

# Town of North Haven Energy Management Plan



August 2011  
Chris Fogg  
EPA Region 1, Summer Intern  
Connecticut College  
270 Mohegan Ave  
New London, CT 06320  
[cfogg@conncoll.edu](mailto:cfogg@conncoll.edu)

## **Executive Summary Town of North Haven Energy Management Plan**

The goals of this project were to document current and past energy improvement projects, benchmark 12 municipal buildings, streetlights, and vehicles for energy use, and create a report highlighting ways in which further improvements can be made to reduce energy use. This study found from June 2010 – May 2011, a total of 100,209.7 MMBTU of energy use. This cost the town a total of \$ 3,002,165. Of the total energy used, 81% was used for the 12 municipal buildings. The greatest energy users and/or most inefficient buildings were the High School, Clintonville Elementary, and the Town Hall Annex and Recreation Center, which together used 44% of the energy used by the 12 buildings. The town should set a target of 10% energy reductions. Efforts to meet this target should focus first on the three largest and most inefficient buildings listed above. Behavioral changes should be the first step toward reaching the 10% reduction target. Increasing energy awareness through education and policy implementation can foster these changes. After a foundation of good energy behavior has been implemented, physical upgrades can be made. These can range from such minor upgrades as lighting reduction and motion sensor light switches to major upgrades such as co-generation systems and insulation renovations. Energy reduction projects are important, but can be very expensive to implement and the payback period can be long. To aid in the planning and decision process, priority-ranking worksheets can be used. Once energy improvement projects are agreed upon, an energy action report can aid in the implementation of the projects. Although there are many potential projects available to the Town of North Haven, it is important that any projects pursued in the future are thoroughly documented and filed with records of past projects. Furthermore, it is critical that the benchmarking process be continued, so that the results of future energy projects, and total energy reduction progress, can be measured.

**Chris Fogg August 2011**

## Introduction

The town of North Haven, CT has a population of approximately 24,222.<sup>1</sup> There have been many energy management studies and conservation projects conducted in the past including the 2008 streetlight upgrade, and lighting upgrades in the public schools. In addition to these upgrades, solar panels have recently been installed on the High School roof. The North Haven Clean Energy Task Force has been instrumental in promoting awareness of energy efficient practices. Although these projects and efforts have been important in the town's effort to reduce energy use, the absence of a centralized plan and project history have prevented North Haven from reaching its energy reduction potential. For this reason, **the first goal of this project was to assess the current state of energy management in the town, and bring together all current and past energy management plans and projects and document them.** A synthesized document describing energy reduction history will allow future project coordinators to determine what projects have been done, how effective they were, and their associated costs. This will make the future planning process run more smoothly.

The use of benchmarking as a tool for energy reduction in municipalities is important for several reasons. First, it allows town officials to determine where and how energy is being used. Second, by continuing to track energy performance, benchmarking can show the effects of individual energy reduction projects. Thus, **the second goal of this project was to benchmark town buildings, vehicles, and streetlights.** Two useful benchmarking programs are the EPA's Portfolio Manager and Clean Air-Cool Planet's Small Town Carbon Calculator (STOCC). These programs display all energy used in British Thermal Units (BTUs), which facilitates energy comparison, regardless of the type of energy used.

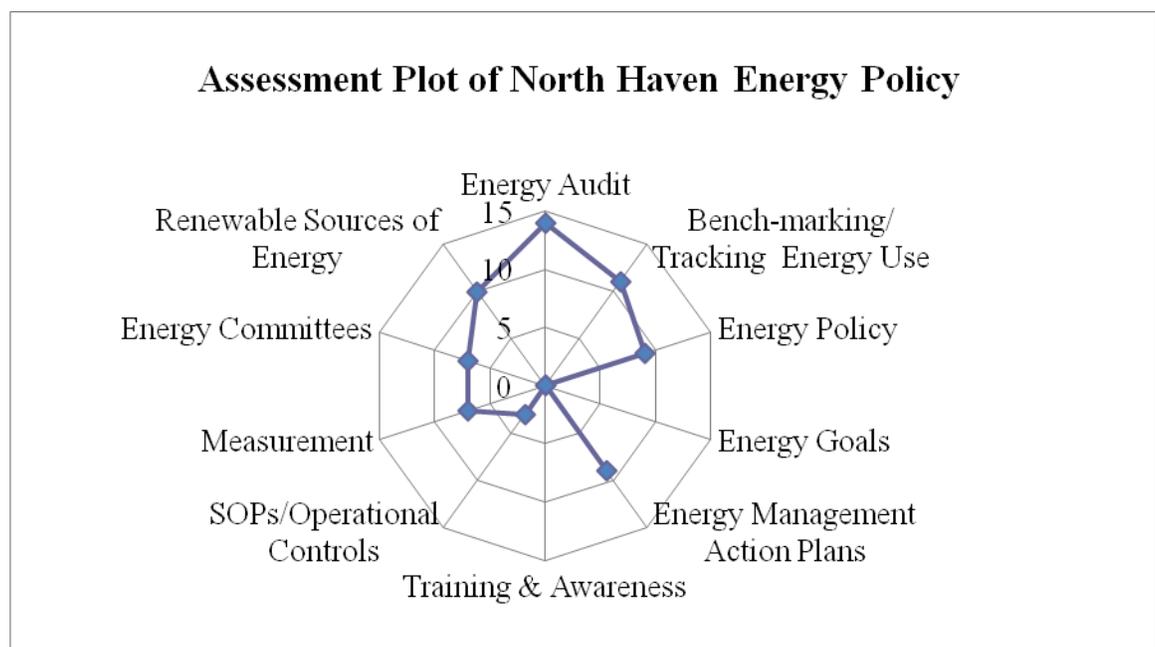
**The third and final goal of this project was to create a report highlighting specific ways in which energy consumption can be reduced.** The benchmarking results and audits show where how efforts to reduce energy use should be focused. It is suggested that the town use this report as a guide to prioritize new projects, and then implement an energy action plan through which these projects can be implemented.

---

<sup>1</sup> <http://cerc.com/TownProfiles/Custommer-Images/northhaven2010.pdf>

## Energy Management Assessment

An assessment tool developed by UMASS/Lowell was used to determine if the town had any of the essential pieces of a management system in place. The following graph shows that the town had some pieces including some benchmarking of schools, an energy policy and a volunteer committee that has a good relationship with town management. The town had no energy goals or training & awareness of town employees, which resulted in many behavioral opportunities being identified during the audits.



## Documentation of Previously Implemented Projects

The documentation of previous reports and projects designed to save energy is important because it provides a single source of project history, which future coordinators and managers can use during their planning. With this in mind, an account of previously implemented energy projects was created. In addition, a graph illustrating the town's overall energy policy was created based on discussion with town officials.

## Worksheet of Previously Implemented Energy Improvement Projects

Energy Use [type]	Completed Projects or Programs	Results (\$\$, gallons, kWh, normalized if possible)	Who were results communicated to?	Were there associated SOPs, training records?
Electricity	Streetlight upgrade Started October 8, 2008 Rebate from UI	Saves \$150,000.00- \$200,000.00 per year	Ed Swinkoski presented to board of finance, televised to citizens	Records on 3600 fixtures that were stepped down 1 level
Electricity	Lighting upgraded in 5 schools Done in 08 Rebates from UI	Saved money, not known how much	No one as yet	Records on lighting & rebates
Electricity& oil	Some bids on Co Gen system for town swimming pool. Town was not able to follow through	N/A	N/A	N/A
Electricity	Upgrades of lighting in Town buildings planned for July, rebates from UI	N/A	N/A	N/A
Electricity	Solar panels completed on roof of high school	None measured yet	Large poster set up on town green, various newspaper articles to let public know about project	
Electricity	Articles published in newspapers by task force about importance of home energy audits	unsure	N/A	600 home audits '10-'11 free of charge by UI
Electricity	Task Force promoted UI's clean energy option by giving 4-packs of CFLs to people who would sign up	85 people signed up for Clean Energy option on election day 2010	none	Records kept by task force
Electricity, Oil, Gas, Propane	Benchmarking of several town buildings and schools done summer 2011 using Portfolio Manager and STOCC		Presentations planned for town	Portfolio Manager username: foggl116 Password: summer2011

Adapted from *Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities*, EPA, January 2008, p. 16

## Benchmarking Methods

In total, 12 municipal buildings were benchmarked using EPA's Portfolio Manager program and Clean Air-Cool Planet's Small Town Carbon Calculator (STOCC) tool. The 12 buildings benchmarked were:

1. Town Hall
2. Recreation Center/Town Hall Annex
3. Library
4. Police Station
5. Fire HQ
6. Clintonville Elementary
7. Green Acres Elementary
8. Montowese Elementary
9. Ridge Road Elementary
10. North Haven Middle School
11. North Haven High School
12. North Haven WPCF

North Haven's streetlights and town vehicles were also benchmarked using STOCC only as Portfolio Manager does not currently have the capabilities to benchmark streetlights or vehicles. Despite this drawback, Portfolio Manager allows users to analyze building energy use in greater detail than STOCC allows.

The time period used for benchmarking began in June 2010 and ended in May 2011. When possible, an account number was used to identify the energy meter used for benchmarking. If an account number or other unique identifier was not available, an effort was made to create one, so that future data entry could be easily performed. The Town Hall Annex and Recreation Center were entered as one facility with two separate spaces due to the unique structure of that building. The data for the town garage could not be completed due to recent renovations. The Portfolio Manager account can be accessed using the following link, username and password:

Link- <https://www.energystar.gov/istar/pmpam/>

Username- fogg1116

Password- summer2011

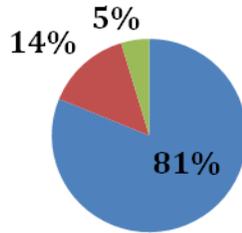
## **Results**

### ***STOCC***

The total annual energy use in the town of North Haven for the 2010-2011 period including buildings, streetlights and vehicles is 100,209.7 MMBTU. The 12 buildings benchmarked account for 81% of this total energy (81,311 MMBTU). Town vehicles make up 14% of the total energy use (14,178.9 MMBTU), while streetlights account for 5% of annual energy consumption (4,719.8 MMBTU).

## Town of North Haven Annual Energy Use

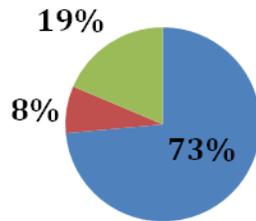
■ Buildings ■ Vehicles ■ Streetlights



The total annual energy cost for these 12 buildings, vehicles and streetlights is \$3,002,165. The 12 buildings make up 74% of this total and cost \$2,208,397 annually. Town vehicles cost \$234,046 and make up 8% of the total. Streetlights cost the town \$559,722 annually and make up 19% of the total annual energy cost.

## Town of North Haven Annual Fuel Expense

■ Buildings ■ Vehicles ■ Streetlights



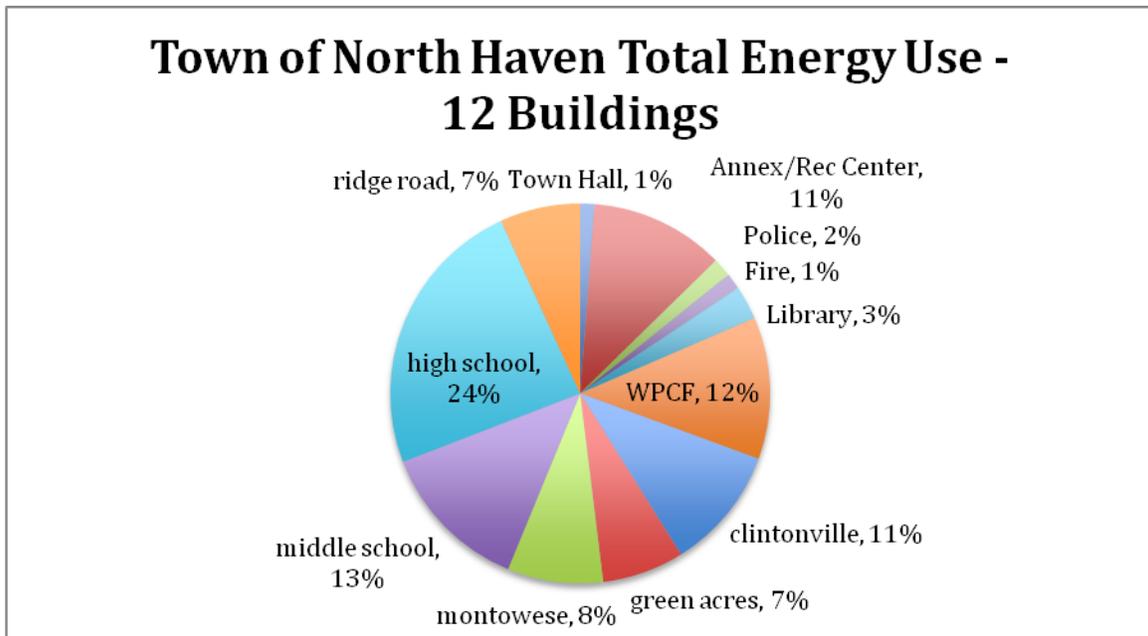
### ***Portfolio Manager***

The results of benchmarking using Portfolio Manager show an annual energy use of 79,970 MMBTU, and an annual cost of \$2,113,212 for the 12 municipal buildings. The table and charts below show a summary of the benchmarking results from Portfolio Manager:

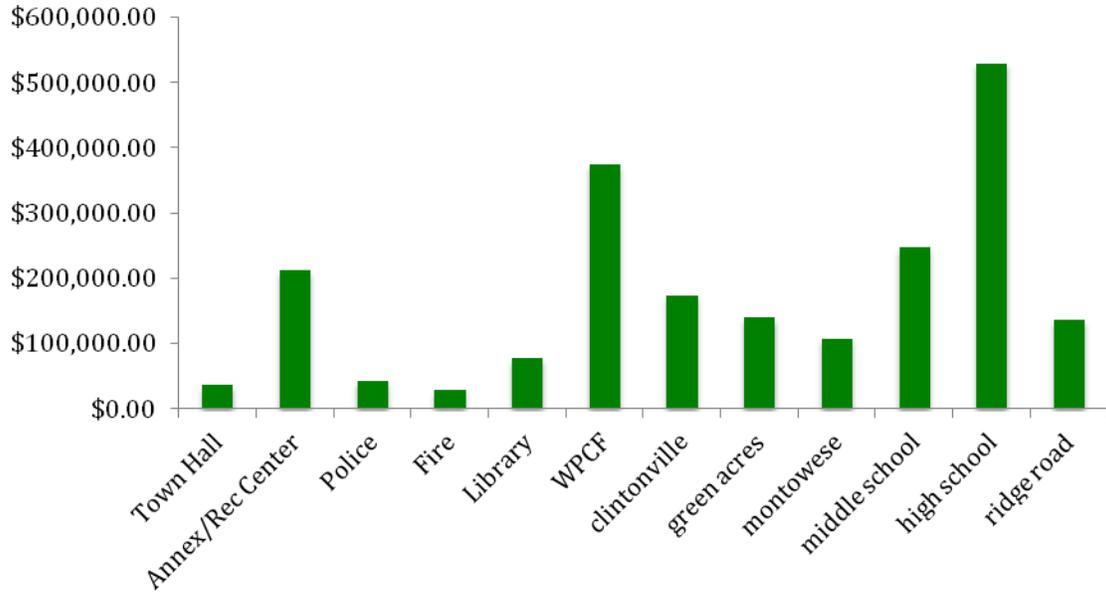
## Summary Table of Portfolio Manager Results

<i>Building</i>	<i>Class</i>	<i>Area (ft<sup>2</sup>)</i>	<i>Annual kBTU</i>	<i>Site Use Intensity (kBTU/ft<sup>2</sup>)</i>	<i>National Average (kBTU/ft<sup>2</sup>)</i>	<i>Annual Cost</i>
Town Hall	Office	10,334	946,121	91.6	86	\$35,649
Rec Center/Town Hall Annex	*Recreation	68,173	8,959,566	131.4	65	\$210,065
Library	*Library	29,450	2,263,541	76.9	104	\$77,527
Police Station	*Police/Fire	14,583	1,269,399	87.1	78	\$42,819
Fire HQ	*Police/Fire	7,500	1,049,867	140	78	\$29,503
Clintonville	K-12 School	73,132	8,213,976	112.3	75.1	\$174,654
Green Acres	K-12 School	64,704	5,455,760	84.3	83.3	\$140,022
Montowese	K-12 School	55,463	6,363,909	114.7	91.5	\$108,324
Ridge Road	K-12 School	62,743	5,366,677	85.5	81.7	\$137,583
Middle School	K-12 School	142,352	10,122,935	71.1	74	\$247,610
High School	K-12 School	246,000	18,790,602	76.4	81.1	\$530,480
WPCF	Wastewater	N/A	9,466,942	N/A	N/A	\$375,780

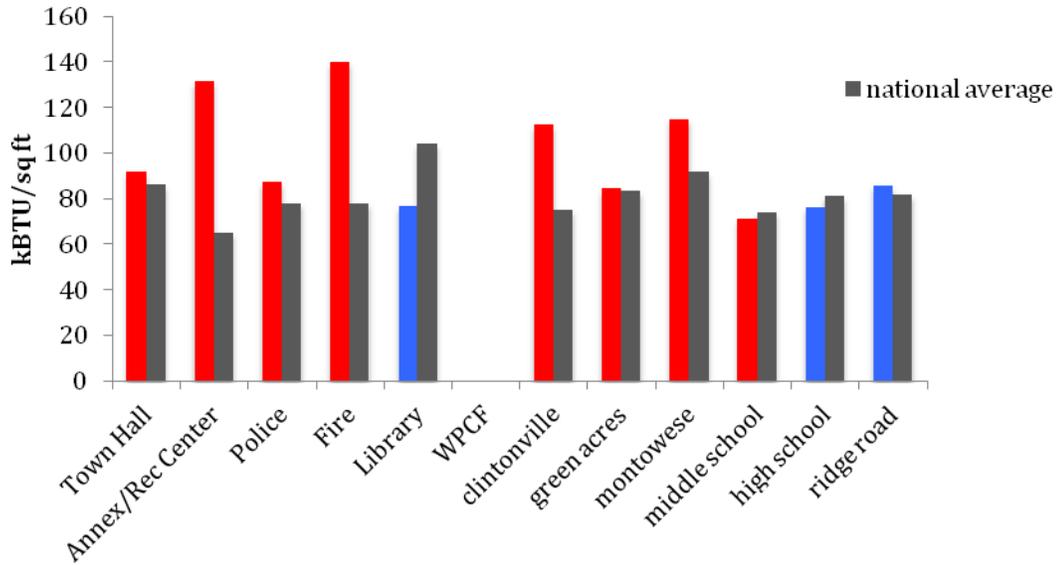
\*Indicates 'other' facility description in Portfolio Manager



## Town of North Haven Annual Energy Cost - 12 Buildings



## Town of North Haven Site Energy Use Intensity - 12 Buildings



Eight buildings were eligible to receive an Energy Star rating. Clintonville Elementary scored an 11, Green Acres Elementary scored a 48, Montowese Elementary scored a 25, North Haven Middle School scored a 54, North Haven High School scored a 56, Town Hall scored a 44, and the WPCF scored a 76. Based on these results, only the WPCF can apply for the Energy Star certificate.

## **Analysis**

Benchmarking produces the information needed to begin planning projects aimed at energy reduction. A common target, one often used by municipalities trying to reduce energy consumption, is 10% reduction. A 10% reduction in energy overall would save the town \$300,217 annually, assuming last year was an average year for energy consumption. Including the rest of the town buildings, those not included in this study, would save even more. A 10% reduction overall would also reduce 1,754,332 lbs of carbon emissions.

Reducing the energy used in town vehicles by 10% would save \$23,405 annually. There are several steps that can be taken to reduce the energy used by town vehicles. First, routes can be analyzed to determine if a vehicle is traveling the shortest distance possible. Second, a 'no idling' policy can be implemented. Vehicles can be selected based on the type of work being done so that large inefficient cars or trucks are only used when needed. Finally, when cars and trucks are replaced, more efficient vehicles should replace them (hybrids, electric, natural gas vehicles, etc.). In order to help make these steps, town vehicles should be tracked individually so that their use can be monitored.

The reduction of energy used by streetlights would also help reach the goal of 10% total municipal energy reduction. A 10% reduction in the energy used by streetlights would save \$55,972 annually. This target could be reached by reducing the total amount of streetlights (removing any unnecessary lights). Also, more efficient or slightly dimmer bulbs can replace the bulbs used in some lights. The town of North Haven likely has efficient streetlights as a result of the 2008 upgrade. Thus, efforts to improve town energy efficiency should be directed toward vehicles and municipal buildings.

The 12 buildings benchmarked in this study made up 81% of the total annual energy use. Because of this, efforts to reduce energy use should be focused on this sector. A 10% reduction in energy use in these buildings could save \$220,840 annually. Focus should be directed to the largest and most inefficient energy consumers. Three of the most inefficient and/or highest energy consumers are the High School, Clintonville Elementary, and the Town Hall Annex and Recreation Center. Thus, initial efforts to improve energy efficiency should be focused on these buildings. 10% reduction in overall energy use would save \$53,048 annually in the High School, \$17,465 in Clintonville Elementary, and \$21,007 in the Annex and Rec Center.

Energy reduction goals can be met by improving energy behavior. Smart energy behavior includes turning off lights that are not being used, turning off refrigerators and freezers in schools during the summer, and turning down/off the air conditioning and heat when it is not being used. Implementing education programs or workshops can improve this type of energy behavior. For example, several of the refrigerators and freezers in the schools were on during the summer and held little or no food. One strategy that could help save energy is to turn off the majority of these cooling units, and move the food to a single, central location during the summer months. Another example of a behavioral change that may help to reduce energy is to turn off the lights in the entrance hall of the Library. This room receives abundant natural light during the day.

The next step toward improved energy efficiency is making minor building upgrades. Such improvements include replacing weather stripping around windows and doors to improve the efficiency of the building envelope. Another example of a minor upgrade is installing motion sensor light switches. Professional energy audits can help identify potential energy saving projects. Although these upgrades will help improve building energy efficiency, it is important to stress that upgrades must only be adopted after a strong behavioral policy is created.

Major building upgrades can be made to reach energy reduction goals as well. Rebates can help cover the cost of major upgrades when they are available. These upgrades include but are not limited to: improving the entire building envelope, including replacing insulation in the roof and walls, installing co-generation systems that recover waste heat, installing programmable window AC units, and installing central HVAC with

programmable thermostats. These types of projects should be looked in to once a strong behavioral foundation has been created.

## **Conclusion**

The goals of this project were to document all previous and current energy projects, benchmark 12 municipal buildings, streetlights and vehicles, and to create a report that highlights ways to improve energy efficiency. The benchmarking process has clearly shown how the town's energy is being used. The town should continue this process, so that progress in each building, streetlights and vehicles can be tracked. In addition, a target reduction and timeline should be set. In order to help achieve target reductions, a list of priorities should be created in which projects are ranked. Once a project or several projects are decided upon, an energy action plan should be created. Examples of a priority ranking sheet and an energy action plan are included at the end of this report.

## **Acknowledgements**

I would like to acknowledge the following people and departments for their help with this project:

Linda Darveau, Supervisor

Ed Swinkoski, Director of Finance

Office of Finance

North Haven Clean Energy Task Force

Grant Peckham, Board of Education Director of Facilities

Office of the First Selectman



Example of an Energy Action Plan

<b>Task</b>	<b>Staff</b>	<b>Timeline</b>	<b>Estimated Time (Person Hours or FTE)</b>	<b>Estimated Costs (e.g.,equipment)</b>
Task:  Deliverable:				
Task:  Deliverable:				
Task:  Deliverable:				
Task:  Deliverable:				