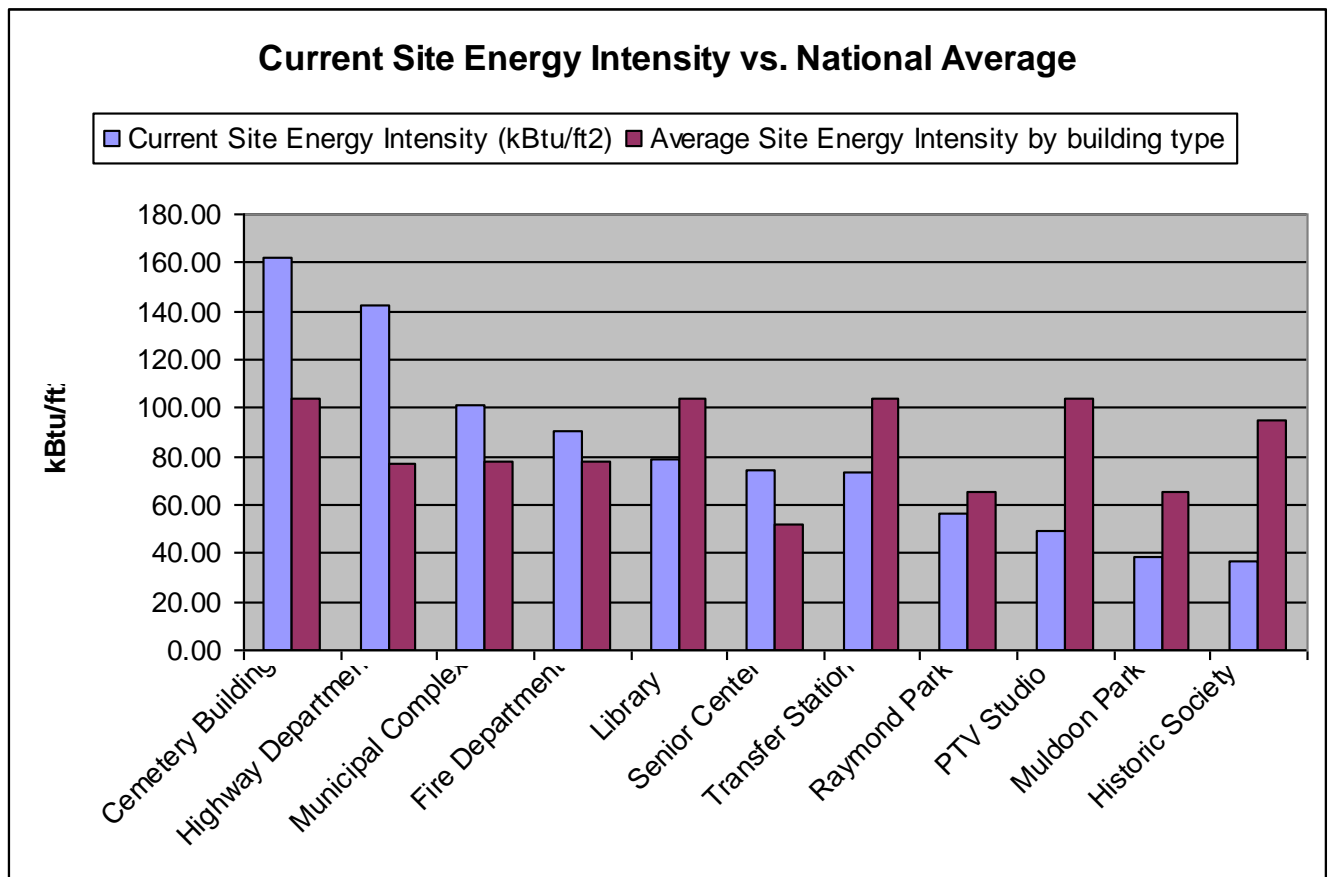
In Pelham, the Cemetery Building (333 ft²) has the highest site energy intensity at 161.9 kBtu/ft² and the second highest source energy intensity at 238.40 kBtu/ft². The heated portion of Highway Department building (600 ft²) has the second highest site energy intensity and the highest source energy intensity at 142.6 and 277.3 kBtu/ft² respectively. Although site energy intensity is consistently lower than source energy intensity across Pelham’s portfolio of buildings, it is recommended that the Town focuses on behavioral changes and simple energy conserving technologies first, as these are often the least costly and most easily implemented actions. These measures can be enacted across all buildings, with a particular focus on the Cemetery Building, Highway Department, and Municipal Complex. A comparison of site and source energy intensities across buildings appears in Graph 2.

Graph 2

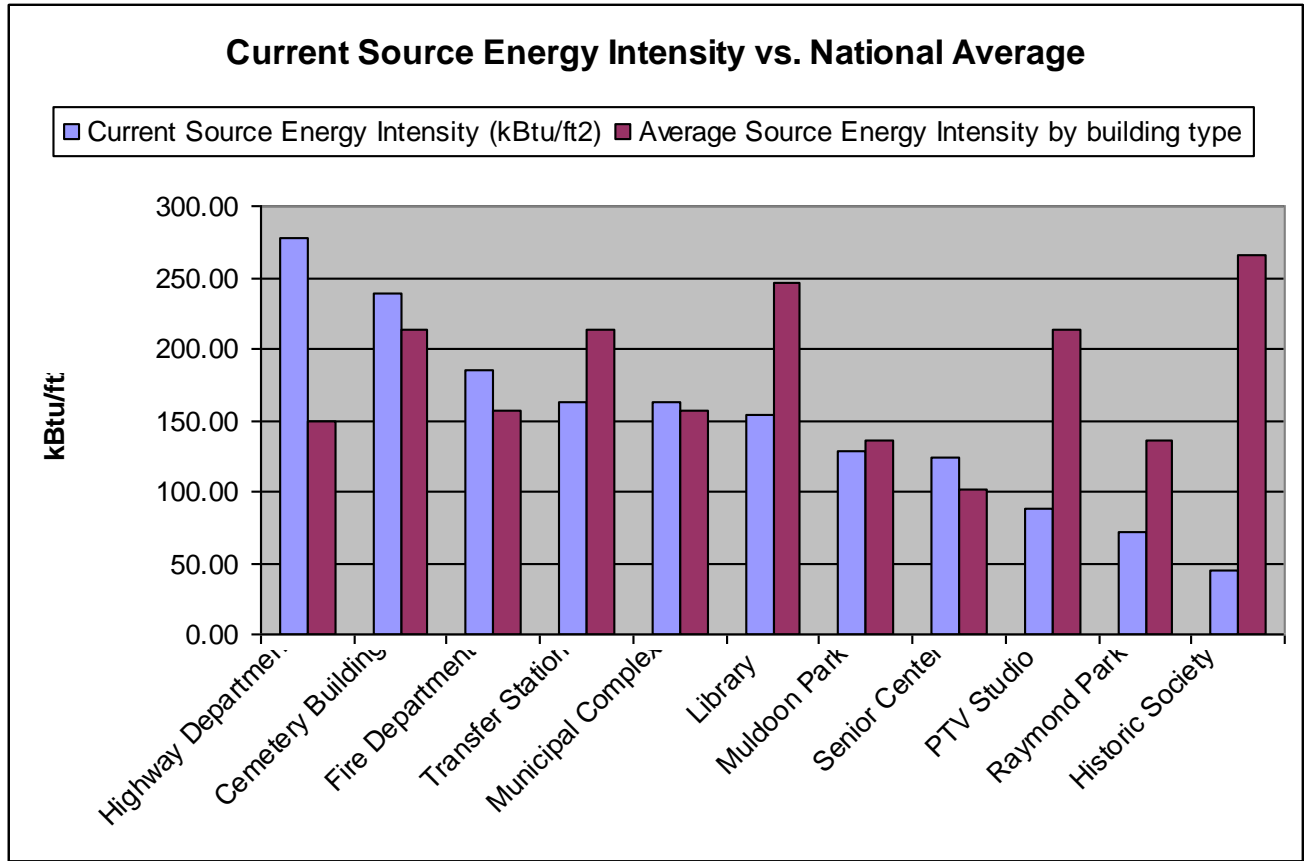


In addition to comparing site and source energy intensities across buildings in the municipality, Portfolio Manager also allows users to compare their buildings' site and source energy intensity to national averages for that building type (building types for Pelham's portfolio are defined by Portfolio Manager and appear in Table 1). Graphs 3 and 4 illustrate these comparisons. Site energy intensity exceeds the national average for the following buildings in Pelham's portfolio: Cemetery Building, Highway Department, Municipal Complex, Fire Department, and the Senior Center. Source energy intensity exceeds the national average for the following buildings: Highway Department, Cemetery Building, Fire Department, Municipal Complex, and Senior Center.

Graph 3.



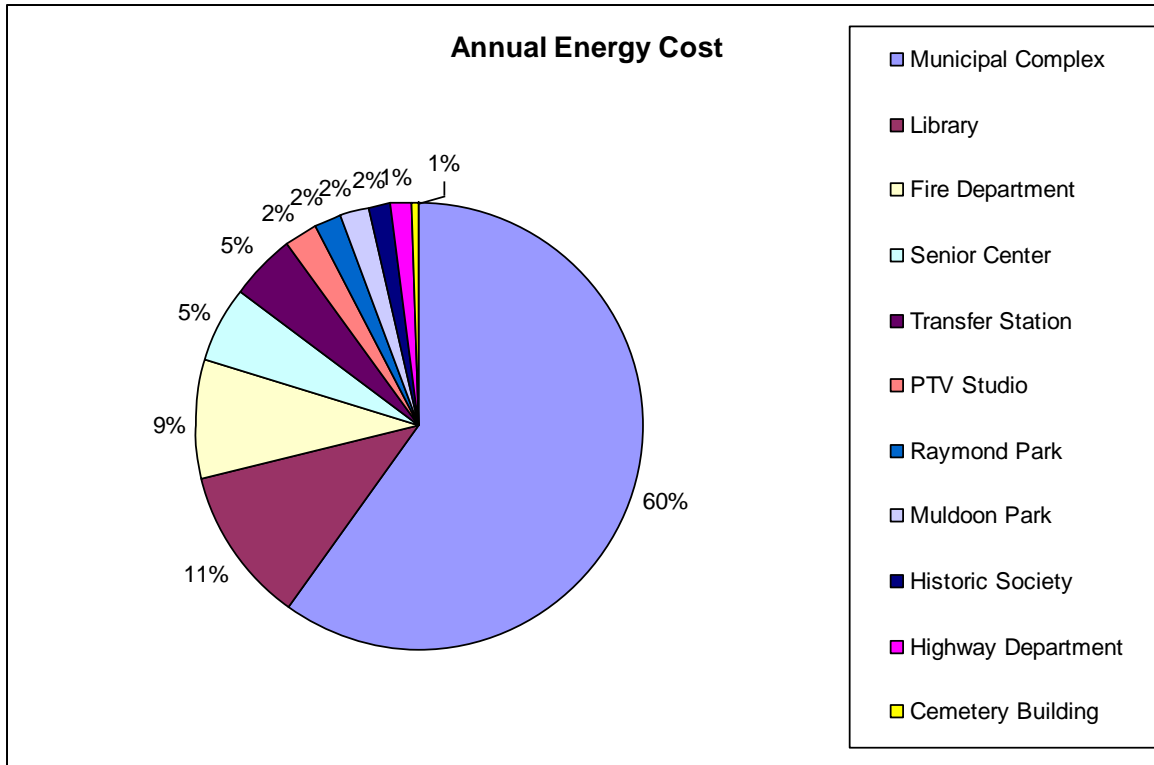
Graph 4



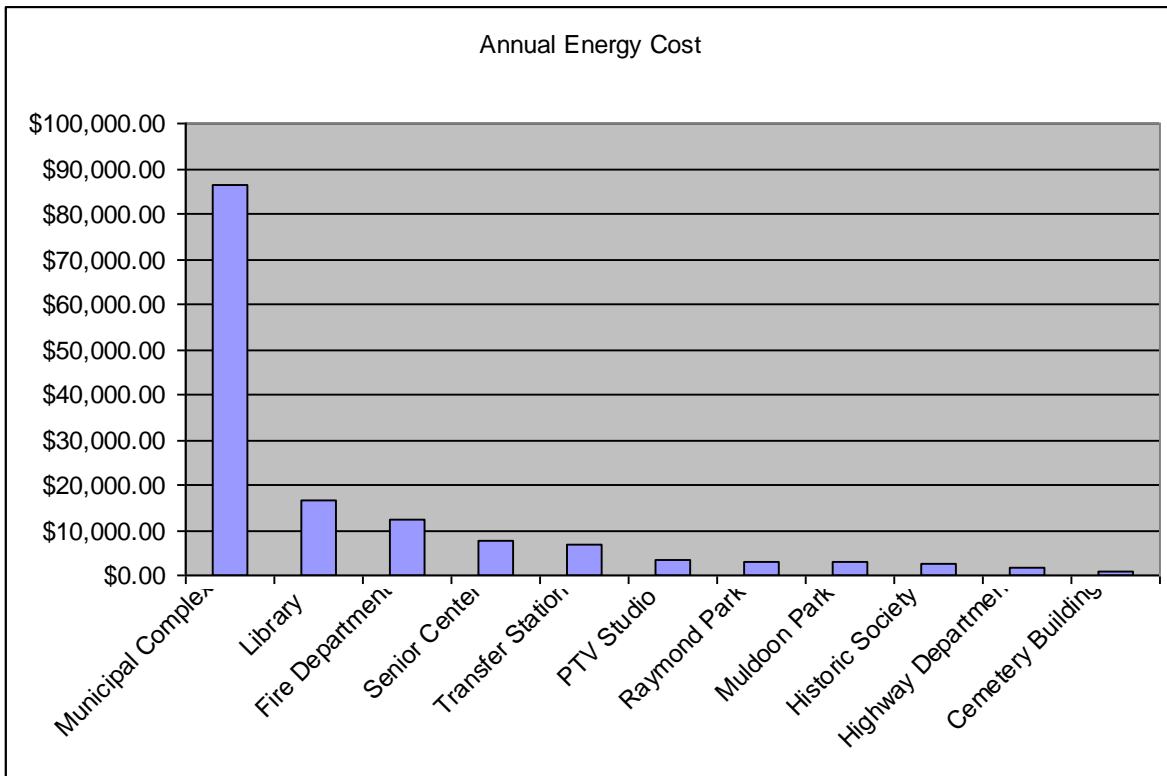
Costs by Building

Another way to evaluate building performance is to examine overall energy costs and energy costs per ft². The cost of running municipal buildings is a major concern for most municipalities and therefore identifying ways to save on energy costs is often a priority when conducting energy inventories. Three of the 11 buildings included in Pelham's portfolio—the Municipal Complex, Library, and Fire Department—account for 80% of total annual energy costs. The Municipal Complex alone accounts for 60% of annual energy costs at \$86,302.74. The Library has an annual energy cost of \$16,625.54 and the Fire Department has an annual energy cost of \$12,547.21. These results are illustrated in Graphs 5 and 6.

Graph 5

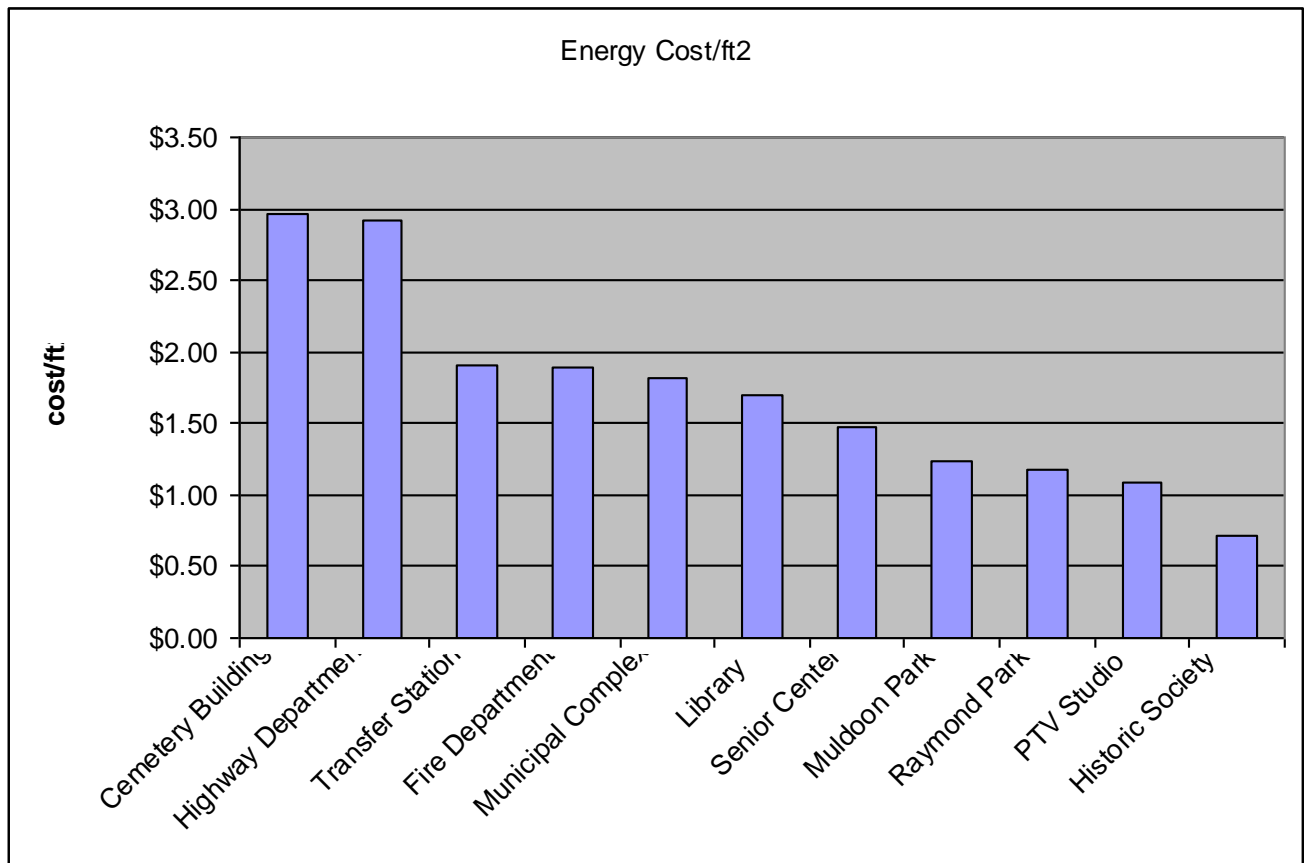


Graph 6



When comparing energy costs per square foot, the Cemetery Building and Highway Department stand out at \$2.97/ft² and \$2.92/ft² respectively. The Transfer Station and Fire Department also have high costs per square foot at \$1.90/ft² and \$1.89/ft² respectively.

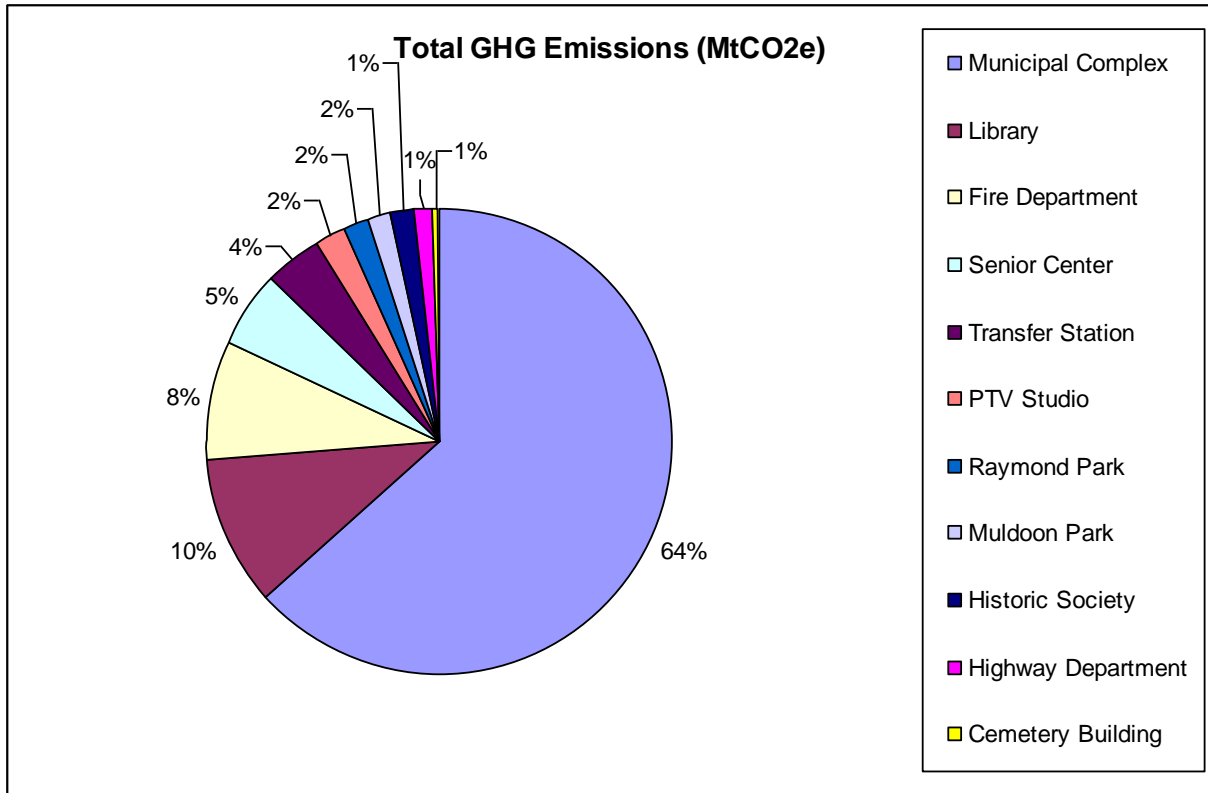
Graph 7



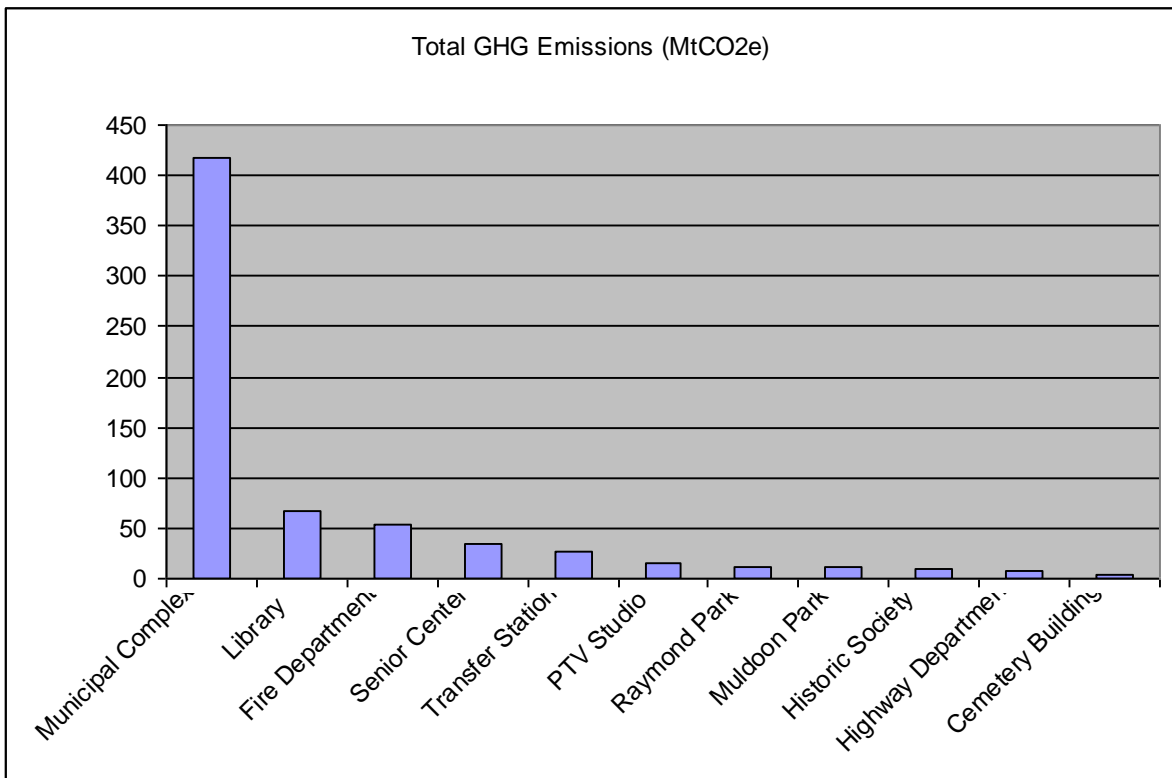
Greenhouse Gas Emissions

The final method for evaluating building performance is through greenhouse gas emissions. As mentioned above, Portfolio Manager measures greenhouse gas emissions in MtCO_{2e}, or metric ton carbon dioxide equivalent. This allows emissions of greenhouse gases of varying strengths to be added together. In Pelham, three buildings—the Municipal Complex, Library, and Fire Department—account for 82% of the total emissions coming from all 11 buildings in the portfolio. The Municipal Complex alone produces 64% of the emissions at 417.19 MtCO_{2e}.

Graph 8



Graph 9



Energy Inventory Analysis

Portfolio Manager's performance measures can be divided into two broad categories—those that take into consideration building square footage and those that do not. Performance measures that take square footage into consideration include Site Energy Intensity (kBtu/ft²), Source Energy Intensity (kBtu/ft²), and Energy Cost/ft². Performance measures that do not take square footage into consideration include Total Energy Use (kBtu), Annual Energy Cost (\$), and Greenhouse Gas Emissions (MtCO₂e).

The Municipal Complex was the worst performing building in every category that does not consider square footage. It had the highest Total Energy Use, Annual Energy Cost, and Greenhouse Gas Emissions. It also had the third highest Site Energy Intensity. At the same time, it only had the fifth highest Energy Cost/ft², indicating that it is performing fairly well for a building of its size. It is recommended that the Town give first priority to energy efficiency work on the Municipal Complex. Given the building's size and its high annual energy costs, there is likely an opportunity to achieve significant energy and cost savings. In addition, given the fact that it is very visible to the public, actions taken in the Municipal Complex will serve as model for Pelham's other municipal buildings as well as its residents.

The Library had the second highest Total Energy Use, Annual Energy Cost, and Greenhouse Gas Emissions. Yet much like the Municipal Facility, its Energy Cost/ft² was right around the average for the portfolio. The Fire Department had the third worst performance in all categories except Site Energy Intensity. It is recommended that the Library and Fire Department receive second and third priority respectively when considering energy efficiency actions. These buildings both have high annual energy usage and therefore efficiency efforts could result in significant energy and costs savings. In addition, both buildings are very visible to the public, which will help to garner public support and demonstrate the Town's commitment to improving energy efficiency. In particular, there are opportunities to incorporate community education and outreach into any energy efficiency efforts undertaken at the Library.

Among categories that consider square footage, the Cemetery Building had the worst performance, with the highest Site Energy Intensity, highest Energy Cost/ft², and the second highest Source Energy Intensity. At the same time, it had the second lowest Total Energy Use, Annual Energy Cost, and Greenhouse Gas Emissions. The Highway Department also performed poorly in these categories, with the highest Source Energy Intensity and the second highest Site Energy Intensity and Energy Cost/ft². Yet it had the third lowest Total Energy Use, Annual Energy Cost, and Greenhouse Gas Emissions. Although the Cemetery Building and Highway Department are very energy intensive given their size, it is recommended that the Town give these buildings fourth and fifth priority given their low annual energy costs and limited public visibility.

Recommendations based on Energy Inventory Results

- A recommended overall goal is to reduce municipal energy consumption by 15% below 2009 levels by 2016. This is in line with the NH Climate Action Plan's goal to reduce NH's annual greenhouse gas emissions by 80% below 1990 levels by 2050. In 2009, Pelham consumed 7,541,458.57 kBtu of energy. A 15% reduction by 2016 would bring Pelham's energy consumption level down to 6,410,239.78 kBtu.
- Form a Local Energy Committee. Local Energy Committees (LECs) work in cooperation with municipal staff and elected officials on energy efficiency projects. Many communities have formed LECs and there are a number of models that can be followed. In general, LECs consist of citizen volunteers and representation from municipal staff and/or town boards. LECs can be instrumental in inventorying energy use, conducting public outreach and education to residents, seeking grants and funding opportunities, and implementing energy efficiency projects.
- Use Energy Committee members, students, and volunteers to conduct walk-through building audits to look for easily correctable changes in behavior or easily implemented energy efficiency measures. Continue to track building performance in Portfolio Manager after subsequent actions have been implemented to measure associated energy efficiency improvements. The following buildings should be included in this process and are listed in order of priority:
 1. Municipal Complex
 2. Library
 3. Fire Department
 4. Cemetery Building
 5. Highway Department
- Use Pelham's facility maintenance staff to recommission buildings that continue to perform poorly after walk-through audit recommendations have been implemented. Recommissioning examines the building's equipment systems operation and maintenance procedures and compares them to intended or design operations procedures. The primary focus of recommissioning is to identify operation and maintenance improvements that will result in energy cost savings and that are relatively fast and inexpensive to implement. Recommissioning does not necessarily involve the purchase or installation of new equipment or technology and in-house staff can typically implement many of the operation and maintenance improvements. Example recommissioning activities include calibrating building controls such as thermostats and occupancy sensors; adjusting operating schedules to ensure equipment is only on when necessary; checking for leaky or improperly functioning steam traps; and cleaning heat exchanger tubes in condensers, evaporators, and boilers to maintain optimal efficiency. Priority should

be given to buildings that do not have an active preventative maintenance program.

- Conduct professional audits of buildings where no performance improvements are seen after implementing volunteer walk-through audit recommendations and recommissioning activities. Energy audits examine existing building systems for equipment replacement (retrofit) opportunities that will result in energy cost savings. Utility providers often offer free or low cost auditing services and should be utilized first.
- Focus initial actions on buildings that are very visible to the public, such as the Municipal Complex and Library. This will raise awareness of the Town's energy efficiency efforts and will help to set a good example for its citizens.
- Involve students to the greatest extent possible when conducting audits and making energy efficiency improvements, not only in the schools but also in municipal buildings. This will help to raise awareness of the Town's efforts to improve energy efficiency and instill an environmental ethic in students and their parents.
- After energy efficiency measures have been successfully implemented, research the feasibility of installing green energy technologies (ex. small wind, solar, geothermal) in one of more municipal buildings. Priority should be given to buildings with high source energy intensity.