VI. ENERGY

A. Introduction

Energy and energy-related issues are addressed in the Cabot Town Plan because they are likely to become more important to the residents of Cabot over time, for the following reasons:

1) The price and price stability of energy resources are impacted by events far away and out of our control. These events can occur with little advance notice but the changes can be dramatic and occur almost instantly.
2) Energy supplies may become less reliable due to global shortages of oil and other fossil fuel sources and the increasing demand for these resources in the developing world. This problem will only become more severe over time as non-renewable energy sources are depleted and global demand grows.
3) Global climate change, due in part to the release of carbon dioxide into the atmosphere from the combustion of fossil fuels, are likely to impact global, national, and local environments and economies. The magnitude and scope of the changes are unknown, and the impacts on agriculture and wild plant and animal populations (including our ability to rely on distant food sources) could be profound.

By acknowledging these issues, Cabot can promote policies to mitigate their environmental and economic impacts. Energy does not stand alone as an isolated concern. In our current system, combustion of non-renewable energy sources such as oil, coal, natural gas, propane, gasoline, and diesel fuel are used as an input. Our goals should reflect a desire to provide energy without the consumption of non-renewable energy inputs or the use of any energy source that leads to long term degradation of the environment.

Our vision is that Cabot residents will meet their needs for food, materials, shelter, and transportation using resources managed in a sustainable and renewable manner.

B. Existing Conditions

Energy Use Statewide

In Vermont, the primary sources of energy are fossil fuels (oil, gas, coal and liquid petroleum gas), nuclear generated electricity, local and imported hydro-electricity, and biomass (fuel wood). Renewable energy sources such as solar and wind currently account for only a small proportion of total energy use. Fossil fuels are used primarily for transportation and heating, while nuclear power (supplied from the Vermont Yankee Facility in Vernon, Vermont) and out of state hydro-power (supplied by facilities in New York state and Quebec) provide most of the State's electricity demand.

Although analyses of energy demand by fuel and by sector are not available for Cabot, data generated for the State as a whole is included below:

Table VI - 1
Statewide Energy Demand - All Sectors, by Fuel
(KW/year)

	Fossil Fuels	Electric	Biomass	Solar
1980	2,112	427	344	.3
	73.2%	14.8%	12.0%	0.0%
1990	2,406	567	263	.2
	74.3%	17.5%	8.1%	0.1%
2010	3,623	817	292	.7
(estimated)	76.5%	17.3%	6.1%	0.1%

Table VI - 2
Statewide Energy Demand- All Fuels, by Sector
(KW/year)

	Residential	Commercial	Industrial	Transportation
1980	1,000	364	387	1,134
	35%	13%	13%	39%
1990	962	393	440	1,444
	29.7%	12.1%	14%	44.6%
2010	1,339	568	601	2,229
(estimated)	28.3%	12.0%	12.7%	47.0%

(Source: Central Vermont Regional Planning Commission)

Since 1980, fossil fuels have continued to account for the bulk of energy use in the State, and transportation has continued to be the sector that uses the most energy. In 2010 it was estimated that the transportation sector accounted for 47% of all energy use.

Potential Local Energy Sources

Table VI – 3
HOUSE HEATING FUEL
CABOT AND WASHINGTON COUNTY

	CABOT		WASHINGTON CTY	
	Total	**Percent**	**Total**	**Percent**
Occupied housing units	**543**	**100.0%**	**24,275**	**100.0%**
Utility gas	**0**	**0.0%**	**636**	**2.6%**
Bottled, tank, or LP gas	**90**	**16.6%**	**5,013**	**20.7%**
Electricity	**18**	**3.3%**	**1,161**	**4.8%**
Fuel oil, kerosene, etc.	**212**	**39.0%**	**14,227**	**58.6%**
Coal or coke	**8**	**1.5%**	**54**	**0.2%**
Wood	**207**	**38.1%**	**2,849**	**11.7%**
Solar energy	**0**	**0.0%**	**15**	**0.1%**
Other fuel	**6**	**1.1%**	**267**	**1.1%**
No fuel used	**2**	**0.4%**	**53**	**0.2%**

Source: 2005-2009 American Community Survey 5-Year Estimates

As shown on Table VI – 3 above, the main sources of heat for homes in Cabot are fuel oil and wood. The percentage of Cabot homes that are heated with fuel oil is estimated at 39%, which is notably lower than the 58.6% of homes county-wide that use fuel oil for heat. An estimated 38.1% of homes in Cabot use wood for heating fuel, as compared to only 11.7% county-wide.

After fuel oil and wood, bottled, tank or LP gas is the next most-used fuel for heating homes in Cabot. An estimated 16.6% of homes in Cabot utilize this source for heating, as compared to 20.7% County-wide.

Biomass

Forest and shrub land cover almost three-quarters of Cabot's total land area. The generation of heat (and even electricity) from biomass is a strategy that may hold potential to benefit the Town. Estimates show that approximately 80% of each dollar spent on wood remains in the state while only 20% of each dollar spent on nonrenewable energy sources remains in the state.

New technology is expanding the potential of high-efficiency wood burning in buildings as a primary heat source. While wood burning does contribute a large proportion of atmospheric particulate pollution (pollution directly associated with respiratory damage) new wood burning technology and stricter EPA emissions standards are resulting in increased efficiency and reduced particulate emissions.

Vegetable Biofuels

Biofuels are renewable, agriculturally derived liquid fuels that can be used to run vehicles and heat buildings. They include biodiesel, ethanol, and even straight vegetable oils. A variety of plants with high oil or cellulose content can be employed to produce these products. Some, including corn, sunflower, canola, soy and hemp, could be grown and processed in Cabot. Doing so could help keep money circulating in the community, creating jobs and sustaining local agriculture, while helping to avoid the external costs associated with fossil fuels. However, it may also take farmland out of food production and some question the energy *inputs* processing requires.

Wind Power

Wind power is one of the oldest and most environmentally benign sources of energy. In recent years it has experienced a resurgence as the fastest growing energy source in the world. Wind turbines are among the most economical renewable energy technologies and have become cost competitive with most conventional electricity sources.

Although Vermont has potential for wind power, it is estimated that only 10 to 15% of Vermont's electrical power could be generated by wind because of its intermittent nature. Furthermore, Cabot probably does not have viable sites for industrial scale wind generation (generally at elevations between 2,500 and 3,500 feet). Advances in small scale wind turbine technology figure to make it an increasingly viable option for private individuals or groups of individuals. State law restricts the regulation through zoning of turbines with blades less than 20 feet in diameter. Furthermore, any small scale turbine that returns energy to the power grid is exempt from local bylaws and is instead reviewed by the Public Service Board under Act 248.

Solar Power

Contemporary solar technologies have proven their value in Vermont, particularly in rural areas. As the technologies improve and costs decrease, solar thermal collectors and photovoltaics (technologies which can convert sunlight to electricity) will become more competitive in the marketplace even in less remote areas. As solar energy is inexhaustible, and neither contributes pollutants to the atmosphere nor to our reliance on foreign energy suppliers, strategies should be developed to encourage its use in Cabot.

The application of active (systems which collect, store and distribute solar energy within a building) and passive (systems which utilize a building's structure to trap sunlight and store it as heat) solar technologies have demonstrated their cost effectiveness in Vermont. Solar-tempered buildings are buildings that have their long axis oriented within 30 degrees of true south and have an unobstructed net south facing window area equal to at least 7% of the total floor area. Solar-tempering coupled with proper insulating can offset heat costs in

a building by 40%. Although solar-tempering at initial construction generally requires no additional investment, experts suggest that a majority of new buildings in Vermont do not incorporate such design principles.

Geothermal Power

Geothermal energy refers to the potential of using the Earth's near constant temperature (45—58 degrees F) a few feet below the surface for heating and cooling applications. According to the Vermont Energy Atlas (http://www.vtenergyatlas.com/), the two types of geothermal systems with potential for use in Vermont are open loop systems and closed loop systems. A potential open loop system is indicated by the location of existing water well. With open loop systems, water is pumped or flows from a well and passes through a ground source heat pump (GSHP) system or heat exchanger. The water is then either returned to the well for reheating (Standing Column Well) or is disposed of (permits may be required if the water is primarily disposed of). With closed loop systems, a series of looped pipes are placed in the ground or even in a pond or water body. Water or other liquids in the looped pipes then pass through a ground source heat pump.

Electric Providers in Cabot

Cabot residents along Route 2 and Route 215 receive electricity from Green Mountain Power Corporation (GMP). Those in the hills and along the back roads are served primarily by the Washington Electric Cooperative.

Green Mountain Power maintains hydroelectric generating facilities at the Marshfield Reservoir and Joe's Pond. According to GMP's data, only two percent of the power it sold to customers in 2010 came directly from fossil fuels. 40% came from nuclear power, 46% from hydropower, 3% from biomass, 1% from wood, methane and wind, and 8% from unspecified market purchases.

The Washington Electric Cooperative owns and operates the Wrightsville hydroelectric generating station, which is a store-and-release plant located at the Wrightsville Dam on the North Branch of the Winooski River. It also operates an electric generating facility at Vermont's largest landfill in Coventry, using landfill-derived methane gas. This methane facility is estimated to provide about two-thirds of WEC's members' electricity needs.

C. Planning Considerations for Energy Sustainablity

Improvements in energy conservation can be a lower cost, immediate opportunity to make progress toward our energy sustainability goals.

Buildings and Structures

According to the Vermont Comprehensive Energy Plan, approximately 30% of the total amount of energy consumed in Vermont is used for residential purposes. The Plan shows that growth in energy demand in the residential sector will be driven by increases in population and housing, and a corresponding increase in demand for space and water heating.

Investments in energy efficiency improvements in new and existing buildings and appropriate site design in new development can have significant potential energy savings. Ultimately, such investments will reduce the percent of income residents spend on energy, per capita energy consumption and environmental degradation.

In August 2010 energy audits were completed on Cabot Town buildings by Building Energy under contract with the Central Vermont Regional Planning Commission (fulfilling one of the action items identified in the 2003 Cabot Town Plan). Reports were completed for the Willey Building, the Masonic Hall, and the Waste Water Treatment Facility with the purpose of identifying ways to reduce the heating and electrical usage of the buildings.

Transportation and Settlement Patterns

According to the Vermont Comprehensive Energy Plan, the transportation sector accounts for over 45% of total energy demand and approximately two-thirds of all fossil fuels used in Vermont. Environmental degradation resulting from heavy petroleum use is well documented, as is the fact that most of the money spent on fuel and automobiles leaves the state, thus undermining the local economy.

The rural character and decentralized settlement patterns of Central Vermont pose a difficulty in efforts to minimize the consumption of traditional fuels in the transportation sector. Improved access to, and increased use of, alternative and public transportation options such as bus, van-pooling, ridesharing and bicycling will decrease energy consumption. (See Section VIII Transportation.)

Another strategy is to encourage settlement patterns that reduce travel. (See Section V Land Use). The concentration of employment opportunities, housing and social services, the expansion of broadband access, and increased use of local goods and services, can reduce transportation demand.

Incentive Programs

A variety of organizations and programs exist to provide assistance to citizens and local governments in the area of energy conservation and development. The Vermont Renewable Energy Resource Center (http://www.rerc-vt.org/) provides incentives funded

through the Clean Energy Development Fund for residential and commercial projects using alternative energy, such as wind and solar.

Efficiency Vermont, an energy efficiency utility, provides technical assistance and financial incentives to help Vermont households and businesses reduce their energy costs with energy-efficient equipment and lighting. Efficiency Vermont also provides energy-efficient approaches to construction and renovation. This utility is funded through an energy efficiency charge on ratepayers' electric bills.

Net metering, a provision created by a state law passed in 1998, requires electric utilities to permit customers to generate their own power using small-scale renewable energy systems. The excess power they generate can be fed back to their utilities, actually running their electric meters backwards. More information about net metering is available on the Vermont Department of Public Service's website, http://publicservice.vermont.gov/energy-efficiency/ee_netmetering.html.

Another mechanism that can provide incentives for homeowners to conduct energy upgrades is the establishment of a Property Assessed Clean Energy (PACE) program, originally known in Vermont as a Clean Energy Assessment District (CEAD). Title 24 of the Vermont Statutes was revised in 2009 to specifically provide for the creation of Clean Energy Assessment Districts, and outlined the responsibilities of municipalities that wish to create such districts and the property owners that opt into them. Participation in such districts can be valuable to homeowners who lack the upfront capital to make energy improvements that will save them money in the long term. The Cabot Selectboard has signed a letter of interest with the Vermont Energy Investment Corporation (VEIC) giving the Town access to technical and legal consulting services from VEIC to explore the practicalities of establishing a Property Assessed Clean Energy (PACE) program in Cabot.

Smart Grid Technology and Smart Meters

In 2009, Vermont received a matching federal grant to deploy smart grid technology. A smart grid allows two-way communication between the electric utility grid and all devices connected to it, all the way down to consumer appliances. For consumers, smart grid means vastly improved opportunities to understand how energy is used, usage costs, and how to save energy and money. Instead of one electric bill at the end of the month, consumers will see their energy usage and cost in much greater detail. There is much yet to be learned about the potential of smart grid technology, which will be deployed over the next several years to about 85 percent of Vermont homes and businesses. Initial studies have shown that households can reduce electrical usage on average by 4 to 12 percent.

D. Goals and Implementation Strategies

Goal	Implementation Strategy	Key Implementer(s)	Future Measures of Progress
VI.1 Create a mechanism for the creation of Ad Hoc task-specific energy teams (rather than a standing Energy Committee) and for publicizing efforts underway for the implementation of energy strategies.	**VI.1(a)** Authorize Ad Hoc Energy Teams as the need arises. Use existing means of communication (e.g., Cabot Chronicle, e-mail list) and develop new means of communication (e.g., Front Porch Forum) to get word out about the creation of ad hoc energy teams and about individual energy tasks.	Planning Commission, Select Board	Energy Teams formed
VI.2 Increase awareness of local energy conservation resources.	**VI.2(a)** Provide information to residents, including farmers, on energy conservation resources and services.	Ad hoc energy team	Communications sent
	VI.2(b) Explore the practicalities of establishing a Property Assessed Clean Energy (PACE) program in Cabot.	Selectboard/Planning Commission/UDAG	Decision made on whether to establish PACE Program
	VI.2(c) Involve local students in projects .	Ad hoc energy team/local teachers	Projects with local students developed
VI.3 Promote energy conservation measures in new construction and enhance on-site renewable energy generation opportunities.	**VI.3(a)** Provide printed information on energy conservation measures and the benefits of third-party certification and audits for Cabot residents and businesses.	Ad hoc energy team/Zoning Administrator	Monitor number of new structures that have been third party-certified for energy efficiency (e.g., Efficiency Vermont)

Goal	Implementation Strategy	Key Implementer(s)	Future Measures of Progress
VI.4 Promote energy conservation in existing buildings.	**VI.4(a)** Post information on available low income weatherization services at Town Clerks office and Town web site. **VI.4(b)** Post information on available energy conservation programs, and a list of local contractors providing energy-efficiency retrofits at Town Clerks office and Town web site.	Ad hoc energy team Ad hoc energy team	Postings Postings
VI.5 Promote land use patterns that minimize fuel consumption (for transportation and road maintenance) and manage local forests (for fuel and materials) and conserve agricultural land (for local food sources) for current and future use.	See Land Use section for strategies.	Planning Commission	(varies)
VI.7 Promote the use of local wood as a fuel source with appropriate consideration of air quality and forest protection.	**VI.7(a)** Investigate ways of tracking the use of local wood as a fuel source	Ad hoc energy team	Data on use of local wood resources as a fuel source available
VI.8 Promote access to a regional transportation network (carpool, van pool access, local bus link)	**VI.8(a)** Designate and maintain a park & ride lot in an appropriate location. **VI.8(b)** Follow up with	Ad hoc energy team Planning	P&R lot created Increased use of

Goal	Implementation Strategy	Key Implementer(s)	Future Measures of Progress
	GMTA on possibility of extending service up Route 215.	Commission	public transportation by local residents
VI.9 Minimize non-renewable energy consumption and promote energy conservation in Cabot School and Town-operated buildings, facilities, and operations (Willey Building, Masonic Hall, Town Garage and road maintenance operations, water system, waste water system).	**VI.9(a)** Carry out improvements to school buildings, including installation of energy-saving insulation, as recommended in 2008 report by Superintendents' Association.	School Board	Efficiency of heating plant at school is optimized and requires less input of fuel oil and/or wood chips
	VI.9(b) Use August 2010 municipal energy audit results to implement cost effective recommendations.	Selectboard	Building improvements at Willey Building, Masonic Hall, and WWTF are implemented
	VI.9(c) Investigate the use of biodiesel blends (B5 or B20) in Town-owned heavy equipment taking into account "embedded" energy.	Ad hoc Energy team	Reduction of the use of fossil fuels by Town vehicles
	VI.9(d) Send town road crew to UVM Transportation Research Center's free program "Eco Driving"	Selectboard	Completion of Eco Driving program by road crew members
	VI.9(e) Base purchasing decisions for Town equipment, as well as new facility for Town Garage, on life cycle ananlysis, including fuel costs.	Selectboard	Life cycle cost estimation underway for new Town garage facility, and for proposed new equipment purchases.

Goal	Implementation Strategy	Key Implementer(s)	Future Measures of Progress
VI.10 Promote consumption of local food and other local products and services to reduce energy usage.	**VI.10(a)** Ensure that funding continues for existing Farm-to-School lunch program.	Cabot School/Selectboard	School continues to use local produce for lunch program
	VI.10(b) Use more locally-produced wood chips than oil in the heating plant at Cabot School.	Cabot School	Greater percentage of wood chips than fuel oil used
	VI.10(c) Investigate use of UDAG funds to incentivize consumption of local products.	UDAG Committee	Economic incentives in place