

CHAPTER 8: ENERGY

Power Pinching Pointers

From the Center Harbor Energy Committee

Center Harbor Voters Offered Bribe

Show up at the polls on November 4, and each Center Harbor voter (regardless of political persuasion) will be given a FREE CFL light bulb. You will be expected to



use this efficient and long-lasting bulb until the 2012 election and save up to \$120 (compared to the cost of operating a regular 75 Watt incandescent bulb)!

The fine print: Please dispose of CFL bulbs safely at the transfer station in the bin provided. Broken CFL bulbs may pose hazards, so handle them carefully. This program is generously supported by Christopher P. Williams Architects PLLC, Cakes by the Lake, Heath's Supermarket, and NH Electric Co-op.

Did you know? If every home in America replaced just one incandescent bulb with a CFL bulb, it would eliminate greenhouse gases equivalent to the annual emissions of nearly a million cars! Imagine the results if all bulbs were replaced.

See what else we're up to at www.realityCHEC.org

8.1 INTRODUCTION

8.1.1 Purpose and Rationale

The primary reason for addressing energy in the community master plan is to identify cost saving measures that will help Center Harbor adapt to the rising costs of fossil fuels and relatively expensive electricity. The plan addresses energy policies, economics, usage patterns and alternative energy sources.

The focus of this energy chapter is a guiding set of goals and recommendations which can be revisited and revised over time. The intent is also to provide a resource for community residents that can be cited and consulted in the ongoing local energy discourse.

8.1.2 Policy

Many of the guiding principles from the Vision Chapter (Preserve scenic views, especially along highways and from the lakes; Protect quality of natural resources; Encourage small business development that builds on regional recreation and tourism) *may* be threatened by the regional impacts of both elevated atmospheric greenhouse gases and smog forming combustion emissions; both related to fossil fuel-based energy consumption. A warmer and wetter regional climate could adversely affect the winter recreational tourism industry (snowmobiling, skiing, ice fishing and ice sailing.) The northeast already experiences more frequent marginal winter recreation conditions as a result of the 1.3°F per decade increase in average winter temperatures since 1970. Higher average temperatures could also exacerbate summer seasonal smog formation, compromising scenic views of distant mountains and lakes, and could intensify in-lake water quality deterioration, which is already deteriorating according to water quality monitoring data. It could conceivably become more difficult to draw and retain recreation and tourism based industry to the Lakes Region if seasonal recreational resources become less reliable.

This master plan acknowledges that some people may not agree with atmospheric data and modeling that project a warmer and wetter climate in New Hampshire. This plan is not an endorsement of any particular assumptions about the future regional climate. It merely states what the general consensus among the scientific community is and considers the link between energy and emissions.

While local action may seem like a futile response to global atmospheric pollution, Center Harbor should support its own interests in emissions reductions and local energy priorities. Actions that are not economically feasible are unlikely to be pursued. Because of this, energy decisions are most likely to be governed by cost-saving benefits rather than environmental benefits, but investments in energy efficiency and conservation will generally reduce emissions as well.

It is the policy of Center Harbor to minimize the financial costs of energy use through the promotion of conservation measures, pursuit of efficiencies, and promotion of renewable energy while limiting the local generation of smog forming emissions and local contributions to elevated atmospheric greenhouse gas concentrations through a reduced dependence on fossil fuel.

8.2 NEW HAMPSHIRE STATUTES AND POLICIES RELATED TO ENERGY

A number of state policies, statutes, codes and administrative rules address local authority for energy planning. It is important that town officials and interested residents be familiar with the authority that exists to guide energy planning in Center Harbor. An annotated list of relevant statutes and policies with active links to the full language is included in Appendix B for reference. Two available policy tools for incentivizing clean energy investments throughout the town are summarized below.

8.2.1 Property Assessed Clean Energy (PACE) Financing Districts

PACE districts allow municipalities to help property owners finance energy efficiency and renewable energy projects for their homes and commercial buildings through the administration of a revolving loan fund. Loans are paid back through a tax assessment on the value of the energy investment. Interested owners opt-in to receive low interest financing to cover the upfront cost of a particular clean energy investment for their home, like solar panels. The loan of up to \$35,000 is paid back with the cost savings that are realized through the clean energy investment, over a period of up to 20 years. PACE spreads the cost of transitioning to clean energy over the expected life of the clean energy equipment and allows the repayment obligation to transfer automatically, like other property assessments, to the next owner if the property is sold.

PACE uses the same kind of land-secured financing districts that municipalities have relied on for over 100 years to pay for improvements in the public interest. They provide a solution to the capital cost dilemma of financing energy investments. PACE represents a revenue neutral mechanism to support energy efficiency and renewable energy investment throughout town and address long-term community energy costs and use, not just the energy profile of municipal operations. Organizations exist that can structure and administer revolving loan funds at no cost to the town.

House Bills 1554 and 144 regarding to PACE districts provide more information on the current status of PACE legislation in New Hampshire:

8.2.2 Property Tax Exemptions for Renewable Energy

RSA 72:27-a allows municipalities to adopt property tax exemptions for solar energy systems (RSA 72:61) wind powered energy systems (RSA 72:66) and wood heating energy systems (RSA 72:70). Center Harbor is one of 81 municipalities in the state that have adopted a solar energy system exemption, having done so in 1978. However, Center Harbor has not adopted a wind-powered energy system exemption (45 in NH) or wood heating energy system exemption (31 in NH) according to the New Hampshire Office of Energy and Planning website.

[NH Towns with Property Tax Exemptions for Renewable Energy Systems](#) are listed on the Office of Energy and Planning's website.

8.3 ENERGY PRICES AND CONSUMPTION TRENDS

8.3.1 Fossil Fuels and Electric Power

Figures 1 and 2 show energy costs from 1990-2011 with projections for continued high prices through 2012. Noteworthy are the sharp increases in the last decade. Highlights of energy cost and consumption trends in New Hampshire are bulleted below.

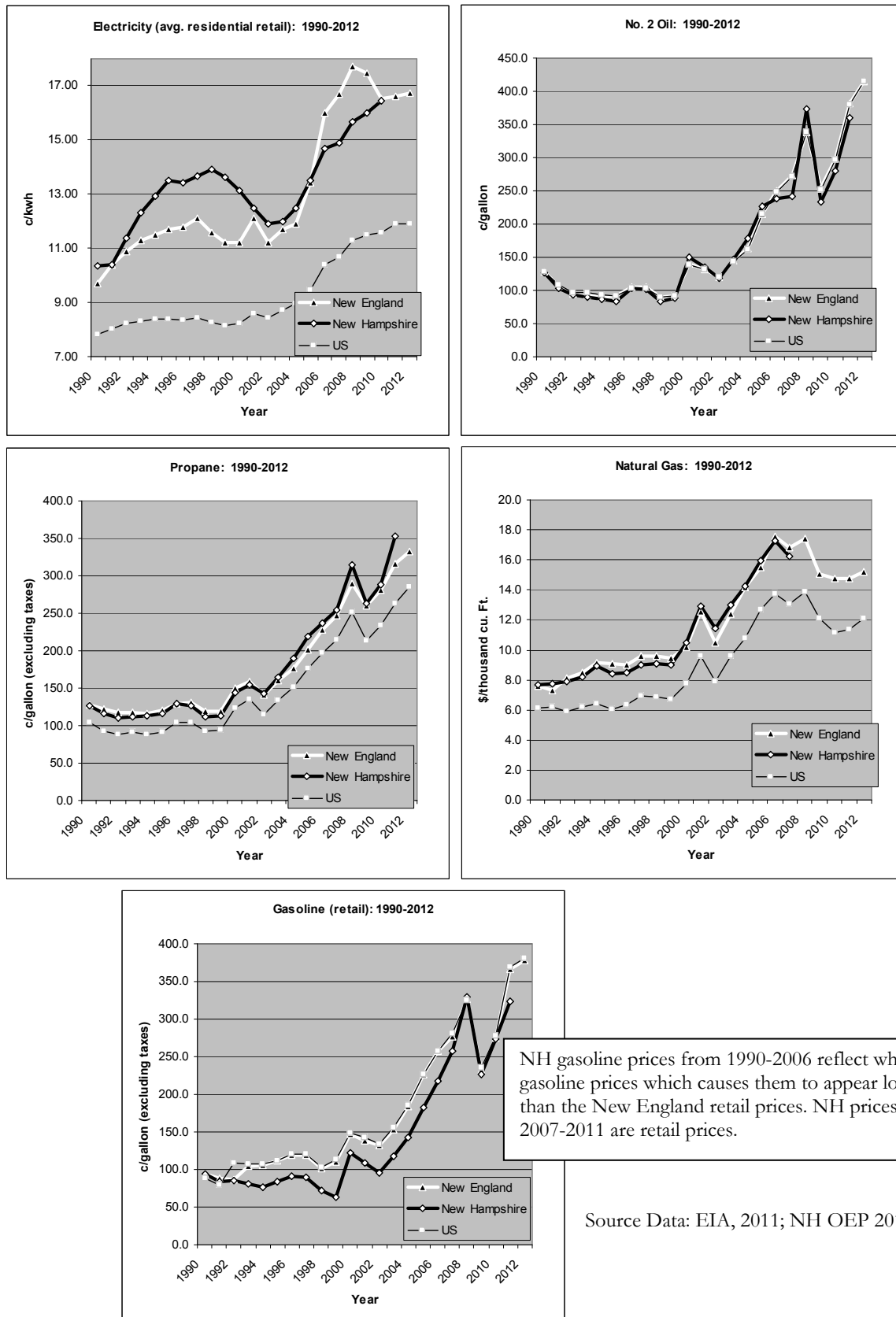
- From 1999 to 2008, the price of residential heating oil in NH increased by 274 percent.¹
- From 1999 to 2008, per capita consumption of petroleum fuel decreased by only 5.2 percent.
- In 1999 per capita expenditure on heating oil in NH was \$192. By 2008 it had ballooned to \$645.
- From 1999-2008, the average annual price of electricity increased by 12.4 percent in NH while per capita residential consumption increased by 9.7 percent.
- Residential energy prices for all fuels in NH were 104 percent higher in 2008 than in 1999.
- Despite the substantial increases in the real price of energy since 1999, per capita consumption of total residential energy has increased by 6.6 percent, largely as a result of the steady increase in electrical use and the challenges faced in decreasing petroleum fuel use while meeting needs.

Figure 1: Retail Prices for Residential Heating Oil, 1990-2012



Image Sources: US Department of Energy, Energy Information Administration website, 2011

¹ US Department of Energy, Energy Information Administration – State Energy Data System. Accessed at <http://www.eia.doe.gov/emcu/states/seds.html> on 4/14/2011

Figure 2: Historic and Projected Energy Prices 1990-2012

8.3.2 Renewable Energy Sources

Renewable energy applications can be utilized in so many ways that it would be overly descriptive for a community Master Plan. A couple examples are provided below. Some of these energy sources are nearly free, while others require significant investments. What may be appropriate for town residents may not be workable for municipal operations or commercial businesses. Simple [fuel cost calculator](http://www.NHclimateaudit.org) is available at www.NHclimateaudit.org for comparing energy costs, and a [home heating index calculator](http://www.NHsaves.com) is available from www.NHsaves.com. These calculators can help determine the potential savings from different energy systems.

Photovoltaic (PV) Electricity

With federal tax incentives and state rebates, PV power is an alternative option that is more feasible now than ever. Though ultimate costs depend partly on the specifics of an installation, the payback period for residential PV systems seems to be hovering around 12-14 years with incentives, though it depends on future electricity rates. According to a local PV installer, residential installed costs in 2011 are around \$4.75-\$5.25 per watt, whereas five years ago the costs were \$9-\$10 per watt.

Biomass

In 2011, as heating oil neared \$4 per gallon, wood prices were significantly lower than oil in terms of cost per unit of energy. At \$240 per ton of pellets and \$170 per green cord of split and delivered firewood, wood was roughly half the price of \$3.60/gallon oil. Since 1999, the average stumpage price for firewood has increased by only 17 percent according to data from the Department of Resources and Economic Development while during the same period, heating oil has increased by more than 200 percent. Wood is a lower cost heating alternative to oil and propane in New Hampshire. In order to help communities assess renewable woody biomass energy options, the North Country Resource Conservation & Development Area Council has put together a [step-by-step decision making tool](#) to help communities develop a roadmap to biomass energy, whether for one building or a district heating system.

8.3.3 Municipal Building Energy Consumption and Expenditures

While the Municipal Building, Library, and Highway garage are the three main municipal buildings in Center Harbor, there are six additional accounts with the New Hampshire Electric Coop. All nine accounts and their electricity use from 2008 –2010 are listed in Table 1. The data show that the Library, Highway Garage, Town Pump and Fountain have all decreased electricity use since 2008. The Municipal Building however used fifty percent more electricity in 2009 and 2010 than in 2008.

Table 1: Municipal Electric Use (kwh) by Account

	Municipal Building	Library	Highway Garage	Town Pump	Historical Society	Fountain	Lights	Main Lights	Plymouth St.
2008	38,068	12,147	28,102	-	-	-	-	-	-
2009	51,887	12,340	23,237	5,120	-	4,136	18,756	7,032	-
2010	57,864	11,520	21,655	3,171	-	3,003	18,756	7,032	-
Percent Change (most recent vs. earliest data)									
	+52.00%	-5.20%	-22.90%	-38.10%	-	-27.40%	-	-	-

Currently the town pays its monthly electric bills by check, with bills and stubs stored in file folders. NHEC offers a free automatic bill pay option through its website and provides summary electric use as well. The town does not currently have an online account with NHEC. By setting up an automatic payment more time could be dedicated to tracking energy usage on a regular basis. An online account would also provide accurate historical usage data which could be referenced for ongoing energy assessment purposes.

The town has an active account with EPA's energy data management system, Portfolio Manager. The account was set up by the Jordan Institute in 2009. The system allows the town to input energy usage data on an ongoing basis, and has the capacity to analyze energy use and cost trends over time. The town has not maintained the account since it was set up. While free, Portfolio Manager is not the most user friendly energy reporting tool, but it allows for easier analysis of use and costs over time. Table 2 displays energy data for the three main buildings, compiled manually for this plan.

Table 2: Combined Energy Use in Main Municipal Buildings (2008-2010)

Table 2: Combined Energy Use in Main Municipal Buildings (2008-2010)									
Municipal Building 7,077 ft ²				Library 2,010 ft ²			Highway Garage 4,200 ft ²		
January - December 2008									
<u>Fuel</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>
Oil (gal.)	3,291	460,740	\$9,824	1,167	163,380	\$3,646	-	-	-
Propane (gal.)	-	-	-	-	-	-	3,882	357,144	\$11,228
Electricity (kwh)	38,068	129,926	\$6,703	12,147	41,458	\$2,225	25,421	86,762	\$4,486
Total	-	590,666	\$16,527	-	204,838	\$5,871	-	443,906	\$15,714
Intensity (kBTU/sf)	83.5			101.9			105.7		
Cost Intensity (\$/sf)	\$2.34			\$2.92			\$3.74		
All buildings 2008 = 1,239,410 kBTU and \$38,112									
January - December 2009									
<u>Fuel</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>
Oil (gal.)	3,495	489,300	\$7,671	1,075	150,500	\$2,360	-	-	-
Propane (gal.)	-	-	-	-	-	-	3,385	311,420	\$8,395
Electricity (kwh)	51,887	177,090	\$9,599	12,340	42,116	\$2,283	23,237	79,308	\$4,299
Total	-	666,390	\$17,270	-	192,616	\$4,643	-	390,728	\$12,694
Intensity (kBTU/sf)	94.2			95.8			93.0		
Cost Intensity (\$/sf)	\$2.44			\$2.31			\$3.02		
All buildings 2009 = 1,249,735 kBTU and \$34,607									
January - December 2010									
<u>Fuel</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>	<u>Units</u>	<u>kBTU</u>	<u>Dollars</u>
Oil (gal.)	3,109	435,260	\$7,033	992	138,880	\$2,259	-	-	-
Propane (gal.)	-	-	-	-	-	-	2,906	267,352	\$4,616
Electricity (kwh)	57,864	197,490	\$10,705	11,520	39,318	\$2,131	21,655	73,909	\$4,006
Total	-	632,750	\$17,738	-	178,198	\$4,390	-	341,261	\$8,622
Intensity (kBTU/sf)	89.4			88.7			81.3		
Cost Intensity (\$/sf)	\$2.51			\$2.18			\$2.05		
All buildings 2010 = 1,152,208 kBTU and \$30,750									

* Values used for kBTU per unit of fuel are: Propane=92 kBTU/gal.; Oil=140kBTU/gal.; Electricity=3.413kBTU/kwh

Table 2 shows energy consumption and cost by fuel and by building, as well as combined totals for each building and for all buildings by year. Energy intensity, the amount of energy used per square foot, and cost intensity, the energy expenditures per square foot, are also shown for each building and each year from 2008-2010. The Library and Highway Garage show declining use intensities in each successive year. The library was 13 percent less energy intensive in 2010 than in 2008. The Highway Garage was 18.5 percent less intensive in 2010 than in 2008. However, the Municipal Building was 7.1 percent more intensive in 2010 than in 2008 due to the 50 percent increase in electric usage.

Table 3: Multi-Year Average Annual Energy Use & Cost (2008-2010) at Municipal Buildings

Baseline Energy Use - Annual Average 2008-2010									
	Municipal Building			Library			Highway Garage		
Oil (gal.)	3,298	461,767	\$8,176	1,078	150,920	\$2,755	-	-	-
Propane (gal.)	-	-	-	-	-	-	3,391	311,972	\$8,080
Electricity (kwh)	49,273	168,169	\$9,002	12,002	40,964	\$2,213	23,438	79,993	\$4,264
Total	-	629,935	\$17,178	-	191,884	\$4,968	-	391,965	\$12,343
Intensity (kBtu/sf)	89.0			95.5			93.3		
Cost Intensity (\$/sf)	\$2.43			\$2.47			\$2.94		
All buildings Annual Average 2008 - 2010 = 1,213,784 kBtu and \$34,489									

^ Dollar amounts for 2009 - 2010 electricity are estimated from the average monthly rates from Jan-Aug 2009 inclusive of monthly NHEC membership fees. This is due to limited time available to extract payment data from paper bills.

8.3.4 Community-Wide Energy Use

While town-wide energy use data is not available, the average residence in the NH Electric Coop Service area uses about 500 kwh per month. This figure provides at least a broad benchmark for residents to compare their electricity use to.

8.4 THE ENERGY/PLANNING CONNECTION

Energy requires special consideration because it is a part of many daily activities and government operation. Land use, transportation, and capital improvement planning can all influence energy use. Other influences include available financing, facilities management, agricultural policy, and forest and water resource management. Planning for energy as a cross-cutting goal requires a close assessment of all policies, operations, and activities. This section highlights the many connections between energy and planning to set the stage for accomplishing Center Harbor's energy goals.

Transportation energy accounts for roughly 40 percent of all energy consumption in the US. In Center Harbor, where most people need to travel to get to a job or to purchase necessities, transportation energy, made up of fossil fuels, ethanol, electricity, and food calories represents a significant portion of most individual energy budgets. While Center Harbor is a small town, many important amenities are available within close proximity, and planning for location efficient housing options could provide low energy transportation requirements for residents who wish to walk to the grocery store, post office, hardware store, library, town offices, town docks, or elsewhere. Land use planning that supports denser housing development near the town center has long term implications for the energy required to run daily errands. However, the scarcity of developable land near the village center makes the development of location efficient housing a challenge.

Energy costs are an influential factor not only in transportation, but in building and facilities siting, design and operations, housing choice, and agriculture and food pricing. The energy requirements associated with each of these is subject to many other influential factors that have implications for overall energy use. Energy planning requires a broad view. For example:

- Transportation energy is subject to land use policies that influence where people live and travel
- Building codes (current and past) affect the long-term energy demands of all buildings
- Decisions about operating buildings affect the energy requirements for those buildings
- Capital improvement plans that do not consider life-cycle energy costs can yield unintended long-term energy expenditures from new investments.
- Land use regulations can be restrictive to certain forms of agriculture, affecting the supply of locally produced foods.
- Available incentives and financing options can be *the* determining factor in whether to invest in a renewable energy system or a conventional one.

These are just a few ways energy cuts across daily life, and the connections to consider in addressing energy as a priority planning concern for Center Harbor.

8.5 ENERGY GOALS

Keeping in mind the purpose, rationale, and trends presented in the preceding sections, Center Harbor has established a set of energy goals. It is important to note that these goals are broad and do not describe specific actions. They have been placed into two categories - municipal government goals, and community-wide goals.

Municipal Goals

1. Track municipal energy use and emissions across all facilities and energy sources over time.
2. Maximize energy efficiency of all municipal facilities and operations.
3. Maximize energy conservation opportunities at all municipal facilities and operations.
4. Ensure that all future municipal capital investments consider projected energy costs and minimize life-cycle costs of the capital investment.
5. Disseminate information related to available energy rebates and incentives.

Community Wide Goals

6. Identify opportunities for municipal operations, town residents, and businesses to switch to lower cost and lower carbon fuels.
7. Support inter-municipal partnerships to explore energy savings opportunities.
8. Promote ride sharing and public transportation options.
9. Enhance bicycle and pedestrian safety and accessibility.
10. Minimize excessive use of outdoor lighting.
11. Promote awareness of cost savings achievable from conservation measures.
12. Support land owner investment in renewable energy for heat and power.
13. Support production and consumption of locally grown food.

8.6 Energy Planning and Implementation Accomplishments

Perhaps the most important energy planning initiative in Center Harbor has been the formation of an Energy Committee in 2007. This action alone has generated substantial activity, summarized on the committee's website, www.realitychec.org. Now in its fourth full year of service to the town, the Center Harbor Energy Committee has completed several energy-saving improvements for the town and continues to initiate new activities focused on additional energy savings. In 2009 the Town approved the creation of a \$20,000 trust fund for energy conservation activities. That funding, plus the time and expertise volunteered by many, helped make past accomplishments possible. In 2011 the Energy Committee requested that the town approve \$20,000 in flat funding.

8.7 RECOMMENDATIONS

- 8.7.1 Develop a municipal energy use and expenditure tracking system. Amend staff job description as needed to establish accessible records of municipal energy use and cost over time.
- 8.7.2 Identify energy efficiency cost savings, conservation measures, and anticipated return on investment for all municipal operations.
- 8.7.3 Create a standard for the construction and renovation of municipal projects that exceed state code by 25-50 percent and incorporates life-cycle energy cost analysis.
- 8.7.4 Work with Lakes Region Planning Commission to create an energy roadmap that identifies specific actions with timeframes and responsible parties.
- 8.7.5 Explore a Property Assessed Clean Energy District or a municipal revenue bond for revolving loan to finance clean energy investment.
- 8.7.6 Draft outdoor lighting regulations using 2008 Innovative Land Use Planning Handbook resources for guidance.
- 8.7.7 Propose tax exemptions for wind powered and central wood heating energy systems in addition to the existing exemption for solar energy systems.
- 8.7.8 Provide regulatory flexibility for development projects proposing use of renewable energy.
- 8.7.9 Encourage voluntary implementation of solar easements on deeds when a developer is subdividing a larger property.

APPENDIX A

Energy Planning Resources

Portfolio Manager login page

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

Username: CenterHarborEnergy

Password: 6032534561

Weekly and Monthly Residential Heating Oil and Propane Prices in New Hampshire and Price History (1990-present)

http://www.eia.gov/dnav/pet/PET_PRI_WFR_DCUS_SNH_W.htm

Short Term Energy Outlook – Real and nominal prices (1968 through Present plus 18-month projection.) Annual, quarterly and monthly prices for U.S. retail gasoline, diesel, heating oil, natural gas and electricity.

<http://www.eia.gov/EMEU/steo/realprices/index.cfm>

Long-Term Energy Outlook - US Petroleum Product Price Projections through 2035

<http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2011&subject=0-AEO2011&table=12-AEO2011®ion=0-0&cases=ref2011-d020911a>

DOE EIA State Data Center for New Hampshire – price and consumption data for NH

http://www.eia.gov/emeu/states/state.html?q_state_a=NH&q_state=New%20Hampshire

<http://www.eia.gov/state/state-energy-profiles-data.cfm?sid=NH#Prices>

Heating Fuel Cost Calculator – Calculator for 9 fuels that lets you input fuel price and heating efficiency for comparison of heating cost efficiency.

<http://www.nhclimateaudit.org/calculators.php>

NH OEP Fuel Price Data – Current and historic fuel prices in NH

<http://www.nh.gov/ocp/programs/energy/fuelprices.htm>

Center Harbor Energy Committee webpage – lists local accomplishments and resources

www.realitychec.org

NH Energy Efficient Appliance Rebate program

http://www.nhsaves.com/residential/es_appliance.html

US Green Building Council – List of local government policies/legislation requiring or referencing LEED green building standards.

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852>

Energy Star for Buildings Program

http://www.energystar.gov/index.cfm?c=business.bus_bldgs

APPENDIX B**Statutes and Rules relating to Energy Conservation, Efficiency, and Clean Energy in NH**

HB 1554 – established PACE district authority, effective 8/27/10:

HB 144 – amended PACE district authority, effective 07/15/2011:

RSA 53-F – Relative to Energy Efficiency and Clean Energy Districts (not reflective of HB 144 changes at the time of writing)

RSA 31:95-h I. (f) Relative to Revolving Loan Funds for financing of energy conservation and efficiency and clean energy improvements by participating property owners in an energy efficiency and clean energy district established pursuant to RSA 53-F (not reflective of HB 144)

NH Statutes of Chapter 72 relative to tax exemptions for renewable energy (See 72:27-a and RSAs 72:61 through 72:72)

RSA 672:1 III-a

“Proper regulations 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 renewables forms of energy, and energy conservation. Therefore, 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 where necessary to protect the public health, safety, and welfare.”

RSA 155-A:2 VI.

“Counties, towns, cities, and village districts may adopt by ordinance pursuant to RSA 674:51 any additional regulations provided that such regulations are not less stringent than the requirements of the state building code pursuant to this chapter and the state fire code pursuant to RSA 153.”

PUC 1800: Administration of New Hampshire Code for Energy Conservation in New Buildings

RSA 155-D: Energy Conservation in New Building Construction

NH Energy Code Certificate

HB 285-FN-Local: Bill establishing a state building code and repealing the authority for local adoption of building codes by reference.

State Building Code Review Board

US Department of Energy Video for Inspectors on Inspecting for Residential and Commercial Provisions of the Energy Conservation Code (part of the NH Building Code)