

*“You can’t connect the dots looking forward;
you can only connect them looking backwards.
So you have to trust that the dots will somehow
connect in your future.”*

*“That’s been one of my mantras – focus and
simplicity. Simple can be harder than complex;
you have to work hard to get your thinking
clean to make it simple. But it’s worth it in the
end because once you get there, you can move
mountains.”*

– Steve Jobs

Energy Chapter Comprehensive Plan

WATERBORO, ME



Prepared for:
Town of Waterboro
20/20 Master Plan Committee

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1. INTRODUCTION

The Energy Chapter of Waterboro’s Comprehensive Plan was developed by Woodard & Curran in collaboration with the Town of Waterboro’s (Waterboro) Town Planner and 20/20 Master Plan Committee. This project was funded through the Energy Efficiency & Conservation Block Grant Program that was secured by the Town of Waterboro. The purpose of the plan is to help Waterboro better understand, manage and improve its energy practices and incorporate energy efficiency, conservation and education into every facet of the community in accordance with a common vision and set of goals. This plan also serves as an action plan to focus Town stakeholders on important energy initiatives and opportunities for consideration.



The main goals of this plan are to:

Project Goals:

- Support the Town of Waterboro as it seeks to better understand the environmental and economic development implications of the energy discussion including potential renewable energy opportunities,
- Understand municipal energy usage and what opportunities exist to reduce it,
- Educate residents and businesses about energy conservation opportunities, and
- Provide resources for resident and municipal use that will serve to guide additional thinking and decision making in the future.

1.1 TOWN OF WATERBORO 20/20 MASTER PLAN COMMITTEE

In August 2010, the Town of Waterboro 20/20 Master Plan Committee adopted a vision statement which is to:

Waterboro 20/20 Master Plan Committee Vision

“Provide a series of action plans to achieve and shape the future growth of Waterboro through a proactive, inclusive community effort that continuously improves and protects our quality of life by

reaching a balance between economic development, environmental sustainability and community livability, in order to provide a legacy for our future generations.”

Having a dedicated energy chapter of the master plan aligns directly with this vision and incorporates quality of living, economic development, sustainability and community engagement. This plan is intended to be action oriented and community inclusive to strive toward proactive energy management. This specific vision of this energy chapter is to support the 20/20 Committee Vision by:

- Providing energy management related actions to support future growth by proactive energy management strategies centered around energy awareness and vigilant pursuit of funding opportunities.

The 20/20 Master Plan Committee may want to discuss an additional vision and goals that pertain more specifically to Energy and the role it will play in the future in Waterboro. Questions to consider include:



- How important is it for Waterboro to reduce its overall energy consumption, energy costs and environmental impacts? Why or why not?
- In what way are local residents currently being informed and educated about energy?
- Where do you see Waterboro being in 5, 10, 20 years with regards to the energy discussion and associated initiatives?
- Does the Energy discussion tie in well to other municipal initiatives? Which ones and why?

Development of this chapter has initiated the community engagement process by gaining input from select stakeholders and community representatives. In October 2011, one on one interviews or phone discussions were completed with the following Waterboro residents to provide input to this chapter.

Town of Waterboro Residents Interviewed		
Steve Ewald , Raven Hill Orchards	Leo Binette , Lakeside Market Inc. Vice President of Waterboro Association of Businesses	William Winkel , William B. Winkel Builders
Todd Abbott , RSD Graphics	Bob Powers , Former Superintendent of Schools	Tracy Ogden , Geothermal Drilling of New England, Waterboro property owner and Vice President of New England Geothermal Professional Association
Tom Ursia , Town Planner		

1.2 OVERVIEW OF ENERGY CONSIDERATIONS

1.2.1 Renewable and Alternative Energy

Renewable energies are those that are derived naturally and cannot be exhausted (as opposed to fossil fuels which will eventually be exhausted). Renewable energy can be obtained from the sun (solar energy), water (hydropower), wind (wind turbines), biomass (wood chips or pellets), or from the earth (geothermal). Alternative energy is alternatives to fossil fuels such as biodiesel, ethanol, or cogeneration. The use of renewable and/or alternative energies can achieve multiple benefits for the Town as follows:

- Reduce reliance and price volatility of fossil fuels – Having alternatives to fossil fuels can help Waterboro diversity its energy portfolio and therefore manage the risk associated with volatile energy prices.
- Reduce greenhouse gas emissions – Traditional fossil fuels emit greenhouse gasses. Greenhouse gases are known to be damaging to the environment.
- Demonstrate a commitment to being “green” – The use of renewable or alternative fuels will reduce the Town’s overall carbon footprint, or greenhouse gases emitted as a result of Town operations. A lower overall carbon footprint is an important “greening” measure many municipalities are working on.



1.2.2 Renewable Energy: Defined

The *Massachusetts Smart Growth/Smart Energy Toolkit* provides helpful descriptions of the most prominent renewable energy technologies and techniques. The descriptions below have been utilized from this resource and modified slightly.

SOLAR

Sunlight, or solar energy, can be used directly for heating and lighting buildings, generating electricity, heating hot water, and a variety of commercial and industrial uses. Solar photovoltaic systems (PV cells/panels) use solar energy to produce electricity and are easily installed on homes, buildings, or property. A PV system can eliminate or reduce the amount of electricity purchased from a utility, and excess power can be fed back into the grid reducing the property owner's energy bill. Incentives and grants are available to reduce installation costs.

WIND

Wind, caused by the heating and cooling of the Earth's surface and atmosphere, is flowing energy. When this kinetic energy is harnessed by turbines, wind power is created to generate pollution-free electricity or mechanical power. As both a coastal and mountainous state, Maine has plentiful opportunities to expand wind energy production, both on- and off-shore. Many Maine communities can capitalize on wind resources developing small-scale, on-site local generation as well as commercial-scale wind turbines, contributing to the power grid as well as reducing energy costs.

BIOMASS

Biomass energy is produced from organic matter: plants, food waste, manure, wood, and agricultural crops that can be burned or converted to gas for heating or power generation. Biomass can be used to produce electricity, transportation fuels, or chemicals as well as for heating and cooling. Maine has great potential for biomass energy. As a densely forested state a vibrant agricultural economy biomass fuel supply can be readily obtained. In addition, if forests are managed sustainably, such that new trees sequester as much carbon as is emitted through the burning of biomass, no net greenhouse gas emissions will result.

FUEL CELLS

A fuel cell uses the chemical energy of hydrogen to efficiently and cleanly produce electricity, with water and heat as by-products. Fuel cells are unique in terms of the variety of potential applications; they can provide both stationary and portable power for systems as large as a utility power plant, or an automobile, and as small as a laptop computer. Fuel cells produce much smaller quantities of greenhouse gases and none of the air pollutants that create smog and cause health problems.

BIOFUELS

Biofuels can be generally defined as solid, liquid, or gas fuels consisting of, or derived from biomass, which is most often used in the form of a liquid or gas transportation or heating fuel such as ethanol or biodiesel. In the U.S., agricultural products specifically grown for biofuel production include corn and soybeans.

- **Ethanol** is an alcohol, made by fermenting any biomass high in carbohydrates through a process similar to beer brewing. Ethanol is made from starches and sugars, however, new technologies are being developed to enable production from cellulose and hemicellulose; fibrous material that makes up the bulk of most plant matter. Currently, ethanol is primarily used as a blending agent with gasoline to increase octane and cut down carbon monoxide and other smog-causing emissions.

- **Biodiesel** is made by combining alcohol with vegetable oil, animal fat, or recycled cooking grease. It is usually used as an additive (typically 5-20 percent) to diesel fuel or heating oil to reduce greenhouse gas emissions.

GEOHERMAL

Geothermal energy is energy from the heat of the Earth, which can be tapped for a variety of uses, including electric power production and the heating and cooling of buildings. Geothermal energy in Maine is primarily used for the heating and cooling of buildings. Geothermal energy is accessed by drilling wells into the ground.



HYDRO

The force of flowing water moving downstream creates energy that can be harnessed and turned into electricity. This is called hydroelectric power or hydropower.

Hydropower is produced for mechanical power or electricity generation. Often stored and controlled by dams, hydropower is created when the kinetic energy of moving water (rivers, waterfalls) is converted by turbines and generators into electricity, which is then fed into the electrical grid to be accessed by homes, businesses, and industry.

LANDFILL GAS RECOVERY

Garbage that is "thrown away" is often buried in a landfill where it breaks down or decomposes creating biomass and methane gas. This gas can seep through the ground and into the atmosphere, contributing to greenhouse gas emissions and other environmental impacts. However, when the gas is captured in a closed system, it can be used to create electricity. Essentially, the gas is collected, purged of any water, and then filtered to remove waste particles. It is then fed through pipes to a generator that burns the gas to create electricity.

OCEAN/TIDAL

The kinetic energy created by the ocean's waves and tides can be harnessed to produce mechanical energy or electricity. This form of hydropower relies on the ebb and flow of tides, which is utilized to turn turbines, generating power. Tidal power takes two principle forms; one method requires large infrastructure (essentially huge dams called "barrages") to take advantage of the highs and lows of the tides, the other, tidal stream systems, capitalize on the energy of waves.

1.3 ENERGY MANAGEMENT PLAN BENEFITS

In recent years, many local and state governments have begun to understand the benefits of energy planning. In addition to providing guidance for making future decisions, engaging local citizens and key stakeholders throughout the process is an effective way to raise awareness about important issues. According to the *Energy Planning and Implementation Guidebook for Vermont Communities (April 2011)*, there are nine main benefits of developing and following an Energy Plan which also ring true for communities in Maine. They include:

- **Municipal Cost Savings** – increasing energy efficiency and conservation at municipal facilities and in operations can reduce fuel and utility bills. over the long term – well beyond the costs of the initial investment and, local renewable energy generation, if used to power municipal facilities, can reduce fuel and utility bills.
- **Increased Revenues** - Renewable energy facilities may result in substantial revenues for municipalities and offset municipal property taxes.
- **A Strong Economy** - For most communities today, 70-80% of money spent on energy leaves town, going to utilities, oil companies, and state and federal taxes. By investing in energy efficiency or local renewable energy projects, a larger portion of that money will remain in the community, stimulating the local economy. In addition, energy efficiency and renewable energy investments create local employment both directly and indirectly.
- **Greater Energy Independence & Security** - Reduced reliance on external energy sources can safeguard residents and businesses from worldwide energy price shocks and supply shortages. It can also serve to ready communities and residents for a world with dwindling oil supplies.

- **Local Influence Over Energy Facility Siting** - Having a clear plan is the principal tool for municipalities to influence the development of energy facilities and their location.



- **More Efficient Communities** - Energy planning, especially if integrated with land use and transportation plans, will result in more compact and efficient use of land, leading to transportation options and shorter travel times and lower operating costs for businesses and residents.
- **Healthier Communities** - Reduced energy use can lead to improved local air quality and associated health benefits. Efficient land use and transportation planning can also promote walking and cycling opportunities, thus promoting healthier lifestyles and reducing levels of obesity and related ailments.

- **A Clean Environment** - Energy efficiency and renewable energy result in reduced greenhouse gas emissions, improved air quality, and healthier ecosystems.
- **Regional Coordination & Collaboration** - Because many energy issues transcend municipal – as well as state and national – boundaries, the process of preparing an energy plan is an opportunity to consider local needs, opportunities, and challenges in a broader context.



2. EXISTING CONDITIONS

2.1 COMMUNITY OVERVIEW

The Town of Waterboro is located in northwestern York County approximately ten miles from Sanford, fifteen miles from Saco/Biddeford and 25 miles from the Greater Portland area. Historically, Waterboro has been identified as a lumbering and agricultural community while today, there is a strong seasonal development and vacation economy that is present. Waterboro is also known as a bedroom community where more affordable housing can be found for people who then commute to the regions more urban labor markets.

One of the most recent and telling pieces of information regarding how Waterboro has changed in the past decade is the recent Census data release. According to the 2010 Census, Waterboro is one of Maine’s 10 fastest growing municipalities. Between 2000 and 2010, the community’s population increased by 24%.

Table 1: Waterboro Population Growth

	1990	2000	2010
Waterboro Population	4,510	6,214	7,693
York County	164,587	186,742	197,131
Source: 2010 Census Redistricting Data [P.L.94-171] Summary Files - U.S. Census			

Table 2: Waterboro Population Change

	1990 - 2000	2000 - 2010	1990 - 2010
Waterboro	1,704	1,479	3,183
Waterboro % Change	38%	24%	71%
Source: 2010 Census Redistricting Data [P.L.94-171] Summary Files -U.S. Census			

Waterboro has an opportunity to outline how this growth is being currently managed and how it would like it to be handled in the future. Energy use and energy opportunities play a role in this discussion, particularly if decisions are made to consider energy use, efficiency, conservation and renewable energy opportunities as they relate to economic development in the future.

2.2 WATERBORO ENERGY USE

Developing an understanding of existing conditions is key to any plan that will guide a community forward regarding a specific project or initiative. In 2011, Waterboro took a step forward towards understanding its energy use by hiring a consultant to conduct an Energy Audit of municipal buildings. The plan focused on gathering and evaluating available information related to local energy supply and use.

2.2.1 Energy Spending

According to the 2009/2010 Expense Detail in the **Waterboro Annual Report**, the Town had the following expenditures related to Energy costs:

	09/10 Budget	09/10 Debits	09/10 Credits	Unexpended Balance
Municipal Buildings – Utilities; Budget: \$43,000				
Electricity	\$33,000	\$31,136.79	0	\$1,863.21
Heat	\$10,000	\$14,326.11	0	-\$4,326.11
<i>Total/Remainder</i>		<i>\$45,462.90</i>	<i>0</i>	<i>-\$2,462.90</i>
Library – Utilities; Budget: \$6,000.00				
Electricity	\$2,000	\$1,381.88	0	\$618.12
Heat	\$4,000	\$2,662.97	0	\$1,337.03
<i>Total/Remainder</i>		<i>\$4,044.85</i>	<i>0</i>	<i>\$1,955.15</i>
Parks & Recreation – Utilities; Budget: \$950				
<i>Electricity</i>	<i>\$950</i>	<i>\$1,654.94</i>	<i>0</i>	<i>-\$704.94</i>
Public Safety – Utilities; Budget: \$29,440				
Electricity	\$14,400	\$10,938.94	0	\$3,461.06
Heat	\$15,040	\$8,405.78	0	\$6,634.22
<i>Total/Remainder</i>		<i>\$19,344.72</i>	<i>0</i>	<i>\$10,095.28</i>
Health & Sanitation – Utilities; Budget \$4,350				
Electricity	\$4,350	\$5,698.73	0	-\$1,348.73
Heat	0	\$311.13	0	-\$311.13
<i>Total/Remainder</i>		<i>\$6,009.86</i>		<i>-\$1,659.86</i>
Public Works – Utilities; Budget: \$800				
Electricity	\$800.00	0	0	\$800.00

	09/10 Budget	09/10 Debits	09/10 Credits	Unexpended Balance
<i>Total/Remainder</i>		\$252.38	0	\$547.62
General Assistance – Utilities; Budget:\$19,500				
Electricity	\$6,000	\$10,929.66	0	-\$4,929.66
Heat	\$13,500	\$8,575.10	0	\$4,924.90
<i>Total/Remainder</i>	<i>\$19,500</i>	<i>\$19,504.76</i>	<i>0</i>	<i>\$4.76</i>
Summary				
	\$104,040	\$96,274.41	0	\$7,765.59

***Note:** This information is representative of some of the community’s energy costs. The purpose is to begin quantifying how much is being spent on electricity and heat on an annual basis.

2.3 COMMUNITY ENERGY EFFORTS TO DATE

2.3.1 Energy Chapter – Waterboro Comprehensive Plan

The Town of Waterboro has recognized the importance of developing an energy action plan as a critical foundation for energy grant funding, planning of future capital investments and economic developments in the future. Toward that end, in the fall of 2011, the community hired Woodard & Curran to work with Town Staff and local residents to develop this Energy Chapter of Waterboro’s Comprehensive Plan update.



2.3.2 Energy Efficiency Coordinator - Maine Energy Education Program and RSU #57

In the fall of 2011, the Maine Energy Education Program and RSU #57 (Massabesic High School which is located in Waterboro) advertised for hiring an Energy Efficiency Coordinator whose responsibility is to help develop a culture of conservation throughout the school district. According to the job description, this is a professional energy management position involving the implementation, promotion and communication of the Schools for Energy Efficiency program. The Energy Efficiency Coordinator will work with school district personnel and occasionally students to successfully promote and communicate energy efficiency.

The Schools for Energy Efficiency program is a holistic, behavior-based program that involves entire school districts in being more energy efficient. The focus is on enabling a large number of people to do small things everyday to make a difference for program participants.

RSU #57 has approximately 3,500 students and the schools in the district range in size from approximately 200 to over 700 students at the elementary level. The middle school has approximately 825 students and the high school as over 1,200 students.

2.3.3 Energy Audit – 2011

Lassel Architects completed an Energy Audit Report in April 2011 for the Town of Waterboro. The work focused on Old Town Hall, Town Hall Annex, the Library and South Fire Station. The purpose of the study was to review existing conditions of the building envelopes, assess indoor air quality and provide a broad overview of heating, ventilation, electrical systems and plumbing fixtures for opportunities in energy conservation, improved comfort and indoor health and safety.

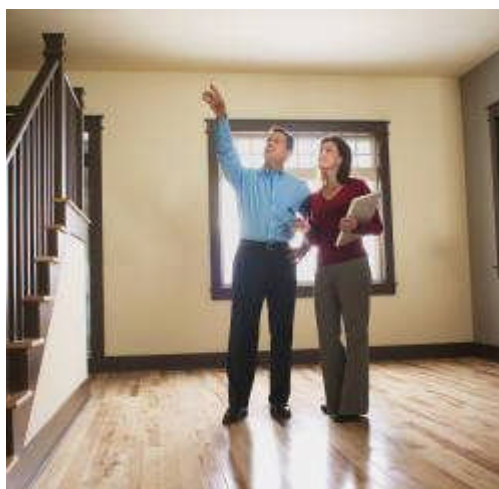
The report provided the following data:

	Old Town Hall	Town Hall Annex	Library	South Fire Station
Average Annual Oil Consumption	2,020 gallons	2,852 gallons*	1,050 gallons	1,205 gallons
Average Electrical Use	13.03 kWh/SF/Year*	2.3 kWh/SF/Year	4.5 kWh/SF/Year	3.24 kWh/SF/Year

* Requires energy assessment/recommendation implementation since these numbers appear to be high usage according to the Audit report.

The report provided a long list of projects that could be completed and showed the many opportunities Waterboro has to save money through energy efficiency. It was noted in the report that each building provides numerous opportunities to conserve energy from a heating, cooling and electrical usage standpoint. To date, Waterboro has only implemented two of the recommendations and has focused on the replacement of windows and improved insulation at the public library.

2.3.4 Property Assessed Clean Energy (PACE) Program



In September 2010, the Town of Waterboro adopted the Property Assessed Clean Energy (PACE) Ordinance. As of September 2011, William B. Winkel Builders in Waterboro, has now completed 36 PACE projects locally. Under the PACE program, a home first has to go through an energy audit and an application process with Efficiency Maine. The loan money is available under a federal program known as Property Assessed Clean Energy, or PACE, which is designed to help people make their homes more energy efficient.

Of the local energy audits completed by William B. Winkel Builders, six of those were performed at homes in Waterboro. Four of the homes have implemented weatherization projects that were recommended by the audit.

2.4 POTENTIAL FUTURE PROJECTS

Waterboro is at an early state of determining if and what potential renewable energy projects it may choose to consider in the future. Section 3 discusses in detail a number of strategies that the town should think about implementing, however, action items will need to be prioritized by Town Staff or a designated committee. The practical and financial feasibility of each project should be taken into consideration when prioritizing. In addition, we have outlined organizations, communities and other entities that it may be helpful to reach out to for future project discussions, or to share ideas and lessons learned.



- **Southern Maine Regional Planning Commission (SMRPC)** – Regional planning commission of which Waterboro is a member. The Greater Portland Council of Governments completed with the assistance of ICLEI Energy Use and Emissions Inventory for the Greater Portland region. It is important for Waterboro to stay in close contact with SMRPC to keep them informed of ongoing projects and to be a part of any initiatives that they pursue.

Website: www.smrpc.org

- **ICLEI** - ICLEI is an international association of local governments as well as national and regional local government organizations who have made a commitment to sustainable development. ICLEI provides technical consulting, training, and information services to build capacity, share knowledge, and support local government in the implementation of sustainable development at the local level. Our basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives.

Website: <http://www.iclei.org/>

- **Efficiency Maine** – Efficiency Maine is a statewide program to promote more efficient use of electricity, help Maine residents and businesses reduce energy costs and improve Maine’s environment. Waterboro should continue to work with Efficiency Maine on projects and developing programs for the community.

Website: <http://www.energymaine.com/>

- **Clean Air, Cool Planet** – The mission of this organization is to: Solve the global warming problem through civic engagement, education and effective policy.

Clean Air-Cool Planet (CA-CP) is the leading organization dedicated solely to finding and promoting solutions to global warming:

- We partner with companies, campuses, communities and science centers to help reduce their carbon emissions.

- We help our partners, their constituents, and other regional opinion leaders and stakeholders understand the impacts of global warming and its best available solutions, through comprehensive outreach efforts celebrating commitment, innovation and success in climate action.
- We showcase practical climate solutions that demonstrate the economic opportunities and environmental benefits associated with early actions on climate change.
- We propose and recommend the implementation of effective policy solutions aimed at reducing greenhouse gas emissions at the state, regional and national levels.

Website: <http://www.cleanair-coolplanet.org/about/index.php>

2.5 KEY MUNICIPAL ISSUES & TRENDS

2.5.1 Some of the Issues

Often seen as less obvious but equally important topic, energy planning continues to be an area of increased visibility and urgency in communities throughout the United States, including Maine. Current energy consumption practices – consuming more energy than necessary, much of which is from highly polluting fossil fuels like coal and oil - are not sustainable in the long-term. Greenhouse gas emissions which continue to point towards global warming, foreign oil dependence including associated national security concerns and health related impacts like air pollution all point to the rationale that something different must be done.

According to the *Municipal Energy Planning Workbook prepared by the University of Wisconsin*, there are three main issues that can help facilitate municipal energy discussion.

- **Cost** – Municipal budgets have been hard hit in the past three years and an energy plan can provide guidance and a roadmap for navigating the next time the prices for energy start to substantially increase – and they will.
- **Availability** – While it’s hard to imagine that gasoline and oil for example will reach unaffordable prices, it is possible. An energy strategy that outlines steps to be taken when and if availability of fossil fuels becomes an issue will help a community facilitate how to handle the situation. Questions like “what retrofits or infrastructure additions would be needed to take advantage of a substitute?”
- **Reliability** – Being able to obtain the source of energy that typically is utilized, ensuring that sources are reliable and that the cost is affordable can be issues. Reducing overall energy use and reducing peak demand and having a plan for how to do this can pay off in spades.

According to the MEP Workbook:

“Municipalities have responsibilities to their citizens. Cost, availability and reliability will impact everyone. For vulnerable populations who may not be able to afford cost increases the impact will be more severe. By being proactive with education and assistance with weatherization and other conservation efforts a municipality may lessen the disruption from future energy supply or cost issues.”

2.5.2 What Are Other Communities Doing?

Renewable energy sources, increased energy efficiency and conservation have in recent years begun to be more seriously pursued. Communities throughout the country have begun to realize that reduced energy use results in long-term cost savings which thereby allows us to change our energy needs while meeting them through the use of renewable sources like wind, solar, geothermal and biomass.

Today, communities are having the energy conversation and focusing on some of the following initiatives:

- Conducting and completing baseline energy assessments regarding use, conducting greenhouse gas inventories and individual building assessments to determine level of efficiency;
- Creating plans such as this Energy Chapter to address the subject, establish goals and set forth detailed action items which allow a community to educate residents and demonstrate progress,
- Adopting local ordinances for renewable energy siting and other facilities, building codes that foster increased efficiency in new and redevelopment projects and growth management ordinances that direct future development to designated areas as part of a larger community strategy for sustainability,
- Utilizing available funding to help construct and finance construction and retrofitting of homes, businesses and municipal buildings and facilities,
- Purchasing fuel-efficient municipal vehicles that directly reduce fossil fuel consumption and reduce air pollution and spotlight increased use of public transportation, carpooling, bicycling and walking,
- Making energy policy recommendations that facilitate citizen-level actions, decisions, regulations and land use policies that lead to energy market shifts towards competitive, healthy and safe energy alternatives.

2.6 STATE & REGIONAL ENERGY PLANNING

2.6.1 York County

According to Efficiency Maine, since 2006, nearly 450 energy improvement projects have been completed by York County businesses. These businesses have received more than \$2.7 million in financial incentives and are saving more than \$33 million over the life of the projects. These businesses are across York County, and include companies like Poland Springs, Tom's of Maine, Pratt & Whitney, General Dynamics and Corning Incorporated.

2.6.2 State of Maine Comprehensive Energy Plan (2008-2009)

The Governor's Office of Energy Independence and Security in accordance with Public Law 656, developed a Comprehensive Energy Action Plan for the State of Maine. The overarching commitment of this document is that it will help to advance the principles, the programs and the integrated plans necessary to secure a safe, clean and affordable energy future for Maine citizens. Ten key principles that

focus on the areas of energy, economic development and environment serve as guidance for developing and achieving long-term goals. The principles include:

1. Competitively priced energy is vital to the state’s economy and the wellbeing of our citizens. Maine should strive to provide energy to all its citizens at the lowest possible cost to promote economic development and to retain jobs;
2. Maine should increase its energy independence, security, service quality and reliability through greater reliance on cost-effective energy efficiency, conservation, demand management and distributed resources in all energy using sectors;
3. Maine’s energy policy ultimately relies on the health of competitive markets;
4. When barriers prevent the effective operation of energy markets or when these markets do not take the long-term societal and environmental impacts of energy decisions into account, the State should look to other tools to achieve its goals, including: regulation, education, taxation policies, subsidies and leadership by example;
5. An adequate and reliable energy delivery infrastructure is critical to economic growth and to continued expansion of competitive energy markets;
6. Maine should continue to support indigenous renewable energy resources in all energy using sectors to ensure that Maine participates in an effective manner in national and international efforts to promote energy security, independence, diversity and long-term sustainability;
7. State policies should seek to minimize the unnecessary environmental and public health impacts of energy production, distribution and use;
8. State Government should lead by example and action in its energy procurement, infrastructure and usage practices and policies;
9. Maine people should have access to adequate information on the costs, environmental and other impacts of their own energy choices to ensure that they can make more informed decisions; and
10. Active interagency coordination on state, regional and federal energy policies offers many opportunities to make more economically efficient, environmentally responsible and energy secure decisions regarding the use of State energy resources.



Accordingly, the critical action items in this Plan revolve around six overarching and interconnected strategies with accompanying goals, objectives and implementation measures:

- Strengthening Energy Efficiency, Conservation and Weatherization
- Fostering Renewable Energy

The Plan recommends pursuing the following goals to achieve improvements in fostering renewable energy in the State:

- Encourage Maine’s businesses and residences to invest in distributed renewable generation of energy.
 - Continue to advance Maine’s position as a leader in responsible wind power development and maximize the tangible benefits Maine people receive.
 - Work with State agencies, the Governor’s Ocean Energy Task Force, Maine Maritime Academy (MMA) and private developers to promote tidal power in Maine.
 - Seek to develop on-site clean, renewable energy projects at appropriate state facilities.
 - Work with public and private schools across the state to facilitate energy alternative demonstration projects.
 - Support research at the University of Maine to create cellulosic ethanol from paper making waste.
 - Increase the use of bio-fuels and alternative energy in state-occupied buildings.
 - Encourage the development of ethanol-blend fueling stations.
 - Increase the development and use of cogeneration and tri-generation in the State of Maine.
 - Encourage the strategic location and development of industrial and district heating energy generation clusters.
 - Assist the University of Maine and other colleges with the use of biomass/bio-fuel cogeneration and tri-generation energy system
 - Increase the generation of renewable power into the State of Maine’s electricity portfolio.
- Improving Transportation and Fuel Efficiencies
 - Upgrading Electricity and Natural Gas Services, Transmission Systems and
 - Transmission Infrastructures
 - State of Maine Leading by Example
 - Emergency Preparedness and Response

2.6.3 Charting Maine's Future – Grow Smart Maine & Brookings Institute Report (2006)

In 2006, GrowSmart Maine, in conjunction with the Brookings Institution, produced Charting Maine’s Future, an in-depth examination of Maine’s strength and weaknesses in a changing world. This report looked closely at the various regions of Maine all which have their own unique characteristics. The Town of Waterboro is in the identified Southern Maine region (York and Cumberland Counties). The report identifies a number of recommendations. Two of the recommendations have specific relevance to this particular project, they are:

- **Optimism about Maine's future.**
 - Maine is poised for a renewal — if we act now.
 - The new economy favors Maine.
 - Our population is growing again.
 - The economy is diversifying.
 - The Maine 'brand' is gaining in value.
- **Sustainable growth won't happen unless we fix some of the problems we face.**
 - Our state's economic development work is unfocused.

- Good, new jobs are just taking root.
- Our work force isn't ready for tomorrow's jobs.
- We tax and spend too much.
- We're squandering our small-town landscape.

In particular, with regard to sustainable growth, Waterboro has an opportunity to directly address some of the issues noted above by: focusing on certain economic development initiatives that relate to energy, ensuring that where possible, energy initiatives create jobs, recognizing energy projects that can generate revenue and focusing energy initiatives to specific areas of Waterboro so as to direct the growth and not react to it.

2.6.4 Regional Vision - Southern Maine Regional Planning Agency (SMRPC)

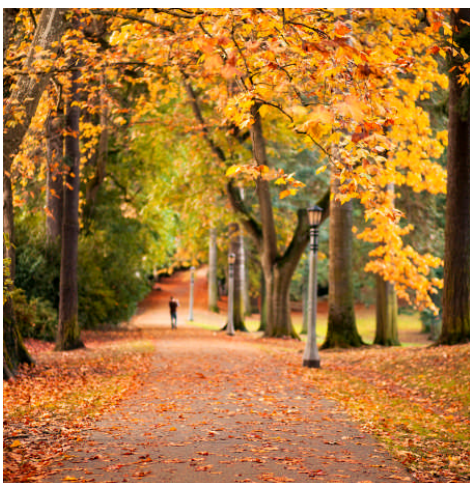
In 2004, SMRPC completed a Regional Vision document for its 39 town area which has experienced tremendous growth and change over time. According to the report, “growth in the Southern Maine region has been driven largely by wealth from outside the region, with many new residents either commuting to jobs in Portland, Portsmouth or even Massachusetts, or coming from out of state to retirement or vacation homes.” Much of the discussion involved regionalization and growth.

Key findings of the regional vision document included:

- The focus in communities and for SMRPC needs to be on practical matters that can demonstrably save towns money.
- All 10 towns already have largely met their capital needs for the time being, so it will be many years down the road before major joint purchases will be possible.
- This is a purely voluntary effort—towns are reluctant to be forced into regionalism.
- Existing regional purchasing programs run by SMRPC are popular and should continue.
- Towns feel very strongly about maintaining local control over planning and land use decisions, and would not be receptive to letting land use decisions be made at the regional level.

2.6.5 Maine Downtown Center – Green Downtown Program

The Maine Downtown Center Green Downtown program was launched in 2009 and follows eight key principles:



- **Reduce, reuse, recycle** – preserve and fully use buildings, reduce waste,
- **Healthy Communities** - Active options, centralized social needs, local foods,
- **Green Canopy** – Street trees, plantings
- **Green Energy** - Alternative sources: passive/active solar, heat pumps, attic fans, wind
- **Urban Living** – Upper floor living, walkable neighborhoods
- **Stormwater Planning** – Capturing, cleaning and reusing runoff
- **Transit** – Public alternatives to private autos
- **Active Transportation** – Walking, trails, bicycles, shared autos

The program is designed to accomplish two primary goals: strengthen the link between the natural and built environment in Maine's historic downtowns to make them more environmentally responsive and ecologically conscious and strengthen Maine's downtowns by building local leadership and community capacity to support sustainable green initiatives. The Maine Downtown Center is available for consulting with communities about how to launch a Green Downtown Program.

Website: http://www.mdf.org/mdc_green_downtowns.php

3. ENERGY STRATEGIES

Energy strategies are identified and described in this section along with recommendations of specific actions that can be taken by the Town to make progress toward implementing each strategy.

1. Organize a Town Governing Body Headed by a Designated Energy Coordinator to Lead Energy Initiatives.



Waterboro realizes the importance of efficient energy management in today's economy and understands that recognizing energy management benefits takes effort and discipline. Any successful initiative needs a champion that can develop priorities, move initiatives forward, implement tasks and be the spokesperson for the overall effort. In order for Waterboro to be serious about and make progress toward improved energy management, they town needs to designate and ask for leadership from an energy coordinator.

This coordinator should not act alone, but in collaboration with a governing body that can provide guidance and ensure that energy related initiatives fit within the overall plan for the community. We suggest this position may be part-time or added as an additional responsibility of an existing staff member. We anticipate the position can be justified based on savings achieved from implementing more efficient energy management practices. Several actions that could be incorporated into the energy coordinator position are outlined below after.

Actions:

- ***Certified Building Energy & Sustainability Technician.*** Invest in the Energy Coordinator or alternate Town energy representative becoming a Certified Building Energy & Sustainability Technician. The Association of Energy Engineers of which Waterboro is an active member offers a Certified Building Energy & Sustainability Technician program that provides targeted training on how to reduce energy usage in operations and best maintenance practices. Checklists to guide the evaluation process are provided as well as strategies to make the business case for equipment upgrades. The training can be achieved by attending a 40 hour course and passing an examination at its conclusion. Having someone with this certification available to the Town could help the Town achieve efficiencies in its buildings as well as support local homeowners and businesses with implementable strategies.
- ***Communicate the Town's energy objectives, plans and successes.*** In order to raise the overall energy awareness of the community, **frequent and consistent communication is necessary** through a variety of media. One of the many goals of these communications should be to foster community engagement and understanding about energy. Communications could consist of publications in the local newspaper, informational sessions regarding energy use, a portion of the

Town web site dedicated to energy initiatives, and communications via social media such as Facebook and Twitter to reach the younger generation.

- ***Coordinate with the School's New Energy Efficiency Coordinator.*** We understand the school system recently hired an Energy Efficiency Coordinator, which represents an opportunity for coordination and collaboration. The Town energy manager should work closely with the school energy manager to partner in specific initiatives, share resources, and ideas.
- ***Provide education on energy conservation and renewable energy choices and opportunities.*** In order to decrease our dependency on foreign oil, energy conservation and renewable energy alternatives need to be explored and implemented. Making different energy choices is very hard to accomplish if people don't understand what to do differently. Having the Town take a leadership role in providing education on energy conservation and renewable energy will be an important means to engage the community and foster change.
- ***Develop mechanisms to monitor funding opportunities.*** Locating and securing funding at the municipal and individual home owner levels is a challenge as there are numerous, rapidly changing programs available. The energy coordinator should work collaboratively with the Town energy governing body to identify and secure available funding. When opportunities are identified, the Town may want to secure contracting with a grant writer or make this an important criterion for the energy coordinator position. The ability to secure additional funding will allow Waterboro to become more energy efficient, as well as may provide a mechanism to fund additional conservation activities through cost savings.

Examples:

- ***Kennebunk, ME*** - The local Energy Committee is very active. For example, when the school district receives an energy bill, they offer considerations for how to reduce the fees. They also decided to try to find a role for students in helping to address the energy conservation problem and in 2007, by working with a group of students, a solar thermal panel was installed at Kennebunk High School.
- ***Scarborough, ME*** - In June 2011, Scarborough approved an Energy Plan which will serve to guide the Town toward an energy management system that is financially and environmentally sustainable. The very first recommended strategy is to establish an Energy Office.
- ***Falmouth, ME*** – The 2010 Falmouth Climate Action Plan recommended creating an Energy Committee who will be charged with implementing the plan.
- ***New Gloucester, ME*** – The New Gloucester Energy Efficiency Workgroup has set measurable goals for the community that are in support of its overall mission to reduce energy use and greenhouse gas emissions. The plan focuses on municipal government and it includes strategies that support town-wide renewable energy and transportation alternatives.

Goals:

- Reduce energy use and greenhouse gas emissions of municipal buildings 25% by 2015.
- Reduce energy use and greenhouse gas emissions of municipal vehicles 5% by 2015.
- Reduce energy use and greenhouse gas emissions of municipal street lights 20% by 2015.
- Support transportation alternatives, such as car pooling and public transportation.
- Support energy alternatives, including wind power and more sustainable fuels.
- Educate citizens about reducing energy use and greenhouse gas emissions.

2. *Increase Energy Awareness in the Town.*

The role of the energy coordinator and Town energy governing body suggested previously will be important in raising the overall energy awareness in the Town of Waterboro. However, there are other more easily implementable actions the Town can take immediately to start the process of raising awareness and making energy more visible.



Actions:

- ***Start with Town Buildings.*** Town buildings offer an easy opportunity to reach out the public and lead by example. Advertising the Town’s commitment to energy conservation can be easily relayed by including signage near light switches to conserve energy and posters advertising energy conservation tips, workshops, vision and goals.
- ***Create energy guidelines for Town building use.*** These guidelines could consist of items such as the last person in the building or in a department to be responsible for turning off lights, and shutting down equipment etc. The guidelines could also be applied to developing practices around when the building is occupied after hours such as for night cleaning or other Town related activities to ensure the building is properly closed down from an energy usage standpoint when not occupied.
- ***Sponsor an Energy Conservation Award.*** An energy conservation award is a great means to generate energy publicity in a positive way. The award could be given by the Town energy governing body to a Town business or resident that has demonstrated energy conservation practices or has implemented renewable energy alternatives. The award should be given at least annually and include a plaque to be publically displayed, an award ceremony, and press around the award.
- ***Host “green” public events.*** “Green” public events are a means of bringing and disseminating important energy and sustainability related information to the community. Waterboro could commit to developing and promoting “green events” for the public and communicating events sponsored by other organizations within Waterboro or surrounding communities. Waterboro should reach out to the public to encourage members of the community to contact members of the energy governing body or energy coordinator if there are events community members would like to be involved in or topics they would like to learn more about.
- ***Select and utilize a computer-based tool to inventory and track greenhouse gas emissions and energy use.*** The purpose of utilizing a computer-based tool is to help communities establish baseline information regarding energy consumption and then provide the ability to analyze the energy savings from various implementation strategies. The most commonly used tools are:

- The **Clean Air Climate Protection software program** available through membership in ICLEI - Local Governments for Sustainability - USA (formerly the International Council for Local Environmental Initiatives);
- The U.S. Environmental Protection Agency (EPA) developed an **ENERGY STAR Portfolio Manager** and an associated benchmarking starter kit to quickly and easily prioritize energy efficiency projects in buildings, measure progress, and verify/report results;
- The **Small Town Carbon Calculator (STOCC)** developed by Clean Air-Cool Planet in conjunction with Carbon Solutions New England and the University of New Hampshire

These tools help communities with data management and information retention as well as to help establish baseline information regarding energy consumption and to analyze the energy savings from various implementation strategies.

Examples:

- The focus included sustainable living and agriculture.
- **Scarborough, ME** – This community as a part of its Energy Plan is focusing on measuring success and showing improvement for increasing efficiency and setting benchmarks. Being able to show clear metrics will be helpful in educating the public and showing areas of improvement.

3. Explore the potential for using or generating renewable or alternative energy.



We are all aware of the U.S. dependence on fossil fuels and the challenges associated with the use of this limited and costly resource. Finding alternatives to fossil fuels demonstrates both fiscal and environmental responsibility and can lead to long-term cost savings. Looking closely at renewable energy is a great opportunity for the Town to chart the course in how a business or individual home owner might consider alternatives to fossil fuel use, while potentially achieving cost savings for the Town at the same time.

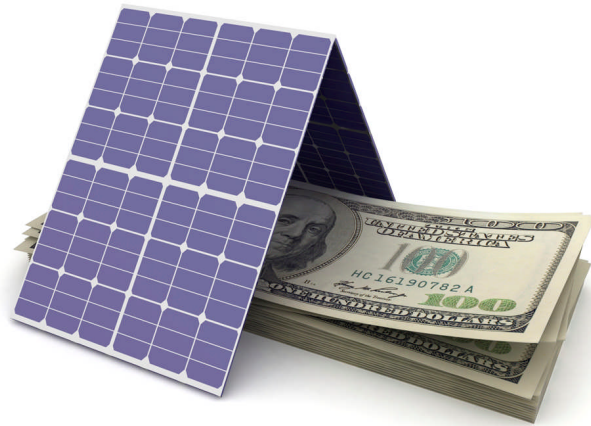
Actions:

- **Consider a demonstration scale solar energy project.** While there are several renewable energy alternatives available to the Town, currently funding is best suited to the implementation of solar projects. The town might explore Maine's Voluntary Renewable Resources Grants, supported by the state's Voluntary Renewable Resources Fund and administered by the Efficiency Maine, that provide funding for small-scale demonstration projects designed to educate communities on the value and cost-effectiveness of renewable energy. Maine's Voluntary Renewable Resources Fund, a public benefits fund, was established in 2000 and is supported by contributions made by

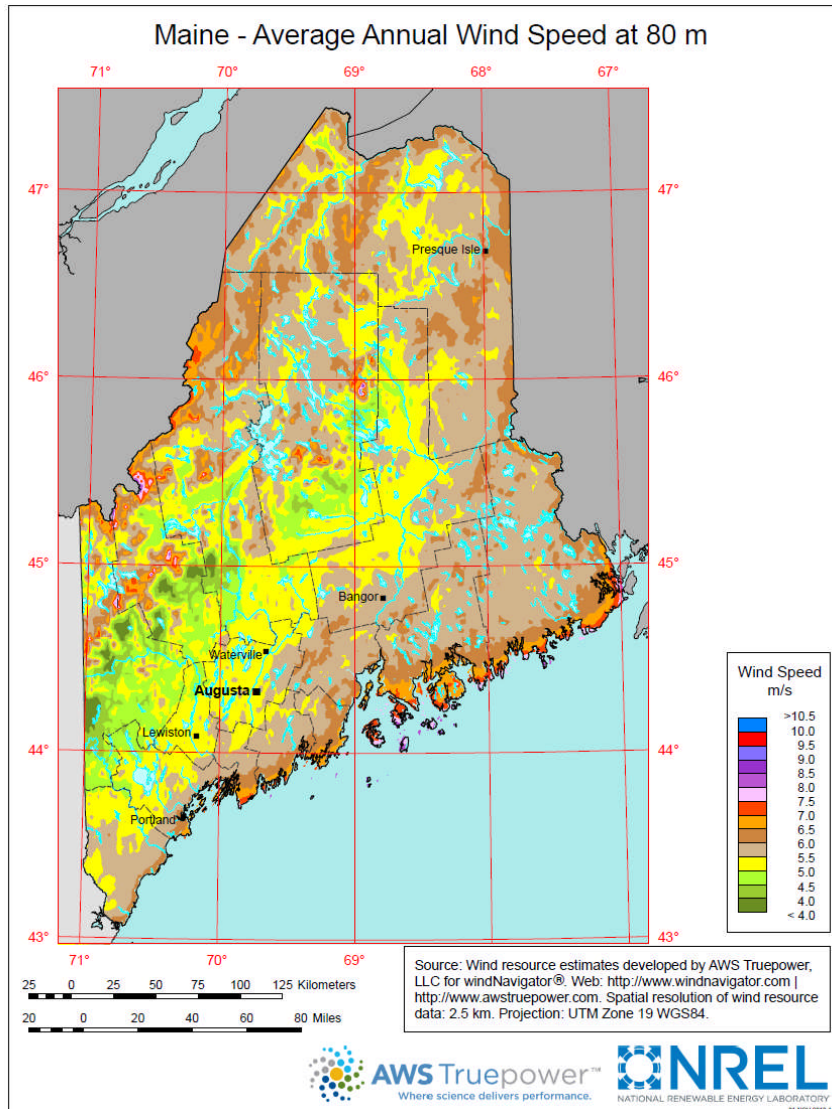
consumers on their electric bills. Applications for Voluntary Renewable Resources Grants are available only during specified application periods; funding is made available when a certain amount has been collected as a result of voluntary contributions. In addition, Efficiency Maine will make funds available from the American Recovery and Reinvestment Act (ARRA) to supplement this grant program. For details see: <http://www.maine.gov/mpuc/recovery/>

Grants of up to \$50,000 are generally available to Maine-based nonprofit organizations (including community-based nonprofits), electric cooperatives, quasi-municipal corporations and districts, schools, and community action programs. To qualify for grant funding, renewable-energy resources generally must (1) qualify as a small power production facility under Federal Energy Regulatory Commission rules or (2) must not exceed 100 megawatts in capacity and use one or more of the following resources to generate electricity: fuel cells, tidal power, solar energy, wind energy, geothermal energy, hydropower, biomass energy, and/or municipal solid waste used in a generator in conjunction with recycling. There is a 20% cost-share requirement for grant-funding but typical solar projects would have a reasonable payback of around 10 years with this type of grant and potentially as short as 5 years if SRECs could be captured.

- ***Invite Efficiency Maine to Speak to the Town about Energy Grant Opportunities.*** Creating a venue to invite Efficiency Maine to speak to the Town residents and other stakeholders about energy opportunities will both generate energy awareness and identify real implementation and funding options. An open dialog should be ongoing with Efficiency Maine so the Town understands new funding opportunities as they develop.
- ***Invite Ogden Geothermal to Speak to the Town about the Implementation of Geothermal Projects.*** The Town has a great local resource in Tracy and Tom Ogden who both are property owners in Waterboro as well as run their own geothermal company in Massachusetts. In addition to the geothermal implementations they do in their work, the Ogdens are considering a geothermal installation at their Waterboro property. The Ogdens will be great resources in educating the community on what geothermal energy is, how it works, and potential applications for businesses and residents.
- ***Explore Outreach to Developers to Implement Large Scale Wind.*** While micro-scale wind projects likely don't represent a good opportunity for the Town, large scale wind is an option that could be examined. The Town could do outreach to developers to potentially identify a partner that may like to explore wind implementations in Waterboro. Waterboro should be aware that there is generally larger opposition to wind than other renewable projects due to visibility and noise impacts that make these projects sensitive and potentially controversial. There are also certainly wind speeds that must be present for wind to be a viable option as outlined below:



http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=me



Examples:

- Saco Energy Initiative, Saco, ME** - The City of Saco is committed to reducing its energy dependence by obtaining as much of our energy as is practical from renewable energy sources. The Saco Energy Committee was formed in the spring of 2005, and includes a city councilor and five city personnel. The Committee meets regularly to investigate means of conservation, efficiency and renewable energy. Saco has completed wind and solar projects at its wastewater treatment plant and taken on the Governor’s Carbon Challenge. <http://www.sacomaine.org/news/energy.shtml>
- Falmouth, ME** - Falmouth School Department received a grant of more than \$45,200 for a 10.3-kilowatt photo-voltaic panel to be installed at the high school.

- **Freeport, ME** - In Freeport, the small-scale demonstration project will promote a roof-mounted photo-voltaic solar electric power array of 10.2 kilowatts. It will consist of 54 modules occupying 718 square feet, mounted on the roof of the library meeting room. The project is designed to educate the community on the cost-effectiveness of harnessing natural resources for clean electricity.

4. *Increase the energy efficiency of town lighting.*

Optimizing town lighting is a known and relatively straight forward approach to achieve immediate energy efficiencies and cost savings. Taking advantage of LED street lighting and other related products will be beneficial.

Actions:

- **Assess the status of non-building street lights.** The town should determine and/or inventory the types and locations of non-building lighting that currently exist in Waterboro. Once this information is known, the town should assess whether certain lighting can be replaced or upgraded with more energy efficient products or, alternatively powered down or even eliminated, provided this does not cause a safety issue.
- **Phase out conventional street lights and replace with more energy efficient fixtures.** Once the Town has identified the presence and locations of conventional street lights, it should develop a program to systematically replace these lights with newer, more energy efficient products as budgets and maintenance schedules will allow.



Examples:

- **Poultney, VT** – in 2003, the community took the initiative to engage and educate the public to change out incandescent lightbulbs to energy saving CFLs.
- **Fort Fairfield, ME** – in 2011, Fort Fairfield was able to leverage \$58,290 in Energy Efficiency and Conservation Block Grant funding with a \$45,675 lighting incentive from Efficiency Maine to replace 174 streetlights with LED lighting technology.
- **Saco, ME** - in May of 2010, the City received a grant of \$85,000 for various energy efficiency grants in the City. As part of that grant, the City was able to purchase \$71,000 worth of Light Emitting Diode (LED) retrofit units for the existing decorative lighting in downtown Main Street area. The LED retrofit of the existing metal halide street lighting on Main Street uses about half the energy of conventional lighting.
- **Cape Elizabeth, ME** – in 2011, the Alternative Energy Committee, formed in 2007 to look at alternative energy options for both the school and municipal departments, voted to recommend a

plan to the Town Council that would put light-emitting diode, or LED, lighting and induction lighting in town parking lots.

- **Bangor, ME** – instituted a Downtown Street Light Replacement with Energy Efficient Light Emitting Diode Technology at a cost of \$161,700.
- **Easthampton, MA** – in 2010, funding was received to install energy-efficient LED streetlights. The Massachusetts Department of Energy Resources (DOER) awarded the City \$174,985 for the project.

5. Implement energy efficiencies resulting from energy audits to reduce energy expenditures.

Lassel Architects complete an Energy Audit Report in April 2011 for the Town of Waterboro. The work focused on Old Town Hall, Town Hall Annex, the Library and South Fire Station. The purpose of the study was to review existing conditions of the building envelopes, indoor air quality and provide a broad overview of heating, ventilation, electrical systems as well as plumbing fixtures for opportunities in energy conservation, improved comfort and indoor health and safety.

Waterboro has many opportunities to save money through energy efficiency and given the potentially overwhelming nature of the long list of projects in the report, it will be helpful to identify a set of projects for early implementation. To help with this effort, below is a table that separates the efficiency opportunities into two categories: #1 that require little or no capital expenditure and #2 those that require capital.

Actions:

- **Implement Low and No Cost Energy Project on Municipal Buildings.** The audit report identified several projects that might be early candidates for implementation at low or no cost. We believe this might serve as a catalyst for other more involved projects. One approach to implementation is a community based effort that can use volunteers or existing staff to complete projects. It is estimated that these projects can be implemented for less than \$1,000 dollars and will have near immediate energy savings.

Location	Project
Old Town Hall	Install insulated covers over through-wall AC in Winter
	Improve air sealing and insulation
Annex	Improve air sealing and insulation
	Energy settings on office equipment
Library	Cover dirt crawl space with heavy duty vapor barrier
	Address insulation concerns

Location	Project
Firehouse	<i>(Building is in deteriorated condition and may not warrant any investment. That said some minimal investments in air sealing may still make sense.)</i>
	Improve air sealing
General	Programmable Thermostats; 60F temperature during unoccupied times
	Implement Energy Star Purchasing Policy
	Replace lighting that is only re-lamping
	Participate in New England Carbon Challenge
	Develop behavioral change to minimize energy use

- **Focus on Building Envelope.** It was noted in the report that each building provides numerous opportunities to conserve energy from a heating, cooling and electrical usage standpoint. In addition, Waterboro should make sure that any envelope upgrades should be coordinated by a general contractor with air sealing and high efficiency envelopes because standard construction methods are not always sufficient to obtain energy savings desired.
- **Develop funds for improvements that require capital.** If funds are to be made available, the community should determine the magnitude of the efforts desired. To maximize funds, projects should be structured to target the most attractive projects first in alignment with the total spending appetite of the community. We suggest an annual budget of \$5,000-\$10,000 to support project implementation. Projects should also be conducted in methodology to ensure that by completing one type of project others are not eliminated. Projects can be made on a revolving basis where savings can be returned to conduct additional projects. In that manner, the energy efficiency project fund becomes an ongoing or "revolving" financial tool. This money can then be fully leveraged to support the most energy efficiency projects as possible.

○ **Revolving Loan fund information – to be added!**

Example:

- **Bangor, ME** – Utilized \$100,900 in Energy Efficient & Community Development Block Grant money to fund chimney repairs and boiler upgrades in three municipal buildings.
- **Eliot, ME** – In 2011, this community completed an Energy Audit of municipal buildings.
- **New Gloucester, ME** – According to the Town of New Gloucester website, “the Town of New Gloucester was awarded a **\$10,000** grant from Efficiency Maine to conduct energy auditing of municipal buildings and to develop a municipal energy efficiency plan. Efficiency Maine has also awarded the town a **\$36,000** fund for energy efficiency improvements to New Gloucester municipal buildings based on the energy audit recommendations.”

6. *Utilize the schools and its students to build and implement green programs.*

The students are the future leaders of tomorrow. Outreach to the schools and getting students involved is a great approach to perpetuate the message of energy conservation and to harness the energy and talent of the Town's young people. The knowledge gained by the students will stay with them for a lifetime and will transcend into their homes and community. RSU #57 recognized this potential has advertised an energy coordinator position for the school system which will take the lead in implementing programs. The Town could build upon this work and partner with the schools in the following ways:

Actions:

- *Involve students in volunteer activities town-wide.* Students can be easily overlooked in the development of Town committee and groups. Having student representation in these groups will bring the perspective of a younger generation and harness their creative energies. One way to outreach to students beyond outreach completed within the school walls is to engage students in Town led or sponsored volunteer activities. This would further perpetuate energy awareness, but could also help the Town accomplish tasks that might otherwise be understaffed or take longer to complete.



- *Consider offering an energy internship at the Town or coordinate an internship with local businesses.* This is an experience that high schools seniors may be very interested in. It will give them both real world training working with community stakeholders as well an opportunity to apply what they have learned in school to a real world situation.

Examples:

- **Hanson Elementary School, Lebanon, ME** - Clair Ledue and Susan Devito's excel environmental classes received funding for the installation of 19 occupancy sensors that will automatically turn off lights when rooms are not in use. Students will also be consulting with local middle and high school students on other ideas for improving the environmental friendliness of their respective schools.
- **Lincoln Academy, Newcastle, ME** - The Climate Change Action Club received funding to purchase and install new high efficiency hand dryers, replacing aged models with higher energy consumption. Lincoln Academy offered to match the distributed funds to further improve the school's efficiency.

- **Lincoln Middle School, Portland, ME** – Several science classes were awarded grant money for the installation and purchase of new high efficiency hand dryers. The team carried out extensive research and after performing a cost/benefit analysis, decided to purchase the Dyson Airblade, which uses less electricity per use than any other hand dryer on the market and will result in a decreased use of paper towels. The science classes have also received matched funding from KIDS Consortium for additional dryers.
- **Oak Hill Middle School, Sabattus, ME** - Students were awarded money for implementation of their multi-pronged energy efficiency project. The students looked at the school’s energy usage and where it could be improved and after extensive research and data analysis found that installation of motion sensors, CFLs for task lighting (to reduce the overhead light use) and improving the weatherization would be the best fixes for improving school-wide energy efficiency.

7. *Examine opportunities to optimize energy purchasing practices. Find cheaper energy.*

There may be opportunities for Waterboro to optimize its current energy purchasing by integrating energy purchases and understanding how pricing is completed by its suppliers. Aggregation of purchasing power within and outside of the Town can enable market leveraging. A proactive approach to energy purchasing will also allow Waterboro to both understand its energy purchasing and develop strategies to become more efficient and proactive in its practices.

Actions:

- **Partner with surrounding communities for bulk energy purchases.** The collective purchasing power of multiple entities is typically greater than with any single entity. The Town could explore opportunities to work with other surrounding communities regarding potential joint energy purchases.
- **Examine electric and fuel oil supply agreements.** Waterboro should review its existing supply agreements to ensure it is getting the best purchasing agreement possible.

Examples:

- **South Portland, ME** – The City has considered buying electricity on the wholesale market to cut its electricity bills and possibly those of residential and commercial customers. The concept calls for the city to form a nonprofit energy supply company, called South Portland Energy, which would be able to get cheaper rates because it would buy power in bulk. A conservative estimate for savings on electricity – which is separate from the transmission and delivery of power -- is 10 to 20 percent. The savings could be passed on to users or go into a fund for projects.
- **York Hospital, York, ME** - York Hospital purchases 100 percent of its electricity from Maine renewable sources as part of a commitment to creating environmentally healthy surroundings for patients, staff and communities. While the state of Maine requires 30 percent of the energy sold in the state to come from renewable sources, York Hospital has raised the bar by going to 100 percent, becoming the first hospital in the state to set such a precedent.

8. *Foster the creation of a new village area and highlight energy efficiency and conservation.*

The Town of Waterboro currently does not have a clearly identifiable village area. Lakeside Market, a community business leader in energy conservation is located in an area that could be identified as downtown with further development. Targeted village efforts create jobs, makes places more attractive live, promotes energy efficiency and helps to preserve open space. Development could be encouraged in this area and employ the following concepts outlined in the actions below:



Actions:

- ***Work with the Maine Downtown Center to Launch a Green Village Program in Waterboro.*** The Maine Downtown Center is a resource that can be utilized to help Waterboro start a program that would help achieve in part, energy independence and efficiency goals as they relate to the potential creation of a downtown or defined mixed use village area. One of the key principles of this program is Green Energy.
- ***Ensure that this Energy Chapter is consistent with the new Village planning chapter of the Comprehensive Plan.*** Typically, the land use section of a Master Plan inventories existing conditions and provides recommendations for future development and conservation in a community. In addition, it may include specific mention of water resources and planning for location and protection of future sources. Renewable Energy should be an additional consideration for this evaluation.
- ***Adopt regulatory requirements that will foster the appropriate location and design standards for renewable energy projects.*** The Town of Waterboro has an opportunity to be proactive with regards to planning for renewable energy projects. Having a general idea of where they could be located in town along with appropriate regulatory guidelines and/or design guidelines could help protect the community against any controversial issues.
- ***Incorporate LEED building standards into new downtown development codes.*** The Town should try to be as proactive as possible in recruiting new businesses to Town so that development doesn't just happen without being well thought out. To ensure the downtown hub is possible, LEED building principals can be incorporated and may well be an attractive design concept to developers or energy conscious businesses.
- ***Develop Town infrastructure to support a downtown area.*** If the Town wants to attract businesses to the downtown area it should consider creating infrastructure to support growth. The Town needs to evaluate how it currently prioritizes and implements infrastructure improvements.

Examples:

- ***Kennebunk, ME*** – Kennebunk is working with the Maine Downtown Center utilizing their Green Downtown approach which focuses on the Main Street design principles, building recycling, energy efficiency and a healthy, walkable downtown with trail and transit connections. (See **Appendix B for a recent presentation about this collaborative effort.**)

9. *Support the individual homeowners in becoming more energy efficient.*

Waterboro realizes that its most important assets are the people that live in the community and fully supporting its home and business owners in their energy efficiency and management efforts is critically important. There are numerous energy incentive programs from a number of entities available to individual homeowners, however often these programs are hard to locate or unclear in what the homeowner must do to take advantage of them. Providing support associated with these programs and other energy and sustainability guidance to the individual homeowners will not only reduce home and business owner's individual energy costs, but will generate energy efficiency awareness that can be perpetuated throughout the community.

Actions:

- ***Provide education targeted toward homeowners.*** In order to help support homeowners in getting their homes more energy efficient, the multiple benefits of doing so must be demonstrated. If homeowners can see a return on investment and real cost savings, implementing these measures will be more palatable. The specific education targeted to homeowners should be charge of the energy coordinator and can include invited guests to speak to homeowner audiences and targeted communications and recommendations through a variety of media. Once suggested invited guest is Bill Winkel an independent contractor and Waterboro resident who has completed several home energy audits in Waterboro, several of which have implemented weatherization projects recommended by the audit.
- ***Continue to help homeowners obtain PACE loans.*** – In September 2010, the Town of Waterboro adopted the Property Assessed Clean Energy (PACE) Ordinance. As of September 2011, William B. Winkel Builders in Waterboro, has now completed 36 PACE projects locally. Under the PACE program, a home first has to go through an energy audit and an application process with Efficiency Maine. The loan money is available under a federal program known as Property Assessed Clean Energy, or PACE, which is designed to help people make their homes more energy efficient.
- ***Communicate town strategies that could be adopted at the individual homeowner level.*** As the Town develops and implements strategies resulting from the previous energy audits conducted it should look for means to communicate these measures to Town residents and outline how these could be applied at the homeowner level. For example, the Town has plans to update the windows and insulation in the public library. These plans should be communicated with benefits outlined so that homeowners could understand and implement these strategies.

Examples:

- **Saco, ME** – This community participates in the PACE program which was launched by Efficiency Maine to offer homeowners a new way to finance energy efficiency upgrades to their homes. These loans provide a way for homeowners to borrow funds at a competitive interest rate to make energy improvements, such as installing a new energy-efficient heating system, weatherizing a home with insulation and air sealing, and replacing inefficient appliances and lighting.

- **Save Like a Mainer Program** – Efficiency Maine launched in October its new energy efficiency awareness program - Save Like a Mainer Program. Featured throughout the multi-media campaign are Maine residents, municipalities and businesses that have realized energy savings using Efficiency Maine programs. The campaign encourages Mainers to explore energy-saving investment opportunities through Efficiency Maine to assist them in saving money on heating, electricity and fossil fuels through efficient and cost-effective uses of energy laid out in Efficiency Maine’s strategic three-year plan. The new awareness campaign is integral to Efficiency Maine’s implementation of that plan and achieving the more than \$472 million in net benefits it will deliver to Maine’s consumers and the local economy.

10. Support businesses in becoming more energy efficient.

Supporting local businesses in energy efficiency and conservation is a very visible way to engage stakeholders and communicate energy management practices. The local businesses in and of themselves can act as demonstration projects for the community. The actions recommended below are similar to those for homeowners, but may be larger in scale.

Actions:

- ***Provide education targeted toward businesses.*** If businesses can see a return on investment and real cost savings, implementing these measures will be more palatable. The specific education targeted to businesses should be charge of the energy coordinator and can include invited guests to speak to business owner audiences and targeted communications and recommendations through a variety of media. Once suggested invited guest is the owner and contractors involved in improvements completed at Lakeside Market.
- ***Communicate town strategies that could be adopted at the individual business owner level.*** As the Town develops and implements strategies resulting from the previous energy audits conducted it should look for means to communicate these measures to Town business owners and outline how these could be applied at the business owner level. For example, the Town has plans to update the windows and insulation in the public library. These plans should be communicated with benefits outlined so that business owners could understand and implement these strategies.

Examples:

- **Windham Millworks, Windham, ME** – Founded in 1957, the business focuses on architectural millwork and cabinetry, moldings, and laminated panels. When its 25 year-old wood-fired boiler began breaking down constantly, through a \$65,000 Rural Development grant, they funded 25 percent of the cost to install a bio-mass boiler system that is fueled by the waste wood produced as a by-product of the business. (See Appendix B)
- **Blue Spruce Farm, Bridgeport, VT** - A dairy housing and milking operation with 1,200 dairy cows who in an effort to sustain their farm business and maximize their revenue potential, began to explore diversification opportunities on the farm. Recognizing the energy potential in the farm’s abundant manure assets, the farm developed a partnership with their local utility company, CVPS, which fostered the development of “Cow Power” electricity generation on the farm. And

construct an anaerobic digester system that would convert dairy manure into electricity. (See Appendix B)

- **Lyman Morse Boatbuilding, Thomaston, ME** – In June 2006, Lyman Morse began researching and designing a large, energy efficient building for large yacht construction, storage, and service. They included a solar roof, propane boilers, Structured Integrated Panels, waterless urinals and T-8 lighting fixtures.
- **Save Like a Mainer Program** – Efficiency Maine launched in October its new energy efficiency awareness program - Save Like a Mainer Program. Featured throughout the multi-media campaign are Maine residents, municipalities and businesses that have realized energy savings using Efficiency Maine programs. The campaign encourages Mainers to explore energy-saving investment opportunities through Efficiency Maine to assist them in saving money on heating, electricity and fossil fuels through efficient and cost-effective uses of energy laid out in Efficiency Maine's strategic three-year plan. The new awareness campaign is integral to Efficiency Maine's implementation of that plan and achieving the more than \$472 million in net benefits it will deliver to Maine's consumers and the local economy.

11. Develop Relationships With People, Organizations & Programs Who Can Help the Town of Waterboro

There are numerous resources available to support Town energy management efforts both within and outside the community. As part of the Town's outreach activities, many of these resources that may not currently be known will be identified. Maintaining relationships with these people, organizations and programs and engaging them in Waterboro's efforts could yield endless benefits.

Actions:

- ***Maintain and utilize a directory of energy resources.*** In order to keep track of these resources and share them with Town stakeholders, the Town should maintain and make available a directory of energy resources. This should be maintained and continually updated when new information becomes available.

Examples:

- **The Maine Energy Handbook** – Identifies a number of Maine support sources regarding who would be great to develop additional relationships with. Most of the programs listed are free of charge.
 1. Clean Air – Cool Planet (CA-CP), www.cleanair-coolplanet.org
 - CA-CP specialties include: networking opportunities through workshops; an easy-to-use energy inventory software tool called the Small Town Carbon Calculator (STOCC); a suite of informative trainings, workshops, and webinars; the *Maine Energy Handbook* to help guide your local effort; and staffed assistance to help your local energy committee.
 2. Conservation Law Foundation (CLF), www.clf.org

- CLF works on energy efficiency and sustainable energy policy on a local, regional, and state level, recently working to help towns develop and implement wind ordinances.
3. Department of Energy (DOE), www.energy.gov and www1.eere.energy.gov/wip/eecbg.html
 - The DOE administers a range of grant programs, including the Energy Efficiency and Conservation Block Grant program for local governments. Note that some DOE grants are administered by Efficiency Maine. The DOE also has informative reports and webinars on energy efficiency for homes, businesses, and governments.
 4. Efficiency Maine (EM), www.energymaine.com
 - EM is the first stop to help identify grants and incentives for your Maine local government and community. A representative can help identify which EM grants and incentives your local effort is eligible to receive. EM also offers training to help staff run energy efficient buildings.
 5. EmPowerMe Energy Working Group (EWG), <http://energy.gpcog.info>
 - EmPowerMe provides models and resources for local energy committees around the state.
 6. Environmental Funder's Network (EFN), www.environmentalfundersnetwork.com
 - EFN periodically offers grants to Maine organizations, including local energy efforts.
 7. EPA Community Energy Challenge (CEC), www.epa.gov/ne/eco/energy/energy-challenge
 - CEC requires a signed commitment to reduce energy use from your municipality. In return, you will receive access to: recognition, the EPA Portfolio Manager software tool, up-to-date information about other municipal energy efforts, trainings and webinars on how to use the EPA Portfolio Manager software tool in your town, and limited technical assistance.
 8. EPA Energy Star, www.energystar.gov
 - Energy Star offers: a recognition program for highly energy efficient buildings, the EPA Portfolio Manager software tool, useful reports such as the Building Energy Upgrade Guide, and webinars on how to save money through energy efficiency.
 9. EPA State and Local Climate and Energy Program (SLCEP), www.epa.gov/slclimat/
 - SLCEP offers a considerable amount of useful information for local energy efforts, including a highly useful webinar series as well as a website offering: tools and model solutions, reports, and links to previous webinars.
 10. Greater Portland Council of Governments (GPCOG), www.gpcog.org
 - GPCOG offers comprehensive technical assistance and coordination to twenty-five member governments. Annual membership fee and location in GPCOG

service area required. GPCOG also creates and disseminates models and resources to be used statewide through EmPowerMe, above.

11. ICLEI Local Governments for Sustainability (ICLEI), www.icleiusa.org
 - A \$600± annual membership fee is required to receive the software and most benefits, including: networking and collaboration between municipalities, example ordinances, recognition as an ICLEI member government, the 2009 Clean Air-Climate Protection Software, technical assistance to help use the software, up-to-date information about other municipal energy efforts, information about how local governments work, and a range of reports and webinars helpful to local energy efforts.
12. Maine.gov/local, www.maine.gov/local
 - Maine.gov is a website to learn about and connect with other local governments in Maine.
13. Maine Association of Nonprofits (MANP), www.nonprofitmaine.org
 - MANP provides resources and excellent, low cost trainings and written resources for effective nonprofit organization, management, communication, fundraising, and grant writing. A \$100 membership fee gives access to online resources and reduces the cost of trainings, which run \$25-\$150± per session.
14. Maine Clean Communities (MC2), <http://mainecleancommunities.gpcog.info/>
 - MC2 works to encourage clean and efficient municipal fleets. They may be helpful to your local energy committee in a number of ways, including: grants, policy support, recognition, model solutions, reports, webinars, and phone-based technical assistance related to clean and efficient municipal fleets.
15. Maine Community Foundation (MCF), www.mcf.org
 - MCF offers small to mid-sized grants that may be relevant to your local energy effort, including region- and mission-specific grants.
16. Maine Department of Environmental Protection (DEP) Governor's Carbon Challenge (GCC), www.maine.gov/dep/innovation/gcc
 - GCC requires a signed commitment to reduce carbon emissions from your municipality. In return, you will receive access to a network of businesses and municipalities reducing energy use, recognition, a greenhouse gas inventory tool and reporting form, case studies on active municipalities, and limited technical assistance.
17. Maine DEP Green Schools Program, www.mainedep.com
 - DEP Green Schools helps schools start down the energy saving path in a number of ways, including: mini-grants for student projects to reduce energy use; recognition; school energy audit toolkits; informative reports and webinars; and technical assistance for students, teachers, staff, and administrators seeking to reduce energy use in a school.
18. Maine DEP Idle Reduction Program, www.mainedep.com

- DEP Idle Reduction supports student intern projects to reduce idling in a number of ways, including: mini-grants for intern projects; recognition; energy idling analysis toolkits; signs, stickers, and advertising videos to change local idling practices; model anti-idling ordinances; informative reports and staff training on social marketing; and support for intern projects to change.
19. Maine Department of Transportation (MDOT), www.maine.gov/mdot
 - Maine DOT works supports municipal transportation initiatives in a number of ways, including: state and federal grants it periodically offers to towns; informative reports, trainings, and webinars on how to reduce community transportation fuel use, and technical assistance for community transportation efficiency initiatives.
 20. Maine Initiatives, www.maineinitiatives.org
 - Maine Initiatives offers small to mid-sized grants that may be relevant to your local energy committee.
 21. Maine Partners for Cool Communities (MPCC), www.coolmaine.org
 - MPCC accepts a signed Mayors for Climate Protection Agreement to reduce energy and carbon emissions from your municipality. In return, your local energy committee will become part of the MPCC network of municipalities and benefit from reports, model solutions, recognition, and limited technical assistance.
 22. Maine Power Options (MPO), www.mainepoweroptions.org
 - MPO staff will work with you to see if their joint purchasing programs, which can reduce electricity and fuel oil costs by up to 20%±, may be a good fit with your municipality.
 23. Maine Municipal Association (MMA), www.memun.org
 - MMA offers the free 2005 “Local Government in Maine” guidebook, case studies demonstrating lessons learned from municipal energy efficiency efforts, and a suite of members-only resources. Membership fee required.
 24. Maine Office of Energy Independence and Security (MOEIS), www.maine.gov/oeis
 - MOEIS offers important resources and policy documents to help municipalities understand the state’s energy situation.
 25. Maine State Planning Office (MSPO), www.maine.gov/spo
 - MSPO offers smart-growth planning technical assistance and resources.
 26. National Resources Council of Maine (NRCM), www.nrcm.org
 - NRCM offers policy advice, a network of statewide activists, and a Business Guide to Energy Efficiency.
 27. New England Grassroots Environment Fund (NEGEF), www.grassrootsfund.org
 - NEGEF offers small grants (\$5000 and lower) for local environmental movements. There was a 60% acceptance rate for applications as of 2009.
 28. US Green Building Council (USGBC) Local Government Program, www.usgbc.org

- USGBC accepts a signed commitment to green municipal buildings. In return you will receive access to resources and recognition.

12. Track and leverage various funding sources for energy efficiency and conservation projects.



There are a number of funding sources available to homeowners, businesses and municipalities. These sources are constantly changing and need to be tracked regularly. This should be one of the primary responsibilities of the energy coordinator. When a fund is identified, it should be communicated to the appropriate parties and leveraged by submitting applications to try to secure funding.

Actions:

- ***Maintain a directory of funding resources.*** In order to keep track of the funding resources and share them with Town stakeholders, the Town should maintain and make available a directory of available funding resources. This should be maintained and continually updated when new information becomes available.
 - Efficiency Maine - <http://www.energymaine.com/>
 - DSIRE - <http://www.dsireusa.org/incentives/index.cfm?State=ME>
 - Governors Office of Energy and Independence – Grants Connector - <http://www.maine.gov/oeis/grants.html>



Table: Action Item Summary List

	Action	For More Info (Page #)	Status
1. Organize a Town Governing Body Headed by a Designated Energy Coordinator to Lead Energy Initiatives.			
	Certified Building Energy & Sustainability Technician.		
	Communicate the Town’s energy objectives, plans and successes.		
	Coordinate with the School’s New Energy Efficiency Coordinator		
	Provide education on energy conservation and renewable energy choices and opportunities.		
	Develop mechanisms to monitor funding opportunities.		
2. Increase Energy Awareness in the Town.			
	Start with Town Buildings.		
	Create energy guidelines for Town building use.		
	Sponsor an Energy Conservation Award.		
	Host “green” public events.		
	Select and utilize a computer-based tool to inventory and track greenhouse gas emissions and energy use.		
3. Explore the potential for using or generating renewable or alternative energy.			
	Consider a demonstration scale solar energy project.		
	Invite Efficiency Maine to speak to the Town about Energy Grant Opportunities.		
	Invite Ogden Geothermal to speak to the Town about the implementation of geothermal projects.		
	Explore outreach to developers to implement large scale wind.		
4. Increase the energy efficiency of town lighting.			
	Assess the status of non-building street lights.		
	Phase out conventional street lights and replace with more energy efficient fixtures.		
5. Implement energy efficiencies resulting from energy audits to reduce energy expenditures.			
	Implement low and no cost energy projects on Municipal buildings.		
	Focus on building envelope.		
	Develop funds for improvements that require capital.		
6. Utilize the schools and its students to build and implement green programs.			



	Action	For More Info (Page #)	Status
	Involve students in volunteer activities town-wide.		
	Consider offering an energy internship at the Town or coordinate an internship with local businesses.		
7. Examine opportunities to optimize energy purchasing practices. Find cheaper energy.			
	Partner with surrounding communities for bulk energy purchases.		
	Examine electric and fuel oil supply agreements.		
8. Foster the creation of a new village area and highlight energy efficiency and conservation.			
	Work with the Maine Downtown Center to launch a Green Village program in Waterboro.		
	Ensure that this Energy Chapter is consistent with the new Village planning chapter of the Comprehensive Plan.		
	Adopt regulatory requirements that will foster the appropriate location and design standards for renewable energy projects.		
	Incorporate LEED building standards into new downtown development codes.		
	Develop Town infrastructure to support a downtown area.		
9. Support the individual homeowners in becoming more energy efficient.			
	Provide education targeted toward homeowners.		
	Continue to help homeowners obtain PACE loans.		
	Communicate town strategies that could be adopted at the individual homeowner level.		
10. Support businesses in becoming more energy efficient.			
	Provide education targeted toward businesses.		
	Communicate town strategies that could be adopted at the individual business owner level.		
11. Develop relationships with people, organizations & programs who can help the Town of Waterboro.			
	Maintain and utilize a directory of energy resources.		
12. Track and leverage various funding sources for energy efficiency and conservation projects.			
	Maintain a directory of funding sources.		

APPENDIX A: GLOSSARY OF ENERGY TERMS

NOTE: This glossary is a compilation of terms from the **EPA Website** as well as the **Guide to Purchasing Green Power**, published by The Center for Resource-Solutions.

Annual consumption. Annual consumption refers to the amount of electricity used by a consumer in one year and is typically measured in kilowatt-hours (kWh). This information can be acquired from your electricity bill or by contacting your energy provider.

Carbon dioxide. The burning of fossil fuels releases carbon that has been stored underground for millions of years into the atmosphere. During the combustion process, the carbon in these fossil fuels is transformed into carbon dioxide, the predominant gas contributing to the greenhouse effect. Increases in the emissions of carbon dioxide and other gases, such as methane, due to the burning of fossil fuels and other human endeavors, accelerate heat-trapping processes in the atmosphere, gradually raising average temperatures worldwide. Carbon dioxide is absorbed and released at nearly equal rates by natural processes on the earth, an equilibrium that is disrupted when large amounts of carbon dioxide are released into the atmosphere by human activities, such as the burning of fossil fuels.

Combined heat and power (CHP). Combined heat and power (CHP) is an electricity generation technology, also known as cogeneration, that recovers waste heat from the electric generation process to produce simultaneously other forms of useful energy, such as usable heat or steam. On average, two-thirds of the input energy used to make electricity is lost as waste heat. In contrast, CHP systems are capable of converting more than 70 percent of the fuel into usable energy.

Commodity electricity. Commodity electricity is generic electricity not associated with a particular power generation source.

Competitive markets. Until recently, most consumers received generation, transmission, and distribution services from one local utility company. As a regulated monopoly, the utility was given an exclusive franchise to provide electricity to consumers in a particular community. Rates were set, and consumers had little choice but to pay the rate for their area. In recent years, however, many states have restructured their electricity industry and are now allowing consumers to choose from among competing electricity suppliers. In states permitting retail competition, sellers of electricity obtain power by contracting with various generation sources and setting their own price. Consumers in these states have the opportunity to choose their energy provider and purchase products based on the price or type of power supplied to their home or business. Some consumers are exercising this choice and switching to accredited "green power"

resources. In states that have not restructured their electricity markets, consumers interested in purchasing renewable energy now have the option to participate in green-pricing programs offered by their local utility.

Conventional power. Conventional power is power produced from nonrenewable fuels such as coal, oil, natural gas, and nuclear fuels. These fuels are a finite resource that cannot be replenished once they have been extracted and used.

Distributed generation. Distributed generation refers to small, modular, decentralized, grid-connected, or off-grid energy systems located in or near the place where energy is used.

Electricity supplier. As states restructure their electricity markets, more and more customers will be able to choose from a range of energy suppliers that market different types of power products, including green power from renewable energy. Restructured local utilities offer electricity products generated exclusively from renewable resources or, more frequently, electricity produced from a combination of fossil and renewable resources. In states without restructured electricity markets, local utilities may offer green-pricing programs, in which customers may elect to have their utility generate a portion of their power from renewable sources.

Energy efficiency. Energy efficiency refers to products or systems using less energy to do the same or a better job than conventional products or systems can. Energy efficiency saves energy, saves money on utility bills, and helps protect the environment by reducing the amount of electricity (and associated environmental impacts) that needs to be generated.

Fossil fuels. Fossil fuels are the United States' principal source of electricity. The popularity of these fuels is due largely to their low cost. Fossil fuels come in three main forms: coal, oil, and natural gas. All three were formed many hundreds of millions of years ago before the time of the dinosaurs, hence the name fossil fuels. Because fossil fuels are a finite resource and cannot be replenished once they have been extracted and burned, they are not considered renewable.

Global climate change. For most of human history, changes in the earth's climate resulted from natural causes that took place over thousands of years. But today, human activities are beginning to affect our climate in serious and immediate ways by rapidly adding greenhouse gases to the atmosphere. These gases trap heat close to the earth that would otherwise escape into space, intensifying a natural phenomenon called the greenhouse effect. Over the next century, scientists project that global temperatures will rise two to six degrees Fahrenheit as a result of rising concentrations of greenhouse gases. Scientists also believe that this rate of global warming will be unprecedented compared with that of the past 10,000 years. Global warming could result in a rise in sea levels, changes in patterns of precipitation, more variable weather, and many other consequences. These changes threaten our health,

agriculture, water resources, forests, wildlife, and coastal areas. For more information on the science and impacts of global climate change, visit the EPA's Global Warming Web site (www.epa.gov/globalwarming).

Greenhouse effect. The greenhouse effect is produced as greenhouse gases allow incoming solar radiation to pass through the earth's atmosphere, while preventing part of the outgoing infrared radiation from the earth's surface and lower atmosphere from escaping into outer space. This process occurs naturally and has kept the earth's temperature about 59 degrees Fahrenheit warmer than it would otherwise be. Current life on the earth could not be sustained without the natural greenhouse effect.

Greenhouse gases (GHG). Gases in the earth's atmosphere produce the greenhouse effect. Changes in the concentration of certain greenhouse gases, due to human activities such as the burning of fossil fuels, increase the risk of global climate change. Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinate carbons, and hydrofluorocarbons.

Green power. Electricity that is generated from renewable energy sources is often marketed as "green power," a term that implies a smaller environmental impact from electricity generation. The resources that qualify as green power vary depending on the state or organization.

Green power marketers. Energy suppliers operating in states that permit retail competition in the electricity markets are usually referred to as green power marketers. This term can also include utilities that offer green power options under what are typically referred to as green-pricing programs.

Green power products. Green power products refer to electricity generated exclusively from renewable resources or from a combination of fossil and renewable resources.

Green pricing. Green pricing is an optional service offered by regulated utilities to allow customers to support a greater level of utility investment in renewable energy by paying a premium on their electric bill. Usually green pricing is offered in areas that do not allow retail competition.

Interval meter. An interval meter is an electricity meter that measures a facility's energy usage in short increments (typically 15 minutes). These meters are useful for determining electricity demand patterns and participating in real-time pricing programs.

Kilowatt-hour (kWh). A kilowatt-hour is the basic unit for measuring the generation and consumption of electrical energy. A megawatt-hour (MWh) of electricity is equal to 1,000 kilowatt-hours. A kilowatt and a megawatt are units of generation capacity.

LED (Light Emitting Diode). A semiconductor light source used for lighting. They are small and result in lower energy consumption and longer lifetime functioning.

Low-impact hydropower. Low-impact hydropower is hydroelectric power generated with fewer environmental impacts, by meeting criteria such as minimum river flows, water quality, fish passage, and watershed protection. These hydropower facilities often operate in a "run of the river" mode, in which little or no water is stored in a reservoir.

Net metering. Net metering is a method of crediting customers for electricity that they generate on-site. Customers generating their own electricity offset what they would have purchased from their utility. If they generate more than they use in a billing period, their electric meter turns backward to indicate their net excess generation. Depending on the individual state or utility rules, the net excess generation may be credited to their account (in many cases at the retail price), carried over to a future billing period, or ignored.

New renewable generation. New renewable generation facilities are those built in the recent past or will be built to meet the growing market demand for green power. For Green-e certification, new generation must have come online since the late 1990s (depending on the region; see the Green-e Web site for more details).

On-site renewable generation. On-site renewable generation refers to electricity generated by renewable resources using a system or device located at the site where the power is used.

Peak demand. Peak demand is the maximum power consumption for a facility, measured over a short time period such as 15 minutes or an hour.

Power marketer. A power marketer is an entity that buys and sells power generated by others. A green power marketer is an electricity supplier that offers a green power product.

Renewable electricity. Renewable electricity is power generated from renewable resources and delivered through the power grid to end users.

Renewable energy certificate (REC). A renewable energy certificate (REC), also known as a green tag or tradable renewable certificate, represents the environmental, social, and other positive attributes of power generated by renewable resources. For example, RECs may represent the emissions avoided by renewable power generation compared with those of conventional sources. RECs can be purchased separately from electricity service.

Renewable energy resources. Renewable energy sources, such as wind, solar, geothermal, hydropower, and various forms of biomass, are continuously replenished on the earth. Some definitions also include municipal solid waste as a renewable resource.

APPENDIX B: SUPPORTING DOCUMENTS

- The Maine Energy Handbook – A Resource for Municipalities on Energy Efficiency and Sustainable Energy, September 2010 (GPCOG, EMPOWERME, Cool Air, Clean Planet)
- Economic Vitality for the Villages of Kennebunk, February 2011 (Maine Downtown Center)
- Energy Efficiency Coordinator Advertisement
- Two Renewable Energy Success Stories, The Maine Community Exchange
- Charting Maine’s Future, Brookings Institution Metropolitan Policy Program