Recommending a Strategy for Improving Energy Use in Our Community

Presented By: FLL Team 609 Scorpacudas

Presented To: Brookline Conservation Commission

Brookline Town Hall

October 9, 2007

Vision Statement

- Brookline can be a proactive community and a local leader in adopting alternative energy use for residential communities, thus reducing the negative consequences of the world's current excessive use of non-renewable fossil fuels.

Goal and Objective

- Our goal is to enable Brookline to become a green energy town.
- Our objective with this meeting is to encourage our local leaders to revise zoning ordinances to allow residential use of new technology for alternative energy.
- We want to educate people on how to make cost-effective environmentally friendly choices.

Today's Situation

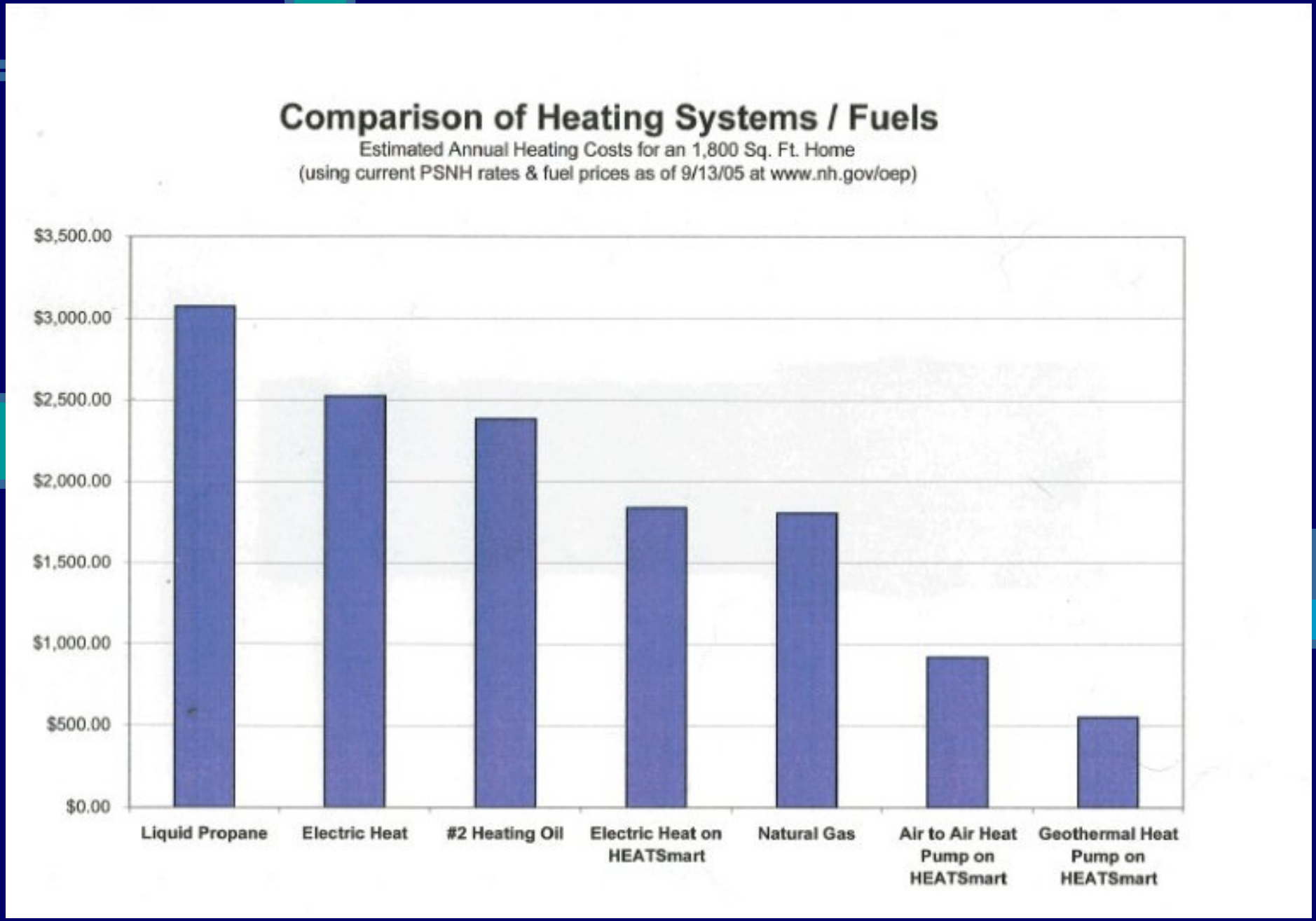
- There are approximately 1,619 residential houses in Brookline, and about a dozen community buildings like Town Hall, the library, and the ambulance bay.
- A typical residential building uses 7,164 kWh each year for its energy costs.
- The primary sources of this energy are oil and gas run furnaces and electricity purchased from PSNH. Most of Brookline building energy is derived from fossil fuels.

How Did We Get Here?

- When humans discovered that oil, coal, and gas can be burned for heating and electricity, they used these sources without regard to sustainability and without regard to negative environmental and health impacts.
- In the past decades, people started to realize that the demand for oil far exceeds the world's easily gained supply and that burning fossil fuels increases the amount of greenhouse gases in the atmosphere.

Available Alternative Energy

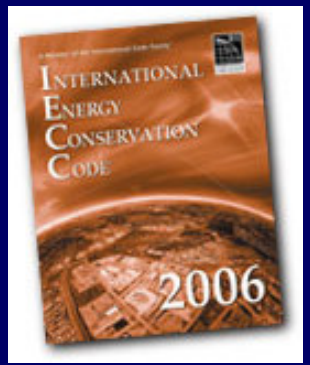
- Some Potential Alternative Sources for Brookline
  - Geothermal
  - Solar
  - Wind
  - Hydrogen-Fuel Cell
- Evaluate advantages & disadvantages of each
- Cost Comparison



Data Provided By Don Edson

New Hampshire Energy Conservation Building Codes

- Under RSA 155-A:1 IV, New Hampshire's building code adopted the International Energy Conservation Code 2006, as published by the International Code Council.
- http://www.iccsafe.org/



Community Considerations

- Energy Use Includes:
  - how energy is made
  - how it is stored
  - how we use it
  - how much we consume, and
  - how we dispose of associated waste
- What are the positive/negative consequences?
  - Environmental
  - Financial cost to community
  - Social Consequences (medical/health hazards)
  - Cultural Consequences (different work/commute habits; more/less quality of life opportunities)

Recommendations

- In the next slides, we will present on each slide a single topic question addressing the current zoning by-laws.
- Our questions are intended to address ways for residents to modify their homes to use alternative energy.
- We consider existing technologies and anticipate new technologies as the market increases and new scientific breakthroughs are made.

Ethanol/Bio Fuel Storage

- Storage and production of bio fuels or ethanol is dangerous when being produced or stored in residential areas.
- Should the town officials know that someone is producing or storing ethanol or bio fuels in their house?
- What about the fire department?

Home-brewed Fuel

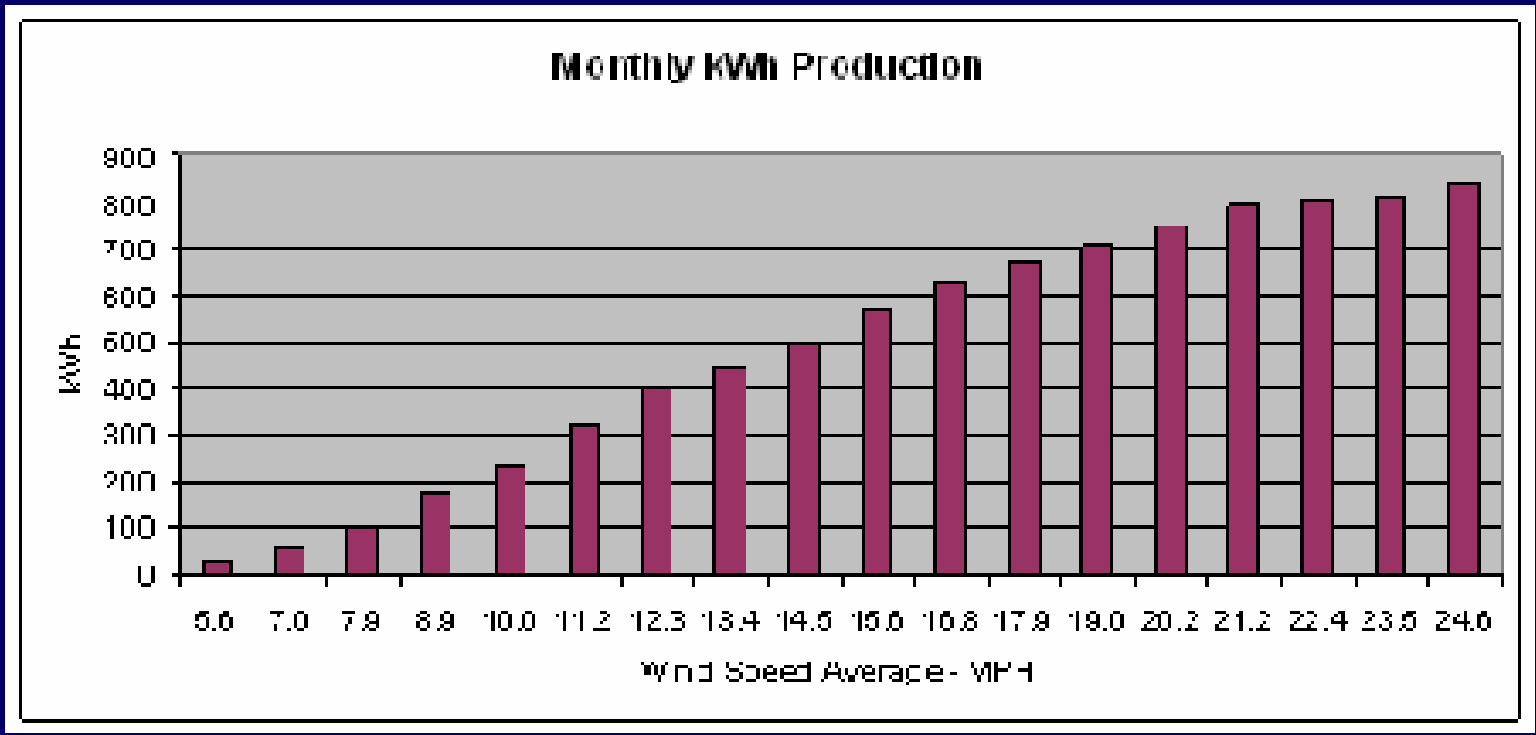
- You need a permit to establish an alcohol fuel plant, is it legal or illegal to buy home distilling equipment for making your own fuel?

Wind Turbines

http://home.altenergystore.com/

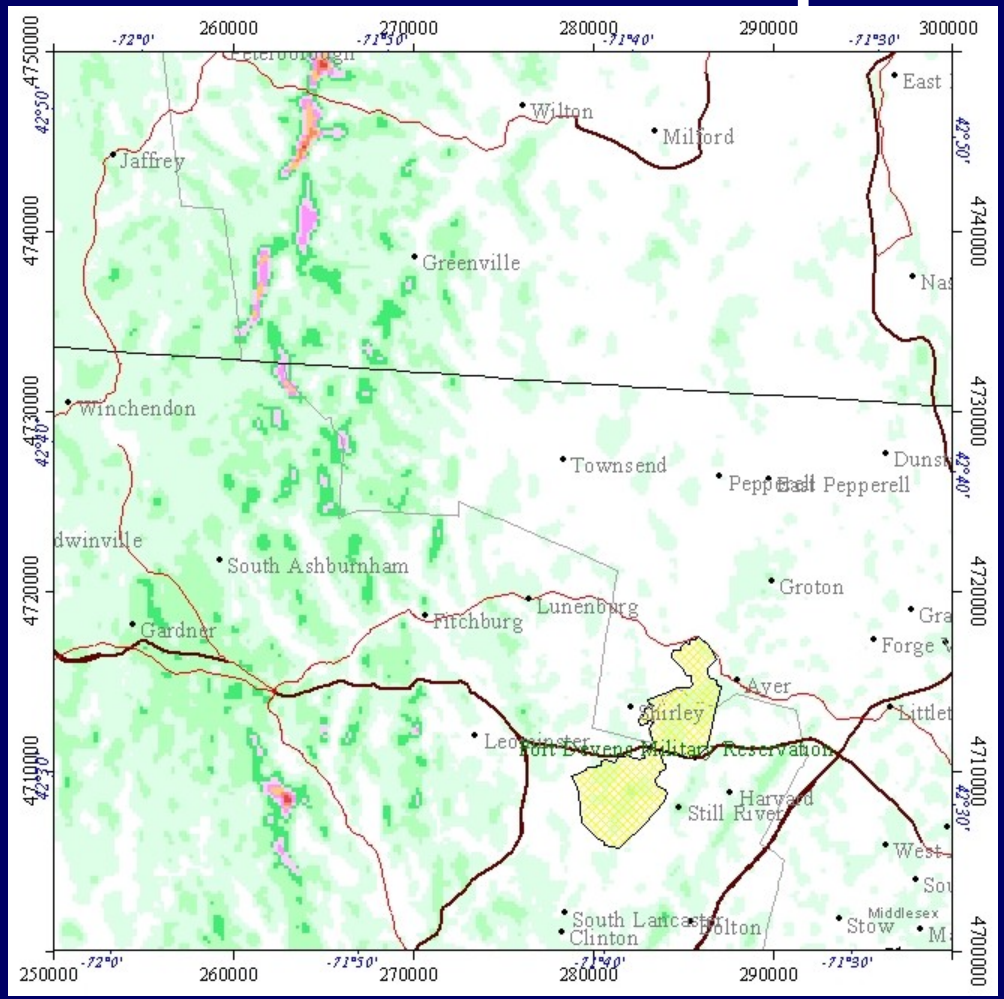
- Could you save the environment and money by using windmills?
- There is a building height in the law that is 35 ft tall if the building is used for people, so would a windmill on top of a house that goes above 35 ft tall, be legal?

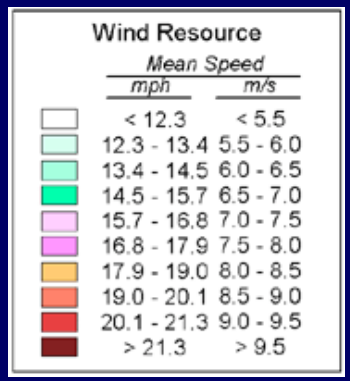
kWh Production vs Wind Speed



Local Wind maps

30 Meter Tower



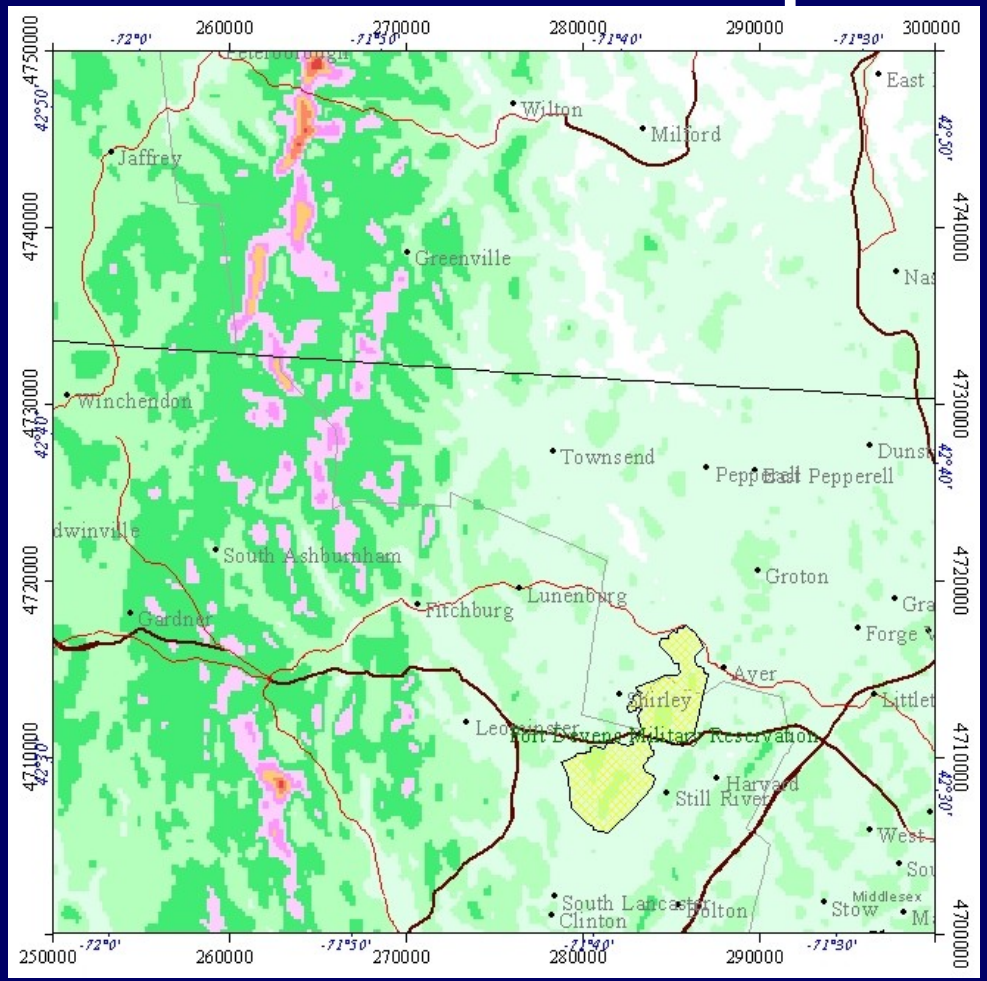


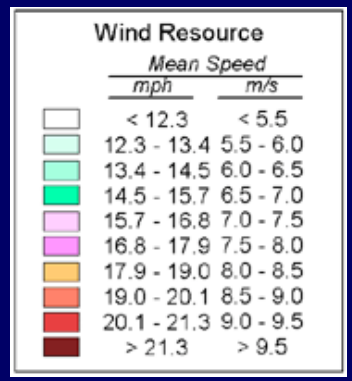
TrueWind Solutions

AWS Truewind, LLC
463 New Karner Road
Albany, NY 12205
http://truewind.teamcamelot.com/ne/

Local Wind maps

100 Meter Tower





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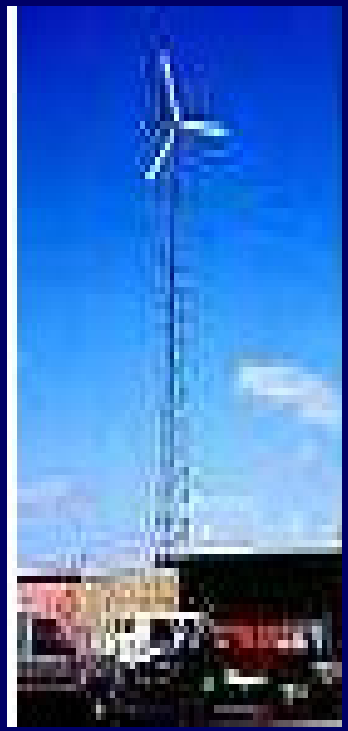
Wind by Time and Height

	Avg. Wind Speed (m/s)	Avg. Wind Power Density (W/m2)
30m Annual	4.6	
50m Annual	5.2	150
70m Annual	5.6	
100m Annual	6.1	
50m Spring	5.3	154
50m Summer	4.3	85
50m Fall	5	149
50m Winter	5.9	212

Using Wetlands For Turbines

- Would windmills in a wetlands be considered a permitted use (1104.0)?

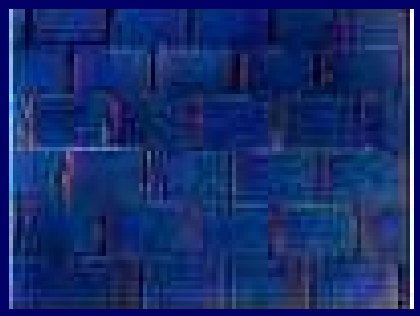


http://home.altenergystore.com/

Solar Panels

Photovoltaics

- Are there any zoning laws in existence that do not allow for the installation or use of solar panels?



Solar roofing shingles

Solar attic fan

Images from http://home.altenergystore.com/

When Producing More Than Consuming

- Does making more energy than you use in your house and selling it back to the utility count as a home business?

Geothermal Alternatives

- Is using pipes to heat your house going into to the earth's crust a workable, accessible, and effectively cheap way to keep the house temperature at a constant 55 degrees Fahrenheit?
- What are the advantages of geothermal energy?
- Is geothermal energy more efficient, powerful, or easier than other forms of green energy?

Hydrogen Fuel Storage

- Hydrogen is used for hydrogen fuel cells, but it is explosive when in contact with oxygen. Is it still a good idea?

Open Space Land for Energy Production

- Issue: Open space provided by the town that and saved for green energy production in the future is:
  - needed/good to have/
  - or not needed
- This conservation land would be set aside for wind, solar, geothermal, and emerging equipment for energy production for municipal buildings.

Common Energy Space in Residential Communities

- Currently a developer can modify a development by setting aside common green space in a neighborhood.
- Issue: Should zoning laws be changed to allow a developer to set aside common space for energy production for a neighborhood.
- The picture you see here is a idea for a future town of Brookline.
  - In the center of each cul-de-sac is a green energy producing playground for the houses to rely on for energy.
  - The houses are around the outside of each cul-de-sac.
- Do you think that planning a residential community this way would be helpful to the world?


SCORPACUDAS
TEAM #1609
cul-de-sac
- stores
- school
- windmill
- house

Local Option Property Tax Exemption for Renewable Energy

- Each city and town may adopt under RSA 72:27-a an exemption from the assessed value, for property tax purposes, for persons owning real property which is equipped with a solar energy, wind powered, or woodheating system. New Hampshire's local option property tax statute (RSA 72:61-72) allows each city and town to offer an exemption on residential property taxes in the amount of the assessed value of a renewable energy system used on the property (solar, wind, and/or wood energy systems.) Applications for exemptions shall be governed by the provisions of RSA 72:33, 72:34, and 72:34-a.

RSA Definitions

- **72:61 Definition of Solar Energy Systems. –** In this subdivision "solar energy system" means a system which utilizes solar energy to heat or cool the interior of a building or to heat water for use in a building and which includes one or more collectors and a storage container. ""Solar energy system" also means a system which provides electricity for a building by the use of photovoltaic panels.
- **72:65 Definition of Wind-Powered Energy Systems. –** In this subdivision "wind-powered energy system" means any wind-powered devices which supplement or replace electrical power supplied to households or businesses at the immediate site.
- **72:69 Definition of Woodheating Energy System. –** In this subdivision "woodheating energy system" means a wood burning appliance designed to operate as a central heating system to heat the interior of a building. The appliance may burn wood solely or burn wood in combination with another fuel. A central heating system shall include a central appliance to distribute heat by a series of pipes, ducts or similar distribution system throughout a single building or group of buildings. A wood burning appliance shall not include a fireplace, meaning a hearth, fire chamber or similarly prepared place with a chimney intended to be usable in an open configuration whether or not it may also be closed and operated closed; or a wood stove meaning a wood burning appliance designed for space heating purposes which does not operate as a central heating system or as a sole source of heat.

Municipalities with Property Tax Exemptions for Renewables as of 2006

Hillsborough County	Solar Energy Exemption	Wind Powered Exemption	Woodheating Energy Exemption
Amherst	**yes**	no	no
Bedford	**yes**	**yes**	**yes**
Brookline	no	no	no
Greenfield	no	no	no
Greenville	no	no	no
Hollis	**yes**	**yes**	no
Mason	**yes**	no	no
Merrimack	no	no	no
Milford	**yes**	no	no
Mont Vernon	**yes**	no	no
Nashua	**yes**	**yes**	**yes**
Pelham	**yes**	**yes**	**yes**
Peterborough	**yes**	no	no
Wilton	no	no	no

from New Hampshire Office of Energy and Planning

Thank You

- Thank you for your time and cooperation and have a great day/night.
- Can we schedule a follow-up time to present our final research project about how Brookline buildings can become sustainable and green energy users?

Resources

- Small Wind Electric Systems: A New Hampshire Consumer's Guide (DOE) http://www.eere.energy.gov/windandhydro/windpoweringamerica/filter_detail.asp?itemid=317
- New Hampshire Incentives for Renewables and Efficiency http://www.dsireusa.org/library/includes/map2.cfm?CurrentPageID=1&State=NH&RE=1&EE=1
- New Hampshire Public Utilities Commission http://www.puc.state.nh.us/Electric/electric.htm
- New Hampshire Office of Energy and Planning http://www.nh.gov/oep/index.htm
- New Hampshire Sustainable Energy Association http://nhsea.org/
- New England Wind Resource Map http://truewind.teamcamelot.com/ne/