8. Energy

Overview—NH and Nottingham rely on Fossil Fuel

As a result of increasing reliance on fossil fuel and concerns about climate change, many public and private entities have made efforts to better understand and manage energy consumption and the use of non-renewable energy. The State of New Hampshire has taken several steps to manage energy consumption:

- December 2007 - Governor Lynch signed an executive order creating a Climate Change Task Force and directing it to develop a *Climate Action Plan.*

- 2008 - The New Hampshire Legislature adopted an amendment to the state Planning Enabling Legislation indicating that a town's Master Plan may include:

  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 674:2 III (n)].

- March 2009 – *The New Hampshire Climate Action Plan (NHCAP), a Plan for New Hampshire's Energy, Environmental and Economic Development Future* released and located on the NHDES website. The main goal of NHCAP is to achieve significant reductions in greenhouse gas emissions while providing long-term economic benefits to the citizens of New Hampshire. NHCAP concludes that the most significant reductions in both emissions and costs will come from:

  - substantially increasing energy efficiency in all sectors of the economy,
  - continuing to increase sources of renewable energy and
  - designing our communities to reduce reliance on automobiles for transportation.

  NHCAP urges NH communities to engage in local energy planning that includes strategies for decreasing emissions overall through energy conservation and reduction.

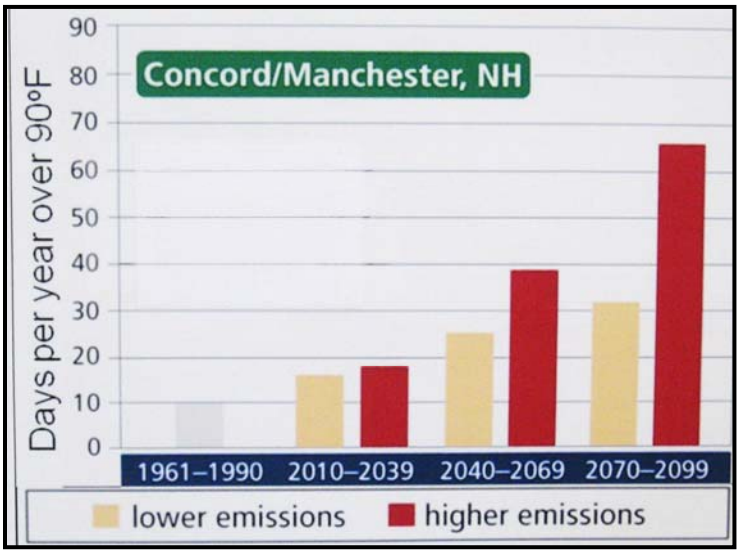
  NHCAP determined that the temperature effects of a changing climate would increase the number of days over 100°F in the state from an average of one per year to as many as 23 by the latter half of this century if aggressive steps are not taken to combat the causes of climate change. **Figure 8-1** shows the projected effects of higher and lower emission scenarios on these temperatures.

  To address these dramatic changes, NHCAP proposed two primary goals:

  - A mid-term goal of reducing greenhouse gases to 20% below 1990 by the year 2025
  - A long term goal of reducing greenhouse gases to 80% below 1990 levels by the year 2050.

  These greenhouse gases are monitored continually and summarized annually.

Figure 8-1: Temperature Effects of a Changing Climate



Source: NH Climate Action Plan, p.12

This chapter documents the energy uses and needs in Nottingham and recommends steps to reduce energy consumption through a variety of conservation measures and suggest options for increasing the use of renewable energy.

Energy Use and Climate Change

Climate change begins with the understanding of the greenhouse effect, where heat from the sun is trapped within the global ecosystem by gases in the atmosphere. The greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), Chlorofluorocarbons (CFC's), Nitrous Oxide (N_2O), Ozone (O_3) and water vapor (H_2O), absorb a portion of the infrared radiation and prevent it from escaping the earth's atmosphere. The absorbed infrared radiation then causes the increased temperature in the atmosphere and ultimately the land and sea masses on earth. This process is vital to life's existence on the planet; however the amount of heat being retained in recent years has heightened concerns over its effect on environmental ecosystems. Atmospheric carbon dioxide is now estimated to be the cause of 60% of the enhancement to the greenhouse effect (Houghton, et. al., 2001).

State Energy Supply and Demand

On average, every NH resident consumes the energy equivalent of 1,895 gallons of gasoline per year. 90% of the state's energy comes from petroleum, nuclear, natural gas and coal. The remaining 10% comes from renewable sources which are dominated by wood and hydroelectric.

According to the US Energy Information Administration (USEIA), New Hampshire had the seventh lowest total annual energy consumption per person in the country at 235 million British Thermal Units (MBTU) in 2008. That is the equivalent of 1,895 gallons of gasoline consumed by each person in the state every year.

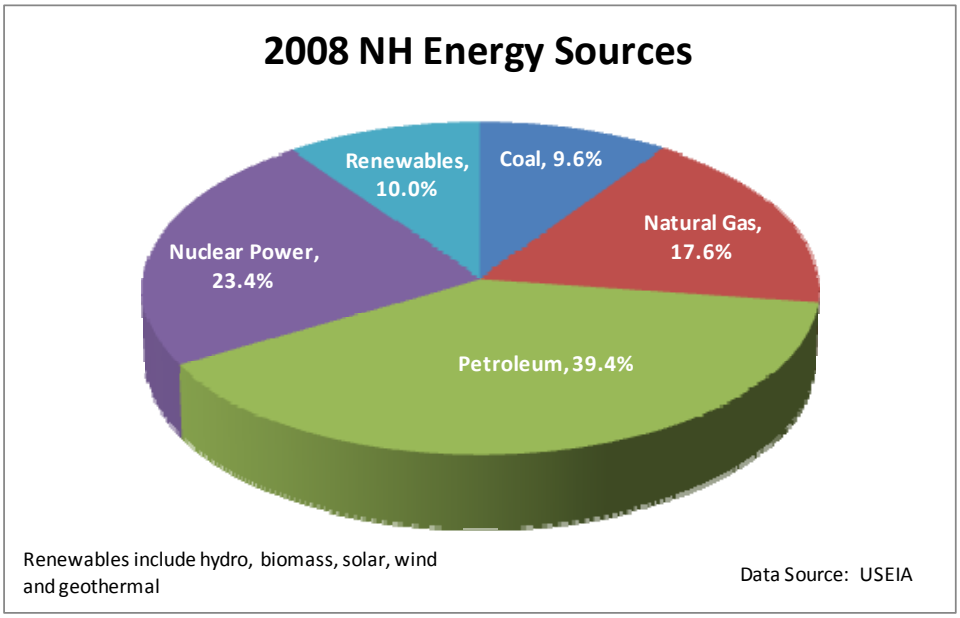
By comparison, New York had the lowest per capita consumption at 204 MBTU/person and Wyoming had the highest at 1,106 MBTU. The per capita consumption average for the entire country was 326 MBTU.[1] **Figure 8-2** shows the corresponding figures for the northeastern states, as well as the six states that use less energy per capita than New Hampshire. How do these numbers relate to Nottingham? Based on the state per capita consumption and an estimated Nottingham 2010 population of 4,875, the implication is that Nottingham residents use the energy equivalent of 9.3 million gallons of gasoline per year.[2] Assuming that a typical vehicle has a fuel efficiency of about 20 miles per gallon of gasoline, Nottingham residents use enough energy to drive at least 186 million miles every year.

Figure 8-2

2008 Per Capita Energy Consumption by State (MBTU)	
United States	326.5
Wyoming (highest in US)	1016.1
Maine	355.6
Pennsylvania	310.3
New Jersey	304.4
Vermont	248.7
New Hampshire	235.5
Connecticut	231.2
California	229.1
Massachusetts	225.4
Hawaii	220.4
Rhode Island	208.9
New York (lowest in US)	204.9
	Source: US EIA

Figures 8-3 and 8-4 provide a summary of the state's major energy sources and end-uses. **Figure 8-3** highlights the fact that almost 40% of the state's energy comes from petroleum. Nuclear energy accounts for 23% with natural gas providing nearly 18% of New Hampshire's needs. At present, only 10% of the state's power supply comes from renewable sources that include hydro, biomass (primarily wood), solar, wind and geothermal. A more detailed chart showing the flow of energy in the state from its source to end user is found in **Appendix EN-1.**

Figure 8-3: State Energy Sources

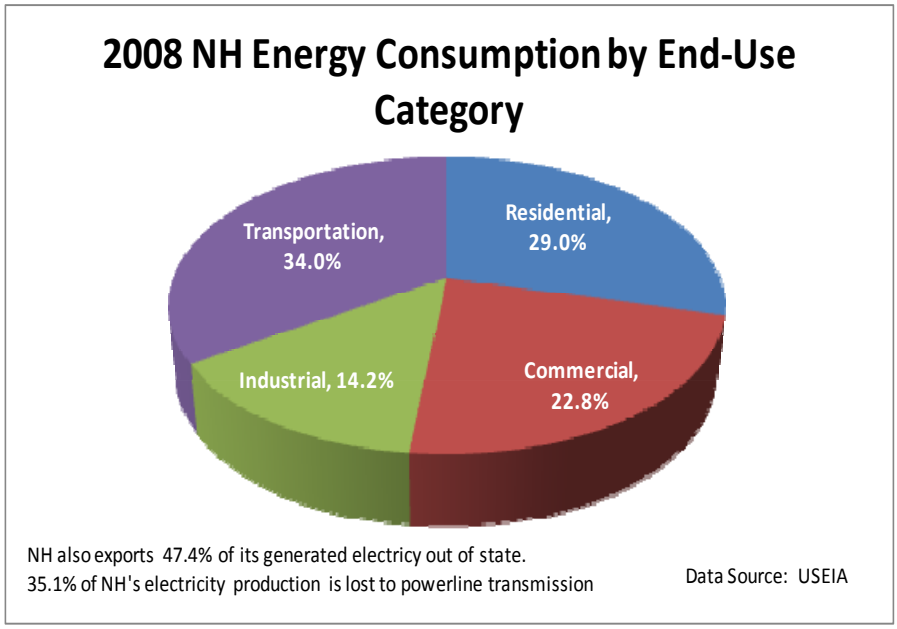


As shown in **Figure 8-4**, transportation is the largest consumer of energy (34%) as well as the largest producer of CO_2 in the state of New Hampshire. Residential uses consume 29%; commercial activity takes up another 23% with industrial holding the smallest share at 14%. The state inventory indicates that oil and electricity are the main sources of energy in the residential and commercial sectors. In the industrial sector, the highest energy usage is electricity.

[1] A full listing of energy source and consumption data can be found at the US Energy Information Administration at www.eia.doe.gov.

[2] Based on each resident consuming approximately 1,903 gallons of fuel oil each year,

Figure 8-4: NH Energy Consumption



A comprehensive chart of the state's energy sources and uses can be found in the Appendix, which further illustrates that:

- Electricity generation consumes 54% of all the energy used in the state, but nearly half of that is exported.
- Out of the total electricity that stays in the state, 67% of it is lost in power production and transmission between the power source and the end user, which is consistent with the losses seen throughout the United States.

New Hampshire produces very little of its own energy from local resources. While it does generate a significant amount of electricity at the Seabrook nuclear power plant, the nuclear fuel rods are brought in from elsewhere. Virtually all petroleum products are imported into the state (nationally 84% of the petroleum is imported from abroad). New Hampshire's only native energy sources are small amounts of wind, solar, hydro, geothermal, and biomass (predominantly wood). As stated earlier, these local energy sources make up less than 10% of the state's total supply. Because Nottingham is a small community located in a small state, at the end of most fuel supply chains, much of the energy used in town is susceptible to forces beyond local or even state control. Furthermore, almost all of the money spent on electricity and petroleum flows out of the local economy and outside of the state. By reducing the amount of money spent on imported energy, Nottingham can redirect more money back into the growth and prosperity of its local economy and citizens. By encouraging energy conservation and energy-efficiency the town can improve its prosperity. To this end, Nottingham needs to develop an energy management plan.

Nottingham Energy Use

As noted in the Land Use chapter, almost 80% of the town's developed land is used for residential activity, primarily single family homes. Given the rural character of Nottingham, the small amount of commercial property, and the rural development densities, both the residential and transportation sectors consume a higher percentage of energy use in town as compared to the state-wide averages. Taking the residential (including municipal buildings) and transportation consumption ratios from **Figure 8-4**, it can be inferred that Nottingham consumes about 45% of its energy in the residential sector, with nearly all of

the remainder going to transportation. This would enable the community to concentrate its energy conservation efforts on residential/municipal energy conservation measures and promoting ways to reduce transportation energy use.

Residential Energy Use in Nottingham

Based on the residential end-use data displayed in the NH Energy Flows chart in the Appendix, a total of 67% of the electrical energy used to supply homes is lost in electrical generation and transmission. The remaining energy is "useable" in homes—26.1% of the useable residential energy is from electricity; 58.4% is petroleum based; 12.5% is natural gas with the remaining 3% coming from renewable sources. Nottingham does not have access to natural gas, but uses more wood per residence for heating than the state average.

Figure 8-5: Primary Residential Heating Sources

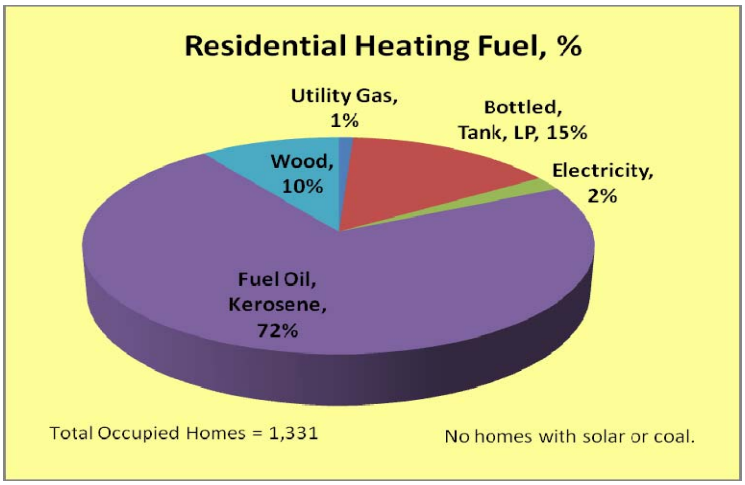


Figure 8-5 shows the distribution of primary heating sources for Nottingham homes in 2000.

- Fuel oil (petroleum) was the primary heating source for 958 homes (72%)
- LP gas provided primary heat to 204 homes (15%)

In 2000, no homes were reported to have used solar, geothermal, or biodiesel for primary home heating.

Over the last six years a number of residences have installed alternative energy devices. This represents a very small percentage of the total number of homes in Nottingham, but it is a significant increase over the 2000 census data. Between 2000 and 2010, there have been 15 solar energy installations and four geo-thermal installations. Also over the same time period six wood-fired boilers have been installed, representing the primary heating source for those residences. One commercial business has installed a small wind generator.[3] At the September 19, 2011 Nottingham Day an informal energy survey was undertaken with responses from 47 individuals. Many of those interviewed had installed some sort of renewable energy equipment. For example, almost 20 had installed a wood stove. The survey form and the results are provided in **Appendix EN-2** and **Appendix EN-3**, respectively.

Municipal Energy Use in Nottingham

Based on records kept by the town, energy use for municipal buildings and vehicles is tabulated below in **Table 8-1.** This table records the use of heating fuel including propane as well as vehicle gasoline and diesel fuel. There is also a tabulation of electrical use by municipal buildings. The use of each energy source/type has been converted to a common unit—British thermal units. At present, the records for fuel are kept in an aggregated manner, making direct comparisons from building to building difficult. Based on building usage, size, etc., it is quite likely that the buildings with the most energy use are the Municipal Office Complex (including the Police Department) and the Fire Station.

[3] Data provided by Nottingham Code Enforcement Office, August, 2011

Table 8-1: Energy Use by Municipal Sector-2010

Municipal Sector	Energy Use #2 Fuel (gallons)	Energy Use Propane (gallons)	Energy Use Vehicle Gasoline (gallons)	Energy Use Diesel Vehicle (gallons)	Energy Use Fuel (MBTU) [1]	Electrical Use (KWH)	Electrical Use (MBTU)
Municipal Office Complex	8,400				**1,164**	109,152	**372**
Police Department							
Old Town Hall						428	**1.5**
Old Fire Station						16	**0.054**
van Dame School		7,500			**685**	Included in Municipal Office Complex	Included in Municipal Office Complex
Fire Station						34,208	**117**
Library						20,059	**68**
Vehicle Fleet (Gasoline)			6,000		**754**		
Vehicle Fleet (Diesel)				22,500	**3,121**		
Grange Hall	Electric Heat					>10	**NA**
Recycling Center	Waste Oil					16,248	**55**
Total	**8,400**	**7,500**	**6,000**	**22,500**	**5,724**	**180,111**	**615**

Source: 2010 Town Records for fuel and electrical use.

1. The Clean Air and Climate Protection software presents energy use in MBTUs, which is one million British Thermal Units, a common measure of energy consumption (see www.energyvortex.com/energydictionary/british_thermal_unit_(btu)_mbtu_mmbtu.html).

Nottingham School Energy Use

c

The Nottingham School is heated with propane gas that is supplied by Energy North. Electricity is supplied by Public Service of New Hampshire (PSNH). The school had an energy audit done approximately four years ago which only recommended some lighting changes in the gymnasium and other areas, but most of the building was considered to be lighting efficient.

In the last year the school used 36,929 gallons of propane fuel for heating/cooking that translates to 3,373 MBTU's. The school also used 50,763 KWH's of electricity or the equivalent of 173 MBTU's.

Residential and Municipal Opportunities to Reduce Energy Consumption

Renewable Resources

The following resources represent opportunities for energy reduction and conservation within Nottingham.

Biomass (Wood)

Wood or wood pellets are burned to heat homes and buildings. On a larger scale, wood pellets can be burned to heat water and produce steam which can turn a turbine to produce electricity.
The Land Use Chapter documented that approximately 73% of the town land area (or 22,522 acres) is forested. Discounting the 5,500 acres that is in Pawtuckaway State Park, there are approximately 17,022 acres of non-state forested land in town. With sustainable yield management practices, this forest resource could provide Nottingham with considerable potential for sustainable energy production.

Sustainable yield practices are based on the logic that harvesting wood can be done at a rate no greater than the rate at which trees would mature, die and emit CO_2 as they decompose on the forest floor. The forestry industry estimates that ½ cord of wood can be harvested per acre per year. For example, if all 1,331 homes in Nottingham heated with wood, at up to 8 cords/house/year, it would take more than 20,000 acres of managed woodlots to support wood heating for the entire town on a sustained yield basis.

Geothermal
Heat that is stored below the earth's surface is used to heat a liquid (typically water) to produce heat or increase the ambient temperature of water going into a heating system.

Solar (photovoltaic)
Electricity is produced when the sun shines on panels made of interconnected silicon "cells" where excited electrons are collected and transmitted for use. These devices can provide reduced electricity consumption from the grid and offset transmission losses.

Solar (thermal)
Heat energy from the sun is collected and stored for use. In general this technology is more efficient than photovoltaic's. Designs can be *passive*, requiring little or no mechanical hardware (such as orienting a house to face south and having more windows on the south side) or *active,* which includes specialized collectors, a heat transfer medium and associated controls. In New Hampshire, efficient uses can include space heating, heating water for domestic use and heating pool water.

Wind
As wind blows through turbine blades affixed to a tower, the blades turn a central shaft which is attached to a generator to produce electricity. Nottingham has a Class I (lowest rated) wind resource which does not offer ideal conditions for wind turbine use.

Energy Conservation

Energy conservation is the wise use or management of energy. *Energy efficiency* refers to reducing or significantly limiting the amount of energy used to accomplish a desired goal, such as powering a building or driving a vehicle. Energy savings can be achieved through employing energy efficiency measures; reusing, reducing, and recycling resources; and substituting technologically more advanced equipment to produce the same level of end-use service.

In order to reduce energy consumption in Nottingham, new residential, commercial and municipal buildings could be constructed to higher energy efficiency standards than current codes specify. For example, the town could adopt local requirements that exceed the State Energy Code to facilitate the building of units that use less energy and are less expensive for the users to operate annually for no additional construction costs.

Existing buildings can also be retrofitted with a variety of energy conservation measures, including:

- better insulation,
- weather-stripping,
- installing programmable thermostats,
- purchasing Energy Star appliances and equipment, and
- installing more efficient lighting and electrical devices.

Both new and existing buildings can use renewable energy sources to a greater degree than at present. In addition to reducing the reliance on imported energy sources, increasing the use of locally generated renewable energy (solar, biomass, and geothermal) can also reduce the total amount of energy that needs to be produced by significantly lowering the electric transmission line losses that result from reliance on centralized power generation. In total, the NHCAP projects that residential energy use should be reduced by as much as 60% (NHCAP, p. 39) to achieve the state's long term energy goals for the year 2050.

Implementing Building Energy Conservation

The main issues to be addressed to achieve significant energy reduction in residential buildings are: (1) how to provide the up-front capital to identify and pay for the conservation improvements and (2) educating the public about the costs and benefits of undertaking significant improvements to their buildings.

In 2010, New Hampshire became the twenty-second state to enable communities to pursue "property assessed clean energy" (PACE) legislation. RSA 53-F ("Energy Efficiency and Clean Energy Districts.") makes it possible to establish voluntary districts, or the entire town, to finance energy conservation and clean energy improvements to their property and pay off the cost of those improvements over as much as 20 years.

If adopted at town meeting, property owners can volunteer to participate in the program, which would require the following steps:

1. An energy audit would be done to their building, energy improvements identified and priced out and an implementation plan agreed to.
2. The property owner would then execute a lien on the property to finance the energy improvements.
3. Repayment of the lien would show as a line item on the property owner's tax bill and be paid off at a rate that would not exceed the annual energy savings on the property.
4. The town, or its agent, would issue a bond to cover the improvement costs within the district and be repaid by each participating property owner for the loan amount, the interest on the bond, and any administrative expenses associated with the program.

The benefit of the program is that the lien runs with the property, and the town is able to recoup all of its associated costs so there is no net cost to the town or other taxpayers who chose not to participate in the program. With the provisions of RSA 53-F in place, the challenge for Nottingham is now to decide if it wishes to adopt the program, and market it to the community so that it can be widely used.

Transportation Energy Use in Nottingham Can Be Reduced

There are three major approaches that can be taken to lower the amount of energy used in transportation: (1) improve the efficiency of vehicles; (2) reduce the number of miles that everyone travels on a daily, weekly or monthly basis; (3) use other forms of transportation that are less energy intensive, such as public transportation, walking and bicycling.

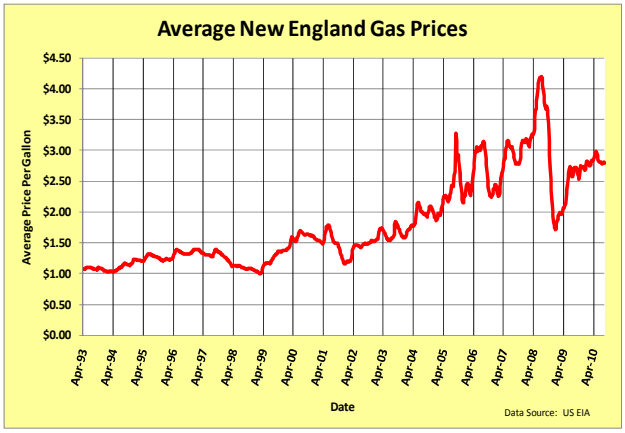
Improved Vehicle Efficiency

A state as small as New Hampshire does not have enough influence to force greater fuel efficiency from manufacturers. Regional and federal initiatives to mandate or encourage higher fleet fuel efficiency averages are the only practical approach. In April, 2010, recognizing that there is growing interest in increasing the "corporate average fuel efficiency" (CAFÉ) standards, EPA announced that a new combined standard (auto and light truck) would begin with the auto model year 2012. The new standard requires combined fuel efficiencies of 34.1 miles per gallon by 2016. As a result of the new standard, EPA predicts that CO_2 emissions in the United States will be reduced by the equivalent of taking 50 million vehicles off the road by 2030.

Reducing Vehicle Miles Traveled

Reducing the number of miles everyone drives is something that every community and individual can directly affect. The simplest way to cut down on travel mileage is to combine multiple trips into one.

Figure 8-6—Average NE Gas Prices, 1993-2010



- Some communities have instituted programs in elementary schools asking students to encourage their parents to "drive ten fewer miles per week."
- When fuel prices were at $4 per gallon in the summer of 2008 **(Figure 8-6),** people became motivated to find creative ways to lower their fuel use.
- Car-pooling, particularly for regularly scheduled trips to work, school, etc., is also an easily implemented approach. The NH DOT has an active ride-sharing program that can be found on their web site. They also have reported very heavy use at most of their park-and-ride lots around the state.

Encourage Use of Alternative Forms of Transportation

The rural nature of the majority of the community makes any significant provision of public transportation challenging. In order for public transportation to be economically viable, concentrations of population are necessary, either in nodes such as village centers or on travel corridors that have higher population densities. The Cooperative Alliance for Seacoast Transportation (COAST) operates a fleet of buses that connect Rochester, Dover, Durham and Portsmouth, but there are no services to Nottingham. The town could explore ways to provide local connecting services to this bus service. A significant increase in fuel prices, similar to what happened in 2008 (**See Figure 8-6.**), might encourage public transportation in Nottingham.

Encourage Compact Development

A longer term approach to reducing vehicle travel is to promote more compact, mixed-use forms of land development that enable people to live, work and shop within walking distance of their home or business.

A recent publication of the Urban Land Institute highlighted the fact that the total number of miles driven in this country has grown three times faster than the growth in the U.S. population. With more compact development, people drive 20 to 40 percent less, at minimal or reduced cost, while reaping other fiscal and health benefits.[4]

Action Plan

Vision Goal for Energy

Encourage a sustainable community by conserving energy and reducing greenhouse gas emissions.

Objective E 1: Undertake energy efficiency improvements in all areas of town government including buildings, vehicles and operations.

Actions

E 1.1: Undertake detailed energy audits on existing town buildings, evaluating life cycle costing of energy related improvements and implementing those that provide a reasonable return on the investment, including consideration for increasing energy costs, fuel availability and greenhouse gas emissions.

E 1.2: Establish a town vehicle procurement policy that carefully considers the intended use of the vehicle, its durability, vehicle size, energy efficiency and life-cycle capital and operating costs.

E 1.3: Implement a fuel use tracking system for every town vehicle so that fuel consumption, mileage and use can be monitored to make informed decisions about replacement.

E 1.4: Evaluate ways to reduce fuel usage within the town vehicle fleet by analyzing routes, usage, and idling practices.

E 1.5: Encourage purchasing hybrid or full electric vehicle (EV) for in-town municipal use.

E 1.6: Evaluate life-cycle costs, including possible use of energy efficient devices and energy improvements, at the time municipal building improvements or replacement are being pursued.

E 1.7: Encourage ride-sharing, bike riding, walking and the use of mass transit where possible.

E 1.8: Encourage municipal development of bike and walking paths where feasible.

Objective E 2: Establish a town-wide program to encourage reduction in energy use through conservation and installation of energy efficient devices.

Actions

E 2:1: Establish a Local Energy Commission per RSA 38-D for the study, planning and utilization of energy resources for municipal buildings and built resources in the community, and to

[4] Reid Ewing, Keith Bartholomew, Steve Winkelman, Jerry Walters & Don Chen, *Growing Cooler: The Evidence on Urban Development and Climate Change* (Washington, D.C., ULI, 2008). p.4

recommend to local boards plans and practices for energy conservation, energy efficiency, energy generation and zoning practices.

E 2.2: Consider adopting the provisions of RSA 53-F to allow energy conservation improvements for local residents.

E 2.3: Establish an educational program for all municipal employees to implement energy saving strategies and techniques.

E 2.4: Establish an education and outreach program to encourage townspeople to undertake energy efficient practices such as:

- Encouraging alternative energy sources for primary space heating, such as solar or wood.
- Purchasing Energy Star equipment and products.
- Encouraging energy saving strategies such as installing weather-stripping, thermal pane windows and doors, replacing incandescent lights, walking and biking.
- Encouraging recycling and composting in order to divert the amount of municipal solid waste that has to be hauled to a landfill.

E 2.5: Adopt energy conservation and efficiency measures for municipal buildings and operations. This could include creating local energy building requirements that exceed the State Energy Code.

E 2.6: Expand the number of activities (e.g., Farmer's Market) and uses available in the village center to encourage local activity and reduce vehicular travel.

E 2.7: Identify funding sources and grants targeted toward investments in energy efficiency systems.

E 2.8: Encourage and help support the incorporation of energy and energy issues into the curriculum of the Nottingham School District.

E 2.9 Conduct a statistically reliable energy survey of Nottingham residents as a valuable tool in planning for a more sustainable and self-sufficient community.

E 2.10 Conduct a community-wide energy use survey as a follow-up to the September 17, 2011 informal survey conducted at Nottingham Day.

Objective E 3: Encourage, and where feasible, implement sustainable energy practices in both the residential and municipal sectors of Nottingham.

Actions

E 3.1: Consider alternative energy sources for large municipal buildings to reduce escalating fossil fuel prices and emissions. Investigate payback for possibly installing a small combined heat and power (CHP) unit, a biomass heating system or a geothermal heat pump.

E 3.2: Identify funding sources targeted toward investments in sustainable energy systems.

E 3.3: Adopt a town-wide energy management plan.

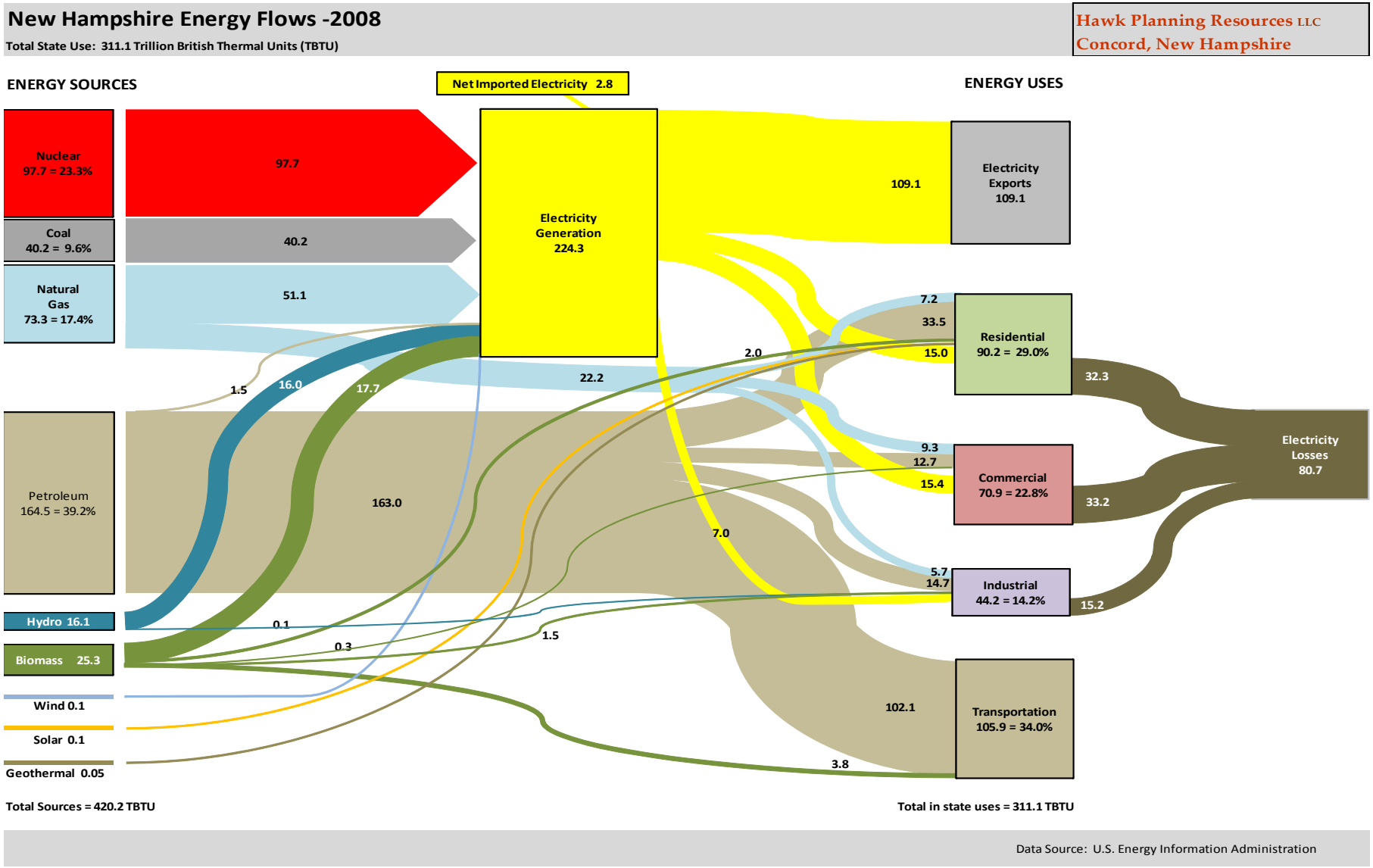
E 3.4: Provide residents with opportunity for local public transport to the existing public transportation grid.

E 3.5: Adopt the Office of Energy Planning (OEP) model Small Wind Energy Systems Ordinance.

E 3.6: Create several Park and Ride locations in town to encourage carpooling.

Appendix EN-1—New Hampshire Energy Flows

The following chart displays the sources of energy used in New Hampshire and how much each of them provides to the total needs of the state. The energy sources are shown on the left side of the chart and are linked to the energy use categories, on the right side of the chart, by colored bands whose thickness relates to the amount of energy supplied.



Appendix EN-2
Nottingham Day Energy Survey

Please take a moment to complete this survey to assist the Planning Board Master Plan Committee to collect opinions of town residents regarding energy. Thank you for your time and support.

Marital Status __ single _married Gender: __male __female
Age:___ Number of Occupants in Household:___

Occupation (circle one): Agriculture Education Healthcare Sales/Retail
Engineering Technology Non-profit Government Self-Employed Student
Retired Unemployed Other:_____

1. How much do you know about energy conservation? (Circle one)
(Nothing)1 2 3 4 5 6 7(A lot)

2. How much do you know about renewable energy? (Circle one)
(Nothing)1 2 3 4 5 6 7(A lot)

3. Have you installed renewable energy equipment? __Yes __No
If yes, what kind? (circle all applicable)

Wood or pellet stove Solar panels Wind Solar lights Geothermal
Solar hot water heater Passive solar design Other_____

4. Based on the size of your house, how would you rate the overall energy use? (Circle one)
   a. Less energy than the average house
   b. About the same amount of energy
   c. More energy than the average house

5. Would you be more apt to install alternative energy systems if there was a financial grant/tax incentive?
___Yes __No __Maybe

6. Have you performed any of the following energy improvements on your home? (check all that apply)
__ High efficiency lighting or appliances
__ Insulation
__ Setting thermostats at lower temperature
__ Sealed windows, doors, attics, or leaks
__ Had energy audit done
__ Other_____

7. In place of using your personal car, truck or motorcycle, do you use the following alternate forms of transportation on a regular basis: (check all that apply)
__walk __bike __carpool __ use public transportation __other:_____

8. What improvements to your community would convince you to bike/walk? (check all that apply)
__bike racks __bike paths __bike safety classes __benches __other:_____

9. How important do you consider that energy efficiency improvements should occur over time in all areas of town government including buildings, vehicles and operations.
(Not Important)1 2 3 4 5 6 7(Very Important)

10. How important do you consider a town-wide program to encourage reduction in energy use through conservation and installation of energy efficient devices.
(Not Important)1 2 3 4 5 6 7(Very Important)

Please use the space below to add any other comments:

Appendix EN-3
Nottingham Day Energy Survey Results (9/14/2011)

Nottingham Day's Planning Board booth 47 9/17/11 47 surveys

Nottingham Energy Survey

Please take a moment to complete this survey to assist the Planning Board Master Plan Committee to collect opinions of town residents regarding energy. Thank you for your time and support.

Marital Status 9 single 34 married Gender: 21 male 23 female DNR-3 Age:

Age: 3 other Number of Occupants in Household: one-1 2 3 4 5 Two-17 4-9

Occupation (circle one): Agriculture 2 Education 4 Healthcare 7 Sales/Retail 5 Engineering Technology-3 Non-profit Government-4 Self-Employed Student 12 Retired Unemployed Other: 8 part time 6 Finance-1 Disabled-1 DNR 14

1. How much do you know about energy conservation? (Circle one)
(Nothing)1 2 3 4 5 6 7(A lot)
4 15 12 10 4 NOT enough-1 DNR-1

2. How much do you know about renewable energy? (Circle one)
(Nothing)1 2 3 4 5 6 7(A lot)
2 7 14 10 9 3 NOT enough 1 DNR-1

3. Have you installed renewable energy equipment? 20 Yes 27 No
If yes, what kind? (circle all applicable)

Wood or pellet stove 19 Solar panels 8 Wind Solar lights 2 Geothermal
Solar hot water heater 2 Passive solar design 5 Other Instant hot H2O - 11 Energy STAR app/rain-1 light bulbs-1

4. Based on the size of your house, how would you rate the overall energy use? (Circle one)
a. Less energy than the average house – 24 17
b. About the same amount of energy
c. More energy than the average house – 4 DNR 2

5. Would you be more apt to install alternative energy systems if there was a financial grant/tax incentive?
Yes No Maybe All were yes or Maybe, but 1 NO

1/2 = 23.5
1/3 = 15.67
1/4 = 11.75
3/4 = 35.25
2/3 = 31.3
1/5 = 9.4

6. Have you performed any of the following energy improvements on your home? (check all that apply)
38 26 High efficiency lighting or appliances
24 Insulation
37 Setting thermostats at lower temperature
29 Sealed windows, doors, attics, or leaks
2 Had energy audit done
1 Other Changed windows, low flow faucets, use power strips

7. In place of using your personal car, truck or motorcycle, do you use the following alternate forms of transportation on a regular basis: (check all that apply) Train to Boston
0 walk 4 bike 9 carpool 1 use public transportation other: None-4 In Lott?-1 Did Not Resp 26

R "NA" DNR- 15

8. What improvements to your community would convince you to bike/walk? (check all that apply)
2 bike racks 29 bike paths 2 bike safety classes 2 benches other: walking Trails -5 sidewalks-1 wider ROAD shoulders-1

9. How important do you consider that energy efficiency improvements should occur over time in all areas of town government including buildings, vehicles and operations.
(Not Important)1 2 3 4 5 6 7(Very Important)
1 4 4 13 23 DNR-1
1-educate Bikers + vehicle drivers
1-public Transp.

10. How important do you consider a town-wide program to encourage reduction in energy use through conservation and installation of energy efficient devices.
(Not Important)1 2 3 4 5 6 7(Very Important)
1 2 6 16 21 DNR-1 Comment! be a role Model.

Please use the space below to add any other comments:

- Public Transp. on Rte 4 would be a high priority
- would like to see composting at Recycle Center
- suggest that town had workshops/info on Renewable Energy
- Funds to offset cost of utility/state audit programs
- Under present government standards how much would this cost us? to make any/all changes.