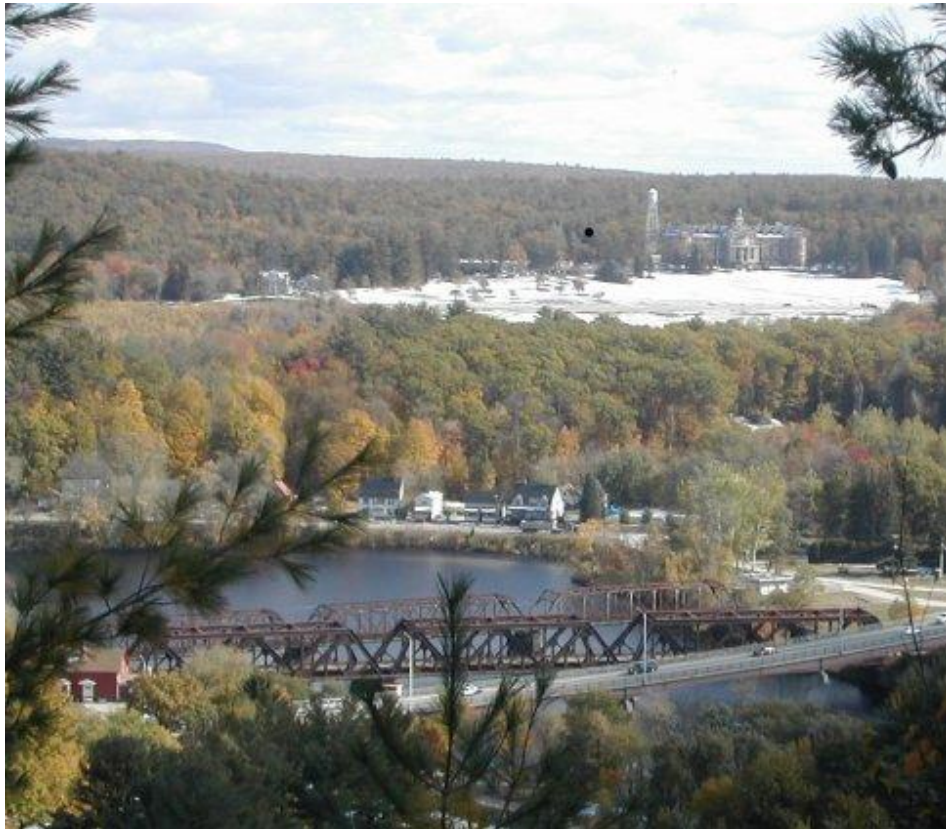


Town of Hooksett Master Plan Energy Chapter



Hooksett, New Hampshire
Bridge over Merrimack River

Prepared by the Town of Hooksett Energy Advisory Committee
& Southern New Hampshire Planning Commission

Adopted March 19, 2012

**This Energy Chapter has been prepared by the Town of Hooksett's
Energy Advisory Committee with the assistance of the SNHPC.
It was adopted by the Hooksett Planning Board as a chapter in the
Town's Master Plan on March 19, 2012**

Energy Advisory Committee Members:

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1. Introduction

1.1. Purpose

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



1.2. Energy Conservation Related to Sustainability

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

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

Energy efficiency serves many purposes which include:

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

1.3. Hooksett Energy Goals and Objectives

Overall Goals Set Forth by the NH Climate Action Plan:

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

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

Town of Hooksett Energy Goals

- Reduce overall energy use and emissions and promote energy conservation throughout the community through increased public awareness and planning.
- Monitor existing energy use of town buildings/facilities and produce an Annual Energy Use Reduction Progress Report for the Town Administrator.
- Increase community participation on Hooksett's Energy Advisory Committee.

Objectives:

- Develop long term energy goals and projects to promote greater efficiency, conservation, independence, energy cost savings.
- Consider setting targets for reducing municipal and/or community energy use over the next five and ten years.
- Promote public and private (nonresidential/residential) participation in programs to reduce energy costs such as MyEnergy.net.
- Plan for efficient growth and development patterns within the community (promoting Smart Growth and Energy Sustainability practices).
- Encourage business owners and residents to develop energy efficiency improvement plans and install "energy star" appliances and renewable solar, wind and wood energy efficiency heating systems.
- Consider offering property tax exemptions as provided by RSA 72:61-72 for the installation of eligible renewable energy systems.
- Consider adopting the 2012 IECC – RSA 155-A:2(VI) allows municipalities to adopt stricter measures than the New Hampshire State Building Code.
- Explore available grants and loans to make energy efficiency improvements and install renewable energy systems for both public and private buildings.

2. State Statutes/Plans/Programs Related to Energy

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

RSA 672:1 III. provides regulations to enhance the public health, safety and general welfare and encourage the appropriate and wise use of land. **RSA 672:1 III-a.** provides regulations to encourage energy efficient patterns of development, the use of solar energy, including adequate access to direct sunlight for solar energy uses, and the use of other renewable

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

forms of energy and energy conservation. As a result, zoning ordinances should not unreasonably limit installation of solar, wind, or other renewable energy systems or the building of structures that facilitate the collection of renewable energy, except necessary to protect the public health, safety, and welfare.

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

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

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

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

HB 585 now signed into law does four things that may be of interest to town planners and municipal boards: (1) requires all new and replacement outdoor lighting (including roadway lighting) installed with state funds to be fully shielded, “dark sky friendly” and not to exceed minimum lighting levels recommended by standards organization IESNA (Illuminating Engineering Society of North American) unless it can be shown that compliance would increase installation costs or compromise safety; (2) requires utilities to provide fully shielded dark-sky compliant streetlight fixtures to NH municipalities as the default model, although local governments can choose other designs if they wish; (3) tells Public Utilities Commission to set a “midnight service” rate for streetlighting that allows utilities to install inexpensive timers on non-essential lights selected by the municipalities, to turn them off at midnight, thereby cutting energy consumption by half; and (4) establishes a statewide policy on protecting New Hampshire dark skies as a cultural asset important to rural character and the tourism industry.

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

2.1. New Hampshire Climate Action Plan

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

The Climate Action Plan recommends that New Hampshire strive to achieve long-term reductions in greenhouse gas emissions of 80 percent below 1990 levels by 2050. The Climate Change Policy Task Force also recommends 67 specific actions to achieve the following goals:

- Reduce greenhouse gas emissions from buildings, electric generation, and transportation;
- Protect natural resources to maintain the amount of carbon sequestered;

- Support regional and national initiatives to reduce greenhouse gases;
- Develop an integrated education, outreach and workforce training program; and
- Adapt to existing and potential climate change impacts.

It is envisioned that with participation from all communities, the NH Climate Action Plan will benefit the economy, increase state and regional energy security, and improve environmental quality. In order to meet the recommended goal of reductions in greenhouse gas emissions statewide, it states that NH communities must engage in local energy planning that includes strategies for decreasing their overall emissions.

3. Existing Conditions

3.1. State Energy Supply and Consumption

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

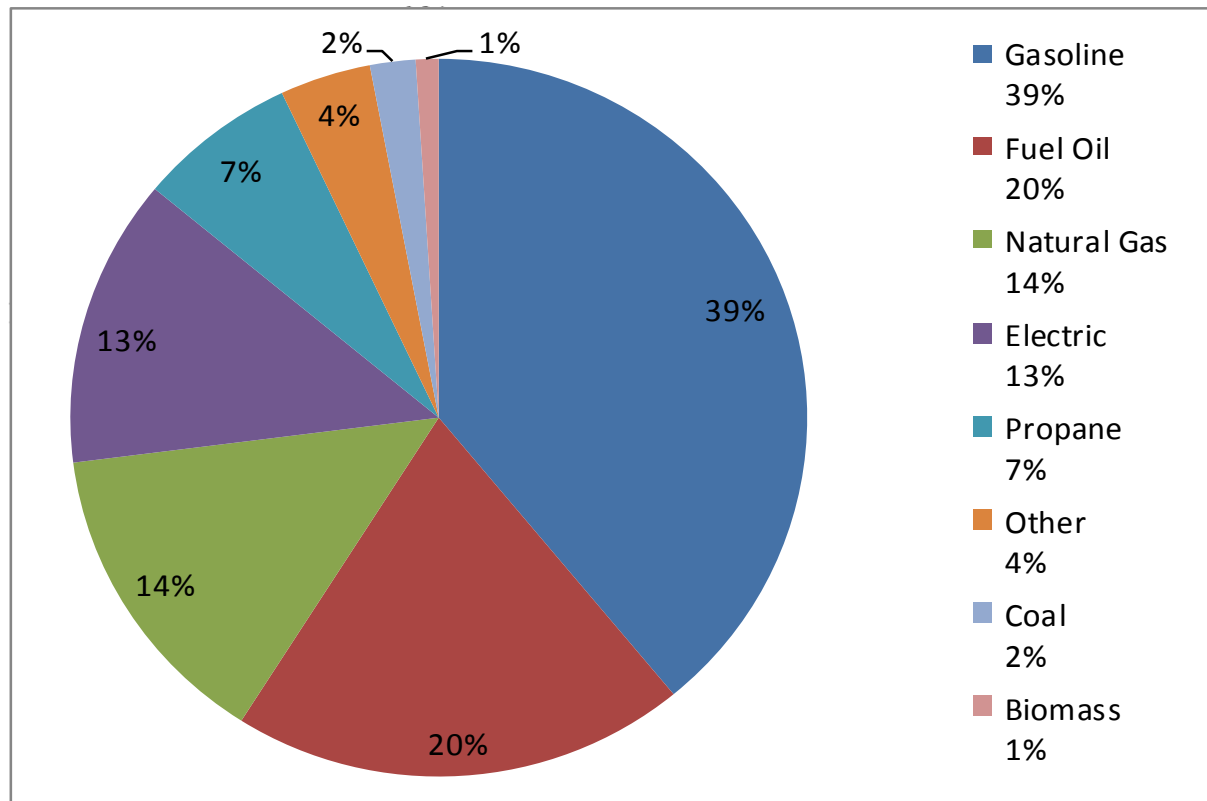


Figure 1.1³

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

² New Hampshire Office of Energy and Planning

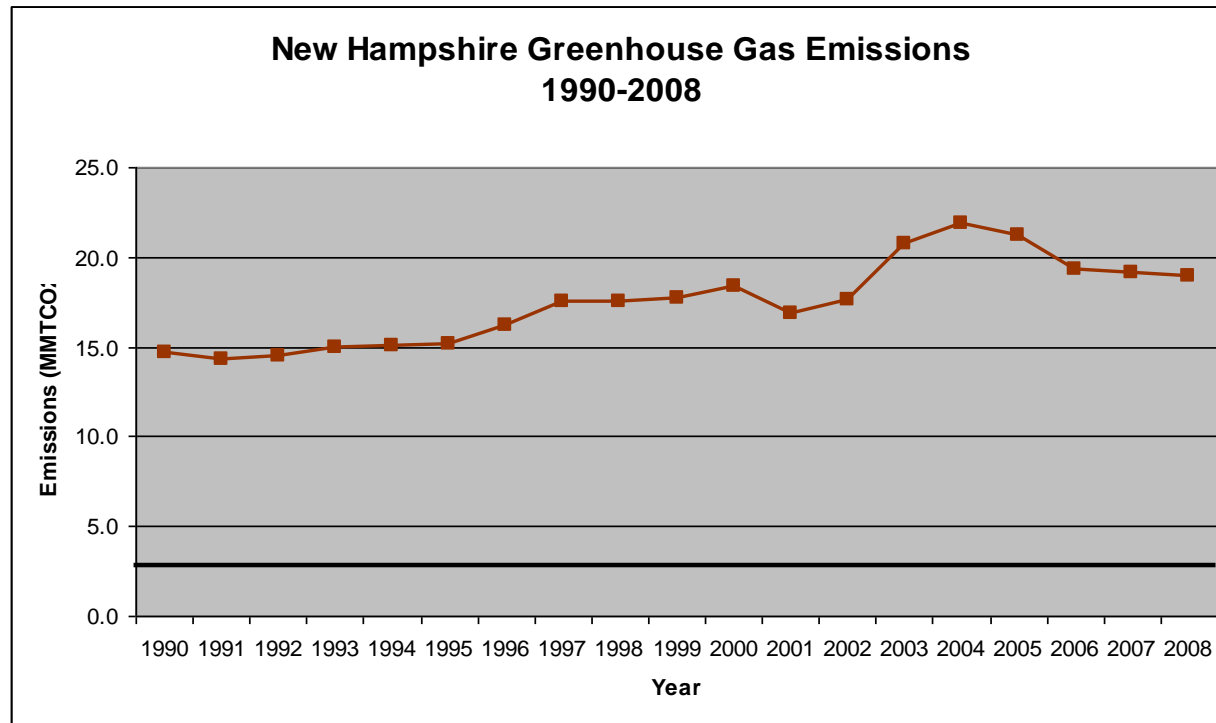
³ Energy Information Administration, State Energy Data System 2008, "Table S1b Energy Expenditure Estimates by Source, 2008," http://www.eia.gov/emeu/states/hf.jsp?incfile=sep_sum/plain_html/sum_ex_tot.html.

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

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

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

Figure 1.2

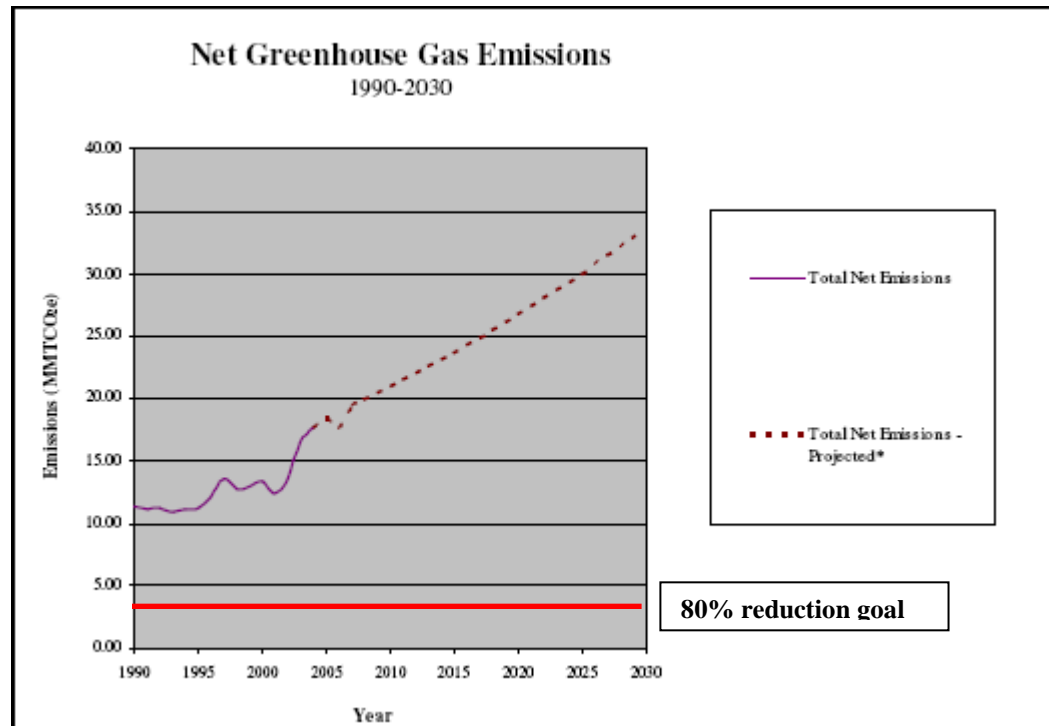


Source: U.S. Energy Information Administration. http://www.eia.gov/oiaf/1605/ggrpt/excel/tbl_statetotal.xls. Retrieved 2011-09-14.

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

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

Figure 1.3



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

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

3.2. Hooksett Energy Inventories/Audits

Hooksett participated in the Energy Technical Assistance and Planning (ETAP) Program during 2010-2011, administered by the New Hampshire Office of Energy and Planning. The town received an initial high level energy assessment of three municipal buildings as part of this program to address the town's interests and needs with respect to energy efficiency improvements and capital upgrades. Those buildings include the Public Works Building, Public Safety Building, and the Municipal Building. Table 1⁸ shows the annual utility use and energy density of these three buildings based on data collected from 2009-2011. The highest energy use per square foot of the three municipal buildings assessed is the Public Safety Building, followed by the Municipal Building. These two buildings have the most opportunity for energy reduction and savings in town.

Table 1: Annual Utility Cost and Energy Cost Intensity

Facility	Square Footage	Electric Cost (\$)	Waste Oil Cost (\$)	Propane/ Gas Cost (\$)	Cost per Square Foot
Public Works	18,000	7,533	8,100	2,589	1.01
Municipal Building	37,500	25,091		20,031	1.20
Public Safety	35,820	56,028		13,961	1.95
Total	91,320	\$88,652	\$8,100	\$36,581	\$1.46

¹ Thousand Btu per square foot of gross floor area, reported separately for oil, electricity, and total. ENERGYSTAR reports that total values can range from 30 kBtu/Sf to 340 kBtu/SF.

The Town Hall has a number of opportunities for energy reduction and savings outlined in Table 2. Further details on these recommendations and the others mentioned can be found in the attached "Energy Efficiency Opportunities for Town Facilities in Hooksett, New Hampshire" document, dated December 2, 2010.

⁸ Peregrine Energy Group. *Energy Efficiency Opportunities for Town Facilities in Hooksett, New Hampshire*. December 2, 2010.


Table 2: Summary of Recommendations for the Department of Public Works

	Description	Approximate Implementation Cost	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings			Annual Cost Avoidance	Simple Payback Yr
					Electric kWh/yr	Waste Oil Gal/yr	LP Gal/yr		
1	Program Office Thermostat	\$0			1,000	-	150	\$500	<1
2	Turn Lights Off in Garage	\$0			1,200	-	-	\$200	< 1
3	Turn Off Compressor at Night	\$0			1,300	-	-	\$200	<1
4	Air Seal Building	\$4,000		A	500	300	-	\$500	7 - 9
	<i>Estimated Program</i>	<i>\$4,000</i>	<i>\$0</i>		<i>4,000</i>	<i>300</i>	<i>150</i>	<i>\$1,400</i>	<i>2.9</i>

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

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

Current Utility Budget:  \$18,222 /yr

Percent Reduction: 8%


Table 3: Summary of Recommendations for the Municipal Building

	Description	Approximate Implementation Cost	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings		Avoidance	Payback
					Electric kWh/yr	Natural Gas Therms/yr		
1	Monitor and Adjust HVAC Equip.	\$10,000		A	8,000	500	\$2,200	3 - 5
2	Install Lighting Controls	\$5,000	\$200		5,000	-	\$800	5 - 7
	<i>Estimated Program</i>	<i>\$15,000</i>	<i>\$200</i>		<i>13,000</i>	<i>500</i>	<i>\$3,000</i>	<i>4.9</i>

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

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

Current Utility Budget:  \$45,122 /yr

Percent Reduction: 7%


Table 4: Summary of Recommendations for the Public Safety Building

	Description	Approximate Implementation Cost	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings		Avoidance	Payback
					Electric kWh/yr	Natural Gas Therms/yr		
1	Airseal Building and Asses Ducts	\$10,000		A	4,000	400	\$1,400	7 - 9
2	Install T5 Lighting	\$8,000	\$500	B, C, D	11,000	-	\$1,800	3 - 5
3	Install Economizer Dampers	\$10,000			8,000		\$1,300	6+
	Estimated Program	\$28,000	\$500		23,000	400	\$4,500	6.1

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

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

Current Utility Budget:  \$69,989 /yr

Percent Reduction: 6%

Further Notes: Inclusion in the Town's CIP and Energy Star's Portfolio Manager

On September 22, 2011, the Town's Energy Advisory Committee decided not to add any of these proposed energy efficiency improvements to the 2012 CIP. However, the Advisory Committee will review the advisability of adding electric hot water heaters to improve hot water distribution in the Municipal Building, and will also contact PSNH regarding the replacement of HO-T12 lighting fixtures in the Public Safety Building garage. Finally, the Advisory Committee has recommended that window replacements for the Public Safety Building be pursued as a future CIP.

It has also been recommended that the town make use of Energy Star's Portfolio Manager, which is an interactive energy management tool, allowing the tracking and assessment of energy and water consumption across an entire portfolio of buildings in a secure online environment. The Portfolio Manager can help to set investment priorities, identify under-performing buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance. A full explanation of the Portfolio Manager, along with a full copy of the above Peregrine Energy Assessment/Audit, will be added to the Appendix of this report.

3.3. Renewable Energy

Renewable energy flows involve natural phenomena such as sunlight, wind, tides, plant growth, and geothermal heat, as the International Energy Agency explains:⁹

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

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

State law, RSA 72: 61-72 grants municipalities the option to exempt certain renewable energy installations from property taxation. Incentives such as this encourage people to explore different options for home heating and energy, leading to an improvement in the region's economic vitality and energy sustainability.

3.4. Transportation

Transportation is an activity that consumes a great deal of fossil fuel. As communities grow and physically spread out, vehicle miles traveled per household and the associated energy demand have increased to support a more auto-dependent lifestyle. This practice is energy and resource inefficient and promotes unsustainable future transportation, land and energy use trends. Strategies for reducing vehicle miles traveled and reliance on automobiles can help to create a more sustainable, energy efficient transportation network. These strategies can also create transportation systems that better serve more people while fostering economic vitality for both businesses and communities. Strategies include providing multiple routes and multiple types of transportation, providing access to public transportation, implementing complete streets design standards and planning more mixed-use and compact development where appropriate.

Complete streets (sometimes livable streets) are roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users, including pedestrians, bicyclists, motorists and public transport users of all ages and abilities.¹⁰

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

Major streets with moderate to high volumes of traffic should be transformed into “complete streets.” According to the American Planning Association, complete streets allow free and uninterrupted transportation for pedestrians, bikers, and public transit vehicles.¹¹



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

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

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

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

¹⁰ Ritter, John (2007-07-29). *Complete streets' program gives more room for pedestrians, cyclists*. [USA Today](http://www.usatoday.com/news/nation/2007-07-29-complete-streets_N.htm). http://www.usatoday.com/news/nation/2007-07-29-complete-streets_N.htm. Retrieved 2011-09-07.

¹¹ “Complete Streets,” *American Planning Association*. <http://www.planning.org/research/streets/index.htm>. Retrieved 2011-12-21

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

Ramps should comply with the Americans with Disabilities Act and “universal design” standards.”¹²

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

3.5. Land Use

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

- Initiating impact fees that require developers to pay for the increased demands on infrastructure they generate.
- Encouraging alternative forms of transportation in the planning and design of the community.
- Encouraging energy efficient development through subdivision and site plan review regulations, zoning ordinance and building codes. Site design techniques that take advantage of sun exposure, differences in microclimate, and landscaping reduce a development’s demand for fossil fuel derived energy sources and reduce overall energy consumption.¹³

3.6. Building Codes

Building codes can be used to promote sustainable, energy-efficient construction in the built environment. Programs like the U.S. Department of Energy’s Building Energy Codes Program (BECP) and certifications such as Leadership in Energy & Environmental Design (LEED) offer guidelines and metrics that can be used to

¹² Walkable and Livable Communities Institute. “Toward a More Walkable and Livable Manchester Technical Memorandum.” June 2011.

¹³ Model ordinance language can be found in *Innovative Land Use Planning Techniques*. October 2008.

increase a building's energy performance and result in greater energy efficiency and ultimately cost savings.

Current building codes represent the minimum legal energy efficiency for structures. These standards focus on the building envelope and mechanical systems and disregard natural and renewable means of reducing a building's environmental impacts. By applying passive solar design in conjunction with building codes, energy utility bills can be decreased by 30 percent. Add to that "well insulated and tightly constructed building shells" and the savings can reach 75 percent.¹⁴

RSA 155-A: 2 VI allows municipalities to adopt more stringent building codes than the state codes. For examples of more stringent standards that a community may adopt to achieve desired energy savings see the Innovative Land Use Planning Techniques Handbook.¹⁵

4. Planning Roles

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

4.1. State-Level Energy Agencies

- **NH Office of Energy and Planning:** NHOEP is a cabinet-level division of the New Hampshire Executive Branch and reports directly to the Governor. It is charged with overseeing and carrying out a wide array of energy-related activities, including but not limited to the following:
 - Coordination of programs funded by the 2009 American Recovery and Reinvestment Act (ARRA), popularly known as the "Stimulus"
 - Statewide administration of the Fuel Assistance Program (see below)
 - Management of the State's "25 by '25 Program," which seeks to ensure that at least 25% of NH energy comes from renewable sources by 2025
 - Administration of the State's Weatherization Program (see below)
- **NH Public Utilities Commission (PUC):** A watchdog agency also affiliated with the Executive Branch, whose job is to make sure that customers of regulated utilities receive safe, adequate and reliable service at just and reasonable rates. Some of the responsibilities of the PUC include:
 - Monitoring and inspecting gas utilities for safety and proper construction
 - Acting as a mediator in disputes between customers and regulated utility companies

¹⁴ Urban Land Institute, 2000

¹⁵ NHDES. *Innovative Land Use Planning Techniques, A Handbook for Sustainable Development*. October 2008.

- Initiating public hearings, audits of public utilities, and other forms of inquiry and investigation
- **Office of Consumer Advocate (OCA):** An independent state agency administratively attached to the PUC. However, while the PUC is charged with balancing the interests of ratepayers and utility shareholders, the role of OCA is to advocate exclusively for residential ratepayers
- **Energy Efficiency and Sustainable Energy Board (EESE):** The EESE is a relatively new agency, created in 2008 to help promote and coordinate programs relating to energy efficiency, demand response, and sustainable energy in NH
 - Investigates potential sources of funding for energy efficiency and sustainable energy development
 - Works with local communities, non-profits, and civic engagement groups to increase statewide knowledge about energy efficiency
 - Provides recommendations to the PUC about how to spend energy efficiency and renewable energy funds

4.2. State-Administered Energy Programs and Funding Mechanisms:

- **ARRA (Stimulus) Grants:** Between 2009 and 2012, stimulus grants provided \$72 million towards NH energy efficiency projects.
- **State Energy Efficient Appliance Rebate Program (SEEARP):** Offers residential consumers rebates for the replacement of existing hot water heaters, boilers and furnaces to more energy efficient models
- **Enterprise Energy Fund (EEF):** A low-interest loan and grant program to help finance energy improvements in buildings owned or leased by businesses and nonprofits of all sizes
- **State Weatherization Program:** Provides insulation and heating efficiency improvements, carried out by public utility companies and NHOEP
- **RGGI:** The Regional Greenhouse Gas Initiative is a cap and trade program aimed at reducing carbon dioxide emissions across ten participating states in the northeast. It uses sales of emissions permits to fund a wide variety of state-wide energy programs.
- **Low Income Home Energy Assistance Program (LIHEAP):** Offers home-heating assistance to qualifying low-income NH residents
- **Pay For Performance Program:** Helps business owners improve energy efficiency in large commercial and industrial buildings
- **Retail Merchant's Association of NH (RMANH) Energy Program:** Offers detailed energy efficiency audits along with free energy-awareness seminars and printed materials to RMANH members
- **NH Community Loan Fund:** Has provided deep energy efficiency retrofits in approximately 425 manufactured homes located in a score of resident-owned communities throughout the state

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

4.3. Energy and Sustainability Boards/Committees in Hooksett

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

4.4. Current Hooksett Energy Initiatives

One of the most important energy initiatives in Hooksett is the operation of the Town wide Recycling Program. Recycling reduces significant waste disposal

costs and materials for the town and the facility operations are a high energy use and thus important to monitor and continuously seek greater efficiencies.

5. Issues and Concerns

Over the past several years, the Town of Hooksett has made important progress in the areas of energy efficiency and sustainability. Improvements have been made at the Town Recycling Center and to many municipal and school buildings within the community. The Planning Board has adopted a wind turbine ordinance and is currently considering the adoption and inclusion of this plan as a chapter in the town's master plan. However, as Hooksett enters the second decade of the 21st Century, there are still many challenges to overcome.

5.1. Challenges: Some examples of energy-related challenges faced by many communities in New Hampshire, including the Town of Hooksett include:

- 1.) **Volatile Fuel Prices:** The price of oil has increased by more than 400% since 1998, and in New Hampshire, the cost of home heating oil rose 30% between 2010 and 2011¹⁶
- 2.) **Commuter-driven Patterns of Development:** In recent decades, development in the United States has been characterized by sprawl: the tendency of communities to fracture into residential and commercial zones, accessible to each other only by automobile
- 3.) **Lack of adequate Public Transit:** Like many other rural towns, Hooksett lacks access to major public transit lines such as rail or bus
- 4.) **Lack of funding for Energy Efficiency programs:** Between 2009 and 2012, much of NH's energy and sustainability funding came from the ARRA. With stimulus funding scheduled to end by 2012, NH communities will be forced to deal with deep spending cuts in a tough economic climate
- 5.) **Transactional complexity:** Many energy efficiency and sustainability programs in New Hampshire are complex and difficult for the general public to understand. For instance, one recent survey showed that more than 40% of NH residents had little to no idea about where to go for sustainable energy loans, rebates, or grants¹⁷
- 6.) **Lack of Start-up Capital:** Although cost-effective in the long run, many energy efficiency projects require significant up-front costs that businesses and individuals cannot afford
- 7.) **Lack of residential interest and education:** Depending on the project, energy efficiency projects can seem daunting and complex. Lack of residential interest

¹⁶ New Hampshire Heating Oil Dealers and Price Guide. < <http://www.heatingoilnh.com/lowest-prices.htm>
> Retrieved 2011-10-06

¹⁷ *Independent Study of Policy Issues:* Prepared by the Vermont Investment Corporation, June 2011.
Appendix A: Page 3.

and education can present a challenge when trying to make positive changes in a community towards energy efficiency and sustainability.

6. New Opportunities for Energy Efficiency

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

6.1. Opportunities in Renewable Energy

Solar

New Hampshire has an average solar energy density of 4.0-4.5 kWh/m²/day¹⁸, enough to drive significant amounts of energy on the state's rooftops and fields, as well as through larger distributed systems. Costs have indeed been steadily declining over the past few years, with installed costs for a residential-scale PV system currently averaging below \$6.50/W.¹⁹

- **Self-Contained Solar Units** are immune to power outages and offer battery backup for cloudy days. They also are typically easier to maintain than traditionally powered units and reduce ownership costs by eliminating monthly electric bills. Self-contained solar is a good option in places where it may be difficult to run wires or that are especially remote.
- **Solar heating** harnesses the power of the sun to provide heat for hot water, space heating and swimming pools. Solar heating can be either passive, such as simply using large windows to let in more light and warmth, or active, where specially designed mechanical systems increase the heat gained from the sunlight.

Wind

Although only 0.3% of the state's power supply is currently provided by wind, a recent resource assessment by the National Renewable Energy Lab determined that wind could provide up to 60% of the state's current electricity needs.²⁰

- Small wind energy systems are turbines which require 1 acre of open land and can lower electricity bills to homes and businesses by 50 to 90 percent²¹
- Smaller, single-unit wind turbines are also less likely than larger units to raise complaints over scenery issues.

¹⁸ *Independent Study of Policy Issues*: Prepared by the Vermont Investment Corporation, June 2011.
Section 10: Page 28

¹⁹ See above

²⁰ *Independent Study of Policy Issues*: Prepared by the Vermont Investment Corporation, June 2011.
Section 10: Page 31.

²¹ See above

- Recent studies suggest that Hooksett does not have high enough average wind speeds to justify large-scale wind ordinances, although small-scale projects may still be feasible.²²
- On May 12, 2009, Hooksett adopted a zoning ordinance allowing property owners to receive permits for small wind energy systems, provided that such systems conform to designated height, noise level, and setback requirements.²³

Hydro-electric

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

LED Lighting

For most uses, Light Emitting Diodes typically last 20 years, compared to less than a year for incandescent bulbs. In addition to requiring less maintenance, LED bulbs provide up to a 90% reduction in power consumption and have a similarly wide-range of application, from commercial and home use, to street and traffic lighting. As of December 2011, the Town of Hooksett does not offer any financial incentives to developers using LED-certified lighting systems, although such systems are allowed under the current version of the Town's Development Regulations.²⁴



In 2009, the City of Manchester partnered with the Department of Energy to install new LED lighting in the TJ Maxx Plaza on S. Willow Street. The new LED lights (left) outperformed the old incandescent lights (right) by 58%, leading to a projected payback period of less than three years.

²² *Wind Power America*: Prepared by the National Renewable Energy Laboratory, November 2010
<http://www.windpoweringamerica.gov/images/windmaps/nh_80m.jpg>

²³ *Zoning Ordinance of the Town of Hooksett, NH*: Prepared by the Town of Hooksett, 2010. Article 29: Page 166.

²⁴ *Town of Hooksett Development Regulations*: Prepared by the Town of Hooksett, 2010. Section 16.04, Page I-63.

Biomass

Unlike coal and oil, biomass has the ability to quickly replenish itself, and is thus considered a renewable energy source. In 2008, biomass represented over 6.5% of total New Hampshire electric production and just over 4% of residential and commercial & industrial energy consumption.²⁵

- Biomass typically takes the form of unused wood chips, stumps, roots, and discarded crop matter, and thus would not negatively affect the lumber or farming industries.
- It is estimated that biomass will have a particularly large impact in rural communities with easy access to wood and crop materials. Already, more than 10% of rural NH residents use wood as their primary heating source.²⁶
- In a recent study, the Northeast Biomass Thermal Energy Working Group developed a vision for heating the Northeast, which estimated that 19 million tons of forest and crop biomass will be available by 2025 to fuel the region.²⁷

6.2. Other Energy-Efficiency and Sustainability Opportunities

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

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

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

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

6.3. Grant Opportunities

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

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

²⁶ *Independent Study of Policy Issues:* Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 36.

²⁷ *Independent Study of Policy Issues:* Prepared by the Vermont Investment Corporation, June 2011. Section 10: Page 38

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

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

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

7. Recommendations

This section contains a list of energy-related actions recommended for the Town of Hooksett. These recommendations have also been considered by other communities within the region and from initial discussions among Hooksett’s EAC members.

Energy Recommendations for the Town of Hooksett

1. Reduce municipal energy costs by reducing energy consumption.

- a. Hooksett Energy Advisory Committee (EAC) should continue to prioritize energy efficiency recommendations from the December 2, 2010, ETAP Technical Memorandums -- energy audits/assessments performed on the Municipal Building, Public Safety Building, and Public Works Building.
- b. Track energy use in municipal buildings using the Energy Star’s Portfolio Manager (see page 13 of this chapter) or a similar tracking tool. Also, consider utilizing the school district’s suspension program to assist in the data collection effort.

- c. Recommend quarterly or semi-annual reporting on energy use in municipal buildings to the Town Administrator.
- d. Recommend that the Town Administrator assign a responsible party and that the town utilize the services of the Southern New Hampshire Planning Commission to explore the availability of energy efficiency grants.
- e. Recommend that, as the price of hybrid and electric vehicle decreases, the town examine purchase of these vehicles through CIP funds or grants.
- f. Encourage department heads to consider energy efficiency projects and possibilities for cost savings as well as coordination on projects between departments which will increase energy efficiency for town facilities.

2. Increase community awareness, advise and educate residents on reducing energy costs and consumption.

- a. Publicize energy savings measures the town is taking for municipal buildings and progress on reducing municipal energy and costs.
- b. Consider creating a page for the Hooksett Energy Advisory Committee on the Town website and post energy efficiency tips (provided by the HEC) on the homepage periodically. Also, encourage energy efficiency themed booths at Old Home Day, and contact the *Hooksett Banner* to see if they would consider publishing energy efficiency tips and grant opportunities.
- c. Continue to work with the EAC to hold free sustainability workshops/seminars and to hold events with a sustainability focus.

3. Consider ways to decrease energy expenditures, fossil fuel consumption and associated pollution.

- a. Check with the town planning board about the feasibility of offering financial and/or development incentives to builders using LED certified lighting systems.
- b. Consider implementing elements of complete streets design guidelines and conduct an evaluation to determine the best roads/areas to implement these elements.
- c. Consider implementing a Safe Routes to School program.
- d. Consider ways to encourage alternative transportation methods such as ridesharing, public transportation options and expanding trails and bicycle lanes in town. Also, check with local civic organizations, such as Kiwanis International, to see if they would be willing to sponsor and/or promote such efforts.

8. Action Plan

In this final section, an action plan based upon the goals and recommendation contained within this chapter has been prepared as a tool and guide for future consideration and implementation by the Town of Hooksett.

Action Plan

	Recommendation	Who (Leadership)	When (Suggested Deadline)	How (Resources)
1a	Prioritize energy efficiency recommendations from building assessment reports	Energy Advisory Committee/Town Administrator	2012 - 2013	Internal
1b	Assign staff to track energy use in municipal buildings	Town Administrator/Assistant	2012-2013	Internal
1c	Report quarterly energy use to BOS	Administrative Assistant	Ongoing	Internal
1d	Assign staff to work with SNHPC on energy grants	Energy Advisory Committee	Ongoing	Internal
1e	As cost decline consider hybrid/electric vehicles for Town Fleet in CIP	BOS/Budget Committee	Ongoing	Internal
1f	Request Dept. Heads consider energy efficiency in use of town services and facilities	Department Heads	Ongoing	Internal
2a	Publicize energy savings measures & actions	Energy Advisory Committee/Town Administrator	Ongoing	Internal
2b	Post energy efficiency tips on town website	Energy Advisory Committee/Town Administrator's Assistant	Ongoing	Internal
2c	Encourage free energy/sustainability public forums	Energy Advisory Committee	Ongoing	Internal
3a	Consider adding incentives for LED certified lighting	Planning Board/Building Inspector	2013-2014	Internal
3b	Consider adding complete street guidelines	Planning Board	2013-2014	Internal
3c	Participate in Safe Route School Program	School District/BOS/Planning Board	2013-2014	Grants
3d	Work with local civic groups	BOS/Planning Board	Ongoing	Internal

APPENDIX

Energy Efficiency Opportunities for Town Facilities in Hooksett, NH – December 2, 2010, Prepared by Peregrine Energy Group, Inc. (funding provided by NH Office of Energy & Planning)

Energy Efficiency Opportunities For Town Facilities Hooksett, New Hampshire

**Preliminary Assessment
December 2, 2010
(Draft)**

**Prepared by:
Peregrine Energy Group, Inc.
Boston, Massachusetts
and
Breakaway Energy Services LLC
Portland, Maine**

**Provided by:
New Hampshire's Office of Energy and Planning**

1.0 Introduction and Executive Summary

Peregrine Energy Group, Inc. (“Peregrine”) and Breakaway Energy Services have prepared this preliminary energy efficiency and renewable energy investment assessment for the facilities we visited on Wednesday, August 20, 2010 in Hooksett, NH. We’ve prepared this report on behalf of the New Hampshire Office of Energy and Planning with support from the Energy Technical Assistance & Planning for New Hampshire Communities program (“ETAP”). Funding for this project comes from the American Recovery and Reinvestment Act Energy Efficiency and Conservation Block Grant program of the U.S. Department of Energy. Peregrine gratefully acknowledges the assistance that Daryl Bradley, Facility Director DPW, who coordinated the site visit and helped answer questions for our initial assessment and Jodi Pinard, Administrative Assistant DPW, who assisted us with utility data and building information.

The primary goal for this report is to identify cost-effective energy efficiency and renewable energy investments that Hooksett may want to consider as part of its long term energy management plan. The report includes Peregrine’s recommendations for energy cost reductions that Hooksett may want to pursue and a summary of building energy use and cost information we were able to collect.

Findings and Recommendations

In order to generate our list of recommendations, Peregrine’s site visit and staff interviews focused on:

- Observations of existing facility conditions
- Current operating practices and facility uses
- Short term and long term facility plans
- Potential building and mechanical equipment energy efficiency upgrades
- Potential renewable energy upgrades

After our site visit, Peregrine reviewed utility bill information (when available) for each facility to corroborate our site visit observations and ground our recommendations against actual energy consumption.

Drawing on our site visit observations and discussions with town staff, Peregrine has identified several energy saving opportunities in facilities we visited. Many of our recommendations focus on opportunities to improve energy management practices in day to day operations that the Town can implement within existing town budgets using existing staff resources. More capital intensive energy efficiency recommendations that Peregrine identified include:

- Air Leakage and Insulation diagnostics and remediation for the three facilities
- Energy Management Systems for the Municipal Building and potentially for the Public Safety building as well
- Installing a multizone heat pump for the Municipal Building
- Installing economizers on the roof top heating, ventilation, and air conditioning equipment for the Public Safety Building

Preliminary Energy Assessment for the Town of Hooksett

In addition, Peregrine considered potential renewable energy investment opportunities for facilities that include:

- Solar Energy at all three sites
- Small-scale wind energy at the Public Safety building

Table 1. Energy Reduction Program Potential Results¹

Approximate Implementation Cost	Utility Incentive Available ¹	Potential Utility Savings				Annual Cost Avoidance	Simple Payback Yr
		Electric kWh/yr	Natural Gas Therms/yr	Oil Gal/Yr	LP Gal/yr		
\$47,000	\$700	40,000	900	300	150	\$8,900	5 - 7 yrs

Summarizing our Major Findings and Recommendations:

- Air sealing and targeted insulation would reduce energy consumption for heating in most of the buildings Peregrine inspected. Peregrine can help Hooksett prepare a Request for Proposals for this work.
- Installing “economizer” dampers and controls and pressure diagnostic analysis and repairs will help reduce the energy consumption at the Public Service Building. Peregrine can help Hooksett prepare Requests for Proposals for this work.
- Hooksett has several locations on or near facilities Peregrine assessed that could support potential renewable energy installations. Peregrine can help Hooksett plan for future renewable energy installations in these locations and review potential financing mechanisms to support these investments.

In general, we found that

Town staff already has been looking closely at operation improvements of the facilities they manage that will reduce the Town’s energy costs. Air sealing, minor lighting upgrades, and an additional economizer control for Public Safety will augment these efforts.

Suggested Next Steps

Within the context of the ETAP program, Peregrine can continue to support the Town to help plan and execute these recommendations. All projects identified in this report will require further development and analysis to obtain firm pricing and tighten up the saving projections.

Immediate next steps include:

- Select which measures the Town would like to proceed with and establish an implementation schedule.
- Authorize further engineering activity, if necessary, to develop detailed specifications and/or generate more accurate savings projections.

¹ This table does not include renewable energy or replacement window costs and savings

Preliminary Energy Assessment for the Town of Hooksett

- Develop request for proposal documents and/or select preferred mechanical, lighting and controls vendors. Your utility company may require use of specific vendors for work supported by their programs.
- Secure quotes for projects and select controls, insulation, air sealing, mechanical, and lighting contractors.

2.0 Utility Cost and Consumption

Energy Cost

The total energy cost for the buildings Peregrine visited is about \$133,333. The cost per square foot varies from a high of \$1.95 at the James H. Oliver Public Safety building down to \$1.01 at the Public Works building.

Table 2. – Annual Utility Cost and Energy Cost Intensity

Facility	Square Footage	Electric Cost (\$)	Waste Oil Cost (\$)	Propane/ Gas Cost (\$)	Cost per Square Foot
Public Works	18,000	7,533	8,100	2,589	1.01
Municipal Building	37,500	25,091		20,031	1.20
Public Safety	35,820	56,028		13,961	1.95
Total	91,320	\$88,652	\$8,100	\$36,581	\$1.46

Energy Use

Energy consumption figures were unavailable at the time of this report.

3.0 Department of Public Works

Existing Conditions

Hooksett's Department of Public Works (DPW) facility is located next to the town's old landfill and transfer station. The facility is relatively new, built in 1997 and totals about 18,000 square feet. It is a slab-on-grade steel frame structure with steel exterior panels on the wall and roof with vinyl covered fiberglass insulation. The downstairs office area is about 2,000 square feet and is finished with sheetrock. An upstairs storage room above the office is unfinished. Two large garage doors, one on the side of the building and one at the end of the building allow access for DPW's vehicles into the garage space. The rollup garage doors were replaced recently with a high quality insulated and weather stripped doors.

Figure 1. Department of Public Works



The primary sources of energy use at the facility are waste oil for heating in the garage bay, propane for heating in the office and Domestic Hot Water (DHW), and electricity for interior and exterior lighting, HVAC, compressed air, repair tools in the garage, and office equipment.

Garage Bay

Clean Harbors delivers waste oil to an underground oil storage tank located in the back of the building. In addition DPW contributes a small amount of waste oil from its vehicles to the storage tank. The waste oil² serves two 350 MBH oil-fired furnaces located in the garage bays. According to town staff the oil quality is lower than standard fuel oil and the furnaces require frequent maintenance. In addition to the standard annual tune up a technician comes in once a month during the heating season to service and clean the furnaces. DPW staff estimate that the average winter air temperature in the garage is in the 60s.

² NH DES http://des.nh.gov/organization/commissioner/p2au/pps/ppmp/used_oil.htm

Preliminary Energy Assessment for the Town of Hooksett

Figure 2. Waste oil furnace



The garage has two exhaust fans that DPW staff can turn on manually when air quality in the garage from vehicle exhaust or other sources becomes an issue, or the fans are sometimes used to help keep the space cool in hot weather. The exhaust fans are on timers that turn the fans off after one hour of operation. In addition, there is a 10 hp reciprocating air compressor with refrigerated drier.

The garage has relatively new T5 lighting, plus some high output T12's in the service bay area. Lighting levels are relatively low in the garage and high in the service bay; Peregrine measured light levels at about 9 ft candle and about 66 ft candle respectively. Outside lighting includes eight 150 watt metal halide wall packs installed on the building exterior walls under the eaves and the salt shed, plus there are two 400 watt metal halides used to light the salt shed.

Office

A propane-fired, packaged split system located in the office storage area provides heating and cooling for the office. Office staff controls this equipment with a Honeywell Chronotherm II programmable thermostat located in the central hall. The circulation fan appears to be set for constant ventilation and windows are fixed pane. The garage bay doors were open in the garage during our visit to take advantage of the nice weather. The office had the air conditioning system on. The existing 40 gallon propane-fired DHW tank is located next to the central wash sink.

Preliminary Energy Assessment for the Town of Hooksett

Figure 3. Office furnace in second floor storage area



Recommendations

Most of the energy efficiency measures that Peregrine recommends for the DPW building are operational and do not require major capital investments. The nature of the use for this facility is primarily as a heated garage for town service vehicles with a small dedicated vehicle maintenance area. In addition, frequent opening and closing of the garage doors would compromise the benefit of any major insulation upgrades. The minor operational recommendations that we identified include:

Table 3. Summary of energy reduction opportunities for the Department of Public Works

	Description	Approximate Implementation Cost	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings			Annual Cost Avoidance	Simple Payback Yr
					Electric kWh/yr	Waste Oil Gal/yr	LP Gal/yr		
1	Program Office Thermostat	\$0			1,000	-	150	\$500	<1
2	Turn Lights Off in Garage	\$0			1,200	-	-	\$200	< 1
3	Turn Off Compressor at Night	\$0			1,300	-	-	\$200	<1
4	Air Seal Building	\$4,000		A	500	300	-	\$500	7 - 9
	Estimated Program	\$4,000	\$0		4,000	300	150	\$1,400	2.9

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

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

Current Utility Budget:  \$18,222 /yr

Percent Reduction: 8%

1. Program Office Thermostat

Use the programming capability of the office thermostat.

Next Step: DPW staff should be able to set the thermostat to set back at night. This might require a little trial and error to determine the correct time to turn the heat on in the morning so the office is warm when staff arrives.

Preliminary Energy Assessment for the Town of Hooksett

2. Turn off lights in the garage

Leave lighting off in the bays where trucks are parked.

Next Step: Town staff could perform this task manually or DPW could install an occupancy sensor to turn the lights on and off automatically.

3. Turn off air compressor

Turn off the air compressor at night.

Next Step: Either assign a staff member to perform this task or install a digital timer to the compressor off at night.

4. Confirm the building's thermal integrity

The one building envelope related measure that may be worth pursuing is an infrared scan of the building during cool weather to identify and seal up obvious air leaks and thermal deficiencies like we noticed around outside supply air dampers and ductwork. More aggressive thermal upgrades would potentially include strip curtains for the roll up doors and additional insulation for the walls and roof of the building.

Next Step: Peregrine can help Hooksett identify an infrared imaging consultant to perform this analysis. As an alternative, many fire departments have their own infrared scanning equipment that could be used to perform this inspection.

4.0 Municipal Building

Hooksett's "new" Municipal Building is the former Hooksett Village School building. The facility includes the 9,626 square foot original building constructed in 1936 and a 27,883 square foot addition constructed in 1968. Both buildings have brick facades. The original building is constructed with wood framing, and the new addition is constructed with concrete block. The facility is currently receiving major upgrades, including: new individual split system ductless air conditioning systems, one per room; insulation in the walls and attic of the original building; and vinyl replacement windows for the original aluminum and Kalwall windows. Large window openings are being replaced with double hung windows installed on either end of the openings and insulation and infill panels installed in between the double hung windows.

Figure 4. Municipal Building infill panels and ductless air conditioning condensers



Beyond natural ventilation provided by operable windows, we could not easily determine if there is any mechanical ventilation functioning in the building. The school has mushroom fans on the roof that appear to have provided mechanical exhaust ventilation for the class rooms at one point. These were not on during our site visit. In addition, we noted a large fresh air intake for the gymnasium ventilation system that is blocked off. It's not clear how much additional mechanical ventilation if any is required to maintain adequate indoor air quality. Current commercial building codes provide minimum mechanical ventilation guidelines in that Hooksett can reference.

Two 1,250 MBH gas-fired Weil-McLane cast-iron central boilers provide heating hot water for the facility. The plant is setup as primary-secondary with two 1/3 hp primary pumps and two 3 hp secondary

Preliminary Energy Assessment for the Town of Hooksett

pumps. Only one boiler and one of each duplex pump is normally required to operate. We are not certain, based on our observations, how the control panels are set and operate the boilers.

A dedicated Teledyne Lars Mini Therm 07 boiler and HotStow DHW storage tank provide domestic hot water for the facility.

Figure 5. Municipal building boiler



Individual thermostats in each room, one for heating and one for air conditioning, control the air temperature in the rooms. The heating thermostats open and close zone valves and allow heated water to circulate through fin-tube radiators located on the outside of the rooms. The cooling thermostat turns a dedicated split air conditioning system on and off. The air handlers for the air conditioning systems are located in the middle of the ceiling for each room.

Preliminary Energy Assessment for the Town of Hooksett

Figure 6. Separate heat and cool thermostats



Figure 7. Heating system zone valves



Lighting in the school has been upgraded recently with T5, T8, and compact fluorescent lighting. There appear to be pockets of less efficient lighting in the building, including incandescent, but for the most part it appears that most if not all of the lighting has been upgraded already. We noted 14 CFL fixtures unnecessarily in use at the main entrance which has sufficient natural daylight.

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Figure 8. High efficiency lighting in the old gymnasium



Exterior lighting includes several large light pole mounted light fixtures along with a few lights installed on the outside of the facility. Public Service of New Hampshire (PSNH) owns the parking lot lighting.

Figure 9. Pole-mounted lighting



Town staff appears to be on track with energy-related building envelope upgrades to the facility (for the roof, walls, windows, and basement) as the town transitions town government services into the old school building. Insulation has been added in the attic and walls of the original building structure and new vinyl windows are being installed in the window fenestrations.

Recommendations

Table 4. Summary of energy reduction opportunities for the Municipal Building

	Description	Approximate Implementation Cost	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings		Avoidance	Payback
					Electric kWh/yr	Natural Gas Therms/yr		
1	Monitor and Adjust HVAC Equip.	\$10,000		A	8,000	500	\$2,200	3 - 5
2	Install Lighting Controls	\$5,000	\$200		5,000	-	\$800	5 - 7
	Estimated Program	\$15,000	\$200		13,000	500	\$3,000	4.9

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

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

Current Utility Budget:  \$45,122 /yr

Percent Reduction: 7%

1. Mechanical equipment upgrades

The town is at a good point in the School Building to Municipal building conversion process to review and revisit the operation of the facility's heating, ventilation, and air conditioning equipment. Changes that the town made to the building envelope as part of the building's renovation should reduce the heating and cooling load on the building. In addition, the town has several months experience working in the facility and has a clearer understanding now of where the building is not performing as well as the town would like.

Town staff explained that a proposal is under consideration to install additional heating and air conditioning in the hallways. The proposed system is a multizone air source heat pump split system with a "smart" distribution system control center. Peregrine reviewed similar equipment for proposed multifamily renovation project in Massachusetts recently and was impressed with what we learned about the technology.

Peregrine suggests that Hooksett also monitors the electricity consumption of individual A/C equipment on roof. We noticed during our site walk that the roof-mounted condensers are lined up parallel to each other and heat blows from one device to the next device. Alternatively, the town could simply proceed with reorienting all the condensers 90 degrees, if monitoring the electricity consumption becomes expensive or complicated to coordinate.

Next Step: Town staff should monitor the performance of the heating equipment this winter to fine tune the heating system controls and local distribution equipment. In addition, Peregrine can help review proposed quotations and system designs for the hallway air source heat pump installation if this moves forward.

2. Lighting controls

Hooksett could install some lighting control either as part of a central energy management system or stand alone controls. The entrance lights, for example, were on in the middle of the day during our site visit. The only existing lighting control is manual on/ off switches.

Next Step: Request a proposal from a PSNH-approved vender to install lighting controls.

3. Indoor air quality

Review and identify target ventilation rates for the current room configurations and uses. Confirm that the available mechanical and natural ventilation (open windows and wind and thermally driven air leakage) can meet these standards. We observed that the mechanical ventilation appears to be blocked/ shut off in the gym and all roof mushroom fans are turned off.

Next Step: Town staff can evaluate the operation of the Municipal building's ventilation equipment and review the potential need for additional mechanical ventilation.

5.0 Public Safety Building

Hooksett's Public Service Building, constructed in approximately 1998, totals about 35,820 square feet, including fire equipment garage, living quarters, office space and dispatch center for the town police and fire departments. It stands alone in a field in an industrial zoned area, and the facility appears to be well maintained. The facility is slab on grade with brick veneer on steel frame and steel stud construction. The ceiling and walls have fiberglass batt insulation. The major issue that town staff shared, however, is moisture damage, primarily from wind driven rain through the building envelope. Ceiling tiles have water stains and apparently the windows were installed inside out and the weep holes drain into the building instead of out of the building.

Figure 10. Public Safety Building



Figure 11. Primary fire apparatus service bay



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Four gas-fired Trane DX rooftop units on the roof of the garage provide heating, cooling, and mechanical ventilation for the facility. The units are from 1 hp to 2 hp (166 to 203 MBH heating)

Figure 12. Roof top heating, cooling, and ventilation equipment



Figure 13 is a picture Peregrine took above the ceiling tiles of the second floor office space. Town staff indicated this is an area where water had stained the ceiling tiles at one point. The source for the water isn't obvious; however, Peregrine has seen other similar situations where water has indeed collected.

Figure 13. Condition of insulation above ceiling panels



From both an energy and building durability perspective it would be useful for Hooksett to consider a pressure diagnostic and infrared analysis of the facility. The pressure diagnostics would help identify potential pressure imbalances in the ductwork and the exposed and hidden air spaces and cavities in the building. Building scientists often find that structures with steel stud construction and forced air heating systems have higher than average building air leakage rates and room to room and room to ceiling cavity pressure imbalances. Infrared analysis would help pinpoint sources of air leakage and areas with

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inadequate or failed insulation. If you look carefully, for example, behind the ventilation ductwork in Figure 13, you will see a large sheet of fiberglass insulation that appears to have fallen down.

There are two gas-fired DHW tanks in the building. The DHW tank in the picture below is located upstairs in the office space and serves residential-grade laundry equipment and miscellaneous hot water needs in the office. It appears to be very new and efficient. The black housing at the top of the tank is an electronic vent damper. This device reduces the amount of heat loss that escapes up the chimney when the burner is off.

Figure 14. Gas water heater with automatic vent damper



Lighting in the office area of the building is T8 fluorescent. Lighting in the service bays is high output T12 fluorescent.

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Recommendations

Table 5. Summary of energy reduction opportunities for the Public Safety Building

	Description	Approximate Implementation Cost	Utility Incentive Available ¹	Other Benefits ²	Potential Utility Savings		Avoidance	Payback
					Electric kWh/yr	Natural Gas Therms/yr		
1	Air Seal Building and Assess Ducts	\$10,000		A	4,000	400	\$1,400	7 - 9
2	Install T5 Lighting	\$8,000	\$500	B, C, D	11,000	-	\$1,800	3 - 5
3	Install Economizer Dampers	\$10,000			8,000		\$1,300	6+
	Estimated Program	\$28,000	\$500		23,000	400	\$4,500	6.1

Notes

(1) Subject to Utility Incentive Policy and Screening Analysis

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

Current Utility Budget: ▼ **\$69,989 /yr**

Percent Reduction: **6%**

1. Assess potential building air distribution-induced pressure imbalances

Coordinate energy-related building envelope, ductwork, and internal room pressure imbalance analysis with ongoing moisture damage engineering analysis. There could be a correlation between building and duct air leakage, and potential duct system pressure imbalances and the thermal discomfort and moisture damage problems staff have experienced in the building. In addition to moisture issues from roof leaks there could be moisture dripping from cooling ductwork and piping due to failed insulation. More robust central controls are desirable; however, energy savings will be less in this building than other buildings due to the 24/7 operations.

Next Step: Peregrine can help Hooksett prepare a Request for Proposals for pressure diagnostic technical services if the Town would like to pursue this measure.

2. Lighting

Replace HO T12 fixtures in the garage area with new T5 fixtures.

Next Step: Request a proposal from PSNH to upgrade the lighting.

3. Install economizer dampers

Install economizer dampers on all the rooftop terminal units (RTUs) if they don't exist already. This feature monitors outdoor weather conditions and opens a damper to bring cool dry air into the building with less energy than it would take to cool the building with 100% mechanical refrigeration.

Next Step: We suggest that the town prepare a Request for Proposals to install economizer dampers and damper control on the RTUs. Peregrine can help prepare a technical specification for this measure if Hooksett is interested.

4. Replace existing windows?

Town staff asked if it would be cost effective to install operable windows in place of the existing fixed windows. The fixed windows have been a source of frustration for public safety staff because they don't open and they were installed improperly so rain apparently drains into the building. Operable windows (installed properly) would have been an excellent investment during the initial building construction project; however, it is hard to justify the full cost of window replacement exclusively from energy savings. If new windows need to be installed for other reasons then by all

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means replace them with operable windows. As an additional feature of a more robust control system Hooksett can install window security sensors to the operable windows that connect to the energy management system. When occupants open their windows the control system will turn off the heating and cooling for the room. Peregrine estimates that replacement windows would cost on the order of \$70,000. Estimated annual cost savings for replacement windows would be about \$1,900 for electric and gas savings with a 30-40 year simple payback.

Next Step: Peregrine can help Hooksett review a Request for Proposals for replacement windows if the Town elects to pursue this measure. Peregrine would focus its review on the energy-related features of the proposed windows.

6.0 Renewable Energy

1. Department of Public Works - Generate electricity with Landfill gas?

Two potential renewable energy opportunities caught our attention during our site walk of the Department of Public Works facility. Each measure would require deeper analysis than we can offer at this time to decide whether or not to install these measures. Any further analysis for these measures should include a rigorous review of the technical proof of concept, initial installation cost effectiveness, long-term maintenance cost and replacement considerations, and potential environmental-related economic financial installation incentives.

This first renewable energy opportunity we observed was a potential landfill gas-driven electricity generation plant. The DPW facility's location next to the former landfill creates an interesting opportunity to extract methane from the landfill to generate electricity or use the gas to provide thermal heat for the DPW facility. Peregrine reviewed the findings for a similar proposed landfill gas project considered for Bourne, Massachusetts. Based on our analysis of the report, Peregrine suggests that the Town would need to be willing to enter the wholesale electricity generation business for this measure to be cost effective assuming that there are adequate methane reserves in Hooksett's landfill.

Next Step: Peregrine can help Hooksett prepare a Request for Proposals for more detailed analysis of this measure if the Town is interested.

2. Department of Public Works - Install solar energy generation systems

The second renewable energy opportunity we observed was a potential solar photovoltaic generation installation. The landfill and the salt shed are both excellent sites for solar photovoltaic electricity generation. These sites can be developed for renewable electricity generation either as facilities owned by the town or offered as host sites for third party renewable energy generation.

Next Step: Peregrine can help Hooksett prepare a Request for Proposals for a renewable energy power purchase agreement if the Town would like to pursue this measure.

3. Municipal Building - Install Solar PV

Similar to the DPW building, the Municipal building is an excellent candidate for a small-scale solar photovoltaic installation on the roof of the building. The current cost of a small 9 kW solar PV system is about \$75,000, would generate about 12,000 kWh/ year, and save about \$2,000/ year.

Next Step: Peregrine can help Hooksett prepare a Request for Proposals for a renewable energy power purchase agreement if the Town would like to pursue this measure.

4. Public Safety Building - Install Solar PV or Wind generation equipment

The public safety building has a good solar orientation and better than average wind energy potential based on site staff comments regarding the amount of wind they experience at this location compared to other locations in town. Both of these renewable energy options will require more detailed analysis than this preliminary analysis can provide, however, the site warrants additional analysis when the town elects to pursue renewable energy investments with its town facilities.

Next Step: Peregrine can help Hooksett prepare a Request for Proposals for a renewable energy power purchase agreement if the Town would like to pursue this measure.

7.0 Waste Oil

DES has conducted a study of typical recycled oil burner emissions in order to simplify the compliance determination process. The study examined RTAP emissions from typical recycled oil burners using a variety of recycled oil characteristics, fuel use rates, and installation configurations. The results of this study show that recycled oil burners are in compliance with the provisions of [Air Toxic Rule Env-A 1400](#) provided they meet all of the following criteria.

- Unit is rated at 500,000 BTUs/hour or less heat input.
- Unit is rated at 3.6 gallons/hour or less of fuel use.
- Unit burns 8,640 gallons or less per year of used oil.
- Exhaust stack is 8 inches or less in diameter.
- Exhaust stack outlet is 20 feet or more above the ground.
- The exhaust stack is vertical.
- The unit is operated and maintained in accordance with manufacturer's specifications.

If your facility operates a recycled oil burner meeting all of the above criteria, DES has determined that its emissions are in compliance with Env-A 1400 and the unit does not require a permit. However, records such as annual fuel use, number of days of operations, and maintenance records must be kept on-site to document that the above criteria are being met. Owners/operators of recycled oil burners that do not meet all of the criteria listed above should contact DES and conduct a source specific compliance determination as soon as possible in order to verify the compliance status of the installation.

All used oil burners, regardless of their compliance status with the NH Air Toxics Control Program, are required to submit a Notification Form to the DES Waste Management Division, (603) 271-2921. For more information also go to [Reporting and Information Management Section](#).