

Town of Candia Master Plan Energy Chapter



Candia, New Hampshire
Tower Hill Pond

Prepared by Southern New Hampshire Planning Commission
and the Town of Candia Energy Advisory Committee

Adopted by Candia Planning Board on March 21, 2012

This Energy Chapter has been prepared by SNHPC with the assistance of the Town of Candia's Energy Advisory Committee and was adopted by the Candia Planning Board on March 21, 2012 as a chapter in the Town's Master Plan

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APPENDIX

1. Introduction

1.1. Purpose

Energy efficiency has become a key issue to communities, as energy costs continue to increase and concern grows over the environmental and health costs of major forms of energy production. The purpose of this chapter is to provide guidance and tools and to identify strategies, policies and actions, as well as a vision for achieving energy efficiency and conservation in the Town of Candia. Promoting and incorporating energy efficient measures in town buildings, activities and ordinances has many benefits to the town, including reducing operating costs and cutting carbon emissions.



1.2. Energy Conservation Related to Sustainability

Energy conservation is the efficient use of energy or the reduction of energy use by implementing energy efficient practices, policies, technologies, construction, development or any other action aimed at reducing energy use.

The 1970 National Environmental Policy Act (NEPA) formally established as a national goal the creation and maintenance of conditions under which humans and nature “can exist in productive harmony, and fulfill the social, economic and other requirements of *present and future generations of Americans*”, and this has become an accepted definition of sustainability.

Energy efficiency serves many purposes which include:

- Reducing costs
- Reducing health impacts from pollutants and negative environmental impacts
- Reducing environmental pollutants
- Reducing negative environmental impacts
- Reducing carbon emissions
- Increasing quality of life by reducing environmental, health and economic impacts of conventional means of energy production

1.3. Candia Energy Goals and Objectives

Overall Goals Set Forth by the NH Climate Action Plan:

- Reduce greenhouse gas emissions from buildings, electric generation and transportation.

- Protect natural resources to maintain the amount of carbon sequestered.¹
- Support regional and national initiatives to reduce greenhouse gases, such as New Hampshire's goal to reduce greenhouse gas emissions 25% by 2025.
- Develop and integrate education, outreach and workforce training programs and adapt to existing and potential climate change impacts.

Town of Candia Energy Chapter Goals

- Reduce overall energy use and greenhouse gas emissions throughout the community through increased public awareness.
- Monitor existing energy use of public buildings/facilities and produce an Annual Energy Use Reduction Progress Report for Board of Selectmen and SAU.
- Encourage community participation in the formulation of Candia's energy policies.
- Consider setting targets for reducing energy use in public buildings over the next five and ten years.
- Promote public and private (nonresidential/residential) participation in programs to reduce energy costs, such as MyEnergy.net.
- Plan for energy efficient growth and development patterns within the community (promoting Smart Growth and Energy Sustainability practices).
- Encourage business owners and residents to install "energy star" appliances and renewable solar, wind and wood energy efficient heating systems.
- Consider offering property tax exemptions as provided by RSA 72:61-72 for the installation of eligible renewable energy systems.
- Develop small scale wind turbine regulations in town's zoning ordinance.

2. Selected State Statutes/Plans/Programs Related to Energy

There are a number of state statutes outline related to energy and the environment. Pertinent statutes include the following:

RSA 672:1 III. provides regulations to enhance the public health, safety and general welfare and encourage the appropriate and wise use of land. **RSA 672:1 III-a.** provides regulations to encourage energy efficient patterns of development, the use of solar energy, including adequate access to direct sunlight for solar energy uses, and the use of other renewable forms of energy and energy conservation. As a result, zoning ordinances should not unreasonably limit installation of solar, wind, or other renewable energy systems or the building of structures that facilitate the collection of renewable energy, except necessary to protect the public health, safety, and welfare.

¹ Sequestered carbon refers to carbon not actively circulating in the earth's atmosphere. Carbon may be sequestered in soil, rock, water, plants, or animals. Because sequestered carbon is released through the burning of fossil fuels, energy efficiency measures can help to maintain a proper carbon balance

RSA 674:2 provides that the municipal master plan shall include, at a minimum, the following required sections: **(n)** an energy section, which includes an analysis of energy and fuel resources, needs, scarcities, costs, and problems affecting the municipality and a statement of policy on the conservation of energy.

RSA 38-D Ch. 275 (effective September 27, 2009) enables municipalities to appoint an energy commission by either the local legislative or the local governing body of between 3 to 10 members with staggered three year terms. The purpose of an energy commission is "...for the study, planning, and utilization of energy resources for municipal buildings and built resources or such city or town", to research municipal energy use, and recommend to local boards pertaining to municipal energy plans and sustainable practices, such as energy conservation, energy efficiency, energy generation, and zoning practices.

RSA 155-A:2(VI) allows municipalities to consider adopting stricter measures than the New Hampshire State Building Code. Currently all new construction, renovations and additions must meet the requirements of the New Hampshire State Building Code (<http://www.nh.gov/safety/boardsandcommissions/bldgcode/>). Effective April 1, 2010, the State Building Code Review Board also adopted the 2009 International Energy Conservation Code (IECC) with amendments. The IECC sets requirements for the "effective use of energy" in all buildings. Certain buildings that use very low energy use (such as buildings with no heating or cooling) are exempt. The IECC has two separate categories of buildings: residential and commercial. The code requirements are almost entirely different for these buildings. Construction requirements related to energy efficiency are set forth for space heating; space cooling (air conditioning), water heating and lighting. Most of the requirements in the IECC are for building envelope (ceilings, walls, windows, floor/foundation). Most of New Hampshire, including Town of Candia is found in Zone 6 which requires R-49 ceilings; U-0.35 windows; R-20 walls; R-30 floors; and R-15 foundations in residential buildings.

RSA 72:61-72 permits municipalities to offer property tax exemptions on the installation of certain renewable solar, wind and wood heating energy systems. These systems include solar hot water, solar photovoltaic, wind turbine or central wood heating systems (not stovetop or woodstoves). The goal of the exemption is to create a tax neutral policy within the municipality that neither increases an individual's property tax, nor decreases the municipality's property tax revenues. By implementing this tax exemption as a tax neutral policy, homeowners do not have a disincentive of higher property taxes for installing a renewable energy system, and since there is no net reduction in municipal tax revenues, other taxpayers in the municipality are not affected.

HB 585 now signed into law does four things that may be of interest to town planners and municipal boards: (1) requires all new and replacement outdoor lighting (including roadway lighting) installed with state funds to be fully shielded, "dark sky friendly" and not to exceed minimum lighting levels recommended by standards organization IESNA (Illuminating Engineering Society of North American) unless it can be shown that

compliance would increase installation costs or compromise safety; (2) requires utilities to provide fully shielded dark-sky compliant streetlight fixtures to NH municipalities as the default model, although local governments can choose other designs if they wish; (3) tells Public Utilities Commission to set a “midnight service” rate for streetlighting that allows utilities to install inexpensive timers on non-essential lights selected by the municipalities, to turn them off at midnight, thereby cutting energy consumption by half; and (4) establishes a statewide policy on protecting New Hampshire dark skies as a cultural asset important to rural character and the tourism industry.

HB 1554 now signed into law enables municipalities to create Property Assessed Clean Energy (PACE) Districts. Through PACE programs, residents and business owners are able to finance energy efficiency and renewable energy improvements through an additional assessment on their property tax bills or other municipal bills. On July 6, 2010, the Federal Housing and Finance Authority (FHFA), the body which regulates home mortgage lending, issued guidance cautioning Fannie Mae and Freddie Mac about purchasing mortgages on properties with PACE financing attached to a priority lien position. PACE programs for commercial sector and in subordinate lien positions remain unaffected by this guidance. Therefore, the State Office of Energy Planning is recommending that as PACE continues to evolve, municipalities should be cautious in moving forward with PACE programs for the residential sector in priority lien positions.

2.1. New Hampshire Climate Action Plan

The 2009 NH Climate Action Plan was developed by the state-authorized, bipartisan Climate Change Policy Task Force composed of representatives from all sectors of New Hampshire. It aims at achieving the greatest feasible reductions in greenhouse gas emissions while also providing the greatest possible long-term economic benefits to the citizens of New Hampshire. The Task Force concluded the most significant reductions in both emissions and costs will come from substantially increasing energy efficiency in all sections of the economy; continuing to increase sources of renewable energy; and designing our communities to reduce reliance on automobiles for transportation. The Climate Action Plan recommends that New Hampshire strive to achieve long-term reductions in greenhouse gas emissions of 80 percent below 1990 levels by 2050. The Climate Change Policy Task Force also recommends 67 specific actions to achieve the following goals:

- Reduce greenhouse gas emissions from buildings, electric generation, and transportation;
- Protect natural resources to maintain the amount of carbon sequestered;
- Support regional and national initiatives to reduce greenhouse gases;
- Develop an integrated education, outreach and workforce training program; and
- Adapt to existing and potential climate change impacts.

It is envisioned that with participation from all communities, the NH Climate Action Plan will benefit the economy, increase state and regional energy security, and improve environmental quality. In order to meet the recommended goal of reductions in greenhouse

gas emissions statewide, it states that NH communities must engage in local energy planning that includes strategies for decreasing their overall emissions.

2.2 Energy Project Connector

The New England Carbon Challenge, a joint initiative of the University of New Hampshire and Clean Air-Cool Planet, is a new comprehensive web tool – the Energy Project Connector. This web tool, developed in partnership with NH Sustainable Energy Association (NHSEA) and UNH Cooperative Extension makes starting a home energy project easier. You can find the tool here at: <http://myenergy.net/>



This web tool searches all the federal, state and utility incentives available to New Hampshire residents for a home energy job and then provides a list of all the contractors and energy auditors who can do that work in a given area. The reported information is specific to each user based on where they live and what kind of project they are interested in pursuing. This tool compresses hours of web research and investigation into a relatively simple 15 minute exercise.

3. Existing Conditions

3.1. State Energy Supply and Consumption

New Hampshire citizens, businesses, and industries spent over \$6 billion on energy in 2008².

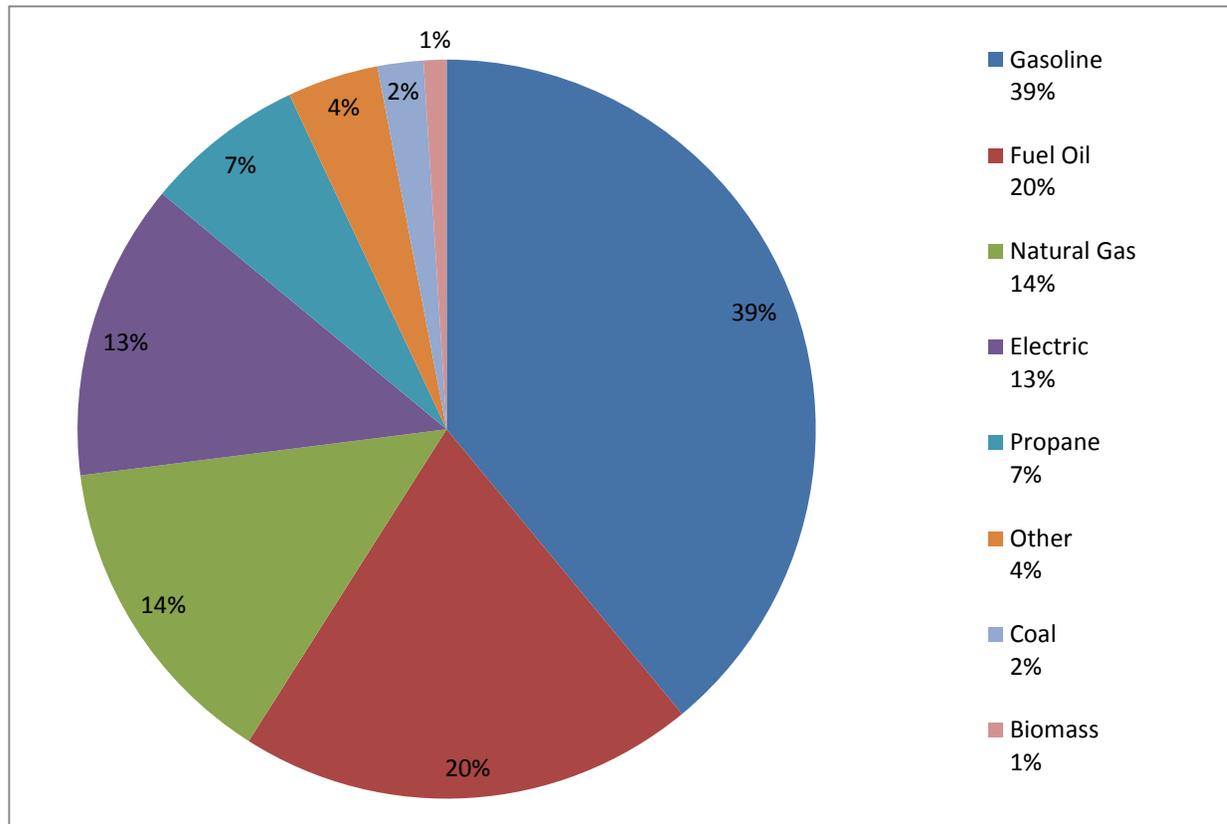


Figure 1.1³

Of this money, more than 2/3 of it left the state immediately, much of it to pay for fossil fuels and nuclear fuels imported from overseas.⁴ This outflow of dollars represents nearly 7% of New Hampshire's GDP and has been identified as a major drain on the economy. Investments in more efficient energy use could cost up to \$2 billion. However, savings would offset the investments in less than four years. According to a 2009 study, if all state households achieved the highest level of energy efficiency, residents would save \$309 million per year.⁵ Commercial and industrial buildings would save \$220 million per year.⁶

² New Hampshire Office of Energy and Planning

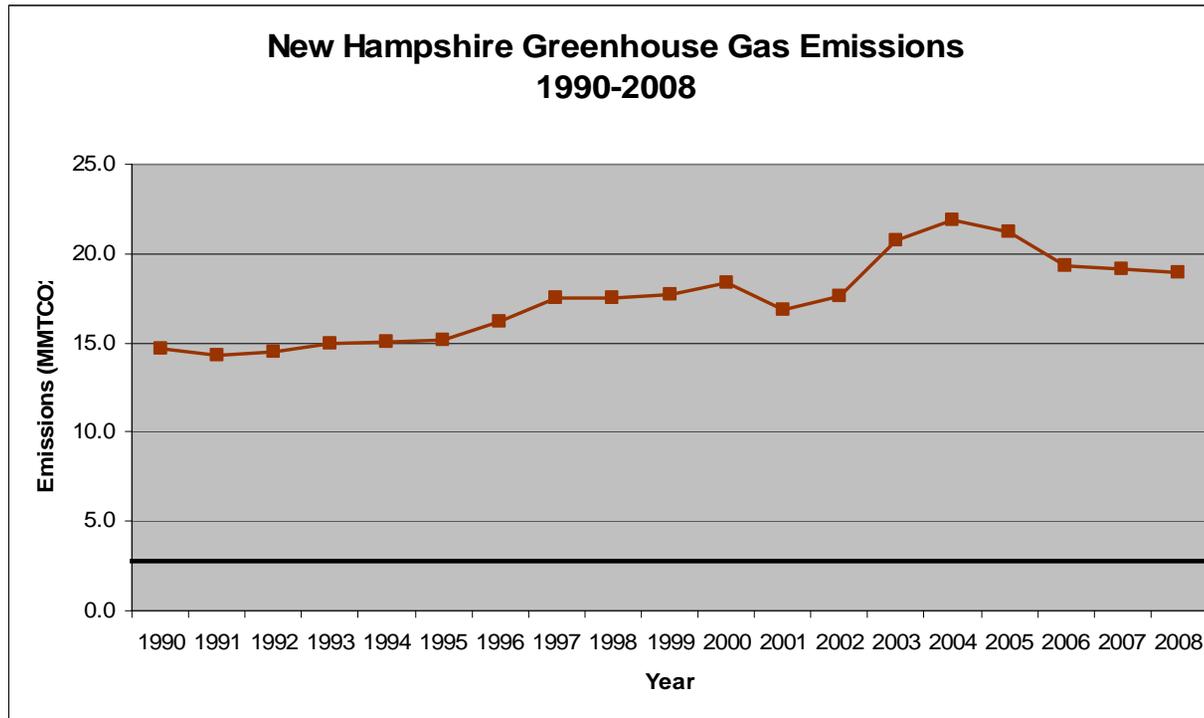
³ Energy Information Administration, State Energy Data System 2008, "Table S1b Energy Expenditure Estimates by Source, 2008," http://www.eia.gov/emeu/states/hf.jsp?incfile=sep_sum/plain_html/sum_ex_tot.html.

⁴ New Hampshire Office of Energy and Planning, "2007 New Hampshire Energy Facts," <http://www.nh.gov/oep/programs/energy/nhenergyfacts/2007/introduction.htm>.

⁵ This represents energy savings of around 20%, as defined as cost-effective in the study *Additional Opportunities for Energy Efficiency in New Hampshire*, Final Report to the New Hampshire Public Utilities Commission, GDS Associates, Inc., 2009

⁶ Independent Study of Energy Policy Issues. Vermont Energy Investment Corporation, Jeffrey Taylor and Associates, Optimal Energy Inc. June 30, 2011

Figure 1.2

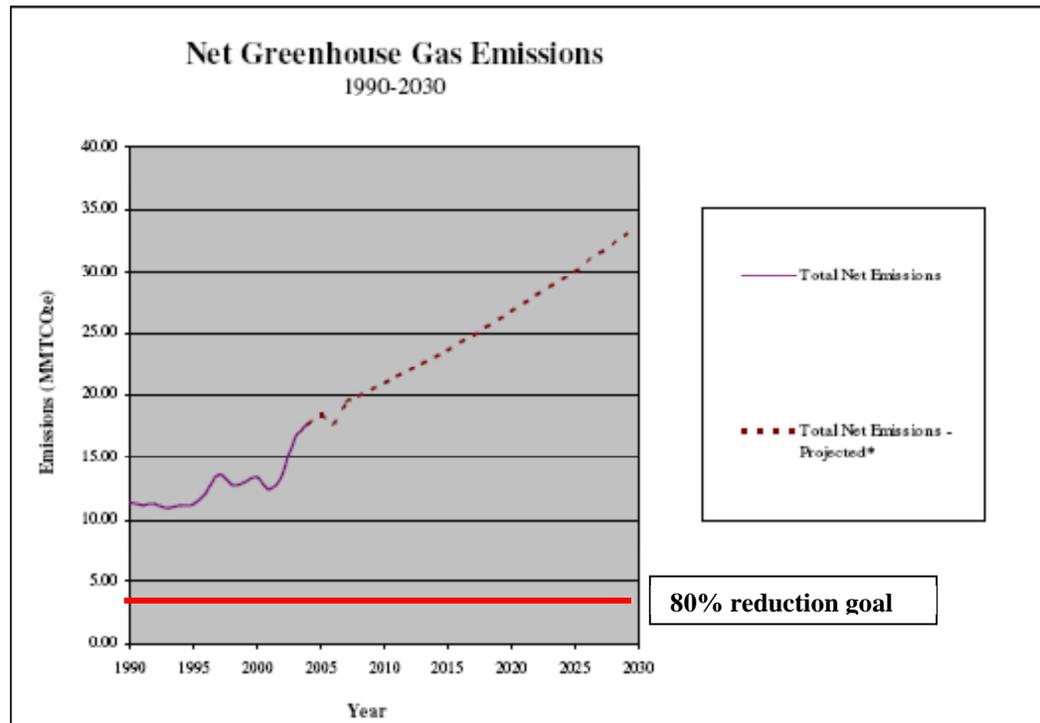


Source: U.S. Energy Information Administration. http://www.eia.gov/oiaf/1605/ggrpt/excel/tbl_statetotal.xls. Retrieved 2011-09-14.

Figure 1.2 shows the net greenhouse gas emissions from 1990-2008 in New Hampshire. The New Hampshire Climate Action Plan recommends that New Hampshire strive to achieve long-term reductions in greenhouse gas emissions of 80 percent below 1990 levels by 2050. As the graph shows, emissions went up approximately 28% from 1990-2008. The New Hampshire Greenhouse Gas Emissions Reduction Fund (GHGERF) started in 2009. In the first year emissions were reduced by 4,600 metric tons from the projects that were implemented. Details on reductions made in the first year (July 2009 – June 2010) can be found in the Year 1 Evaluation published by Carbons Solutions New England, University of New Hampshire.⁷

⁷ Carbon Solutions New England, University of New Hampshire. *The New Hampshire Greenhouse Gas Emissions Reduction Fund Year 1 (July 2009–June 2010) Evaluation*. 2011.

Figure 1.3



Source: NHDES, EIA. *New Hampshire Greenhouse Gas Emissions Inventory and Projections*, 2008.

Figure 1.3 shows net greenhouse gas emissions in New Hampshire from 1990-2004 and projections through 2030 for a “business as usual” scenario with no major changes from current trends. Projections are considered to be mid-range estimates and do not account for impact of economic recession, expansion of renewable or clean energy sources, potential shift to fuels with higher lifecycle emissions, loss of forests, or impacts of climate change on heating and cooling loads. Emissions for New Hampshire in 1990 were 14.7 million metric tons of carbon dioxide. To achieve the 80 percent reduction, levels will have to fall to 2.94 million metric tons by 2050.

3.2. Candia Energy Inventories/Audits

Candia participated in the Energy Technical Assistance and Planning (ETAP) Program during 2010-2011, administered by the New Hampshire Office of Energy and Planning. In June of 2011, the town received an initial high level energy assessment of the Old Smyth Library Building and the Fire Station Building as part of this program to address the town’s interests and needs with respect to energy efficiency improvements and capital upgrades.⁸ On January 6 of 2012, a second report was released detailing the energy costs of both the Town Hall and the town recycling center.⁹ Table 1 shows the annual utility use and energy density for both of these buildings based on data collected from 2009-2011.

Table 1: Annual Utility Cost and Energy Cost Intensity

FACILITY	Square Feet	Electric Cost (\$)	Oil Cost (\$)	Propane Cost (\$)	Total Cost (\$)	Cost (\$) Per Square Foot
Old Smyth Library	1,320	569	1,271	-	1,840	1.39
Fire Station	5,878	3,297	-	3,709	7,006	1.19
Town Hall	5,441	9,403	-	5,911	15,314	2.81
Recycling Center	6,000	8,485	-	-	8,485	1.41

Currently, Candia Town Hall is the least energy efficient building among the four measured, with a cost per square foot nearly double that of any other building in the survey. The fire station is the most energy efficient, with a cost of only \$1.19 per square foot.

Note: Thousand Btu per square foot of gross floor area, reported separately for oil, electricity, and total. ENERGYSTAR reports that total values can range from 30 kBtu/Sf to 340 kBtu/SF.

⁸ Peregrine Energy Group. *Energy Efficiency Opportunities for Town Facilities in Candia, New Hampshire*. June 9, 2011.

⁹ Peregrine Energy Group. *Energy Efficiency Opportunities for Town Hall and Recycling Center: Candia, New Hampshire*. January 6, 2012.

Building Recommendations

The June 9, 2011 energy assessment report offers a number of energy reduction and savings opportunities for the Old Smyth Library and the fire station. These recommendations are summarized in tables 2 and 3. In the January 6, 2012 report, a second set of recommendations was released for the town hall and the recycling center, and are summarized in tables 4 and 5. For the town hall assessment, the installation costs of each suggested improvement was listed, along with an estimated payback period. Further details on these recommendations can be found in the attached “Energy Efficiency Opportunities for Town Facilities in Candia, New Hampshire,” dated June 9, 2011 (tables 2 and 3), as well as “Energy Efficiency Opportunities for Town Hall and Recycling Center: Candia, New Hampshire,” dated January 6, 2012 (tables 4 and 5).

Table 2: Summary of Recommendations for the Old Smyth Library

Building	Recommendation	Funding Source	Action to be done/ Responsible Party
Old Smyth Library	Replace furnace	O/M	Contract with professional
Old Smyth Library	Increase attic insulation	O/M	Contract with professional
Old Smyth Library	Replace windows upstairs for increased insulation	O/M	Contract with professional
Old Smyth Library	Electrical upgrades and new appliances	O/M	Contract with professional
Old Smyth Library	Research domestic hot water options	O/M	Internal Staff
Old Smyth Library	Turn off and winterize the building if not in use	O/M	Internal Staff

Table 3: Summary of Recommendations for the Candia Fire Station

	Fire Station	Install “vendor miser” on large soda machine and remove <u>lightbulbs</u> in front	O/M	Contract with professional
	Fire Station	Investigate exhaust vent damper for fan in garage bay	O/M	Internal Staff
	Fire Station	Install airtight, insulated cover over attic fan in winter	O/M	Contract with professional

Table 4: Summary of Recommendations for the Town Hall

	Description	Approximate Installed Cost (\$)	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings		Annual Cost Avoidance (\$)	Simple Payback Yr
					Electric kWh/yr	Propane Gallons/ yr		
1	Install energy efficient lighting	\$3,440	\$520	B	2,312		\$336	9
2	Insulate pipes	\$1,000		A		47	\$118	9
3	Insulate basement walls	\$3,500		A	400	118	\$354	10
	Estimated Program	\$7,940	\$520	A,B	2,712	166	\$808	9.2

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

(2) A - Better Comfort; B - Improved Reliability; C - Reduced Maintenance; D - Enhanced Appearance

Current Utility Budget: \$15,314 /yr
Percent Reduction: 5%

Table 5: Summary of Recommendations for the Recycling Center

	Recycling Center	Review winter electricity consumption to confirm the source for the winter-related electricity consumption. If it is just from heating then further investigation would be warranted to identify opportunities to reduce the office heating load	O/M	Internal Staff
	Recycling Center	Review the operation of the bailer and other equipment with large horsepower motors	O/M	Internal Staff
	Recycling Center	Include the Recycling Center as a potential site for future renewable energy investments or initiatives. Long term, the center is well oriented for solar preheat for make-up air ventilation, windows or light tubes for day lighting, and solar photovoltaic panels to reduce facilities electric load.	O/M	Contract with Professional

Current Energy Efficiency Building Initiatives: After reviewing and discussing the results of the above building assessment reports and recommendations with Peregrine Consultants on January 20, 2012., the Candia Energy Advisory Committee recommended that the Board of Selectmen (BOS) consider taking the following action steps and measures:

Town Office Building:

- BOS to discuss/determine participating in the PSNH Lighting Program;
- BOS to monitor use of dehumidifier in basement and consider purchasing gauges to regulate use;
- BOS to monitor use of window air conditioners in summer months;
- BOS to consider utilizing high school or boy scouts to install foam insulation/pipe insulation in basement

Recycling Center:

- BOS to review winter electricity consumption and discuss with staff turning off bailer and other large electric equipment when not in operation
- In future, BOS to consider long term potential solar energy investments as the building has good solar orientation.

Old Smyth Library:

- Building is now closed and hot air furnace turned off to save oil. BOS to consider installing new thermostat.
- Heritage Commission is currently applying for grant for installing ADA accessibility improvements.

Fire Station:

- No actions necessary at this time.
- In future, BOS should consider long term potential solar energy investments as the building has good solar orientation.

3.3. Renewable Energy

Renewable energy flows involve natural phenomena such as sunlight, wind, tides, plant growth, and geothermal heat, as the International Energy Agency explains:¹⁰

“Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition are electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, biofuels and hydrogen derived from renewable resources.”

Renewable energy is an important consideration in energy planning. While energy demand cannot be eliminated completely, renewable energy can be a valuable complement to energy efficiency and conservation. The New Hampshire Office of Energy and Planning estimates that, on average, at least 85% of our heating energy in New Hampshire comes from imported sources. One of the best opportunities to increase the use of renewable and local energy sources is through residential renewable energy projects. These renewable energy options could also be implemented for larger uses and structures over time.

State law, RSA 72: 61-72 grants municipalities the option to exempt certain renewable energy installations from property taxation. Incentives such as this encourage people to explore different options for home heating and energy, leading to an improvement in the region’s economic vitality and energy sustainability. The Town of Candia should consider this program as well as developing regulations and incentives for small scale wind turbines.

In addition, the Town of Candia has several public buildings within the “Four Corners” area which have excellent solar orientation, including the Fire Station and school. As part of the development of a future village plan for this area, the Town of Candia should consider working with the school system and the library to consider the installation of solar roof systems to provide electricity to these buildings. In addition, the Town of Candia should also consider and reserve land at the town recycling center for the installation of a future solar collection system to provide renewable and less expensive electricity to operate the facility.

3.4. Transportation

Transportation is an activity that consumes a great deal of fossil fuel. As communities grow and physically spread out, vehicle miles traveled per household and the associated energy demand have increased to support a more auto-dependent lifestyle. This practice is energy and resource inefficient and promotes unsustainable future transportation, land and energy use trends. Strategies for reducing vehicle miles

¹⁰ IEA Renewable Energy Working Party (2002). *Renewable Energy. into the mainstream*, p. 9.

traveled and reliance on automobiles can help to create a more sustainable, energy efficient transportation network. These strategies can also create transportation systems that better serve more people while fostering economic vitality for both businesses and communities. Strategies include providing multiple routes and multiple types of transportation, providing access to public transportation, implementing complete streets design standards and planning more mixed-use and compact development where appropriate.

Complete streets (sometimes livable streets) are roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users, including pedestrians, bicyclists, motorists and public transport users of all ages and abilities.¹¹

Major streets with moderate to high volumes of traffic should be transformed into “complete streets.” According to the American Planning Association, complete streets allow free and uninterrupted transportation for pedestrians, bikers, and public transit vehicles.¹²



As shown above, some features of complete streets include bike lanes, bike trails, sidewalks, street-scaping, curb extensions, mid-block crossings, and bus or trolley stops

¹¹ Ritter, John (2007-07-29). *Complete streets' program gives more room for pedestrians, cyclists.* [USA Today](http://www.usatoday.com/news/nation/2007-07-29-complete-streets_N.htm). Retrieved 2011-09-07.

¹² “Complete Streets,” *American Planning Association*. <http://www.planning.org/research/streets/index.htm>. Retrieved 2011-12-21

The June 2011 Technical Memo, *Toward a More Walkable and Livable Manchester*, by the Walkable and Livable Communities Institute suggests:

“Traffic calming and traffic management techniques should be used. On-street parking can be striped, and curb extensions, tree wells and medians can be added. Such improvements not only bring down speeds, they improve town centers and connect streets by reducing noise and perceived danger.

Most principal streets should have lanes narrower than today, especially when combined with bike lanes. Bike lanes add a buffer to parking and sidewalks.

Sidewalk construction and maintenance is generally a priority, especially within a quarter-mile or half-mile of town centers and schools.

Ramps should comply with the Americans with Disabilities Act and “universal design” standards.”¹³

Complete streets options for Candia might include bike lanes, traffic calming and traffic management techniques, narrowing streets with striping techniques, crossing islands or raised intersections and making linkages and connections between walking trails and destinations in town. These types of improvements can be considered as Capital Improvement Program projects or be considered for funding through the NH DOT pedestrian/bicycle enhancement program or the “Safe Routes to School” program.

3.5. Land Use

The way communities are designed, planned, and built has significant influence over the amount of energy used, how energy is distributed, and the types of energy sources that will be needed in the future. Energy efficiency can be incorporated into land use planning by adopting mixed-used zoning, which would allow greater accessibility to desired services without requiring greater mobility. This can be achieved by promoting Traditional Neighborhood Developments, Village Plan Alternatives (VPA) and conservation subdivisions that promote a mix of uses in larger new developments. Other ways to promote energy efficiency and conservation in land use planning include:

- Initiating impact fees that require developers to pay for the increased demands on infrastructure they generate.
- Encouraging alternative forms of transportation in the planning and design of the community.
- Encouraging energy efficient development through subdivision and site plan review regulations, zoning ordinance and building codes. Site design techniques

¹³ Walkable and Livable Communities Institute. “Toward a More Walkable and Livable Manchester Technical Memorandum.” June 2011.

that take advantage of sun exposure, differences in microclimate, and landscaping reduce a development's demand for fossil fuel derived energy sources and reduce overall energy consumption.¹⁴

3.6. Building Codes

Building codes can be used to promote sustainable, energy-efficient construction in the built environment. Programs like the U.S. Department of Energy's Building Energy Codes Program (BECP) and certifications such as Leadership in Energy & Environmental Design (LEED) offer guidelines and metrics that can be used to increase a building's energy performance and result in greater energy efficiency and ultimately cost savings.

Current building codes represent the minimum legal energy efficiency for structures. These standards focus on the building envelope and mechanical systems and disregard natural and renewable means of reducing a building's environmental impacts. By applying passive solar design in conjunction with building codes, energy utility bills can be decreased by 30 percent. Add to that "well insulated and tightly constructed building shells" and the savings can reach 75 percent.¹⁵

RSA 155-A: 2 VI allows municipalities to adopt more stringent building codes than the state codes. For examples of more stringent standards that a community may adopt to achieve desired energy savings see the Innovative Land Use Planning Techniques Handbook.¹⁶

4. Planning Roles

More often than not, energy initiatives cut across jurisdictional and political boundaries, requiring the cooperation and coordination of many different actors. Thus, for towns such as Candia, it is essential to understand the various interests involved, as well as the many opportunities available, at the both the state and local levels.

4.1. State-Level Energy Agencies

- **NH Office of Energy and Planning:** NHOEP is a cabinet-level division of the New Hampshire Executive Branch and reports directly to the Governor. It is charged with overseeing and carrying out a wide array of energy-related activities, including but not limited to the following:
 - Coordination of programs funded by the 2009 American Recovery and Reinvestment Act (ARRA), popularly known as the "Stimulus";
 - Statewide administration of the Fuel Assistance Program;

¹⁴ Model ordinance language can be found in *Innovative Land Use Planning Techniques*. October 2008.

¹⁵ Urban Land Institute, 2000

¹⁶ NHDES. *Innovative Land Use Planning Techniques, A Handbook for Sustainable Development*. October 2008.

- Management of the State's "25 by '25 Program," which seeks to ensure that at least 25% of NH energy comes from renewable sources by 2025; and
- Administration of the State's Weatherization Program.

- **NH Public Utilities Commission (PUC):** A watchdog agency also affiliated with the Executive Branch, whose job is to make sure that customers of regulated utilities receive safe, adequate and reliable service at just and reasonable rates. Some of the responsibilities of the PUC include:
 - Monitoring and inspecting gas utilities for safety and proper construction;
 - Acting as a mediator in disputes between customers and regulated utility companies; and
 - Initiating public hearings, audits of public utilities, and other forms of inquiry and investigation.

- **Office of Consumer Advocate (OCA):** An independent state agency administratively attached to the PUC. However, while the PUC is charged with balancing the interests of ratepayers and utility shareholders, the role of OCA is to advocate exclusively for residential ratepayers

- **Energy Efficiency and Sustainable Energy Board (EESE):** The EESE is a relatively new agency, created in 2008 to help promote and coordinate programs relating to energy efficiency, demand response, and sustainable energy in NH
 - Investigates potential sources of funding for energy efficiency and sustainable energy development;
 - Works with local communities, non-profits, and civic engagement groups to increase statewide knowledge about energy efficiency; and
 - Provides recommendations to the PUC about how to spend energy efficiency and renewable energy funds.

4.2. State-Administered Energy Programs and Funding Mechanisms:

- **ARRA (Stimulus) Grants:** Between 2009 and 2012, stimulus grants provided \$72 million towards NH energy efficiency projects.
- **State Energy Efficient Appliance Rebate Program (SEEARP):** Offers residential consumers rebates for the replacement of existing hot water heaters, boilers and furnaces to more energy efficient models;
- **Enterprise Energy Fund (EEF):** A low-interest loan and grant program to help finance energy improvements in buildings owned or leased by businesses and nonprofits of all sizes;
- **State Weatherization Program:** Provides insulation and heating efficiency improvements, carried out by public utility companies and NHOEP;
- **RGGI:** The Regional Greenhouse Gas Initiative is a cap and trade program aimed at reducing carbon dioxide emissions across ten participating states in the

northeast. It uses sales of emissions permits to fund a wide variety of state-wide energy programs;

- **Low Income Home Energy Assistance Program (LIHEAP):** Offers home-heating assistance to qualifying low-income NH residents;
- **Pay For Performance Program:** Helps business owners improve energy efficiency in large commercial and industrial buildings;
- **Retail Merchant's Association of NH (RMANH) Energy Program:** Offers detailed energy efficiency audits along with free energy-awareness seminars and printed materials to RMANH members;
- **NH Community Loan Fund:** Has provided deep energy efficiency retrofits in approximately 425 manufactured homes located in a score of resident-owned communities throughout the state;
- **New England Carbon Challenge:** A joint initiative of the University of New Hampshire and Clean Air - Cool Planet which works to educate, inspire and support sustained reductions in residential energy consumption;
- **Systems Benefits Charge (SBC):** The SBC is a tax on all public utilities, a portion of which is used to fund energy efficiency projects;
- **CORE Energy Star Program:** Helps homes and businesses reach the Energy Star standards adopted by the federal government. So far, approximately 4% of NH households have participated in this program with the help of their public utilities provider;
- **Electric Assistance Program (EAP):** Provides low-income residents with assistance on their electric bill; and
- **Property Assessed Clean Energy (PACE):** On May 12, 2010 the NH Senate passed HB 1554, AKA the "PACE Bill." PACE is an acronym for Property Assessed Clean Energy—its final passage will enable municipalities to establish revolving loan funds to finance energy efficiency and renewable energy projects for both residential and commercial properties. HB 1554 will provide an important tool for financing energy efficiency improvements in existing homes and businesses in a manner that is consistent with the local control ethic of New Hampshire government. It will enable the State's municipalities to provide access to bond-based or other capital for the residents' and businesses' clean energy projects. Eligible projects include weatherization and a variety of innovative renewable energy projects. Financing for these improvements will be achieved through mechanisms that provide for a positive cash flow for the property owner, based on demonstrable energy efficiency savings. (The arrangement authorized by the bill is similar to special assessment or betterment district mechanisms used to finance street upgrades, utility line burial or other improvements benefitting certain properties, except that participation by property owners in energy efficiency and clean energy districts would be purely voluntary).

4.3. Energy and Sustainability Boards/Committees in Candia

The primary boards and committees in Candia which are currently responsible for energy related planning and decisions include the Board of Selectmen, the Budget Committee, the Planning Board, and the Conservation Commission. The BOS and Budget Committee are largely responsible for decisions related to energy improvements and capital projects, costs, and efficiencies. The Planning Board and Conservation Commission are traditionally focused on seeking energy efficiency and energy conservation in the review of development proposals and community-wide planning.

4.4. Current Candia Energy Initiatives

Presently, the most important energy initiative in Candia is energy saving improvements to the Town Office building and in the future, finding ways to reduce energy costs in the operation of the Recycling Center. The town's recycling program is another important energy initiative that provides for significant reductions in waste disposal costs for the town. The facility operations are currently a high energy use and thus important to monitor and seek greater efficiencies.

5. Issues and Concerns

Over the past several years, the Town of Candia has made important progress in the areas of energy efficiency and sustainability. However, as the town enters the second decade of the 21st Century, there are still many challenges to overcome.

5.1. Challenges

Some examples of energy-related challenges faced by New Hampshire and the Town of Candia include:

- 1.) **Volatile Fuel Prices:** The price of oil has increased by more than 400% since 1998, and in New Hampshire, the cost of home heating oil rose 30% between 2010 and 2011.¹⁷
- 2.) **Commuter-driven Patterns of Development:** In recent decades, development in the United States has been characterized by sprawl: the tendency of communities to fracture into residential and commercial zones, accessible to each other only by automobile.
- 3.) **Lack of adequate Public Transit:** Like many other rural towns, Candia lacks access to major public transit lines such as rail or bus.

¹⁷ New Hampshire Heating Oil Dealers and Price Guide. < <http://www.heatingoilnh.com/lowest-prices.htm>
> Retrieved 2011-10-06

- 4.) **Lack of funding for Energy Efficiency programs:** Between 2009 and 2012, much of NH's energy and sustainability funding came from the ARRA. With stimulus funding scheduled to end by 2012, NH communities will be forced to deal with deep spending cuts in a tough economic climate.
- 5.) **Transactional complexity:** Many energy efficiency and sustainability programs in New Hampshire are complex and difficult for the general public to understand. For instance, one recent survey showed that more than 40% of NH residents had little to no idea about where to go for sustainable energy loans, rebates, or grants.¹⁸
- 6.) **Lack of Start-up Capital:** Although cost-effective in the long run, many energy efficiency projects require significant up-front costs that businesses and individuals cannot afford.
- 7.) **Lack of residential interest and education:** Depending on the project, energy efficiency projects can seem daunting and complex. Lack of residential interest and education can present a challenge when trying to make positive changes in a community towards energy efficiency and sustainability.

6. New Opportunities for Energy Efficiency

It is widely acknowledged that current patterns of growth, development, and consumption cannot be maintained indefinitely. Fortunately, as the costs of energy grow more prohibitive, many actors are turning to new, more sustainable methods of energy use. These new methods can be direct, such as implementing plans for renewable energy, or indirect, such as increasing citizen awareness about the importance of sustainability.

6.1. Opportunities in Renewable Energy

Solar

New Hampshire has an average solar energy density of 4.0-4.5 kWh/m²/day¹⁹, enough to drive significant amounts of energy on the state's rooftops and fields, as well as through larger distributed systems. Costs have indeed been steadily declining over the past few years, with installed costs for a residential-scale PV system currently averaging below \$6.50/W.²⁰

- **Self-Contained Solar Units** are immune to power outages and offer battery backup for cloudy days. They also are typically easier to maintain than traditionally powered units and reduce ownership costs by eliminating monthly electric bills. Self-contained solar is a good option in places where it may be difficult to run wires or that are especially remote.

¹⁸ *Independent Study of Policy Issues:* Prepared by the Vermont Investment Corporation, June 2011. Appendix A: Page 3.

¹⁹ *Independent Study of Policy Issues:* Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 28

²⁰ See above

- **Solar heating** harnesses the power of the sun to provide heat for hot water, space heating and swimming pools. Solar heating can be either passive, such as simply using large windows to let in more light and warmth, or active, where specially designed mechanical systems increase the heat gained from the sunlight.

Wind

Although only 0.3% of the state's power supply is currently provided by wind, a recent resource assessment by the National Renewable Energy Lab determined that wind could provide up to 60% of the state's current electricity needs.²¹

- Small wind energy systems are turbines which require 1 acre of open land and can lower electricity bills to homes and businesses by 50 to 90 percent.²²
- Smaller, single-unit wind turbines are also less likely than larger units to raise complaints over scenery issues.
- Recent studies suggest that Candia does not have high enough average wind speeds to justify large-scale wind ordinances, although small-scale projects may still be feasible.²³

Hydro-electric

Currently, hydro-electric dams located in New Hampshire produce about six percent of the state's electricity needs. The Northern Pass transmission project, currently in the planning and permitting stages, is designed to deliver up to 1,200 additional megawatts of low-carbon, renewable energy to the state. As one of the most cost-effective and widely available forms of re-usable energy, hydro-electric power is expected to play a big part in NH's future sustainability goals.

LEDs

For most uses, Light Emitting Diodes typically last 20 years, compared to less than a year for incandescent bulbs. In addition to requiring less maintenance, LED bulbs provide up to a 90% reduction in power consumption and have a similarly wide-range of application, from commercial and home use, to street and traffic lighting. The Planning Board should evaluate and consider various planning and other financial incentives to encourage developers to use the new LED-certified lighting systems, as part of the Town's land use regulations.

As an example, in 2009, the City of Manchester partnered with the Department of Energy to install new LED lighting in the TJ Maxx Plaza on S. Willow Street. The new LED lights as shown in the following photo outperformed the old

²¹ *Independent Study of Policy Issues*: Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 31.

²² See above

²³ *Wind Power America*: Prepared by the National Renewable Energy Laboratory, November 2010
<http://www.windpoweringamerica.gov/images/windmaps/nh_80m.jpg>

incandescent lights (right) by 58%, leading to a projected payback period of less than three years.



Biomass

Unlike coal and oil, biomass has the ability to quickly replenish itself, and is thus considered a renewable energy source. In 2008, biomass represented over 6.5% of total New Hampshire electric production and just over 4% of residential and commercial & industrial energy consumption.²⁴

- Biomass typically takes the form of unused wood chips, stumps, roots, and discarded crop matter, and thus would not negatively affect the lumber or farming industries.
- It is estimated that biomass will have a particularly large impact in rural communities with easy access to wood and crop materials. Already, more than 10% of rural NH residents use wood as their primary heating source.²⁵
- In a recent study, the Northeast Biomass Thermal Energy Working Group developed a vision for heating the Northeast, which estimated that 19 million tons of forest and crop biomass will be available by 2025 to fuel the region.²⁶

6.2. Other Energy-Efficiency and Sustainability Opportunities

Direct (e.g. new programs and/or shovel-ready projects)

- New or modified Building Codes
- More mixed-use/Village districts
- Walk-able and Bike-able Streets (Complete Streets)

²⁴ *Independent Study of Policy Issues*: Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 36.

²⁵ *Independent Study of Policy Issues*: Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 36.

Independent Study of Policy Issues: Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 38

Indirect (e.g. civic education and/or community awareness efforts)

- Provision of free sustainability workshops and seminars
- Encouragement of carpooling and alternative transportation methods
- Festivals or parades with a sustainability focus
- Increased cooperation and collaboration between public and private sectors

6.3. Grant Opportunities

New England Grassroots Environmental Fund: NEGEF is a 501c3 public charity that offers funding to “grassroots organizations” working to better the environment at a community level. Grants are available for a wide range of projects, from energy efficiency measures to conservation projects and citizen awareness. NEGEF limits its funding to small institutions with an annual operating budget of no more than \$100,000 and no more than 2 paid, full-time staff.

USDA Energy Efficiency Grants: The US Department of Agriculture offers a number of grant opportunities for communities under its “Rural Development Energy Program.”

- **The Bio-refinery Assistance Program** provides loan guarantees for the development, construction, and retrofitting of commercial-scale bio-refineries
- **The Repowering Assistance Program** provides payments to eligible bio-refineries to replace fossil fuels used to produce heat or power to operate the bio-refineries with renewable biomass
- **The Advanced Biofuel Payment Program** provides payments to producers to support and expand production of advanced biofuels refined from sources other than corn kernel starch
- **The Rural Energy for America Program** provides assistance to agricultural producers and rural small businesses to complete a variety of projects, including renewable energy systems, energy efficiency improvements, renewable energy development, energy audits, and feasibility studies

RGGI Funding: The Regional Greenhouse Gas Initiative helps individuals, companies, and municipalities in the Northeast and Mid-Atlantic to fund energy efficiency, renewable energy, and job training programs. Grants in New Hampshire are delivered through the Greenhouse Gas Emissions Reduction Fund (GHGERF), which is administered by the NH Public Utilities Commission. These funds support energy efficiency, conservation, and demand response programs in order to reduce greenhouse gas emissions and have already seen revenues in excess of \$24 million.

Community Development Enterprise Energy Fund: This is a low-interest loan and grant program to businesses and non-profit organizations to help finance energy improvements and renewable energy projects in their buildings. Eligible activities include:

- Improvements to buildings' envelope, including air sealing and insulation in walls, attic, and foundations;
- Improvements to HVAC equipment and air exchange;
- Installation of renewable energy systems;
- Improvements to lighting, equipment and other electrical systems; and
- Conducting comprehensive, fuel-blind energy audits.

Clean Air Cool Planet Community Catalyst Fund: Through support from The Overbrook Foundation, grants are available to community based groups and organizations in New England states working to improve local environmental sustainability and energy efficiency. Grants in this program range in size from \$250 to \$2,500.

7. Recommendations

This section contains a list of energy-related actions recommended for the Town of Candia. These recommendations have also been considered by other communities within the region and offer potential for Candia.

Energy Recommendations for the Town of Candia

1. Reduce municipal energy costs by reducing energy consumption.

- a. EAC should prioritize energy efficiency recommendations from ETAP Technical memorandums developed for the building assessments prepared for the public buildings in Candia (completed see page 13).
- b. Assign staff person to track energy use in municipal buildings using the Energy Star's Portfolio Manager (see page 12 of this report) or a similar tracking tool. Also, consider utilizing the school district's suspension program to help staff the data collection effort.
- c. Recommend quarterly reporting on energy use in municipal buildings to the Board of Selectmen.
- d. Recommend that the Board of Selectmen assign a responsible party and that the town utilize the services of the Southern New Hampshire Planning Commission to explore the availability of energy efficiency grants.
- e. Recommend that, as the price of hybrid and electric vehicle decrease, the town examine purchase of these vehicles through CIP funds or grants.

- f. Encourage department heads to consider energy efficiency projects and actions for cost savings as well as coordination on projects between departments which will increase energy efficiency for town facilities.
 - g. Explore long-term solar energy investments at Fire Station, Library, Recycling Center and School buildings.
- 2. Increase community awareness, advise and educate residents on reducing energy costs and consumption.**
- a. Publicize energy savings measures the town is taking for municipal buildings and progress on reducing municipal energy and costs
 - b. Consider creating a webpage to periodically post energy efficiency tips on the town's homepage. Also, consider contacting the *The Forum* to see if they would consider publishing energy efficiency tips and grant opportunities.
 - c. Encourage and support free sustainability workshops/seminars and events with a smart growth and sustainability focus within the community.
- 3. Consider ways to decrease energy expenditures, fossil fuel consumption and associated pollution.**
- a. Check with the town planning board about the feasibility of offering financial and/or development incentives to builders using LED certified lighting systems.
 - b. Consider implementing elements of complete streets design guidelines and conduct an evaluation to determine the best roads/areas to implement these elements.
 - c. Consider implementing a Safe Routes to School program.
 - d. Consider ways to encourage alternative transportation methods such as ridesharing, public transportation options and expanding trails and bicycle lanes in town. Also, check with local and regional civic organizations, such as Kiwanis International, to see if they would be willing to sponsor and/or promote such efforts.
 - e. Adopt small scale wind turbine regulations.
 - f. Implement property tax exemptions per RSA 72:61-72 for renewable energy systems.

8. Action Plan

In this final section, the following action plan is recommended for the Town of Candia as a guide to follow that lays out steps to achieve the goals and recommendations of this energy chapter of the town's master plan.

Recommendation	Who (Leadership)	When (Suggested Deadline)	How (Resources)
Energy efficiency recommendations from energy assessment reports	BOS	2012 - 2013	Internal
Plan to track energy use in municipal buildings	BOS/Selectmen's Assistant	2012-2013	Internal
Report quarterly energy use to BOS	Selectmen's Assistant	Ongoing	Internal
Continue to work with SNHPC on energy grants	BOS	Ongoing	Internal
Continue to evaluate and consider hybrid/electric vehicles for town fleet in CIP	BOS/Budget Committee	Ongoing	Internal
Department Heads consider energy efficiency measures for town services and facilities	Department Heads	Ongoing	Internal
Continue to explore long-term solar energy investments at Town Library, Recycling Center & School	BOS/Budget Committee & School District	2014-2015	Grants
Implement energy savings measures & actions	BOS	Ongoing	Internal
Develop energy efficiency tips on town website	BOS/Selectmen's Assistant	Ongoing	Internal
Host quarterly energy/sustainability public forums	BOS/Planning Board	Ongoing	Internal
Develop and offer rebating incentives for LED certified lighting	Planning Board/Building Inspector	2013-2014	Internal
Develop and offer rebating complete street guidelings	Planning Board/Building Inspector	2013-2014	Internal
Continue to explore and implement Safe Route School Program	School District/BOS/Planning Board	2013-2014	Grants
Develop and offer rebating for carpooling/park&ride lots	BOS/Planning Board	Ongoing	Master Plan
Develop and offer rebating for small scale wind turbine regulations	Planning Board/Building Inspector	2014-2015	Internal
Review and update property tax exemptions per RSA 77:61-			
Develop and offer rebating for geothermal energy systems	BOS/Budget Committee	2013-2014	Internal

APPENDIX

Energy Efficiency Opportunities for Town Hall & Recycling Center, Candia, NH - January 6, 2012, Prepared by Peregrine Energy Group, Inc. (funding provided by NH Office of Energy & Planning)

Energy Efficiency Opportunities for Town Facilities, Candia, NH – June 9, 2011, Prepared by Peregrine Energy Group, Inc. (funding provided by NH Office of Energy & Planning)

Energy Efficiency Opportunities for Henry Moore Elementary School, Candia, NH – November 15, 2011, Prepared by Peregrine Energy Group, Inc. (funding provided by NH Office of Energy & Planning)