2008 MUNICIPAL ENERGY USE BASELINE REPORT AND ENERGY ACTION PLAN

Prepared for the

Hampton Falls Energy Committee and the Town of Hampton Falls, New Hampshire

by the
Rockingham Planning Commission

June 2009

Insert photo of Town Hall

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This project was funded by a grant from Clean Air Cool Planet through the New Hampshire Charitable Foundation.

2008 MUNICIPAL ENERGY USE BASELINE REPORT
TOWN OF HAMPTON FALLS, NEW HAMPSHIRE
JUNE 2009

1.0 INTRODUCTION

This report is a summary of energy use, energy costs and greenhouse gas emissions for all municipal buildings and facilities of the Town of Hampton Falls, New Hampshire for the year 2008. The focus of this report is the municipal operations of the town, with special emphasis on town-owned buildings. This report does not include information about residential, commercial, or industrial energy use in the town.

This report was prepared by the Rockingham Planning Commission in partnership with and funded by a grant from Clean Air-Cool Planet. Energy data was gathered through the volunteer efforts of the Hampton Falls Energy Committee and staff of the Rockingham Planning Commission, using EPA Portfolio Manager software and the Small Town Carbon Calculator (STOCC) program developed by Clean Air Cool Planet.

2.0 TOWN OF HAMPTON FALLS PROFILE

Town Population:	2,095 (US Census Bureau, 2007)
Area of Municipality (land and water):	12.6 square miles
Population Density (12.4 square miles of land):	167.7 persons per square mile
Number of municipal buildings:	4
Total area of municipal building space:	square feet
Number of street lights:	10
Number of vehicles in fleet:	_____
Total cost of municipal energy use in 2008:	**$120,212**
Total cost for electricity	$58,141
Total cost for No. 2 heating oil	$39,004
Total cost for vehicles (gasoline)	$18,735
Total cost for streetlights (electric)	$4,333
Total municipal energy use in 2008:	3,948 mmBtu
Total municipal CO_2 emissions in 2008:	784,027 lbs
2008 Average energy intensity of municipal buildings:	**kBtu/square feet**
Lincoln Ackerman Elem. School	56.0 kBtu/ sq ft
Library	54.0 kBtu/ sq ft
Public Safety Complex	21.2 kBtu/ sq ft
Town Hall	18.8 kBtu/sq ft

3.0 HAMPTON FALLS ENERGY COMMITTEE

In 2008, Hampton Falls was one of 165 municipalities - of the 183 municipalities in the state - that passed the New Hampshire Climate Change Resolution that calls on the federal government to prioritize climate change policy and enables the formation of a local energy committee for the town of Hampton Falls to address energy efficiency and conservation, emission reductions, and other energy related issues. The generation and use of energy and emissions from energy use - whether for our homes, businesses, transportation or recreation - has a very significant impact on our environment, and the health and welfare of the community. In support of energy conservation, NH State law encourages energy efficient patterns of development through zoning that does not unreasonably limit development of alternative and renewable sources of energy.

The Hampton Falls Energy Committee (HFEC) was appointed by the Board of Selectmen in April, 2008. The HFEC consists of seven members represented by the Board of Selectmen, the Planning Board and volunteer citizens. The HFEC will maintain nine active members and invite 3-4 persons to work with them on specific projects and initiatives as ad-hoc members as needed.

Members of the Hampton Falls Energy Committee include:
Chair: Susan Smylie; Members: Tom Baker, Scott Bieber, Tony Delano, Shawn Hanson, Beverly Mutrie, John Ratigan, Larry Rice, and Steve Sabatini

Role of the Hampton Falls Energy Committee

The role of the Hampton Falls Energy Committee is to:

- coordinate efforts among municipal officials, town departments, businesses, residents, and community organizations
- develop and help manage municipal energy programs and initiatives
- acquire sources of funding including regional, state and federal grants, and organize fundraising activities for energy related projects and improvement
- coordinate outreach and awareness activities in the community
- recommend revisions and/or the development of regulatory and planning documents; and
- coordinate outreach and awareness activities in the community.

HFEC Activities

The Hampton Falls Energy Committee (HFEC) has worked diligently to identify the town's energy uses and potential cost savings. Since its formation in April 2008, the HFEC has completed the following activities:

1. Contracted with the Jordan Institute to complete an energy audit for the Lincoln Ackerman Elementary School;
2. Continued creation of a "baseline energy use" profile for the town using EPA Portfolio Manager and the Small Town Carbon Calculator (STOCC) programs; and
3. Conducted research about potential renewable energy solutions for the town.

In addition, the HFEC obtained a grant from the Rockingham Planning Commission and Clean Air-Cool Planet to facilitate energy planning for town, including collection of energy data, development of this energy report, and development of a Road Map document to guide future activities of the HFEC.

4.0 HAMPTON FALLS ENERGY INVENTORY

A municipal energy inventory involves the collection of data on the energy usage and energy costs for all buildings, facilities, street and other lighting, and vehicle fleet owned and operated by the municipality. Energy usage data includes the units of energy for all forms of energy used to power electric fixtures, heating and cooling systems, and equipment/facility operation. Energy cost data includes the per unit charge for all forms of energy consumed as well as any service, transmission and other fees charged by the provider.

Data Collection and Inventory Methods
Data collection for this inventory involved collaborative efforts between the Hampton Falls Energy Committee, town staff, and staff of the Rockingham Planning Commission (RPC). Hampton Falls Energy Committee (HFEC) members, with assistance from the RPC staff, identified sources and locations of energy data to complete the energy inventory. The Committee used 2008 as a baseline year to collect the fuel and energy consumption information. Data was gathered for all sectors of energy usage under the jurisdiction of the town, including the Lincoln Ackerman Elementary School, facilities and infrastructure, vehicle fleet, and street lights. The different types of energy use were collected for each sector including electricity, heating oil, propane, and gasoline. Energy usage associated with town staff travel, school buses, water, and waste were not included in this analysis.

Staff from the Rockingham Planning Commission coordinated with and met the HFEC on a regular basis to make sure that the inventory progressed, the data collection process was effective, and the data needed was accurately collected.

Data Processing and Analysis
To process the data collected, Excel spreadsheets and the Small Town Carbon Calculator (STOCC) program, an energy assessment software program developed by Clean Air Cool Planet, were used. The STOCC program was used to quantify and estimate the amount of energy used and the greenhouse gases (GHG) generated from municipal energy consumption.

Energy and Utility Providers for Hampton Falls
Electricity: Unitil
Fuel Oil: Lamprey Oil Company

Table 1. Summary of municipal buildings and infrastructure included in this inventory

Municipal Buildings	Year Built	Size (sq ft)	Energy/Fuel Types
Town Hall	1909 (2000)	3,100	Electric
Lincoln Ackerman Elem. School	1950 (1986)	44,000	Electric, No. 2 heating oil
Public Safety Complex	1989	9,000	Electric
Library	2001	5,500	Electric, No. 2 heating oil

5.0 2008 MUNICIPAL ENERGY INVENTORY RESULTS

The Hampton Falls municipal energy inventory statistical results are summarized in Table 1 below. Table 2 and the three graphs below illustrate the fact that the municipal buildings are the most significant sector in Hampton Falls in terms of overall energy use and energy cost, and in terms of carbon dioxide emissions.

Table 2. Energy use, equivalent carbon emissions, and costs, by municipal sector

Municipal Sector	Energy Use (MMBtu)	Energy Use (%)	CO_2 (lbs)	CO_2 (%)	Energy Cost (US$)	Energy Cost %
Buildings/Facilities	3,027	77	624,726	80	97,145	81
Vehicle Fleet	807	20	125,969	16	18,735	16
Street Lights*	114	3	33,332	4	4,333	4
Total	**3,948**	**--**	**784,027**	**--**	**120,212**	**--**

MMBtu = one million British Thermal Units

* *Streetlights energy use includes operation of an irrigation system and lighting for the bandstand and flagpole at the Town Common.*

Note energy statistics for each building and facility are presented in the following section.

As reported in Table 2 above and in Graphs 1-3 below, the building sector is the most significant energy user, comprising 77 percent of energy use and 81 percent of energy costs, and contributing 80 percent of total carbon dioxide emissions. The vehicle sector is the second highest energy user, comprising 20 percent of the energy and 16 percent of the energy costs, and contributing 16 percent of total carbon dioxide emissions. While the streetlight sector contributes far less to the town's energy use, streetlights comprised 3 percent of energy use, 4 percent of energy costs, and contributed 4 percent of total carbon dioxide emissions.

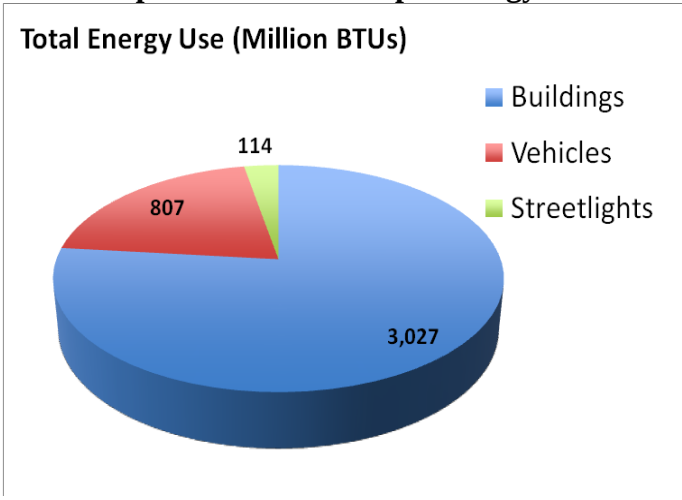
Streetlights, Facility and Property Lighting

The town has nine (9) street lights and one pole mounted light at the Town Storage/Dump facility. Other lighting includes the bandstand and flagpole at the Town Common. Other electricity use combined with the lighting statistics includes operation of irrigation systems at Governor Weare Park and the Town Common.

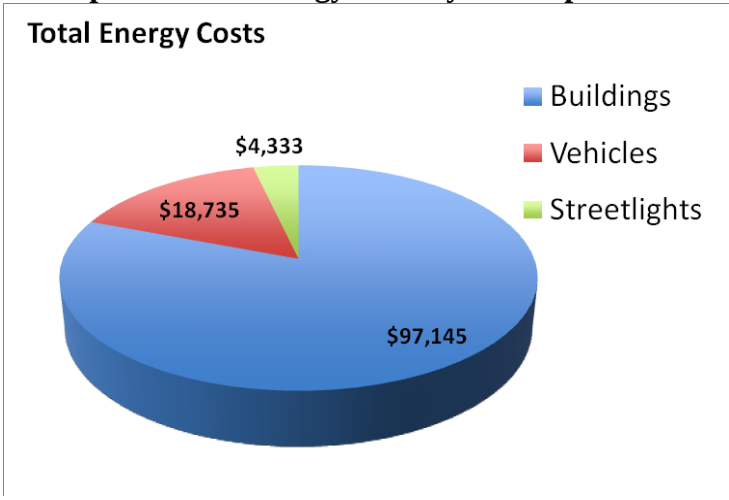
Table 3. Energy use for streetlights, facility and property lighting

Streetlights	kWH	Cost ($)
Town Common	4,349	408.50
Governor Weare Park	722	297.75
Town Hall Garage	1,256	178.35
Lighting Master (8 streetlights)	22,528	3,200.00
Town Storage/Dump	2,508	257.97
Town Hall Garage	1,256	129.30

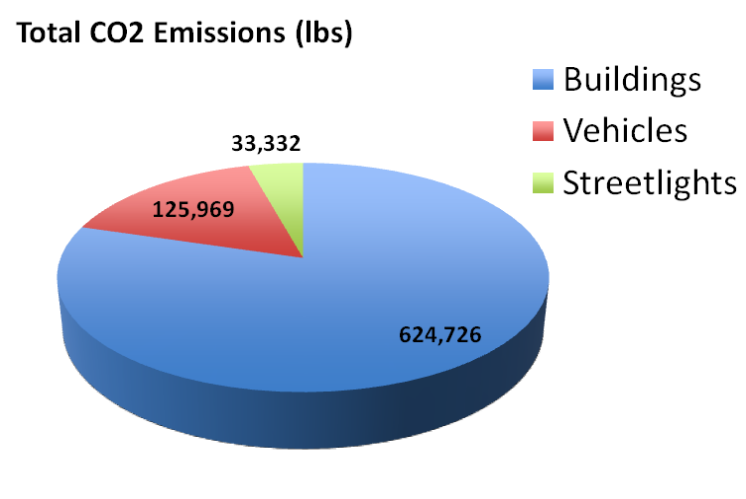
Graph 1. Total municipal energy use



Graph 2. Total energy costs by municipal sector



Graph 3. Total municipal carbon emissions



Carbon Dioxide Emissions estimated using the following conversion (from the Small Town Carbon Calculator program):

Electricity = 1 lb/kWH

No. 2 Heating Oil = 22.4 lbs/gallon

Propane = 12.7 1bs/gallon

6.0 2008 MUNICIPAL BUILDING AND FACILITY PERFORMANCE

Energy data was gathered for each building and facility managed or supported financially by the municipality. The following table and graph presents data analysis from the STOCC software, including energy use, carbon dioxide emissions and costs by municipal building and facility.

Table 4. Energy use, carbon emissions, and costs by municipal buildings and facilities

Municipal Buildings	Energy (MMBTu)	% Energy	CO2 (lbs)	% CO2	Cost $	% Cost
Library	297	9.1	60,282	9.7	9,412	14.3
Lincoln Ackerman Elem. School	2,465	75.9	487,005	78.6	45,786	69.3
Public Safety Complex	191	5.9	55,626	9.0	7,956	12.0
Town Hall	297	9.1	16,930	2.7	2,895	4.4
Total	**3,250**	**--**	**619,843**	**--**	**66,049**	**--**

Note: Town Hall and the elementary school use both electric and No. 2 heating oil.

As indicated by the data reported in Table 4, it appears that the Lincoln Ackerman Elementary School may offer significant opportunities for energy savings as this one building represents 69 percent of the total annual municipal energy costs, in addition to having by far the highest energy use and carbon dioxide emissions.

Graph 4. Comparison of energy costs for all buildings.

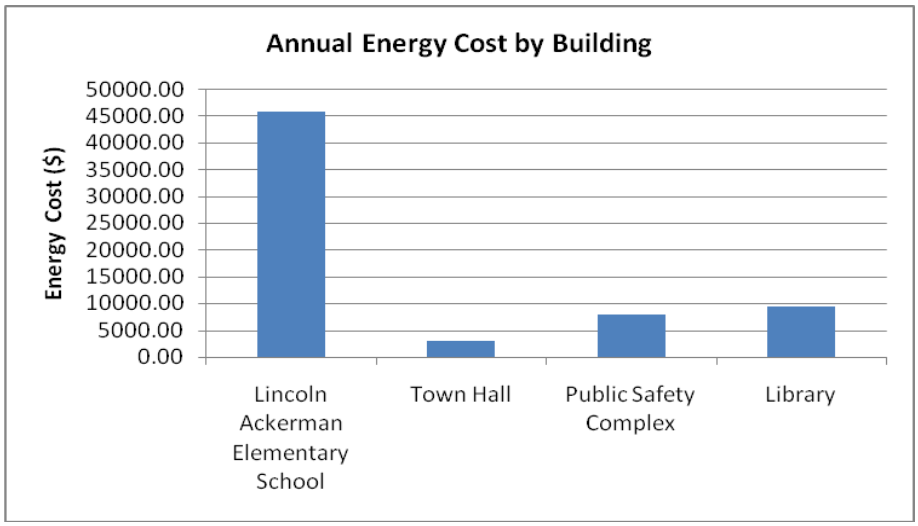


Table 5 below summarizes the energy use, costs and carbon dioxide emissions per square foot for municipal buildings. The Lincoln Ackerman Elementary School and the Library use the most energy, have the highest overall energy costs, and the highest energy cost per square foot of building area (or energy use intensity). Although the Lincoln Ackerman Elementary School has the highest volume of carbon dioxide emissions overall, the Town Hall has the highest overall carbon dioxide emissions per square foot of building area. This information is also presented in Graphs 5-7 on the following page.

Table 5. Energy use intensity, carbon emissions, and costs by municipal building area

Municipal Building	MM BTU	Area (sq ft)	EUI (kBTU/ sq ft)	CO2 (lbs)	lbs CO2/ sq ft	Energy Cost	Cost/ sq ft
Library	297	5,500	54.0	60,282	10.96	9,412	10.96
Lincoln Ackerman Elem. School	2,465	44,000	56.0	487,005	11.07	45,786	11.07
Public Safety Complex	191	9,000	21.2	55,626	6.18	7,956	6.18
Town Hall	58	3,100	18.8	16,930	16.93	2,895	5.46

EUI = energy use intensity

Energy Use Intensity

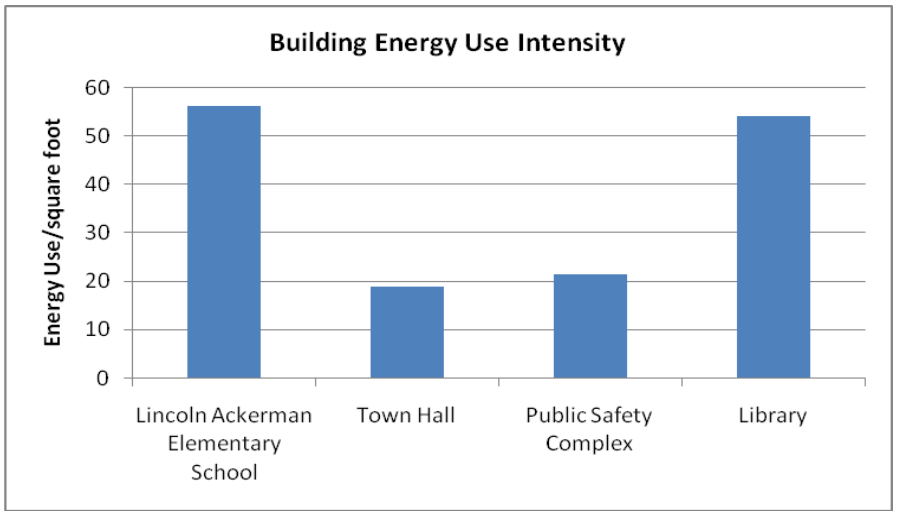
Energy use intensity is a measure of the units of energy (in thousands of BTUs) consumed per square foot of building space. Energy use intensity is a powerful tool available for measuring the relative energy efficiency of particular types of buildings.

Site energy intensity is the amount of energy expended per square foot *on site* to heat, cool, and electrify the area. This measure relates to the amount of energy being used on site, which corresponds directly with how much lighting is being used, temperature, thermostat controls, etc. The best opportunities for saving energy on site can involve implementation of several strategies including:

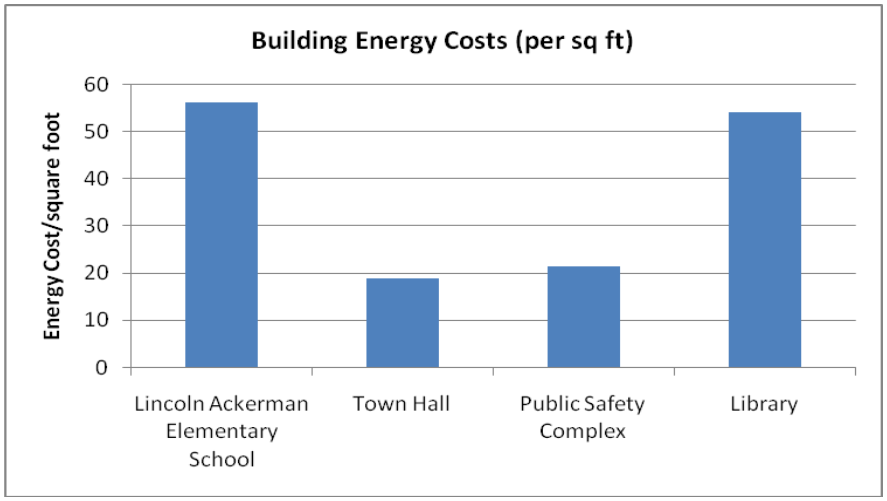
- behavioral changes such as keeping lights and computers turned off, turning down thermostats, and modifying hours of operation during peak energy use months;
- employing energy conserving technologies such as motion sensor lighting, programmable thermostats, energy efficient electronics and appliances.

Measures to save source energy would include converting to a different type of fuel for heating or cooling a building and asking your electricity provider to use green sources of energy.

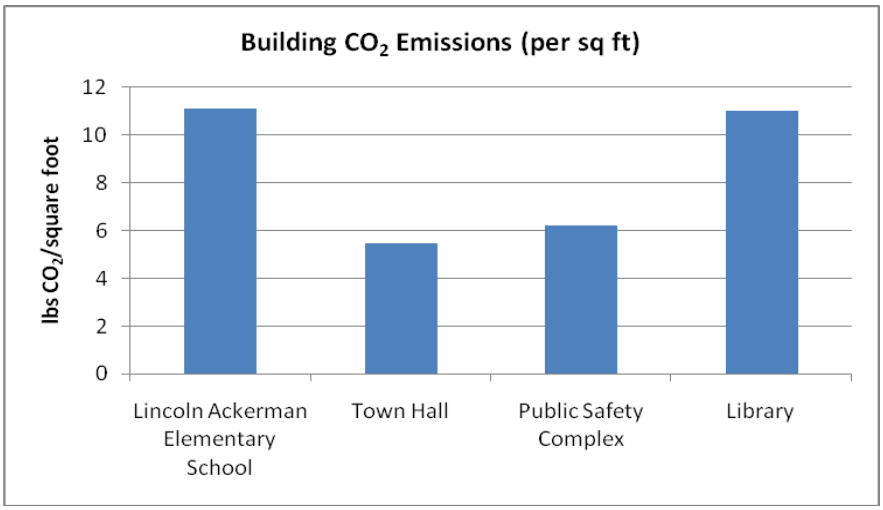
Graph 5. Building Energy Use Intensity



Graph 6. Cost per Building Area ($/sq ft)



Graph 7. Carbon Dioxide Emissions by Building



7.0 VALUE AND GOALS OF BUILDING ENERGY AUDITS

The municipal energy inventory described in Section 4.0 provides information to help prioritize which buildings and facilities are in most need of energy efficiency improvements.

As a next step beyond the inventory, an energy audit will provide a detailed analysis of energy systems and the energy efficiency of a building or facility. The purpose and value of conducting building energy audits is to reduce overall energy consumption by increasing energy efficiency and identifying energy conservation measures. Generally, the goals of an energy audit are:

- Secure/Safe Goal: Ensure that health and safety issues are addressed without creating new ones and a comfortable and healthy indoor air quality environment is maintained.
- Sustainable Goal: Install energy-saving measures that do not require further maintenance, with the possible exception of changing fluorescent lamps after 7-10 years and the yearly tune-up of the furnace(s).
- Functional Goal: Decrease the building's overall use of fossil fuels, either directly, such as oil consumed, or indirectly, such as electricity having been generated from the consumption of fossil fuels by the utility.
- Cost-Effective Goal: Make improvements that have product life cycles that assure the projected Savings to Investment Ratio (SIR) and reasonable Return on Investment (ROI), are met.

Energy Evaluation – Lincoln Ackerman Elementary School
Mr. Gary O'Connell, of the Jordan Institute, conducted an energy evaluation of the Lincoln Ackerman Elementary School (report dated February 20, 2009). The evaluation included calculation of energy use intensity, cost use intensity, and an energy efficiency measures analysis of building shell upgrades, lighting and lighting controls, heating systems, ventilation systems, and mechanical controls. The assessment resulted in specific findings and recommendations to implement the following building improvements:

- Building shell upgrades – air sealing, additional insulation, new windows
- Lighting and lighting controls – additional occupancy sensors, daylight controls
- Heating systems – distribution system upgrades, variable speed circulating pumps, solar DWH system
- Ventilation systems – energy recovery units
- Mechanical controls – DDC controls

Based on the results of the energy evaluation, the combined building improvements recommended would cost an estimated $313,606 to implement. With a predicted annual savings of approximately $25,397 per year in heating and cooling costs, the improvements would provide a simple payback within approximately 12.3 years.

The Jordan Institute report also recommended a full energy assessment of the school including energy modeling and detailed financial modeling.

8.0 FINDINGS AND RECOMMENDATIONS

Findings of the Hampton Falls Energy Committee (HFEC)

The Hampton Falls Energy Committee during their review of town records found the following and believes that these items could provide opportunities for cost savings for the town.

1. Some town buildings may benefit from general weatherization and insulation and, in some cases, improvements to the heating and cooling systems to increase efficiency.
2. Although the town has a Capital Improvement Committee and a Capital Improvement Plan (CIP), the plan does not include funding to implement energy efficiency and conservation strategies (including improvements to municipal infrastructure and buildings, and purchase of energy efficient equipment and vehicles).
3. The town has a manual system for tracking of energy usage and costs.
4. The town has limited capacity to raise funds (i.e. grant proposal writing) to implement energy efficiency and conservation projects.
5. The town currently has no regulatory measures or voluntary incentives to ensure energy efficiency for new and existing private (residential) and municipal construction.
6. In order to reach long-term energy conservation goals, the town must consider the infrastructure necessary to support energy production and delivery systems.

The HFEC will continue to work with town officials and the Planning Board to ultimately develop a long-term energy plan for the Town.

HFEC Recommendations

The HFEC has developed recommendations and actions items to encourage the town to participate in the implementation of energy efficiency and conservation (refer to the document *Roadmap and Action Plan Toward Energy Efficiency And Conservation* developed by the Atkinson Energy Committee). Recommendations and actions items were developed to address the following general themes:

- *Ordinances and Regulations*
- *Planning and Building Construction/Building Code*
- *Education and Outreach to residents and businesses*

List of Acronyms

CACP	Clean Air Cool Planet
STOCC	Small Town Carbon Calculator
EPA	Environmental Protection Agency
GHG	Greenhouse Gases
kBtu	Kilo British Thermal Units
MMBtu	Million British Thermal Units
RPC	Rockingham Planning Commission