

CHAPTER VII

ENERGY

A. Overview

During the past decade, the cost, reliability and access to traditional energy sources had been challenging. It is imperative that Williamstown develop economical and environmentally conscious alternatives to produce energy. Early 2010, plans and talks for a 250 mega-watt Solar Panel farm is being considered. This and other forms of alternative energy resources need to be developed.

B. Energy Sources

In Williamstown, 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 negligible 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 for the lion's share of our electricity demand.

Although analyses of energy demand by fuel and by sector are not available for Williamstown, data generated for the State as a whole can be interpolated for planning at the local level.

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

	Fossil Fuels	Electric	Biomass	Solar
1980	2112 73.2%	427 14.8%	344 12.0%	.3 0.0%
1990	2406 74.3%	567 17.5%	263 8.1%	.2 0.1%
2010 (estimated)	3623 76.5%	817 17.3%	292 6.1%	.7 0.1

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

	Residential	Commercial	Industrial	Transportation
1980	1000	364	387	1134
	35%	13%	13%	39%
1990	962	393	440	1444
	29.7%	12.1%	14%	44.6%
2010	1339	568	601	2229
(estimated)	28.3%	12.0%	12.7%	47.0%

Transportation stands as the sector where energy use has grown substantially during the past 30 years. During that time energy consumption in the transportation sector will have grown 97% primarily due to increased commercial and industrial uses. The transportation sector now accounts for 45% of all energy, and approximately 60% of all fossil fuels, consumed in Vermont.

Fossil Fuels

As shown in the above tables, fossil fuels account for over 3/4's of all energy consumed in Vermont. In Williamstown fossil fuels are used primarily to power vehicles and heat homes and businesses. Approximately 65% of the oil consumed in the U.S. is imported, up from only 10% in 1960. In fact, oil imports account for approximately 50% of the total U.S. trade deficit and the cost of U.S oil imports has increased over 300% in this decade to a level of about \$340 billion in 2007. Our economic system is so tied to the availability of fossil fuels that even modest increases in price can lead to high inflation, lagging economic growth and monetary instability.

The economic and social consequences of intensive fossil fuel use are only part of the story. The combustion of fossil fuels is by far the largest contributor of atmospheric "greenhouse gases" (primarily carbon dioxide). There is strong consensus in the scientific community that continued accumulation of "greenhouse gases" within the earth's atmosphere is creating a warming of the atmosphere, or "greenhouse effect." Such warming could cause severe coastal flooding and unpredictable climate shifts, threatening the viability of the earth's most significant urban and agricultural centers. In Vermont, significant warming could cause irreparable harm to the State's largest industry, tourism. Reduced snowfall and a die-off of sugar maples could spell disaster for ski areas, syrup producers, and our fall foliage season. Further, fossil fuel combustion is directly linked to the acidification of rivers, lakes and soil, and human health hazards resulting from declining air quality.

For reasons highlighted above, and because fossil fuels are an exhaustible natural resource, Williamstown should strive to reduce fossil fuel consumption.

Nuclear

The Vermont Yankee Nuclear Power Plant in Vernon provides about one third of current electric power in Vermont. However it is only licensed to operate until 2012 and its future beyond that is uncertain.

Hydro-power

Currently, Williamstown gets about half of its energy from hydro-power, primarily from HydroQuebec and New York Power Authority. The Hydro Quebec contract is scheduled to expire in 2015.

It is estimated that Vermont has at least 174,000 KW of undeveloped hydroelectric potential. This represents about 22% of current use. Most of the sites constituting this additional capacity are classified a "mini-hydro" (under 1000KW) developable at existing, but unused, dam sites.

Any hydroelectric development in Williamstown will require a balancing of priorities. While the benefits of generating electricity from local, renewable resources are evident, they are not without associate costs. The power output captured from a given stream must be moderated by environmental considerations. A minimum stream flow, adequate to support aquatic life forms, must be maintained and impoundments must be designed with water quality and land use/recreation considerations in mind

Hydropower potential lies not only within naturally flowing streams and rivers, but to some extent in potable water systems as well.

Biomass

Forest land covers approximately three-quarters of Williamstown's total land area. The generation of heat (and even electricity) from biomass is a strategy that may hold the potential to benefit the town. Under proper management and replacing fossil fuel combustion, the use biomass could reduce greenhouse emissions. Importantly, this could also stimulate the local economy, as 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.

Currently, about 15 % of Williamstown residents use wood as a heat source. Increased use of wood for heating would stimulate local economies and, if harvest and burning is executed in an environmentally sound manner, would decrease the environmental impacts of existing patterns of energy consumption. New technology is expanding the potential for implementing 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.

In Vermont, schools have taken the lead in the use of biomass fuels. Approximately 20% of Vermont's students attend buildings heated by wood chips. The Williamstown Middle/High School was retrofitted with a biomass heating system in 2007.

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 Vermont. 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.

Biodiesel, in particular, appears to be catching on in Vermont (and elsewhere), as it can be used in many existing vehicles and furnaces with minimal equipment modification. Furthermore, it is often blended with petroleum fuels. As of January 2007, biodiesel fuel was available at about two dozen location throughout Vermont.

Wind-power

Essentially a form of solar power, created by pressure and temperature differences across our planet, wind-power is one of the oldest and most environmentally benign sources of energy. In recent years it has experienced resurgence in its application which is certain to continue. In fact, it is the fastest growing energy source in the world. Wind turbines are among the most economical of contemporary renewable energy technologies, and have become cost competitive with most conventional electricity sources (especially when indirect, avoided costs are factored in).

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, Williamstown probably does not have viable sites for industrial scale wind generation (generally at elevations between 2,500 and 3,500 feet). However, it should be noted that advances in small scale wind turbine technology figure to make them 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

Solar energy has tremendous potential for providing clean, reliable and safe energy, even in Williamstown's climate. The application of both 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.

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

C. Conservation

Demand Side Management

In 1990 the Public Service Board required the state's regulated utilities to carry out Least Cost Integrated Planning and implement Demand Side Management programs. In Central Vermont those utilities are investor owned municipal and cooperative electric utilities. Least Cost Integrated Planning requires that each utility "...meet the needs of its customers at the lowest total long term cost and do so by giving equal consideration to all generation, transmission and energy efficiency options..." Demand Side Management programs promote the conservation of energy as an energy source available for future demand. Through their Demand Side Management programs, the region's utilities will likely provide various incentives including financing and partial payment of certain efficiency improvements, energy audits and design services.

As the creation of excess generating capacity can be used to meet future electrical needs for Vermont, conservation must continue to be viewed as a source of electricity. Conservation is our least expensive and most environmentally benign source of electricity.

Transportation

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. As discussed in previous pages, this situation imposes a tremendous economic and ecological detriment. Environmental degradation resulting from heavy petroleum use is well documented, as is the fact that the lion's share of money spent on fuel and automobiles leaves the state, thus undermining the local economy.

The rural character and decentralized settlement patterns of Central Vermont, the very qualities which render our area an extraordinary living environment, create difficult circumstances in which to minimize the consumption of traditional fuels in the transportation sector. Nevertheless, there are strategies which can be employed at the local, regional and state levels which will bear influence within this context.

Improved access to, and increased use of, alternative and public transportation options such as rail, bus, vanpooling, ride-sharing and bicycling, will not only decrease energy consumption, but will also reduce the infrastructure expenditures that are associated with the "car culture."

Another strategy by which the demand for transportation can be reduced is through encouraging settlement patterns which require less physical travel. The concentration of employment opportunities, housing and social services, the expansion of telecommunications potential, and the increased use of local resources may help achieve this objective.

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. This demand, when considered with the energy demand associated with the space and water heating requirements of commercial and industrial buildings, represents tremendous potential energy savings.

Investments in energy efficiency improvements in new and existing buildings and appropriate site design in new development will result in the realization of this savings, and will demonstrate a significant impact on total energy demand. Ultimately, such investments will reduce the percent of income residents spend on energy, per capita energy consumption and environmental degradation.

D. Energy Programs and Resources:

A variety of organizations and programs exist to provide assistance to citizens and local governments in the realm of energy conservation and development. A partially list of Vermont based resources follows:

The Alliance for Climate Action/14% Challenge - Community energy organizing and programs.

www.10percentchallenge.org

Apollo Alliance Vermont - Coalition of labor, business and community groups dedication to energy independence.

www.apolloalliance.org/state

Biomass Energy Resource Center - Consults on biomass and cogeneration projects. 802-2237779

Efficiency Vermont - Financial and technical assistance for energy savings. EnergySmart home energy analysis.

www.encyvermont.org

Renewable Energy Vermont - Trade association for renewable energy dealers.

www.REVermont.org

School Energy Management Program - Provides free energy assessments for schools. www.vtvs.org

Sustainable Energy Resource Group - Consults with communities on energy planning/programs.

www.SERG-info.org

Vermont Biodeisel Project - Collaboration designed to help accelerate emergence of industry in Vermont,

www.vtbiodeiselproject.org

Vermont Green Building Network - Promotes green building in Vermont. www.vgbn.org **Vermont Energy**

Education Program. - Provides in school energy curriculum. www.veep.org **Vermont Energy Investment Corp** - Promotes energy efficiency and renewable technologies. www.veic.org
Vermont Energy Star Homes - Technical assistance to build energy efficient homes. www.Vtenergystarhomes.com
Vermont Peak Oil Network - Network of groups and individuals working on energy sustainability. www.vtpeakoil.net
Vermont Rideshare- Promotes commuter carpooling. www.VermontRideShare.org **Vermont Energy and Climate Action Network**- Collaborative of organizations involved in energy and climate issues.
Vermont Fuel Dealers Association - Trade association of fuel marketers. www.vermontfuel.com;
Vermont Biofuel Partnership - Resource for producers, wholesalers, retailers and users of bioheat and biodiesel fuel, www.vtbio.org

ENERGY

GOAL	POLICIES AND TASKS
<p>To encourage energy conservation and the development of renewable energy resources</p>	<ul style="list-style-type: none"> • Williamstown should consider forming a Town Energy Committee and/or appointing a Town Energy Coordinator. The Committee/Coordinator should review the <i>Town Energy and Climate Guide (Vermont Energy and Climate Action Network, 2006)</i> for ideas on energy conservation and development. • Support demand side management conservation programs which are designed to reduce demand for electricity through enhanced energy efficiency and conservation. • Conduct energy audits of Town buildings • Reduce Town expenditures by considering the cost of energy over the life of equipment to be purchased by the Town. • Support home weatherization programs • Support efforts to create a fund to provide low interest capital to home owners, landlords, institutions, and businesses to assist in making cost effective investments in energy efficiency and renewable energy • Consider the establishment of local, publicly owned and operated bulk storage fuel facilities, as authorized under 24 VSA, Chapter 107, Section 3701, as a means of containing fuel costs for Williamstown residents. • Support the use of biofuels and/or electric power in government and public transit vehicles. • Promote the design and construction of buildings which are energy efficient. • Encourage the development of small scale wind, solar, or hydro power by individuals, or groups of individuals, to offset fossil fuel consumption and promote self-sufficiency • Encourage land use planning that: encourages the concentration of social and civic services, employment and housing opportunities within or adjacent to Williamstown's villages; supports the expansion of telecommuting, teleconferencing and public transit; provides for pedestrian transportation options; and promotes the development of commuter parking lots.