

Chapter Five

Energy

Introduction

In order to sustain growth in the Southern New Hampshire Planning Commission region we need affordable and clean energy. Defined in the very technical sense, energy is “the capability to do work, expressed in units of power or capacity over time.” The Southern New Hampshire Planning Commission region and the state of New Hampshire as a whole need reliable, affordable energy. These resources are needed to expand and strengthen our economy. Energy is used in every facet of our day-to-day lives in our homes, our businesses and for our transportation needs. This important component is critical to our environmental quality and economic vitality, which are both highly regarded here in Southern New Hampshire.

Access to secure, affordable supplies of energy is required for almost every activity of private citizens, business and government. We need clean and reliable energy to sustain the region’s present and future quality of life at the lowest financial and environmental cost. In today’s changing world we need to establish a fair degree of independence from uncertain international energy markets. In addition we need to ensure responsible contributions from our region to the global economy. The ultimate goal should be the creation of an energy program that is sustainable both locally and globally.

According to the U.S. Energy Information Administration (EIA) in 2008 New Hampshire ranked 40th in population in the United States and 45th in the amount of energy consumed, indicating that New Hampshire consumes slightly less per person than the rest of the nation. The EIA states that New Hampshire is not an energy-intensive state as both total energy consumption and per capita energy consumption are among the lowest in the United States.¹

At the regional level, there is a need for increased awareness of adapting energy policy into the fabric of everyday life. In the past, energy has not played a major role in regional and local planning. The Southern New Hampshire Planning Commission recognizes the fact that a region-wide energy planning effort needs to be created to ensure that municipalities have access to accurate energy information, as well as the tools and resources to help them with energy policy information. It is the duty of local government and regional planning organizations to facilitate with progressive citizen level actions, decisions, regulations, and land-use policies that lead to energy market shifts towards competitive, healthy and safe energy alternatives. Guidance from the Southern New Hampshire Planning Commission can assist communities in reducing the need for energy and the environmental impacts of electric generation and consumption and other energy resource use. Local government can also influence local energy decisions through the use of subsidies and education.

¹ New Hampshire State Energy Profile, http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=NH

Continuing uncertainty in the New Hampshire energy market may indicate a need for energy planning at the regional level. This type of planning can:

- Identify whether energy demand will exceed supply in the Southern New Hampshire Planning Commission region;
- Clarify trade-offs among the environmental, social and economic benefits and costs of various energy policies or choices;
- Identify and publicize energy efficiency opportunities;
- Help local municipalities design and implement energy policies and develop energy chapters in master plans;
- Enable informed regional decision making about energy policies.

At the state level, New Hampshire law provides general guidance for the state's energy policies. RSA 378:37 requires that we ensure the "lowest reasonable cost while providing for the reliability and diversity of energy sources." The New Hampshire Office of Energy and Planning is charged with energy planning to help policymakers ensure that decisions are consistent with the state's energy policy goals.

New Hampshire's electric restructuring statute, RSA 374-F:3 sets forth several broad public policy goals. These principles call for full and fair competition, benefits for all consumers, protection of low-income consumers, environmental improvement, increased commitment to renewable energy sources, and investments and incentives for energy efficiency.

The New Hampshire Public Utilities Commission (NHPUC) is the overseeing body vested with general jurisdiction over electric, telecommunications, natural gas, water and sewer utilities as defined in RSA 362:2 for issues such as rates, quality of service, finance, accounting, and safety. It is the NHPUC's mission to ensure that customers of regulated utilities receive safe, adequate and reliable service at just and reasonable rates.²

The New Hampshire State Energy Program, Energy Technical Assistance and Planning for New Hampshire Communities (ETAP), rolled out in 2010. Through this program New Hampshire municipalities are being offered energy efficiency technical assistance to reduce energy use, reduce fossil fuel emissions and improve energy efficiency and transportation, building and other areas. This technical assistance can take many different forms and is being determined on a community by community basis through several preliminary meetings with municipal contacts. The level of assistance is also determined at these meetings. More details on the State Energy Program can be found under "Current Energy Programs."

The New Hampshire Climate Action Plan, published by the NH Department of Environmental Services (DES) in March of 2009 with help from New Hampshire Climate Change Policy Task Force, considers and addresses the link between energy emissions, climate change and future economic growth in the state. It advocates for increased energy efficiency in all sectors of the economy by continuing to increase sources of

² NH Public Utilities Commission, <http://www.puc.state.nh.us/Home/aboutus.htm>

renewable energy and designing communities that reduce reliance on the automobile for transportation. It recommends that New Hampshire strive to achieve a long-term reduction in greenhouse gas emissions of 80 percent below 1990 levels by 2050. This plan is an important early step in addressing the challenges that climate change will present the state and region in the future.³

At the national level, New Hampshire is a participant in the Regional Greenhouse Gas Initiative (RGGI), a carbon cap and trade program operating in ten states in the Northeast and Mid-Atlantic regions. RGGI is a flexible, market-based program aimed at reducing carbon emissions from power plants with 25 MW or greater generating capacity by creating a market of emissions allowances for greenhouse gas emissions. States buy and sell allowances at quarterly auctions according to their overall carbon output levels. The program rewards energy efficient states by allowing them to sell allowances to states emitting over the cap level. The RGGI went onto effect in the ten states September of 2008.

Public Survey Results

The Energy Survey was developed to seek public input in both gauging the progress communities have made in reducing energy costs as well as measuring the effectiveness of various government and private programs aimed at helping reduce energy emissions. A slight majority of communities in the region participated in the survey, including the towns of Bedford, Candia, Deerfield, Derry, Londonderry, and Raymond as well as the City of Manchester (Londonderry and Manchester recorded the highest participation levels). The communities of Auburn, Chester, Goffstown, Hooksett, New Boston and Weare did not participate. Two respondents from outside the region also completed surveys.

- The response would appear to indicate that greater educational and training programs as well as increased collaboration between the public and private sectors regarding energy issues may be necessary as many respondents indicated that they were unaware of the nature and scope of energy-related activities in their communities.
- Fifty-eight percent of those surveyed pointed to the formation of local energy conservation committees as programs they had undertaken to promote public awareness regarding energy conservation, eighteen percent noted the implementation of new energy efficiency standards and fifteen percent sponsored public meetings and workshops. Fewer than ten percent advertized in local media or established renewable energy tax breaks and no respondents reported hosting local fundraisers. However, one-third of all those surveyed acknowledged that they were unsure of what (if any) community educational programs were in place.

³ NH DES, NH Climate Action Plan,
http://des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/nh_climate_action_plan.htm

- Nine percent of those surveyed indicated programs initiated were effective; while thirty percent expressed that the programs were not effective. Most respondents, however, – fifty-six percent – said they were unsure how effective such programs were.
- Respondents were asked if they had worked with government offices and businesses in exploring renewable energy sources, forty percent indicated that they had not, while thirty-six percent said they were unsure. Only twenty-four percent said they had initiated such efforts.
- Fifty-two percent of those surveyed indicated they had promoted recycling and provided incentives to businesses to do so.
- Respondents were presented with a list of state, national and private energy efficiency programs and asked if businesses in the community were aware of their existence. Forty-two percent acknowledged that they simply did not know, while thirty-nine percent said they were aware of some of the programs, but not all of them. Fifteen percent said businesses were familiar with the programs, while three percent said they were not.
- Respondents were asked to identify what planning steps (if any) their communities had undertaken toward becoming more energy efficient. Eighty-two percent of those surveyed indicated that an energy planning committee had been assembled in the community.
- Communities also displayed some progress in creating a baseline inventory of energy use and drafting an action plan to reduce energy consumption (both of which garnered twenty-nine percent).
- Respondents were asked what efforts were being launched to improve the efficiency of existing and newly developed buildings, forty-five percent pointed to community energy audits, twenty-four percent indicated they had modified building standards, and twenty-one percent said they had encouraged developers to incorporate green materials into their building plans.
- In regard to land use patterns, respondents voiced strong support for mixed-use development and the transit-oriented development (both garnered seventy percent support) and slightly less enthusiasm for impact fees (fifty-six percent).

Existing Conditions

By considering energy, environmental and economic policies and programs together, we can protect the air, water, and open space in the region. Municipalities, regional planning commissions, and the state can work together to incorporate the various existing programs and create new ones that will provide a cleaner and healthier environment for all citizens while continuing to have a strong and diverse economy.

Electricity

As a result of the electric industry undergoing constant restructuring, regional organizations have the ability to play an increasingly larger role in energy planning. It is important for the region to take action in recognizing that New Hampshire is not an energy island, and actions taken outside of New Hampshire affect our energy security, costs and environmental impacts. As privatization and deregulation have become more prevalent in our country, state, and region, it has become a regional responsibility to adopt energy policies that take into consideration the changing global energy economy.

Currently the region is served by Public Service of New Hampshire (PSNH) the State's largest utility. A few small areas in the towns of Auburn, Candia, Chester, Deerfield, Raymond and Derry are served by the New Hampshire Electric Cooperative. PSNH serves more than 490,000 homes and businesses throughout New Hampshire and has grown to comprise three fossil fuel-fired generating plants, one wood burning power plant and nine hydroelectric facilities. These facilities are capable of generating more than 1,110 megawatts of electricity. As a wholly owned subsidiary of Northeast Utilities, PSNH is an integral part of New England's largest electric system and provides the foundation for continued prosperity and growth in New Hampshire and especially in the Southern New Hampshire Planning Commission Region. (Please refer to the Service Map in the Public Utilities Chapter). PSNH plans to utilize its statewide presence to play a major role in New Hampshire's business development efforts. There are partnerships with state and local organizations to aide in bringing new businesses to New Hampshire and enabling existing businesses to expand. A variety of services are available to companies interested in moving in to New Hampshire.

PSNH operates three fossil-fuel fired plants and nine hydroelectric facilities. Through these facilities they are capable of generating more than 1,110 megawatts of electricity. While none of the fossil-fuel fired plants or the wood burning power plant are located within the region, the three of the hydroelectric facilities found here are:

- 1) **Amoskeag Hydro-** Completed in 1924 by the Amoskeag Manufacturing Company and purchased by PSNH in 1936, Amoskeag Hydro originally powered the mills in the Manchester Millyard. The original generators and turbines are still in operation and the facility generates 16 MW of power
- 2) **Hooksett Hydro-** Completed in 1927 by PSNH, Hooksett Hydro is located on the Merrimack River and generates 1.6 MW of power. In 1988, a downstream fish passage was installed to allow native fish to move freely downriver. The original generators and turbines are still in operation.
- 3) **Garvins Fall-** Originally built in 1901 by PSNH predecessor Manchester Traction and Light Company, Garvins Falls Hydro is located on the Merrimack River. The plant only had two turbine generators when built; two more were added in 1925. In 1988, the waste gate at the end of the power canal was modified to permit passage of downstream fish. This facility generates 12.1 MW of power.

Fossil Fuels

It is clear that fuel oil, kerosene, and other types of fossil fuels are the primary sources of household heating (see Table 6.1). All of the communities in the region have a higher percentage of oil-based heating than the state as a whole. This dependence on oil-based heating is proving to be costly and harder to come by and will continue to do so in upcoming years as oil and natural gas prices increase and the economies of India and China become more oil dependent.

Table 5.1
SNHPC Household Heating Type By Percentage

Municipality	Utility Gas	Bottled, Tank or Liquid Propane	Electricity	Fuel Oil, Kerosene, Etc	Coal or Coke	Wood	Solar Energy	Other Fuel	No Fuel
Auburn	0.0	9.7	1.0	82.3	1.3	5.2	0.4	0.0	0.0
Bedford	0.1	9.0	3.8	72.0	0.0	0.9	0.0	0.0	0.0
Candia	0.0	16.0	1.9	75.9	0.4	5.7	0.0	0.0	0.0
Chester	0.3	8.9	1.5	82.2	0.0	7.1	0.0	0.0	0.0
Deerfield	0.5	11.2	1.1	78.7	0.5	7.6	0.0	0.4	0.0
Derry	6.5	14.1	14.8	59.8	0.6	2.5	0.1	1.2	0.2
Goffstown	9.6	9.7	4.6	73.4	0.1	2.4	0.0	0.1	0.0
Hooksett	28.0	6.8	4.6	57.3	0.2	1.6	0.0	0.8	0.6
Londonderry	5.0	19.1	7.9	65.3	0.5	2.1	0.0	0.1	0.0
Manchester	43.1	3.1	9.4	42.7	0.2	0.6	0.0	0.7	0.2
New Boston	1.0	17.3	1.7	73.0	0.0	7.0	0.0	0.0	0.0
Raymond	4.0	20.1	4.4	64.3	0.3	6.7	0.0	0.3	0.0
Weare	0.7	18.8	1.6	68.6	0.5	9.8	0.0	0.0	0.0
State of New Hampshire	18.4	10.7	7.6	58.1	0.2	4.3	0.0	0.5	0.2

Source: 2000 U.S. Census

Renewable Energy

Energy efficiency and energy conservation can be the most sustainable, cost-effective and least polluting means of reducing our demand for energy. Homeowner and municipal education as well as other initiatives are needed to reduce the demand for energy in the Southern New Hampshire Planning Commission Region. While energy demand cannot be eliminated completely, renewable energy can be a valuable complement to energy efficiency and conservation.

The EIA states, “New Hampshire has no fossil fuel reserves but has substantial renewable energy potential. The Appalachian Mountains, which cover much of western New Hampshire, offer wind power potential, and several waterways, including the Connecticut and Merrimack River basins, are hydroelectric power resources. In addition, dense forests in northern and southern New Hampshire offer potential fuel wood for electricity generation.⁴ Among the potential benefits of renewable energy are:

- Diversification of energy sources;

⁴ New Hampshire State Energy Profile, http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=NH

- More security because it can be produced close to point of use and it has multiple sources such as hydro, wind, solar, biomass and geothermal;
- Efficiency gains due to less energy consumed in transmission or transport;
- More energy dollars are retained in local or regional economy, not exported;
- Renewable energy installations can create additional local jobs;
- Reduced pollution compared with fossil fuels;
- Can be greenhouse-gas neutral;
- Lifetime cost can be lower than for non-renewable energy sources;
- “Wastes” such as manure, sewer gas, landfill gas, landscape trimmings, can become energy sources;
- Annual operation costs are low.

State law, RSA 72: 61-72 grants municipalities the option to exempt certain renewable energy installations from property taxation. Currently five communities in the region – Bedford, Chester Londonderry, Raymond and Weare – have elected to exempt at least one type of renewable energy installation incentive. This total is up from three communities in 2003. If more municipalities participated in these programs, there would be more incentive for people to explore different options for home heating, leading to an improvement in the region’s economic vitality and energy sustainability.

Table 5.2
SNHPC Property Taxation Exemptions

Municipality	Solar Energy Exemption	Wind Powered Exemption	Wood heating Energy Exemption
Auburn	NO	NO	NO
Bedford	YES	YES	YES
Candia	NO	NO	NO
Chester	YES	YES	NO
Deerfield	NO	NO	NO
Derry	NO	NO	NO
Goffstown	NO	NO	NO
Hooksett	NO	NO	NO
Londonderry	YES	YES	NO
Manchester	NO	NO	NO
New Boston	NO	NO	NO
Raymond	YES	YES	YES
Weare	YES	NO	NO

Source: 2009 New Hampshire Office of Energy and Planning

If a municipality has adopted the exemption, the added value of the equipment and installation to property may be exempt from taxation.

Current Energy Programs

New Hampshire currently has a variety of programs that help homeowners, cities, towns, school districts, businesses and industries, and entire regions to cut their energy use and

reduce pollution. Currently the Southern New Hampshire Planning Commission region and its member communities have done little to take advantage of these programs and, as energy consumption becomes more of a daily headline, it is time for the region to come together and take advantage of these programs.

The New Hampshire Office of Energy and Planning (NHOEP) operates several energy programs in partnership with both private and public entities to promote a sustainable, environmentally sound future for New Hampshire as well as to encourage conservation and renewable energy source. New Hampshire also has two clean transportation programs that seek to reduce emissions by automobiles, trucks and buses and to reduce the state's reliance on foreign oil supply.⁵ Additionally, the two major electric utility providers in the region, PSNH and New Hampshire Electric Cooperative, also provide many energy conservation incentive programs designed to reduce energy use, save money and protect our environment. The following section briefly discusses some of these programs that are being used to promote sustainable energy use in greater detail.

New Hampshire Greenhouse Gas Emissions Reduction Fund (GHGERF)

The Greenhouse Gas Emissions Reduction Fund (GHGERF) is a dedicated fund created by New Hampshire legislation, RSA 125-O: 23. The source of the funding comes from New Hampshire's participation in the Regional Greenhouse Gas Initiative (RGGI). RGGI is the regional cap and trade program aimed at reducing carbon dioxide emissions in the electric power sector across ten participating states in the northeast. Under RGGI, emission amounts are inventoried and a cap is established at a level below current emission levels.

GHGER is tied into the previously mentioned Regional Greenhouse Gas Initiative (RGGI), which was adopted by New Hampshire in 2008 as part of a ten-state initiative to reduce greenhouse gas emissions that contribute to global climate change. New Hampshire emissions allowances are sold at quarterly auctions and the proceeds fund the GHGER program.

The proceeds of these allowance auctions are portioned out among the state participants, and in New Hampshire, the statute directs that the proceeds of each auction flow into the GHGERF. The GHGERF is administered by the PUC, which is responsible for distributing the funds to programs across the state. These funds support energy efficiency, conservation and demand response programs in order to reduce greenhouse gas emissions generated in New Hampshire.

Ten percent of RGGI funds are set aside to help low-income residential customers reduce their energy use, and the remainder of the funds are distributed through competitive grants or adjudicative proceedings. In 2009 there were 30 awards given totaling \$17.7 million, Grants were awarded to towns and schools for audits and retrofits, revolving loan funds, large businesses, electric utilities, non-profits, educational institutions, job training programs, and grassroots organizations.

⁵ NHOEP maintains a website that serves as a clearinghouse for State sponsored and assisted energy planning programs at <http://www.nh.gov/oep/programs.htm>.

As of June, 2010 the GHGERF has seen revenue of \$24.3 million. During the first reporting year (July 2009 to June 2010), the program was responsible for savings of \$1.5 million in energy costs for New Hampshire residents and a 4,600 metric ton reduction in carbon emissions, which is equal to taking 9000 cars off the road for a year. Projections for the second reporting year of the program (July 2010 to June 2011) forecast an energy cost savings of \$4.2 million and a carbon emissions reduction of 13,200 metric tons.^{6,7}

Municipal Energy Reduction Fund (MERF)

As part of the aforementioned GHGERF funding program, the Community Development Finance Authority (CDFA) was awarded \$1.5 million to help finance energy improvements to municipal facilities and activities. The CDFA is a nonprofit group that promotes affordable housing and economic development.

CDFA's Municipal Energy Reduction Fund is available to help municipalities improve the energy efficiency of their municipal buildings, street lighting, water and sewer treatment facilities, and where appropriate, electrical distribution systems. The goal is to reduce energy usage and costs.

The program will be available to finance improvements to the overall energy efficiency performance of a municipality's buildings, thereby lowering the overall energy costs and the associated carbon emissions. These activities will include, but are not limited to:

- Improvements to the buildings envelope including air sealing and insulation in the walls, attics, and foundations;
- Improvements to HVAC equipment inside conditioned space;
- Installation of sealed combustion, high efficiency condensing boilers;
- Installation of alternative energy sources.⁸

25 x 25

The 25 x 25 Renewable Energy Initiative was announced in August of 2006. The goal of 25 x 25, a bipartisan national effort, is for New Hampshire to obtain 25% of its energy from clean, renewable sources by the year 2025.

According to the most recent data from the federal Department of Energy, about 6.6% of our total energy usage is renewable. Energy sources include heating fuels, transportation fuels and electricity. Of the electricity consumed in New Hampshire, 10.6% is from renewable sources. This data, regrettably, is specific to 2004 and does not reflect developments such as the use of a 10% ethanol blend in gasoline in large portions of New Hampshire, nor the addition of a new wood-fired electric generating facility.

⁶ NH Greenhouse Gas Emissions Reduction Fund Year 1 (July 2009 – June 2010) Evaluation, published by Carbon Solutions New England

⁷ New Hampshire Public Utilities Commission (PUC), <http://www.puc.nh.gov/Sustainable%20Energy/GHGERF.htm> and

⁸ New Hampshire Community Development Finance Authority, http://www.nhcdfa.org/web/erp/merf/merf_overview.html

Achieving 25% renewable energy for New Hampshire might be more easily accomplished as an overall goal rather than working toward 25% renewable energy in each of the end use categories and economic sectors. It will also be easier to meet the overall goal for renewable energy if demand for energy is reduced by means of energy efficiency and conservation.

The 25 x '25 Plan is being developed jointly by the Office of Energy and Planning and the Department of Environmental Services, in coordination with Innovative Natural Resource Solutions LLC, a New Hampshire-based consulting firm.⁹

Energy Technical Assistance and Planning for New Hampshire Communities (ETAP)

“As a component of the 2007 Energy Independence and Security Act, the U.S. Department of Energy's Energy Efficiency and Conservation Block Grant (EECBG) Program was established to assist eligible entities in implementing strategies relating to:

- Reduction of fossil fuel emissions
- Reduction of total energy use
- Improved energy efficiency in transportation, building and other areas

Underneath ARRA, the EECBG received its first ever appropriation of \$3.2 billion nationally in 2010. NH received approximately \$17.3 million. The national funds were distributed using the following formula:

- 68% distributed from the US Department of Energy via a formula to the 10 most populated municipalities and/or counties in each state
- 28% distributed from the US Department of Energy via a formula to the state energy offices in each of the states
 - Out of the portion going to NH Office of Energy and Planning, 60% is required to go to the municipalities who are not chosen as one of the 10 most populated municipalities. The remaining 40% will go into the State Energy Program
- 2% distributed by the US Department of Energy to the Tribes
- 2% distributed by the US Department of Energy via competitive process to municipalities, counties and tribes who are not eligible for the direct formula grant funds”¹⁰

The State Energy Program is called Energy Technical Assistance and Planning for New Hampshire Communities (ETAP).

ETAP is being implemented as a partnership between NHOEP, CLF Ventures, Peregrine Energy Group, Clean Air Cool Planet and the New Hampshire Regional Planning Commissions. Through this program New Hampshire municipalities are being offered energy efficiency technical assistance to reduce energy use, reduce fossil fuel emissions and improve energy efficiency and transportation, building and other areas. This

⁹ NHOEP, http://www.nh.gov/oep/programs/25_x_25/index.htm

¹⁰ NHOEP, <http://www.nh.gov/oep/recovery/eeecbg.htm>

technical assistance can take many different forms and is being determined on a community by community basis through several preliminary meetings with municipal contacts. The level of assistance is also determined at these meetings.

Granite State Clean Cities Coalition

Operated by the New Hampshire Department of Environmental Services and funded by the U.S. Department of Energy, Granite State Clean Cities Coalition (GSCCC) is a partnership of local private and public fleets (including highway department, parks and recreation and emergency vehicles) throughout the state. The project seeks to expand the use of alternative, cleaner burning fuels by private and public fleets and individuals. GSCCC offers training, equipment and vehicle demonstrations, and strategic planning services. Currently within the Southern New Hampshire region, only the City of Manchester is a stakeholder of GSCCC.¹¹

The Alternative Vehicles Fuel Project

Operated by the New Hampshire Department of Environmental Services and funded by Congestion Mitigation Air Quality funding from the New Hampshire Department of Transportation and the U.S. Department of Transportation, the project provides funding to help state and municipal fleets purchase alternative fuel vehicles and infrastructure.¹²

Building Energy Conservation Initiative

Established in April 1997, with a second financing package secured by the State Treasurer in 2002, this program analyzes state buildings for energy and resource conservation opportunities. Building Energy Conservation Initiative (BECI) utilizes a "paid from savings" procedure known as "Performance Contracting." This allows agencies to perform energy retrofits and building upgrades that would otherwise not be funded through capital appropriations, providing that energy savings can pay for the project cost, as outlined in RSA 21I. NHOEP institutes the study, along with the individual state agencies whose buildings are being evaluated.

BECI is designed specifically for energy improving measures. A sample of those improvements may include lighting upgrades, HVAC upgrades, domestic hot water systems, energy management controls, water conservation measures, building envelope improvements, and miscellaneous projects which an energy service company can prove are feasible within BECI.

Each BECI contract includes instructions on the procedure needed to verify the savings generated by these energy improvements. Since various buildings may include some, but not all, of the suggested measures, a procedure of Measurement and Verification (M & V) is unique to each energy improvement. The most common M & V procedures are "Stipulated Savings," which are calculated upfront, and "Measured Savings" which involve metering and submetering.¹³

¹¹ Granite State Clean Cities Coalition, <http://www.granitestatecleancities.nh.gov/>

¹² NHOEP, <http://www.nh.gov/oep/programs/energy/altfuels.htm>

¹³ NHOEP, <http://www.nh.gov/oep/programs/energy/beci.htm>

New Hampshire Industries of the Future

New Hampshire Industries of the Future (NHIOF) is a U.S. Department of Energy sponsored partnership between businesses, the Business and Industry Association's WasteCap Resource Conservation Network, and the Governor's Office of Energy and Community Services. NHIOF is designed to help energy- and waste-intensive industries use technology and process advancements to improve profitability and competitiveness by cutting energy costs. NHIOF is helping manufacturers in some of the state's largest industry sectors- metals, rubber, plastics, and forest products- to develop strategies to resolve issues of energy efficiency, productivity, waste reduction and environmental conservation. It also seeks to develop a vision of what business people want their respective industries to look like five, ten and twenty years in the future. Businesses are identifying the obstacles to achieving that vision - such as energy efficiency, productivity, waste reduction and environmental issues - and putting together pragmatic strategies to resolve the problems.¹⁴

Renewable Energy Property Tax Exemption

This incentive, discussed in the previous section, outlined in NH RSA 72:61-72, permits cities and towns to offer exemptions from local property taxes for certain renewable energy installations. These include solar thermal (for example, to heat water), solar photovoltaic (to generate electricity), wind (to generate electricity) and central wood-fired heating systems (not stoves or fireplaces).¹⁵

New Hampshire Energy Smart Schools Program

This program is open to all K-12 public and private schools in New Hampshire. It is designed to allow schools to pursue energy efficiency initiatives aimed at controlling energy usage and saving money. The program utilizes an energy benchmarking system designed to help schools:

- Understand the energy consumption and cost trends at each of their buildings;
- Learn how their buildings are performing compared to other schools locally and nationally;
- Identify opportunities for improving operations and reducing costs;
- Take advantage of resources to implement efficiency improvements and save money.

To start, the program asks schools to submit their building and energy use data. This data is then used to create a customized analysis for each school that assesses the basic nature of its energy consumption and utility costs. The analysis also compares the school's data against similar schools in New Hampshire and across the country to assess its performance relative to buildings with comparable codes, standards, regulations, size and climate/weather. The analysis also proposes recommendations for making money saving improvements and outlines a list of resources that can help to implement them.

¹⁴ NHOEP, <http://www.nh.gov/oep/programs/energy/iof.htm>

¹⁵ NHOEP, <http://www.nh.gov/oep/programs/energy/RenewableEnergyIncentives.htm>

Schools that have participated in energy benchmarking programs have demonstrated an approximate 20 percent decrease in overall energy use. As of early 2011, 96 New Hampshire schools have been benchmarked through the Energy Smart Schools program.¹⁶

High Performance Schools

High performance schools offer superior indoor environmental conditions for health and academic performance, are cost-effective and efficient to operate and maintain, and are resource efficient in the areas of energy use, water use, and building material content and durability.

House Bill 129, effective September 9, 2005 gives the Department of Education the ability to award up to three percent more state funding to districts which design, build, and operate school facilities that meet new high performance standards.

Those standards, which are being developed now, will be modeled after similar criteria established by the Collaborative for High Performance Schools (CHPS) in California and modified for the New England climate and region-specific building codes. No New Hampshire school buildings currently qualify as high performance, but a number of districts, design firms, and other advocates are working toward making high performance schools a commonplace occurrence in the state.

In New Hampshire there are over 200,000 public school students and 15,000 teachers who spend time in schools with poor indoor air quality, inadequate lighting and drafty rooms. At the same time, administrators, parents and taxpayers must address parent dissatisfaction, increased energy and operation costs and the mitigation of environmental impacts. On average \$165 million is spent annually on school construction in the state, yet despite this investment, the buildings are still lacking in terms of quality and performance.

Over seventy percent of the schools in New Hampshire have been in service for 36 years or more, this gives New Hampshire a tremendous opportunity as many municipalities look to construct new schools and rehab existing spaces. High performance schools utilize proactive, cost-effective and integrated design to result in healthy and efficient school buildings. These schools serve to maximize tax dollars as well as improve the quality life for students.

The major hurdle is the perceived cost of building a new school or rehabbing an existing one. However with the incentives provided, the long-term benefits outweigh the initial costs.¹⁷

Cities for Climate Protection Program

The Cities for Climate Protection Campaign (CCPC) enlists cities to adopt policies and implement measures to achieve quantifiable reductions in local greenhouse gas

¹⁶ New Hampshire Energy Smart Schools Program, <http://www.nhschoolbenchmarking.com/Default.aspx>

¹⁷ New Hampshire Performance for High Performance School, <http://nhphps.org/>

emissions, improve air quality, and enhance urban livability and sustainability. More than 650 local governments participate in the CCP, integrating climate change mitigation into their decision-making processes.

Communities that participate in the CCP benefit from the actions they take to reduce greenhouse gas emissions through:

- Financial savings in reduced utility and fuel costs to the local government, households, and businesses;
- Improved local air quality, contributing to the general health and well being of the community;
- Economic development and new local jobs as investments in locally produced energy products and services keep money circulating in the economy.

The City of Keene has been participating in the CCP since 2000. Officials from that city acknowledged that local governments play a key role in climate change efforts because they can have direct influence and control of activities that produce such emissions. Decisions about development and land use, energy-efficient buildings, investment in public transit, waste reduction and recycling program all affect local air quality and living standards. They felt the Cities for Climate Protection program was an opportunity for Keene to take practical steps that reduce greenhouse gas emissions and generate other benefits for their communities.

The Cities for Climate Protection Campaign features a five-step process:

- Conduct an energy and emissions inventory and forecast;
- Establish an emissions reduction target;
- Develop and obtain approval from the Local Action Plan;
- Implement policies and measures from Plan;
- Monitor and verify results.

Other towns in the New England region that participate include Burlington, Vermont; Bridgeport, Connecticut; and Springfield, Massachusetts.¹⁸

Bio Oil Project

New Hampshire Office of Energy and Planning and the New Hampshire Department of Resources and Economic Development led a study to determine the economic, environmental and technical feasibility of establishing a bio-oil production and utilization industry in New Hampshire. Other partners in the study team included US and Canadian federal agencies; multiple states' agencies; universities; forest industry, environmental, and biomass energy organizations; economic development organizations; and private individuals. The final report, entitled *Bio-oil Opportunity* and published in September 2004, was intended to provide New Hampshire state government, forest industries, community groups, citizens, bio-oil facility developers and others information on the

¹⁸ City of Keene, NH, <http://www.ci.keene.nh.us/sustainability/climate-change>

opportunity that bio-oil production may provide in New Hampshire. This analysis is part of New Hampshire's ongoing effort to secure sustainable and clean energy.

Bio-oil is a renewable, liquid resource that can be obtained from low-grade wood waste by a process known as pyrolysis. This liquid burns cleaner and produces fewer pollutants (e.g., virtually no sulfur emissions) than coal and oil fuels. Bio-oil has potential uses for the production of heat and electricity. Eventually, it may have additional, higher value as a feedstock for a "green" chemicals industry.

Bio-oil production and utilization have several potentially beneficial outcomes including: economic support of sustainable forest management practices; renewable, indigenous, carbon-neutral energy supply; creation of jobs and retention of energy dollars in the regional economy; ability to generate and market electricity at peak demand times; possible spin-off business growth through co-location; combined heat and power applications; derivative products and services.¹⁹

State Heating Oil and Propane Program

The State Heating Oil and Propane Program (SHOPP) monitors residential retail prices for heating oil and propane to determine the average prices for these fuels in New Hampshire. From October through March, SHOPP conducts weekly price surveys and monthly from April to September. Additionally, the state monitors kerosene, electricity, natural gas, gasoline, and diesel fuel prices on a monthly basis.²⁰

Weatherization Program

The State of New Hampshire's Weatherization Program is designed to reduce household energy use and costs in low-income households throughout the state by installing energy efficient improvements. The overall goal of the Weatherization Program is to serve those households that are most vulnerable to high-energy costs and may not have the means of making cost-effective energy conservation improvements to their homes.

The New Hampshire Office of Energy and Planning (NHOEP) operates the Weatherization Program with grants from the U.S. Department of Energy (DOE) and the U.S. Department of Health and Human Services. NHOEP subcontracts with New Hampshire's Community Action Agencies (CAAs), which are responsible for operating and delivering weatherization services at the local level. OEP, whenever possible, collaborates with the electric and natural gas utilities' energy efficiency programs to enhance the weatherization services provided to low-income households in New Hampshire. In the Southern New Hampshire region, the following agencies are:²¹

- Hillsborough County-Southern New Hampshire Services- (603) 668-8081
- Rockingham County-Rockingham Community Action- (603) 431-2911
- Merrimack County-Community Action Program- (603) 225-3295

¹⁹ NHOEP, <http://www.nh.gov/oep/programs/energy/bioOil.htm>

²⁰ NHOEP, <http://www.nh.gov/oep/programs/energy/shop.htm>

²¹ NHOEP, <http://www.nh.gov/oep/programs/weatherization/index.htm>

Stay Warm NH

Stay Warm NH is a program offered by the NHOEP that centralizes information and resources pertaining to money and energy saving measures in one location. The Stay Warm NH website provides links to energy resources, weatherization programs and available energy-related funding opportunities. It is an invaluable source of information for residents and businesses looking to reduce energy costs in these difficult financial times.²²

Industrial Assessment Centers

The Industrial Assessment Center (IAC), funded by the U.S. Department of Energy, enables eligible small and medium-sized manufacturers to have comprehensive industrial assessments performed at no cost. The IAC assessments assist manufacturers to become more economically competitive by helping them reduce energy use, minimize waste, and increase productivity.

The Center for Energy Efficiency and Renewable Energy (CEERE) at the University of Massachusetts in Amherst serves most of New Hampshire. It was established in 1984 and is nationally recognized for its work. Since being established, they have surveyed over 450 plants. More than 1,900 Assessment Recommendation (AR) measures have been identified with average cost savings of \$35,000 per year and an average simple payback of 1.2 years.

An industrial assessment consists of an in-depth assessment of a plant site including its facilities, services and manufacturing operations. The assessment involves a thorough examination of potential savings from:

- Energy efficiency improvements;
- Waste minimization and pollution prevention;
- Productivity improvement.

The assessment begins with the IAC team, consisting of engineering faculty and students, conducting a survey, followed by a one or two day site visit, taking engineering measurements as a basis for assessment recommendations. The team then performs a detailed analysis for specific recommendations with related estimates of costs, performance and payback times.

Within 60 days, a confidential report detailing the analysis, findings and recommendations of the team is sent to the plant. In two to six months, follow-up phone calls are placed to the plant manager to verify recommendations that will be implemented.²³

Pay As You Save (PAYS) Energy Efficiency Products Pilot Program

The Pay as You Save (PAYS) pilot program, offered by PSNH and the New Hampshire Electric Cooperative, allows certain customers to finance the purchase of approved efficiency devices, appliances, or services on their electric bill. This innovative pilot

²² NHOEP, <http://www.nh.gov/staywarm/>

²³ NHOEP, <http://www.nh.gov/oep/programs/energy/iac.htm>

program provides eligible customers with a way to purchase efficiency measures while eliminating up-front costs. The costs of installed measures are repaid over time by participating customers from savings on their electric bill.

The PAYS program can be used for:

- Weatherization; including air sealing, insulation and recommended through a Home Energy Analysis
- ENERGY STAR lighting, ENERGY STAR products
- Lighting and Lighting control recommended through a Business Energy Analysis²⁴

Core Energy Efficiency Programs in New Hampshire

As part of the Restructuring Act, RSA 374-F:3 X, the electric utilities in the State of New Hampshire have established a set of energy efficiency programs designed for statewide implementation in the service territories of the utilities regulated by the Public Utilities Commission (PUC). A variety of programs exist, serving both residential and commercial and industrial customers. They include programs for new construction, retrofitting existing structures, and rebate programs for selected lighting and appliances. In addition to the statewide programs, individual utilities run specific programs. The electric utility companies involved are PSNH, the New Hampshire Electric Cooperative, Unitil Energy Systems and National Grid.²⁵

NHSaves

NHSaves is the website formed by New Hampshire's electric utility companies designed to provide New Hampshire residents and businesses with information and support pertaining to the Core Energy Efficiency Programs in New Hampshire. Created in conjunction with the New Hampshire Public Utilities Commission and other interested parties, it serves as a clearinghouse for the programs available through the Core Energy Efficiency Programs. Residential, commercial and industrial electricity customers of PSNH, the New Hampshire Electric Cooperative, Unitil Energy Systems and National Grid can take advantage of these programs.

Utility estimates indicate that the programs, when fully implemented have the potential to reduce electric use in New Hampshire by more than 704.7 megawatt hours, removing 522.8 tons of carbon dioxide, more than three tons of sulfur dioxide, and 1,830 pounds of nitrogen oxides from New Hampshire's air annually. For more information, visit NH Saves at <http://www.nhsaves.com/>. The following is a list of some of the programs currently being offered through NHSaves. Contained in the following list are programs offered through the Core Energy Efficiency Programs in New Hampshire and presented on the NHSaves website.²⁶

²⁴ NHOEP, <http://www.nh.gov/oep/programs/energy/pays.htm>

²⁵ State of New Hampshire, <http://www.puc.state.nh.us/Electric/coreenergyefficiencyprograms.htm>

²⁶ NHSAVES, <http://www.nhsaves.com/>

For Businesses:

Large Business Retrofit Program:

This program seeks to improve the efficiency of a facility through services including installation of variable frequency drives, replacement of motors, installation of energy management systems, air compressors and lighting upgrades. Technical assistance is also offered through the Retrofit Program, including project evaluation, measure identification, equipment monitoring, and energy audits. To help fund these improvements, this program offers perspective and custom rebates to customers who replace equipment at their facility with more energy efficient equipment. Not only will participants save money in the form of rebates, but they will also see long-term savings in their energy bills.

Small Business Energy Solutions Program

This is another retrofit program designed for business customers with an average monthly demand of less than 100 kilowatts (kW) and operating aging and inefficient equipment. This program will help better the efficiency of the facility through services including lighting upgrades, electric hot water measures, occupancy sensors and installation of programmable thermostats and controls for walk-in coolers. Not only will you see long term savings in the electric bill, but PSNH will help fund a portion of the improvements to the facility.

Net Metering Program

The Net Metering Program is open to any customer with a generator that has a capacity of 100 kilowatts or less and uses a renewable energy source, such as solar, wind or water, to produce electricity. Under this program, a customer's monthly PSNH bill amount reflects the difference between the power generated and the power used during that month. Net metering allows a meter to run backwards when generation exceeds usage. If generation exceeds use during a billing period, the excess generation creates a credit that is carried forward to the next billing period. When use exceeds generation in a future billing period, the customer uses the credit before buying from their utility provider.

Municipal Smart START Program

The Smart START (Savings Through Affordable Retrofit Technologies) Program gives municipal customers an opportunity to install energy saving measures with no up front costs. Payment for services and products are made over time with the savings obtained from lower energy costs. First, the utility provider applies rebates for all eligible retrofit measures and then finances the remaining costs associated with the purchase and installation of approved measures. A Smart Start Purchase and Installation Charge, calculated to be less than the monthly savings, is then added to the monthly electric bill until all costs are repaid. Over time, the new energy efficient, environmentally friendly equipment that is installed through this program pays for itself.

New Equipment and Construction Program

This program offers prescriptive and custom rebates to businesses building new facilities, updating existing ones or looking to replace failed equipment. It helps businesses purchase more energy efficient equipment, such as energy efficient lighting, motors, HVAC systems, chillers, variable frequency drives, and air compressors. In addition to rebates, the New Equipment & Construction Program offers technical assistance to help customers identify and purchase premium energy efficient equipment and measures.

For Residents:

Energy Star Lighting Program

Residential customers who purchase Energy Star rated light bulbs and fixtures can receive rebate coupons redeemable at participating retailers. Other lighting and select energy savings products will also be made available from a mail order catalog. A typical Energy Star rated compact fluorescent lamp lasts up to 10 times longer than an equivalent incandescent bulb and uses 75 percent less energy.

Energy Star Appliance Program

Customers will receive a rebate coupon of \$10 to \$30 towards the purchase of Energy Star rated washing machines, dryers, dishwashers, refrigerators, air conditioners, dehumidifiers and air purifiers when purchased at a participating retailer. Energy Star qualified appliances can save 10-50 percent compared with conventional models, and even more compared with older models. Replacing a 10 year old refrigerator, dishwasher, room air conditioner and clothes washer with Energy Star equipment would save around \$140 each year (calculated using the national average electric rate of 8.5 cents per kWh.)

Income Qualified Energy Efficiency Program

This program provides weatherization services and helps income-qualified customers understand their energy use with the goal of lowering energy costs. Qualified customers who receive an electric bill and live in an apartment or house, either rented or owned, can receive up to \$5,000 in services (additional funds may be available to customers that qualify for the NH Weatherization Assistance Program).

Home Energy Solutions

Under this program, PSNH can help you with your home's energy efficiency through improvements such as insulation, air sealing, thermostat replacement, electric hot water conservation measures, and cost effective appliance and lighting upgrades.

NH Energy Star Homes Program

The NH ENERGY STAR homes program encourages customers to take advantage of the benefits of building a new (or complete renovation of an

existing) single or multi-family energy efficient home with incentives up to \$2,500. ENERGY STAR construction results in reduced monthly operating costs, improved homeowner comfort and a higher resale value, all while providing greater environmental benefits. The program provides assistance in evaluating your new home plans, air leakage testing, and incentives to install ENERGY STAR appliances and lighting systems.

Planning Roles

Municipalities, the Southern New Hampshire Planning Commission, and the state can work together to incorporate the various available programs, as well as create new ones to provide a cleaner and healthier environment for all citizens while continuing to have a strong and diverse economy.

The creation and use of energy, whether for businesses, homes, transportation or other applications, has a great impact on the environment both on a local and global scale. Emissions from our day-to-day energy use affect our health, our natural resources, and our quality of life.

The State of New Hampshire has the ability to significantly impact the electricity market through its purchasing decisions. One way the state can encourage environmentally responsible power is to purchase electricity generated from renewable sources. Additionally, the state can help create a market for renewable power by insisting that some percentage of the electricity that it uses comes from renewable sources (for instance, though the 25 by 25 initiative).

New Hampshire has two statewide Energy Codes, one for residential structures and one for commercial and industrial structures. The Office of Energy and Planning (OEP) works in conjunction with the Public Utilities Commission (PUC) to raise awareness of and increase compliance with these energy codes.

The benefits of statewide energy codes:

- Save occupants money;
- Make housing more affordable;
- Increase resale value of buildings;
- Make housing more durable;
- Make indoor environments healthier;
- Increase buying power of citizens by putting more money in their pocket;
- Retain more money in the state's economy;
- Prevent air pollution;
- Reduce reliance on foreign oil;
- Reduce emissions of greenhouse gases associated with global warming.

Additionally, President Obama's Better Buildings Initiative is an attempt to incentivize the retrofit of existing commercial and public buildings in order to reduce energy usage and costs while increasing profits. Tax incentives and funding opportunities will be given to qualifying energy efficient construction projects and retrofits. Ultimately, the goal is

to make commercial building space in the United States 20 percent more energy efficient by the year 2020 and save businesses across the country \$40 billion per year in energy costs²⁷.

Land Use Planning

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. 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. Examples of land use tools that can help reduce vehicle miles traveled include:

- Initiating impact fees that require developers to pay for the increased demands on infrastructure they generate.
- 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.
- Promoting development around transportation facilities, including transit stations. This practice, known as Transit-Oriented Development (TOD), allows people to utilize modes of transportation other than the personal automobile.
- Techniques such as density transfer credits, lot size averaging and infill development target future growth to specific areas in a community, which can increase density and lessen the demand for transportation-related energy usage. Techniques such as these also help to preserve open space areas in a community.

Energy-efficient development can also be used to incorporate site-design techniques that take advantage of sun exposure, differences in microclimate, landscaping, as well as planning techniques that can be used in designing housing, deciding on density levels, integrating different land uses, and designing transportation and circulation systems. Energy-efficient planning techniques can also be implemented through the use of traditional police power controls such as site plan, zoning and building code.

Energy Planning is essential for determining which techniques will offer each community the most sustainable energy program. New Hampshire municipalities have begun to incorporate either an Energy Master Plan or an Energy chapter into their Municipal Master Plans. Other ways municipalities in New Hampshire are addressing energy planning include Local Energy Committees or Commissions (LECs) as well as energy efficiency ordinances for municipal energy use. The ETAP program cited above is playing an important role for moving municipalities forward towards better energy planning.

²⁷ White House.gov, <http://www.whitehouse.gov/the-press-office/2011/02/03/president-obama-s-plan-win-future-making-american-businesses-more-energy>

Comprehensive Assessment of the Impact of Increased Energy Costs

In response to increased energy costs, Governor Lynch directed state agencies to undertake a comprehensive assessment of the impact higher energy costs will have on the state budget. Additionally, he directed agencies to take additional steps to lower their energy use. This is in response to the recent and dramatic increase in energy costs that the Governor stresses will greatly impact the state's finances.

Governor Lynch asked for state agencies to submit estimates showing any administrative, service or contract costs that may be affected by increased energy prices including:

- Costs for heating buildings;
- Costs for operating vehicles and mileage reimbursements;
- Direct service costs;
- Potential increased program costs;
- Potential increased provider costs.

Governor Lynch issued an executive order directing state agencies to reduce energy use by ten percent in July 2005. His declaration encouraged:

- Tele-conferencing to reduce the need for travel;
- Employee carpools to meetings;
- Restricting discretionary travel to the extent possible;
- Reducing energy use in state facilities by turning off unused appliances and lights, and lowering the thermostat.

Governor Lynch has also been a staunch supporter of the 25 x 25 initiative. Around the country, state and local governments have the market power to purchase renewable power. New Hampshire, and in particular the Southern New Hampshire Planning Commission region, should consider purchasing a fixed percentage of its power from renewable sources. Doing so will not only demonstrate the commitment of state and local government to use its market power to encourage environmentally responsible electricity generation, it will serve as an example for others.

It is expected that the purchase of renewable electricity will cost more than the purchase of fossil fuel power, and the municipalities in the region should consider this increased cost when weighing what percentage of power to purchase from renewable generation. However, as a leader in environmental responsibility and a major consumer of electricity, the region should not miss the opportunity to use market-based, non-regulatory power to help shape the region and the state's competitive electricity market.

Currently the Southern New Hampshire Planning Commission is participating in PSNH's Small Business Efficiency Program. This will enable the Commission to conserve energy and cut energy billing costs. Programmable thermostats were installed and new Energy Star light bulbs will replace the old ones.

Issues and Concerns

The Southern New Hampshire Planning Commission has identified the following as issues that will have an impact on energy production and use in the region in the

upcoming years. When addressing energy policy the following should be taken into consideration:

Volatile Fuel Prices

Develop conservation programs, identify alternative energy resources, examine infrastructure development issues, understand and monitor the impact of market design on operational efficiency and resource development, and propose solutions.

Impact of Electric Industry Restructuring

Monitor energy prices and advise the municipalities on restructuring issues.

Consolidation of Northeast Energy Markets

The federal Energy Regulatory Commission has indicated its preference to combine New England, New York, and Mid-Atlantic electricity markets into a single market, with a single system operator. There are numerous technical and logistical challenges to overcome if a successful Northeast Market is to be developed. Additionally, the financial implications for residents of the Southern New Hampshire region, impacts on system reliability, and ability to influence market design and operations are unknown.

Energy Resource Diversity as a Means to Energy Security

Having a mix of energy supplies can reduce disruptions and mitigate the price volatility of fossil fuels. Indigenous energy resources can improve local energy security. The Southern New Hampshire region will face many decisions related to energy security and will need to assess the pros and cons of government intervention to achieve diversity goals.

The Inter-relationship of Energy and Environmental Policy

The Southern New Hampshire Planning Commission recognizes that environmental policy decisions can affect energy choices, prices, and reliability, and energy policy decisions can affect environmental quality and the region's ability to meet environmental goals. There is a need for close coordination between energy and environmental policymakers to more effectively achieve common goals and to ensure that their respective decisions do not inadvertently work at cross purposes.

Land Use Patterns/Sprawl

The Southern New Hampshire Planning Commission recognizes that current zoning regulations and patterns of development are not conducive to reductions in energy consumption. Working with the municipalities in the region to encourage smart growth development principles and educating citizens about best practice homebuilding is an essential tool in reducing energy demand.

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.

Transportation Alternatives

The Southern New Hampshire Planning Commission recognizes that transportation is an activity that consumes a great deal of fossil fuel. There are numerous opportunities to create alternatives to the single-occupancy vehicle travel that we are so accustomed to today. The Southern New Hampshire Planning Commission can work with municipalities to upgrade fleets, incorporate the use of alternative fuels, institute non-idling policies and create incentives for efficient car use. Additionally, when the use of alternative fuel in private automobiles becomes more common, accommodations for new fueling infrastructure should be made as needed.

New Trends

There are many sources of alternative energy that are becoming more readily available and have proven to be energy efficient and environmentally sound. The Southern New Hampshire Planning Commission must work with the municipalities in the region to explore these possibilities.

Energy Efficient Development

Communities can implement energy efficient regulations through a number of ways to minimize the impact of public utilities. For communities looking for easy and less burdensome ways to implement energy efficiency they can develop language to the regulations that can be adapted to subdivision or site plan regulations. Towns could also adopt additional building codes that exceed the state energy codes for residential and non residential construction or adopt performance zoning ordinance encouraging the voluntary implementation of energy efficient practices for new construction in exchange for a set of incentives or bonuses. When all three alternatives are used in combination the greatest energy savings results will be achieved.

For guidance on these practices please refer to the New Hampshire Innovative Land Use Planning Techniques: A Handbook for Sustainable Development, October 2008.

Small Wind Electric Systems

Small Wind Electric Systems can make a significant contribution to our nation's energy needs. Although wind turbines large enough to provide a significant portion of the electricity needed by the average U.S. home generally require one acre of property or more, approximately 21 million U.S. homes are built on one-acre and larger sites, and 24 percent of the U.S. population lives in rural areas.

A small wind electric system can work if:

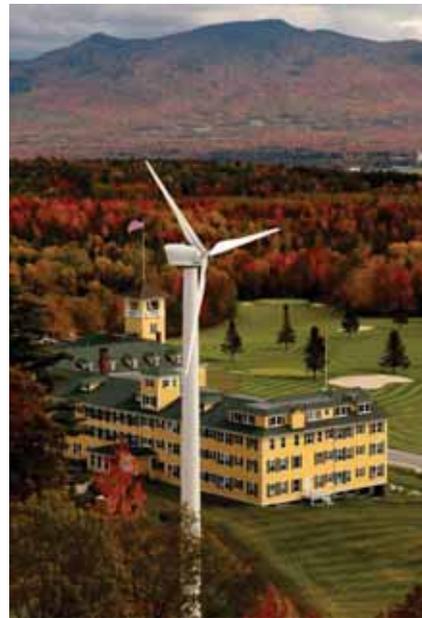
- There is enough wind in the area;
- Tall towers are allowed in the neighborhood or rural area;
- There is enough space;
- The resident can determine how much electricity he or she needs or wants to produce;

- It works economically.

Depending on the wind resource, a small wind energy system can lower an electricity bill by 50 to 90 percent, help avoid the high costs of having utility power lines extended to remote locations, prevent power interruptions, and most importantly, is non-polluting. Moreover, excess energy produced by a turbine can be sold back to the existing electric grid. A small wind electric system might be a practical option for homes or businesses:

- Whose property has a good wind resource;
- Located on at least one acre of land in a rural area;
- Local zoning codes or covenants allow wind turbines;
- Whose average electricity bills are \$150 per month or more;
- Whose property is in a remote location that does not have easy access to utility lines;
- Are comfortable with long-term investments.

Using wind to generate electricity is currently being researched in the state. Alternative energy advocates are currently looking at several New Hampshire communities such as Claremont as possible locations to expand the use of wind power to generate electricity. State officials believe that wind power could someday contribute 10 percent of New Hampshire's power supply. However, there is resistance to creating such wind farms. Some people object to the large turbines and dislike their placement on visible hillsides. Additionally, wildlife organizations have expressed concern regarding bird and bat mortality related to turbines.²⁸ The image to the right shows a small wind turbine that was recently installed at the Mountain View Grand Hotel in Whitefield.²⁹



Biomass

Biomass materials consist of whole-tree wood chips (undried, unprocessed wood chips with bark attached), stumps, brush and smaller low-lying vegetation, low-grade woods, and other plan material unusable in timber or paper production. These materials can result from normal forestry practices such as timber harvesting and fire control measures, or from clearing land for homes, roads and commercial developments. For wood-fired power generation and steam generation for heat (district heating), natural residue from sawmills and other clean wood byproducts can be added to the mix.

²⁸ Extensive information on small wind electric systems as they apply to New Hampshire can be found in *Small Wind Electric Systems: A New Hampshire Consumer's Guide* at: http://www.windpoweringamerica.gov/filter_detail.asp?itemid=317

²⁹ Photo taken from Green Lodging News, <http://www.greenlodgingnews.com/>

A trend to implement such resources has grown in the New England region. **The Northeast Biomass Thermal Working Group** (NEBTWG) is a coalition of biomass thermal advocates committed to working together to advance the use of biomass for heating and CHP (combined heat and power) in the northeastern United States.

Some activities that they are working on are³⁰:

- Policy and regulatory advocacy at the local, state, and regional levels
- Development, promotion, and distribution of the Heating the Northeast with Renewable Biomass 2025 Vision
- Outreach to allied groups and organizations to expand network of biomass thermal advocates in the Northeast
- Identification and prioritization of key policy, regulatory and public relations issues facing biomass thermal industry
- Information and data collection to assist/influence policy makers and regulators
- Coordination of advocacy to federal delegations on key issues in Washington
- “Best ideas” sharing across region

The Renewable Biomass 2025 Vision could:

- Supply 19 million green tons of sustainable biomass for thermal energy available annually from forest and farm sources
- Achieve 25% of all thermal energy from renewable resources by 2025
- Achieve 75% of thermal renewable energy from biomass by 2025
- Convert 1.38 million households in the seven states to biomass for thermal needs
- Improve air quality, reduce greenhouse gases and build healthier communities
- Reduce 1.14 billion gallons of heating oil annually
- Reinvest \$4.5 billion in resulting economic wealth in the Northeast economy
- Create 140,200 jobs

For small-scale domestic applications of biomass the fuel usually takes the form of wood pellets, wood chips and wood logs.

In New Hampshire the Northern Wood Power Project at the Schiller Station in Portsmouth is the first biomass project in the state. It is the first non-hydro, commercial scale renewable project. Over 50 MW of coal-fired power generation was replaced by a biomass boiler. This project developed by PSHN will burn wood chips and other clean wood products. In addition to creating a market for woodchips from New Hampshire’s many logging operations, the facility is now a major regional contributor of renewable energy.

There are two main ways of using biomass to heat a domestic property:

- Stand-alone stoves providing space heating for a room. These can be fuelled by logs or pellets but only pellets are suitable for automatic feed.
- Boilers connected to central heating and hot water systems. These are suitable for pellets, logs or chips, and are generally larger than 15 kW.

³⁰ Northeast Biomass Thermal Working Group <http://www.nebioheat.org/vision.asp>

Solar Electric (Photovoltaic) Systems

Stonyfield Farms in Londonderry recently added a 5,000 square foot photovoltaic array on top of the roof of their yogurt facility. The integrated array will generate about 50,000 watts of energy on full sun days. This is enough to power 1,600 LCD computer monitors or 500 100W light bulbs. It is comparable to the amount of electricity 10 homes might use on an annual basis.

Hybrid solar lighting collects sunlight and routes it through optical fibers into buildings where it is combined with electric light in "hybrid" light fixtures. Sensors keep the room at a steady lighting level by adjusting the electric lights based on the sunlight available. This new generation of solar lighting combines both electric and solar power. Hybrid solar lighting pipes sunlight directly to the light fixture and no energy conversions are necessary, therefore the process is much more efficient.

Until recently, the Stonyfield solar array was the largest in New Hampshire. However, Exeter High School recently added over 350 solar panels that will create over 80,000 watts of electricity initially and up to 100,000 watts in the future. The panels at EHS are expected to produce seven to ten percent of the electricity used by the school and save them \$20,000 per year over the next decade. The first phase of the project, 3,000 watts of production, was completed in December of 2009.

Under the financing agreement with the contractors of the project, several groups working under the title New Hampshire Seacoast Energy Partnership, the Exeter Region Cooperative School District will pay approximately \$150,000 per year for 10 years after which the school district will own the equipment outright.³¹ This project shows that sustainable, renewable energy measures can be taken at the municipal level and lead to thousands of dollars in cost savings.

PSNH also produces a significant amount of solar electricity. Their headquarters in Manchester, located in a reused mill building, is equipped with 183 roof panels that produce over 51,000 watts of electricity, resulting in an estimated reduction of 100,000 pounds of carbon dioxide emissions. The panels, shown in the picture below, will satisfy approximately five percent of the energy needs for PSNH's Energy Park facility.

³¹ Seacoast Online.com, accessed 1/20/11, <http://www.seacoastonline.com/articles/20091009-NEWS-910090323>, and, Revolution Energy, <http://www.rev-en.com/>, and Coolerplanet.com



Source: PSNH

Solar Heating

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.

Self-Contained Solar Units

On a smaller scale, solar energy can be harnessed using self-contained units to power street and crossing lights, parking lots, parks, bus shelters, trails and advertising billboards. These self-contained solar units do not need to be tied into the existing electric grid and do not require difficult underground wiring. They 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. These relatively inexpensive and easy-to-install units are becoming increasingly popular as a safe, cost effective and efficient way for municipalities to take their first steps toward renewable energy use. The picture below is an example of a self-contained solar powered street light.



Source: Techno Green Energies, <http://technogreenenergies.com/>

Hydro Electric

Hydro electric is an excellent source of clean, renewable power. There are many hydro electric dams located in New Hampshire that produce about six percent of the state's electricity needs. The Northern Pass transmission project, currently in the planning and permitting stages, is a measure designed to deliver up to 1,200 additional megawatts of low-carbon, renewable energy (predominantly hydropower) from Québec to New England's power grid. Currently Hydro-Québec has an available supply of over 42,000 MW of electricity—more power than all of New England's power plants combined.

A study is currently underway to determine the best potential route for Northern Pass infrastructure according to issues of technical and geographical feasibility, rights of way access and potential environmental and social impacts. It has already been decided that a substation in Deerfield is the optimal location for the Northern Pass to connect into the region's alternating current (AC) electric grid. From this terminal location the 1,200 megawatts (MW) of power will be distributed.

This innovative transmission project will expand the region's fuel diversity significantly, strengthening the local economy and supply a long-term, stable supply of renewable electricity to the Southern New Hampshire region, the state of New Hampshire and large parts of New England for decades to come. It will also help the state in its goal of

reaching 25 percent renewable energy usage by 2025. Other environmental and economical benefits of the project include:

- Renewable Power at Competitive Costs for the Long-Term;
- Stronger Local Tax Bases;
- Hundreds of Local Jobs;
- Resource Diversity;
- Major Source of Low-Carbon Power;
- Complementing Local Renewable Development;
- Meeting Future Energy Needs.³²

Light Emitting Diodes

For most applications, LEDs can last up to 20 years and require less maintenance than conventional incandescent bulbs, which often burn out after only a year. Traffic lights using incandescent bulbs may typically use about 150 watts per hour, 24 hours a day. LEDs only require 15 watts, a 90 percent reduction in power consumption. Multiply these savings per every traffic light and it's easy to see that the energy savings are significant. LEDs can be used for:

- Commercial lighting;
- Traffic lighting;
- Industrial lighting;
- Street lighting;
- Flashlights;
- Light bulbs for home or office;
- Fluorescent replacements;

In November and December of 2009, the T.J. Maxx Plaza on South Willow Street in Manchester was used as part of a study for the U.S. Department of Energy (DOE) GATEWAY Solid-State Lighting Technology Demonstration Program. This federal program is designed to provide real-world demonstration experience and data on state-of-the-art solid-state lighting (SSL) product performance and cost effectiveness.

The 151,000 square foot parking lot was incurring high maintenance costs from the need for frequent lamp replacements in its 25 year old luminaries and needed an update. 25 new LED luminaries were placed in the lot, each controlled by an integral occupancy sensor that varies its operation between “high” and “low” light output settings according to the occupancy of the parking lot and the time of day. The study determined that the payback period for the LED installation was approximately three years and that they provided the parking lot with a fifty eight percent energy savings. The picture below shows a comparison of the new LED lighting (left) and the old, standard luminaries (right) at the project’s midpoint.

³² The Northern Pass, <http://www.northernpass.us/index.html>



Source: Final Report prepared in support of the U.S. DOE Solid-State Lighting Technology Demonstration GATEWAY Program, June 2010

When patrons and employees of the shopping center were surveyed, seventy-nine percent said the replacement lighting system provided more light, twenty-two percent felt the lighting was about the same as in the original parking lot, and no one who responded felt the lighting had gotten worse.³³ The picture below shows the parking lot after the completion of the LED installation

³³ U.S. DOE Solid-State Lighting Technology Demonstration GATEWAY Program Report, June 2010, http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_tjmaxx.pdf



Source: Final Report prepared in support of the U.S. DOE Solid-State Lighting Technology Demonstration GATEWAY Program, June 2010

Alternative Automobile Fuels

Alternative fuels are becoming increasingly popular with American consumers, who are looking to decrease their carbon footprint and become less dependent on volatile fossil fuel prices and supplies. In response, automakers have been steadily increasing production of plug-in electric vehicles that run completely on electricity, alternative fuel vehicles that run on cleaner combustible fuels and hybrids that run on a mix of combustible fuel and electric battery power. Governments have promoted the use of alternative fuel vehicles by offering tax incentives and subsidies to consumers.

The Chevrolet Volt is currently the most fuel efficient car on the market in the United States, recently surpassing the Toyota Prius for that distinction. It gets the equivalent of 93 miles per gasoline gallon when running on battery power alone and has the ability to go 25 to 50 miles on battery power, after which can be fueled by a small gasoline powered engine. It can be charged in a standard residential electrical outlet.³⁴ Regarding the future of electric vehicles and their benefits, Chevy states, “Put simply, electricity is a cleaner source of power. And as technology improves in the generation of electricity, we will continue to see reduced carbon outputs. Advancements in electricity production along with reduction in emissions from electric-powered driving could help make our world a cleaner place.”

³⁴ Chevrolet, <http://www.chevrolet.com/volt/features-specs/>

With the popularity, affordability and importance of alternative fueled vehicles rising, the region must remain conscious of new developments in technology and remain equipped with the necessary infrastructure updates to foster growth in this area. This would involve, for instance, the adequate placement of recharging facilities and increased capacity on the grid for electric vehicles and the provision of alternative fuel pumps at filling stations for alternative fuel vehicles.

Conclusion

Region-wide energy efficiency can best be implemented when other public policies are taken into consideration. Implementation of energy measures can only work when integrated with programs dealing with other region-wide issues such as land-use, air quality, transportation, housing and economic development and other issues that are at the forefront of the Southern New Hampshire Planning Commission's efforts to make our region a healthier and more functional place to live.

The Southern New Hampshire Planning Commission recognizes that a region-wide energy plan needs to be created to ensure that municipalities have access to accurate energy information. Current energy challenges require that we move forward to achieve adequate, affordable, efficient, and environmentally sound energy supplies in our region and the State of New Hampshire as a whole. It will be important for the Southern New Hampshire Planning Commission and other regional planning commissions in New Hampshire to work together with the state to create awareness on this issue. The education and dissemination of programs and alternatives is key to region-wide energy efficiency.

The Southern New Hampshire Planning Commission encourages all of the communities in the region to evaluate the effects of plans, programs, and policies on energy use, and to determine how to reduce energy impacts by making more efficient use of all energy resources.