

Town of Acton
Draft Submission
“Supplemental Information”
Green Communities Designation
Application
April 21, 2010

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TOWN CLERK
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**ABSTRACT OF THE SPECIAL TOWN MEETING HELD
TUESDAY, JUNE 23, 2009, 7:00 P.M.
ACTON-BOXBOROUGH REGIONAL HIGH SCHOOL AUDITORIUM**
NUMBER OF REGISTERED VOTERS ATTENDING SPECIAL TOWN MEETING
JUNE 23, 2009 – 416

**ARTICLE 5 USE OF TOWN FACILITIES FOR SOLAR, RENEWABLE OR
(Two-thirds vote) ALTERNATIVE ENERGY PROJECTS**

To see if the Town will vote to authorize the Board of Selectmen to enter into any leases, licenses, easements, and/or other agreements allowing the use, for a term allowed by law, on such terms and conditions as the Board of Selectmen may determine, of any Town-owned lands, buildings, facilities, or portions thereof, for the purpose of installing and operating solar, renewable or alternative energy facilities to defray the cost of energy borne by taxation, and to enter long-term power purchase agreements, energy management services agreements, utility easements and similar instruments in conjunction therewith and in furtherance thereof, all on such terms and conditions as the Board of Selectmen may determine, or take any other action relative thereto.

MOTION: Ms. Knibbe moves that the Town authorize the Town Manager, subject to the approval of the Board of Selectmen with respect to municipal buildings, and subject to the approval of the School Committee with respect to school buildings, to enter into any leases, licenses, easements, and/or other agreements allowing the use for up to 25 years, on such terms and conditions as the Town Manager may determine, of any Town-owned lands, buildings, facilities, or portions thereof, for the purpose of installing and operating solar, renewable or alternative energy facilities to defray the cost of energy borne by taxation, and to enter long-term power purchase agreements, energy management services agreements, utility easements and similar instruments in conjunction therewith and in furtherance thereof.

Motion to amend: Ms Michelman moves to amend the motion by removing "renewable or alternative" from the motion.

AMENDMENT TO MOTION CARRIES

**AMENDED MOTION CARRIES
DECLARED 2/3 BY MODERATOR***

*TOWN OF ACTON HAS EXCEPTED MGL CH 39 SEC 15 AT ITS ANNUAL TOWN MEETING APRIL 2001,
ARTICLE 43 AND THE AMENDED BYLAW 5A WAS APPROVED BY THE ATTORNEY GENERAL ON AUG. 6, 2001.
(THE TOWN MEETING MODERATOR IS NOT REQUIRED TO COUNT A 2/3 REQUIRED VOTE.)

A TRUE COPY. ATTEST:


TOWN CLERK, ACTON, MA

Supplemental Information
EPA Energy Star Community Energy
Challenge Analysis

2010 New Hampshire Pollution Prevention Internship Program

EPA ENERGY STAR Community Energy Challenge (CEC), Transportation and Municipal Fuel, Streetlight and Traffic Light Analysis in Acton, Massachusetts

Date: February 20, 2010

Project Title: EPA ENERGY STAR Community Energy Challenge (CEC), Transportation and Municipal Fuel, Streetlight and Traffic Light Analysis in Acton Massachusetts

UNH Intern: Jim Potter

Faculty Advisor:

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Accessing your Portfolio Manager account:

- Go to the EPA's ENERGY STAR website www.energystar.gov
 - Click on the looking for Portfolio Manager icon on the bottom right side of the web page.
 - Type in username and password to access your account.
- All Data were entered in Jim Potter Portfolio Manager account
Jim has verified that all buildings are completely shared with your account.
The names of all your facilities start with Acton

Table of Content

1. Background
2. Objective/Intern Role
3. Buildings Benchmarked
4. Benchmarking Process
5. Benchmarking Results and Expected Savings
6. Total Energy and Environmental Benefits
7. Suggestions to Achieve 10% Energy Use Reduction
8. Transportation Fuel Data for Municipal and School Use
9. Transportation Fuel Analysis results
10. Data from Street and Traffic Lights
11. Analysis results of Streetlights and traffic lights
12. Suggestions for energy saving for Transportation, Streetlights and traffic lighting
13. Acknowledgements

1. Background

Recently Acton's Green Advisory Board has expressed interest in Benchmarking the town municipal buildings and possibly entering the EPA's Community Energy Challenge (CEC) Program. The Community Energy Challenge is an opportunity for municipalities across New England to identify simple and cost-effective measures that increase energy efficiency and renewable energy use while reducing air pollution and saving money.

2. Objective/Intern Role

During the period November 2009 to February 2010 I worked with the town as a UNH P2 intern working on the EPA Community Energy Challenge (CEC). My role was to help the town achieve the objective of benchmarking a number of the town buildings and analyze fuel transportation, streetlights and traffic lights energy use data. This will help in establishing a baseline of energy use and cost. The town can measure improvements, and evaluate the energy savings from changes or updates that the town implements.

3. Buildings Benchmarked

Eighteen of Acton's town buildings were benchmarked. These include: The Acton Center Fire Station, Acton Citizens Library, Acton Civil Defense Building, Acton Department of Public Works, Acton Memorial Library, Acton Public Safety Facility, Acton Senior Center, Acton South Fire Station, Acton Town Hall, Acton Wastewater Treatment Facility, Acton West Fire Station, and the Acton Windsor Building. The Acton schools were also benchmarked including the Acton Boxborough Regional High School, Acton Boxborough Junior High school, Parker Damon Elementary, Gates Elementary, Conant Elementary, and Douglas Elementary. In total 974,097 square feet of town owned property was benchmarked.

4. Benchmarking Process

Each building is entered into EPA ENERGY STAR's Portfolio Manager and has received either an ENERGY STAR Rating or Energy Use Intensity (EUI) rating. The first step in the benchmarking process was to gather at least twelve months of utility data for each of the buildings. Space type data is also needed for each building. Space type data includes: zip code, the year the building was built, square footage, number of personal computers, number of regular occupants, operating hours, and percent of the building heated/ cooled. Some buildings like schools require more data like number of students, if there are on-site cooking facilities, and if the building is mechanically ventilated. The baseline period which all the building calculations were conducted was December 2008- November 2009. Data obtained are summarized in the following Table:

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

The benchmarking of wastewater treatment plants requires other data. These are given in the following table.

**Acton Wastewater Treatment
Facility**

Average Influent Flow(gallons)	124,271
Average Influent Biological Oxygen Demand	343lbs/day
Average Effluent Biological Oxygen Demand	1.4 lbs/day
Plant Design Flow Rate	500,000
Presence of fixed film trickle filtration process	NO
Presence of nutrient removal process	YES

5. Benchmarking Results and Expected Savings

5.1 Acton Town Hall

The first building benchmarked was the Town Hall. The building received energy use intensity (EUI) of 115.9 kBtu/sq.ft-yr. This is compared with the national average of 208 kBtu/sq.ft-yr. The lower the EUI is for the building, the more efficient the building is. Being below the average is desirable, like in a game of golf. Therefore, this building is doing well compared to the national average. The building received an EPA ENERGY STAR score of 89. This means that the building is in the 89th percentile compared to the national average. If Acton wanted to get an ENERGY STAR plaque for the building then a licensed professional engineer would have to come and check basic building parameters such as lighting and humidity. When the 10% reduction in energy use is reached there will be a financial savings of \$4983 a year!

5.2 Acton Public Safety

The Acton Public Safety Complex received an energy intensity of 288 kBtu/ Sq. Ft/yr. The national average for similar buildings is 189 kBtu/ Sqft/yr. This puts the complex at higher than the national average for its energy consumption, which may be due to the buildings new design and technology intensive nature. There still exists opportunities for energy savings as a 10% reduction can save the facility \$11,970 a year.

5.3 Acton Senior Center

The Acton Senior Center received an energy use intensity of 115 kBtu/sq.ft.-yr. This is to be compared to the national average for similar buildings of 102 kBtu/sq.ft.-yr. This building is slightly above the national average. Due to the energy consumption, this indicates opportunities for savings. A 10% reduction will be equal to \$1334 a year.

5.4 Acton Memorial Library

Acton's Memorial Library earned an EUI of 163 kBtu/sq.ft.-yr compared to the national library average of 246, this means it is performing much better than the national average. A 10% reduction will mean a savings of \$13,489 a year. This building is Acton's highest bulk energy user and is also the largest (besides schools).

5.5 Acton Citizens Library

Acton's Citizens Library which is much smaller than the memorial library earned an EUI of 87 kBtu/sq.ft.-yr compared to the national library average of 246, this means it is also performing much better than the national average, however this building is not used as much as a typical library. A 10% reduction will mean a savings of \$325 a year.

5.6 Acton Fire Department

The Acton Fire Departments three stations received an average energy use intensity (EUI) of 157.3 kBtu/Sq.Ft/yr. This is right on par with the national average of 157

kBtu/Sq.Ft/yr. A 10% reduction in energy use here will result in a savings of \$3,891 per year.

5.7 Acton Department of Public Works

The Department of Public Works (DPW) received an energy use intensity of 119 kBtu/sq.ft/yr. compared to the national average of 77. This facility is similar to the Transfer Station in that it is of the garage type. A 10% reduction in energy use here will save \$3653 dollars.

5.8 Acton Civil Defense

The Acton Civil Defense Building was also a small and low energy using building. Its EUI was 89 kBtu/sq.ft/yr. compared the national average of 77. A 10% savings on this building would amount to \$407 per year.

5.9 Acton Windsor Building

The Acton Windsor Building which is usually not in use was also benchmarked. The EUI was found to be 34 kBTU/sq.ft.-yr. compared to the national average of 52. A 10% yearly reduction in energy use here could result in a savings of \$206.

5.10 Acton Waste Water Plant

Acton's Waste Water plant used a total of 761,528 KWh equivalents of electricity. This Savings on this plant with a 10% reduction in energy use would amount to \$12,403. Savings in

these plants can be achieved by turning off machines when they are not needed and making capital improvements to increase efficiency of various day to day operations.

Acton Municipal Yearly Energy Usage Summary

Building	kBTU	KWh	Red kBTU	Red KWh	Savings	EUI	Nat Ave EUI	ENERGY STAR Rating
Town Hall	1346220	394274.2	1193796	349633	\$4,983.00	115.9	208	89
Public Safety	3318460	971894	2986614	874704.6	\$11,970.00	288	189	
Fire Dept	1608167	470991.9	1447350	423892.6	\$3,891.00	157.3	157	
Civil Defense	184414	54010.25	165973	48609.34	\$407.00	89	182	
Senior Center	423423	124010	381081	111609.1	\$1,334.00	115	102	
Windsor Bldg	83779	24536.77	75401	22083.07	\$206.00	34	102	
Memorial Lib	3354680	982501.9	3019212	884251.7	\$13,489.00	163	246	
Citizens Lib	119605	35029.31	107644	31526.24	\$325.00	87	246	
Dept. Pub. Works	1047919	306909.3	943127	276218.3	\$3,653.00	119	150	
Wastewater	2600183	761528.6	2340165	685375.8	\$12,403.00			

5.11 Acton Schools

Acton’s schools were also benchmarked. The building information is presented in the following Table.

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

In addition to three elementary schools (Gates Conant and Douglas), the town of Acton has one central campus which includes the Acton-Boxborough Regional High School, the Acton Boxborough Junior High, the Parker Damon Elementary School, and an administration building. This Campus used a combined 54,273,162 kBTU's per year and a yearly electricity use reduction there of 10% would result in a \$173,905 savings. This campus was all placed on one electric meter so the individual buildings themselves cannot get ratings or receive a EUI.

The three Elementary Schools received an ENERGY STAR rating. Conant Elementary School had an EUI of 134.9 compared to the national average of 157 kBTU/sq.ft.-yr. The building received an ENERGY STAR rating of 63. A 10% energy use reduction here would save \$12,759.

The Douglas Elementary School had an EUI of 128.9 compared to the national average of 157 kBTU/sq.ft.-yr. This building received an ENERGY STAR rating of 86! As long as the information in Portfolio manager is continually updated and this does not go below 75 it would be eligible to apply for an ENERGY STAR award. A 10% reduction in annual energy consumption would result in a \$ 9,954 savings.

Acton's Gates Elementary school received an EUI of 146.6 compared to the national average of 156 kBTU/sq.ft.-yr. This gave it an ENERGY STAR rating of 56. This building is doing better than the national average and with a 10% reduction in energy usage it would save \$12,369. A summary of the benchmarking of the schools is given in the following table.

School	kBtus	kBTU w/ 10% reduction	10% Savings	EUI	Nat. Avg	Rating
Acton-Boxborough	54273162	48845846	\$173,905.24			
Gates	4918120	4426308	\$12,369.00	146.6	156	56
Douglas	3584583	3226125	\$9,954.00	146.6	157	86
Conant	4538179	4084631	\$12,759.00	146.6	157	63

Total	67314044	60582910	\$208,987.24
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6. Total Energy and Environmental Benefits

A 10% reduction in the energy use of the municipal buildings and the schools in Acton would save the town 8,140,084 kBTU (2,384,027 KWh) per year and a financial savings of \$261,648 a year! The environmental benefits to this savings are the town will save 1712 Metric Tons of CO₂ from being emitted. This is equal to the annual green house gas emissions from 327 passenger vehicles = CO₂ emissions from 192,590 gallons of gasoline = CO₂ emissions from 3982 barrels of oil. As we have seen the rising cost of electricity we understand what this savings means to both the environment and our finances.

7. Suggestions to Achieve 10% Energy Use Reduction

The first step to meet this 10% reduction might be to talk to the town utility company because they have incentives and other programs to help their customers reduce energy consumption and reduce peak load. Other measures to think about are starting with No-cost/ Low –Cost ways to increase energy efficiency. There are many resources available on the energystar.gov site including the Best Practices Checklist which starts at operating and maintenance, occupants' behaviors, lighting and moves up to controls and equipment. There is also a Building Manual that is a great reference for improving energy performance.

8. Transportation Fuel Data for Municipal and School Use

Acton's Municipal and School Transportation fuel costs were also collected. The table below reflects the information.

Town Of Acton Fuel Consumption

FY 05 Municipal

Fuel	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 Municipal

Fuel	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 Municipal

Fuel	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 Municipal

Fuel	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 Municipal

Fuel	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	

FY 08 Transportation

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

FY 09 Transportation

Fuel	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	

9. Transportation Fuel Analysis Results

As can be seen from the above information, the municipal and transportation fuel costs are significant expenses. The town is taking the right steps to protect the environment by starting to use Bio-Diesel (B20&B100). Cost analysis should be performed to study the fuel savings of buying more energy efficient vehicles vs. the capital costs of procuring them. Environmental considerations are also important as the towns Diesel Municipal& Transportation consumption alone in 2009 generated over 1.75 million pounds of CO2 through the combustion of the fuel in the vehicles engines.

10. Data from Street and Traffic Lights

	SA Bridge Décor	48 Main Décor(KWh)	Main/Mass Pole 31 (KWh)	NSTAR Street lighting (KWh)	Total Expense\$
Jun-08	107	134	49	31385	4444.32
Jul-08	103	141	0	33584	4743.06
Aug-08	116	173	0	37491	5292.94
Sep-08	135	205	55	41278	5836.86
Oct-08	153	247	61	47873	6763.82
Nov-08	158	253	66	50927	7190.87
Dec-08	187	225	68	54955	7752.29
Jan-09	182	190	68	53613	7708.24
Feb-09	937	164	66	44818	6964.64
Mar-09	305	154	62	44453	6821.04
Apr-09	127	132	64	37859	5805.11
May-09	114	119	64	35148	5377.14
Jun-09	110	116	58	52769	8010.58
Jul-09	105	111	0	21696	3330.1
Aug-09	111	116	0	24221	3715.7
Sep-09	143	149	59	26666	4097.21
Oct-09	151	159	66	30926	4743.34
Nov-09	166	173	60	32899	5049.07

Traffic and Street Light Information

	Acton Traffic Light Electricity Usage (KWh)				
	Pwdr Mill	Main/School	Tech Drive	Great Road	Mass Central
2008 June	116	158	126	104	243
2008 July	119	164	130	110	229
2008 Aug	109	157	119	100	234
2008 Sep	117	167	126	107	244
2008 Oct	113	166	125	107	239
2008 Nov	108	159	120	104	226
2008 Dec	112	161	125	107	252
2009 Jan	114	168	128	112	249
2009 Feb	108	158	121	103	236
2009 Mar	111	165	124	106	245
2009 Apr	111	160	121	103	239
2009 May	112	159	121	103	243

11. Data from Street and Traffic Lights

Acton Massachusetts has 754 street lights and 5 Town Operated traffic lights. The total electricity expense for the 5 lights from June 08-May 09 was \$1870. The combined street lighting expense was \$74,700. The emissions from the generation of the electricity to power these lights released 277227 kg of CO₂ , 7444 kg Methane and 4045 kg of Nitrous Oxide into the atmosphere. As can be surmised from the prior information, these lights consume a significant amount of electricity and are expensive to operate. The street and traffic lighting is an area the town could possibly look into saving money and lowering its environmental impact by different means such as upgrading light bulbs to more efficient ones.

12. Suggestions for energy savings for Transportation, Street lighting, and Traffic lighting

Various methods exist to go about reducing the town's energy consumption. The following link http://www.energystar.gov/ia/business/CRE_BP_handouts.pdf has useful tips and checklists to make sure that the buildings are operating efficiently. There are a variety of Energy Service Companies available in New England which perform consulting operations specific to a towns energy reduction goals.

13. Acknowledgement

Working with the town of Acton has been a pleasure. It is clear that conscious energy saving practice will be continually employed to both save money, and protect the environment. Aside

from the town energy committee the following individuals are to be thanked for help in data collection and getting questions answered; Kate Crosby, JD Head, and Dean Charter.

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