

**SECTION 1—INTRODUCTION**

The way in which Brookline generates and uses energy has consequences for many facets of life. It can affect municipal costs and operations, influence job growth and the local economy, and impact the natural resources and quality of life that are so important to Brookline residents. This chapter serves as an important first step to help the Town begin examining its energy usage and develop and implement strategies to assist it in becoming a more sustainable and self-sustaining community.

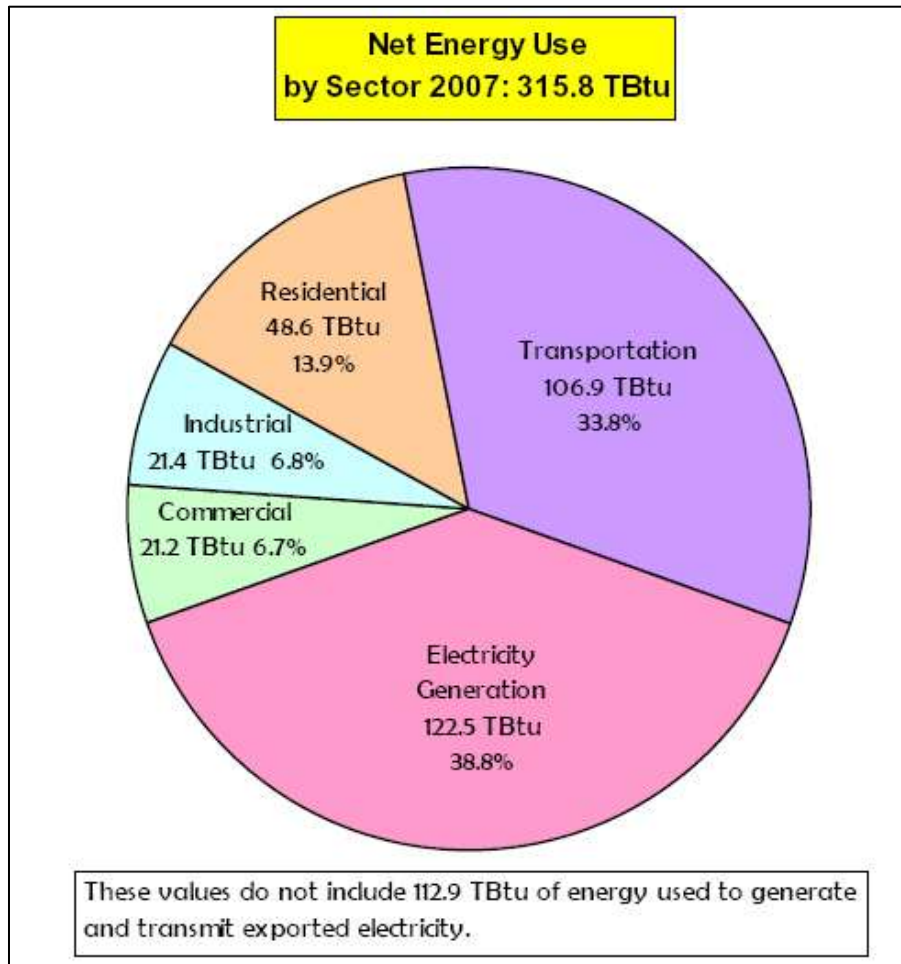
**SECTION 2—ENERGY VISION FOR BROOKLINE**

The overall vision for Brookline is a community that supports and preserves its rural character while simultaneously embracing 21<sup>st</sup> century technology, environmentally progressive strategies, and local business opportunities. Brookline's energy policies will play a significant role in achieving this vision. Brookline residents would like the Town to become a sustainable and self-sustaining community. Environmentally progressive policies with respect to energy generation, building standards, land use patterns, and transportation are critical to Brookline's long term sustainability, and all policy decisions should be evaluated through the lens of energy efficiency.

**SECTION 3 ~ IMPORTANCE OF ENERGY PLANNING, EFFICIENCY, AND CONSERVATION****3.1 ~ State and Regional Energy Patterns**

Before considering how to decrease energy use or improve energy efficiency, it is important to understand how energy is being used in the state and where it comes from. 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, net energy use was distributed across the following sectors: electric generation (38.8%), Transportation (33.8%), Residential (13.9%), Industrial (6.8%), and Commercial (6.7%).

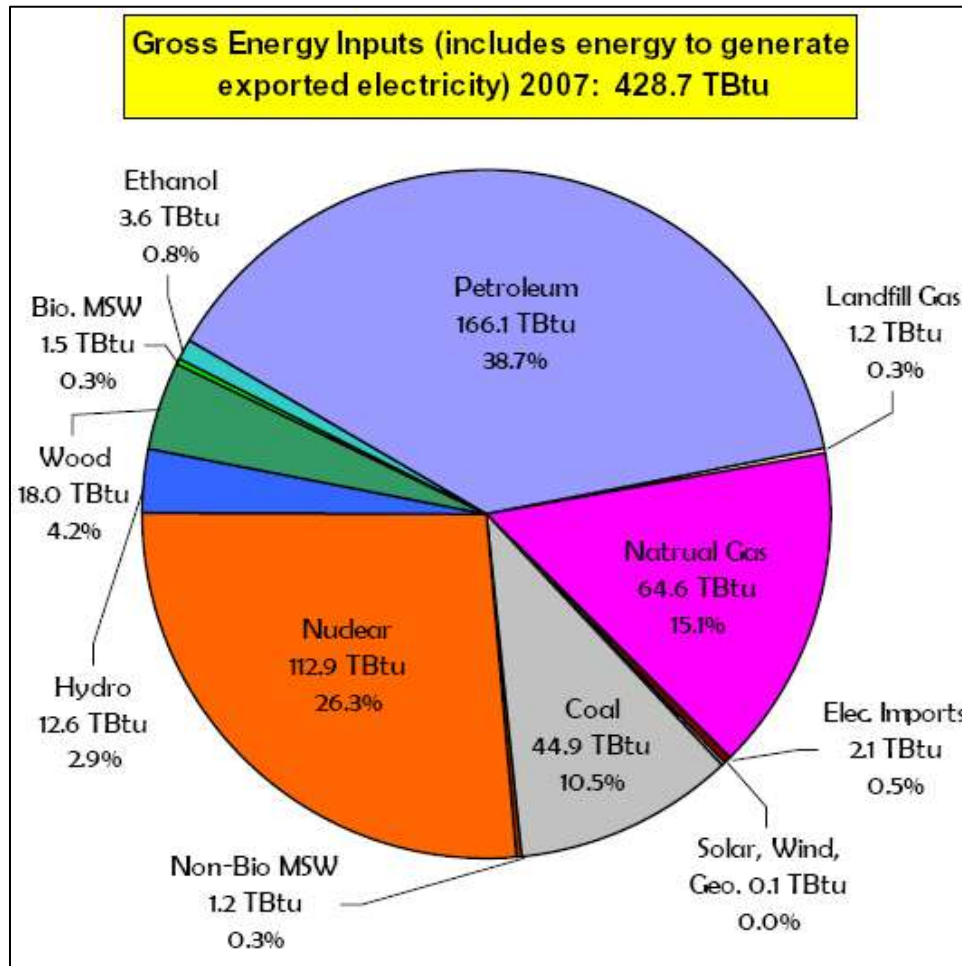
Graph 1—Net Energy Use in New Hampshire by Sector



NH Office of Energy and Planning

NH’s Gross Energy Use refers to all of the energy imported into the state as well as all of the energy produced with resources from within the state. 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 0% coming from solar, wind, or geothermal (NH OEP).

Graph 2—Gross Energy Use in New Hampshire



NH Office of Energy and Planning

In 2007, 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%). NH OEP estimates that at least 85% of NH’s heating energy comes from imported sources. Because of this, residences may offer the best opportunity to increase the use of in-state renewable energy sources.

Energy Costs and Volatility

Between 1970 and 2007, NH’s population increased by 77% and its total energy consumption increased by 69%. Yet its total energy expenditures increased by 214% when adjusted for inflation (NH OEP). NH’s average energy consumption per person in 2007 ranked it 47<sup>th</sup> in the nation. At the same time, its average energy price per TBtu ranked it 5<sup>th</sup> in the nation. Only 4 states pay more than NH does

per unit of energy (NH OEP). In 2007 NH's residents and businesses spent \$5.335 billion on energy. Of this, an estimated \$72.3 million was spent in-State for biomass (wood and waste). Fossil fuel and uranium purchases accounted for \$4.28 billion, of which NH OEP estimates 80% left NH.

NH has no in-state sources of fossil fuel or uranium. Imported resources accounted for just over 90% of the state's energy in 2007 (NH OEP). Since most of NH's energy is imported, it is vulnerable to disruptions due to weather, price volatility, dynamics in commodities markets, political unrest, and other factors beyond the State's control. However, NH does have abundant, underutilized, renewable energy resources such as biomass, geothermal, hydro, wind, wave, tidal, and solar. By using more renewable energy sources NH can decrease vulnerability to energy disruption, create new jobs, and retain more energy dollars in the local economy.

### Quality of Life

A diversified energy mix and more efficient energy use and development in NH are key to the State's future economic growth, strong communities, preservation of rural areas, and maintenance of NH's quality of life. Although this chapter is not specifically about climate change, its impact could affect quality of life in NH. NH's economy is linked to both summer and winter recreational activities based on its natural resources. If these suffer, the economy will also suffer. Less snowfall would result in decreased opportunities for skiing, snowshoeing, snowmobiling, ice fishing, and other winter recreation activities. Increased frequency and severity of damaging storm events and droughts could cause financial and personal hardships. Decreased quality and production of forestry and agriculture products could also have a significant impact on the economy and quality of life.

## **3.2 ~ Energy Planning and the Town of Brookline**

### Role of the Town of Brookline

Although the energy used in municipal operations is fairly small compared to that of the residential and commercial sector, Brookline can lead by example and reduce the energy used in its buildings and vehicle fleet. Energy improvements will save tax payer dollars, will create a model for businesses and residents to adopt, and will help to create the infrastructure needed for certain technologies to be viable.

### Support for Energy Planning in Brookline

There is strong support for energy efficiency planning and implementation among Brookline residents. In 2008, the Town partnered with the Nashua Regional Planning Commission (NRPC) to conduct a visioning process for the Route 13 and Route 130 corridors. As part of this process, residents participated in a town-wide Visioning Meeting on April 4, 2008 and also provided input through four surveys, which addressed zoning, visual preferences, the Town Center, and transportation. Through this process, it is evident that energy efficiency is important to Brookline citizens. For example, of the 160 responses to the 2008 Brookline Route 13 and 130 Zoning Survey, 84% indicated that energy efficient design was very important or important. Overall findings from all four surveys identified six common themes of importance to Brookline residents, one of which was energy.

In 2010, the Town of Brookline partnered with the Nashua Regional Planning Commission and University of NH Cooperative Extension to conduct a town-wide survey and forum to obtain initial input for the Master Plan update. The survey included a section designated to questions about Brookline's energy future and respondents strongly supported the need for renewable energy and green standards for Town buildings, vehicles, and equipment. Although the town-wide forum did not have a breakout session specifically dedicated to energy, residents did discuss the topic during the Community Facilities breakout. In this session, participants stated that their vision for Brookline's future included "self-sustaining," "green," energy efficient facilities and utilities as well as town policies to ensure energy efficient buildings. Additional energy related input received from Brookline's residents is incorporated into the Findings/Results sections of this chapter.

### **3.3 ~ Energy Related Initiatives To-Date in Brookline**

#### Energy Action Plan for SAU 41

Currently, Brookline does not track energy usage or costs for its municipal buildings. Brookline does have an inventory of electric and oil usage and costs for the SAU 41 Administrative Building, Richard Maghekian Memorial School, Captain Samuel Douglas Academy, Hollis-Brookline Middle School, and Hollis-Brookline High School from May 1, 2007 through March 31, 2009. This data is tracked using the Environmental Protection Agency's Portfolio Manager, which is a web-based energy inventory tool. The data was compiled and entered by members of the Hollis Local Energy Committee. The Nashua Regional Planning Commission used this data to write an Energy Action Plan for SAU 41 in 2010. It included a profile of the SAU, background on the energy inventory, energy inventory results, energy use by building, costs by building, greenhouse gas emissions, analysis, and recommendations.

### ARRA Projects

In 2010, the Town of Brookline received \$64,287 in American Recovery and Reinvestment Act (ARRA) funding through the Energy Efficiency and Conservation Block Grant (EECBG) program to complete lighting upgrades in its elementary schools and municipal buildings. After reviewing energy inventory data, the Town determined that a lighting upgrade and retrofit would provide the most effective energy efficiency measure. The Town hired LighTec, a local company specializing in lighting efficiency, to conduct an audit of lighting systems in all municipal facilities and school buildings. The audit resulted in a detailed project plan for lighting retrofits.

EECBG funding will be used to implement the lighting retrofit plan in the Richard Maghegian Memorial School, Captain Samuel Douglas Academy, Town Hall, Fire Station, Library, Historical Society, Annex (former ambulance facility), Chapel & Bruschi Hall, Transfer Station, Communications Center, and Emergency Center. A majority of the upgrade will involve retrofitting existing T12 and T8 fluorescent lighting with new high performance electronic ballasts, T8 sockets, and high performance T8 lamps. Sensor controls will also be installed in areas where the return on investment makes it feasible. In addition, some outdoor high intensity discharge and incandescent lights will be replaced with fluorescent fixtures.

The annual savings resulting from the school upgrades is estimated at 143,441 kWh or \$21,877 at current electricity rates. The annual savings resulting from the municipal upgrades is estimated at 50,358 kWh or \$7,759. The projects are scheduled to be completed by March 10, 2012.

### Pertinent Ordinances

While Brookline does not currently have any ordinances that specifically address energy use or efficiency, the Town has adopted the following ordinances that ultimately encourage decreased energy use.

Brookline Zoning & Land Use Ordinance 1500 *Open Space Development* ~ an Open Space Development plan is required for all developments 20 acres or greater, unless the Planning Board deems that topography, wetlands, soils, or other considerations prevent the proposal from accomplishing the purposes of the ordinance or when an Open Space Development is unnecessary to meet the purposes of the ordinance. A minimum of 35% of the gross tract area must be set aside as permanent open space through easement or deed for low-impact recreation, agriculture, or conservation uses.

Brookline Zoning & Land Use Ordinance 2300 *Outdoor Lighting* ~ the purpose of this ordinance is to preserve the rural atmosphere and dark skies of Brookline. This regulation is intended to enhance public safety and welfare by providing for adequate and appropriate outdoor lighting, providing for lighting that will complement the character of the town, reduce glare, minimize light trespass, reduce the cost and waste of unnecessary energy consumption, and prevent the degradation of the night sky.

## **SECTION 4—ENERGY EFFICIENCY AND ENERGY USE IN BUILDINGS**

### **4.1 ~ Energy Efficiency Overview**

True green building goes much deeper than a structure's energy source. It utilizes processes that are resource efficient to create structures that are themselves environmentally responsible. Green building practices span the entire life cycle of a structure, from its siting, design, and construction, to maintenance, renovation, and demolition. Any type of building can be a green building, including homes, schools, offices, commercial space, and municipal facilities.

According to the US EPA, buildings in the United States account for 39% of total energy use, 12% of total water consumption, 68% of total electricity consumption, and 38% of total carbon dioxide emissions. In NH in 2007, 27.4% of net energy consumed was used to heat buildings and structures, and another 38.8% was used to generate electricity, much of which is used in buildings. The construction and operation of buildings represents a major contributor of state and local energy use and greenhouse gas emissions. At the same time, buildings represent a significant opportunity for reductions in energy consumption by improving building efficiency.

Energy efficiency improvements in buildings was one of four major themes identified by NH residents during public input sessions held in the development of the NH Climate Action Plan. According to the NH Climate Action Plan, "significant improvements in energy efficiency in every sector, but particularly buildings, should be a major recommendation and commitment of the state action plan."

#### *Sample Energy Efficiency Initiatives*

One of the benefits of focusing on improving energy efficiency is that these initiatives can often be implemented quickly and inexpensively, while providing a fast return on investment. For example, the \$64,287 investment Brookline made in lighting upgrades is expected to result in annual cost savings

of \$29,636 at current electricity rates. These cost savings will pay for the initial investment in just over two years. Weatherization is another important and relatively simple way to improve energy efficiency. Weatherization includes sealing, repairing, or replacing windows and exterior doors; improving insulation R-values; insulating heating pipes and air ducts; and cleaning air ducts and radiators for better heat transfer.

Recommissioning also offers a simple, low cost way to improve energy efficiency in buildings. Recommissioning examines the building's equipment systems operation and maintenance procedures and compares them to intended or design operations procedures. The primary focus of recommissioning is to identify operation and maintenance improvements that will result in energy cost savings and that are relatively fast and inexpensive to implement. Recommissioning does not necessarily involve the purchase or installation of new equipment or technology and in-house staff can typically implement many of the operation and maintenance improvements. Example recommissioning activities include calibrating building controls such as thermostats and occupancy sensors, adjusting operating schedules to ensure equipment is only on when necessary, checking for leaky or improperly functioning steam traps, and cleaning heat exchanger tubes in condensers, evaporators, and boilers to maintain optimal efficiency. Priority should be given to buildings that do not have an active preventative maintenance program.

Energy efficiency initiatives can also focus on policies and behaviors. Energy efficient work place practices include adopting green purchasing policies for products such as office equipment, office supplies, and cleaning products. Other energy efficiency policies involve limiting the use of personal appliances (ex. space heaters, mini-refrigerators, coffee pots, non-networked printers), recycling, setting printer and copier defaults to double sided printing, and turning off lights and computers when not in use.

#### **4.2 ~ Energy Efficiency and Buildings Findings/Results**

- The 2008 Brookline Natural Resources/Environment Study Circle recommended focusing on energy efficiency and "green" opportunities for Town and school buildings.
- 84% of residents participating in the 2008 Brookline Route 13 & 130 Zoning Survey stated it was important or very important for new development in Brookline to be built in an energy efficient way, utilizing alternative energy sources.

- Residents in the Community Facilities breakout session of the 2010 Brookline Master Plan Forum recommended that the Town move towards green facilities and utilities and focus on efficiency in order to become more self-sustaining. This was rated as having a high impact and high feasibility. They also recommended that the Town establish policies to ensure energy efficient buildings. This was rated as having high impact and high feasibility at the Forum and moderate impact and high feasibility in the 2008 Vision Plan for Route 13 & 130.
- 79% of residents participating in the 2010 Brookline Master Plan Survey stated that green standards for Town buildings, vehicles, and equipment are somewhat or very important for the Town. 78% stated that town tax incentives for energy conservation upgrades are somewhat or very important for the Town.

**4.3 ~ Energy Efficiency and Building Recommendations**

- Establish and support a Local Energy Committee. These committees are often comprised of local citizens and municipal staff members and are charged with assessing and improving community action on energy use.
- Develop a vision for energy efficiency measures in Brookline’s buildings over the next 10 years to serve as a guide for implementing energy efficiency policies and projects.
- Maximize energy efficiency in new construction and existing buildings. Efforts should apply to commercial, industrial, residential, and municipal buildings and should focus on upgrades to building shells, windows, heating and cooling systems, domestic hot water systems, lighting, and appliances. Water saving measures and renewable energy systems should also be considered.
- Increase enforcement and compliance with building energy codes. Energy codes are among the most cost effective ways to decrease energy use.

**4.4 ~ Energy Efficiency and Buildings Implementation and Timeframe**

Task	Responsible Department or Group	Timeframe
Establish a Local Energy Committee.	Board of Selectmen	1-3 years
Conduct an energy inventory to establish a municipal energy baseline and track municipal energy use across buildings, vehicles, and streetlights.	Local Energy Committee	1-3 years

Develop a vision for energy efficiency measures in Brookline’s buildings over the next 10 years.	Local Energy Committee, Board of Selectmen	1-3 years
Utilize Core Energy Efficiency Programs for energy efficiency upgrades in municipal buildings and schools. Establish a fund for future energy efficiency projects from energy savings, including those achieved through the Town’s ARRA lighting retrofits.	Board of Selectmen	3-5 years
Adopt a performance zoning ordinance that encourages voluntary implementation of energy efficiency practices in exchange for incentives or bonuses.	Planning Board	3-5 years
Evaluate plans for construction of new municipal buildings or additions/renovations to existing municipal buildings for energy efficiency measures.	Board of Selectmen	Ongoing
Evaluate barriers, if any, to enforcement of building energy codes.	Local Energy Committee	1-3 years

**SECTION 5—ENERGY GENERATION**

**5.1 ~ Energy Generation Overview**

While energy efficiency improvements are a critical first step towards decreasing overall energy use, there will still be a demand for energy. Therefore, it is important to look not only at the way energy is used but also at the way it is generated. A focus on increasing the amount of renewable, in-state energy NH generates can decrease greenhouse gas emissions, reduce dependency on imported fossil fuels, and increase the amount of money that stays in the NH economy.

### Renewable Energy

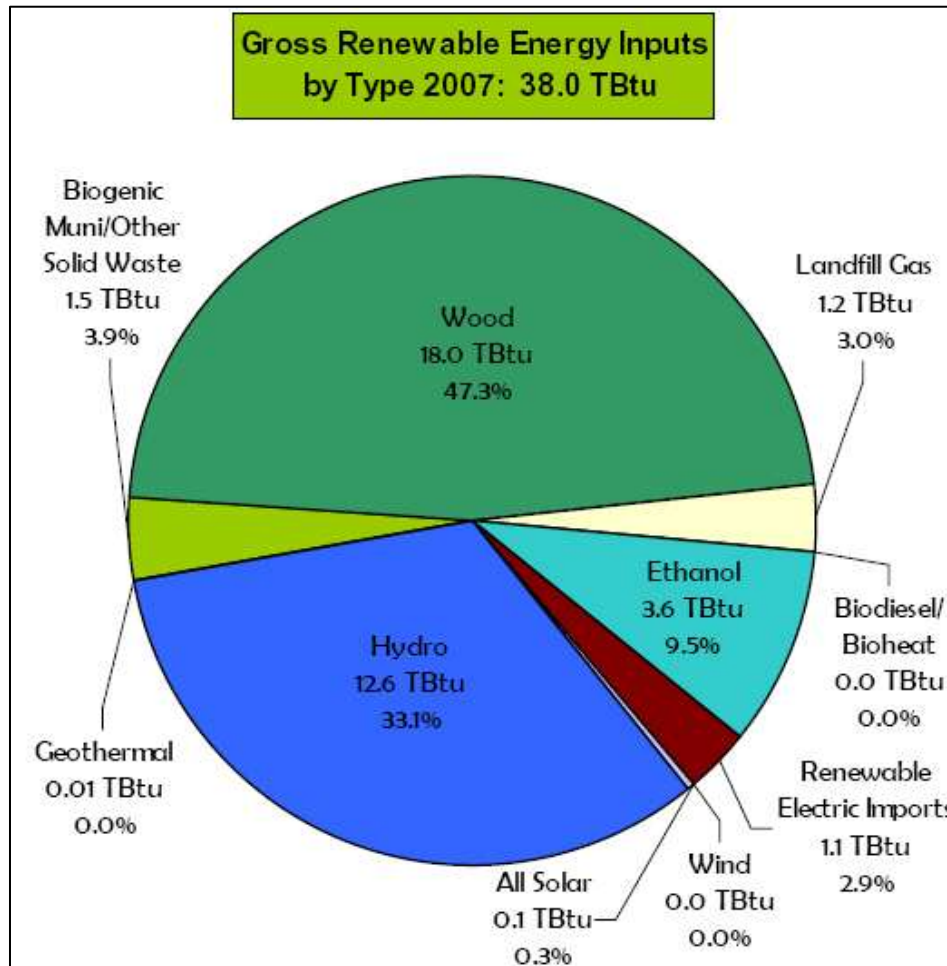
Renewable energy sources are by definition inexhaustible, however, they can be limited in their availability at any given time or location. There are many benefits to using renewable energy.

Renewables provide energy assurance by increasing energy diversity and provide energy security because they are typically produced locally and are less subject to political influences. Renewable energy sources are better for the environment and help to sustainably meet energy demand. Finally, because renewables are often generated locally, they can help to create and keep money in the local economy.

Renewable energy sources currently play a small role in the state. In 2007, only 7.4% of NH's net energy use came from renewable resources. Across the state, sectors vary in terms of the percentage of their energy obtained from renewable resources. The electric power sector has the largest percentage of renewable energy in its mix at 12.9%, followed by the industrial sector at 7.9%. Residential, commercial, and transportation sectors all use a much smaller percentage of renewables at 4.5%, 3.4%, and 3.4% respectively (NH OEP). NH does have a renewable portfolio standard, which was signed into law in May 2007. It requires NH's electricity suppliers to demonstrate they are obtaining 23.8% of their electricity from renewable sources by 2025.

NH has abundant, underutilized, renewable energy resources such as biomass, geothermal, hydro, wind, wave, tidal, and solar. Currently, wood comprises the largest percentage of gross renewable energy inputs by type in NH at 47.3%. Hydroelectric makes up 33.1% and ethanol comprises 9.5%. Other renewable resources make up a far smaller percentage of NH's renewable energy inputs: biogenic/municipal/solid waste (3.9%), landfill gas (3%), renewable electric imports (2.9%), solar (0.3%), geothermal (0%), wind (0%), biodiesel (0%), bioheat (0%). By using more of its own renewable energy sources, NH can decrease vulnerability to energy disruption, create new jobs, and retain more energy dollars in the local economy.

Graph 3—Gross Renewable Energy Inputs



NH Office of Energy and Planning

**5.2 ~ Energy Generation Findings/Results**

- The 2008 Brookline Natural Resources/Environment Study Circle recommended proactively developing a town plan, including regulations, for alternative sources of energy. They also recommended considering tax breaks for residents with solar, geothermal, or other alternative energies.

Of the residents participating in the 2010 Brookline Master Plan Survey:

- 85% stated that solar energy is somewhat or very important for the Town.
- 80% stated that geothermal energy is somewhat or very important for the Town.
- 70% stated that Town sponsored alternative energy generation is somewhat or very important.
- 68% stated that wind farms are somewhat or very important for the Town.

- 50% stated that external wood furnaces are somewhat or very important for the Town. 35% stated that they are not important and 15% have no opinion on the topic.

**5.3 ~ Energy Generation Recommendations**

- Develop a vision for Brookline’s energy generation in the next 10 years to serve as a guide for implementing renewable energy policies and projects.
- Greenhouse gas emissions vary by fuel source. Brookline may consider switching fuel sources in its municipal buildings in order to reduce emissions. However, energy efficiency and conservation measures should be taken first; changing fuel sources should be the final step taken once these measures have already been put into place.
- Consider incentives for the use of renewable energy systems and identify systems that should be eligible for incentives. RSA 72:61-72 permits municipalities to offer Property Tax exemptions on solar, wind, and wood heating systems, including solar hot water, solar photovoltaic, wind turbines, and central wood heating systems (not stovetop or woodstoves). Communities may choose to pass each exemption separately.

**5.4 ~ Energy Generation Implementation and Timeframe**

<b>Task</b>	<b>Responsible Department or Group</b>	<b>Timeframe</b>
Create an implementation plan for renewable energy generation based on Brookline’s vision.	Local Energy Committee, Board of Selectmen	1-3 years
Conduct an in-depth analysis on the feasibility of biomass, combined heat and power, geothermal, hydroelectric, wind, and solar in Brookline.	Local Energy Committee	3-5 years
Adopt incentives for the use of renewable energy systems as allowed by RSA 72:61-72.	Board of Selectmen	1-3 years
Adopt language in subdivision and site plan review regulations that requires the optimization of passive solar heating practices.	Planning Board	3-5 years

## **SECTION 6—ENERGY IMPLICATIONS OF LAND USE PATTERNS AND TRANSPORTATION**

### **6.1 ~ Overview**

#### *Integrating Land Use and Transportation*

While there has been an increased emphasis on the connection between transportation and land use planning, they have often occurred independently over the past century, creating an automobile dependent society. Communities zone for compatible land uses, separate residential and commercial areas, and dictate the density of these uses within their municipal boundaries. But communities are also faced with the challenge of efficiently and safely moving people between these locations through their transportation networks. As communities begin to address concerns about sprawl, increasing costs of maintaining existing infrastructure, and air pollution, there is a need for strategies that integrate land use and transportation planning to create both livable and mobile communities.

#### *Transportation and Emissions*

According to the 2010 US EPA Greenhouse Gas Inventory Report, in 2008 emissions from the transportation sector accounted for the second largest portion of US greenhouse gas (GHG) emissions at 27%. This study also found that the transportation end-use sector accounted for roughly 32% of total CO<sub>2</sub> emissions from fossil fuel combustion, the largest share of any end-use sector. Within the transportation sector, passenger cars accounted for largest source of GHG emissions in 2008 at 33%. Light duty trucks, which include sport utility vehicles, pickup trucks, and minivans accounted for 29%. From 1990 to 2008, transportation emissions rose by 22%, primarily due to increased travel demand and minimal improvements in fuel efficiency. The number of vehicle miles traveled (VMTs) by light duty motor vehicles (passenger cars and light duty trucks) rose 37% during this time period (US Greenhouse Gas Inventory Report, US EPA, 2010). New Hampshire is not immune to the problem of greenhouse gas emissions resulting from transportation. According to the NH Office of Energy and Planning, the transportation sector accounted for 33.9% of the state's energy use in 2007. Furthermore, 100% of the fossil fuel energy used in transportation is imported to NH.

#### *Reduction in Vehicle Miles Traveled*

There is a need to reduce the number of vehicle miles traveled in the Nashua Region and each community has a role to play. The Nashua Region's close proximity to greater Boston has created a number of distinct travel patterns. Residents of the Nashua Region commute within the state as well as

to destinations in Massachusetts to reach employment sites. According to the 2000 US Census, 25,402 residents of the Nashua Region travel to Massachusetts for work. Another 61,433 residents of the Nashua Region travel within the region for work. According to the Nashua Regional Planning Commission's 2010 Travel Demand Model, daily VMTs for the Nashua region are 5,000,382. With an average occupancy rate of 1.05 persons per vehicle (2000 US Census for communities in Nashua Region), these travel patterns contribute to congested roadways and poor air quality levels in the region. Brookline is part of the Boston-Manchester-Portsmouth (SE) NH Non-Attainment Area for the 8-Hour Ozone Standard.

Although NH's growth rate is slowing, the rapid growth it experienced in the past 40 years has resulted in low density, sprawling development. In turn, this leads to increased vehicle miles traveled, as residential and commercial developments are dispersed across the landscape. Growth in VMTs can be reduced by promoting compact, mixed use, walkable design. Proper land use planning can decrease trip length and increase the use of walking, biking, and public transit. At the same time, it improves aesthetics, livability, and quality of life by maintaining forest and agriculture land and preserving traditional rural and village character.

#### Alternative Transportation

With the exception of Souhegan Rides (a regional ride service to non-emergency medical and social service appointments) public transportation is not available in Brookline. Therefore, a program is needed to educate residents on ways to reduce their VMTs that do not involve the use of public transportation. These include, but are not limited to, carpools, vanpools, walking, biking, and telecommuting.

#### Municipal Vehicle Fleet

Currently, Brookline does not have a formal policy to consider fuel economy when evaluating municipal vehicle purchases.

### **6.2 ~ Energy Implications of Land Use & Transportation Results/Findings**

- The top rated transportation priority in the 2008 Vision Plan for Route 13 & 130 was improvements to pedestrian amenities.
- 78% of residents participating in the 2008 Brookline Route 13 & 130 Zoning Survey stated that mixed use development should be allowed throughout Town.

- 84% of residents participating in the 2008 Brookline Route 13 & 130 Town Center Survey stated that their preferred mode of transportation when traveling within the town center was walking.
- Residents in the Community Facilities breakout session of the 2010 Brookline Master Plan Forum recommended that a farmers' market be established in Town. This was rated as having moderate impact and high feasibility at the Forum and high impact and high feasibility in the 2008 Vision Plan for Route 13 & 130.

Of the residents participating in the 2010 Brookline Master Plan Survey:

- 83% stated it is important to maintain and/or improve pedestrian trails in Brookline.
- 81% stated it is important to maintain and/or improve bike paths in Brookline.
- 79% stated it is important to maintain and/or improve the paved road shoulder in Brookline.
- 76% stated it is important to maintain and/or improve sidewalks in Brookline.
- 54% stated it is important to maintain and/or improve bus service in Brookline.
- 50% stated it is important to maintain and/or improve Park & Ride facilities in Brookline.
- 49% stated it is important to maintain and/or improve public transportation in Brookline.
- 46% stated it is important to maintain and/or improve rail service in Brookline.

### **6.3 ~ Energy Implications of Land Use & Transportation Recommendations**

- Develop a vision for Brookline's land use patterns and transportation options over the next 10 years to serve as a guide for implementing energy related policies and projects. Consider how Brookline's land use patterns might change if energy efficiency was taken into consideration. Given that large scale public transportation is not necessarily feasible or practical in Brookline, consider how residents might reduce energy used for transportation in the next 10 years.
- Create a Town Center/Mixed Use Overlay District to encourage more businesses to locate in Brookline. The more businesses Brookline residents can access locally, the fewer miles they will need to travel.
- Continue to support the existing Souhegan Rides intra-regional bus service.
- Improve the viability of using walking and biking as modes of transportation for short distance, local trips within and to the Town Center, higher density areas, and schools.
- Consider updating the non-residential site plan regulations to address connections between commercial sites. Where feasible, all projects should be required to provide interconnecting driveways to existing adjacent properties or easements to allow interconnecting driveways to future

construction. Interior parking lots should be shared between adjacent buildings to allow pedestrian and vehicular access between adjacent lots without entering the roadway.

- Educate Brookline residents on the environmental, economic, health, and social benefits of using non-motorized and alternative forms of transportation, including decreased travel expenses, reduced traffic congestion, and better air quality. Educational initiatives may include articles in the local newspaper, carpool programs at Brookline schools, Town sponsored events that encourage walking and biking, and incentive programs.

**6.4 ~ Energy Implications of Land Use & Transportation Implementation and Timeframe**

<b>Task</b>	<b>Responsible Department or Group</b>	<b>Timeframe</b>
Develop a vision for Brookline’s land use patterns and transportation options over the next 10 years.	Local Energy Committee, Planning Board	1-3 years
Develop a Town Center Overlay District to permit mixed use development.	Planning Board/Town Center Committee*	5-10 years
Provide incentives, such as a streamline review process, for developments with compact, walkable design, and mixed use in existing community centers.	Planning Board	5-10 years
Expand and improve bicycle and pedestrian facilities, with a focus on the Town Center, higher density areas, and schools.	Local Energy Committee, Board of Selectmen	Ongoing
Establish a plan for a central parking area to promote walking once in the Town Center.	Board of Selectmen	5-10 years
Update the non-residential site plan regulations to require connections between commercial sites.	Planning Board	1-3 years
Develop an education and outreach program on the benefits of using non-motorized and alternative forms of	Local Energy Committee	1-3 years

transportation.		
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*\*Recommendation to form a Town Center Committee is made in the 2011 Brookline Master Plan Land Use chapter.*

**SECTION 7—REFERENCES**

**7.1 ~ Definitions**

- Biomass—when referring to fuel, means plant-derived fuel including clean and untreated wood such as brush, stumps, lumber ends and trimmings, wood pallets, bark, wood chips or pellets, shavings, sawdust and slash, agricultural crops, biogas, or liquid biofuels, but shall exclude any materials derived in whole or in part from construction and demolition debris (NH Climate Action Plan).
- Combined Heat and Power—also referred to as cogeneration is the process by which two different and useful forms of energy are produced at the same time. For example, water may be boiled to generate electricity in a turbine, with the leftover steam used to drive industrial processes or captured for space heating (NH Climate Action Plan).
- Geothermal Energy—thermal energy or heat generated and stored in the earth. This heat can be recovered as steam or hot water and used to heat buildings or generate electricity.

**7.2 ~ Relevant State Statutes and Model Ordinances**

- RSA 38-D *Local Energy Commissions*—provides enabling legislation for municipalities to establish energy commissions and to define their purpose and duties.
- RSA 72:61-72 *Property Tax Exemptions*—enabling legislation that permits municipalities to offer property tax exemptions on solar, wind, and wood heating systems, including solar hot water, solar photovoltaic, wind turbines, and central wood heating systems (not stovetop or woodstoves). Sample warrant articles are available.
- RSA 269:1(n) *Energy Master Plan Chapter*—enabling legislation that permits communities to adopt Energy Chapters in their Master Plan, “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 362-F *Electric Renewable Portfolio Standard*—requires NH’s electricity suppliers to demonstrate they are obtaining 23.8% of their electricity from renewable sources by 2025.
- RSA 672:1 III-a *Planning and Zoning General Provisions*—“proper regulations encourage energy efficient patterns of development, the use of solar energy, including adequate access to direct

sunlight for solar energy uses, and the use of other renewable forms of energy, and energy conservation. Therefore, the installation of solar, wind, or other renewable energy systems or the building of structures that facilitate the collection of renewable energy shall not be unreasonably limited by use of municipal zoning powers or by the unreasonable interpretation of such powers except where necessary to protect the public health, safety, and welfare.”

- RSA 674:17 *Purpose of Zoning Ordinances*—“to assure proper use of natural resources; encourage the preservation of agricultural land; to encourage the installation and use of solar, wind, or other renewable energy systems and protect access to energy sources by regulation of orientation of streets, lots, and buildings; may further regulate the planting and trimming of vegetation on public and private property to protect access to renewable energy systems.”
- RSA 674:21 *Innovative Land Use*—innovative land use controls may include conservation subdivisions, village plan alternative, agriculture incentive zoning, transit oriented development, pedestrian oriented development, access management, preserving dark skies, and energy efficient development.” Model ordinances are available for each innovative land use technique.
- RSA 674:36 *Subdivision Regulations*—subdivision regulations that the planning board adopts may encourage the installation and use of solar, wind, or other renewable energy systems and protect access to energy sources by the regulation of orientation of streets, lots, and buildings; establishment of maximum building height, minimum set back requirements, and limitation on type, height, and placement of vegetation; and encouragement of the use of solar skyspace easements under RSA 477.
- RSA 674:44 *Site Plans*—allows the planning board to adopt site plan review regulations that require innovative land use controls on lands when supported by the master plan, including energy efficient development.
- RSA 674:62-64 *Small Wind Energy Systems*—“ordinances or regulations adopted by municipalities to regulate the installation and operation of small wind energy systems shall not unreasonably limit such installations or unreasonably hinder the performance of such installations.” A model ordinance is available.

### 7.3 ~ Resources

- A comprehensive list of energy related resources is available online from the Nashua Regional Planning Commission at <http://www.nashuarpc.org/energy/tools.htm>.

- “Energy Action Plan for School Administrative Unit 41, Hollis and Brookline, NH” written by the Nashua Regional Planning Commission, January 2010. Available at <http://www.nashuarpc.org/publications/local.htm#brookline>.
- Innovative Land Use Planning Techniques Handbook—to address the need for guidance and technical assistance on Innovative Land Use Controls authorized by RSA 674:21, DES and its partners, the NH Association of Regional Planning Commissions, the NH Office of Energy and Planning, and the NH Local Government Center, produced *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*. The handbook includes sections dealing with development density, environmental characteristics, and site level design. Each of the 23 chapters includes model ordinances and regulations for use by municipalities interested in implementing the innovative land use techniques.  
[http://des.nh.gov/organization/divisions/water/wmb/repp/innovative\\_land\\_use.htm](http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm)