STATE OF NEW HAMPSHIRE

BEFORE THE

SITE EVALUATION COMMITTEE

Application of Antrim Wind Energy, LLC

Docket No. 2015-02

TESTIMONY OF THE TOWN OF ANTRIM

BOARD OF SELECTMEN

May 23, 2016

I. INTRODUCTION

Q. Please state your name and address.

A. Michael Genest ("MG"), 83 Old Pound Road, Antrim, New Hampshire.

John Robertson ("JR"), 262 Concord Street, Antrim, New Hampshire.

Robert L. Edwards ("RLE"), 101 Turner Hill Road, Antrim, New Hampshire.

Q. What office do you hold for the Town of Antrim?

JR. I am Board Chair of the Antrim Board of Selectmen and have served on the Board since March 2010 to the present. I have also served as a Trustee of Trust Funds and as the Selectmen's *ex officio* member of the Antrim Planning Board.

MG. I am a member of the Board of Selectmen of the Town of Antrim and have served on the Board since March 2002 to present. I have served multiple terms as the Selectmen's *ex officio* member of the Antrim Planning Board and have been involved in the Antrim Wind Energy, LLC Project ("Antrim Wind") as a Town official since the project first came before the Town.

RLE: I am a member of the Board of Selectmen since March 2016. I have served as a Trustee of Trust Funds for over 25 years and have served twice as Chair of the Antrim Planning Board. Most recently I served as a member on Antrim's Advisory Budget Committee. I was also an intervenor during the last submission to the SEC by Antrim Wind.

Q. What is the purpose of this testimony?

A. We offer this testimony to explain why the Town of Antrim supports the Antrim Wind Project before the Site Evaluation Committee. This testimony is offered in our capacity as the governing body of the Town of Antrim under the Selectmen's responsibility to "manage the prudential affairs of the town." RSA 41:8.

II. ANTRIM WIND WILL BENEFIT THE TOWN AND THE REGION

Q. Why does the Antrim Board of Selectmen support Antrim Wind Project?

A. The Antrim Board of Selectmen believes that the Antrim Wind Project will benefit the Town, the Contoocook Valley School District, the region and the economy. While the Project may have some impacts, we believe that these impacts have been or will be mitigated so that the positive benefits to the Town and the region will outweigh any adverse components of the Project. These benefits include:

- **State, County and Local Property Taxes**. Antrim is a small town that struggles to keep its tax rate low while facing the need to provide basic municipal services and fund capital improvements to provide those services. The Selectmen have negotiated a 20 year PILOT Agreement that will provide meaningful property tax benefits to the Town, the County, Schools and the State. *See Application, Appendix 17b & 17c*. Annual property tax payments to the Town under the provisions of the PILOT Agreement are expected to be approximately $324,000 per year (based on a 28.8 MW capacity) which will make Antrim Wind the Town's largest tax payer. While some argue or have argued that Antrim Wind's payments should be higher, Antrim Wind's payments under the PILOT Agreement will help to reduce the long-term tax burden on residents of the Town, the cooperative school district, and the County, without the potential costs and uncertainty of tax abatement litigation. In addition, Antrim Wind will make state utility tax payments assessed by the Department of Revenue, which is an additional benefit.

- **Town and School Capital Projects.** Both the Town of Antrim and the Contoocook Valley School District have fiscal constraints that limit their ability to fund capital projects. Antrim Wind's tax payments under the PILOT Agreement will help fund future improvements to the Town and the School District. In addition, should the Project receive approval, Antrim Wind has committed to funding physical improvements to the Gregg Lake boat launch, picnic area and other facilities. *See Gregg Lake Agreement, Application Appendix 10*. These projects are needed and Antrim Wind's contribution to these projects will benefit the Town and the economy.
- **Economic Benefits**. The Antrim Wind Project will provide both direct and indirect benefits to the local economy. In addition to providing financial benefit during its construction phase, economic benefits will be derived by local and regional businesses after the construction phase has been completed and the Project goes live. While these economic benefits may be difficult to estimate or measure with certainty, these benefits are likely to enhance our local business economy.
- **Scholarship Fund.** Antrim Wind has agreed to make a $5,000 annual payment to the Antrim Scholarship Committee. This will significantly increase the Scholarship Committee's awards and directly benefit local students in Antrim. *See Scholarship letter, Application Appendix 10.*
- **Promotion of State and Local Renewable Energy Goals**. Both the State and the Town of Antrim in its Master Plan have adopted renewable energy goals that include the construction of new renewable energy facilities.

- **Promotion of Conservation**. Upon approval by the SEC, the Antrim Wind Project will help conserve 908 acres of contiguous land through conservation easements while providing an additional $100,000 for conservation land acquisition by the New England Forestry Foundation within the Project area. While these parcels of lands are currently undeveloped, they are not presently protected by a conservation easement and as such, are exposed to potential future development. In the absence of conservation easement protection such as Antrim Wind and property owners have proposed, these land areas may face future development pressure. We believe that the conservation easements that Antrim Wind has proposed will have lasting economic and social benefits because they will promote tourism, recreation and responsible forestry.

III. CONCLUSION

The Antrim Board of Selectmen supports the Antrim Wind Project and thanks the Committee for the opportunity to provide these comments and support. The Selectmen understand that the Committee's review: (1) recognizes the benefits afforded by renewable energy projects such as Antrim Wind's Project; (2) protects the public against potential adverse impacts to property owners, aesthetics, historic sites, air and water quality, the natural environment, and public health and safety; and (3) ensures that all applicants have adequate financial, technical and managerial capabilities. We look forward to the Committee's careful review of the Project, its benefits, and all appropriate concerns under the provisions of RSA 162-H.

TOWN OF ANTRIM: COMPARISON OF ANTRIM WIND, LLC TO HIGHEST TAX ASSESSMENTS			
Parcel Owner	**Use**	**Assessed Value**	**Tax Assessed**
Antrim Wind, LLC	Proposed Wind Energy Facility	Per P.I.L.O.T.	$324,000
Public Service of NH PO Box 330	Utility transmission	$10,067,640	$255,115
TDS Telecom 525 Junction Road	Telecom utility	$1,015,610	$28,163
La Sala, Stephen & Shea Michelle 27 Masquanipi Drive	Private Residence (partially in current use)	$1,036,180	$30,160
Antrim Village 6 Aiken Street	Apartment building	$1,054,280	$29,236
Overseas United Education Foundation, Inc. ATTN: Yapu Gu	Former school campus, now closed; partially in current use	$1,852,367	$51,365
Carlson Kelly J & Paula M. 54 South Holt Hill Road	Private Resident (partially in current use)	$875,118	$23,767
Cochran Mills, LLC 128 Concord Street	Sign Design Company	$1,278,300	$35,447
Mailloux Richard 104 Pierce Lake Road	Private residence	$744,350	$20,642
Chorney, Richard L. 12 Keene Road	Private residence	$724,000	$20,272
Juliet Enterprises LLC Main Street	Inn and Marketplace	$731,890	$19,841

Energy in NH

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603-271-8316

Slide 1

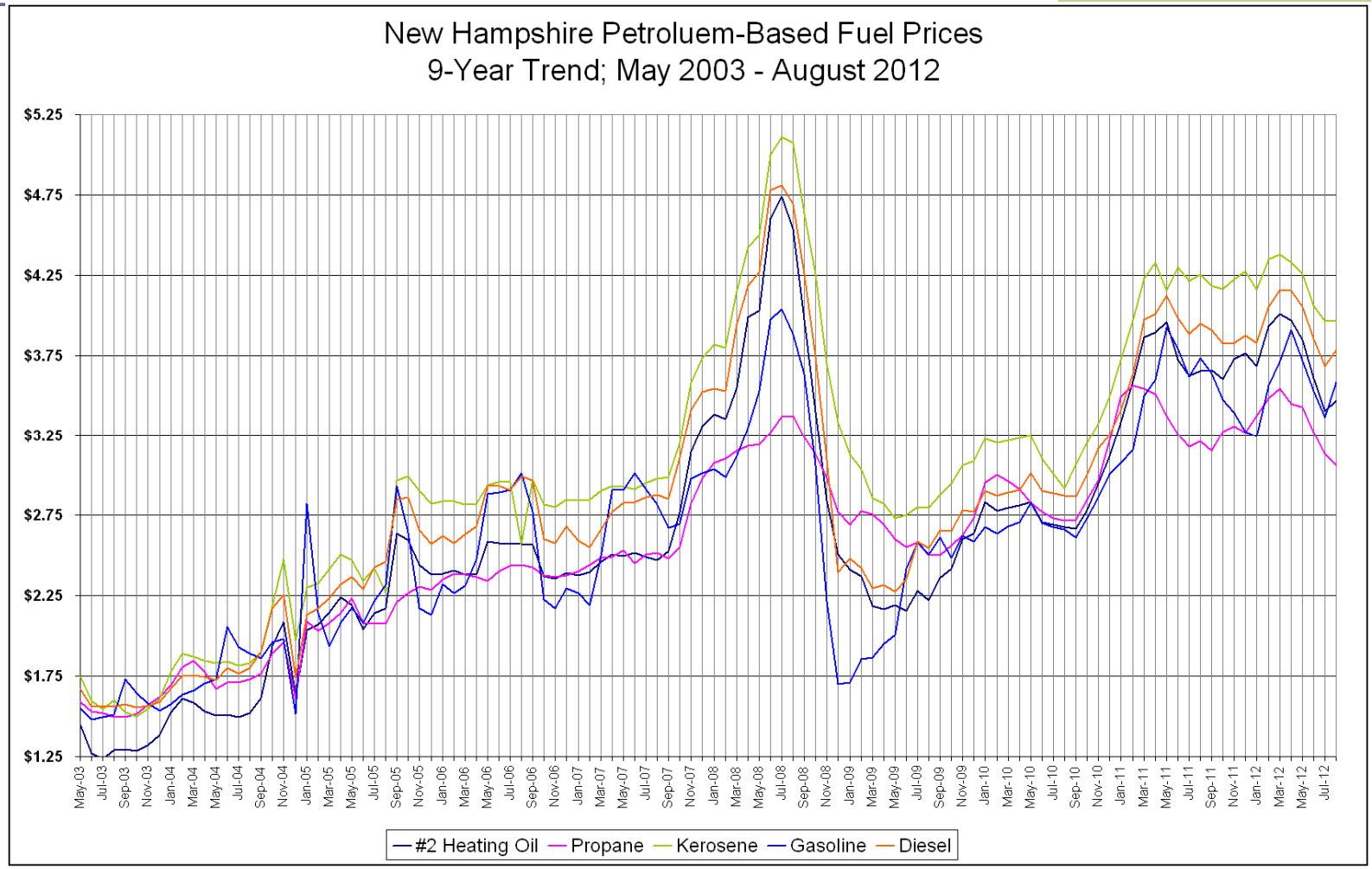
Outline

1. Importance of Energy
2. OEP's Mission
3. New Hampshire's Energy Goals & Policy Tools
4. NH as a Leader
5. Q & A

Importance of Energy

- Reliable, affordable sources of energy critical to economy, way of life
- Over time, prices increasing, reliability questionable
  - Demand in developing countries
  - Supply shifting, harder to extract
  - Infrastructure lagging

Petroleum Prices



Slide 4

Source(s): OEP Surveys (SHOPP)

OEP's Energy Mission

- Provide the public with easily-accessible information and data regarding energy use, energy reduction strategies, and renewable energy generation
- Play a leadership role in energy policy & planning
- Directly support & coordinate with the efforts of the Governor, other NH state agencies, and regional entities engaged in energy management, production, distribution, and energy assurance
- Assist the state in accomplishing goals regarding energy use reduction and diversification

NH's Energy Goals

- Climate Action Plan
- 25 by '25 Initiative
- Executive Order 2005-4—Clean Fleets/EnergyStar
- Executive Order 2011-1—State Building 25 by '25
  - SB 409 — High Performance Design Standard
- Building Energy Code Compliance
- Formal efficiency goal → In Progress

Source(s): http://www.25x25.org/index.php?option=com_content&task=view&id=12&Itemid=41

Renewable Goal - 25 by '25

- National effort with goal of "securing 25 percent of the nation's energy needs from renewable sources by the year 2025."
- Not just electricity, all energy
  - Opportunities in transportation & building conditioning
- Tools to meet goal:
  - Renewable Portfolio Standard
  - Renewable Energy Incentives
  - Lead by Example

Slide 7

Source(s): http://www.25x25.org/index.php?option=com_content&task=view&id=12&Itemid=41

Executive Order 2005-4

- Clean Fleets Policy
  - New passenger & light-duty vehicles >27.5 mpg
  - New light-duty trucks >20 mpg
  - Excludes emergency & law enforcement vehicles
- Appliance Standards
  - State agencies must purchase ENERGY STAR
- Opportunity for updating

Source(s): http://www.25x25.org/index.php?option=com_content&task=view&id=12&Itemid=41

Executive Order 2011-1

- Reduce fossil fuel usage in state buildings 25% by 2025.
- OEP works with State Energy Manager
  - State database
  - Agency Energy Conservation Plans
- Interagency Energy Efficiency Committee
  - Monthly meetings
  - Yearly energy conference
- High Performance Design Standard
  - All new construction & renovations

Slide 9

Source(s): http://www.25x25.org/index.php?option=com_content&task=view&id=12&Itemid=41

Building Energy Code Compliance

- Achieve 90% compliance by 2017
  - Currently <50% compliance
    - ARRA-Funded Roadmap to Compliance
- Big challenge, big rewards
  - For every $1 spent on code compliance measures, $6 saved

- Tools to meet challenge:
  - Existing efficiency programs (CORE, EEF, BetterBuildings)
  - Building Code Collaborative
  - Educational/outreach programs
  - Funding

Source(s): http://www.imt.org/uploads/resources/files/PolicymakerFactsheet-EnergyCodeCompliance.pdf

Efficiency Goal

- Energy Efficiency Resource Standards (EERS) similar to RPS
  - Establish "specific, long-term targets for energy savings that utilities or non-utility program administrators must meet through customer energy efficiency programs"
- OEP applied for and was awarded a competitive grant to develop roadmap for EERS

Source(s): http://aceee.org/topics/eers

NH as a Policy Leader

- History of innovation
  - Thermal sources in RPS
  - Wood Pellet Boiler Rebate
  - State Energy Efficient Appliance Rebate Program (SEEARP)
  - Green Launching Pad at UNH
- Opportunities due to size
  - Easier to implement programs in a smaller state

Questions?

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General Themes

- Energy underlies all aspects of our lives, from household budgets to the State's economy to preserving our environment
  - While past generations assumed that energy would be both available and affordable, we are now increasingly susceptible to the harms of uncertain energy supplies and volatile energy prices.
- We are paying much more for energy
  - Energy expenditures increased threefold from 1970 to 2007, while usage only increased ~80%. Resource price increases, such as for crude petroleum, account for most of the growth in energy expenditures.
- Much of the money spent for energy leaves the State, removing this potential growth stimulus from the State's economy.
  - One OEP modeling exercise suggests that, on average, **75 cents** of each dollar spent on petroleum products leaves the state. (2007 data)

Source(s): http://www.nh.gov/oep/programs/energy/nhenergyfacts/2007/introduction.htm

Energy Supply

- New Hampshire has no in-State sources of fossil fuels (petroleum, propane, coal, natural gas) or uranium.
  - Imported energy provided slightly more than 90% of the State's gross energy inputs in 2007.
  - 100% of the fossil fuel energy used for transportation was imported.
  - This reliance on imports means that our supply is vulnerable to disruptions due to weather, price volatility, commodities markets dynamics, political unrest, and other factors beyond our control. We are a small player in a complex global network.
- New Hampshire has abundant, underutilized renewable energy resources, such as biomass, geothermal, hydro, wind, wave, tidal and solar energy.
  - Increased use of renewables can reduce our vulnerability to energy disruptions, create more jobs and retain more energy dollars in local economies.
- **The least expensive energy is the energy we don't use**.
  - New Hampshire has a vast, largely untapped reservoir of potential energy efficiency savings. Energy efficiency activities circulate dollars in our local economy and may reduce the consumer's energy cost, even if the price per unit of energy increases.

Source(s): http://www.nh.gov/oep/programs/energy/nhenergyfacts/2007/introduction.htm

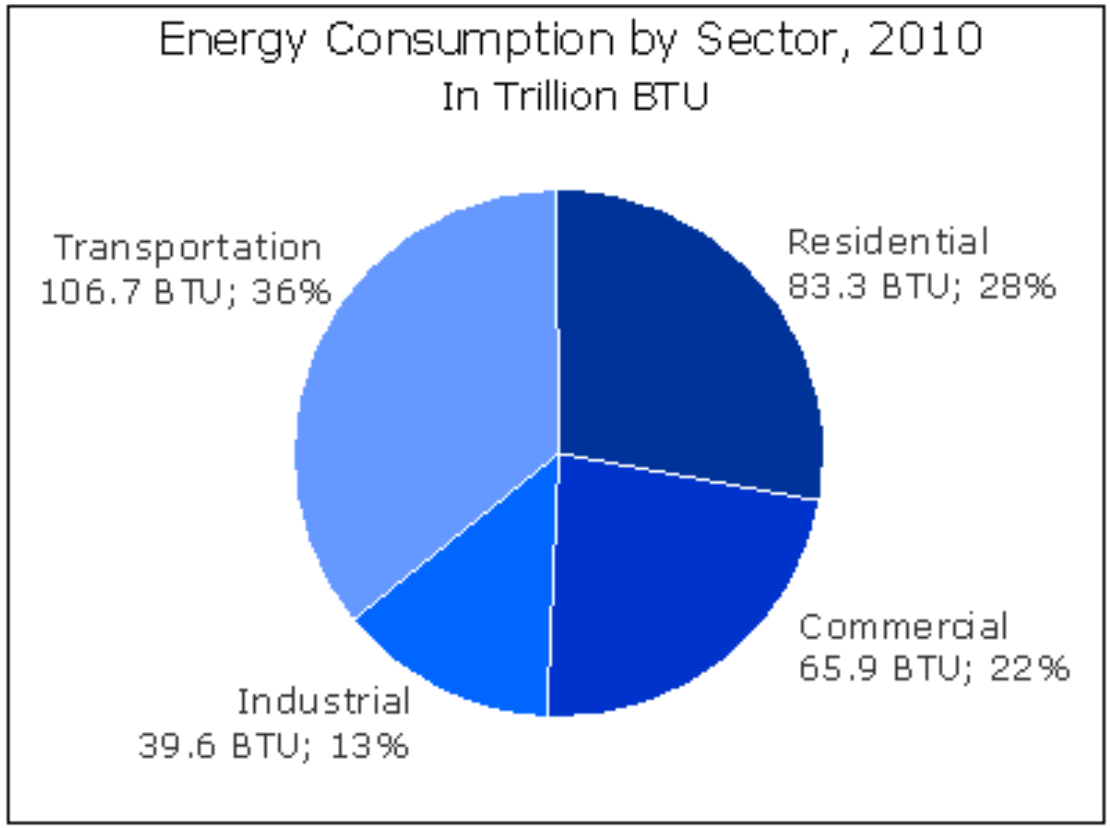
"In the Weeds"

- For many sources of energy, the extraction and refinement process require more energy than the end product contains
  - In other words, if your end product contains X BTU, the start-to-finish process of getting it to you may have required 1.5*X BTU.
  - Why continue with this?
    - Convenience– particularly for liquid fuel (gas, diesel)
- When considering an energy choice, it is helpful to ask where it came from and what was involved in getting it to you. "Involved" includes political, social, economic, energy costs and environmental impacts.
  - Also: how does it match your specific location, needs, use patterns?

Slide 16

Source(s): http://www.nh.gov/oep/programs/energy/nhenergyfacts/2007/introduction.htm

NH Energy Consumption



Source(s): http://www.eia.gov/state/seds/hf.jsp?incfile=sep_fuel/html/fuel_te.html
http://www.nhenergycode.com/live/index.php?go=roadmap

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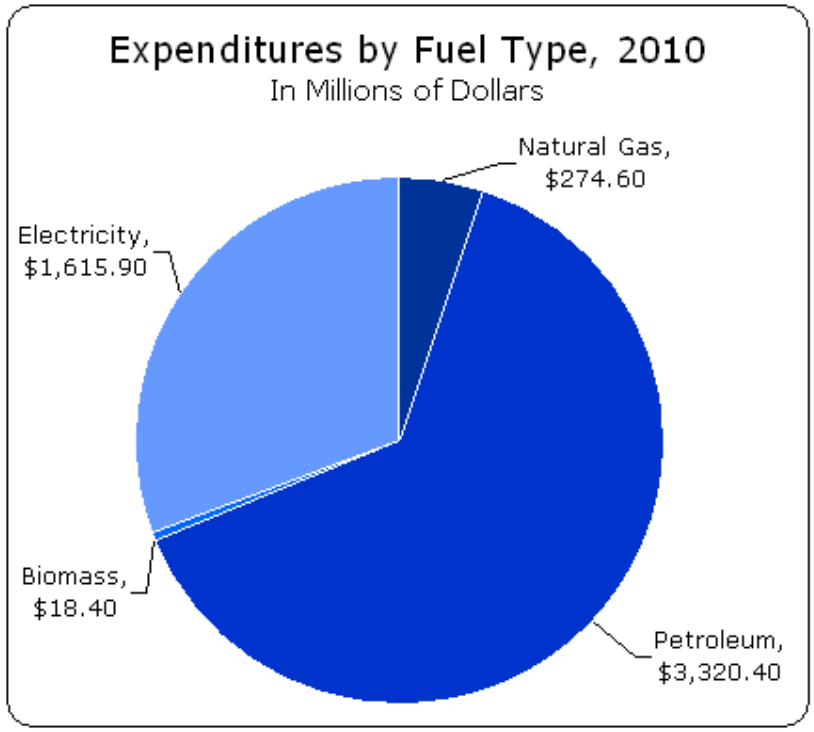
Expenditures by Fuel Source



- Clear need to reduce petroleum usage
  - NH imports 100% of its petroleum

Source(s): http://www.eia.gov/state/seds/hf.jsp?incfile=sep_prices/tx/pr_tx_NH.html&mstate=New%20Hampshire

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Why Assume Prices Will Rise?

- "Plan for the worst, hope for the best"
- Geopolitical considerations:
  - Growing worldwide demand (esp. developing world)
  - Crude oil production barely exceeds demand
  - Crude oil price influences other energy prices
  - Political/social unrest in oil producing regions -even *fear* of unrest –drives up futures prices
- Increasing costs for exploration and production
  - Easily accessible sources exhausted
  - Long-term costs of environmental destruction being recognized (particularly health costs)

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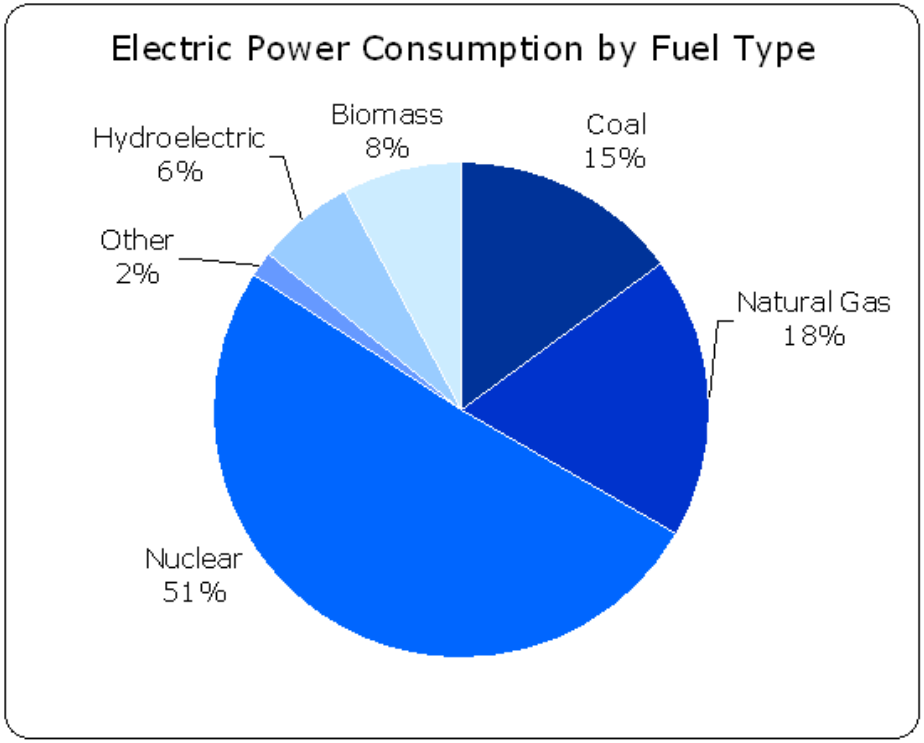
Electricity Usage by Fuel Source



- Renewables included in "Other"– less than 2%

(2010 data)

Source(s): http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/eu/use_eu_NH.html&mstate=New%20Hampshire

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OEP Mission

- The Office of Energy and Planning is an executive level agency. Its mission is to support planning that enhances the state's economic growth while preserving its unique character and natural beauty; and to advocate sound energy policies that encourage the use of renewable resources, reduce energy demand and constrain energy price increases.

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OEP Activities

- Administer several energy-related programs including fuel assistance program, weatherization assistance program, state heating oil and propane price (SHOPP) monitoring
- Statutorily designated member of over 30 regulatory and advisory boards, including the energy planning advisory board (EPAB) and energy facilities site evaluation committee (FSEC)
- Compile, and analyze supply energy/price data to state agencies, the legislature and the public
- Conduct education outreach on energy conservation and efficiency, renewable energy, energy aspects of planning and other topics related to energy assurance

1

Energy Efficiency in NH- CORE

- Administered by electric and natural gas utilities
- Goals of CORE program are to
  - Make energy efficiency improvements
  - Drive market transformation by creating demand for those improvements
- Funded via SBC fee– flat fee assessed to all customers
- Revenues from RGGI auctions also fund CORE

1

Policy Tool - RPS

- Renewable Portfolio Standard requires that a percentage of retail electricity sales come from renewable sources.
- NH has four classes:
  - Class I: New renewables (wind, biomass, geothermal, methane, ocean, etc…)
  - Class II: New Solar Energy
  - Class III: Existing Biomass and Methane
  - Class IV: Existing Hydro

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Policy Tool - Incentives

- Rebates for renewable installations
  - Solar Hot Water
  - Photovoltaic and Wind
  - Wood Pellet Boilers
- Net metering - Chapter Puc 900
  - Customers may receive credit for on-site electricity generation when generation exceeds consumption

Source(s): http://aceee.org/topics/eers

Energy Usage and Conservation

Antrim, like the rest of New Hampshire, is feeling the pinch when it comes to rising energy costs. Our appetite for more and more energy hits us in the pocketbook while damaging the environment.

There is no question that Antrim residents want to do something to reduce energy consumption not only to hold our costs down but to reduce the effects of global warming. Antrim was one of 164 towns in New Hampshire to adopt the New Hampshire Climate Change Resolution in 2007.

The resolution reads:

> ***"Whereas, The protection of our forests, air and water quality, fisheries and other natural resources are important to the health and quality of life of our citizens; and***
>
> ***"Whereas, There is evidence that climate change is already impacting New Hampshire's environment and natural resources, from increased intensity of storms, higher sea level, less snow cover, and more winter rain; and***
>
> ***"Whereas, New Hampshire state government has taken steps to lead by example by reducing energy use of state operations and committing to an overall state goal of using 25 percent renewable energy by 2025; and***
>
> ***"Whereas, The residents of many New Hampshire towns passed the New Hampshire Climate Change Resolution, calling for a national program to reduce U.S. greenhouse gas emissions while protecting the U.S. economy, to create a major national research initiative to foster rapid development of sustainable energy technologies, and encouraging towns to start local energy committees to seek ways to save energy, reduce emissions and save taxpayer dollars;***
>
> ***"Now, therefore, I John Lynch, Governor and the Executive Council of the State of New Hampshire, do hereby commend the New Hampshire Climate Change Resolution and local volunteers for bringing this issue to New Hampshire's town meetings and community leaders."***

Credit for Information That Follows

Before proceeding further, it should be noted that much of the information and data that follows was gathered from the Regional Planning Commission's master plan energy chapter for the Rockingham Planning Commission. It, in turn, relied heavily on the Intergovernmental Panel on Climate Change (IPCC) reports. The IPCC was formed in 1988 through the United Nations Environmental Programme and the World Meteorological Organization. The Regional Planning Commission says the IPCC's latest report, released in 2007, "is well regarded as the single most comprehensive and unbiased report on climate change." The Regional Planning Commission also said in its conclusion of the chapter, "…this chapter has been developed in a modular format to serve as a template for communities to amend and adopt into their master plan. It offered a background on the scientific data of global warming, depicted the baseline energy consumption trends of the region and summarized current programs. When this plan is combined with

community energy information and community goals it could serve as an action plan to guide communities towards reduction of energy use and greenhouse gas emissions."

Impact of Global Warming on New Hampshire

Global warming is caused by the greenhouse effect. Just as a real greenhouse produces heat from the sun shining into it, the earth's atmosphere allows solar radiation to be absorbed by the earth's surface. When absorbed, the radiation is converted to heat and emitted as infrared radiation into the atmosphere. Some gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapor absorb some of the infrared radiation which causes the earth's atmosphere to heat up.

Scientists have taken ice cores in Antarctica which show the correlation between carbon dioxide and temperature changes for the past 400,000 years. As carbon dioxide levels increase, so do atmospheric temperatures; when they fall, temperatures also fall. Scientists have found that historically, carbon dioxide levels have varied between 180 parts per million by volume (ppmv) to 300 ppmv. According to the National Oceanic and Atmospheric Association (NOAA), estimates of atmospheric carbon dioxide reached 386 ppmv in 2007.

How has this affected New Hampshire? According to C.P. Wake at the University of New Hampshire's Climate Change Research Center, in *Indicators of Climate Change in the Northeast,* 2005, there have been notable changes. The weather has become hotter, wetter, and more extreme.

- Average Northeast Temperature Change from 1899 to 2000: annual, up 1.8º; winter, up 2.8º; spring, up 1.9º; summer, up 1.7º; fall, up 0.7º.
- Total precipitation has increased 3.3 inches from 1899 to 2000 and the frequency of extreme precipitation events also has increased.
- Snowfall has decreased significantly in northern New England and northern New York from 1970 to 2000.
- Days with snow on the ground have decreased 16 days from 1970 to 2000.
- Ice-out of lakes occurs 9 days earlier in the northern/mountainous regions and 16 days earlier in the southern regions of New England from 1850 to 2000.
- Sea surface temperatures have increased 1.1º in the Gulf of Maine from 1880 to 2001.
- Relative sea level has increased 16 inches at New York City from 1856 to 2001.
- Growing season has increased by 8 days from 1899 to 2000.
- Lilac bloom dates are 4 days earlier and apple and grape bloom dates are 8 days earlier from 1965 to 2000.

How This Affects New Hampshire

Shorter, warmer winters mean fewer tourism dollars for skiing, snowmobiling, and ice fishing, according to Eric Steltzer, regional planner with the Rockingham Planning Commission. Its

master plan says, "agricultural industry will be affected by a longer growing season and habitat changes which will affect crop output. Specifically, maple syrup production is shown to begin 10 days earlier, end 10 days later and the syrup runs for approximately 3 days shorter compared to 40 years ago. The seacoast areas will be affected by sea level rises and the increase in storm intensity, causing insurance companies to pull their coverage for coastal areas… The health industry will be affected by increased respiratory and heat related illnesses."

New Hampshire's Power Usage

Global warming is not our only problem. Our energy usage has increased at an alarming rate. In 1990, the total energy consumption in New Hampshire was 264.6 trillion British Thermal Units (BTUs).[1] At that time the state population was 1,109,117, which means each resident consumed 239 million BTUs. By 2004, the state's energy consumption had grown by 28.7% to 340.6 trillion BTUs, but the population grew by only 17.1%. The energy consumption per capita in 2004 rose to 262 million BTUs or a 9% increase from 1990 to 2004.

Breaking down energy usage by sectors, the commercial sector grew 73.8% from 1990 to 2004. Transportation grew 49.6% for the same period. The residential sector in 1994 consumed 29.8% of the state's energy making it the state's largest consumer sector. From 1994 to 2004, the residential consumer sector grew 26.4%. It was second only to the growth in transportation.

Petroleum products, including gasoline, propane, home heating oil, and diesel, are the primary fuel sources, providing 60% of the energy used between 1990 and 2004. The use of natural gas has increased dramatically over those 14 years. In 1990, the primary use for natural gas was for heating and accounted for only 5.5% of total energy consumption. By 2004 it had become the third largest fuel source, accounting for 18.9% of total energy consumed. In 1990 there were no natural gas power plants. By 2004 several natural gas plants came on line, producing 5.4 million megawatt hours, or 22.6% of all electricity generated in New Hampshire.

The Seabrook nuclear power plant is the largest in New England. It is the largest source of electricity in the state, producing 42.6% of the state's needs. However, because Seabrook accounts for a lot of electrical output, 34.2% of its generation is exported out of New Hampshire. Renewable energy provided only 4% of the state's energy needs in 2004. Coal usage in the U.S. as a whole accounts for 50% of the electricity generated. In New Hampshire, coal accounts for 17.1% of the generation.

Energy use patterns in New Hampshire are similar to the rest of New England. Per capita use for our state is 262 million BTUs, compared to 258 million BTUs for the rest of New England. However, New Hampshire fares better when compared to the rest of the U.S. which consumes 341 million BTUs per capita.

One of the key motivations in becoming more energy efficient is the rising price of fuel. Oil prices have risen drastically during the last quarter of 2007. The price of oil flirted with the $100

[1] A BTU is defined as the amount of energy required to raise the temperature of one pound of water 1 degree Fahrenheit. To put it into perspective, burning a cord of wood produces roughly 20 million BTUs.

per barrel range in the last quarter of 2007. The table below provides a perspective on the growth of energy prices since 1990.

Fuel	Price in 1990	Price
No. 2 Oil ($/gallon, excluding tax)	$1.25	$ 3.85, March 2008
Natural Gas ($/1000 cubic feet)	$7.80	$ 19.01, July 2008
Propane ($/gallon, excluding tax)	$1.25	$ 3.12, March 2008
Gasoline ($/gallon, excluding tax)	$0.95	$ 3.59, Sept. 2008
Electricity (cents/kilowatt hour)	10.05¢	15.75¢, May 2008

Source: Energy Information Administration

New Hampshire's Carbon Dioxide Emissions

Global warming is tightly bound with carbon dioxide emissions (other gases, such as methane also play a role). However, carbon dioxide emissions are pervasive in our society. Between 1990 and 2004, carbon dioxide emissions in New Hampshire have increased by 33%. Historically, the transportation sector has been the number one emitter of carbon dioxide. However, between 2002 and 2004 emissions from the electric power sector increased sharply. The table below shows the trend for each sector.

Carbon Dioxide Emissions in Million Metric Tons[2]

Sector	1990	2004	Percent Increase
Residential	2.4	3.4	41%
Commercial	1.3	1.8	38%
Industrial	0.9	1.2	33%
Transportation	5.1	7.7	50%
Electric Power	4.8	7.8	63%
Total	**14.6**	**21.8**	**49%**

New Hampshire Regulations

The problems associated with the drastic increase in energy usage and the accompanying increase in greenhouse gas emissions have not gone unnoticed by the state. New Hampshire has a number of regulations that support and encourage energy conservation and use of renewable energy sources.

- RSA 672:1 III-a states: "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, zoning ordinances should not unreasonably limit installation of solar, wind, or other renewable energy systems or the building of

structures that facilitate the collection of renewable energy, except where necessary to protect the public health, safety, and welfare."

- RSA 21-I:19-d allows a municipality to contract with a pre-qualified energy service company to make energy efficient upgrades to be financed through the energy service company and to be paid off over time through the energy savings. There are no upfront capital costs for the municipality. A performance contract also protects the municipality by requiring the company to meet a certain reduction in energy use. If the goal is not met, the company pays the difference in the energy bill.

- RSA 72:61-72 allows municipalities to offer a property tax exemption on solar, wind and woodheating energy systems. The systems include solar hot water, solar photovoltaic, wind turbine or central wood heating systems (not including stovetops or wood stoves). As of 2006, Antrim does not offer property tax exemptions for these renewable energy resources.

- RSA 53-E allows residents, businesses and municipalities to form a Community Choice Aggregate (CCA) to combine their electrical demand in order to receive a reduction in price.

Be Innovative in Our Thinking and Implementation

Antrim should look at the obvious forms of energy conservation, but it shouldn't be afraid to encourage innovative solutions for some of the larger projects. Below are three examples of how other municipalities solved energy problems while saving money and increasing energy efficiencies at the same time. It should be noted here that while the Town of Antrim believes that energy conservation should be everyone's concern and responsibility, the following section should not be viewed as suggesting a mandate to non-residential users or potential businesses. We believe that commercial and manufacturing concerns will know best how to mitigate their energy needs and will take responsible steps in that direction as needed, steps that may be encouraged through reasonable and flexible regulations of the town.

Epping Energy Efficiency Article 22

In early 2007, the voters in Epping, New Hampshire, approved Article 22 which requires new non-residential buildings to implement energy efficiency and production, energy conservation, and sustainable design principles. A point system was established and non-residential buildings must earn a certain number of points based on their square footage. For example, a building 5,000 square feet or less must earn 5 points. A building of 50,001 square feet or larger must earn 25 points. Use of wind, photovoltaic panels, fuel cell based co-generation, use of biomass and bio-synthetic oil co-generation are among the ways designers can earn points.

Clay Mitchell, town planner, said TD Banknorth originally came forward with a design for a bank that met the 5 points necessary for approval. However, later it returned with a new design which achieved 15 points – the highest yet proposed for a building. Among the design changes was a system for using gray water to flush toilets and a solar power array for generating electricity.

Another business which supplies bricks, stones and masonry supplies constructed a new 4,000 square foot showroom. It features windows sealed with foam insulation which is better than fiberglass; four furnaces that eliminate trying to heat the showroom from a distance with the attendant heat loss. The company also recycles the water used in cutting and finishing counter tops to help reduce water consumption and keep from polluting streams.

Some Epping residents felt the innovative energy provision might put a damper on development. However, Mitchell said that businesses are using it as a selling tool in promoting their businesses.

Waste Water Treatment Plant

Up until 2003, the wastewater treatment plant in Essex Junction, Vermont, used only half of its waste methane gas produced by its anaerobic digester to fire the boiler that heated the digester. The remaining methane was flared because methane is 20 times more effective at trapping heat than carbon dioxide.

The facility officials had been considering installing a combined heat and power (CHP) system and power it with methane from the digester. However, they weren't sure that sufficient digester temperatures could be maintained. Also, it was not clear that it would meet the governing board's 7-year payback period. The system also would be required to emit no more pollutants than flaring methane.

Funding was found through various organizations and governmental agencies. Northern Power designed micro-turbines that can run either on methane or natural gas. Before the co-generation was installed, the treatment plant paid out $100,000 per year for electricity. After installation, electric costs dropped $37,000. At first it was assumed the micro-turbines would operate a total for both of 40 hours per day. However, both have run for a total of 48 hours per day, saving 80,000 kwh of electricity per year.

Other benefits of the project include preventing carbon dioxide emissions of 600,000 pounds per year, using nearly 100% of its waste methane, compared to 50% before, and demonstrating the viability of methane-fired cogeneration at a small facility (Essex Junction has a daily average flow of 2 million gallons per day).

Gas-To-Energy Project

In Antioch Village, Illinois, a closed 51-acre landfill was authorized by the U.S. Environmental Protection Agency to be used as a source of methane gas. The gas will be used to heat and power the Antioch Community High School only half a mile away.

The landfill holds about 2 million tons of waste. With the help of grants and bonding, the $1.9 million project will heat the 262,000 square foot school and generate 360 kw of power. The power and electricity will be generated by 12 Capstone MicroTurbines located on school property. Any additional electricity generated is to be sold back to the power company. Each microturbine produces 290,000 BTUs per hour at 550º F. The exhaust from the turbines is routed

through a waste heat recovery system. By varying flow and inlet fluid temperature a wide variety of needs can be met for hot water.

When waste heat recovery is not required, the exhaust can automatically be diverted around the exchanger, permitting electrical output only. Also, during months when the school is not in use, all of the heat from the waste heat recovery system is diverted to other area businesses or industries. Starting in 2003, the annual savings to the school in energy costs was estimated to be over $100,000 annually.

Some of the other benefits of the project include:

- Low energy costs for the high school.
- Revenue from sale of electricity to the power company.
- Clean, complete combustion of waste methane gas.
- Waste heat for internal use in the high school.
- Reduced greenhouse gas emissions.

Biodiesel - An Alternative to Petroleum Diesel

Antrim should look into using biodiesel to power its diesel engines. Biodiesel is made from vegetable oils (commonly soy), animal fats or recycled waste grease. It can be used alone or it can be blended with petroleum diesel fuel. When used in its pure state it may cause damage to rubber parts. However when it is blended with petroleum fuel at a 20% rate of biodiesel to 80% regular diesel, no damage to engines will occur, according to the National Biodiesel Board.

The advantage of using a blend of biodiesel is that it will dramatically reduce emissions and lessen our dependency on foreign oil.

The table below shows the reduction of air pollution for pure biodiesel (B100) and a 20% blend of Biodiesel with 80% petroleum diesel (B20).

Average Biodiesel Emissions Compared to Conventional Diesel, According to EPA

Emission Type	B100	B20
Regulated		
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-48%	-12%
Particulate Matter	-47%	-12%
Nox (various nitrous oxides)	+10%	+2% to -2%
Non-Regulated		
Sulfates	-100%	-20%
PAH (Polycyclic Aromatic Hydrocarbons)	-80%	-13%
nPAH (nitrated PAH's)	-90%	-50%
Ozone potential of speciated HC	-50%	-10%

According to the biodiesel website (www.biodiesel.org), "sulfur emissions are essentially eliminated with pure biodiesel." Sulfur emissions are major components of acid rain. Also, the smog forming potential of biodiesel is less than that for regular diesel fuel.

Antrim looked into using biodiesel previously, but there was concern over whether it would gel up during winter. According to the biodiesel.org website, "biodiesel will gel in very cold temperatures, just as the common #2 diesel does….typical blends of 20% biodiesel are managed with the same fuel management techniques as #2 diesel." Minnesota has been running a biodiesel program for several years, apparently with no problems due to cold temperatures.

Tests have also shown that B20 provides similar engine performance as regular diesel fuel. It was consumed at a similar rate as #2 diesel with horsepower, torque, and haulage rates equivalent to those engines using conventional diesel fuel.

Other municipalities, organizations and the state are using biodiesel including the City of Keene, Keene State College, the University of New Hampshire and the New Hampshire Department of Transportation. In addition, Rymes Heating Oils, Inc. provides biodiesel fuel.

Antrim should take another look at biodiesel fuel.

Perform Public and Private Energy Audits

In late 2007 Antrim formed an energy committee to look at energy usage and to find ways to eliminate wasted energy and improve efficiencies. The first task of the committee was to audit the energy usage in the town's public buildings and vehicles. The committee also sold energy saving compact fluorescent bulbs at little or no cost to residents. The program was well received and almost all the bulbs were sold. The committee likely will offer a similar program in the future.

For individuals there are many ways to cut energy usage. Public Service of New Hampshire (PSNH) points out that "if every American home replaced their five most frequently used lights or the bulbs in them with ones that have earned the ENERGY STAR, each home would save about $60 a year in energy costs, and together we'd save about $6.5 billion each year in energy costs and prevent greenhouse gases equivalent to the emissions from more than eight million cars."

Also consider having a professional energy audit performed on your house. Go to www.psnh.com for more information about what is involved in an energy audit of your home.

PSNH offers a free lighting catalog which lists many energy efficient products that customers can use to cut their electricity bill and save power at the same time. PSNH's website offers ideas and products under its efficiency programs including:

- Energy Star Homes
- Home Energy Solutions
- Home Energy Assistance
- Energy Star Lighting
- Energy Star Appliances

- HEATSMART
- Renewable Rate
- Tax Incentives
- Tools and Calculators

Antrim's Recent Conservation Measures

In 2003 and 2004, Antrim began looking seriously at ways to use electricity more efficiently. Working with Public Service of New Hampshire (PSNH), the town embarked on a street light replacement program to replace older inefficient lighting systems with newer more energy efficient systems. It also entered into another agreement with PSNH to determine what changes in power use could be made to make town buildings more efficient.

PSNH did a study of Antrim's street lighting. It suggested the town convert from the Municipal Outdoor Lighting *Rate OL* to the Energy Efficient Outdoor Lighting *Rate EOL*. To make the conversion Antrim would change over existing street lights to either high efficiency high pressure sodium or all-metal halide. The study indicated the following:

	Conversion Cost	**Annual Savings**	**Simple Payback Period**
High Pressure Sodium	$33,863	$5,168	6.6 Years
Metal Halide	$41,291	$3,581	11.5 Years

In the second program called Pay-As-You-Save (PAYS), PSNH pays all of the costs associated with the purchase and installation of approved measures such as lighting, including LED exit signs, occupancy sensors, programmable thermostats and hot water insulation wraps. A PAYS Purchase and Installation Charge, calculated to be less than the monthly savings, is added to the town's monthly electric bill until all costs are repaid.

The following chart shows how meaningful these savings are.

Facility	**Project Cost**	**Antrim Cost-Share**	**Annual Savings (Conservative)**	**Payback (Years)**
Sewer and Water Department	$3,064.94	$1,532.46	$449.98	3.41
James Tuttle Library	$2,005.20	$1,002.59	$349.15	2.87
Antrim Town Barn	$1,314.10	$657.04	$423.44	1.55
Antrim Grapevine	$702.21	$351.08	$265.14	1.32
North Branch Fire Station	$934.84	$467.42	$402.24	1.16
Antrim Fire Station	$3,277.20	$1,638.57	$649.40	2.52
Antrim Transfer Station	$875.63	$437.79	$195.94	2.23

TOTAL	**$12,174.12**	**$6,086.95**	**$2,735.29**	**2.23**

It is interesting to note that the town's electric costs have not increased since 2004 and that includes our share of the cost for the new lights, so the savings have been greater than originally anticipated above.

Cool Monadnock

Cool Monadnock is a three-year collaborative project for 36 southwest New Hampshire regional communities, including Antrim. Antioch New England Institute and Clean Air-Cool Planet will provide training, coordination and technical assistance to the region's towns and cities. Cool Monadnock's first goal is to "quickly accomplish a 10% reduction in GHG (greenhouse gases)."

Other goals are:

- "To achieve personal commitment and actions from a significant number of residents and businesses to reduce GHG emissions."
- "To stimulate 300 communities throughout New Hampshire and New England in implementing significant community engagement approaches to reducing GHG."
- "To create a model of regional collaboration that can be implemented in other regions in the northeast."

Businesses, local governments, residents and students will partner together to develop effective strategies and actions to reduce greenhouse gases, save on energy costs and support public health. Cool Monadnock also works with Southwest Regional Planning Commission and other agencies to deal with climate change.

Cool Monadnock says that community-level action is very important because there is virtually no federal leadership for this issue. Towns throughout the U.S., it says, can play a major role in reducing green house gas emissions.

Areas that can be targeted to reduce emissions include land-use planning, transportation planning and mass transit, reducing local government energy use, local forestry, power generation, residential energy and solid waste. Communities working collaboratively can institute multi-town efforts to reduce greenhouse gases.

The organization's task force "will prepare a regional climate action plan that identifies a range of actions to reduce GHG emissions that can be undertaken on both the regional and community levels." One reason a regional approach is a sound idea is that some green house gas emissions activities such as transportation are regional in scope. Also, the organization points out that a collaborative effort can help towns achieve economies of scale such as in fluorescent light bulb change-out programs.

The lead partners include Antioch New England Institute (ANEI), a consulting and community outreach department of Antioch University New England. Cool Monadnock says "ANEI promotes a vibrant and sustainable environment, economy, and society by encouraging informed civic engagement. It provides training, programs and resources (U.S. and international) in leadership

development, place-based education, nonprofit management, environmental education and policy, smart growth and public administration." Clean Air-Cool Planet is another lead partner. It is dedicated to finding and promoting solutions to global warming. It partners with campuses, companies, communities and science centers in the Northeast to help reduce their carbon output. It helps partners, constituents and other regional leaders to understand global warming and find ways of dealing with the problem. Christa Koehler, a former city planner for Keene, is a project co-director along with James Gruber, the Antioch New England Institute co-founder.

Cool Monadnock's website has a wealth of information on its three-year project, including a calendar of events, using compact fluorescent bulbs, reaching out to students and social organizations to spread the word and get help with projects, etc. The website also has a page where everyone can see what the individual towns and cities in Cool Monadnock have done to date. See www.coolmonadnock.org.

Encourage Renewable Energy Resources

According to RSA 674:17(j), planning boards should "…encourage the installation and use of solar, wind, or other renewable energy systems." RSA 674:36(k) also encourages "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…and encouragement of the use of solar skyspace easements under RSA 477."

Further information on ways to improve Antrim's energy efficiency and conservation can be found in *New Hampshire Handbook on Energy Efficiency and Climate Change* by Clay Mitchell, Julia Dundorf and Wes Golomb. See Appendix 5. Also see www.carboncoalition.org.

Antrim should also consider offering property tax exemptions to encourage the use of solar, wind and wood heating energy systems. These systems include solar hot water, solar photovoltaic, wind turbine or central wood heating systems (not stovetops or woodstoves). Presently 62 towns and cities in New Hampshire offer tax exemptions on one or more of these systems.

Constructing Green Buildings

The U.S. Green Building Council addresses what can be done to reduce energy use during construction and post construction. It has developed the Leadership in Environment and Energy Design (LEED) criteria which is the benchmark for design, construction, and operation of environmentally friendly buildings. Its criteria apply to new construction, existing buildings, homes and schools.

Its rating system considers sustainable site, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design process. The number of points a project receives determines the level of certification it receives. The ratings are: Certified (26-32 points); Silver (33-38 points); Gold (39-51 points); and Platinum (52-69 points).

Communities can adapt the system to encourage good practices and use of construction materials that are environmentally friendly. Note that this is similar to the Energy Efficiency program,

Article 22, adopted by Epping. (See section above about being innovative). Tied to this point system, communities use incentives such as tax breaks, reduced fees, expedited reviews, density increases, etc. The system can be tied to municipal, residential, and non-residential construction from new buildings and houses to additions and home improvements.

New Hampshire State Energy Plan

In 2002, the state drafted a 10-year state energy plan. The plan says the single most cost effective means to address energy concerns is to improve energy efficiency. It also is a guide for municipalities to use in addressing energy concerns. For more information, see www.nh.gov/oep/programs/energy/StateEnergyPlan.htm.

Other Resources for Planning and Implementation

There is a great deal of information, grants, software, organizations and tools available from the state and non-profit groups that can be tapped by Antrim for assistance.

- ICLEI – Local Governments for Sustainability offers software that can be used to inventory current energy use, set reduction targets, and provide plans for evaluating a community's progress. It is called Clean Air and Climate Protection (CACP). It covers transportation, residential, commercial, and industrial energy use. The software can be downloaded from www.iclei.org.
- EPA Energy Star Program. The EPA provides Portfolio Manager software to perform energy audits. Communities are invited to join the campaign to reduce energy consumption by 10%. To date, the state, Dover, Rochester, Somersworth, and Nashua have signed on. See www.energystar.gov.
- RETSCREEN. It is similar to EPA's software but offers cost analysis for system improvements. RETSCREEN is produced in Canada. It is used to determine the viability of clean energy products. It is in use by 129,000 people across the world. It is downloadable from www.retscreen.net
- Sierra Club Cool Cities. The project provides guidance on what can be done to reduce greenhouse emissions. Municipalities which adopt the U.S. Mayors Climate Protection Agreement can become members of cool cities. See www.coolcities.us.
- U.S. Mayors Climate Protection Agreement. Since being created in 2005, over 680 mayors from three Canadian provinces and municipalities in all 50 states have joined to reduce global warming. In New Hampshire, Dover, Hanover, Keene, Manchester, Nashua, Portsmouth and Rochester have adopted the resolution. See www.usmayors.org/climateprotection.
- Clean Air-Cool Planet helps communities institute programs to reduce greenhouse gas emissions. Some programs include community-owned wind turbines, performance contracting experiences, LED streetlights, etc. Located in Portsmouth, the non-profit organization provides a wide range of projects

and assistance, including help in starting up an energy committee. See www.cleanair-coolplanet.org.

- Performance Contracting. RSA 21-I:19-d allows a municipality to contract with an energy service company (ESCO) to make energy efficient upgrades to be financed through the ESCO and paid off over time through the energy savings. There are no up-front capital costs to the town. If the agreed-upon level of savings is not achieved, the ESCO must pay the difference in the energy bill.
- Community Choice Aggregation. Under RSA 53-E, residents, businesses and municipalities "aggregate" their electric load together to form a Community Choice Aggregate (CCA). The CCA is formed by the community or region's legislative body or bodies to competitively bid for electricity, among other benefits.
- NH Carbon Challenge provides information about how individuals can cut greenhouse gas emissions. Communities can use their materials to create a residential campaign. Go to http://carbonchallenge.sr.unh.edu/.
- Systems Benefit Charge (SBC) was begun in 2002 by the Public Utility Commission. It is a charge on electric bills which fund two energy efficiency programs run by the utilities. One program is the Low Income Assistance Program which subsidizes costs for eligible households. The second program is the Energy Efficiency Program for residential and commercial customers. Another program for municipalities is the Smart Start program. It allows municipalities to upgrade lighting to more efficient lighting and pay for the upgrades through the energy savings. See www.nhsaves.com.
- Database of State Incentives for Renewable Energy (DSIRE). This is a collection of financial incentives and rules applicable to renewable energy projects for all the states and the federal government. It lists many different programs available to New Hampshire through the state, utilities and the federal government. It also covers NH Renewable Portfolio Standard and the U.S. Department of Energy's Alternative Fuels. Go to www.dsireusa.org.
- The U.S. Department of Agriculture offers grants between $75,000 and $5 million through its High Energy Cost Grant Program. It is open to individuals and municipalities. Go to www.usda.gov/rus/electric/hecgp/overview.htm.
- New England Grassroots Environmental Fund is a nonprofit organization which offers small grants to fund grassroots environmental projects. Past projects include maps for conservation lands, creation of urban gardens and municipal energy efficiency programs. The fund is encouraging energy committees to seek funding. Its website is: www.grassrootsfund.org.

Conclusion

There are a wide variety of programs, potential funding and assistance available to New Hampshire municipalities to help them reduce greenhouse gas emissions, conserve energy and make the towns

as a whole more energy conscious. There is no question that the United States has, up to now, done very little to reduce our dependence on foreign oil, cut back harmful energy emissions, and make our society more aware of what the consequences are if we don't mend our ways.

Global warming is a real threat not only to the United States but to the world. Glaciers are melting away; the Arctic ice cap is shrinking which is threatening the polar bears' survival; oceans are rising; storms are becoming more intense. Scientists around the world are detecting a wide variety of changes. They are concerned that it could lead to large scale extinctions and changes to regions of the earth which can or cannot grow food. Coastlines will change as the ice caps melt and the oceans rise. There is even concern that continued warming ultimately could put an end to the Gulf Stream current which would have dire consequences for the world.

Antrim has created an energy committee – a positive first step in making our town more energy conscious and efficient. The committee alone is not enough. All Antrim residents, households, and businesses have to do their part. We should be driving more fuel efficient cars, replacing incandescent bulbs with energy-efficient bulbs and paying attention to Energy Star ratings when purchasing appliances and other products. All are important steps that residents can take to make Antrim more energy efficient while saving money in the process.

Recommendations

The Energy Committee has begun an energy audit for the public buildings in town to see where energy waste may be occurring and how to make them more efficient. Other steps the town can take include:

- Offer incentives in the form of property tax exemptions for residents or businesses who install renewable energy systems such as wind turbines and photovoltaic panels.
- Install the EPA Portfolio Manager software or the RETSCREEN software to manage the data from energy audits and to set goals for energy reduction over time.
- Thoroughly explore all the various programs listed in this document and any others that come to light so that the town can make intelligent choices about energy conservation and planning and take advantage of any grants or financial help that may be available.
- Conduct a feasibility study for creating a Community Choice Aggregate (CCA) to improve energy efficiency services, expand renewable energy and stabilize energy costs.
- Consider entering into a Performance Contract with an energy service company (ESCO).
- Establish point standards similar to those set up by the U.S. Green Building Council LEED certification to promote energy efficiency in future construction. Also, see the discussion above about Epping's modification of the point system to fit its own needs.

- Encourage smart growth principles such as mixed use, centralized development, higher density, and alternative transportation to reduce energy use.
- Reevaluate using biodiesel fuel for Antrim's diesel engines.