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GOSHEN MASTER PLAN - DRAFT

ENERGY RESOURCES CHAPTER OUTLINE

INTRODUCTION

Energy use and energy conservation is an increasingly important topic in the Town of Goshen. The use of energy for electricity, heating, and transportation is integrally tied to community planning, individual lifestyles, natural resource conservation, and environmental quality. The connection between energy use, rising energy costs, and the implications of global climate change in particular have raised concerns within communities. Many in New Hampshire, including Goshen, have begun taking action to individually and collectively reduce energy consumption and greenhouse gas emissions. The state adopted RSA 269:1(n) in 2008 authorizing municipalities to include an energy section in their Master Plan that addresses energy and fuel resources, energy needs, and a strategy for conservation of energy. The purpose of this Chapter is to provide some background on energy issues, usage patterns, local energy conservation efforts, and to make recommendations based on principles discussed below.

Community Attitudes

Principal findings from the Survey that support land use planning and municipal policies that promote opportunities for energy efficiency and renewable energy practices:

- 80% “Agree” or “Strongly Agree” the Town should encourage environmentally sensitive, low-impact business and industry development.
- 83% “Agree” or “Strongly Agree” the Town should identify areas in which to locate business and industrial development.
- 80% believe the Town should encourage high-speed internet access, and “Home-based business” was the most desired by survey respondents.
- The Town could take advantage of a strong community desire to have information discussions and cover topics like municipal and residential energy efficiency practices.
- 91% of respondents “Agree” that the Town should promote energy conservation.
- 86% of respondents “Agree” that the Town should promote alternative energy production.

Goals

This chapter serves as an important first step to help the Town begin examining its energy usage and develop implementation strategies to:

- Reduce municipal energy consumption and costs. Pursue energy savings for all municipal facilities, equipment, and vehicles through weatherization and building renovations, operational guidance, and developing purchasing policies in favor of energy-efficient equipment.
- Encourage land use development that provides opportunities for energy conservation practices including energy-conscious site design and building construction. Utilize regulatory

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tools and incentives to encourage, where appropriate, mixed land uses and clustered buildings in the interest of energy efficient development practices.

- Promote energy efficiency practices among Goshen residents. Encourage energy conservation and use of alternative energy resources and provide educational resources for residents to reduce private energy consumption.

NEW HAMPSHIRE STATEWIDE ENERGY OVERVIEW

Energy generation, consumption, and conservation are, arguably a statewide, national, and international issue. The statewide approach to energy consumption, conservation, and climate change issues provide context for Goshen's individual planning efforts. Success in energy conservation and improved air quality must begin at the local level with an understanding of the broader issues in the state.

Statewide Energy Use and Trends

According to the NH Office of Energy and Planning (NH OEP), electricity generation and transportation account for more than half of NH's net energy use. In 2007:

- Petroleum comprised the largest proportion of gross energy use at 38.7%, followed by nuclear at 26.3%, natural gas at 15.1%, and coal at 10.5%.
- Renewable energy sources played a much smaller role, with 4.2% coming from wood and wood waste; 2.9% coming from hydro; and less than 1% coming from solar, wind, or geothermal.
- 55.3% of NH households used oil for home heating. Other heating sources used in the state included natural gas (14%), wood (10.3%), propane (10%), kerosene (5%), and electricity (4.8%).

The U.S. Energy Information Administration, an agency within the U.S. Department of Energy, collects and disseminates a broad range of energy statistics within the United States. Table 1, below, provides a summary of energy consumption by sector (residential, commercial, industrial, and transportation) for 1990, 2004, and 2009.

The data in Table 1 illustrate overall growth in statewide energy consumption of nearly 15% over the nearly 20 years of record, which generally matches the population growth for the same period. While energy consumption increased by nearly 30% between 1990 and 2004 there was a significant drop in energy consumption between 2004 and 2009. This may be associated with the economic recession of the latter half of the decade. Transportation and residential sectors constitute the major portion of energy consumption for the period of record (64% in 2009).

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Table 1: Energy Consumption by Use Sector (1990, 2004, 2009)

Category	1990		2004		% change '90-'04	2009		% change '04-'09	% change '90-'09
Population	1,109,117		1,299,169		17.1%	1,316,470*		1.3%	18.7%
Energy Consumption (trillion BTU)	264.6		340.6		28.7%	303.0		-11.0%	14.5%
Per Capita Consumption (thousand BTU/person)	239		262		9.6%	230		-12.2%	-3.8%
By Sector (trillion BTU)	Usage	% Share	Usage	% Share	Usage	Usage	% Share		
Residential	78.8	29.8%	99.6	29.2%	26.4%	88.1	29%	-11.5%	11.8%
Commercial	43.5	16.4%	75.6	22.2%	73.8%	69.7	23%	-7.8%	60.2%
Industrial	69.3	26.2%	56.2	16.5%	-18.9%	39.4	13%	-29.9%	-43.1%
Transportation	73	27.6%	109.2	32.1%	49.6%	105.8	35%	-3.1%	44.9%
Total	264.6	100%	340.6	100%	28.7%	303	100%	-11.0%	14.5%

Source: U.S. Energy Information Administration (<http://www.eia.gov/state/>)

Renewable Energy Resources

Heavy reliance on nonrenewable, mostly imported energy resources (e.g. petroleum, natural gas, and coal) can introduce some risk to the state's energy supply and overall economic well-being due to price fluctuations from global demand and geopolitical influences. Renewable energy resources, which are often locally or regionally available, are an important long-term consideration to introduce diversity into the array of energy resources for the state.

Currently, renewable energy sources comprise a small share of the state's energy portfolio. New Hampshire has abundant renewable energy resources (e.g. biomass, geothermal heat, hydroelectric, wind, solar, etc.), which are becoming more economically viable as technologies progress. By using more of its own renewable energy resources New Hampshire and its communities can decrease vulnerability to energy disruption and keep energy investments in the local economy.

Air Quality and Climate Change

The increase in carbon dioxide emissions, a byproduct of burning fossil and biomass fuels, has caused statewide, national, and international concern about air pollution and impacts on climate conditions. Although this chapter is not specifically about climate change, integrating energy efficiency goals into local land use planning and municipal policy will help reduce consumption of these fuels and impacts on air quality and the climate. Ultimately, these efforts are necessary to maintain the existing quality of life in Goshen and throughout New Hampshire.

Land Use, Transportation, and Energy

There has been an increased emphasis on the connection between transportation, land use planning, and energy. Statewide planning initiatives are recognizing this connection and seek proactive strategies to minimize the consumption of resources and the long-term costs of development. Small, rural communities like Goshen, with limited local services and where its residents commute to regional employment centers, will find it challenging to find a simple solution that can address the relationship between transportation, land use, and energy. The

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Planning Board is encouraged to enquire with the Upper Valley Lake Sunapee Regional Planning Commission and seek peer communities to identify initiatives to implement in Goshen.

MUNICIPAL ENERGY EFFICIENCY

Overall, municipal operations and energy consumption is a small fraction of the total energy consumption for public and private properties in Goshen. Regardless, it is important for the Town to reduce its energy demands through building weatherization and upgrades and energy efficient operations and procurement guidance for Town Staff and Officials. The Town would lead by example in an effort of reducing the cost of maintaining and operating its facilities and vehicle fleet and saving tax dollars.

Recent Energy-Related Achievements

The Town can promote energy efficiency through its land use regulations and ordinances. Goshen has already adopted proactive policies and ordinances to encourage use of renewable energy resources by its residents and property owners:

- Adopted a small wind energy system ordinance in accordance with RSA 674:62-64.
- Adopted property tax exemptions for wind and solar installations in accordance with RSA 72:61-72.
- Participated in the American Recovery and Reinvestment Act funded Energy Technical Assistance Program for New Hampshire Communities (ETAP) and received technical assistance in the form of developing a baseline energy inventory of municipal buildings, as well as building energy assessments of municipal buildings.

Municipal Facility Energy Efficiency

As part of the ETAP technical assistance, the Town began a process of tracking and monitoring building energy use and auditing energy use in the municipal buildings. The ETAP program provided Goshen with a preliminary building assessment in 2011 with specific recommendations to reduce municipal facility energy consumption.

Baseline Inventory and Long-Term Monitoring

It is important, as part of a long-term energy efficiency program, to track energy usage and costs. The Town has begun developing an inventory of energy consumption for its buildings, which can be transferred into the U.S. Environmental Protection Agency's secure Portfolio Manager online database. Portfolio Manager is free to use and provides summary statistics to track usage over time. This initial inventory is considered the 'baseline inventory' to help track future energy savings and monitor whether energy efficiency goals are achieved.

As part of the ETAP program, initial inventories were completed for the Town Offices, Grange Hall, Library, Fire Station, and Highway Garage. Tables 2 and 3 summarize the energy costs and consumption based on information collected by community volunteers and Town Staff.

Energy Cost: The total energy cost for the buildings is about \$19,806. The cost per square foot varies from a high of \$5.16 at the Town Garage down to \$.14 at the Grange Hall.

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Table 2. Annual utility cost and energy cost intensity

Facility	Square Feet	Electric Cost (\$)	Oil Cost (\$)	Propane Cost (\$)	Total Cost (\$)	Cost (\$) per Square Foot
Town Hall	2,924	1,973	2,664	-	4,637	1.59
Grange Hall	2,682	377	-	-	377	0.14
Fire Station	2,080	940	3,007	-	3,947	1.90
Town Garage	1,600	1,767	-	6,486	8,253	5.16
Library	1,012	952	1,640	-	2,593	2.56
Total	10,298	\$6,009	\$7,311	\$6,486	\$19,806	\$1.92

Source: Energy Efficiency Opportunities for Town Facilities, Goshen, NH (ETAP, August 2011)

Energy Use: Total energy use for the buildings is about 31,751 kWh for electricity, 2,957 gallons for oil, and 3,264 gallons for propane. The total energy intensity units are expressed in British Thermal Units, a standard unit of measure for energy, per square foot.

Table 3. Annual utility consumption and energy use intensity

Facility	Square Feet	Electric kWh	Oil Gallons	Propane Gallons	Total kBTU	Site kBTU per Square Foot
Town Hall	2,924	12,072	1,074	-	191,520	65
Grange Hall	2,682	1,279	-	-	4,365	2
Fire Station	2,080	4,505	1,205	-	184,104	89
Town Garage	1,600	9,351	-	3,264	329,592	206
Library	1,012	4,544	678	-	110,457	109
Total	10,298	31,751	2,957	3,264	820,037	80

Source: Energy Efficiency Opportunities for Town Facilities, Goshen, NH (ETAP, August 2011)

Building Assessments

Consultant for ETAP prepared a preliminary energy efficiency and renewable energy investment assessment for certain facilities in Goshen with assistance from Town Staff, members of the Selectboard, Planning Board, and other community volunteers. The goal of the report was to identify cost-effective energy efficiency and renewable energy investments that Goshen should consider as part of its long-term energy management plan. The assessment included evaluations of the Town Hall, Grange Hall, Town Library, Fire Station, and Highway Garage.

Major Findings and Recommendations:

- The Town Garage uses more energy per square foot than any other town garage in New Hampshire assessed under the ETAP program.
- The existing heating equipment installed at the Town Grange is a good choice for current temporary use and potential full-time winter use of the building.
- Measures recommended in the report can reduce energy consumption about 14% in the Town Hall, Fire Station, and Library.

The Town should endeavor to address the detailed energy efficiency recommendations in this report as an initial phase of improving municipal energy efficiency.

Opportunities for Increasing Municipal Energy Efficiency

Goshen can continue to improve upon municipal energy efficiency through ongoing monitoring of use, setting energy efficiency goals, and identifying new projects. Opportunities include:

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- Engage the electric utility company or an independent contractor to conduct interior lighting assessments to eliminate unnecessary fixtures and retrofit existing fixtures with more efficient lighting where and when cost effective.
- Purchase energy efficient equipment when replacing appliances or systems.
- Establishment of a no-idling policy to reduce vehicle emissions, and/or purchase of technology such as idling retrofits that provide auxiliary power while engines are off to reduce emissions.
- Installation of renewable energy production systems (solar, wind, geothermal, biomass) where appropriate and when cost effective.
- Coordinate energy efficiency programs with the local schools to maximize potential community savings.

Formation of a Local Energy Committee

The generation and use of energy and emissions from energy use – whether for homes, businesses, or transportation – has a significant impact on the environment, and the health and welfare of the community. Local energy committees are an important way to help inform decisions makers and residents about how to advance cost-effective strategies that conserve energy, reduce costs, and help protect the environment.

An energy committee in Goshen, if formed, could have the following roles:

- advise the Planning Board on regulatory and planning strategies relative to energy efficiency and conservation;
- coordinate with boards, commissions, schools and other organizations to promote and implement energy efficiency and conservation measures in the community;
- Conduct public outreach and education efforts to help residents reduce household energy use and costs;
- report to the Board of Selectmen on energy usage for municipal facilities on an annual basis and as requested; and
- provide information to the Board of Selectmen about strategies to reduce municipal energy use of municipal facilities.

RECOMMENDATIONS

Energy planning is integral to Goshen’s long-term municipal and land use planning efforts. The following recommended actions are all steps to achieving a more sustainable energy economy. By promoting energy conservation behaviors and the employment of energy efficient measures Goshen can do its share to minimize undue municipal costs and community-wide demand for carbon-based energy sources and greenhouse gas emissions.

Provide Municipal Energy Efficiency Leadership

The Town of Goshen can establish itself as a leader in energy conservation and efficiency.

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- Form a Local Energy Committee and adopt an energy action plan to reduce energy consumption in Goshen.
- Develop a Portfolio Manager account to track municipal energy use on an ongoing basis. Designate an individual in Town (e.g. a member of the Energy Committee once it is formed) to report energy use trends to the Board of Selectmen.
- Pursue grant and loan funding whenever possible for energy improvements to effectively leverage Town funds.
- Evaluate plans for municipal building additions/renovation or new building construction for energy efficiency measures.
- Establish a fund in the municipal budget for energy efficiency projects including those identified in the ETAP building assessment.
- Evaluate the City's vehicle fleet and create new policies for staff use and purchasing that will reduce the energy use and costs.
- Establish and promote a community park and ride facility on municipal land for commuters traveling to regional employment centers.
- Conduct outreach, educational events on energy issues. Work with the Town Library to provide resources and programs to residents on ways to reduce energy consumption.
- Establish regular communication among Town committees (including the Energy Committee, if formed) and the Board of Selectmen to coordinate energy projects and efforts.

Adopt Regulations and Ordinances to Promote Energy Efficient Development Practices

Goshen encourages renewable energy by allowing tax exemptions for properties installing such technologies. Additionally, the Town has adopted land use regulations to protect air quality and to address wind generation installations. Continued work on the Town's land use regulations to permit innovative land uses would further promote energy efficiency in local development projects.

- Provide incentives in regulatory review processes that encourage voluntary implementation of energy efficiency practices, innovative land use techniques, or mixed use development proposals.
- Evaluate village center over overlay districts that would allow an appropriate mix of building uses (e.g. residential and small-scale commercial and retail) to locate residences close to services and maximize efficient use of infrastructure and provide local access to the services for residents in Goshen and surrounding communities.

