ENERGY STAR Benchmarking

UNH Pollution Prevention Program Intern

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Green Advisory Board
Town of Acton MA.
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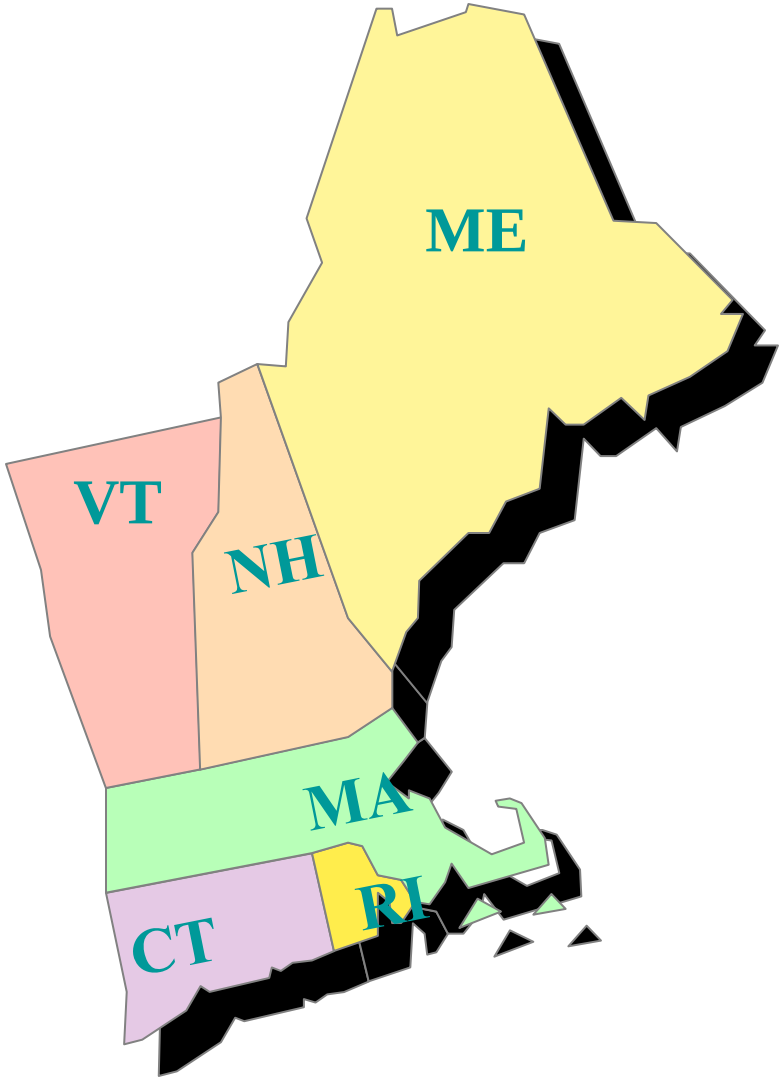
Overview

- Community Energy Challenge
- Benchmarking
- Lights and Fuels use
- Reducing Energy Use
- Acknowledgements

Average New England Town

- 25,000 people $1M/yr on municipal energy
- Energy Cost tend to be second to personnel



Why is energy efficiency so important?

•Saves Money:
-NE has among the highest energy costs in the nation. One billion was spent on energy in NE's 1500 cities, towns, and school districts every year.

•Cuts Pollution
-Energy use is the number one source of air pollution in NE and the nation.

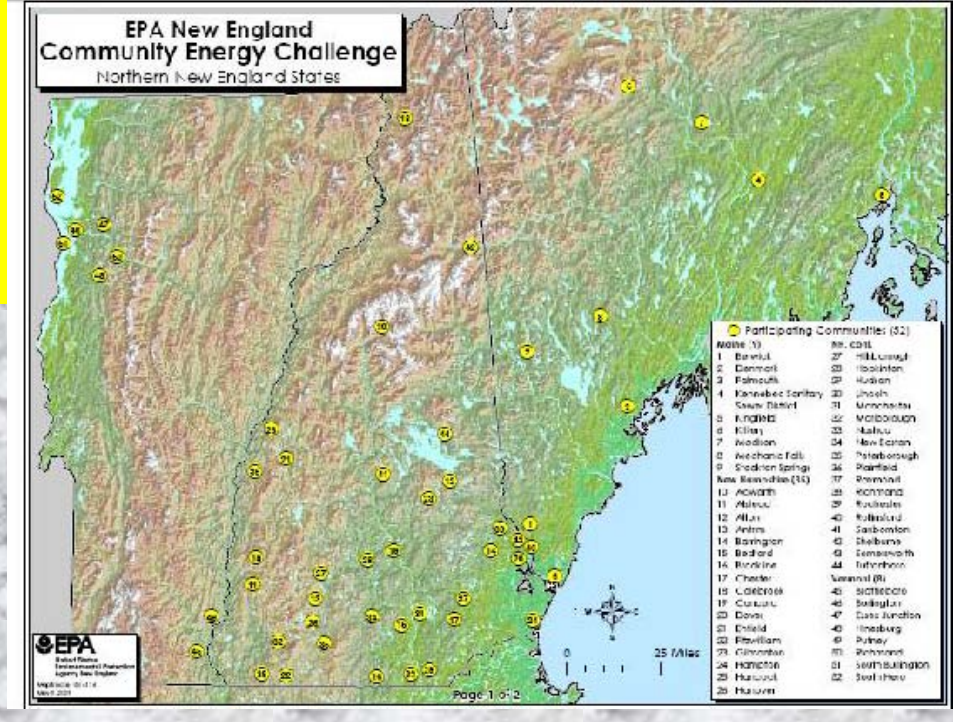
•Reduces Strain on Energy Supplies
-Energy demand in NE has been growing at 2% per year.

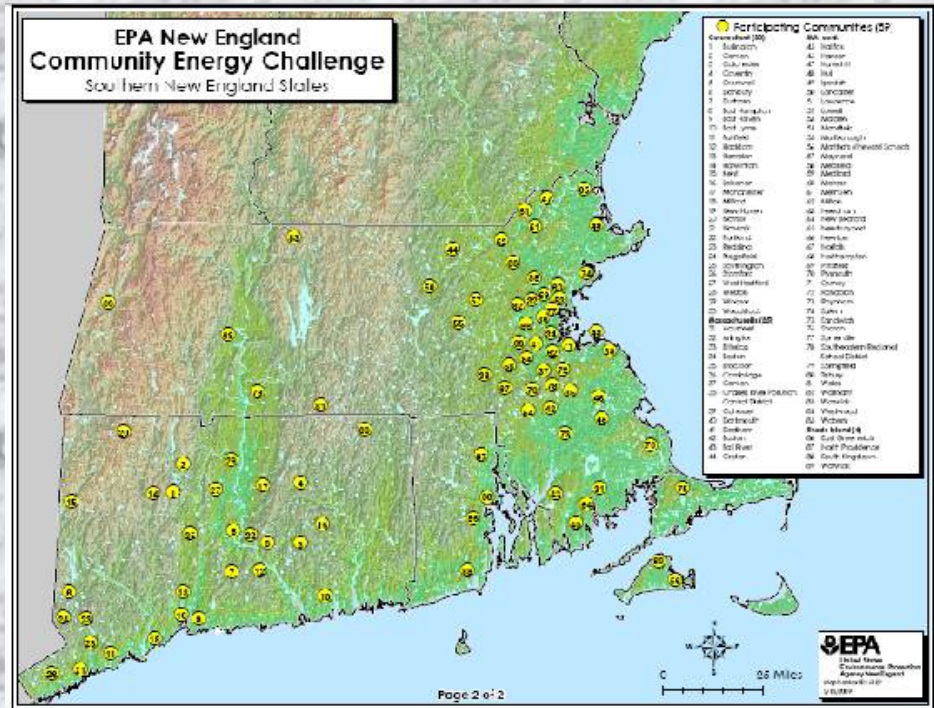
EPA Community Energy Challenge

- Challenges communities to save money and reduce air pollution.

- Targets the municipal buildings, schools, and wastewater treatment plants.

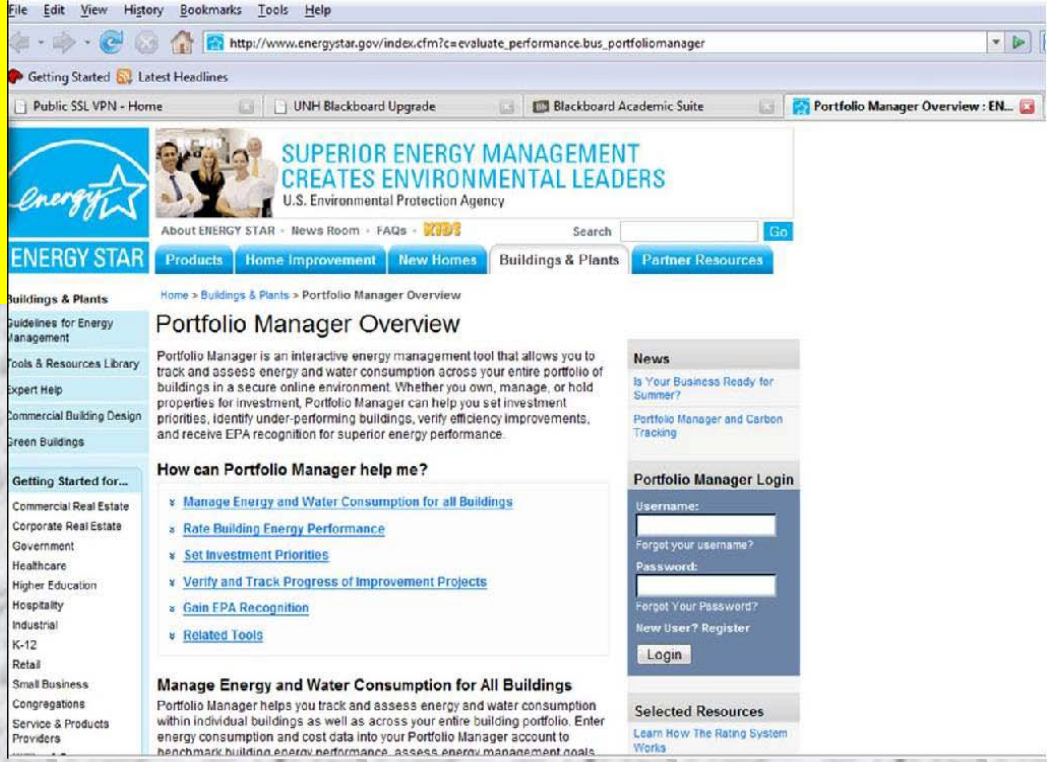
The third year program had reached 146 communities in NE, representing over 30% of NE population.

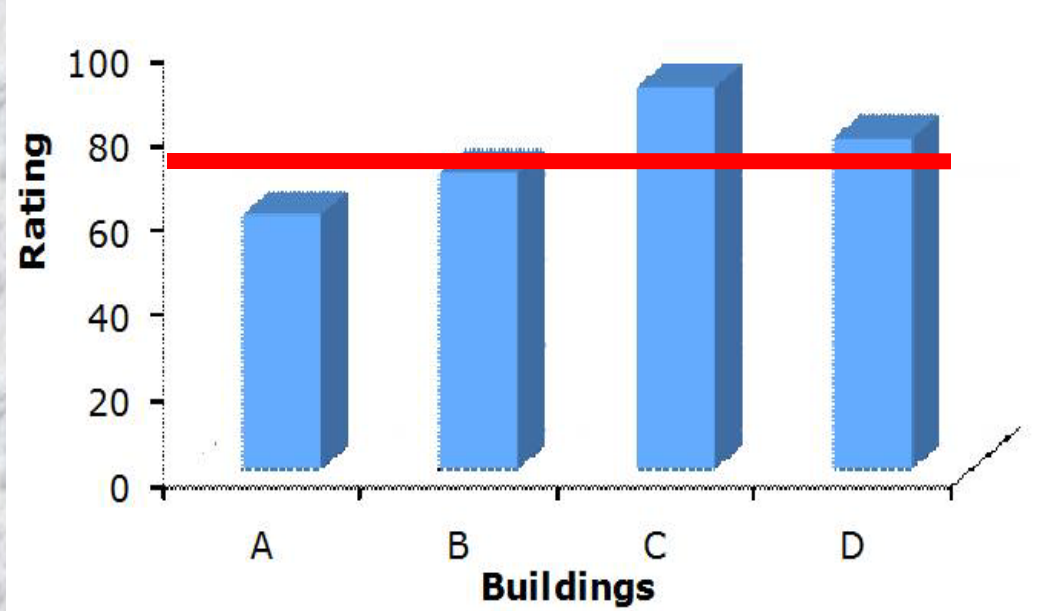




EPA Portfolio Manager

- Benchmark any building
- Certain Buildings get a score 1-100
- 75 +
- < 75





If No Score

How to Use this Table:

- The building types listed in blue define a broad building activity category. Some of the broader building type categories are broken down into more specific building activities.
- When identifying your building within this table, first identify where your building's function falls within the broader blue categories. Then determine if you are able to identify your building's function more specifically by the white categories underneath. Matching your building's main use activities most closely with the building use descriptions below, will give you the most accurate energy performance target.

2003 CBECS[1] National Average Source Energy Use and Performance Comparisons by Building Type			
Building Use Description[2]	**Average Source EUI[3] (Kbtu/Sqft)**	**Average Percent Electric**	**Average Site EUI (Kbtu/SqFt)**
Education	170	63%	76
K-12 School	*See Target Finder / Portfolio Manager*		
College/university (campus-level)	280	63%	120
Food sales	681	86%	225
Grocery store/food market	*See Target Finder / Portfolio Manager*		
Convenience store (with or without gas station)	753	90%	241
Food service	786	59%	351
Restaurant/cafeteria	612	53%	302
Fast food	1306	64%	534
Inpatient health care (hospital/ rehabilitation)	*See Target Finder / Portfolio Manager*		
Lodging	194	61%	87
Dormitory/fraternity/sorority	*See Target Finder / Portfolio Manager*		
Hotel, Motel or inn	*See Target Finder / Portfolio Manager*		
Mall (Strip Mall and Enclosed)	271	71%	107
Nursing/Assisted Living	255	54%	124

http://www.energystar.gov/ia/business/tools_resources/new_bldg_design/2003_CBECSPerformanceTargetsTable.pdf

If No Score

2003 CBECS[1] National Average Source Energy Use and Performance Comparisons by Building Type			
Building Use Description[2]	Average Source EUI[3] (Kbtu/Sqft)	Average Percent Electric	Average Site EUI (Kbtu/SqFt)
Office	*See Target Finder / Portfolio Manager*		
Outpatient and health care	183	72%	73
Clinic/other outpatient health	219	76%	84
Medical Office	*See Target Finder / Portfolio Manager*		
Public Assembly	143	57%	66
Entertainment/culture	265	63%	95
Library	246	59%	104
Recreation	136	55%	65
Social/meeting	102	57%	52
Public order and safety	189	57%	90
Fire station/police station	157	56%	78
Service (vehicle repair/service, postal service)	150	63%	77
Storage/Shipping/Nonrefrigerated warehouse	56	56%	25
Self-storage	12	44%	4
Non-refrigerated warehouse	*See Target Finder / Portfolio Manager*		
Distribution/shipping center	90	61%	44
Refrigerated warehouse	*See Target Finder / Portfolio Manager*		
Religious worship	83	52%	46
Retail (non-mall stores, vehicle dealerships)	191	67%	82
Other[4]	213	56%	104

Intern Role

- Familiarize
- Assist
- Train
- Interpret

Community Energy Challenge Process

Step 1. Take the Pledge.

~Community sends in their commitment letter to EPA-NE

TOWN OF ACTON
472 Main Street
Acton, Massachusetts, 01720
Telephone (978) 264-9612
Fax (978) 264-9630

Paulina S. Knibbe, Chair
BOARD OF SELECTMEN

September 22, 2009

Mr. Robert W. Varney
Regional Administrator
EPA New England
1 Congress Street
Boston, MA 02114

Dear Mr. Varney:

With this letter, the Town of Acton joins EPA New England's Community Energy Challenge and commits to becoming an EPA ENERGY STAR Partner. We are making a commitment to protect the environment through the continuous improvement of our energy performance. We believe that an energy management strategy for our municipal, buildings and facilities will help us enhance our financial health and aid in preserving the environment for future generations. In partnership with EPA, we will specifically:

Assess – Benchmark – the energy performance of all municipal buildings, schools and/or drinking water/wastewater treatment facilities in our community

Set a Goal to reduce energy use in buildings by 10% or more

Promote energy efficiency and renewable to companies and organizations in our community

We understand that our commitment to assess and improve the energy performance of our community is supported by the strategic resources and tools offered through the Community Energy Challenge, in addition, we are aware that both ENERGY STAR and the Community Energy Challenge present opportunities to be recognized for success. To be eligible for recognition, we will share with EPA our progress and milestone achievements.

The Town of Acton looks forward to our partnership with EPA.

Very truly yours,

Paulina S. Knibbe, Chair
Board of Selectmen

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The Town of Acton looks forward to our partnership with EPA.

The Pledge

Community Energy Challenge Process: Step 2 Initial Meeting, Mon Nov 30, 2009

Step 3 Gather data…

Benchmarking Municipal Buildings

	(Temporary values should only be used if an Actual value is not currently known) What is this?	Value		(when this Attribute Value was first true) What is this? (MM/DD/YYYY)
*Gross Floor Area	For Temporary Use?	N/A	Sq. ft.	01/01/1965
*Weekly operating hours	For Temporary Use?		Hours	01/01/1965
*Workers on Main Shift	For Temporary Use?		No Units	01/01/1965
*Number of PCs	For Temporary Use?		No Units	01/01/1965
*What percent of this space is air-conditioned?	Select For Temporary Use?		No Units	01/01/1965
*What percent of this space is heated?	Select For Temporary Use?		No Units	01/01/1965

Benchmarking School Buildings

	if an Actual value is not currently known) What is this?			Attribute Value was first true) What is this? (MM/DD/YYYY)
*Gross Floor Area	For Temporary Use?	N/A	Sq. Ft.	01/01/1965
*Is this building normally open at all on the weekends?	Yes No For Temporary Use?		No Units	01/01/1965
*Number of PCs	For Temporary Use?		No Units	01/01/1965
*Number of walk-in refrigeration/freezer units	For Temporary Use?		No Units	01/01/1965
*Presence of cooking facilities	Yes No For Temporary Use?		No Units	01/01/1965
*Percent of the gross floor area that is cooled	Select For Temporary Use?		%	01/01/1965
*Percent of the gross floor area that is heated	Select For Temporary Use?		%	01/01/1965
*Is this building a high school (teaching grades 10, 11, and/or 12)?	Yes No For Temporary Use?		No Units	01/01/1965

Wastewater Treatment Plants

- Average influent flow (mgd)
- Average influent biological oxygen demand (BOD_5)
- Average effluent biological oxygen demand (BOD_5)
- Plant design flow rate (mgd)
- Presence of fixed film trickle filtration process – yes or no
- Presence of nutrient removal process – yes or no

<u>Electric and Natural Gas/Oil bills on a monthly basis for a 12 month period</u>

Community Energy Challenge Process

Step 4 Enter Data in Portfolio Manager …

Facility Performance Set Baseline Periods | Set Energy Performance Target

Select View: Summary: Energy Use Create View | Edit View

12 Months Ending	Current Rating (1-100)	Current Site Energy Intensity (kBtu/Sq. Ft.)	Current Source Energy Intensity (kBtu/Sq. Ft.)	Change from Baseline: Energy Use Intensity (kBtu/Sq. Ft.)	Change from Baseline: Adjusted Energy Use Intensity (kBtu/Sq. Ft.)	Energy Use Alerts
October 2009	N/A	127.5	258.0	0.0	0.0	
Select Date						
Change						

REFRESH VIEW

Space Use Add Space

Space Name	Space Type	Floor Area (Sq. Ft.)	% Floor Area	Alerts	
Acton Public Safety Facility	Other - Public Order and Safety	26,033	100	>10% of Total Floor Space more	Delete Space
Total		26,033	100		

Because more than 50% of your building is Public Order and Safety, your building is designated as Public Order and Safety within Portfolio Manager. This building may be eligible for a rating (Click to learn more). If you can see a rating for this building, please note that the rating takes into account all of the space types you have listed. If you cannot see a rating for this building, you can be compared to the national average for Public Order and Safety (Click to learn more).

Due to rounding, the % Floor Area Total may not always equal 100%.

Energy Meters Add Meter | Delete Multiple Meters | View All Meter Data in Excel

Meter Name	Energy Type	Space(s)	Last Meter Entry (End Date)	Alerts
Acton Public Safety Gas	Natural Gas (therms)	Entire Facility	10/31/2009	Delete Meter
Public Safety Electricity	Electricity - Grid Purchase (kWh (thousand Watt-hours))	Entire Facility	10/31/2009	Delete Meter

General Facility Administration
Track Energy Performance Improvements
Delete this Facility from Portfolio Manager
Contact us

Sharing Data
Add users to share this Facility
Modify list of users
Transfer Facility to another user
View entire Access List for this Facility

Applying for the ENERGY STAR
Apply for the ENERGY STAR
View status of ENERGY STAR Applications

Building Profiles
A building Profile can be created when an ENERGY STAR label application is submitted

Step 5 Data Analysis and Results …

Buildings Benchmarked

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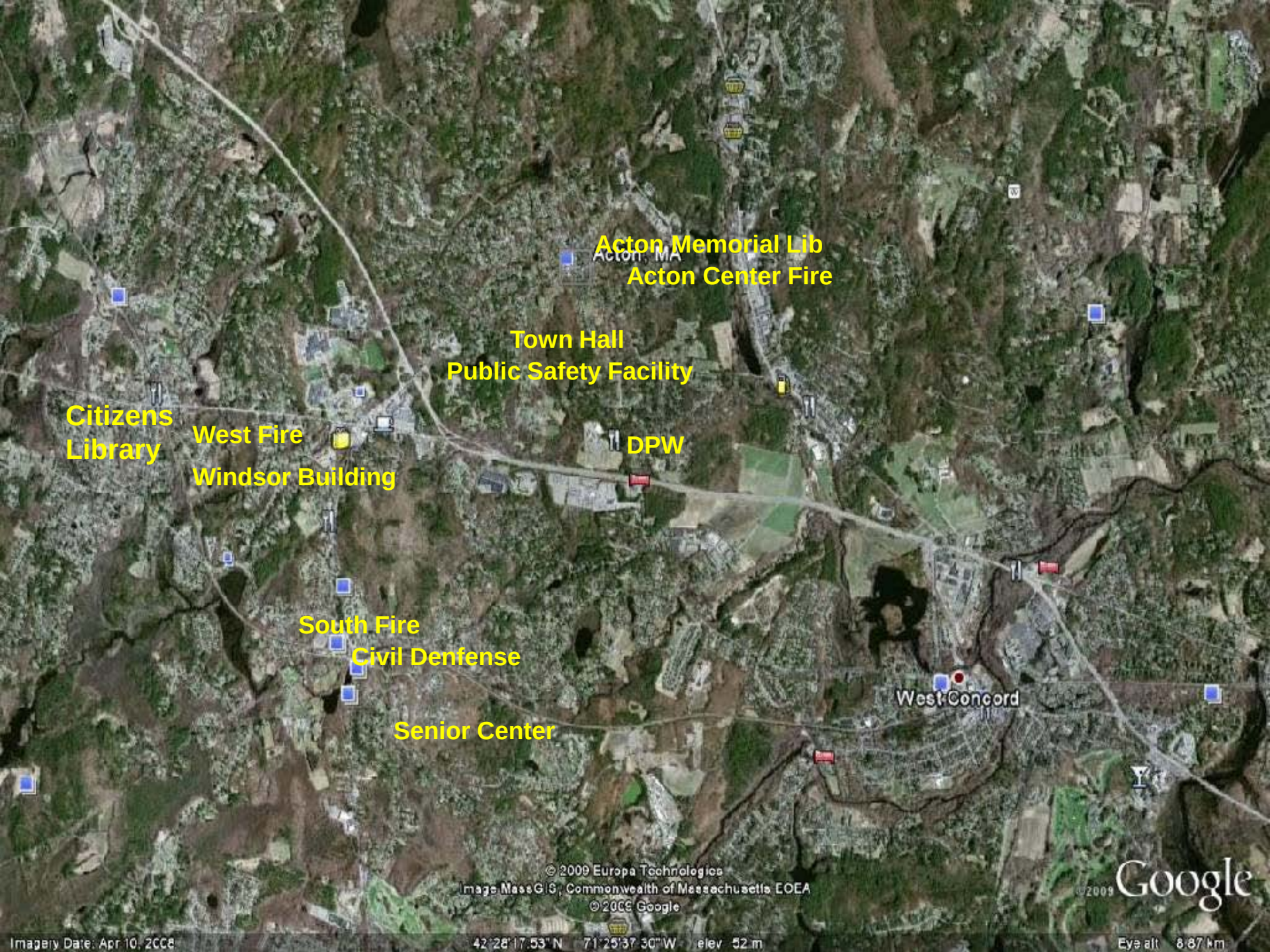
1. Acton Citizens Library
2. Acton Civil Defense
3. Acton Department of Public Works
4. Acton Center Fire Station
5. Acton West Fire Station
6. Acton South Fire Station
7. Acton Memorial Library
8. Acton Public Safety Facility
9. Acton Senior Center
10. Acton Town Hall
11. Acton Wastewater Treatment Facility
12. Acton Windsor Building


Acton Memorial Lib
Acton Center Fire
Acton, MA
Town Hall
Public Safety Facility
Citizens
Library
West Fire
Windsor Building
DPW
South Fire
Civil Denfense
Senior Center
West Concord
© 2009 Europa Technologies
Image MassGIS, Commonwealth of Massachusetts EOEA
© 2009 Google
Google
Imagery Date: Apr 10, 2008
42°28'17.53" N 71°25'37.30" W elev 52 m
Eye alt 8.87 km

Municipal Buildings Benchmarked

Building	Address	Employees	Computers	Operating Hours/week	Sq. Footage
Acton Citizens Lib	21 Windsor Ave	1.75	4	30	2008
Acton Civil Defense	3 School Street	1	0	4	2592
Acton DPW	14 Forest Road	21	5	45	19200
Acton Center Fire	7 Concord Road	4	2	168	4678
Acton South Fire	54 School Street	2	2	168	5848
Acton West Fire	256 Central Street	4	2	168	5162
Acton Memorial Lib	486 Main Street	9.25	45	64	48259
Acton Public Safety	371 Main Street	10	45	168	26033
Acton Senior Center	50 Audubon Drive	5	9	45	6704
Acton Town Hall	472 Main Street	56	52	65	24144
Acton Windsor bldng	18 Windsor Ave.	0	0	0	2952

Schools Benchmarked

School	Open Weekend	PCs	Refrigeration	Cooking	Cooled	Heating	Sq-Ft
Central School Campus							
High School	Yes	714	6	Yes	100%	100%	386000
Jr. High	Yes	320	4	Yes	50%	100%	143280
Parker Damon	Yes	289	4	Yes	100%	100%	139963
Gates Elementary	Yes	102	2	Yes	20%	100%	53933
Conant Elementary	Yes	111	2	Yes	20%	100%	56017
Douglas Elementary	Yes	115	2	Yes	90%	100%	47324

Data Sources: At least 12 months of Energy Use data

NSTAR

Constellation NewEnergy™

A Member of the Constellation Energy

KEYSPAN ENERGY

Portfolio Manger Login Info:

- Portfolio Manager site:

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

Data Entry

- **Obtain Energy and $ savings for 10% energy reduction**

Facility Performance | Set Baseline Periods | Set Energy Performance Target

Select View: Summary, Energy Use | Create View | Edit View

12 Months Ending	Current Rating (1-100)	Current Site Energy Intensity (kBtu/Sq. Ft.)	Current Source Energy Intensity (kBtu/Sq. Ft.)	Change from Baseline: Energy Use Intensity (kBtu/Sq. Ft.)	Change from Baseline: Adjusted Energy Use Intensity (kBtu/Sq. Ft.)	Energy Use Alerts
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Add users to share this Facility
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Transfer Facility to another User
View entire Access List for this Facility

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Apply for the ENERGY STAR
View status of ENERGY STAR Applications

Building Profiles
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Target 10% energy reduction will save $11,970/year.

Baseline Period (12 Months Ending): 10/31/2009 | Modify Baseline Period

Target (1-100 Rating)	Baseline Rating (1-100)	Baseline Energy Use (kBtu/year)	Target Energy Use (kBtu/year)	Energy Cost Savings ($/year)	Target Reduction (%)
0	N/A	3,318,460	2,986,614	$11,970	10 %

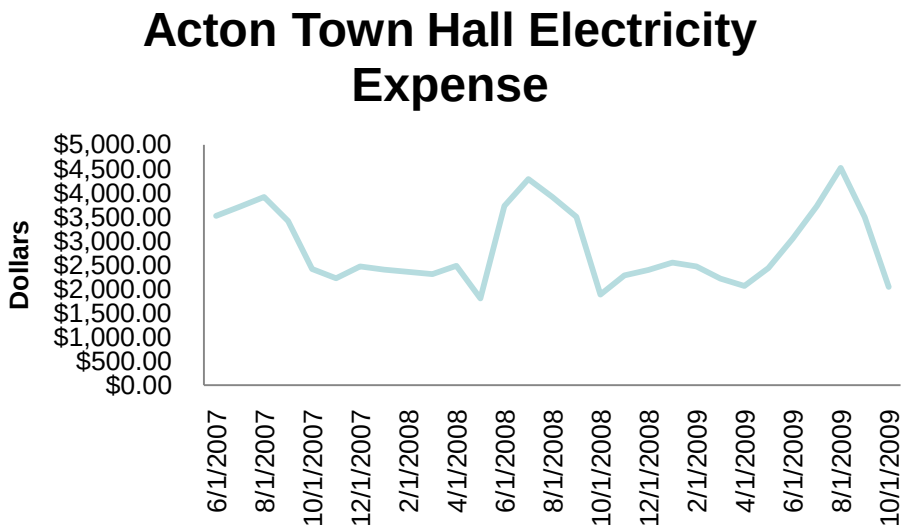
Acton Town Hall

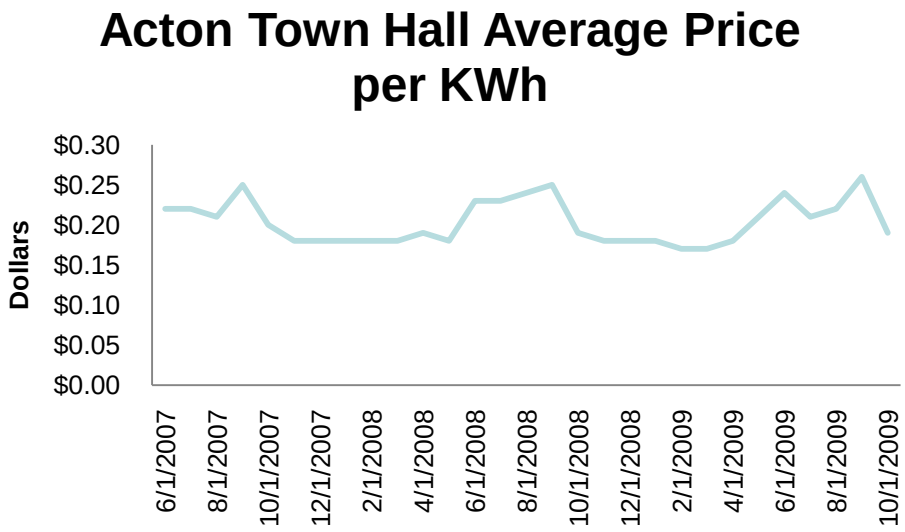
- Baseline energy usage: 1,326,440 kBtu's/year (394,274 kWH)
- Target energy usage with 10% reductions:1,193,796 kBtu's/year (349,633 kWh)
- Energy Star Rating: 89!
- Current source energy use intensity (EUI): kBtu's/Sq. Ft.-year 115.9
- National source energy use intensity (EUI) Average: kBtu's/Sq. Ft.-year 208
- Potential Savings with 10% energy reduction: $4983

Score: 89***

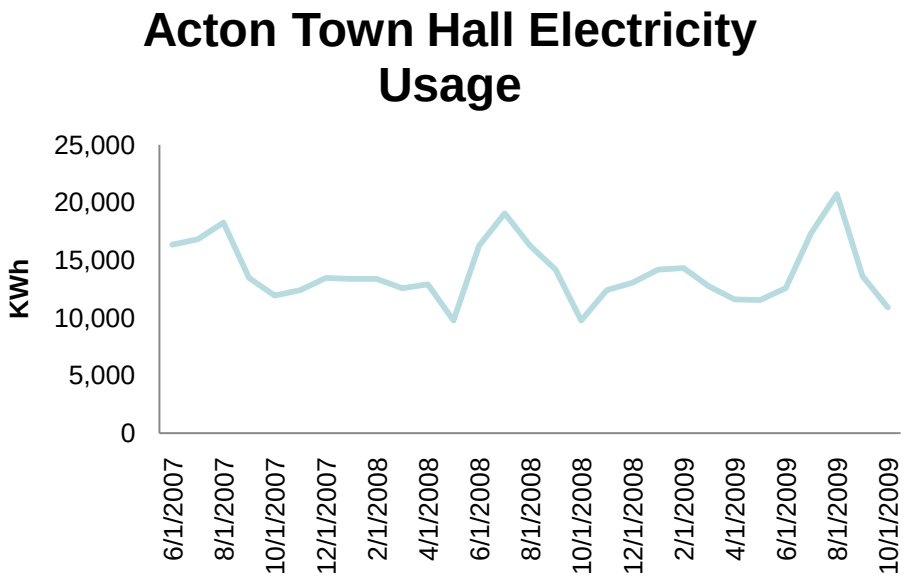
Total Floor Space: 24,144 Sq. ft.

Acton Town Hall Electricity and Natural Gas Monthly Consumption





Gas Usage Data not available for FY08 because boiler was switched from Oil burning to Gas burning in Summer 09. 16,370$ spent on heating in FY 08 as opposed to 13722$s spent on heating in FY09. $2,648 savings.



Acton Public Safety Complex

- Baseline energy usage:

kBtu's/year 3,318,460

(971,894 kWH)

- Target energy usage with 10%reductions: 2,986,614 kBtu's/year

(874,704 kWh)

Current source energy use intensity (EUI): 288

kBtu's/Sq. Ft.-year

Potential Savings with 10% energy reduction: $11,970

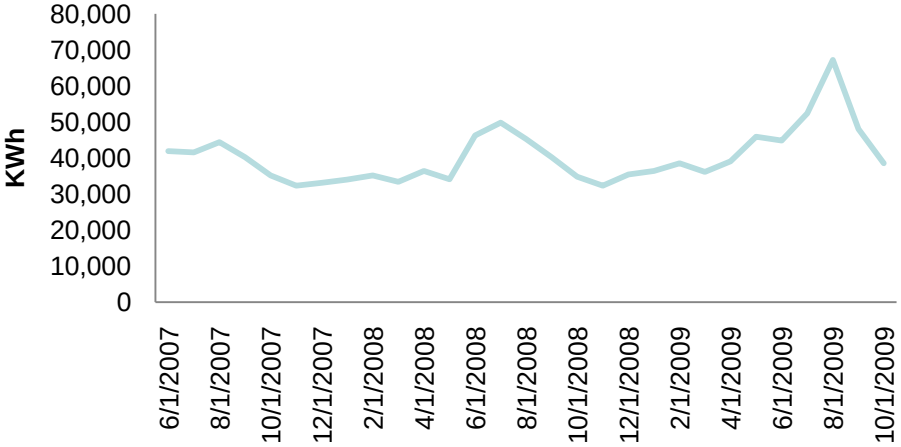
National Average source energy use intensity (EUI): 189

kBtu's/Sq. Ft.-year

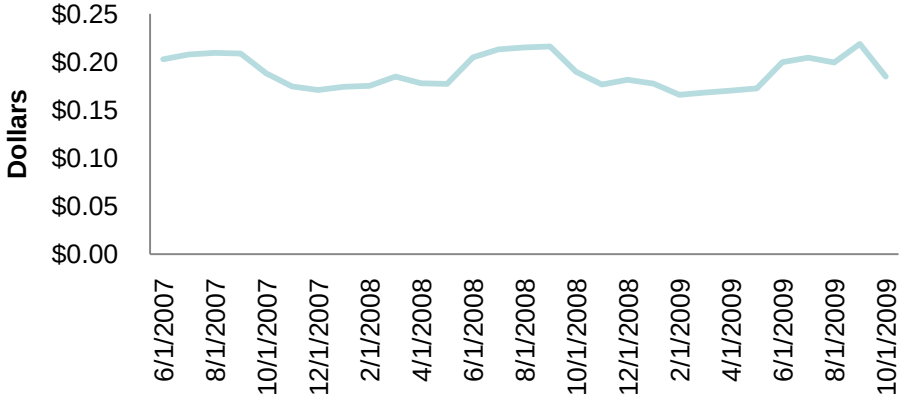
Total Floor Area: 26,033Sq.ft.

Acton Public Safety Complex Electricity Monthly Consumption & Cost

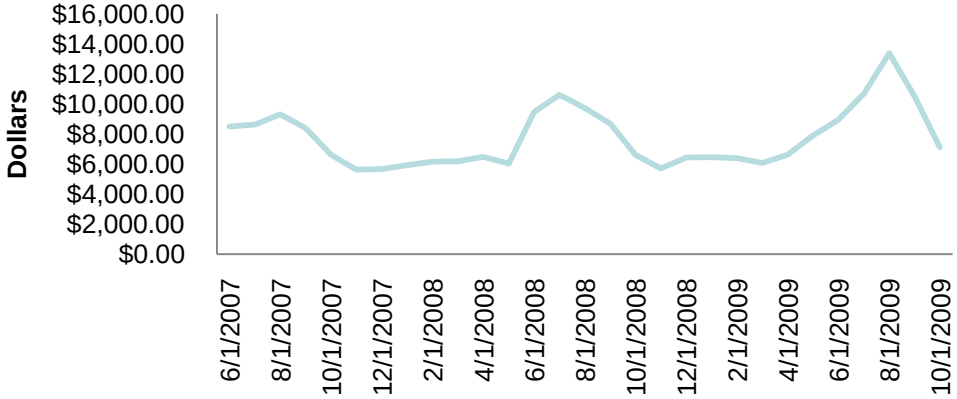
Acton Public Safety Electricity Usage



Acton Public Safety Average Price per KWh

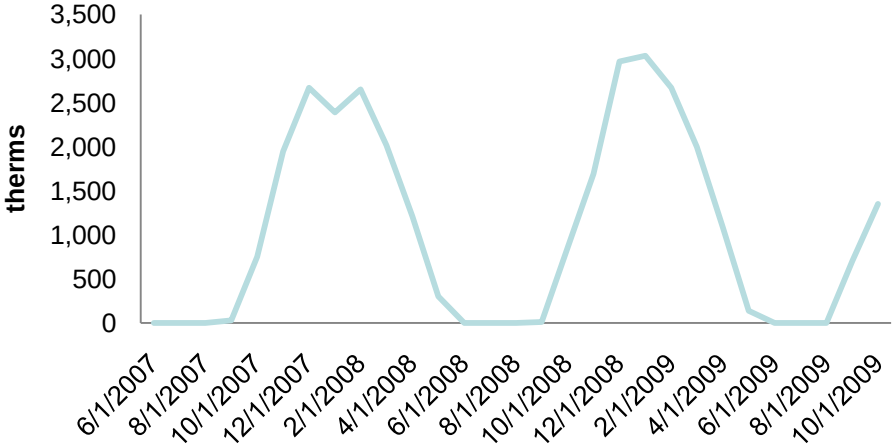


Acton Public Safety Electricity Expense

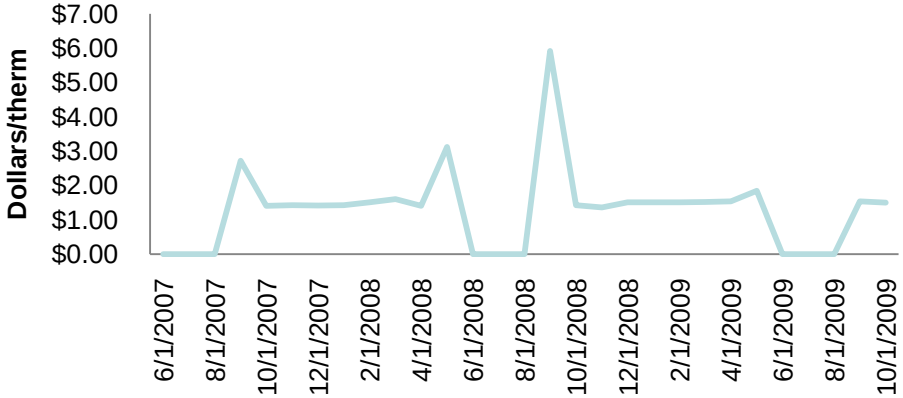


Acton Public Safety Complex Natural Gas Monthly Consumption & Cost

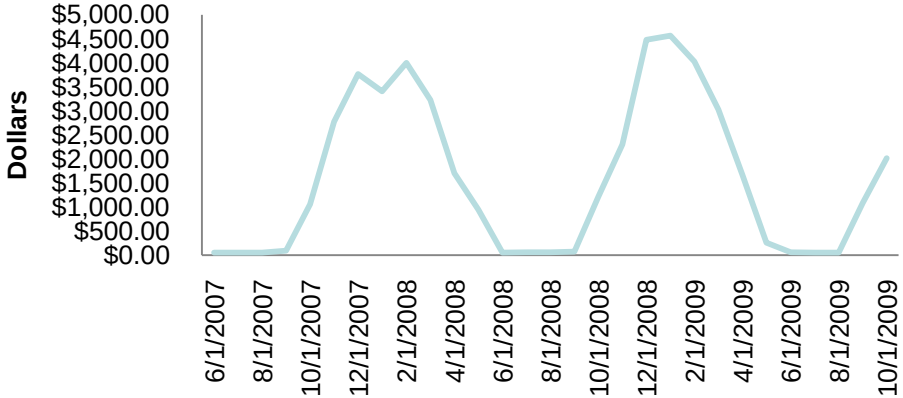
Acton Public Safety Gas Usage



Acton Public Safety Average Price per therm



Acton Public Safety Gas Expense



Acton Fire Dept (Center, West, and South Fire Stations)

- Baseline energy usage:

1,608,167 kBtu's/year

(470,992 kWH)

- Target energy usage with 10% reductions: 1,447,350 kBtu's/year

(423,893 kWh)

Current source energy use intensity (EUI): 157.3

kBtu's/Sq. Ft.-year

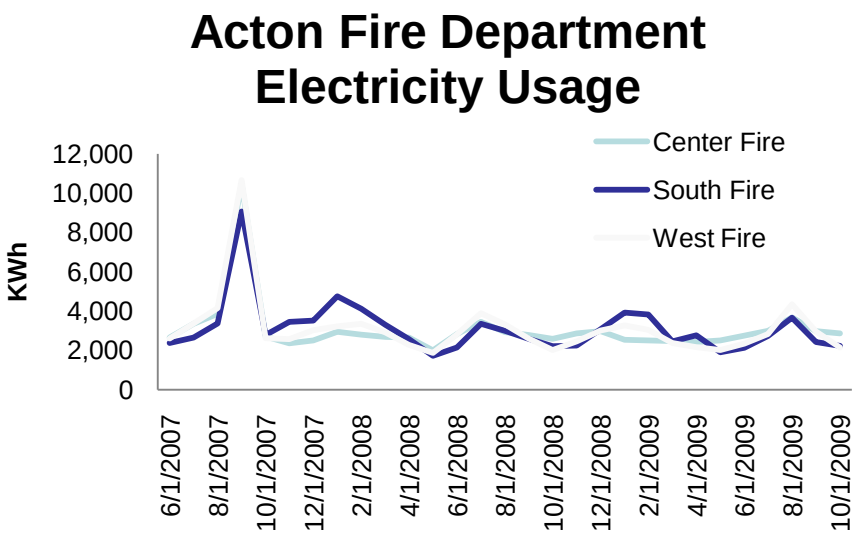
National Average source energy use intensity (EUI): 157

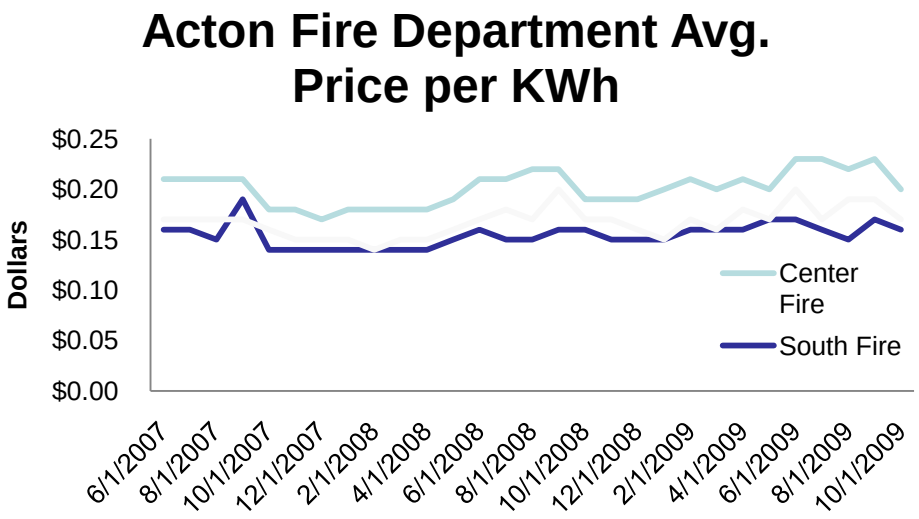
kBtu's/Sq. Ft.-year

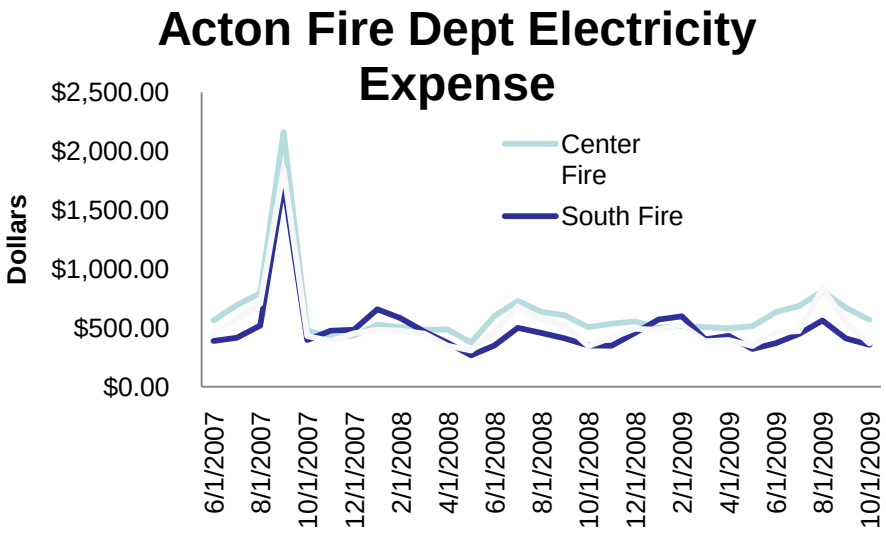
Potential Savings with 10% energy reduction: $3,891

Total Floor Area: 15,688 Sq.ft.

Acton Fire Electricity Monthly Consumption & Cost

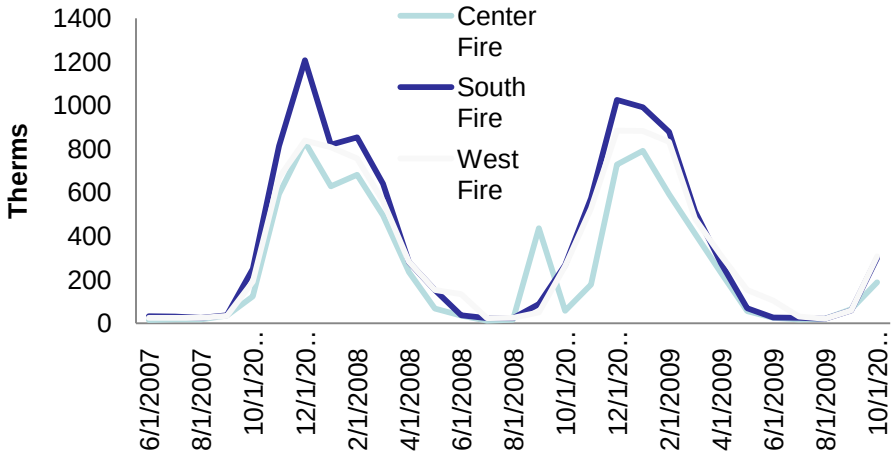




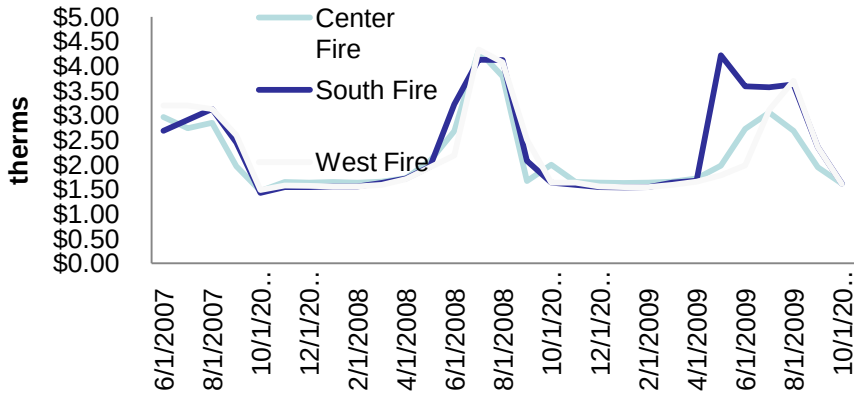


Acton Fire Natural Gas Monthly Consumption & Cost

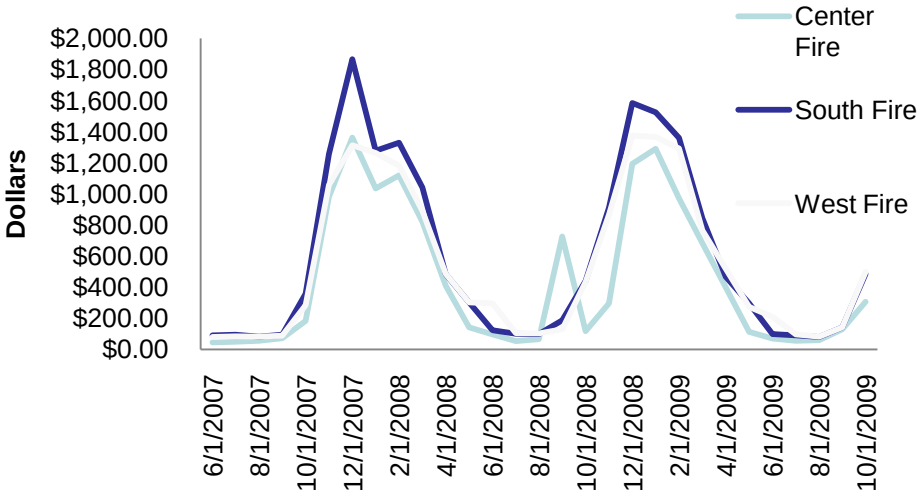
Acton Fire Department Gas Usage



Acton Fire Department Avg Price per therm



Acton Fire Dept Gas Expense



Acton Civil Defense

- Baseline energy usage:

184,414 kBtu's/year

(54,010 kWH)

- Target energy usage with 10% reductions: 165,973 kBtu's/year

(48,609 kWh)

Current source energy use intensity (EUI):

89 kBtu's/Sq. Ft.-year

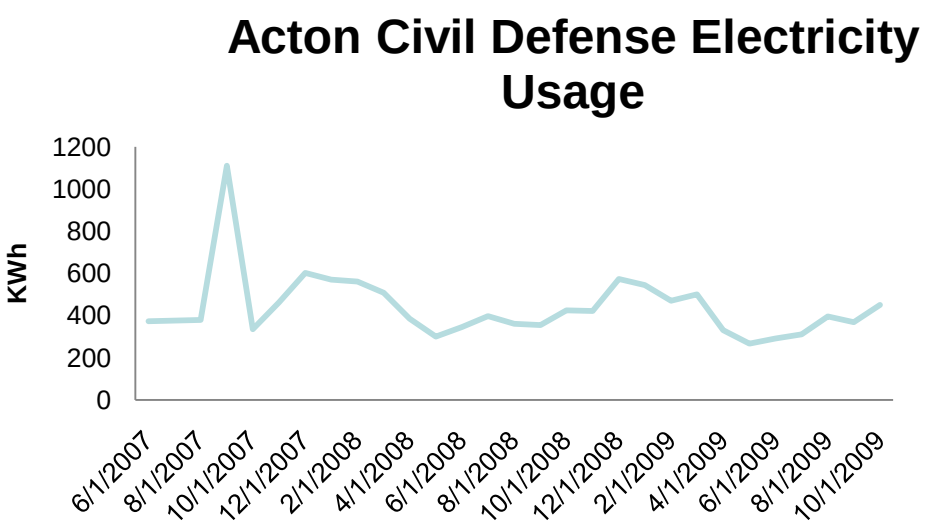
National Average source energy use intensity (EUI):

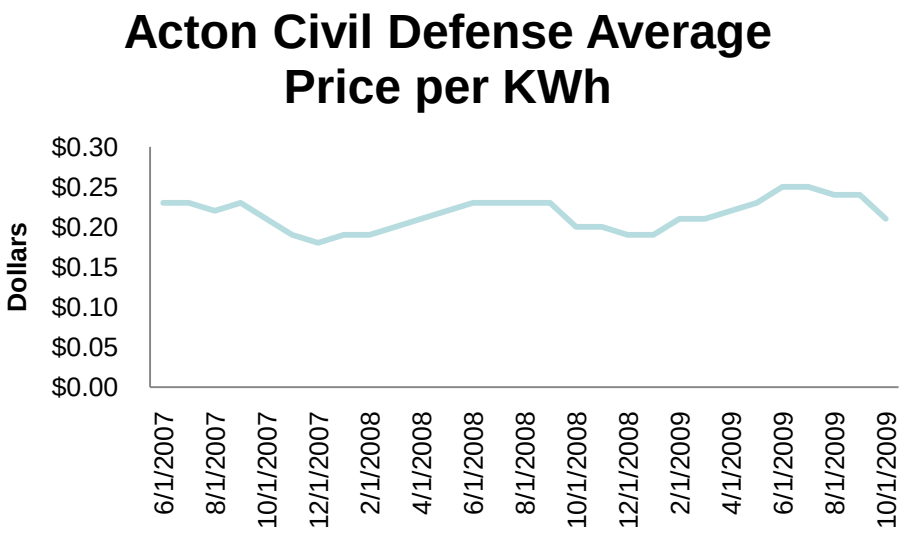
182 kBtu's/Sq. Ft.-year

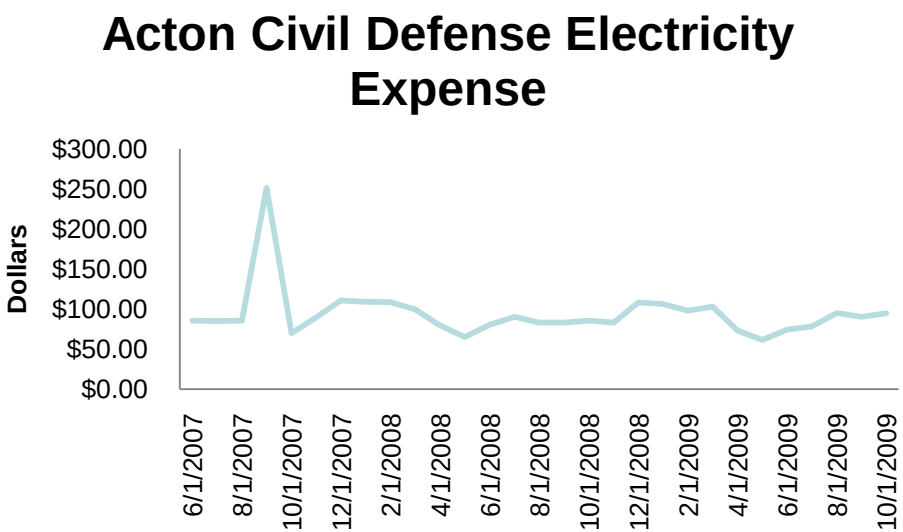
Potential Savings with 10% energy reduction: $407

Total Floor Area: 2,592 Sq.ft.

Acton Civil Defense Electricity and Natural Gas Monthly Consumption

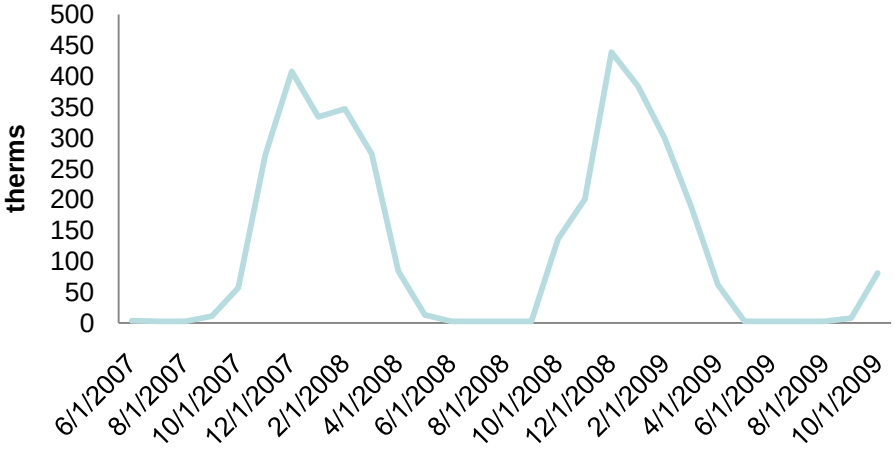




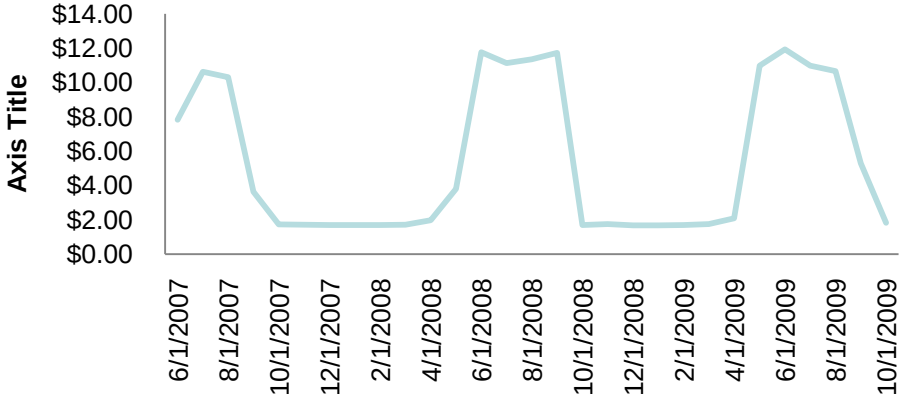


Acton Civil Defense Electricity and Natural Gas Monthly Consumption

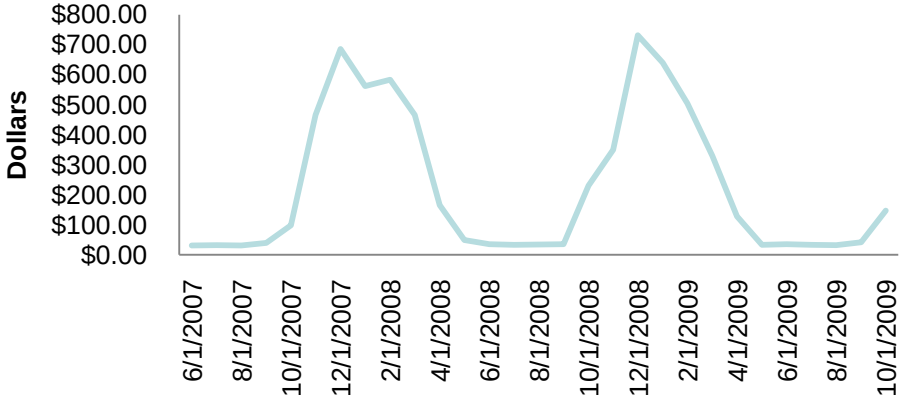
Acton Civil Defense Gas Usage



Acton Civil Defense Average Price per therm



Acton Civil Defense Gas Expense



Acton Senior Center

- Baseline energy usage: 423,423 kBtu's/year

  (124,010 kWH)
- Target energy usage with 10% reductions: 381,081 kBtu's/year

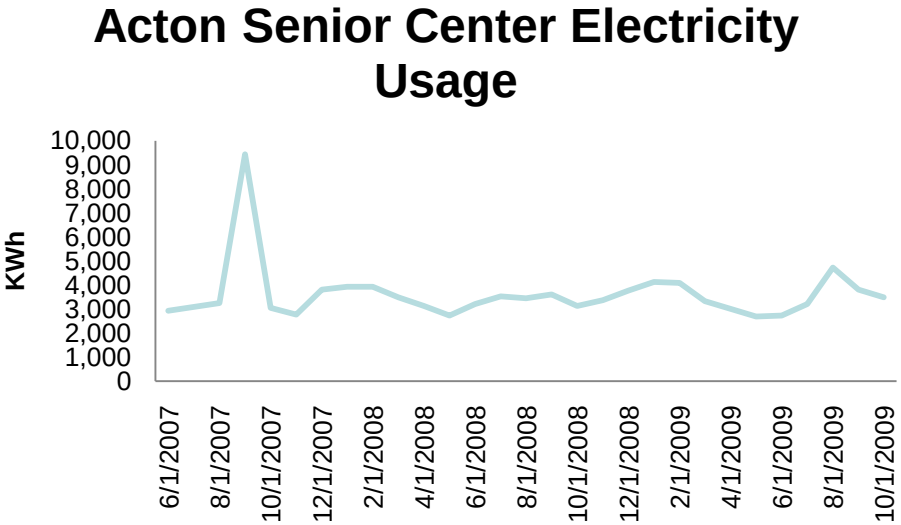
  (111,623 kWh)
- Current source energy use intensity (EUI): 115 kBtu's/Sq. Ft.-year

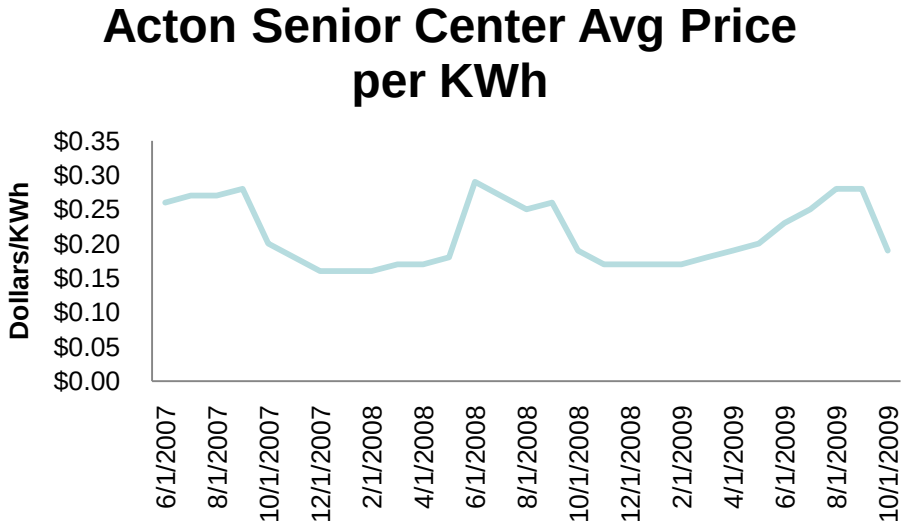
  National Current source energy use intensity (EUI) Average:

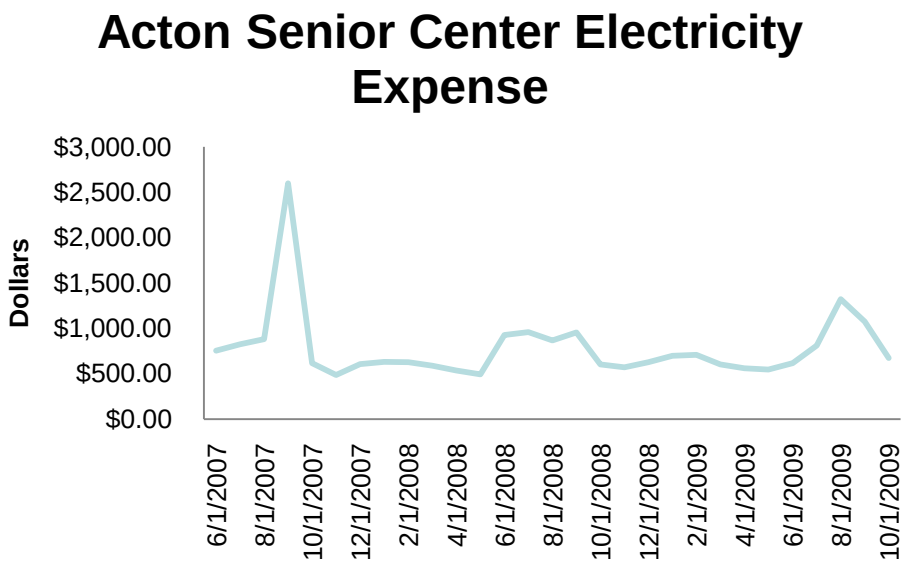
  102 kBtu's/Sq. Ft.-year
- Potential Savings with 10% energy reduction:$1,334

Total Space: 6,704 Sq.ft.

Acton Senior Center Electricity Monthly Consumption & Cost

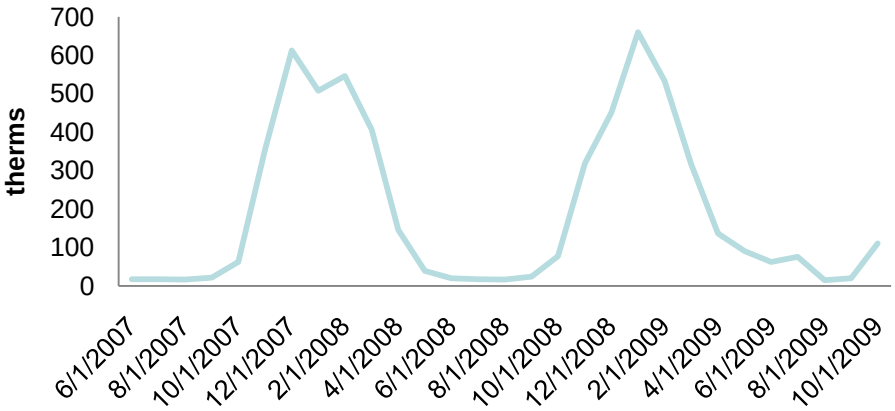




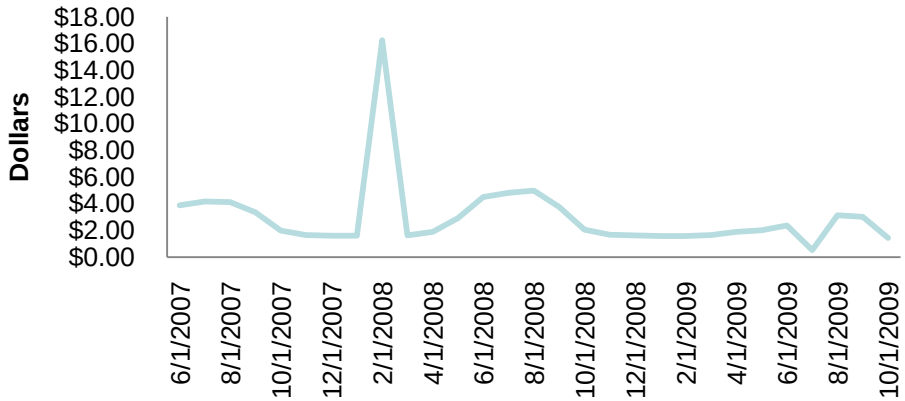


Acton Senior Center Natural Gas Monthly Consumption & Cost

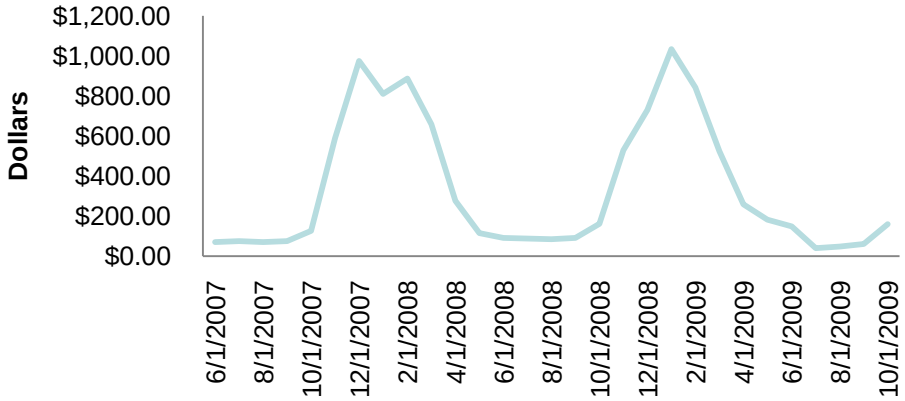
Acton Senior Center Natural Gas Usage



Acton Senior Center Average Price per therm



Acton Senior Center Gas Expense



Windsor Building

- Baseline energy usage: 83,779 kBtu's/year

  (24,537 kWH)
- Target energy usage with 10% reductions: 75,401 kBtu's/year

  (22,083 kWh)
- Current source energy use intensity (EUI): 34.0 kBtu's/Sq. Ft.-year

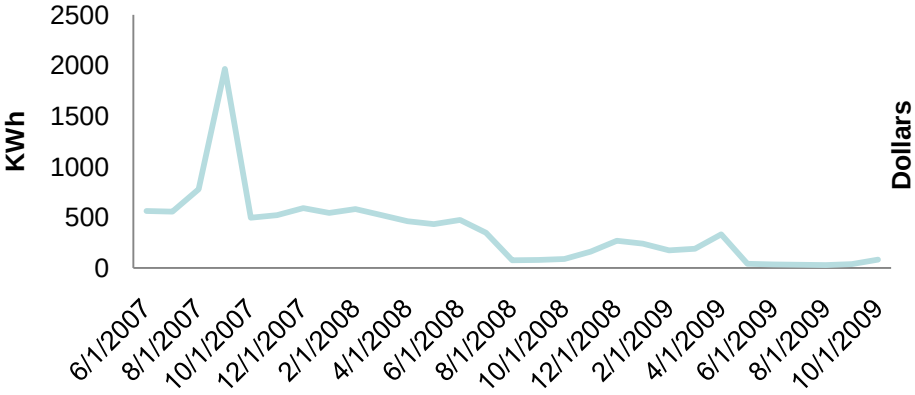
  National Current source energy use intensity (EUI) Average:

  102 kBtu's/Sq. Ft.-year
- Potential Savings with 10% energy reduction: $206

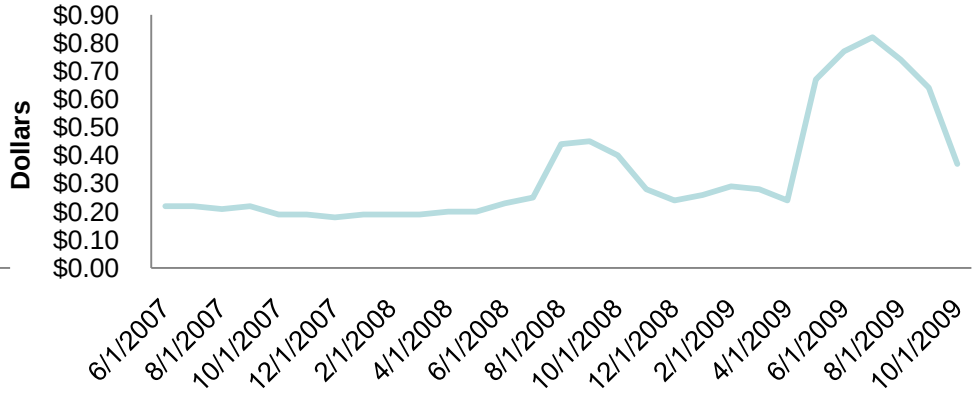
Total Space: 2,952 Sq.ft.

Acton Windsor Building Electricity Monthly Consumption & Cost

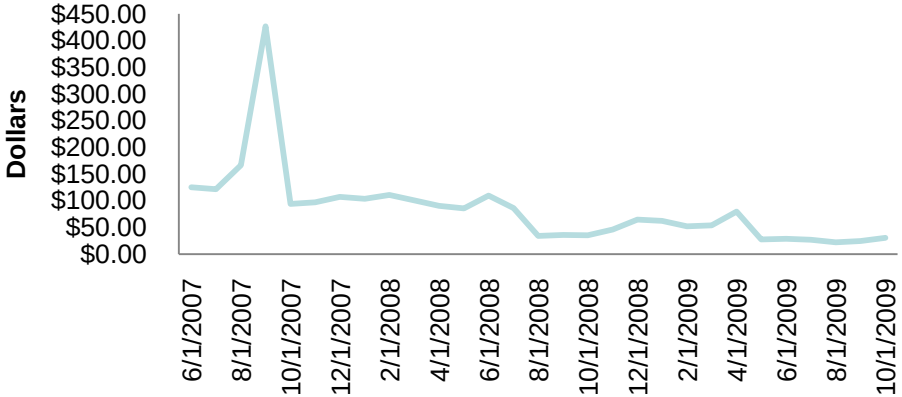
Acton Windsor Building Electricity Consumption



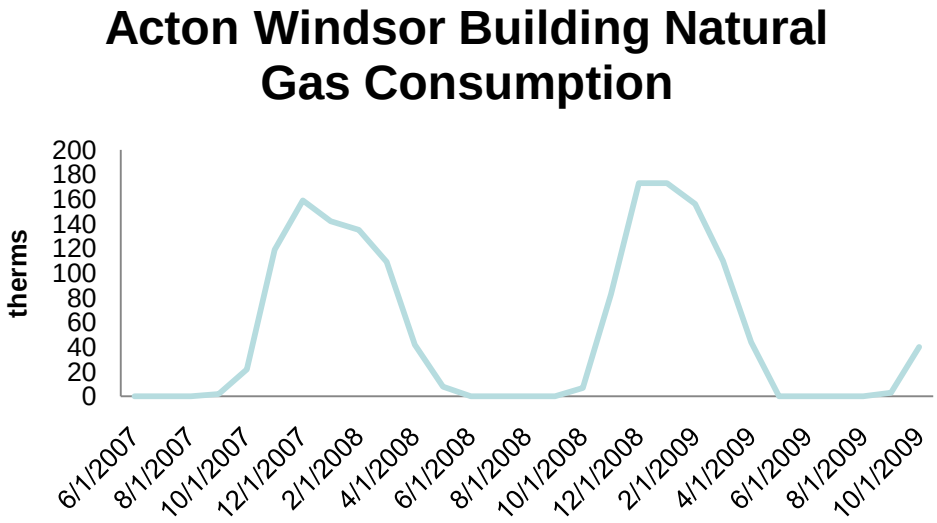
Acton Windsor Building Avg. Price per KWh

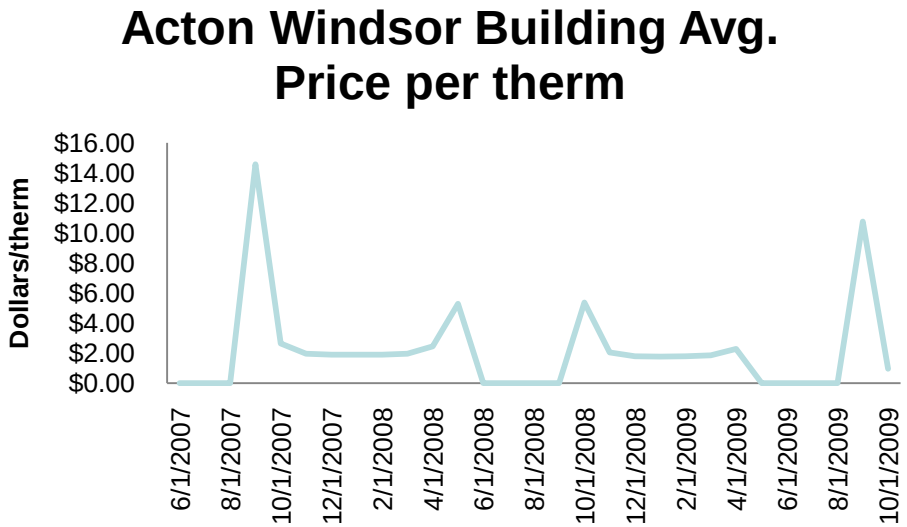


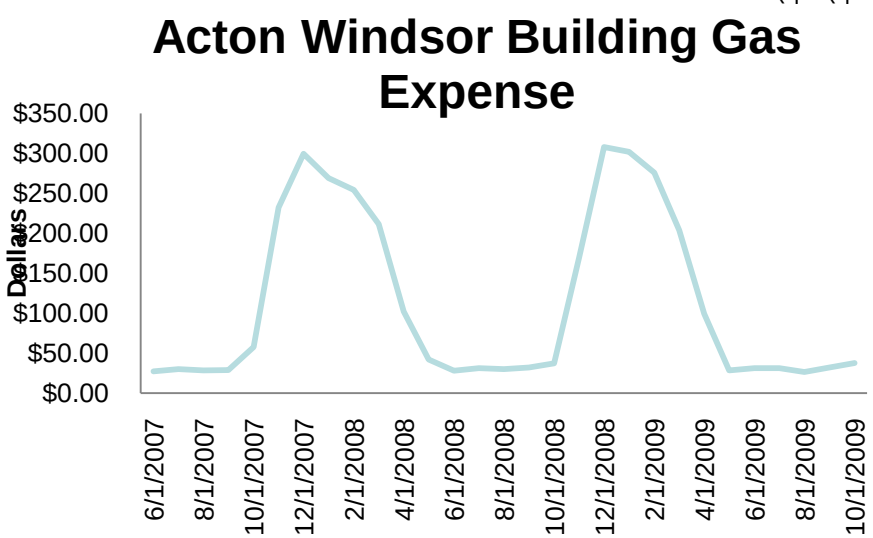
Acton Windsor Building Electricity Expense



Acton Windsor Building Natural Gas Monthly Consumption & Cost







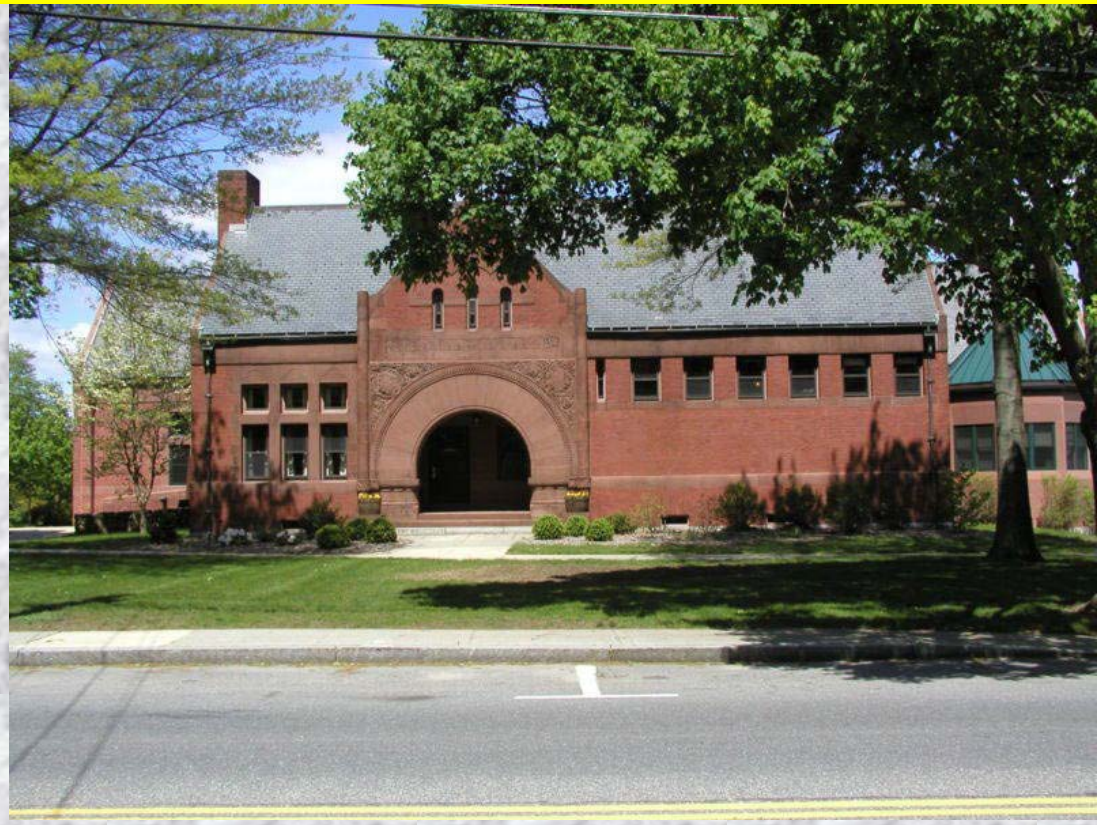
Acton Memorial Library

- **Baseline energy usage: 3,354,680 kBtu's/year**

  (982,502 kWh)
- **Target energy usage with 10% reductions: 3,019,212**

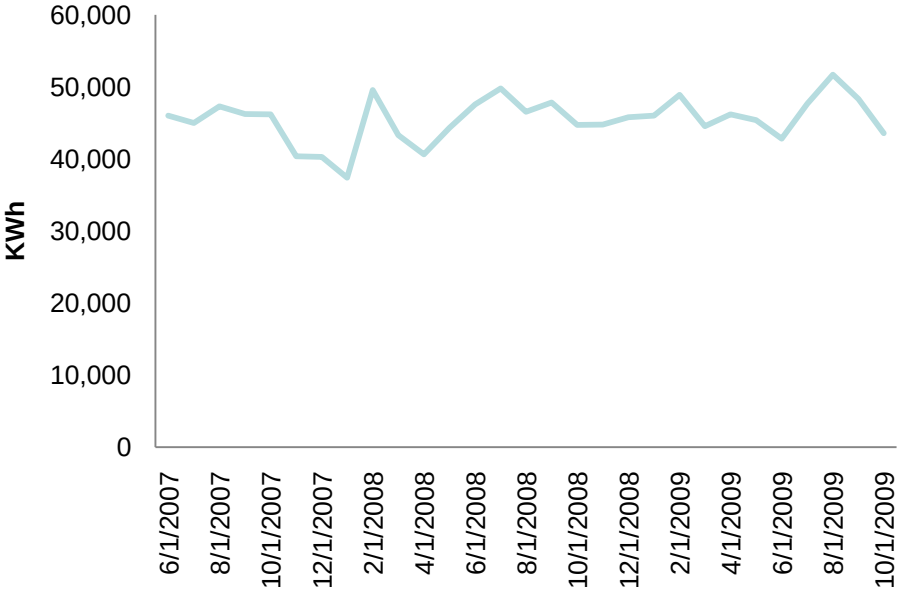
  kBtu's/year

  (884,252 kWh)
- **Current source energy use intensity (EUI):** 163 kBtu's/Sq. Ft.-year
- **National Current source energy use intensity (EUI) Average: 246** kBtu's/Sq. Ft.-year
- Potential Savings with 10% energy reduction: $13,489

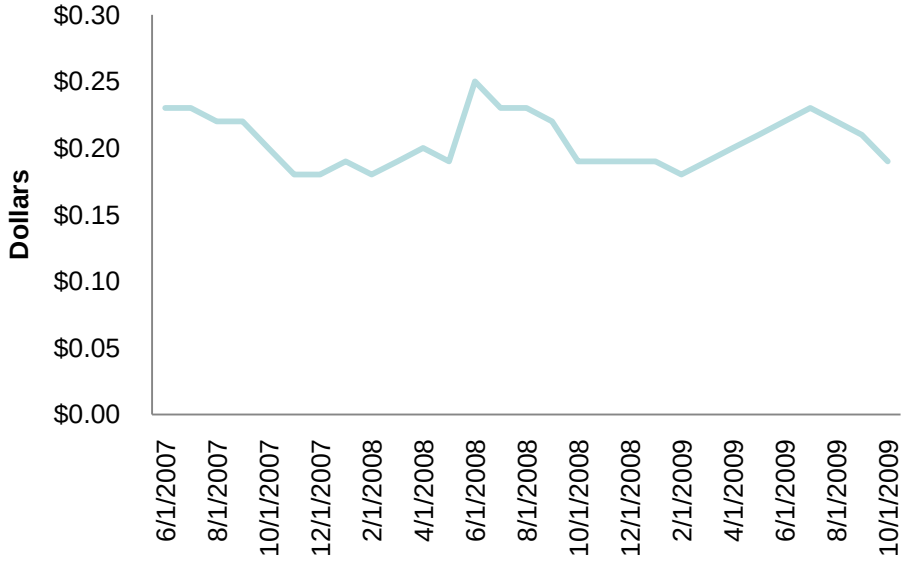


Total Space: 48,259 Sq.ft.

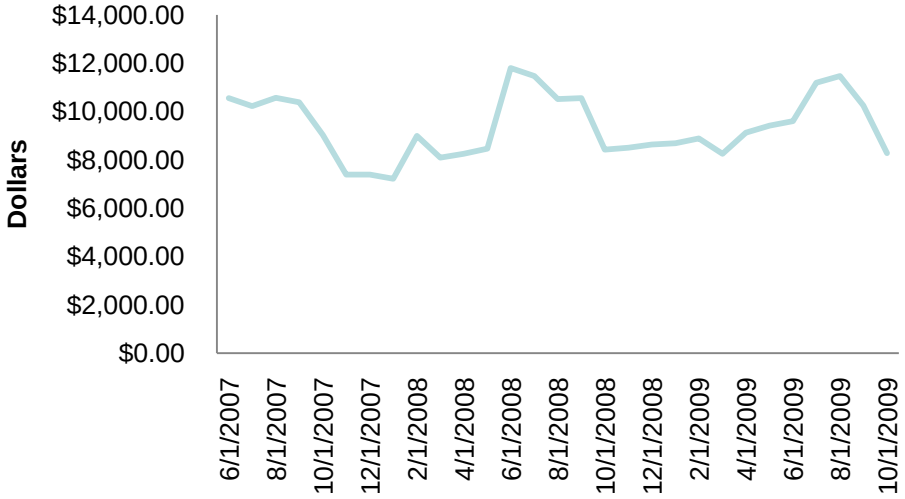
Acton Memorial Library Electricity Consumption



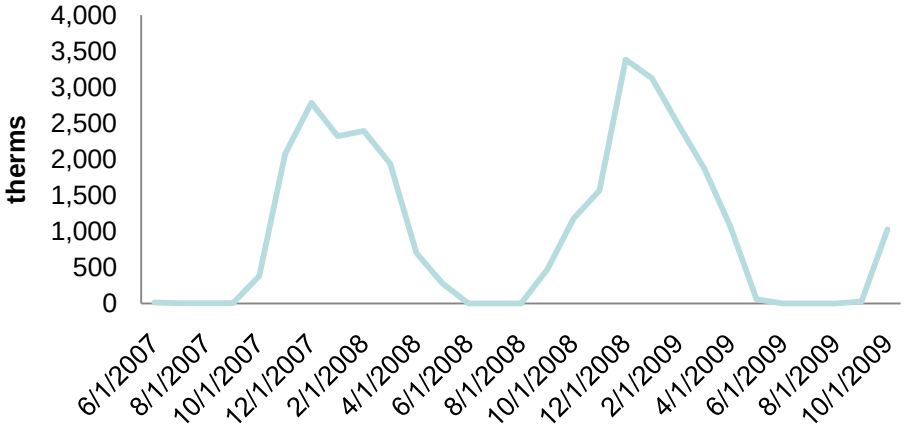
Memorial Library Average Price per Kwh



Acton Memorial Lib Electric Expense

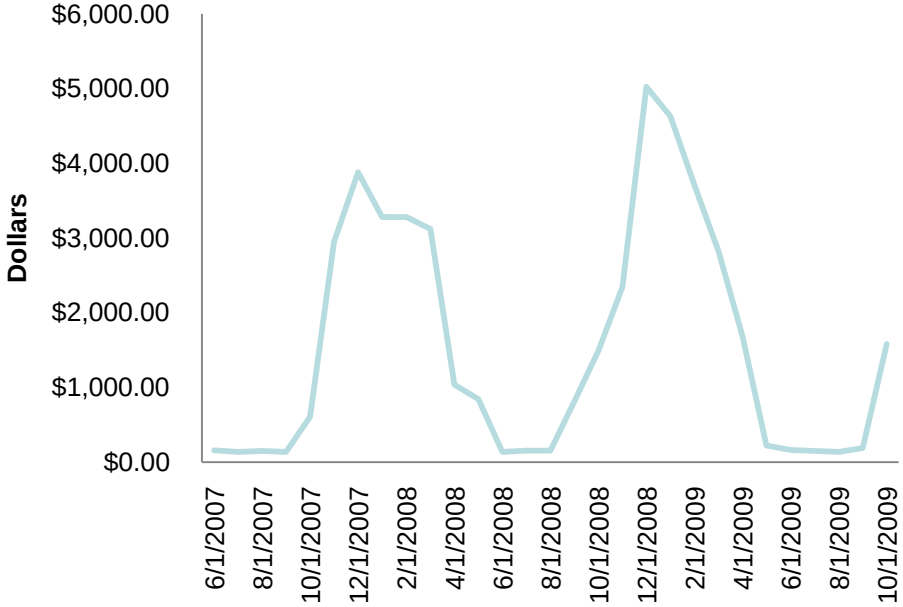


Acton Memorial Library Natural Gas Consumption



Acton Memorial Lib Avg Price per therm

Acton Memorial Lib Gas Expense



Acton Citizens Library

- Baseline energy usage: 119,605 kBtu's/year

  (35,029)
- Target energy usage with 10% reductions:

  107,644 kBtu's/year

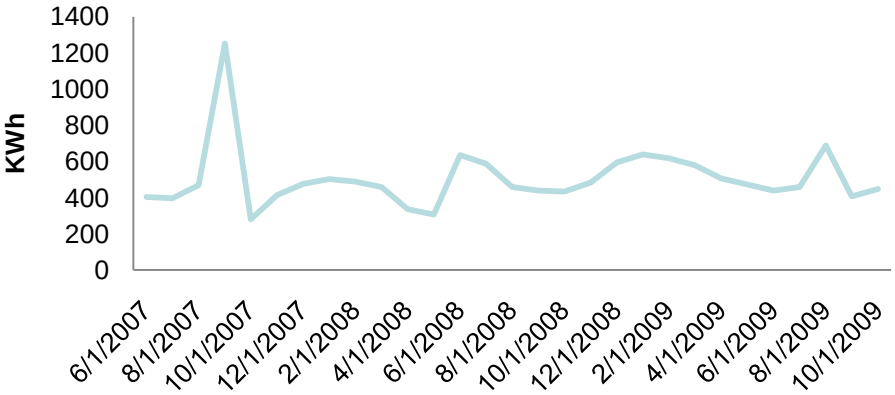
  (31,526 kWh)
- Current source energy use (EUI): 87 kBtu/sq.-ft/year
- National Current source energy use (EUI) Average: 246 kBtu/sq.-ft./year

Potential Savings with 10% energy reduction: $325

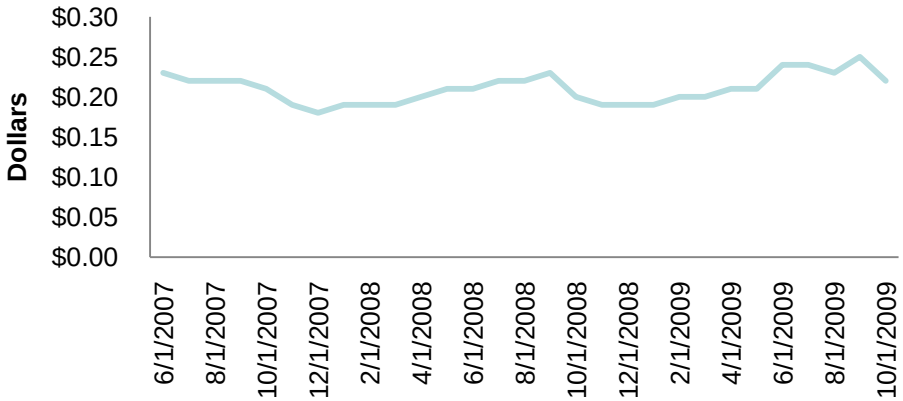
Total Space: 2008Sq.ft.

Acton Citizens Library Electricity Monthly Consumption & Cost

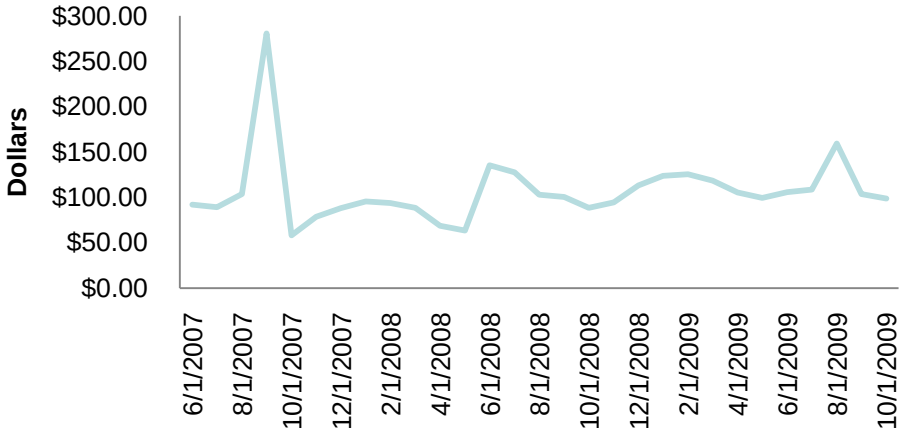
Acton Citizens Library Electricity Usage



Citizens Library Average Price per kwh

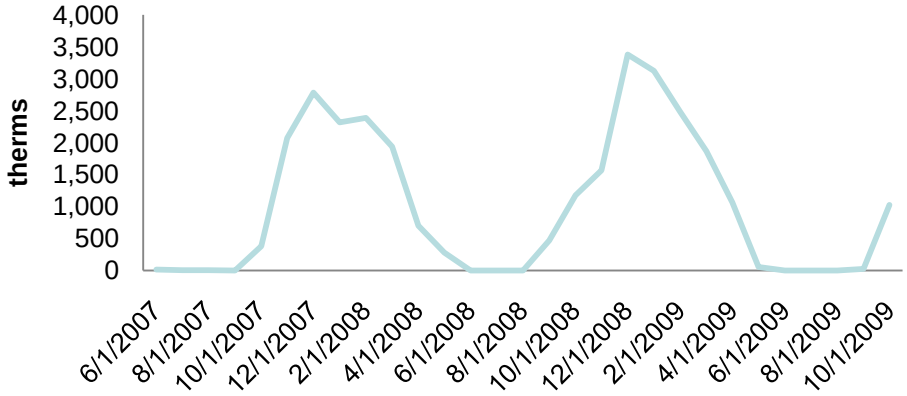


Acton Citizens Lib Electric Expense

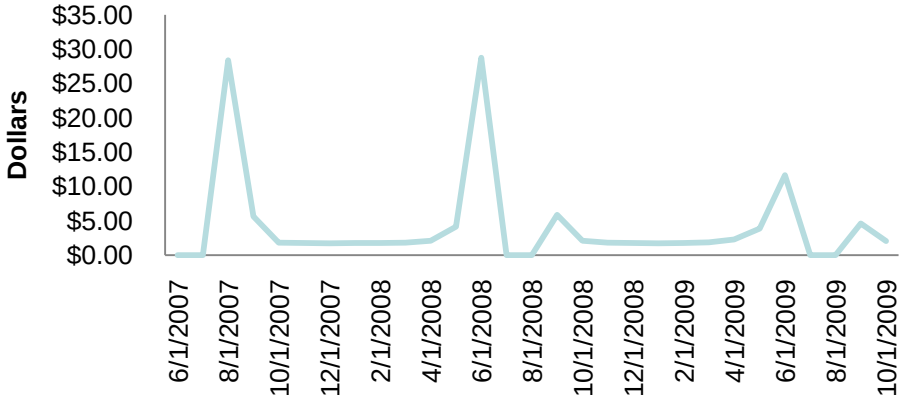


Acton Citizens Library Natural Gas Monthly Consumption & Cost

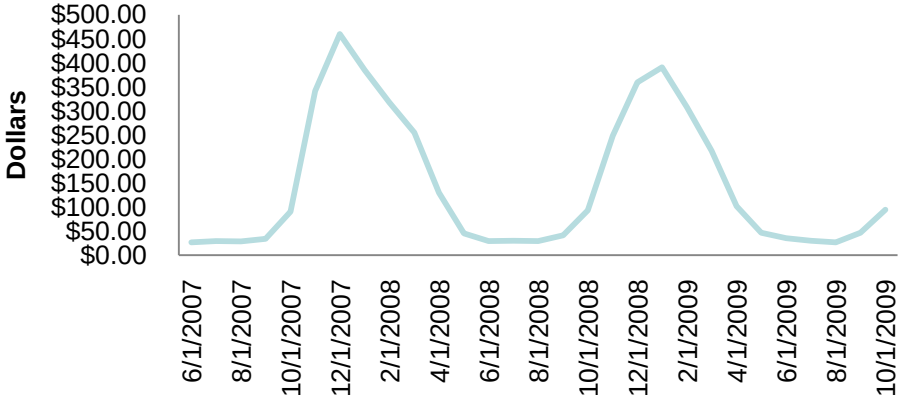
Acton Memorial Library Natural Gas Consumption



Acton Citizens Library Average price per therm



Acton Citizens Library Gas Expense



Acton Public Works Department (DPW)

- Baseline energy usage: kBtu's/year 1,047,919

  (306,909 kWH)
- Target energy usage with 10% reductions: 943,127

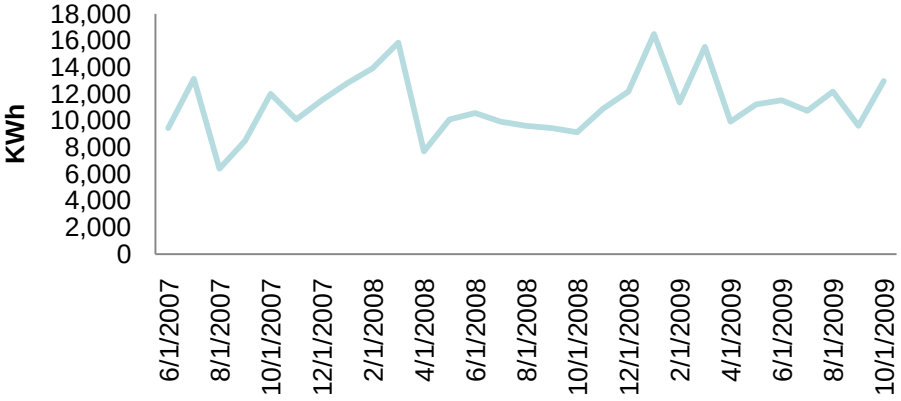
  kBtu's/year

  (276,218 kWh)
- Current source energy use per sq-ft (EUI): 119 kBtu/sq.-ft./year
- National Current source energy use per sq-ft (EUI) Average: 150 kBtu/sq.-ft./year
- Potential Savings with 10% energy use reduction: $3,653

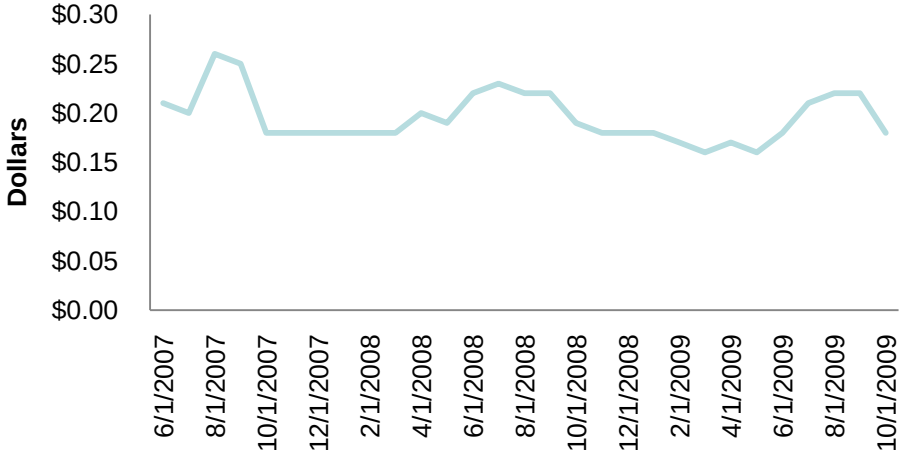
Total Space: 19,200 Sq.ft.

Acton Public Works Department Electricity Monthly Consumption & Cost

Acton DPW Electricity Consumption



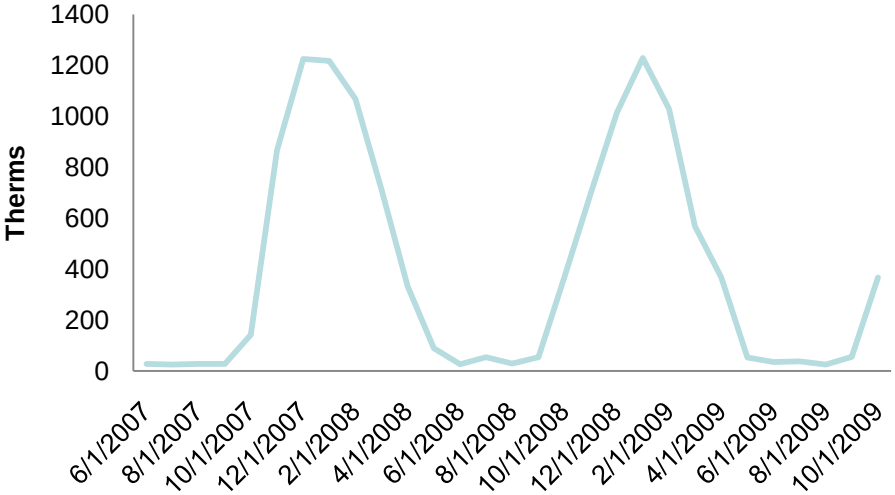
Acton DPW Avg. Price per KWh



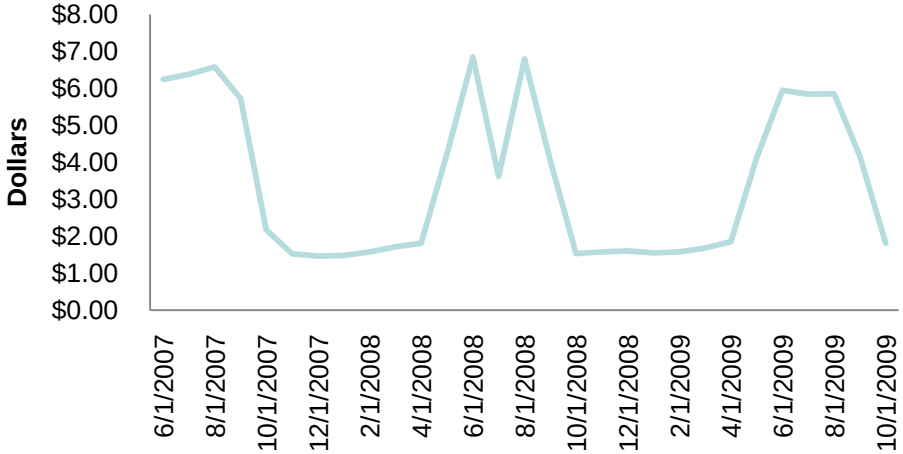
Acton DPW Electricity Expense

Acton Public Works Department Natural Gas Monthly Consumption & Cost

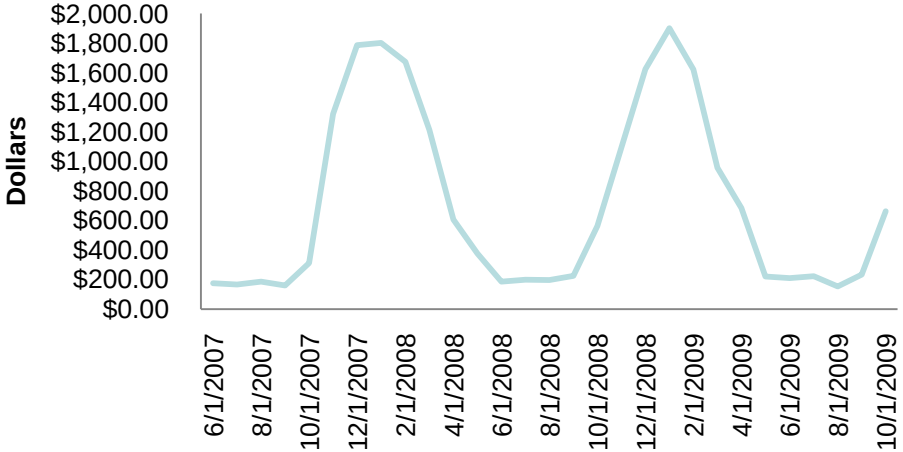
Acton DPW Gas Usage



Acton DPW Avg. Price per therm



Acton DPW Gas Expense



Acton Wastewater Treatment

- Baseline energy usage: 2,600,183kBtu's/year

  (761,529 kWH)
- Target energy usage with 10% reductions:

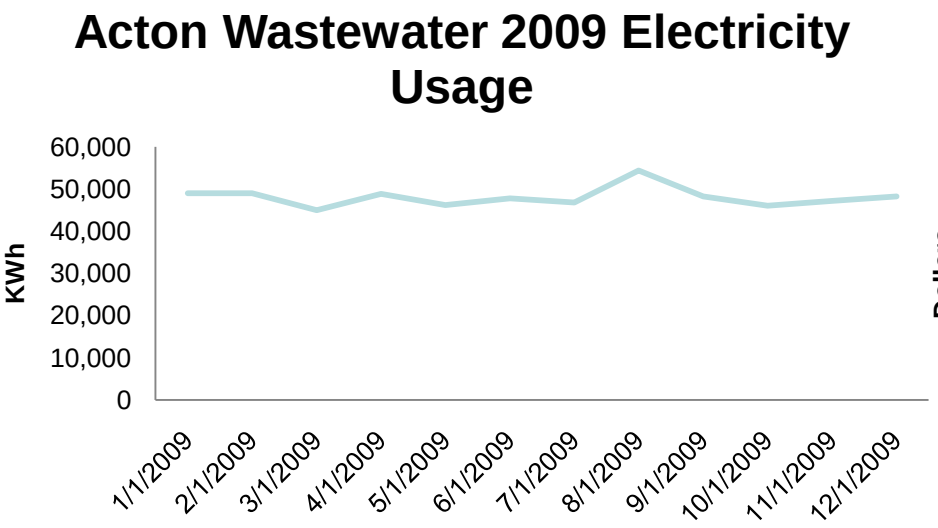
  2,340,165kBtu's/year

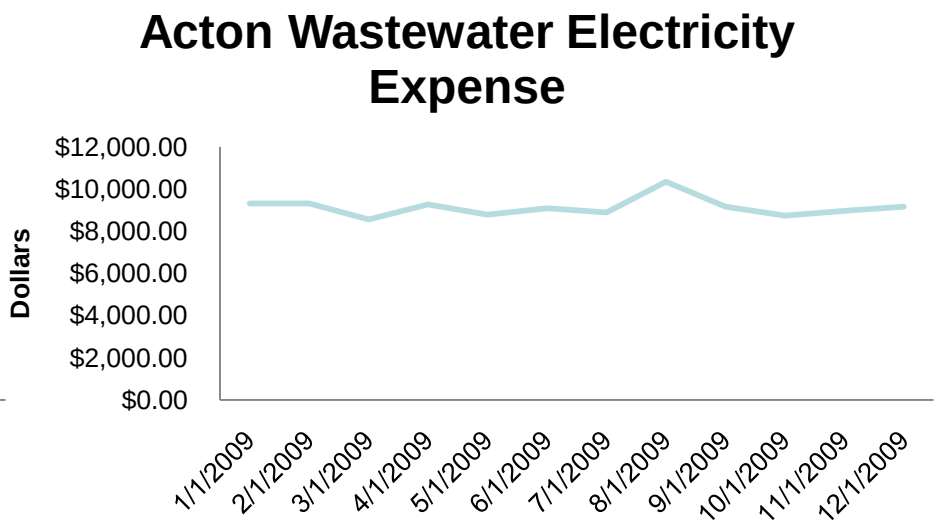
  (285,376 kWh)
- Baseline Rating:N/A (plant must have a daily flow rate of at least 600,000 gpd = 0.6 MGD)

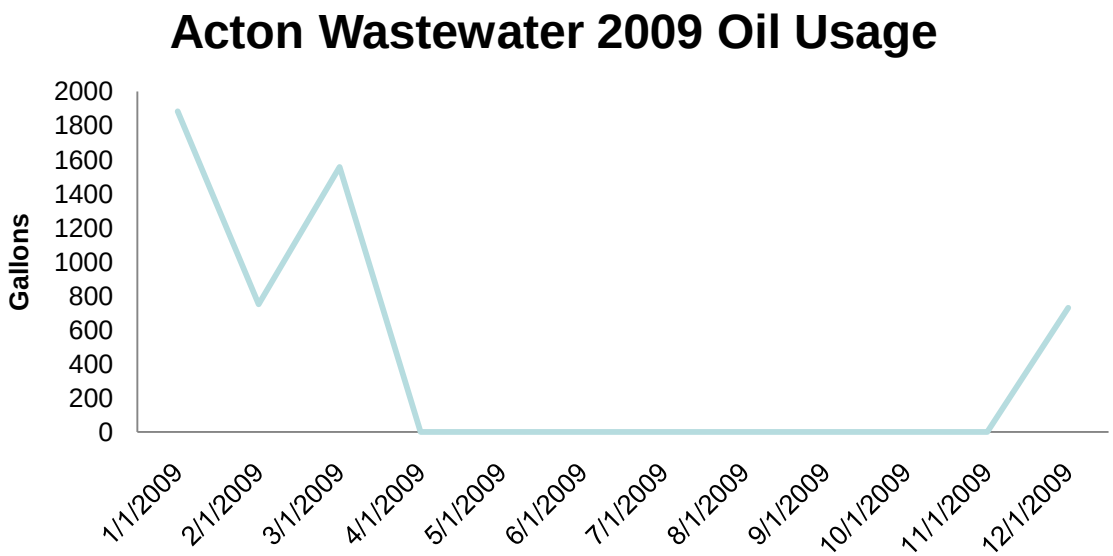
Potential Savings with 10% energy reduction: $12,403

124,271 Gallons/Day

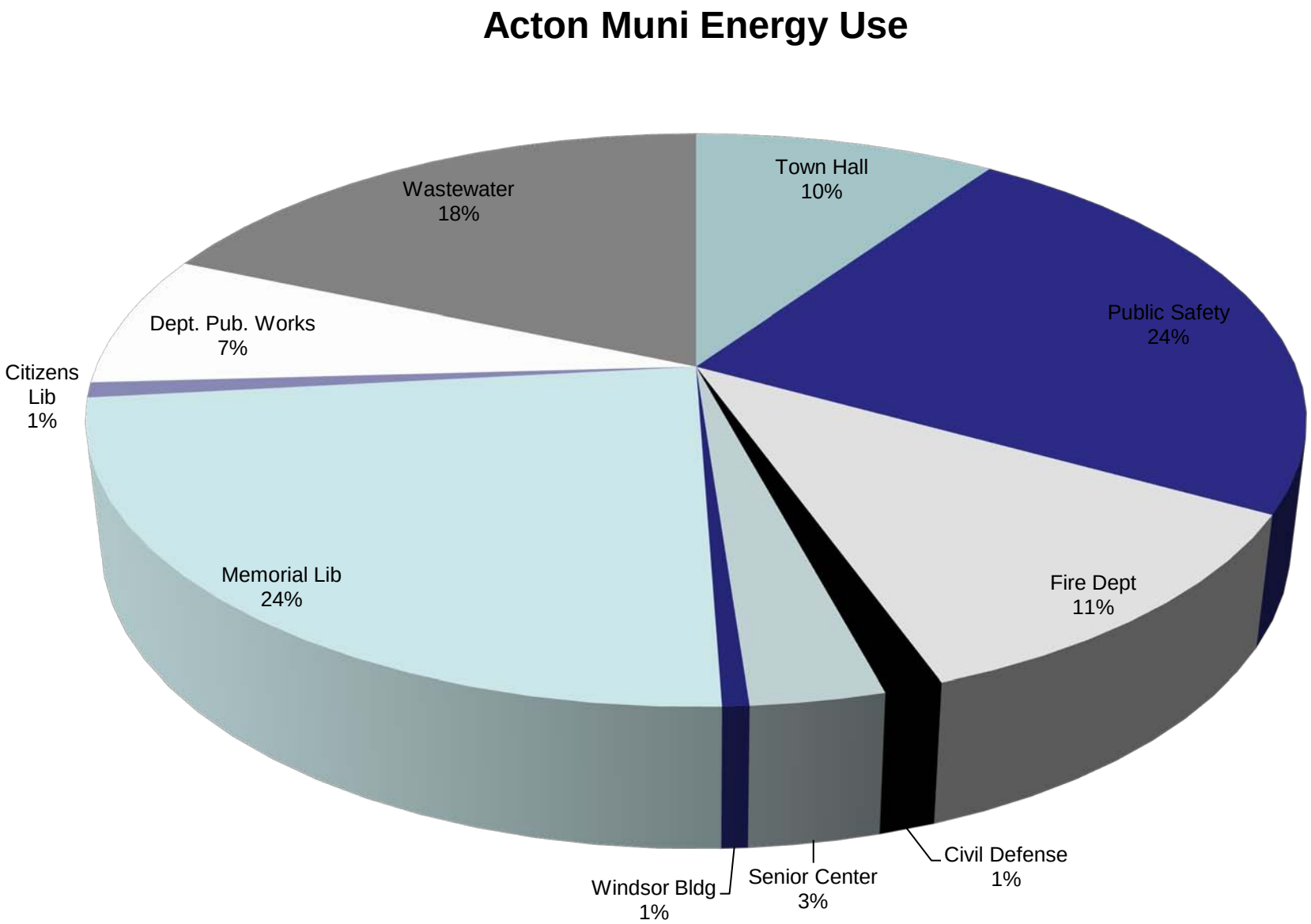
Acton Waste Water Electricity and heating oil Monthly Consumption Trendlines



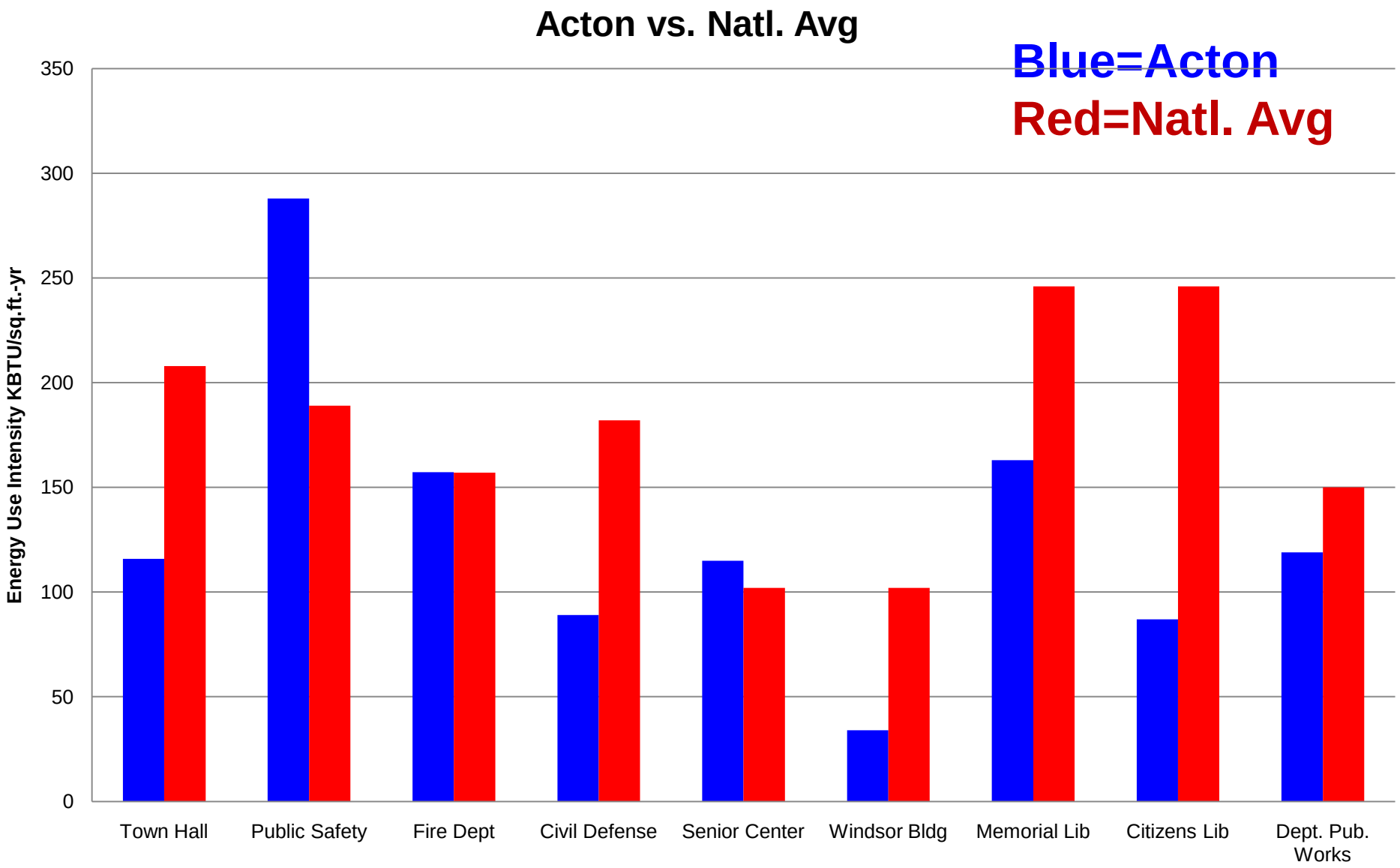




Acton Municipal Buildings Energy Use: % of 14,086,850 total kBtu/Year



Current Source Energy Use Intensity (EUI) Acton vs. National Average: kBtu/sq.ft-yr



Acton Conant School

- Baseline energy usage: 4,538,179 kBtu's/year

  (1,329,119 kWH)
- Target energy usage with 10% reductions:

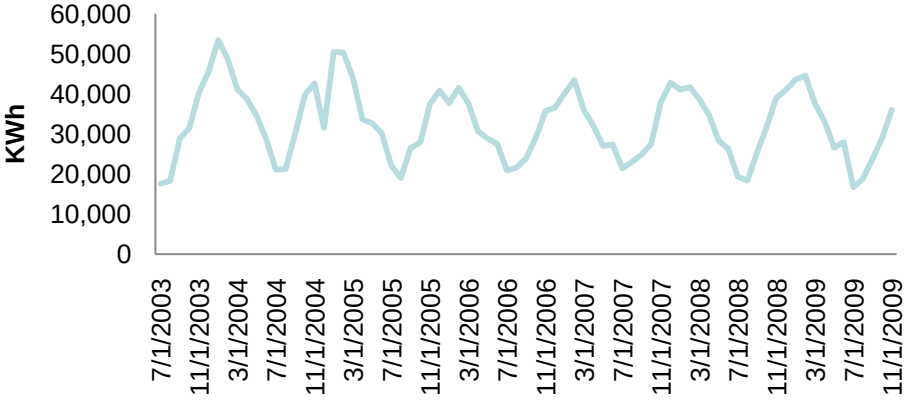
  4,084,361 kBtu's/year

  (1,196,207 kWh)
- Energy Star Rating: 63
- Current source energy use per sq-ft (EUI): 134.9 kBtu/sq.-ft./year
- National Current source energy use per sq-ft (EUI) Average: 157 kBtu/sq.-ft./year
- Potential Savings with 10% energy use reduction: $12,759

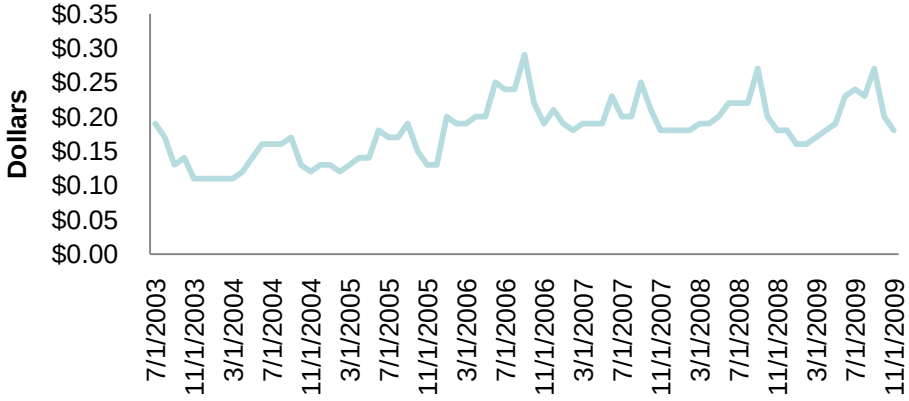
Total Space: 56,017 Sq.ft.

Acton Conant School Electricity Monthly Consumption & Cost

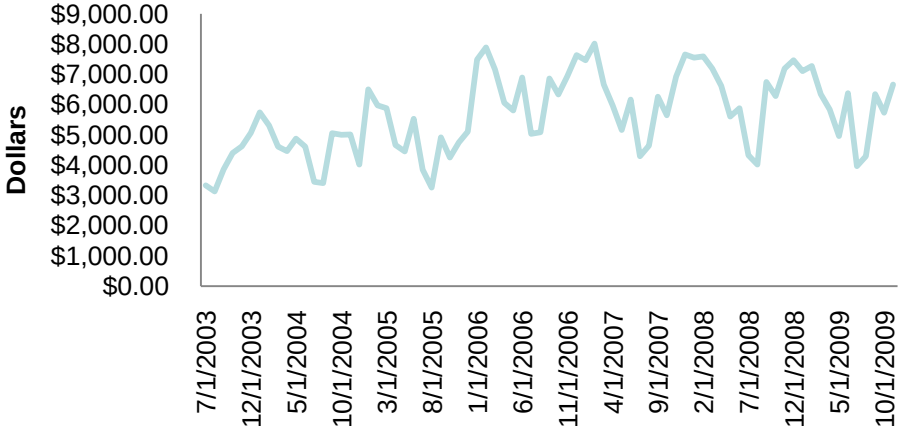
Acton Conant School Electricity Consumption



Acton Conant School Average Price per KWh

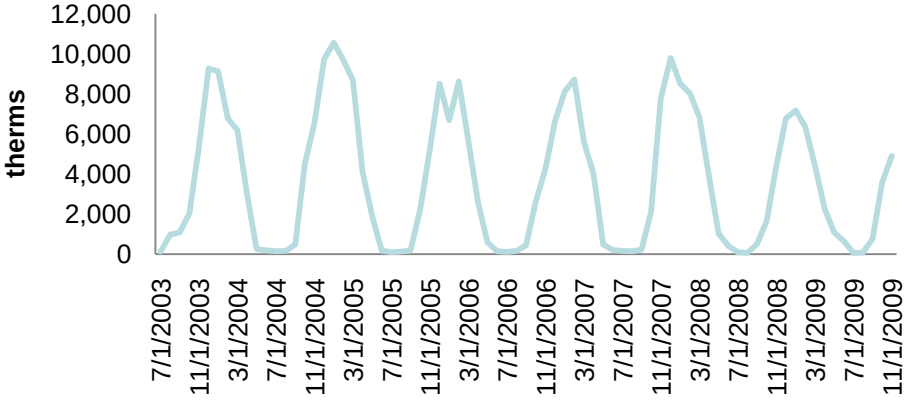


Acton Conant School Electricity Expense

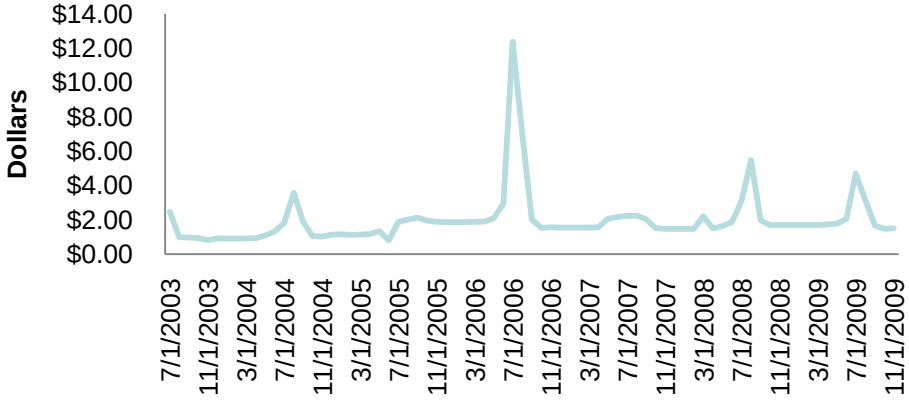


Acton Conant School Natural Gas Monthly Consumption & Cost

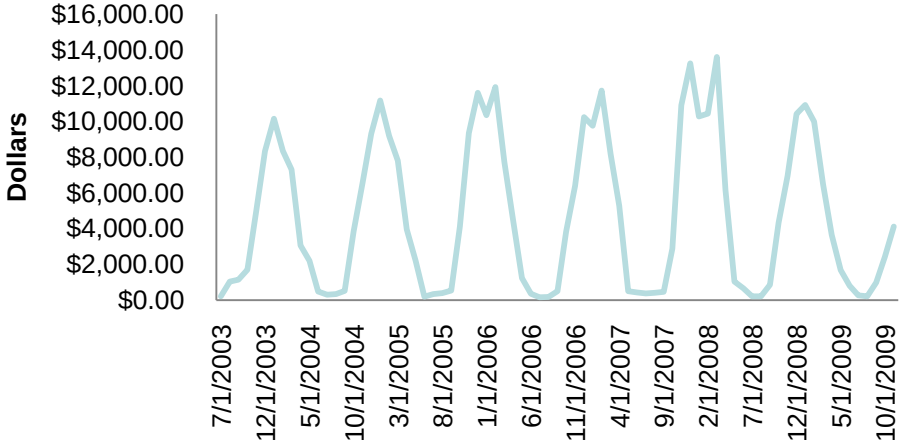
Acton Gates School Natural Gas Consumption



Acton Conant School Average Price per therm



Acton Conant School Gas Expense



Acton Douglas School

- Baseline energy usage: 3,584,583 kBtu's/year

  (1,049,834 kWH)
- Target energy usage with 10% reductions:

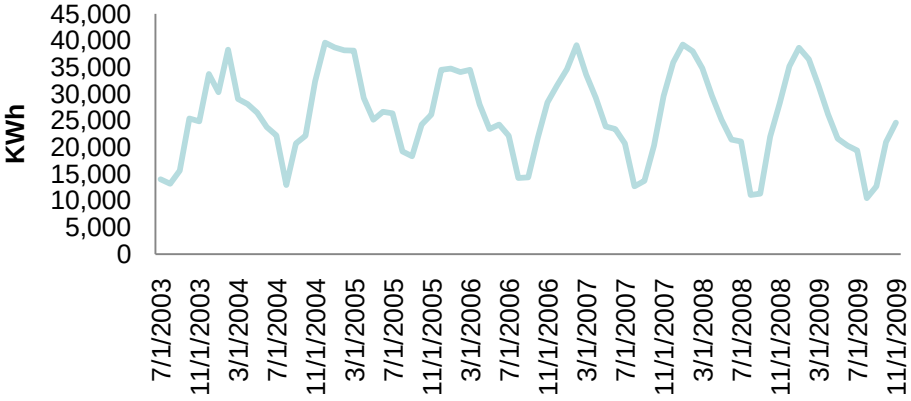
  3,226,125 kBtu's/year

  (944,851 kWh)
- Energy Star Rating: 86!
- Current source energy use per sq-ft (EUI): 135 kBtu/sq.-ft./year
- National Current source energy use per sq-ft (EUI) Average: 157 kBtu/sq.-ft./year
- Potential Savings with 10% energy use reduction: 9,954 $

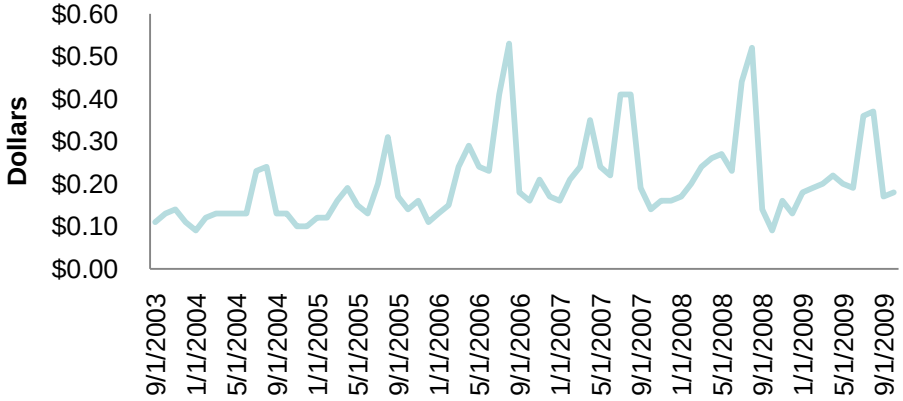
Total Space: 47,324 Sq.ft.

Acton Douglas School Electricity Monthly Consumption & Cost

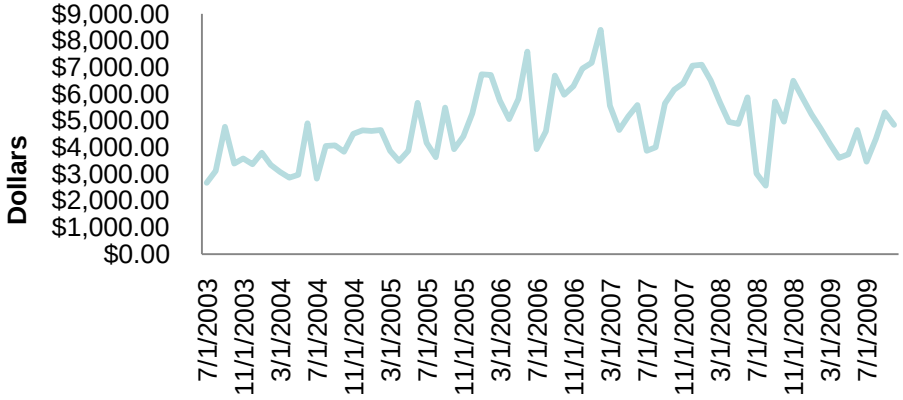
Acton Douglas School Electricity Consumption



Acton Douglas School Avg Price per KWh

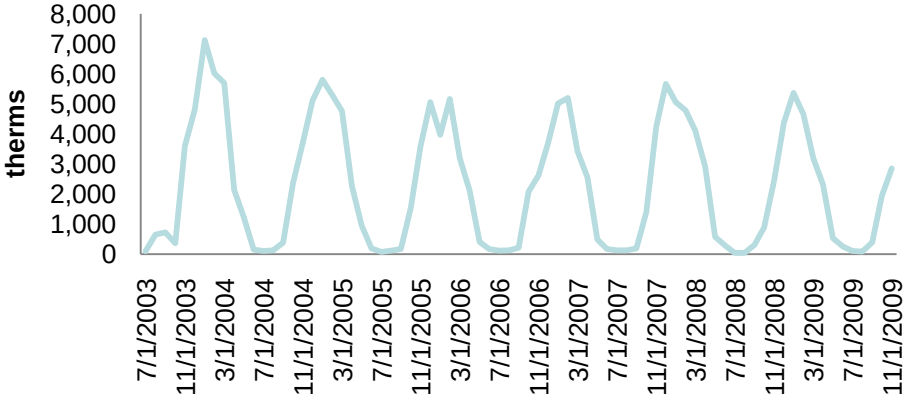


Acton Douglas School Electricity Expense

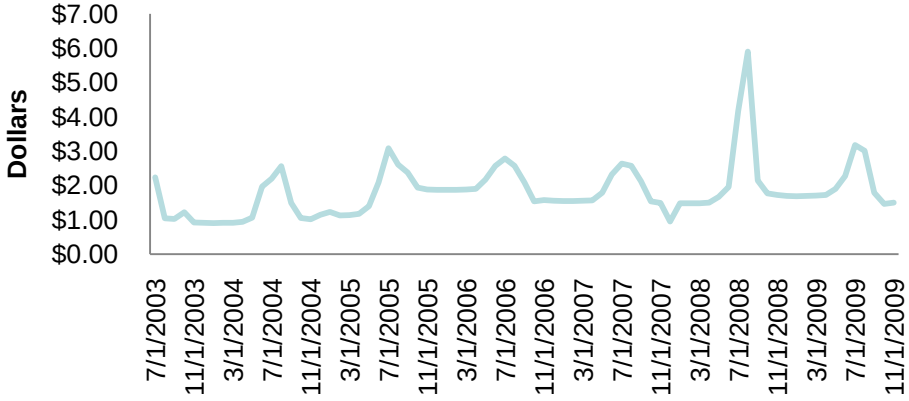


Acton Douglas School Natural Gas Monthly Consumption & Cost

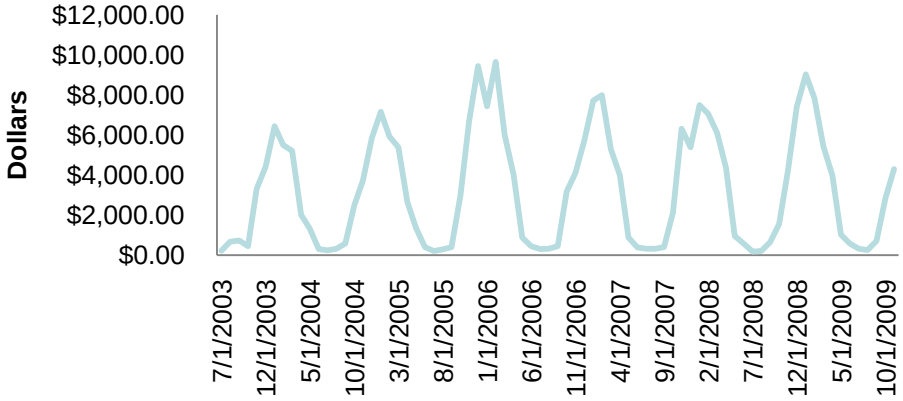
Acton Douglas School Gas Consumption



Acton Douglas School Avg. Price per therm



Acton Douglas School Gas Expense



Acton Gates School

- Baseline energy usage: 4,918,120 kBtu's/year

  (1,440,394 kWH)
- Target energy usage with 10% reductions:

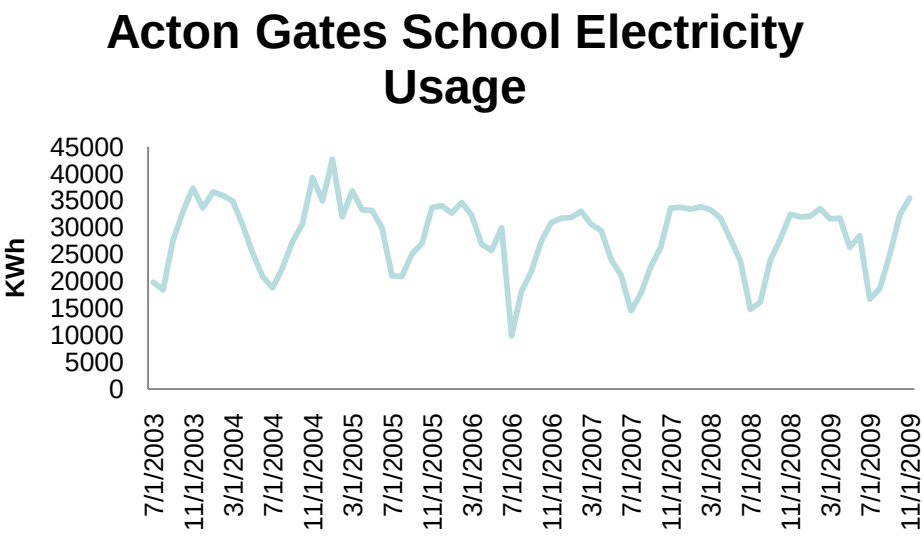
  4,426,308 kBtu's/year

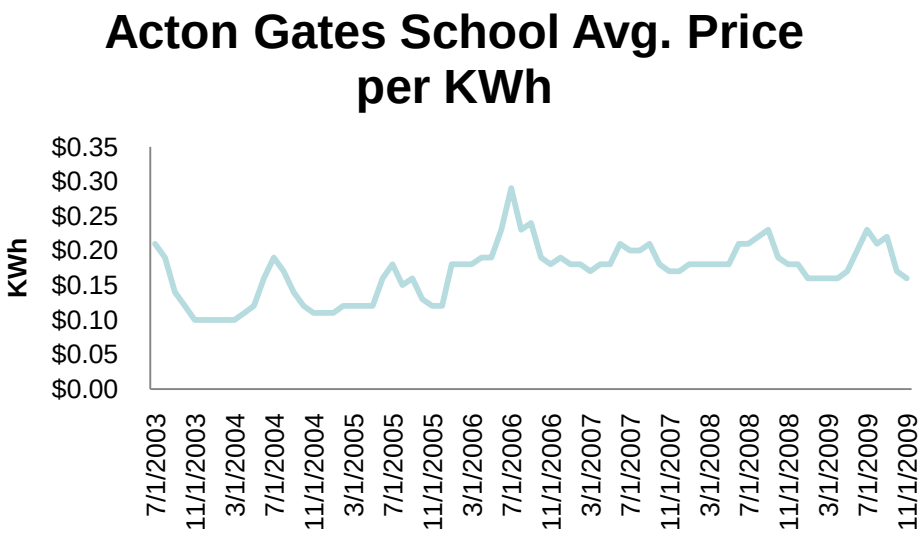
  (1,296,376 kWh)
- Energy Star Rating: 57
- Current source energy use per sq-ft (EUI): 146.6 kBtu/sq.-ft./year
- National Current source energy use per sq-ft (EUI) Average: 157 kBtu/sq.-ft./year
- Potential Savings with 10% energy use reduction: 12,359 $

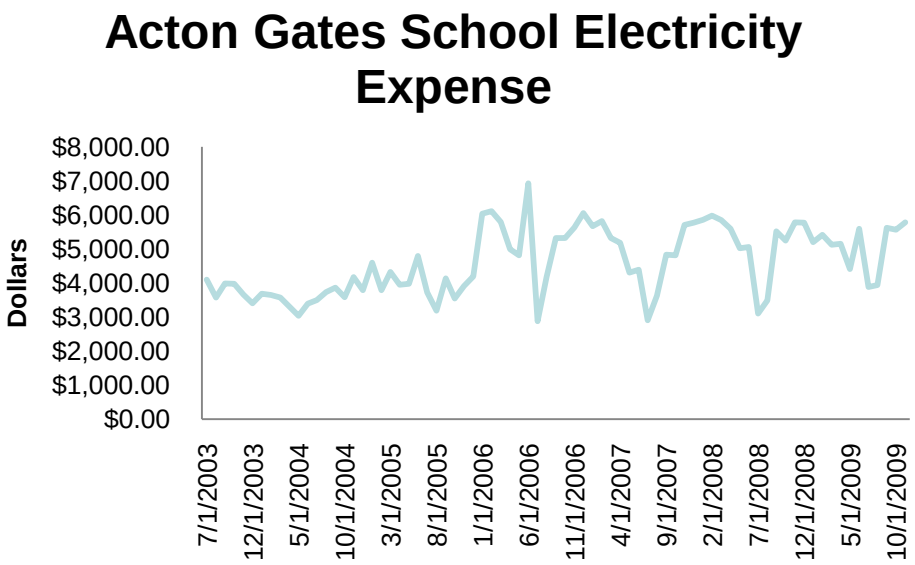
Total Space: 53,933 Sq.ft.

Energy Star Ratings based on Nov 09 data (latest)

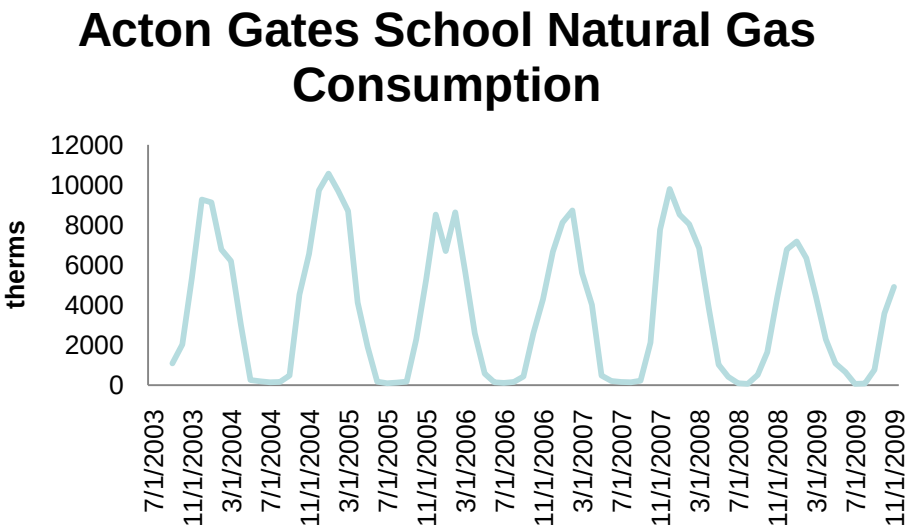
Acton Gates School Electricity Monthly Consumption & Cost

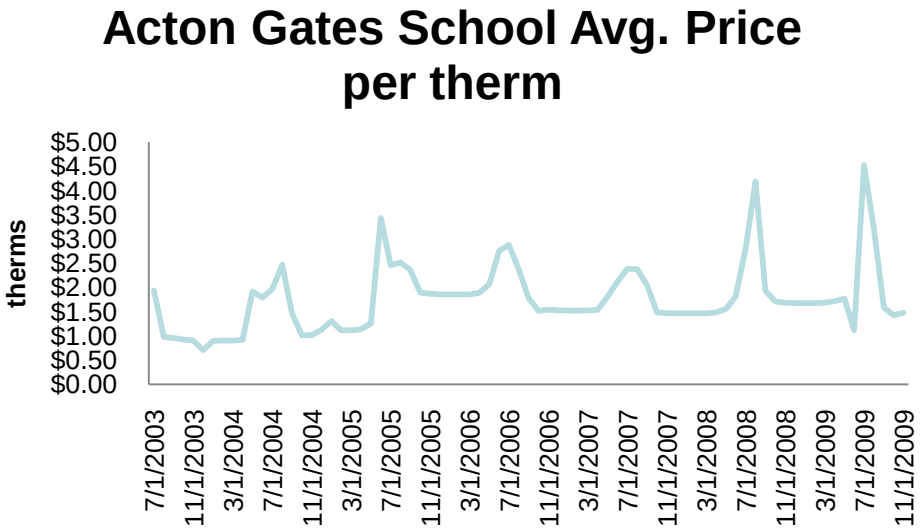


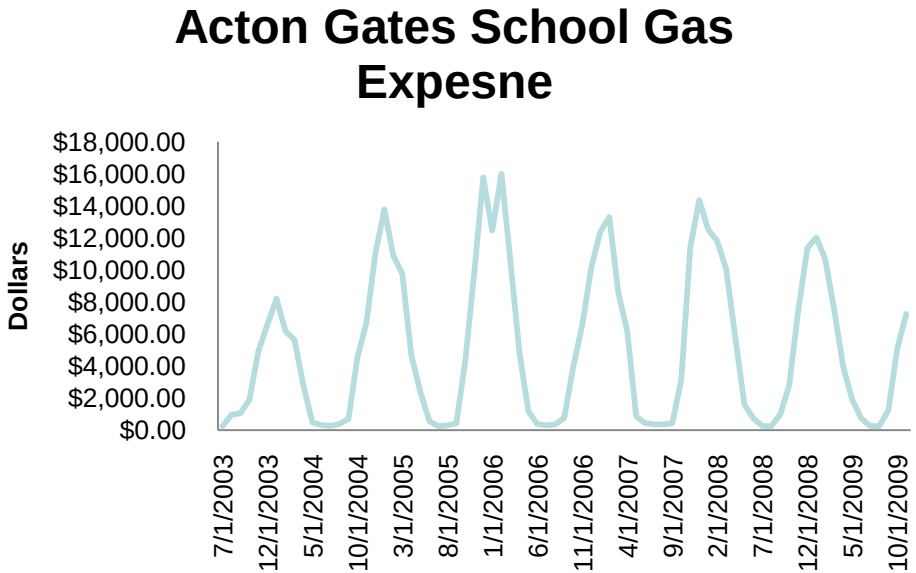




Acton Gates School Natural Gas Monthly Consumption & Cost







Acton Schools Acton-Boxborough Compound & Conant, Douglas, and Gates Elementary

- Baseline energy usage: 67,314,044 kBtu's/year

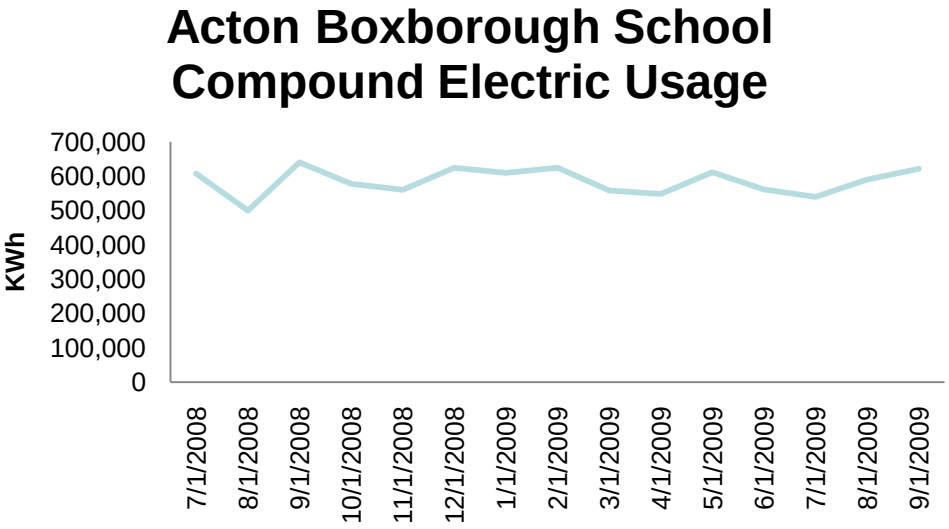
  (19,714,600 kWH)
- Target energy usage with 10% reductions:

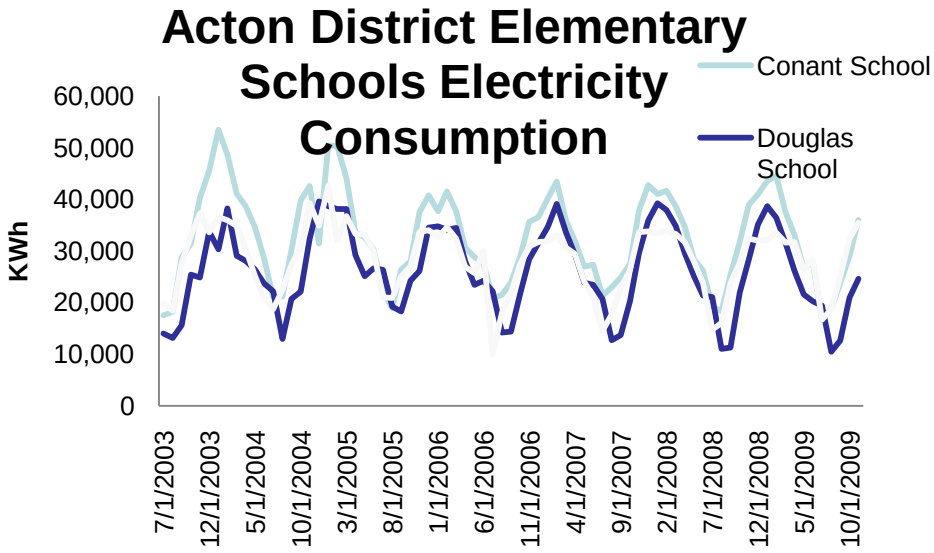
  60,582,910 kBtu's/year

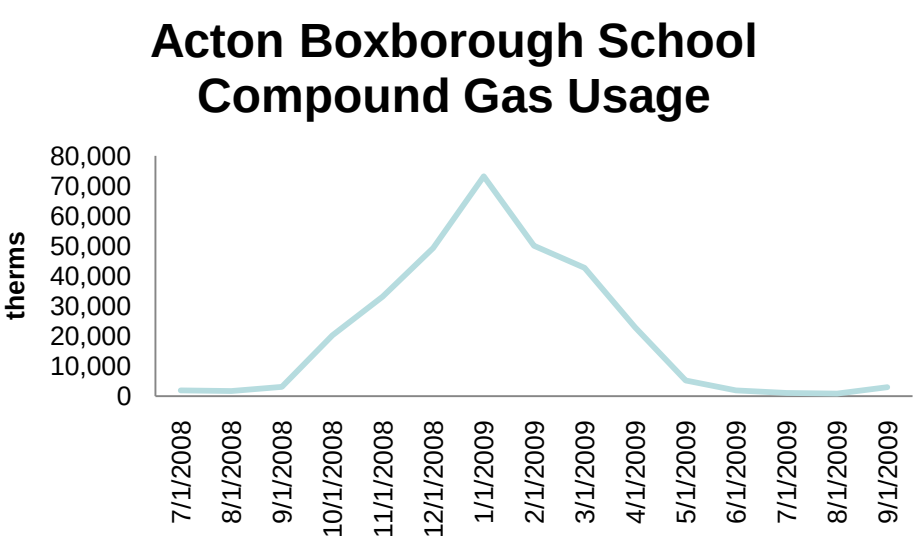
  (17,743,219 kWh)
- Potential Savings with 10% energy use reduction: $208,987

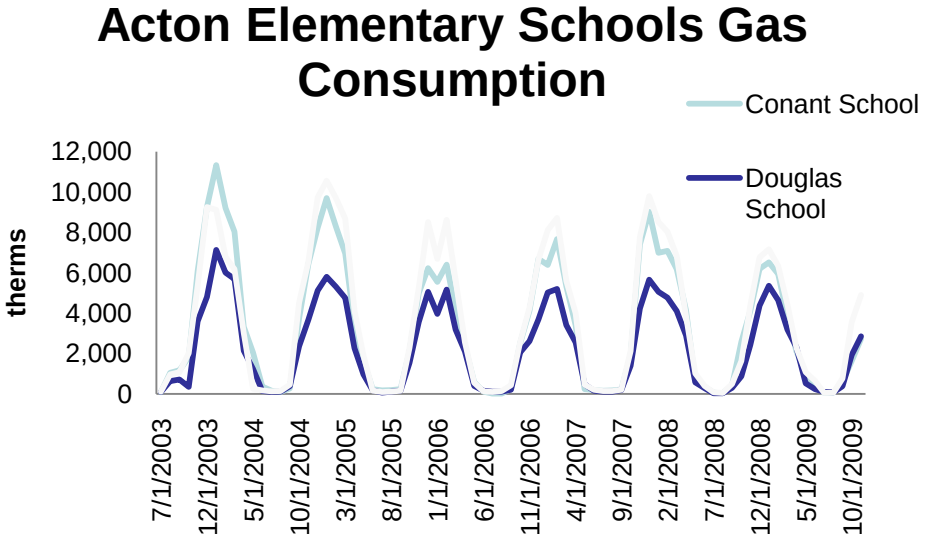
School	kBtus	kBTU w/ 10% reduction	10% Savings
Acton-Boxborough	54273162	48845846	$173,905.24
Gates	4918120	4426308	$12,369.00
Douglas	3584583	3226125	$9,954.00
Conant	4538179	4084631	$12,759.00
Total	67314044	60582910	$208,987.24

Acton Schools Energy Usage

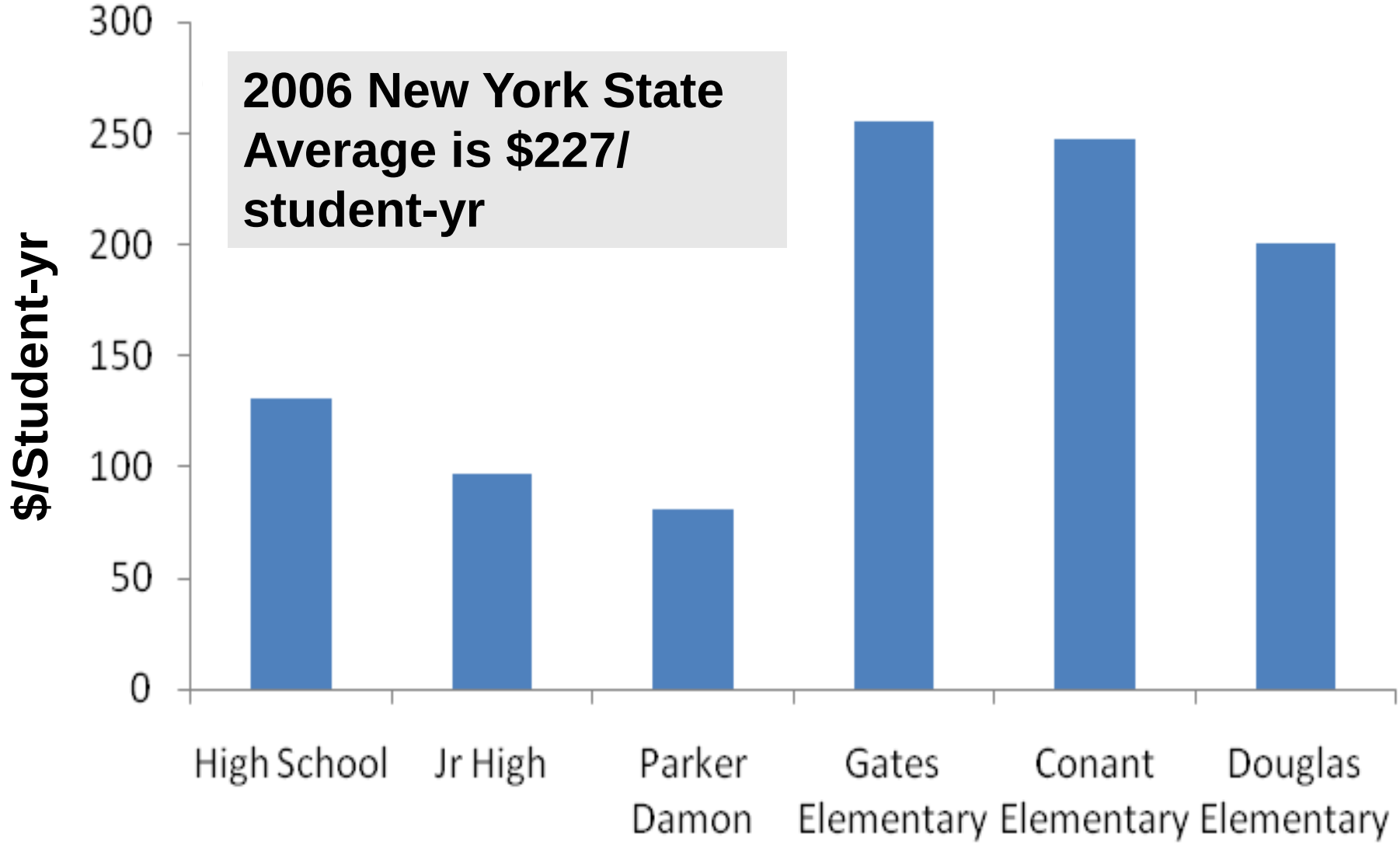






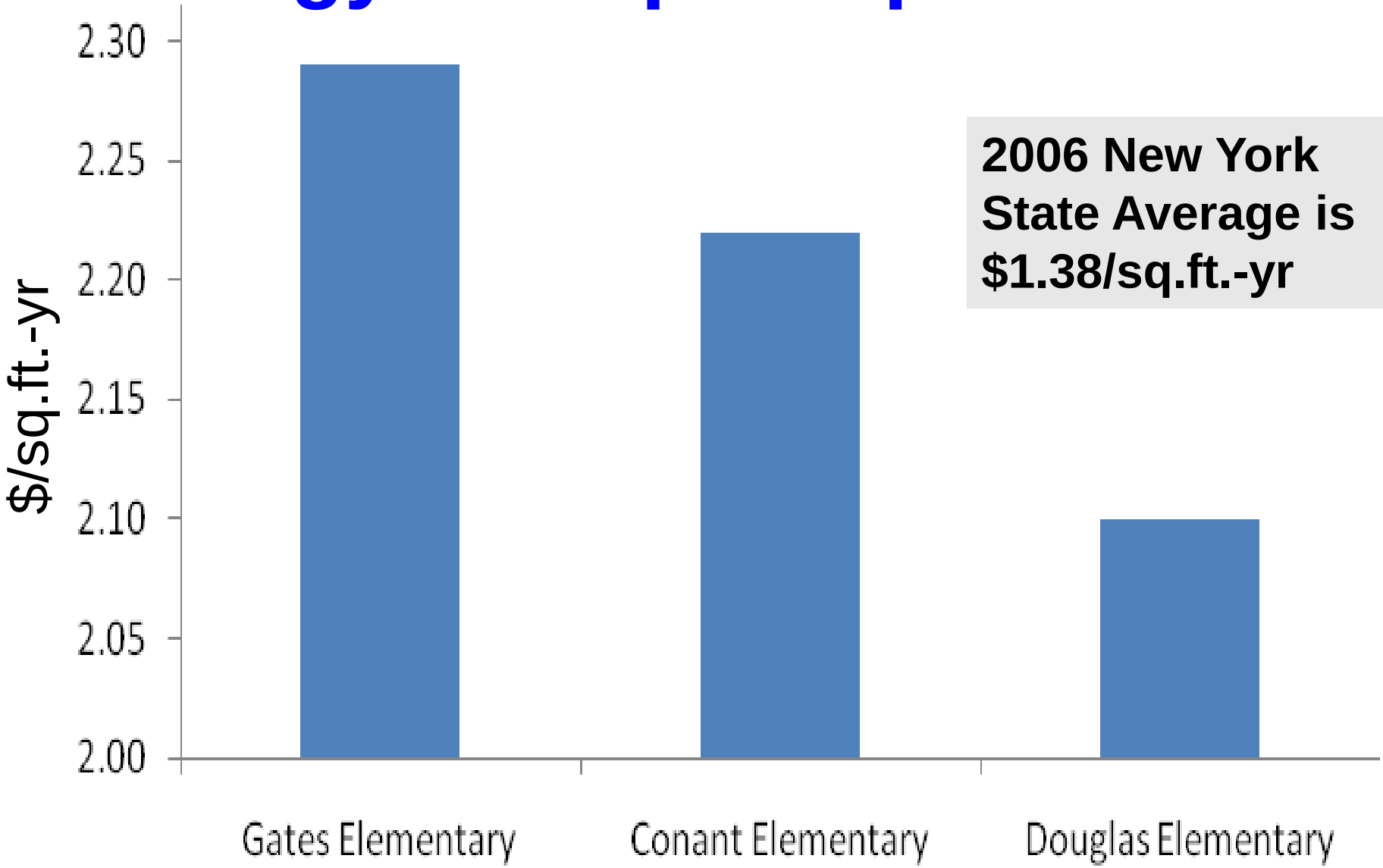


Acton Schools Energy Statistics 2009



http://www.nyserda.org/programs/Schools/Sample%203-yr%20Updated%20Benchmarking%20Report%204-3-09.pdf

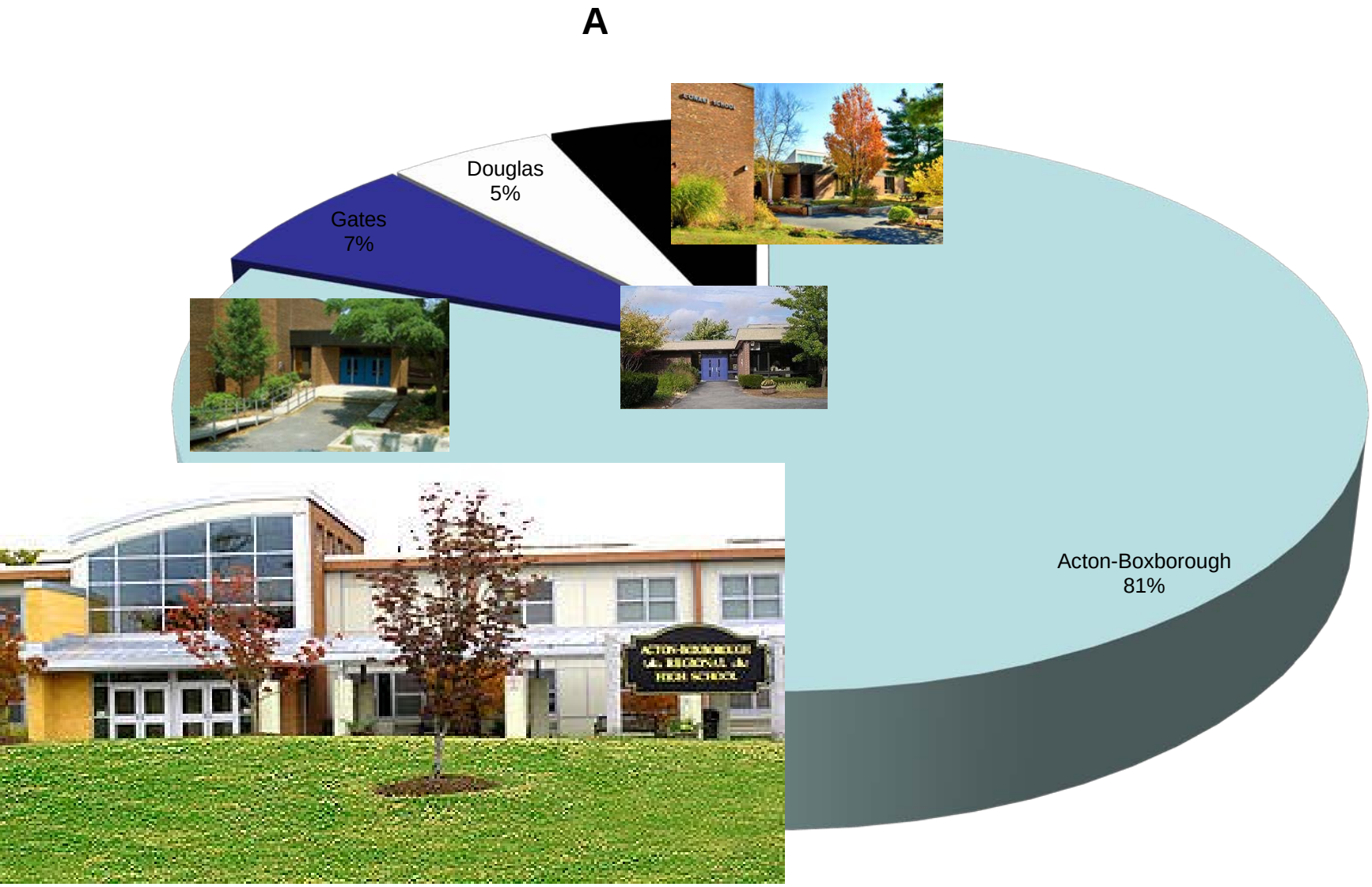
Acton Elementary Schools Energy Cost per sq ft



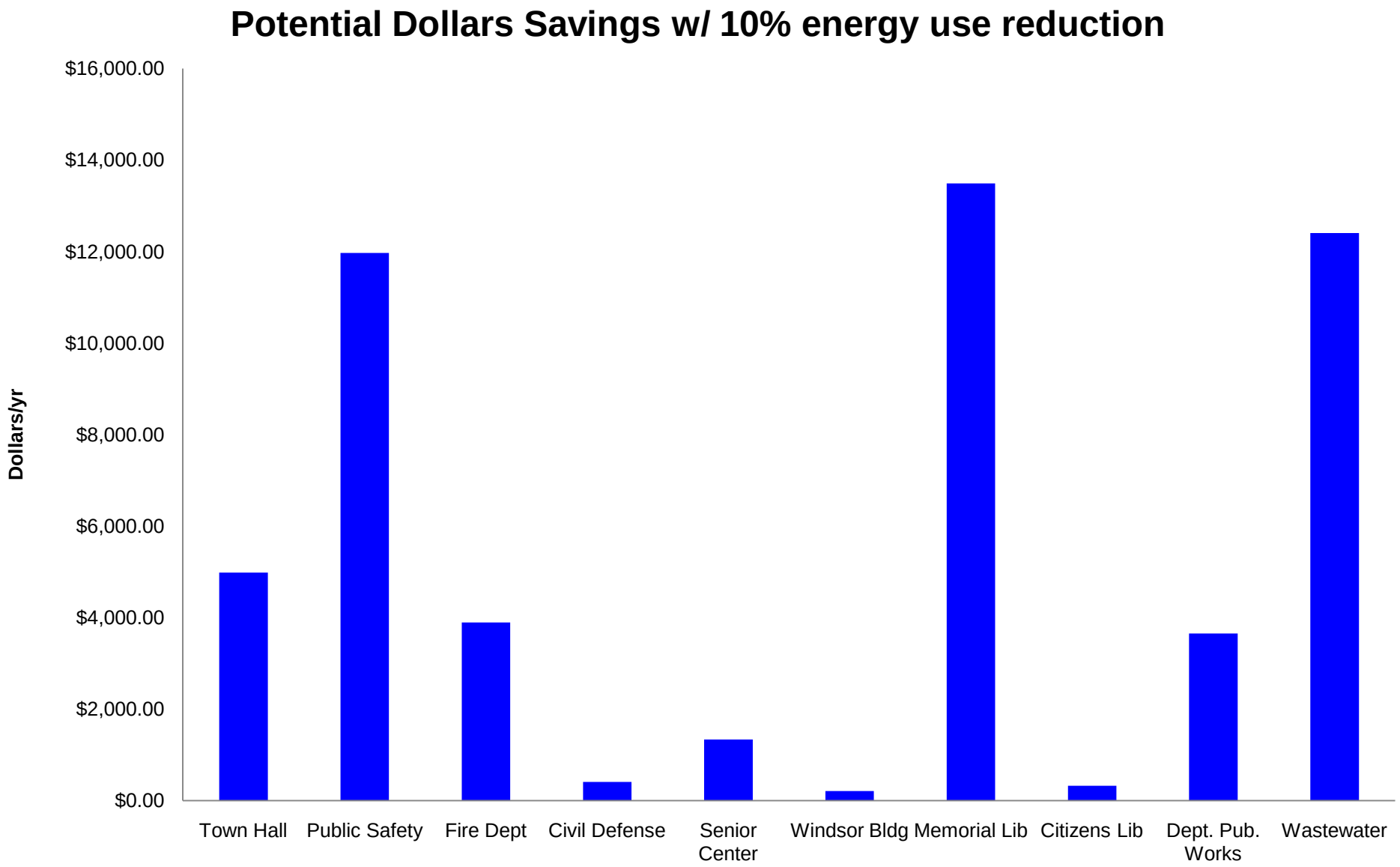
2006 New York State Average is $1.38/sq.ft.-yr

http://www.nyserda.org/programs/Schools/Sample%203-yr%20Updated%20Benchmarking%20Report%204-3-09.pdf

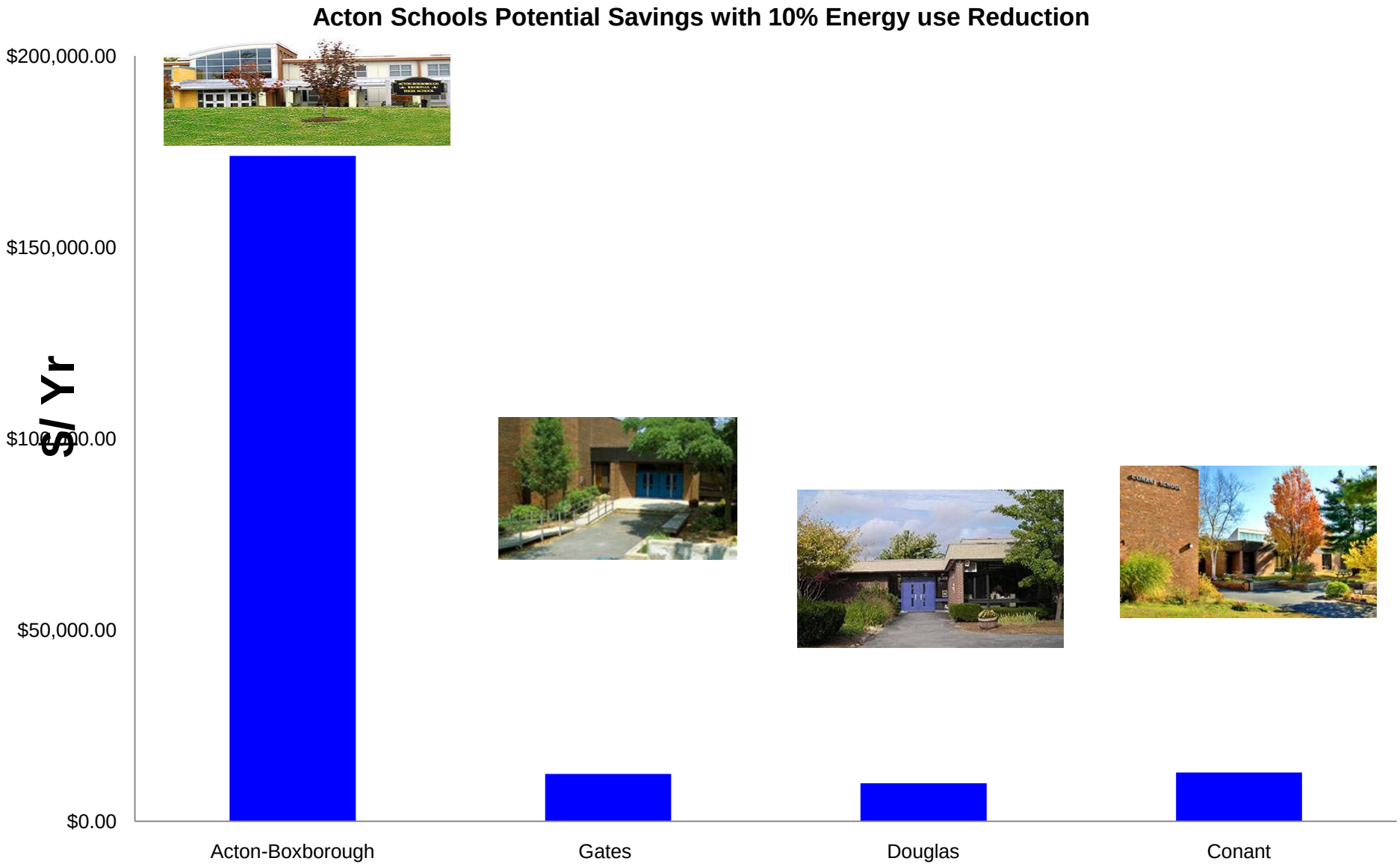
Acton School Energy Use: % of 67,314,044 total kBtu/Year



Acton Muni Total Potential Savings with 10% Energy Use Reduction: $52,661/yr



Acton School Total Potential Savings with 10% Energy Use Reduction: $208,987/yr

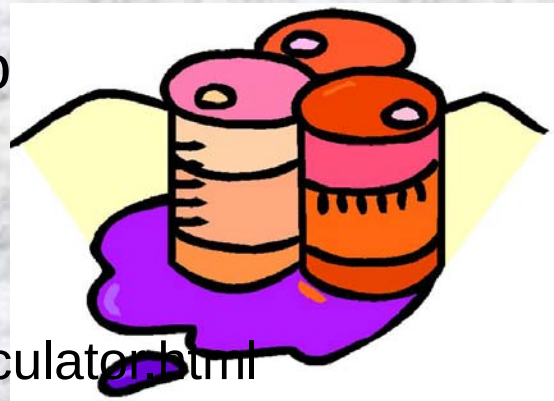


Buildings Benchmarking Summary

- Current total
  23,840,286 kWh
- 10% energy reduction: save kWh 2,384,027
- This is equivalent to…

1,712 metric tons of carbon dioxide not put into the air

3,982 barrels o



http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Buildings Benchmarking 10% savings Summary

- **2,384,027 kWh/yr**
- **= 1,712 tons of Carbon Dioxide/yr:**
- 192,590 gal gasoline
- 327 passenger cars not driven for one year

$261,648 in Buildings Savings!

http://www.epa.gov/cleanenergy/energy-resources/calculator.html

How to increase energy efficiency

Turn Off Lights

Use Programmble Vending Machine

Ceiling Leak

Use Programmable Thermostat

Tankless Water Heaters

Achieving 10% energy reduction

Sequence of where to start:

- Operating & Maintenance
- Occupants' Behavior
- Lighting
- Controls
- Equipments

Achieving the 10% energy reduction

LEARN MORE AT energystar.gov

ENERGY STAR®, a U.S. Environmental Protection Agency and U.S. Department of Energy program, helps us all save money and protect our environment through energy efficient products and practices. For more information, visit www.energystar.gov.

Best Practices Checklist for Improved Energy Performance	High Estimate Potential Energy Savings %	Opportunity Exists?	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
Operations & Maintenance							
Ensure all equipment is functioning as designed	11.5						
Calibrate thermostats	2.9						
Adjust dampers	5.7						
Implement janitorial best practices	8.0						
Occupants' Behaviors							
Turn off equipment	5.2						
Institute and energy awareness program	1.7						
Purchase Energy Star equipment	1.9						
Install Power Management Software	3.0						
Harvest daylight	1.9						
Install work station task lighting	1.4						
Lighting							
Change incandescent to CFL & HID	1.2						
Convert T-12 to T-8 and T-5	9.7						
De-lamp	5.0						
Install full floor lighting sweeps	1.4						
Install occupancy sensors	3.2						
Install high efficiency LED exit signs	0.3						
Install timer controls	2.9						

http://www.energystar.gov/ia/business/CRE_BP_handouts.pdf

Best Practices Checklist for Improved Energy Performance	High Estimate Potential Energy Savings %	Opport Exist
Operations & Maintenance		
Ensure all equipment is functioning as designed	11.5	
Calibrate thermostats	2.9	
Adjust dampers	5.7	
Implement janitorial best practices	8.0	
Occupants' Behaviors		
Turn off equipment	5.2	
Institute and energy awareness program	1.7	
Purchase Energy Star equipment	1.9	
Install Power Management Software	3.0	
Harvest daylight	1.9	
Install work station task lighting	1.4	
Lighting		

Achieving the 10% energy reduction

Best Practices Checklist for Improved Energy Performance	High Estimate Potential Energy Savings %	Opport Exist
Lighting		
Change incandescent to CFL & HID	1.2	
Convert T-12 to T-8 and T-5	9.7	
De-lamp	5.0	
Install full floor lighting sweeps	1.4	
Install occupancy sensors	3.2	
Install high efficiency LED exit signs	0.3	
Install timer controls	2.9	

Achieving the 10% energy reduction

Best Practices Checklist for Improved Energy Performance, continued	High Estimate Potential Energy Savings %	Op
Adjust temperatures for comfort	2.9	
Evaluate and combine after hours usage	1.5	
Adjust ventilation	5.7	
Limit access to thermostats	1.3	
Optimize start-up times	2.9	
Adjust thermostats for seasonal changes	5.7	
Coast last hour of operations	2.9	
Equipment		
Install VFD or VAV	9.3	
Install heat recovery equipment	5.2	
Relocate thermostats	1.4	

Industry Resources

Best Practices for Improved Energy Performance

ENERGY STAR Resources:

Guidelines for Energy Management (sample Energy Management Plan)
http://www.energystar.gov/index.cfm?c=guidelines.download_guidelines

ENERGY STAR Building Manual

- *Recommissioning*
  http://www.energystar.gov/ia/business/Recommissioning.pdf

- *Lighting Stage*
  http://www.energystar.gov/ia/business/Lighting.pdf

- *Load Reductions*
  http://www.energystar.gov/ia/business/SupplementalLoad.pdf

- *Fan System*:
  http://www.energystar.gov/ia/business/FanSystems.pdf

- *Heating and Cooling Systems*
  http://www.energystar.gov/ia/business/Heating.pdf

- Glossary
  http://www.energystar.gov/ia/business/GlossaryBM.pdf

Transportation Fuel Use and Cost

Municipal Costs

2005 – present

School Costs

2008- present

Acton Municipal Transportation Fuel Costs and Usage

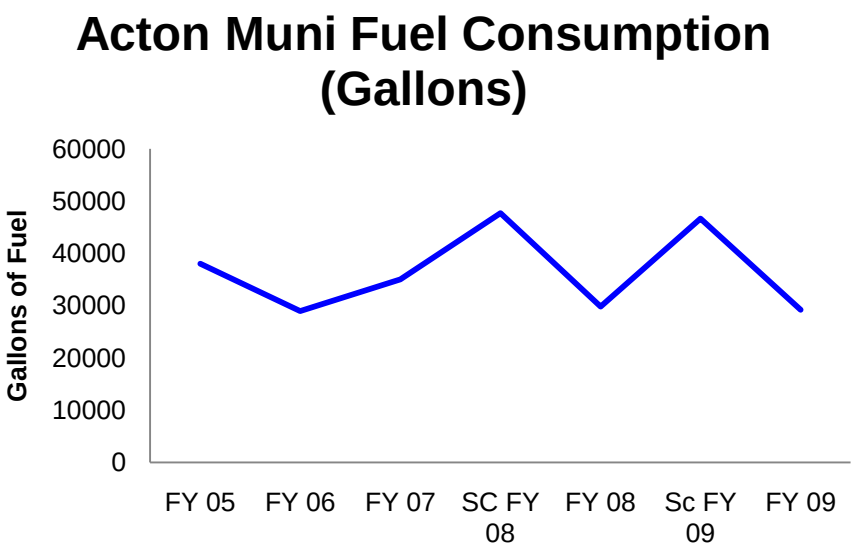
FY 05 Fuel	Municipal Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No Lead tax)
Diesel	38005	66409.02	
No Lead	47050	77499.93	
Total	85055	143908.95	

FY 06 Fuel	Municipal Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No lead tax)
Diesel	28950	69063.07	
No Lead	49068	106646.84	
Total	78018	175709.91	

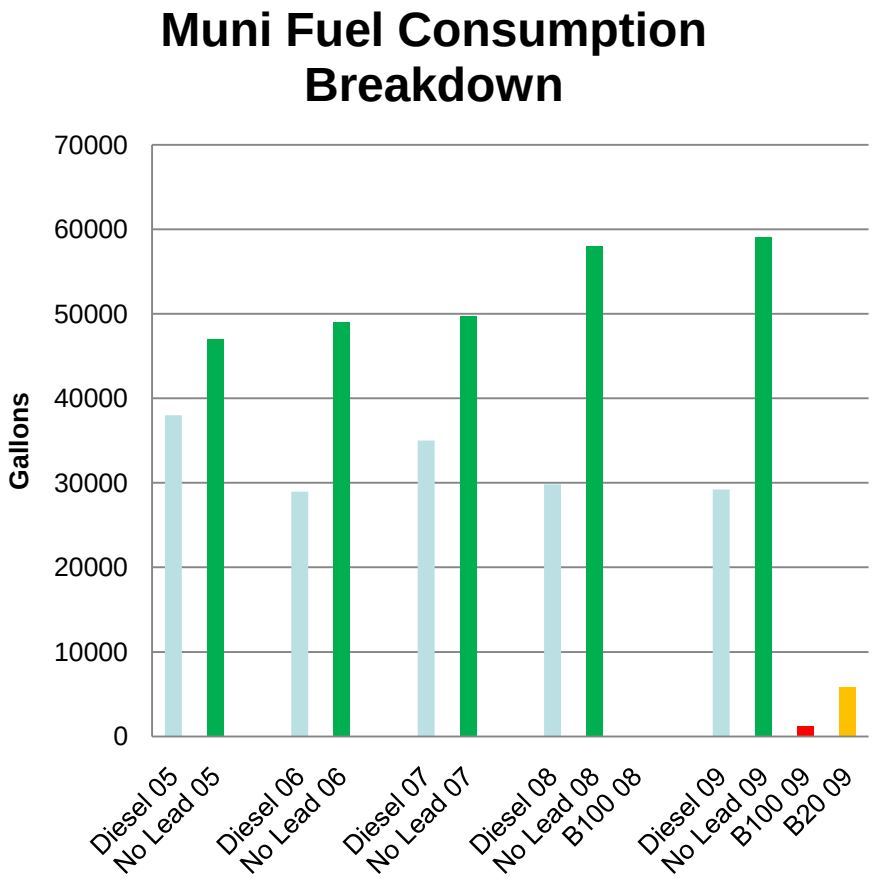
FY 07 Fuel	Municipal Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No Lead tax)
Diesel	35009	74978.18	
No Lead	49700	99854.93	
Total	84709	174833.11	

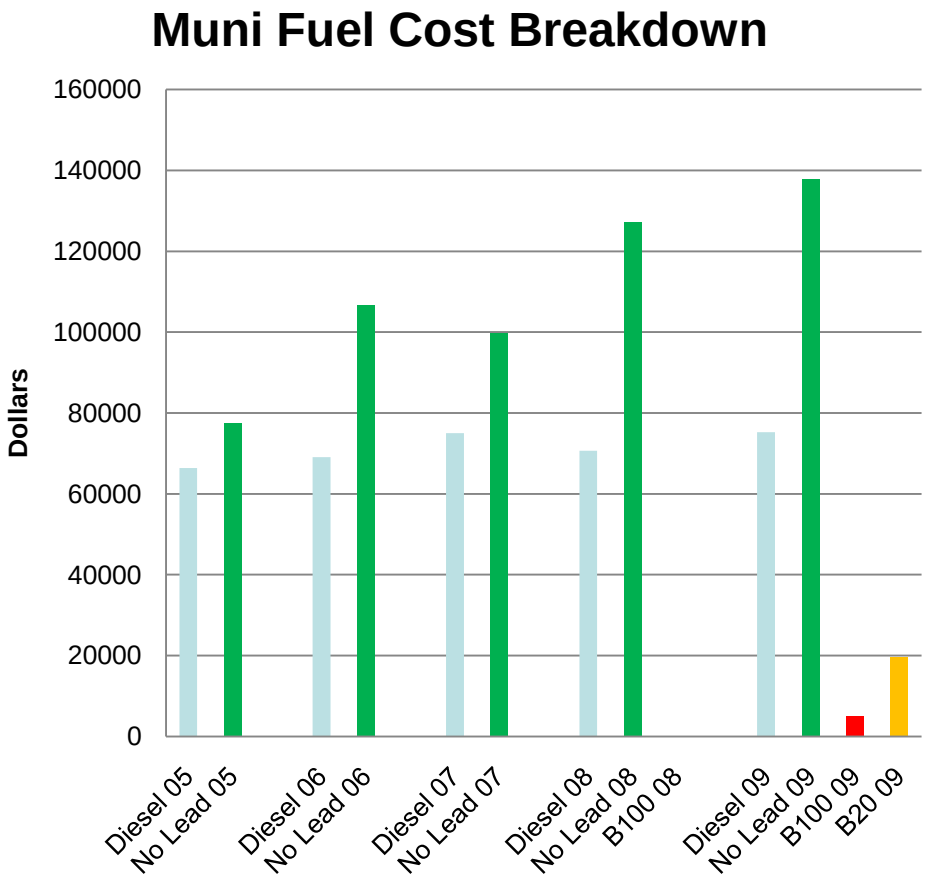
FY 08 Fuel	Municipal Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No Lead tax)
Diesel	29817	70679.9	
No Lead	58020	127155.43	
B100	40.1	212.98	
Total	87877.1	198048.31	

FY 09 Fuel	Municipal Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No Lead tax)
Diesel	29206	75260.6	
No Lead	59083	137939.37	
B100	1240	5126.41	
B20	5846	19546.78	
Total	95375	237873.16	



Acton Municipal Transportation Fuel Costs and Consumption breakdown by fuel type



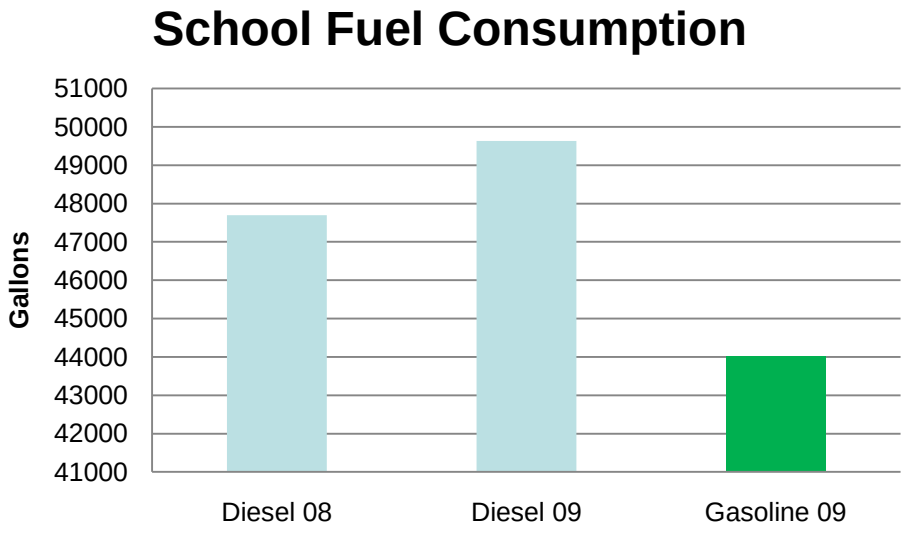


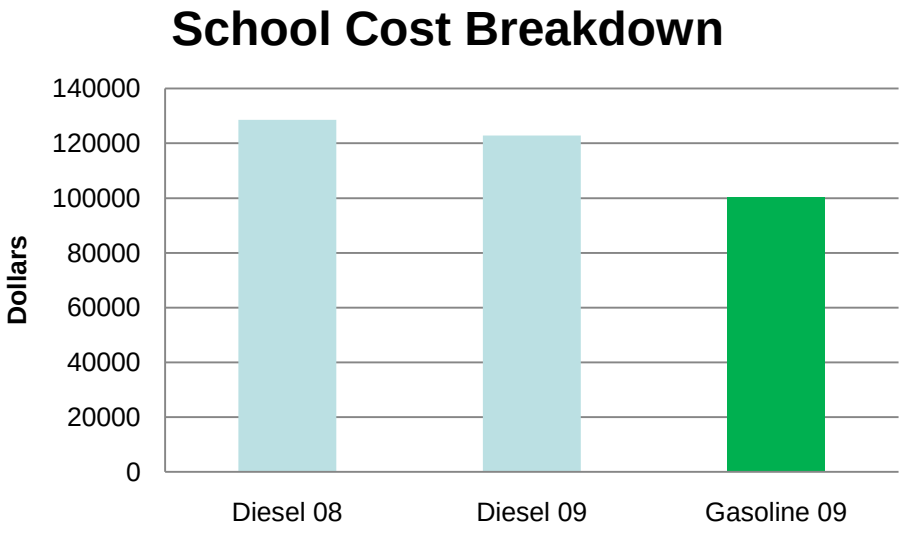
Acton School Transportation Fuel Costs and Usage

FY 08 Fuel	Transportation Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No Lead tax)
Diesel	47699	$128,531.83	
Total	47699	$128,531.83	

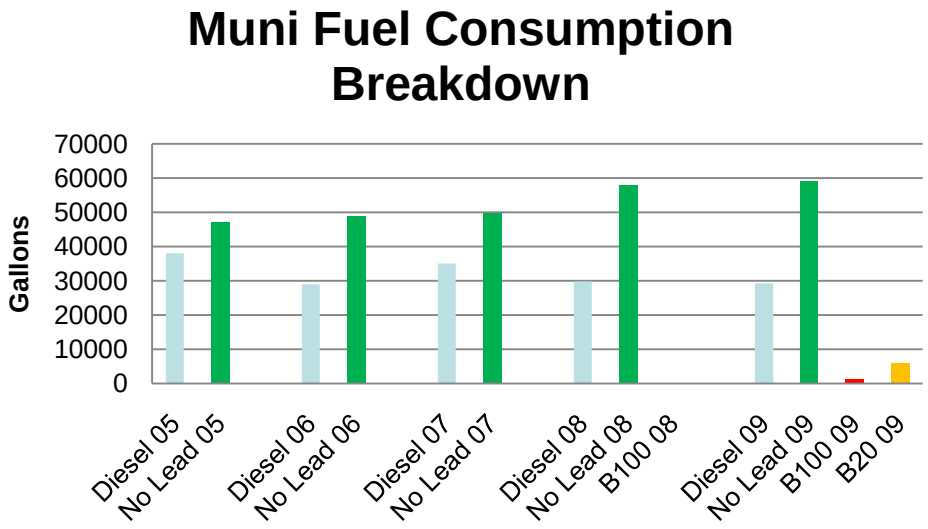
FY 09 Fuel	Transportation Amount(Gallons)	Cost	(Diesel Cost includes Diesel & No Lead tax)
Diesel	49634	$122,821.54	
Gasoline	44011	$100,167.00	
Total	93645	$222,988.54	

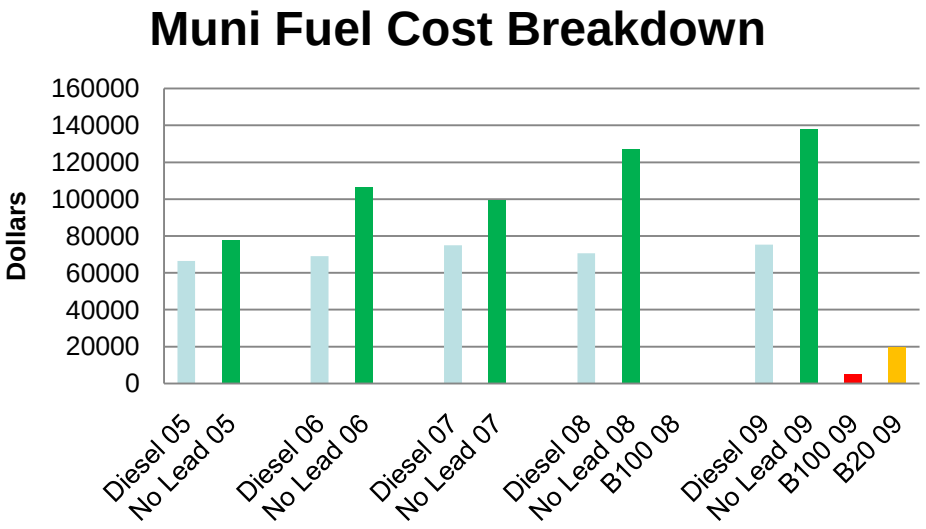
Acton 2009 School Fuel Costs and Consumption breakdown by fuel type

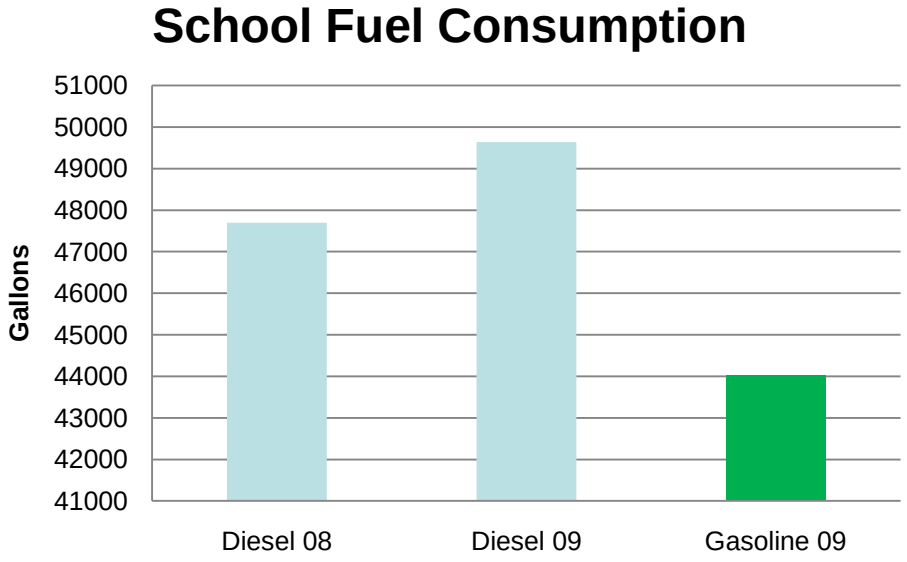


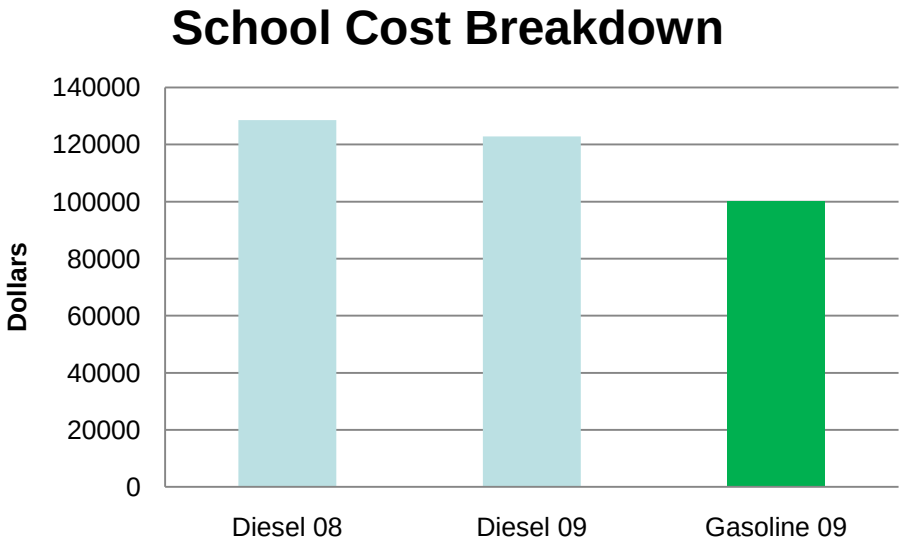


Acton Municipal and School Fuel Costs and Usage

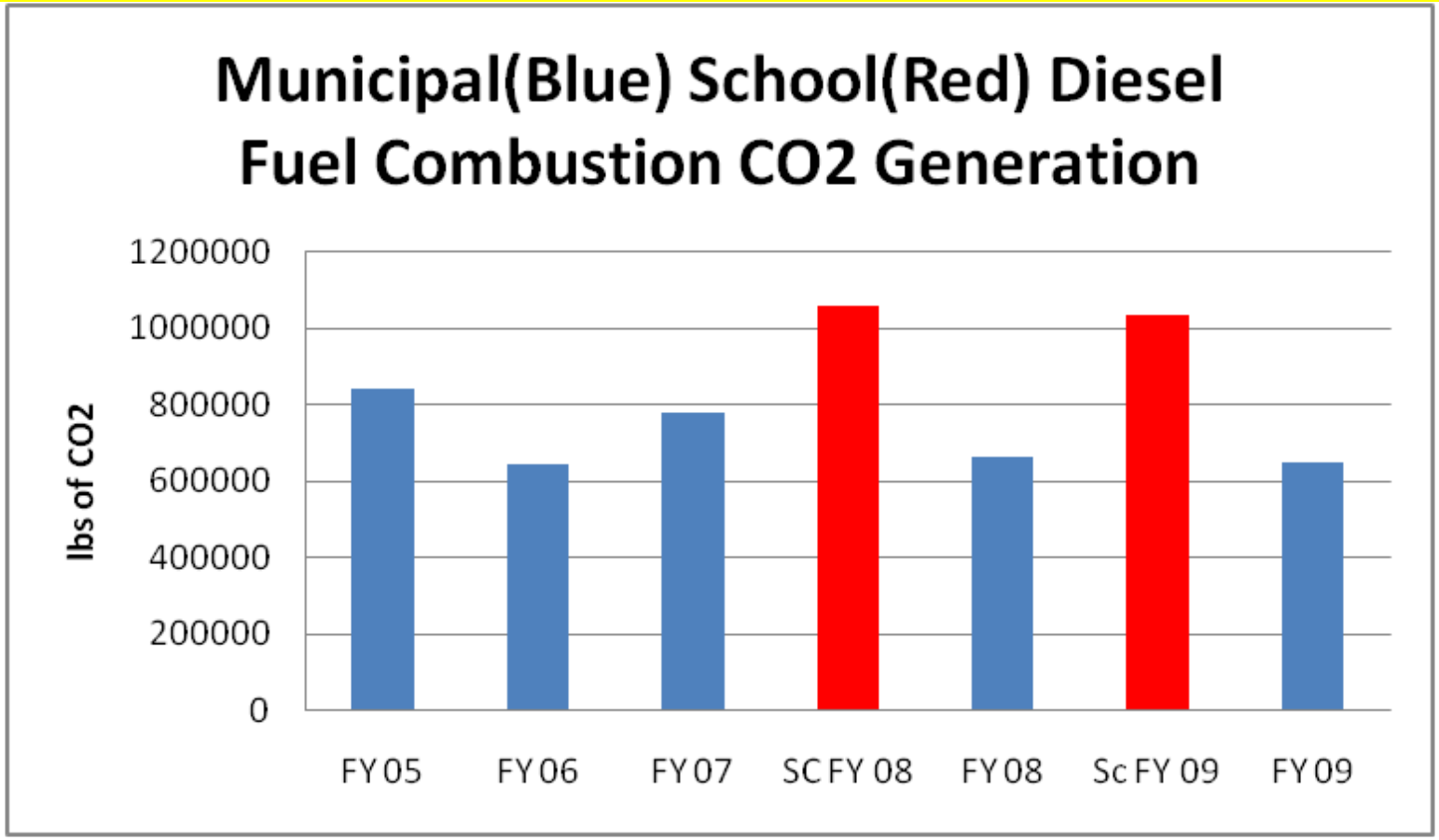








Muni & School Diesel Fuel Combustion CO2 Gas Emission



FY 2009 Diesel Consumption for Muni (29206 Gal) and Schools (49634) =78,840 Gallons

1,750,248 Pounds of CO2 Generated from Diesel alone!

Lights Use and Cost

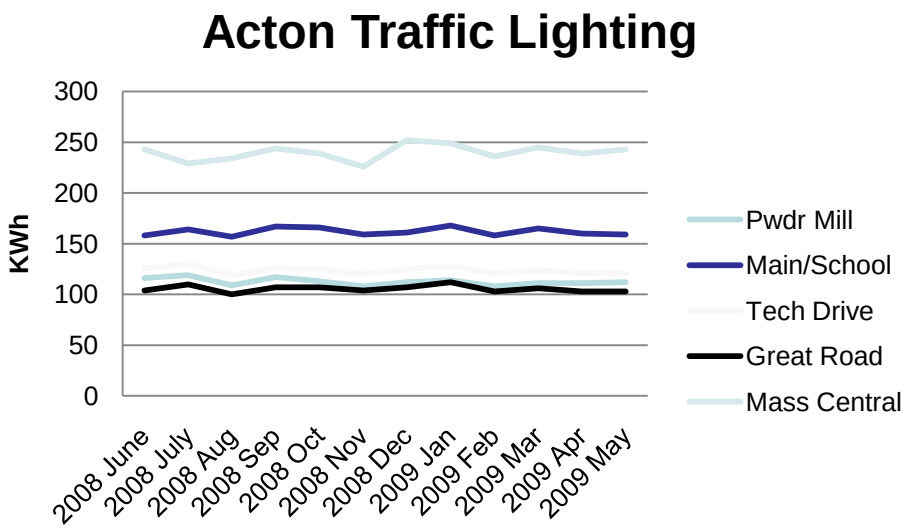
Traffic Lights

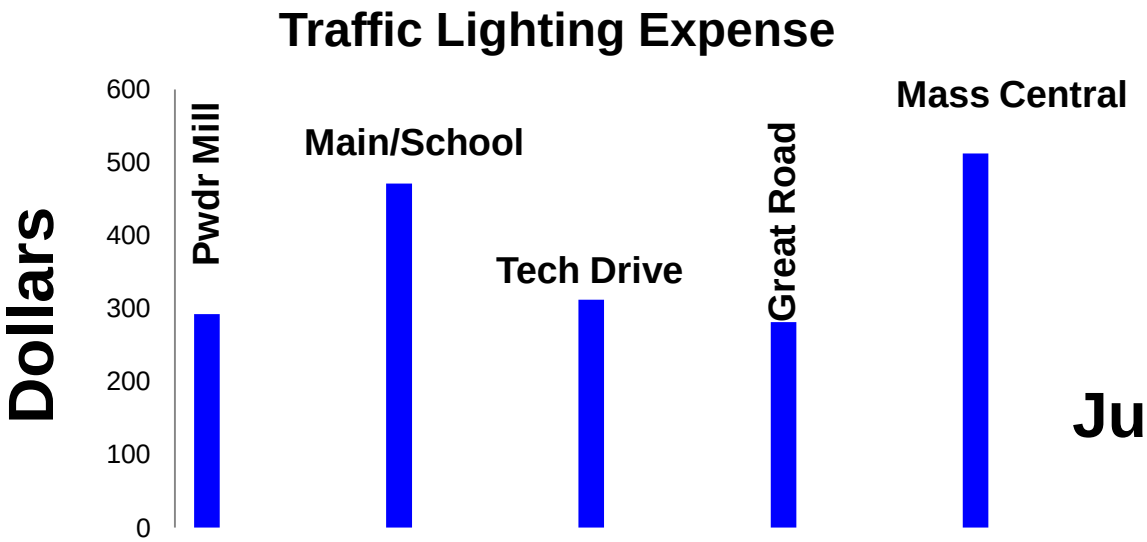
Street Lights

Acton Traffic Lights

- Acton operates 5 Traffic lights at Intersections
- Most of these traffic lights are downtown
- Traffic lights in Acton operated for DOT by paid for by Acton

Acton Traffic Lights





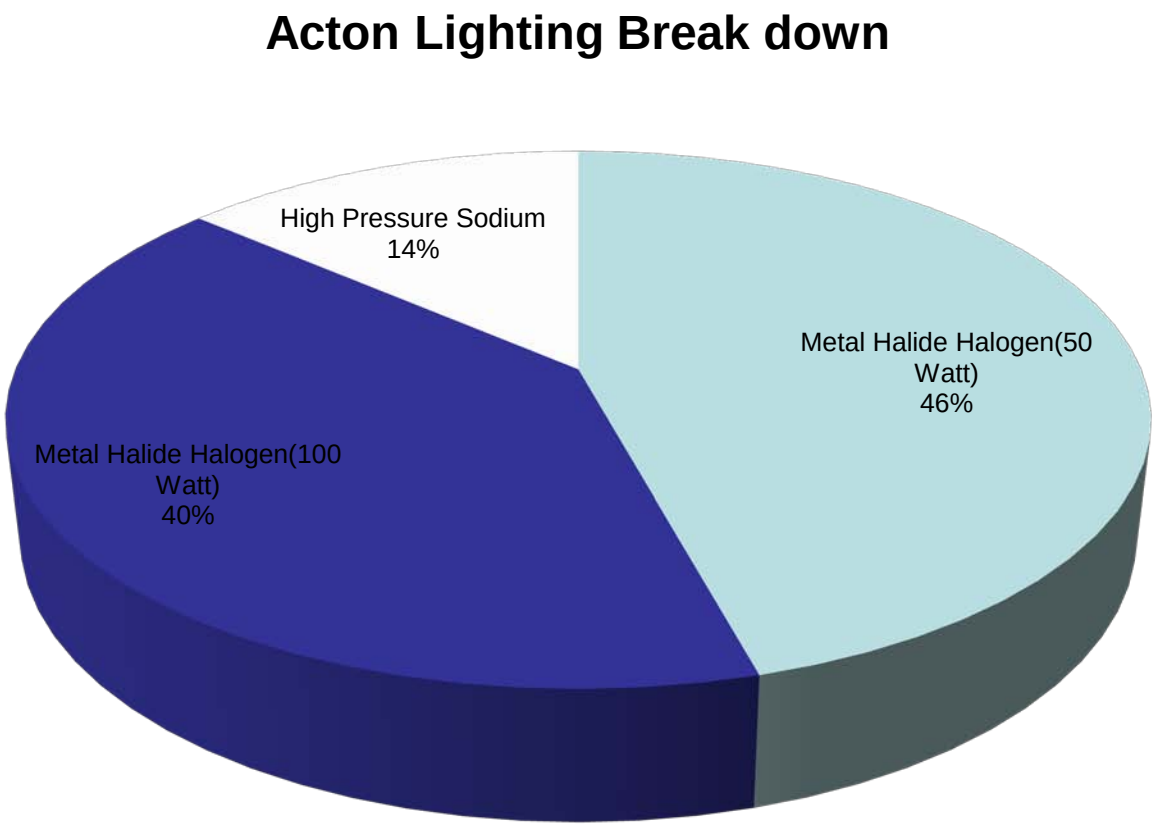
June 08-May 09

Acton Street Lights

- Acton has 754 streetlights
  - 345 of the Halogen (HAL) are Metal Halide, 50 watt
  - 306 of the HAL lights are Metal Halide, 100 watt
  - Remaining 103 High Pressure Sodium (HPS)
- Acton does not have any Mercury Vapor lights left.

http://www.basingstoke.gov.uk/NR/rdonlyres/8548CFC3-291F-4593-9C14-2013B85568DC/0/Lightingpicture.jpg

Acton Street Lights Distribution (754)



Type	Lights
Metal Halide Halogen(50 Watt)	345
Metal Halide Halogen(100 Watt)	306
High Pressure Sodium	103

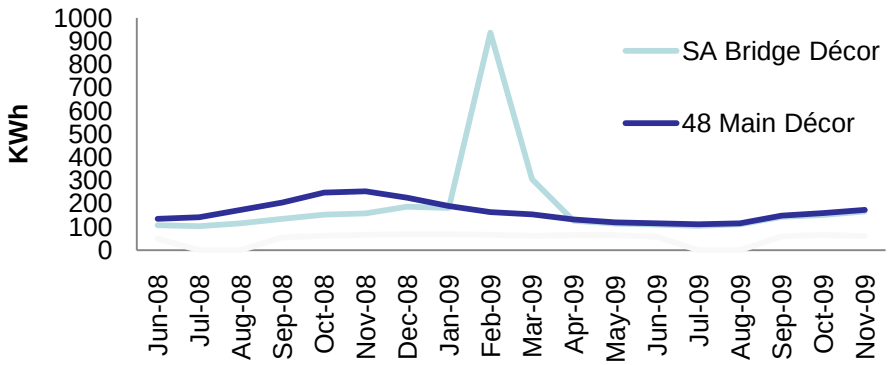
Acton Street Lights

- Dean Charter informed us:
- " Last week I got a detailed inventory from NSTAR and am physically visiting each light to verify what is there. So far I have found a number of locations we are being billed for where there is either no light or no pole. It will take a while to complete the survey and even longer to get NSTAR to adjust the bill"

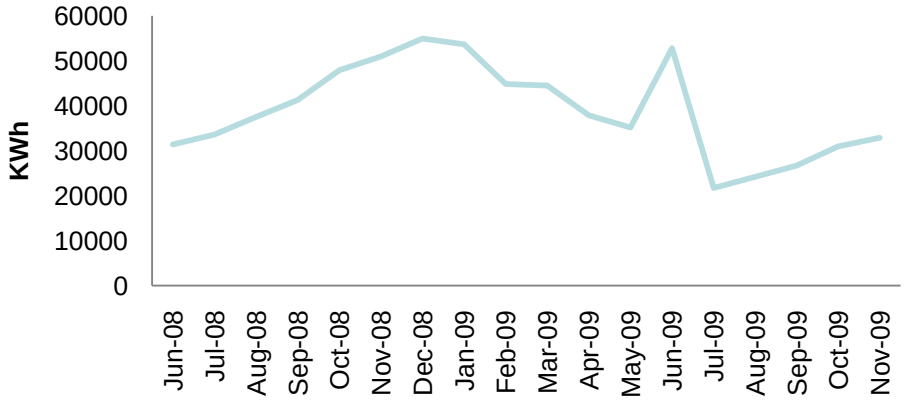
http://www.basingstoke.gov.uk/NR/rdonlyres/8548CFC3-291F-4593-9C14-2013B85568DC/0/Lightingpicture.jpg

Acton Lighting Costs (Municipal)

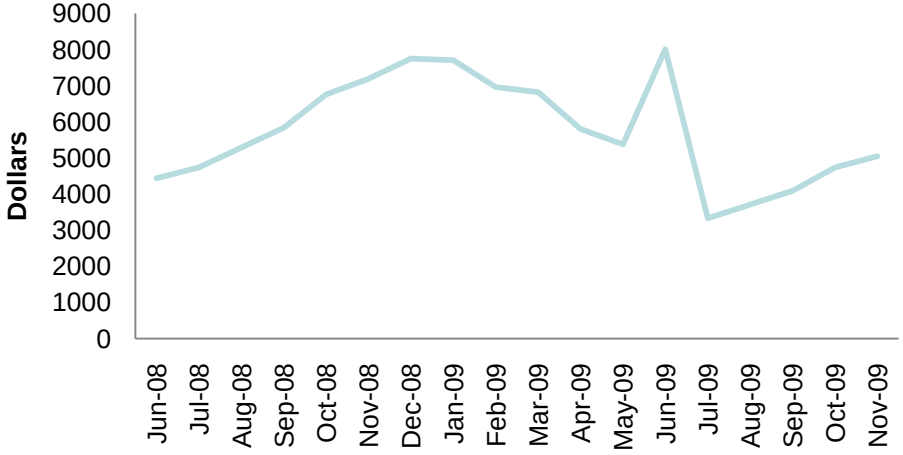
Town Special Lighting Electricity Usage



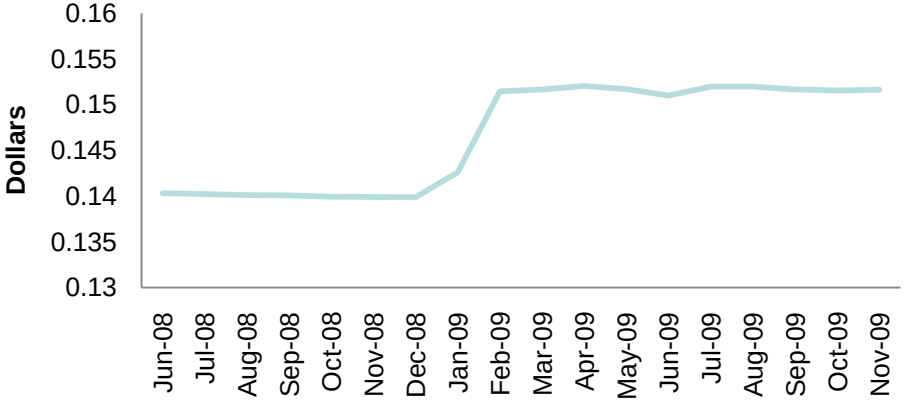
Town NStar Lighting Electricity Usage



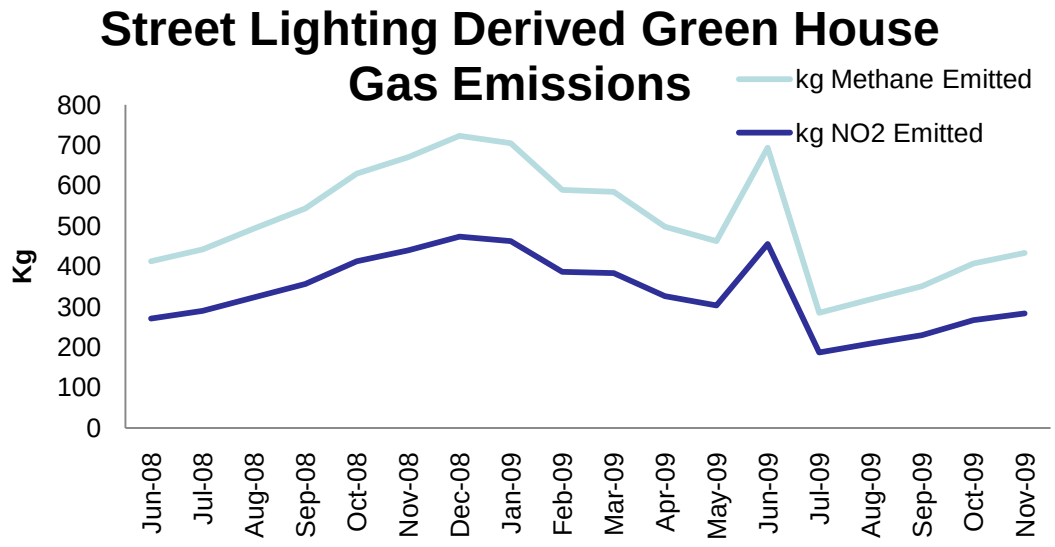
Town Total Lighting Costs

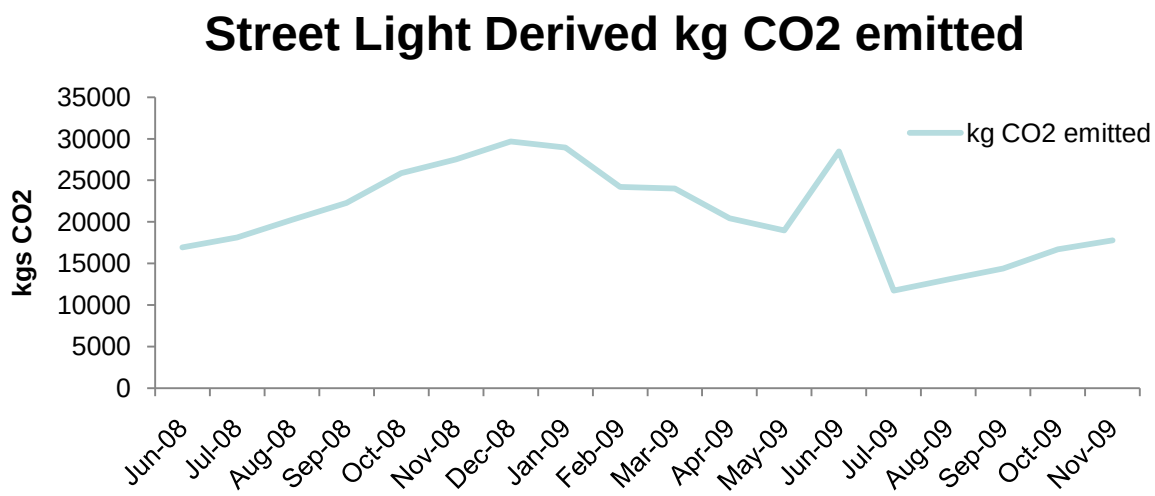


Town Lighting Cost per KWh



Street Lights Environmental Impact





How to increase efficiency, reduce cost and lower Greenhouse Gas Emissions

Street Lighting Energy Reduction

Consider using LED Street Lights.

- consume 80-90 percent less energy and
- generally last 5-7 years, compared to just a year for a comparable incandescent light signal.
- LED traffic signals also offer significant peak demand savings since they operate 24 hours a day.

http://www.cee1.org/gov/led/led-main.php3

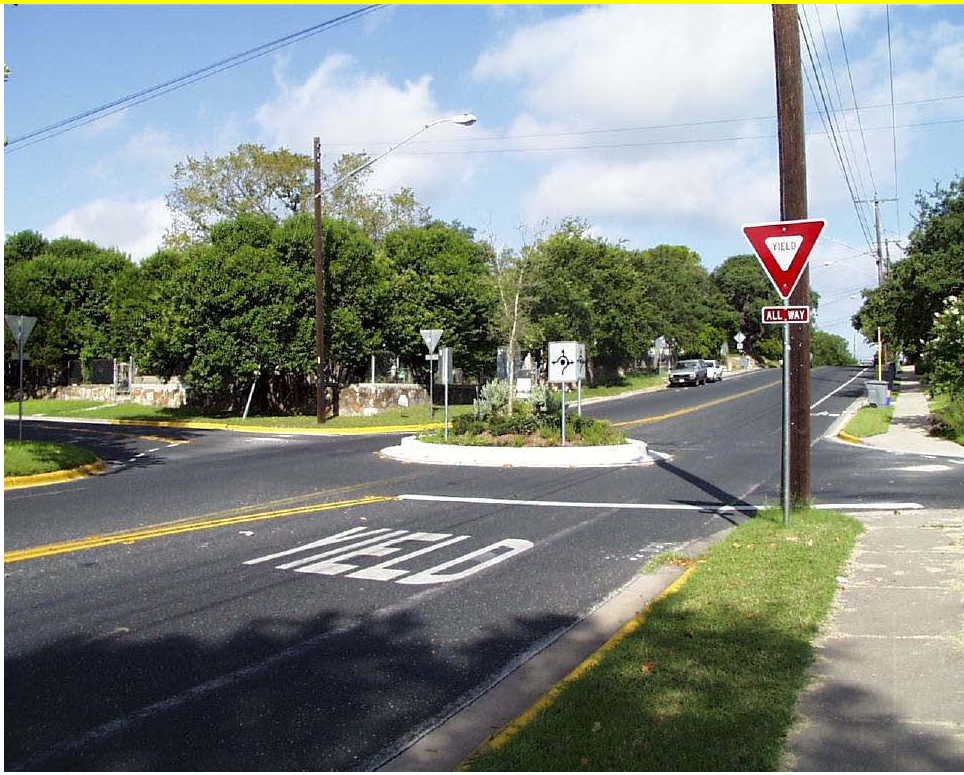
http://www.treehugger.com/LED-street-light-h01.jpg

Traffic Lights Energy Reduction

Consider using Traffic Circles

-Eliminates need of traffic lights

- Reduces vehicles fuel use by 28% compared to signals



http://www.ci.austin.tx.us/roadworks/images/traffic_circle.jpg

Transportation and Municipal Fuel Use Reduction

Increase the use of Biodiesel, B-20 and B-100

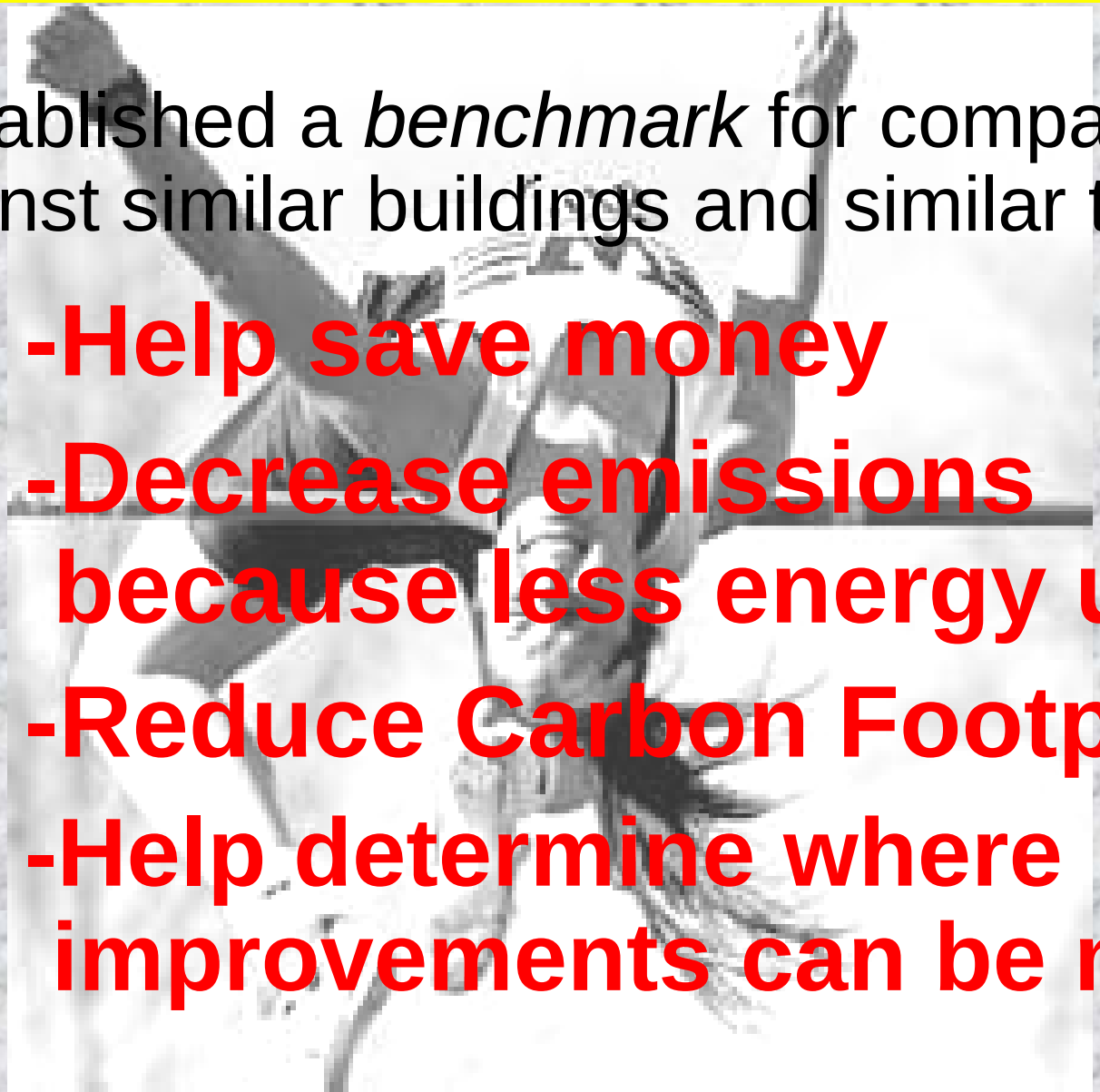
http://www-personal.umich.edu/%7Ebgoodsel/biodiesel/busbiodiesel.jpg

Bicycle Riding

Provide
Incentive to
employees
to use
Bicycle

http://i.ixnp.com/images/v6.19.0.1/t.gif

Conclusion/Benefits



- Established a *benchmark* for comparison against similar buildings and similar towns

-Help save money

-Decrease emissions because less energy used

-Reduce Carbon Footprint

-Help determine where improvements can be made

Next Steps

- Continue to gather monthly data and entering it into Portfolio Manager to keep rating up to date
- Utilize help from Utility Companies
- Use Energy Star Best Practices
- Save Energy
- Save Money
- Continue to lead the community towards Energy Efficiency

Acknowledgments

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Recap

- Community Energy Challenge
- Benchmarking
- Reducing Energy Use
- Acknowledgements

Thank you

Acton, MA
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West Concord
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Imagery Date: Apr 10, 2008
42°29'06.33" N 71°25'58.22" W elev 50 m
Eye alt 17.22 km