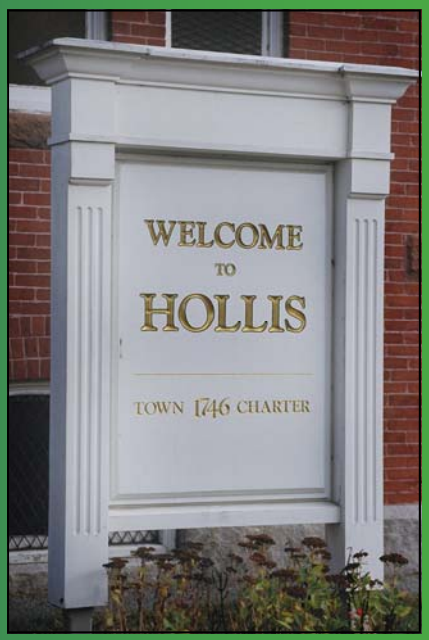
Energy Action Plan for the Town of Hollis, NH



NRPC
Prepared by the
Nashua Regional Planning Commission, June 2009

Community Profile

Hollis, New Hampshire is located in the south central portion of the Nashua Region and is bordered by the NH communities of Brookline, Milford, Amherst, Merrimack, and Nashua as well as Pepperell, MA to the south. According to 2007 Census estimates, Hollis is home to 7,738 residents, which places it 39th among NH's incorporated cities and towns. At the time of the 2000 Census, per capita income was $44,936 and median household income was $92,847. Hollis' 2007 Municipal Budget Appropriations were $8,737,038.

Zoning ordinances were first established in 1960 and most recently updated in 2008. The Hollis Master Plan was most recently updated in 1999. Hollis voters elect representatives to the Board of Selectmen, while Planning Board, Conservation Commission, and Zoning Board members are appointed. The Town Administrator, Troy Brown, and the Selectmen's Office have been most heavily involved in this energy project.

Hollis Local Energy Committee

At Town Meeting 2007 communities across New Hampshire placed resolutions on their ballots calling for a strong federal response to climate change. Many of these towns also took advantage of the opportunity to act locally on this global issue and began forming Local Energy Committees (LECs). These committees are often comprised of local citizens and municipal staff members and are charged with assessing and improving community action on global warming and energy use. The Town of Hollis was one of the 156 communities across New Hampshire to pass the resolution.

The Hollis Local Energy Committee formed in March 2009. The Nashua Regional Planning Commission (NRPC) sent an introductory letter to the Board of Selectmen and Troy Brown, Hollis Town Administrator, stating our interest in helping the Town form an LEC. The committee is comprised almost entirely of Town staff members and includes: Troy Brown (Town Administrator), Cathy Hoffman (Assistant Town Administrator), Jeff Babel (Road Agent), and Karen Cramton (Hollis citizen). To date, the group has held 3 meetings and recently became an official committee of the Town. There is an additional group in Hollis, Project PROGRESS, which is focused on energy use in the Hollis/Brookline School Administration Unit. While Project PROGRESS is not an official part of the LEC, the two groups work very closely.

Hollis Energy Inventory Background

Energy inventories help communities to assess their current energy use and track their energy reduction progress. Hollis conducted an energy inventory of the town's municipal buildings, vehicles, and streetlights using the Small Town Carbon Calculator (STOCC) and the EPA's Portfolio Manager. The STOCC inventory was completed in partnership with Clean Air-Cool Planet and the University of New Hampshire. In particular, STOCC allows towns to track their overall energy usage, costs, and greenhouse gas emissions

resulting from buildings, vehicles, and street lights. Portfolio Manager provides a more detailed analysis of the town's municipal buildings. Portfolio Manager is an online, interactive energy management tool that allows users to track and assess energy consumption across a portfolio of buildings. By examining each building and comparing energy use across buildings, towns can see how well each building is performing and where improvements can be made. The results are also beneficial in helping communities to prioritize potential energy reduction projects.

Hollis Energy Committee members were responsible for conducting the inventory. Town staff provided energy use data for all municipal buildings, vehicles, and streetlights for the 1-year period beginning January 1, 2008 through December 31, 2008. Once this task was complete, the data was given to the "Inventory Committee," to be entered into Portfolio Manager (NRPC staff provided training to all Energy Committee members on how to use the tool). A UNH intern was responsible for inputting the data into STOCC. After the inventory was complete, Statements of Energy Performance were generated in Portfolio Manager and distributed to municipal department heads for their review.

The STOCC results precede the Portfolio Manager results in this report as the data provides an overall glimpse at Hollis' energy usage and greenhouse gas emissions. Portfolio Manager results are more specific and detail-oriented for the buildings only and will be presented following the STOCC inventory information.

Small Town Carbon Calculator Inventory

The Small Town Carbon Calculator (STOCC) provides more broad-based information on energy use resulting from buildings, vehicles, and streetlights. The purpose of using STOCC is to establish a total municipal baseline for energy costs, carbon dioxide emissions (a major greenhouse gas), and energy usage. In addition to municipal vehicles and streetlights, the following buildings were included in the STOCC inventory:

Table 1.

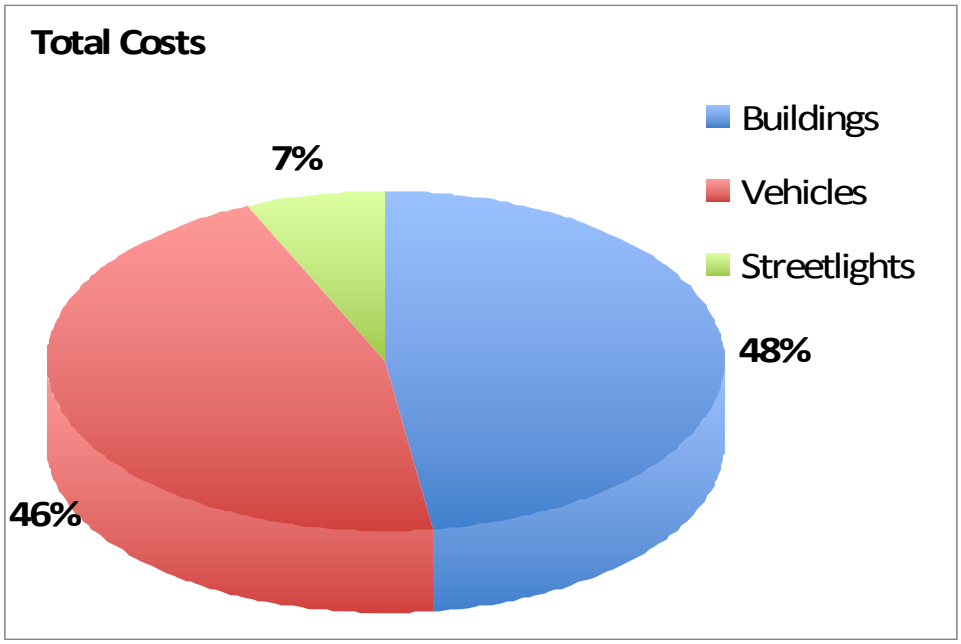
Always Ready Engine House
DPW Garage
Farley Building
Fire Station
Police Station
Social Library
Town Hall
Lawrence Barn
Stump Dump Office
Town Clerk Office
Transfer Station Office

Table 2.

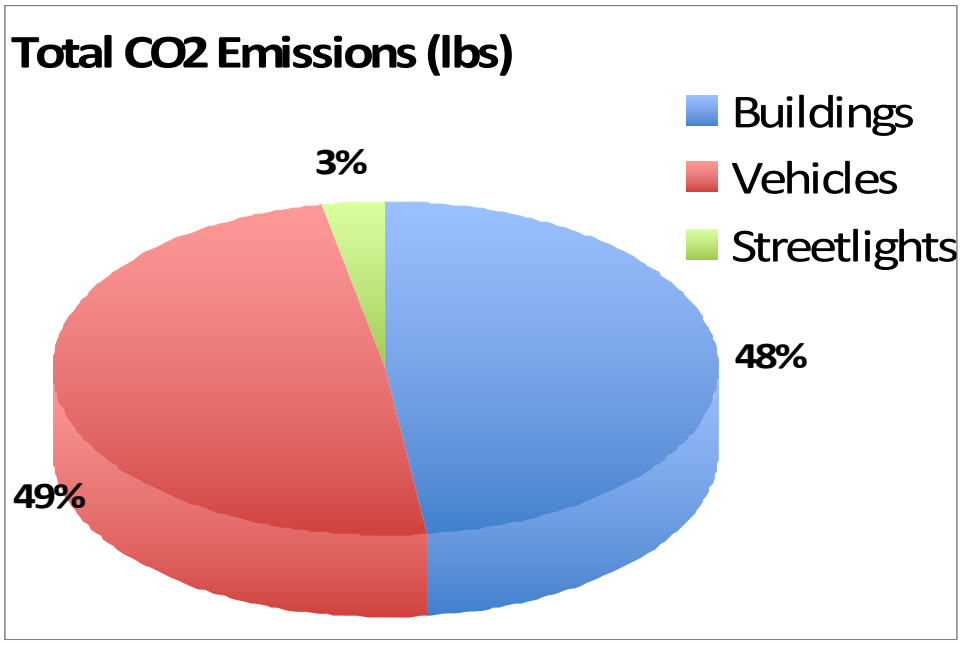
	Municipal Buildings		Vehicles		Streetlights		
	#	% of total	#	% of total	#	% of total	Grand Total
Cost	$109,551	48%	$104,070	46%	$15,139	7%	$228,720
CO_2 (lbs)	692,611	48%	705,004	49%	42,362	3%	1,439,976
Energy (million BTUs)	3,705	45%	4,429	53%	160	2%	8,339

In Total, Hollis spent $228,720 on energy in 2008, was responsible for 1,439,976 lbs of carbon dioxide emissions, and consumed 8,339 MMBTUs of energy.

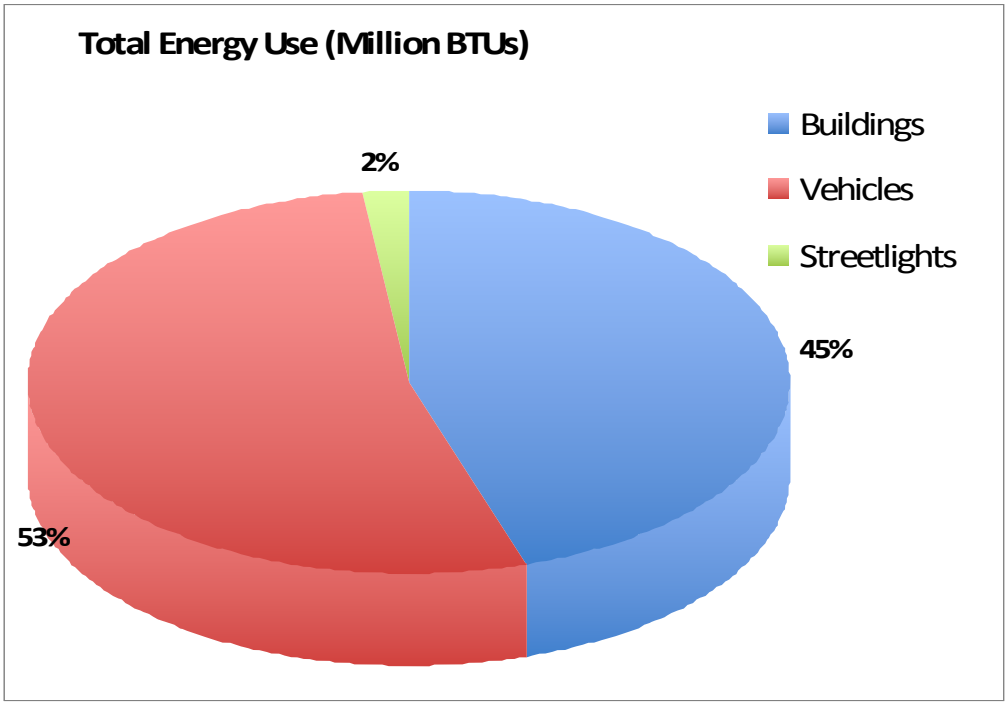
Graph 1



Graph 2



Graph 3



From these graphs, it is clear that the vehicle fleet represents a significant source of energy expenditures and costs for the Town. Moving forward, it will be equally as important for Hollis to address energy use

resulting from its vehicle fleet as it will be from its municipal buildings. Recommendations for reducing energy use from these sectors appears later in this report.

A second STOCC inventory was also conducted, which included the SAU 41 school buildings as well as Hollis' municipal buildings, vehicles, and streetlights. The results of this inventory appear in the Appendix to this report.

Portfolio Manager Inventory

The following municipal buildings were included in Hollis' Energy Inventory using Portfolio Manager: *Table 3.*

Building Name	**Size (ft^2)**	**Year Built**	**Portfolio Manager Category**	**Fuel Types**
Always Ready Engine House	1,800	1800	Other-other	Electricity, Fuel Oil (No. 2)
DPW Garage	7,522	1981	Other-service (DPW Garage) and Other-other (Kennel)	Electricity, Propane
Farley Building	12,900	1800	Other-other	Electricity
Fire Station	13,090	1978	Other-Fire Station/Police Station	Electricity, Propane
Police Station	9,918	2006	Other-Fire Station/Police Station	Electricity, Propane
Social Library	7,795	1910	Other-Library	Electricity, Propane
Town Hall	15,606	1886	Office	Electricity, Fuel Oil (No. 2)
Lawrence Barn	3,909	2006	Other-Social/Meeting	Electricity, Fuel Oil (No. 2)
Stump Dump Office	288	1950	Office	Electricity, Propane
Town Clerk Office	444	1985	Office	Electricity, Propane
Transfer Station Office	675	2006	Office	Electricity

Utility Providers in Hollis

- Electricity—Public Service of New Hampshire (PSNH)
- Propane—Suburban Propane
- Fuel Oil—Lorden Oil

Hollis Energy Inventory Results

The table below provides an overall summary of Hollis' Energy Inventory results using Portfolio Manager. A more detailed analysis by measurement type follows.

Table 4.

Building Name	Total Energy Use (kBtu)	Current Site Energy Intensity (kBtu/ft²)	Current Source Energy Intensity (kBtu/ft²)	Annual Energy Cost	Energy Cost/ft²	Total Greenhouse Gas Emissions ($MtCO_2e$)
Always Ready Engine House	59,542.55	33.1	36.4	$1,127.61	$0.63	4.88
DPW Garage	222,587.37	29.6	67.2	$7,683.17	$1.02	22.04
Farley Building	6,943.42	0.5	1.8	$448.90	$0.03	0.86
Fire Station	684,500.52	52.3	88.6	$20,686.26	$1.58	58.48
Police Station	1,062,794.77	107.2	227.1	$33,094.46	$3.34	101.44
Social Library	414,861.53	53.2	98.8	$13,360.96	$1.71	37.02
Town Hall	965,987.48	61.9	78.6	$20,357.89	$1.30	82.26
Lawrence Barn	209,897.12	53.7	81.2	$6,818.18	$1.74	17.03
Stump Dump Office	14,118.29	49	81.4	$551.40	$1.91	1.19
Town Clerk Office	59,925.25	135	209	$2,249.98	$5.07	4.91
Transfer Station Office	34,382.72	50.9	170.1	$3,133.48	$4.64	4.27

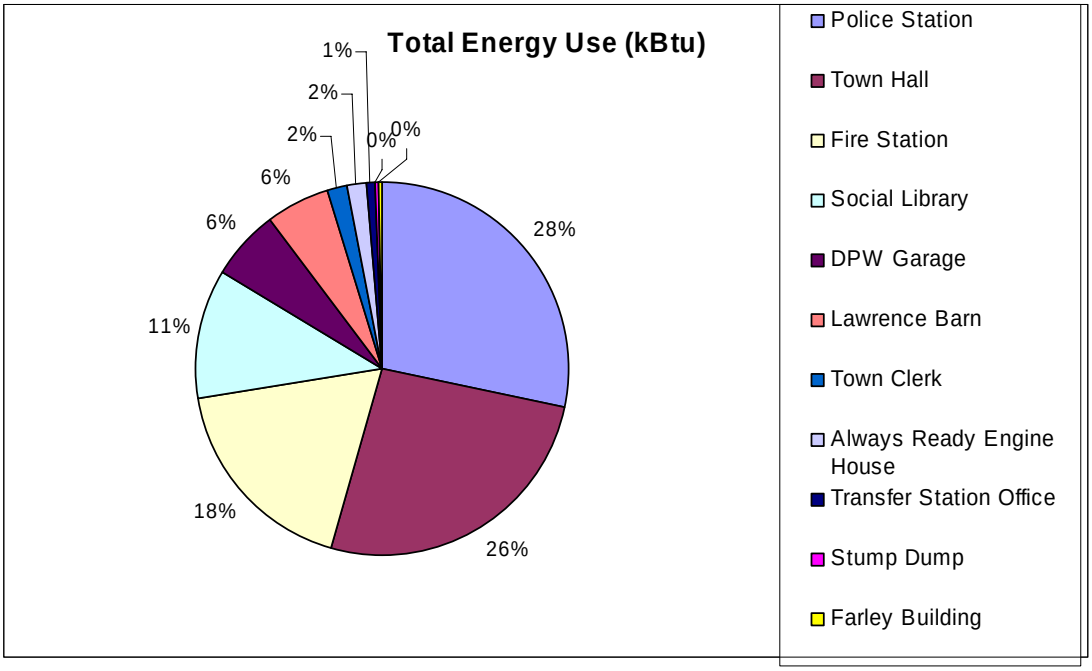
Energy Inventory Measurement Definitions:

- 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.
- $MtCO_2e$—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 Hollis' municipal buildings. For example, three buildings—the Police Station, Town Hall, and Fire Station—are consuming 72% of the total energy used across the entire portfolio of buildings. These results are illustrated in Graph 4 below.

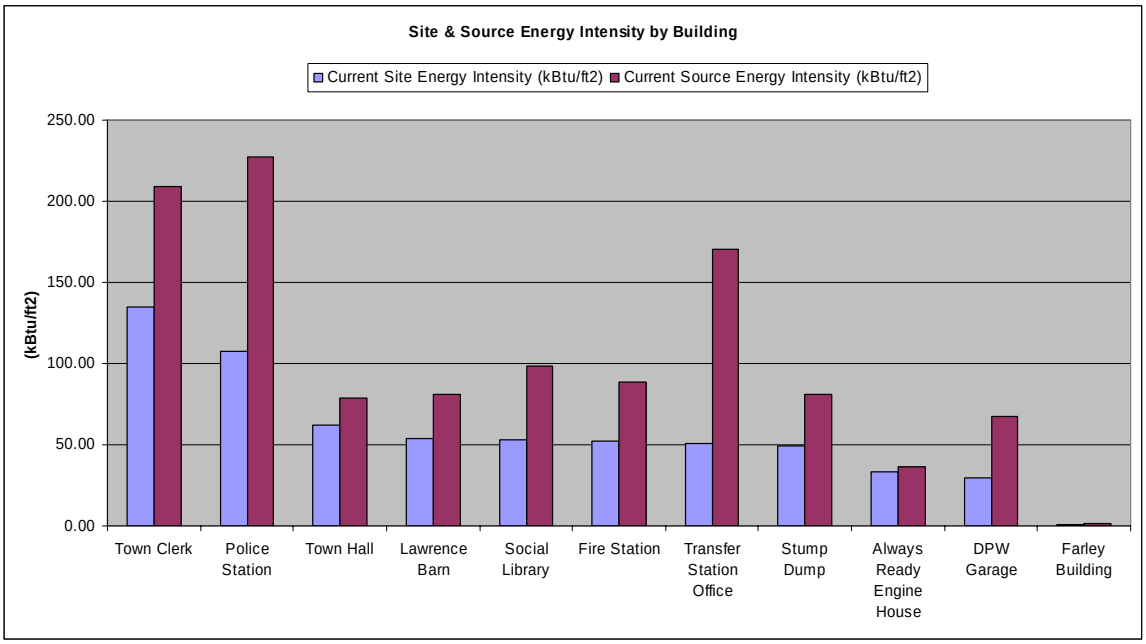
Graph 4



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.

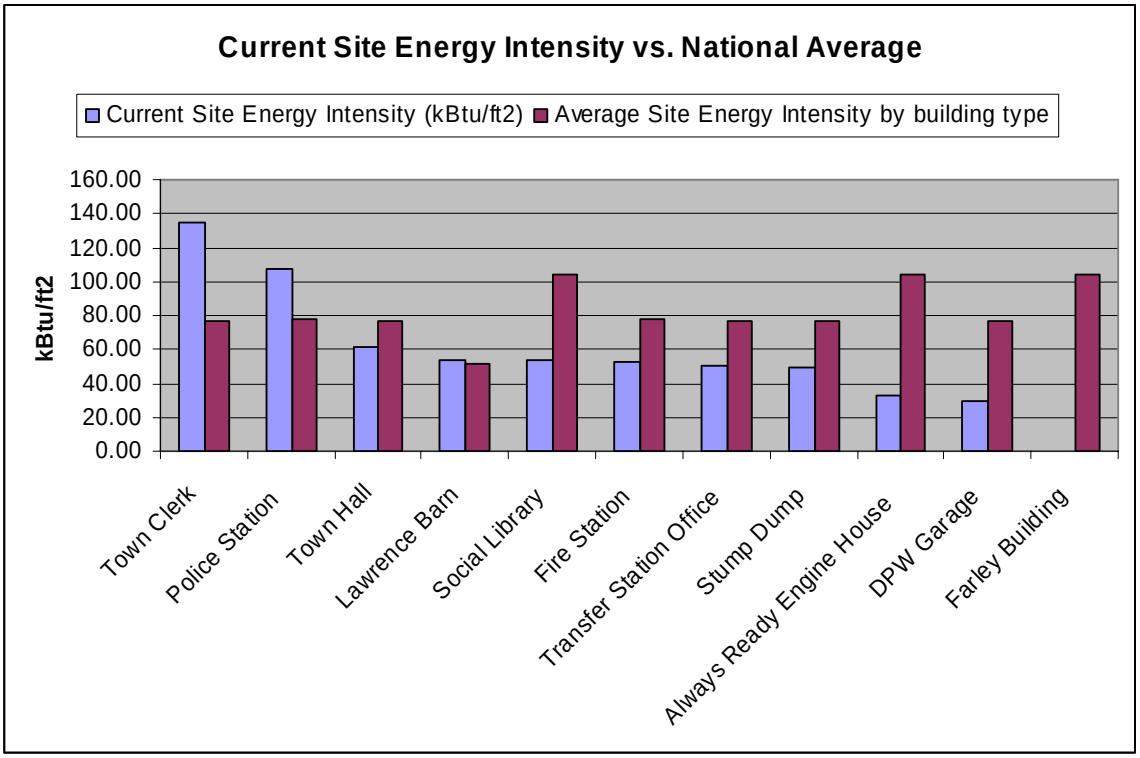
In Hollis, the Town Clerk's Office (444 ft^2) has the highest site energy intensity at 135 kBtu/ft^2 and the second highest source energy intensity at 209 kBtu/ft^2. The Police Station (9,918 ft^2) has the second highest site energy intensity and the highest source energy intensity at 107.2 and 227.1 kBtu/ft^2 respectively. Although site energy intensity is consistently lower than source energy intensity across Hollis' portfolio of buildings, it is recommended that the LEC focus 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 Town Clerk's Office and the Police Station. A comparison of site and source energy intensities across buildings appears in Graph 5.

Graph 5

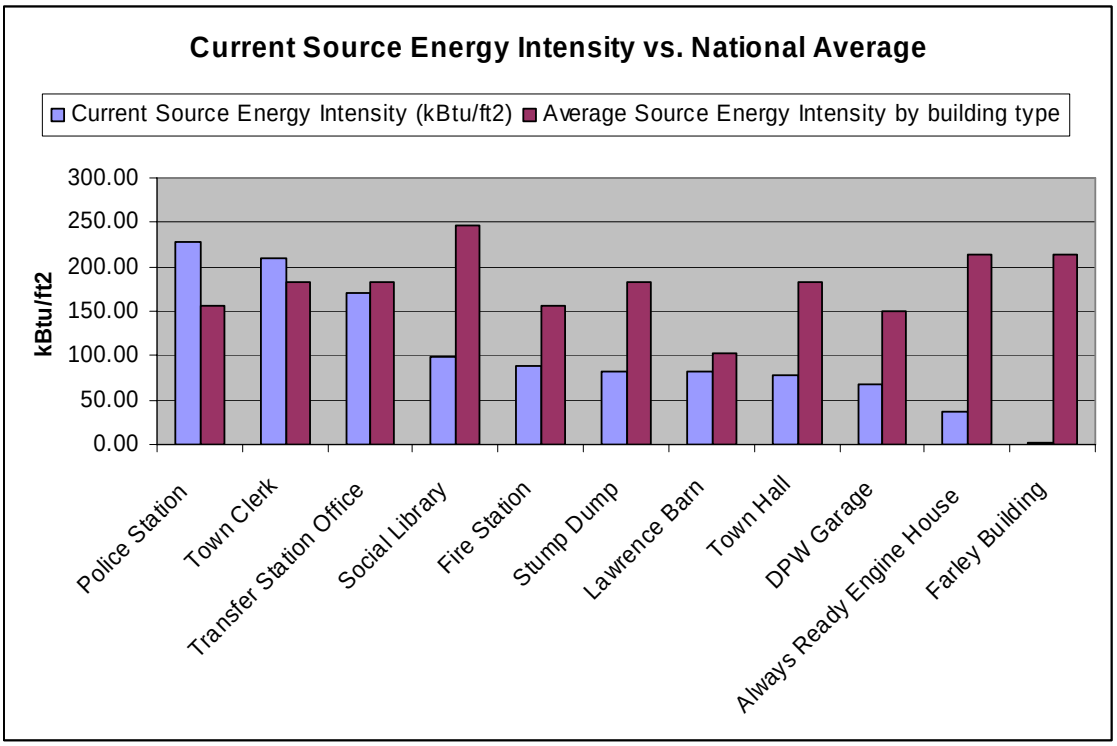


In addition to comparing site and source energy intensities across buildings in the municipality, Portfolio Manager also allows users to compare their buildings' site and source energy intensity to national averages for that building type. Graphs 6 and 7 illustrate these comparisons. Every building in Hollis' portfolio had a lower site and source intensity than the national average, with the exception of the Lawrence Barn (less than 2 kBtu/ft^2 difference), Town Clerk's Office and the Police Station. This provides further justification for the need to examine the latter two buildings carefully.

Graph 6.



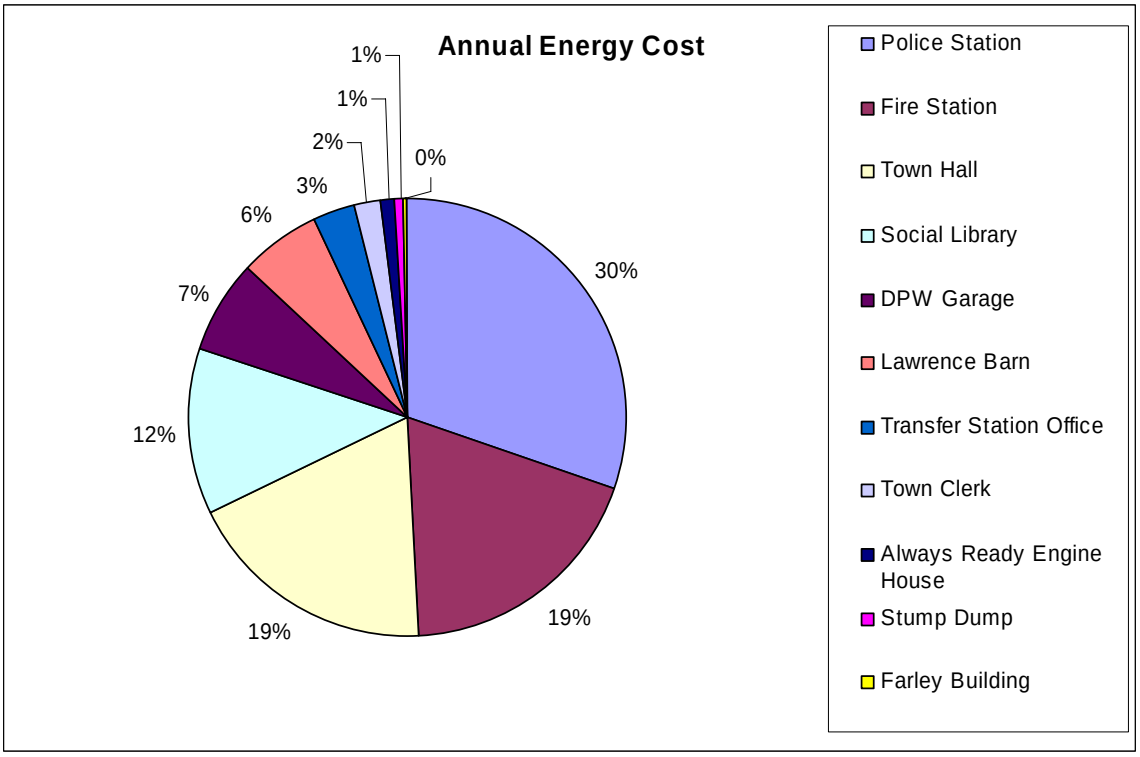
Graph 7



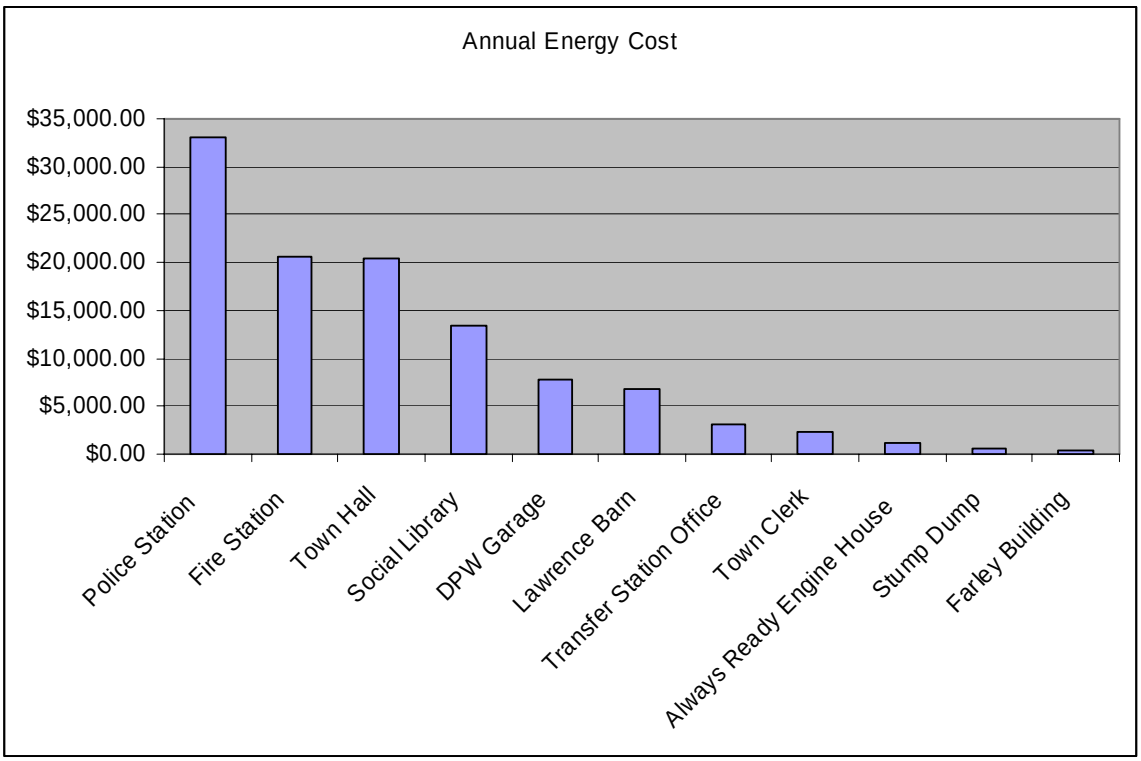
Costs by Building

Another way to evaluate building performance is to examine overall energy costs and energy costs per ft^2. 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 Hollis' portfolio—the Police Station, Fire Station, and Town Hall—account for 68% of total annual energy costs. The Police Station has the highest annual energy cost at $33,094.46, followed by the Fire Station at $20,686.26 and Town Hall at $20,357.89. These results are illustrated in Graphs 8 and 9.

Graph 8

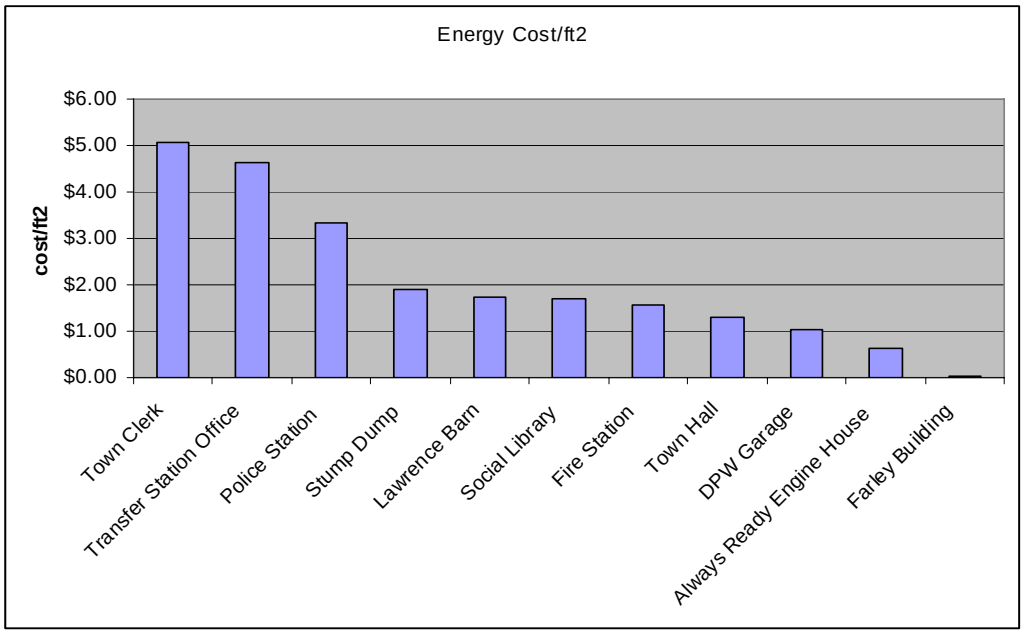


Graph 9



When comparing energy costs per square foot, the Town Clerk's Office and Police Station stand out once again at $5.07/ft² and $3.34/ft² respectively. The Transfer Station Office also has a high cost per square foot (the second highest in the portfolio) at $4.64/ft².

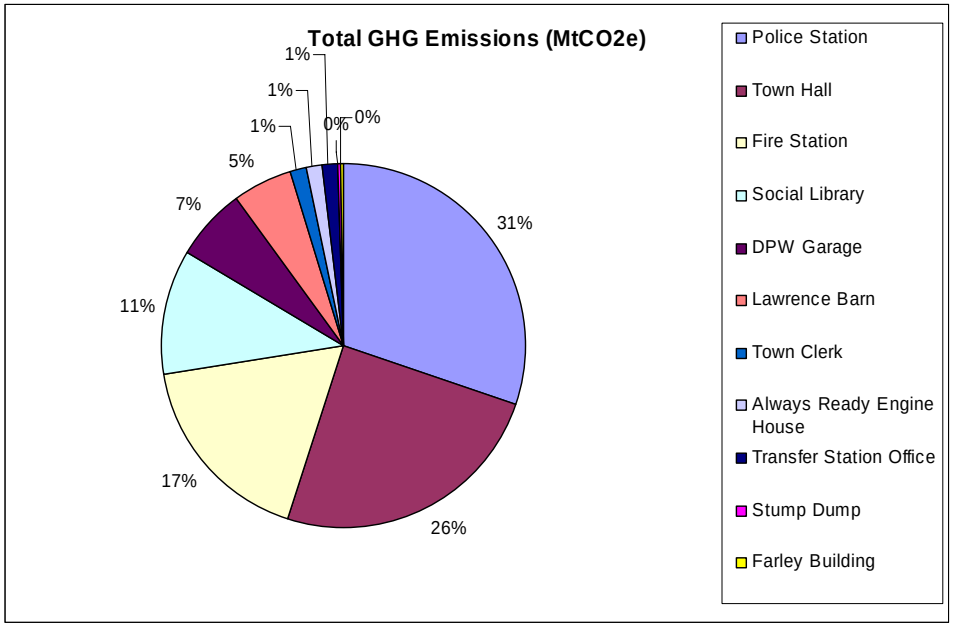
Graph 10



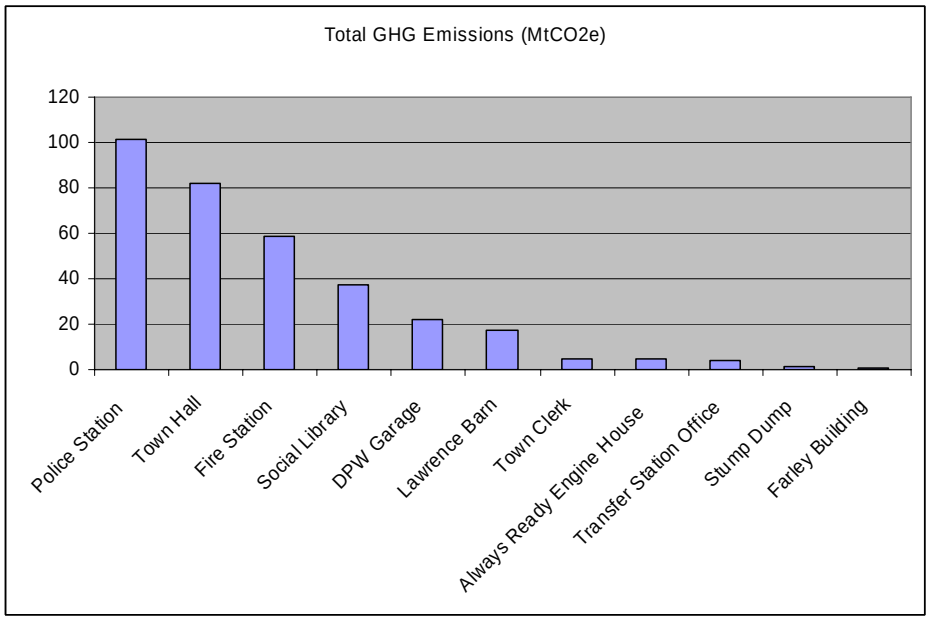
Greenhouse Gas Emissions

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 Hollis, three buildings—the Police Station, Town Hall, and Fire Station—account for 74% of the total emissions coming from all 11 buildings in the portfolio. The Police Station alone produces 36% of the emissions at 101.44 $MtCO_2e$.

Graph 11



Graph 12



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/ft^2), Source Energy Intensity (kBtu/ft^2), and Energy Cost/ft^2. Performance measures that do not take square footage into consideration include Total Energy Use (kBtu), Annual Energy Cost ($), and Greenhouse Gas Emissions ($MtCO_2e$).

The Police Station was in the top three worst performing buildings in every category. It had the worst performance in Total Energy Use, Annual Energy Cost, Greenhouse Gas Emissions, and Source Energy Intensity; the second worst performance in Site Energy Intensity; and the third worst performance in Energy Cost/ft^2. The consistency with which the Police Station performed poorly in each of these categories indicates that further attention and priority should be given to this building.

The Town Clerk's Office was one of the top three worst performing buildings in every category that considers square footage. It had the highest Site Energy Intensity, highest Energy Cost/ft^2 and second highest Source Energy Intensity. The Transfer Station Office also performed poorly in these categories, with the second highest Energy Cost/ft^2 and third highest Source Energy Intensity. Town Hall also appeared in the top three in these categories, with the third highest Site Energy Intensity.

In every category that does not consider square footage, the Police Station, Town Hall, and Fire Station were consistently among the top three worst performers. As mentioned above, the Police Station had the worst rating in each of these categories. Town Hall had the second highest Total Energy Use and Greenhouse Gas Emissions, and the third highest Annual Energy Costs. The Fire Station had the third highest Total Energy Use and Greenhouse Gas Emissions, and the second highest Annual Energy Costs. These buildings are very visible to the public and thus actions taken here would set a good example for citizens.

Recommendations based on Energy Inventory Results

<u>Building Recommendations</u>

- 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. Police Station
    2. Town Hall

3. Fire Station
4. Town Clerk's Office
5. Transfer Station Office

- Use Hollis 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 Town Hall. This will raise awareness of the Energy Committee and help Hollis to set a good example for its citizens. Building efficiency should be addressed before vehicle efficiency, as the buildings consume far more energy.

- 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. Work closely with

Project PROGRESS and use their efforts in the Hollis/Brookline schools as a case study for working with Energy Service Companies (ESCOs) and performance contracting.

- Continue to benchmark using EPA's Portfolio Manager on a regular basis. Complete a STOCC inventory for 2009 once complete data is available (early 2010). Visit the Clean Air-Cool Planet website for the excel files and more information about the inventory process. http://www.cleanair-coolplanet.org/for_communities/stocc.php

Vehicle Fleet Recommendations

- Maintain Town vehicles. A poorly tuned engine, for example, can increase fuel consumption by 10-20% depending on its condition. Keep tires properly inflated and aligned, conduct routine oil changes, and check and replace vehicle air filters. These measures will not only reduce fuel consumption but also will help vehicles to last longer.
- Instruct operators to drive more efficiently. Stay within posted speed limits and use cruise control. Avoid unnecessary idling, braking, and acceleration, which can improve fuel economy by 5-10%. Combine trips when possible; several short trips taken from a cold start can use twice as much fuel as one trip covering the same distance when the engine is warm. Finally, remove excess weight from the vehicle. Carrying an extra 100 pounds reduces fuel economy by 1-2%.
- Develop criteria within the Town's vehicle replacement policy to gradually phase in more fuel efficient or hybrid vehicles.
- Establish an anti-idling policy to encourage municipal fleet users as well as the general public to turn off their engines when the vehicle is not in use. NH state regulations under RSA 125-C:6, XII specify that when temperatures are above 32°F vehicles may not idle for more than 5 minutes. At temperatures between -10F and 32°F vehicles may not idle for more than 15 minutes. Contact the Nashua Green Team for information about the anti-idling policies they put in place for the City.
- Conduct an analysis of the standard routes vehicles take and determine whether there are more efficient routes for them to travel. Contact Steve Russell with the City of Keene's Public Works Department to learn about route analysis studies conducted there.
- Continue to conduct energy inventories of the vehicle fleet. There are a number of reasons why some years may experience increased vehicle use. Cleanup from events such as ice storms and floods may result in abnormally high fuel usage for the year and may not provide an accurate picture of typical fuel usage.

Appendix A: STOCC Inventory with SAU 41 Schools

In addition to the Small Town Carbon Calculator (STOCC) that examined vehicles, streetlights, and municipal buildings, a second STOCC inventory was conducted to include the SAU 41 schools as well. This inventory includes Hollis municipal vehicles, streetlights, and the following buildings:

Municipal Buildings	**SAU 41 School Buildings**
Always Ready Engine House	Hollis/Brookline High School
DPW Garage	Hollis/Brookline Middle School
Farley Building	Richard Maghakian Memorial School
Fire Station	Captain Samuel Douglass Academy
Police Station	Hollis Primary School
Social Library	Hollis Upper Elementary School
Town Hall	SAU 41 Administrative Building
Lawrence Barn	
Stump Dump Office	
Town Clerk Office	
Transfer Station Office	

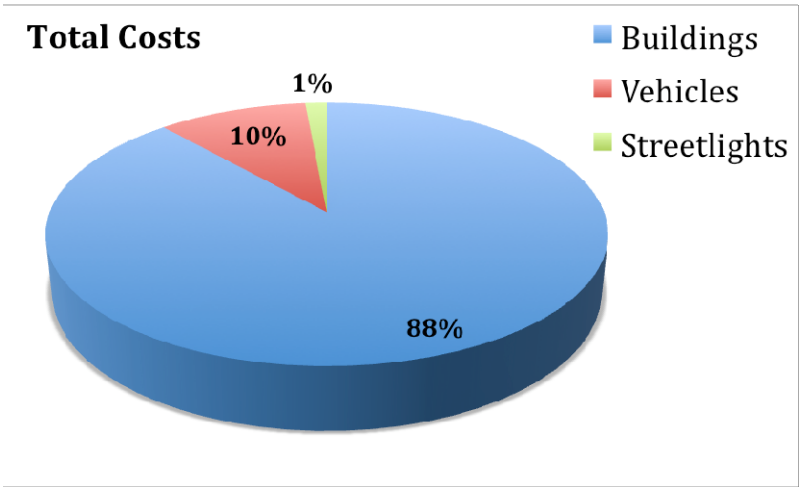
Results from this inventory, which covered the 1-year period beginning January 1, 2008 through December 31, 2008, appear below.

Table 1.

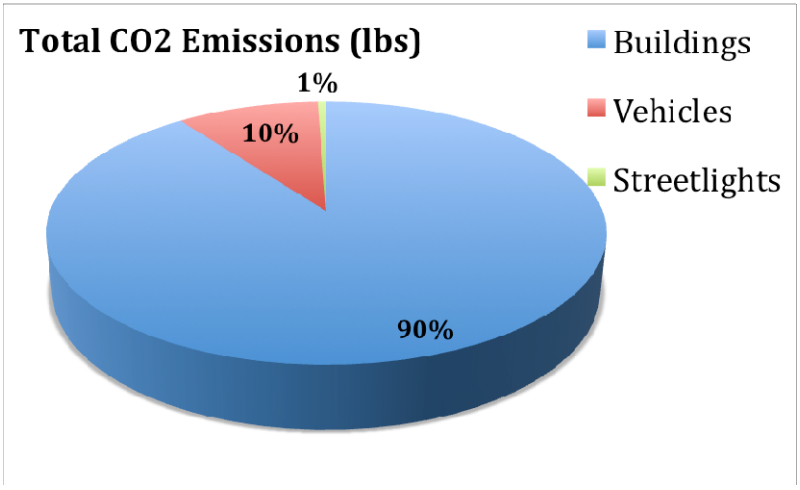
	Buildings		Vehicles		Streetlights		
	#	% of total	#	% of total	#	% of total	Grand Total
Cost	$913,657	88%	$104,070	10%	$15,139	1%	$1,032,866
CO2 (lbs)	6,561,373	90%	705,004	10%	42,362	1%	7,308,739
Energy (million BTUs)	33,185	88%	4,429	12%	160	0%	37,774

In Total, Hollis spent $1,032,866 on energy in 2008, was responsible for 7,308,739 lbs of carbon dioxide emissions (equal to 3,315 metric tons), and consumed 37,774 MMBTUs of energy.

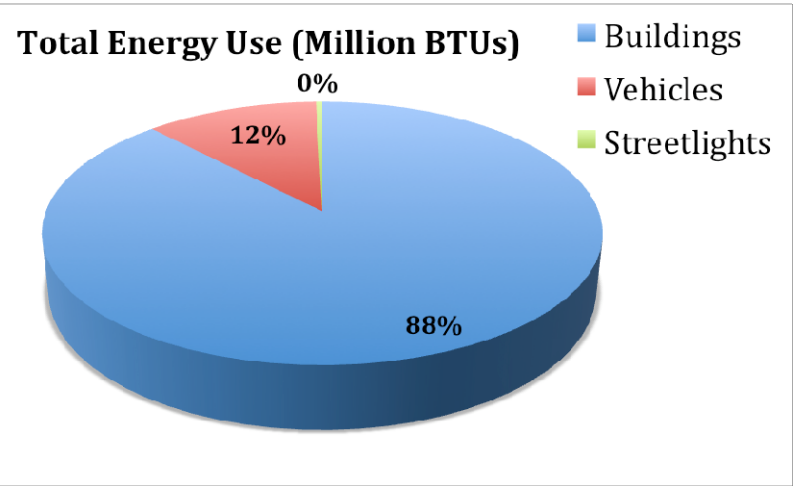
Graph 1



Graph 2



Graph 3



From these graphs, it's clear that the municipal buildings and schools combined consume the majority of the energy (88%). They are responsible for a similar percentage of energy costs and carbon dioxide emissions as well.