

# 7. UTILITIES, FACILITIES AND SERVICES

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## 7.2. Energy

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### A. Summary

#### **Energy and Electricity Planning in the Addison Region**

The Addison County Regional Planning and Development Commission developed the region's first energy plan in 1980. In 1994, the Addison County Regional Planning Commission drafted and adopted a new plan that contained an Energy section, which dealt primarily with energy sources, consumption and policy. Discussion of infrastructure was contained in the Utilities, Facilities and Services section of the plan. In the most recent revision of the Regional Plan, the commission decided to meld the sections on energy policy and infrastructure into a single discussion in the plan.

#### **Electricity Infrastructure and Services**

There are three utility companies that provide service in the Addison Region. Green Mountain Power Corporation (GMP) provides service to approximately 4,500 customers in the City of Vergennes and parts of the towns of Addison, Ferrisburgh, Monkton, New Haven, Panton, Starksboro and Waltham.<sup>33</sup> The Vermont Electric Cooperative (VEC) covers the northeastern corner of the Town of Starksboro. Central Vermont Public Service Corporation (CVPS) serves the remainder of the region.

The Vermont Electric Power Company (VELCO), a private corporation, owns most of the bulk power transmission system in the Addison Region and the State of Vermont. VELCO currently has a 115 kV electric transmission line in the Addison Region that runs on a north-south route through the towns of Leicester, Salisbury, Middlebury, New Haven and Monkton. There are additional regional level transmission lines that serve parts of the Addison Region. Generally, those lines feed power generated at the region's hydro-plants into the transmission grid or link substations with transmission lines.

There are eight hydropower generation facilities operating in the Addison Region, five of which are located on Otter Creek. Two other facilities are powered by Sucker Brook and are located in the towns of Leicester and Goshen. In Salisbury, there is a facility that generates hydropower from the Leicester River. Currently, these are the only large-scale electricity generation facilities in the region. In recent years, interest in small-scale power generation has increased in the region. There are a number of small generators in the region that create primarily wind or solar generated power for their own use, although a few do sell electricity back into the grid. Power is also generated from other sources such as cow manure in the region.

#### **Other Energy Infrastructure and Services**

There are no natural gas transmission lines in the Addison Region. However natural gas is available both to the north in Chittenden County and to the south in Rutland County. If the



systems in northern and southern Vermont were to be connected, the transmission line would likely pass through the Addison Region.

There are a number of companies in the Addison Region delivering heating fuels to retail customers, as well as three major suppliers to wholesale customers. Most heating fuel is shipped into the region by truck. Retail distribution of propane and fuel oil is available throughout the region and the fuels are commonly used for heating and cooking purposes.

Gasoline distribution in the Addison Region is primarily through individual stations affiliated with major oil companies. In the region's rural towns, many stations are small, locally-owned convenience stores with franchises. Along the major highways, gasoline stations are more likely to be corporate-owned chain stores.

### **Energy Use**

Residential customers use just under 60 percent of the electricity sold in the Addison Region. Commercial customers represent about 30 percent of electricity sales in the region. Industrial users consume approximately 15 percent of the electricity sold in the Addison Region. The largest portion of energy used in the Addison Region is for transportation and virtually all of it comes from petroleum products imported into the region. In Vermont as a whole, nearly one-third of all energy consumed is for transportation.

Residential users are the biggest user group of energy in the Addison Region. Next to transportation, the largest percent of energy used by residential customers is for space heating and cooling and domestic water heating. In 2000, two-thirds of households in the Addison Region used fuel oil to heat their homes. Nearly all the remaining households used either gas or wood.

### **Energy Conservation and Efficiency**

Homeowners can reduce the energy consumed in their homes in a variety of ways. Simple, inexpensive measures such as turning off lights in empty rooms or replacing light bulbs with new, more efficient bulbs can substantially reduce energy usage. Other conservation measures that can have a profound impact on energy usage include improved insulation and weatherization of new and existing structures. Additionally, new appliances and mechanical and heating systems can be far more energy efficient than older models.

Nationally, the energy efficiency of vehicular passenger travel improved by only one percent from 1990 to 2000. During the 1990s, many consumers purchased less energy efficient light trucks and sport utility vehicles (SUVs) that use more fuel. As a result, efficiency improvements for passenger cars were virtually offset by the loss in efficiency from light trucks and SUVs.



## **B. Goals and Objectives**

The Addison County Regional Planning Commission establishes the following goals and objectives for the Addison Region through this plan.

### **Goal A.**

*To increase local energy production in an effort to move towards a less centralized and more reliable energy production system in the Addison Region.*

**To meet this goal, it is our objective:**

- a. For there to be small- to medium-sized power producers throughout the Addison Region producing and distributing energy generated from a variety of sources.
- b. For small and individual producers to have a market for their excess power.
- c. To support innovative, experimental energy projects in the region, especially those utilizing local resources, such as wind, solar, hydro and biomass.
- d. To support efforts to reduce energy costs for the region's farms through development of farm-based sources such as biogas and biodiesel.
- e. To encourage new development to use both existing and potential new energy saving and generating strategies.

### **Goal B.**

*To reduce the Addison Region's energy consumption by maximizing the environmental, reliability and economic benefits of conservation.*

**To meet this goal, it is our objective:**

1. Conservation and Efficiency:
  - a. To promote the economic benefits of and support the continued availability and use of state and federal incentives for retrofitting existing buildings to increase their energy efficiency and for incorporating such features into new construction.
  - b. To reduce energy consumed in the Addison Region through provision of a vital system of public transportation and carpooling.
  - c. For there to be pedestrian and bicycle paths near and within settlement areas to reduce dependence on motorized transportation.
  - d. To encourage consumer education related to the quantity and cost of fuel consumed for transportation.
  - e. To facilitate use of Efficiency Vermont's services by the region's businesses and industries.
2. Planning
  - a. To utilize land use planning as a tool to reduce energy consumption in the Addison Region.
  - b. For municipalities to consider energy issues – such as local, small-scale generation, conservation and efficiency, alternative energy sources,



energy used for transportation, and transmission infrastructure – when developing land use plans and regulations.

- c. To encourage municipalities to adopt and enforce building codes to increase energy efficiency to the Vermont Energy Star Homes program standard.

### **Goal C.**

*To have reliable, adequate and affordable energy that meets the needs of the Addison Region's residents and businesses.*

**To meet this goal, it is our objective:**

- a. For the utilities serving the region to provide energy from a diverse portfolio of power generators, including local and renewable sources.
- b. To encourage experimental development of safe, clean and renewable energy sources.
- c. To use the region's existing energy resources to offset the direct and indirect costs of our dependence on imported energy.

### **Goal D.**

*That energy infrastructure and services do not cause undue adverse impact to the health and safety of residents or on the environmental quality of the Addison Region.*

**To meet this goal, it is our objective:**

- a. To fully utilize existing infrastructure and rights-of-way to meet the region's energy needs before additional infrastructure is built or new rights-of-way acquired.
- b. For no large-scale energy generation or transmission facilities, which have as their primary purpose providing energy to markets outside the Addison Region, to be constructed or expanded in the region.
- c. To consider all costs whether capital, environmental or health when evaluating the viability of both locally generated and imported energy sources.
- d. For utilities and individuals seeking Certificates of Public Good for projects in the Addison Region to work with affected landowners, municipalities and ACRPC to develop appropriate aesthetic mitigation plans prior to filing their Act 248 applications.
- e. To work toward the phasing out of fossil fuels and adopting cleaner energy solutions.
- f. To co-locate energy transmission and distribution lines, telephone lines and cable lines in the same corridors on the same infrastructure, if feasible, and to coordinate the delivery of their services to reduce the aesthetic impacts of the services they provide.
- g. For undergrounding of transmission and distribution lines, and if relevant, other service lines in or around the proposed corridor to be considered in the planning and siting of the line to reduce aesthetic impacts of the lines.





## C. Recommended Actions

The Addison County Regional Planning Commission recommends that the following actions be incorporated into its annual work plans, as issues or opportunities arise, to move towards accomplishing objectives and meeting the goals outlined above.

1. Encourage communities countywide to hold advisory votes on issues of large-scale or nuclear energy generating and/or transmission facilities proposed with in the region.
2. Continue education efforts on energy issues in the region.
3. Participate in Act 248 and other reviews of energy projects in the region.
4. Provide support and information for alternative or experimental energy projects in the region.
5. Encourage Addison County Economic Development Corporation and other organizations to support local energy generation as an economic development tool for the region.
6. Continue to partner with and support Addison County Transit Resources.
7. Assist municipalities and organizations in planning and seeking funding for bicycle and pedestrian projects in the region.
8. Assist municipalities interested in developing building codes to increase energy efficiency.
9. Develop and distribute educational materials for homeowners and builders describing Vermont Energy Star Homes program buildings, how they are built and the energy cost savings.
10. Make educational materials available for homeowners, builders, businesses and nonprofits concerning clean energy and energy efficient technologies.
11. Seek an opportunity to partner with and publicize construction of a Vermont Energy Star Homes program model home.
12. Buy energy efficient products when purchasing or replacing equipment, fixtures and light bulbs in the ACRPC office.
13. Seek funding to undertake a study to determine potential sites for wind generation facilities of various scales in the region.



## **D. Documentation and Analysis**

### **History of Energy and Electricity Planning**

#### **a. Vermont State Energy and Electricity Planning**

Vermont began to plan for its energy needs after the energy crisis of the 1970s. The first comprehensive state energy plan was created in 1991 and the Vermont legislature subsequently required that plan be periodically updated. The Vermont Comprehensive Energy and Greenhouse Gas Action Plan was last revised in 1997. The plan outlines Vermont's energy goals, contains information on current, historic and projected energy use, and analyzes the policy options available to achieve the goals. The plan was developed cooperatively by the Department of Public Service, Agency of Natural Resources and Agency of Transportation.

State statute requires the Department of Public Service to adopt a 20-year Electric Plan. This plan was last adopted in 1994 and is currently being revised. The plan reviews the state's current and long-term need for electric energy and analyzes the resources available for meeting future demand.

#### **b. Energy and Electricity Planning in the Addison Region**

The Addison County Regional Planning and Development Commission developed the region's first energy plan in 1980. That 1980 plan indicated that the county was a net energy importer with an estimated \$16 million leaving the region in 1977 to pay for energy. The policies in that plan expressed concern about the future location of large-scale electric generation and transmission facilities in the region. It supported the development of locally generated energy sources and pointed to their potential contribution to the region's economy. The plan also recommended encouraging the concentration of new residential development near existing employment centers and discouraging a scattered pattern of residential development in the rural countryside, thus reducing gasoline consumption.

In 1994, the Addison County Regional Planning Commission drafted and adopted a new plan that contained an Energy section, to address the statutory requirement for an energy plan. That energy element dealt primarily with energy sources, consumption and policy. Discussion of infrastructure was contained in the Utilities, Facilities and Services section of the plan. In the most recent revision of the Regional Plan, the commission decided to meld the sections on energy policy and infrastructure into a single discussion in the plan.

Although the energy picture often appears abstract and beyond the influence of local communities, sound regional and municipal planning can play a positive and effective role in guiding energy decisions. The Addison Region can move toward a position of sustainable energy use that will not only maintain a healthy environment, but will also build a foundation for economic vitality. ACRPC and its member municipalities can promote appropriate land



use patterns, participate in energy development decisions, facilitate alternative transportation options and encourage energy conservation strategies in the Addison Region.

## **Electricity Infrastructure and Services**

### **a. Electric Utilities**

There are three utility companies that provide service in the Addison Region. Green Mountain Power Corporation (GMPC) provides service to approximately 4,500 customers in the City of Vergennes and parts of the towns of Addison, Ferrisburgh, Monkton, New Haven, Panton, Starksboro and Waltham.<sup>34</sup> The Vermont Electric Cooperative (VEC) covers the northeastern corner of the Town of Starksboro. Central Vermont Public Service Corporation (CVPS) serves the remainder of the region.

Electric utilities are granted monopolies over service territories, which guarantees them the right to provide electric service to customers within a certain geographic area. In exchange, utilities are subject to government regulations that require them to act as trustees for public resources. A utility must provide adequate service at reasonable prices, meeting industry standards for reliability and quality of service. Electric utilities in Vermont are required to base their supply decisions on the most societally cost-effective measures identified through a planning process called least cost integrated planning.

### **b. Electricity Transmission Infrastructure**

#### **1. Transmission Lines**

The Vermont Electric Power Company (VELCO), a private corporation, owns most of the bulk power transmission system in the Addison Region and the State of Vermont. VELCO currently has a 115 kV electric transmission line in the Addison Region that runs on a north-south route through the towns of Leicester, Salisbury, Middlebury, New Haven and Monkton.

For a number of years, VELCO has planned to expand its transmission capacity in this corridor. VELCO has been upgrading equipment and lines incrementally to both the north and the south of the Addison Region. During the 1990s, VELCO made several proposals for upgrading the line within in the region to 345 kV, none of which moved into the regulatory process. Currently, VELCO is seeking a Certificate of Public Good for a project that would add an additional 345 kV line alongside the 115 kV line running from West Rutland to New Haven. An existing Green Mountain Power transmission line that runs from New Haven to Vergennes and north through Ferrisburgh towards South Burlington would be replaced with a 115 kV line. There was opposition to VELCO's earlier proposals and to the current project from region residents based mainly on need for a 345 kV line, health, safety, property value and aesthetic concerns.

There are additional regional level transmission lines that serve parts of the Addison Region. Green Mountain Power (GMP) owns a line that runs from New Haven through Waltham, Vergennes and Ferrisburgh. That line is currently 46 kV between New Haven and



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Utilities, Facilities and Services

Vergennes and 34.5 kV from Vergennes north. Central Vermont Power (CVPS) owns three 46 kV lines in the region. Those lines run from Bristol to New Haven, from Weybridge to Middlebury, and from Salisbury through Goshen. Generally, these lines feed power generated at the region's hydro-plants into the transmission grid or link substations with transmission lines.

## **2. Substations**

There are a number of substations throughout the Addison Region. These facilities convert the electricity transmitted along the power grid to allow it to be carried on distribution lines to consumers.

## **c. Electricity Generation**

There are eight active hydropower generation facilities in the Addison Region. Currently, these are the only large-scale electricity generation facilities in the region.

In recent years, interest in small-scale power generation has increased in the region. Currently, the region's small generators use primarily wind or solar generated power for their own use, although a few do sell electricity back into the grid. Power is also generated from other sources such as cow manure in the region. Additionally, there are locations within the region that have been identified as having the wind resources needed for large-scale wind power generation.

### **1. Statewide Generation**

Approximately 70 percent of the power generated in Vermont comes from the Vermont Yankee nuclear plant in Vernon. The plant, a 540-megawatt boiling water reactor, began operation in 1972. The plant is licensed to operate until 2012. The plant supplies approximately 25 percent of Vermont's electricity demand.

Hydropower generation is the other main source, 20 percent, of electricity generated in Vermont. There are 46 utility-owned hydro sites and a number of independent power producers selling hydropower.

### **2. Hydropower Generation**

Hydropower has been used as an energy resource in the Addison Region since colonial settlers built the first mills along the region's streams. Throughout the 1800s most of the region's industrial activity was focused around locations with access to hydropower, such as the Marble Works in Middlebury. Some of those same locations are still being used to generate power today.

Currently, there are eight hydropower generation facilities operating in the Addison Region, five of which are located on Otter Creek. Two other facilities are powered by Sucker Brook and are located in the towns of Leicester and Goshen. In Salisbury, there is a facility that generates hydropower from the Leicester River. Five of these facilities are owned by Central Vermont Public Service (CVPS), two by Vermont Marble and one by Green Mountain Power (GMP).



There are two basic types of hydroelectric facilities: run-of-the-river and ponding facilities. Run-of-the-river plants hinder the flow of water only minimally, with the volume entering the powerhouse equaling the amount leaving the plant immediately. Ponding systems store water behind a dam to be released through the turbines on demand. Most of the hydropower plants in the region are run-of-the-river facilities. However, the Sugar Hill generator in Goshen can store water in a reservoir and release it on demand.

The size of these facilities range from Sugar Hill, which produces less than 2,000 megawatt hours annually to Huntington Falls, which generates more than 22,000. Altogether the region's hydro plants currently produce more than 80,000 megawatt hours of electricity annually. That figure represents approximately 43 percent of the electricity consumed in the Addison Region annually.

### **3. Wind Power Generation**

Wind power can be harnessed for both large and small-scale power generation. In recent years, several studies have shown that Vermont's wind resource is abundant enough to meet a significant portion of the state's electric energy needs. Ridgelines provide the best location for wind generation facilities, with elevations between 2,000 and 3,500 feet above sea level being ideal for maximum power production. In the Addison Region, locations primarily in the towns of Starksboro, Lincoln and Ripton were identified as having a Wind Power Class 3 or greater, making large-scale generation feasible.

The turbines in a commercial-scale wind project would likely be 135 to 250 feet in height. Lighting would be required on turbines over 200 feet tall by federal law. Wind projects in Vermont would likely be in the form of up to 40 turbines arranged in a linear fashion along a ridgeline or other high-wind location. A wind energy project would also require power lines, a substation and access roads.

Small wind turbines, designed for individual residential or business use, usually generate under 15 kW. They have two or three blades usually with a diameter of eight to 24 feet. They are often mounted on a guyed monopole or a freestanding lattice tower ranging in height from about 80 to 120 feet. Turbines need to be 40 to 60 feet above nearby trees or other obstructions for optimum efficiency. Small- to mid-sized turbines operate at lower wind speeds and can be more flexibly located.

### **4. Biogas Power Generation**

During the energy crisis of the late 1970s, the Foster Brothers Farm in Middlebury started producing electricity from cow manure. This electricity is used to provide power for the farm and the excess could be sold back into the power grid. To produce the electricity, an anaerobic digester uses bacteria to break down the manure into methane gas. The methane gas is used as a source of fuel for an internal combustion engine connected to an electrical generator. Methane produced from other sources, such as landfills or composting of food waste, could also be used to produce power in the same manner.



Beginning in 2000, the Vermont Department of Public Service and the Vermont Department of Agriculture received federal funds to promote the use of methane recovery technology on Vermont dairy farms. Foster Brothers and several other Addison Region farms have participated in the Vermont Methane Pilot Project. The goal of this on-going project is to identify and help overcome key strategic hurdles to widespread adoption of methane recovery technologies by Vermont farmers.

The Resource Assessment Report produced as part of the pilot project estimated that with over 4 million tons of dairy manure produced annually in Vermont, 245,000 megawatt hours of electrical power could be generated each year. Given that nearly 25 percent of Vermont's dairy cows are on farms in the Addison Region, biogas has the potential to be nearly as significant an electrical power generator in the region as hydropower.<sup>35</sup>

The pilot project identified barriers to farmers implementing methane recovery and use systems, as well as potential strategies to overcome them. Methane recovery systems are expensive. For the average 300- to 500-cow dairy farm, capital costs can range from \$100,000 to over \$500,000. Sale of electricity back into the grid is still complicated and potentially expensive to setup. Additionally, while not new technology, there is no standardized system that can be bought off the shelf; each system must be designed individually.<sup>36</sup>

#### **5. Net Metering**

Net metering allows customers to generate and use power simultaneously, making it easier and more cost-effective for consumers to generate some of their own electricity. Net metering requires electric utilities to permit customers who generate their own power using small-scale renewable energy systems to feed any excess power generated back into the power grid, actually running their electric meters backwards. Vermont enacted legislation in 1998 that allowed net metering.<sup>37</sup>

In order to qualify for net metering, an electrical utility customer must obtain a Certificate of Public Good (CPG) from the Public Service Board, a process similar to an Act 250 land use permit. Projects that receive a CPG do not have to go through the local permit process. Vermont's net metering law caps the size of generators at 15 kilowatts of generation for photovoltaic panels, wind turbines and fuel cells fueled by renewable sources. Farmers who generate electricity from farm-produced methane can generate up to 125 kilowatts. In addition, the Public Service Board can issue up to five net metering CPGs per year for systems between 16 and 100 kW. Utilities must allow net-metered systems until the cumulative generating capacity of all the net-metering systems on its lines equals one percent of the company's peak demand during 1996.

There are currently 12 net-metering small-scale generators in the Addison Region, six wind and six solar. Net metering works best for those customers who do not generate more power than they use. Once a net-metering customer's meter has been turned back to zero, any additional power sent into the grid is essentially given to the utility for free.



Vermont's net metering legislation has another special provision for farmers, group net metering. This allows power generated on a farm to offset multiple meters. A farm, like Foster Brothers, generating power from methane will produce more electricity than it can use. With the new net metering law, that excess power could be used to offset additional meters off the farm.

## **Other Energy Infrastructure and Services**

### **a. Petroleum-Based Fuels**

#### **1. Natural Gas**

Currently, there are no natural gas transmission lines in the Addison Region. However natural gas is available both to the north in Chittenden County and to the south in Rutland County. If the systems in northern and southern Vermont were to be connected, the transmission line would likely pass through the Addison Region.

In the late 1980s Champlain Pipeline Company applied to the Public Service Board to construct a 24-inch natural gas pipeline to connect with a Canadian pipeline near Highgate Springs. The proposed line would have been used to deliver gas to Vermont and other markets in the northeast. The proposed path would have run south through the Champlain Valley to Rutland, at which point it would have proceeded to Springfield and eventually would have crossed the Connecticut River into New Hampshire. Significant opposition formed in the areas where the pipeline would have been constructed. Opposition was primarily based on safety, growth and aesthetic issues. At the same time, the company proposing the project came up against supply problems and competition from a line in eastern New York. The application for construction was withdrawn.

#### **2. Heating Fuels**

There are a number of companies in the Addison Region delivering propane and fuel oil to retail customers, as well as several major suppliers to wholesale customers. There are approximately eight storage facilities in the region that supply these companies.<sup>38</sup>

Most of these fuels are shipped into the region by truck. There is also a rail facility located in Leicester Junction where fuel is delivered and stored. Retail distribution of these fuels is available throughout the region and the fuel is commonly used for heating and cooking purposes.

#### **3. Gasoline**

Gasoline distribution in the Addison Region is primarily through individual stations affiliated with major oil companies. In the region's rural towns, many stations are small, locally-owned convenience stores with franchises. Along the major highways, gasoline stations are more likely to be corporate-owned chain stores.



This distribution network has historically served the region well and fuel for gasoline engines is readily available. During the past 10 years, changes to the economic climate, consumer purchasing patterns and regulations on underground storage tanks have affected the gasoline distribution system. Smaller stores with limited sales volumes are finding it increasingly difficult to justify the expense associated with gas sales. Consequently, residents in more rural parts of the region have been gradually losing local access to fuel and must drive increasing distances for a fill up.

## **b. Biomass Resources**

Biomass consists of renewable organic materials, including forestry and agricultural crops and residues, wood and food processing wastes, and municipal solid waste. All these products or waste products can be used as energy sources. The benefits of these resources are that they are local, sustainable and often waste materials. Some biomass materials, such as wood, have been traditionally burned to provide heat. However, these materials can also be used in more efficient ways, such as producing gas that can then be burned to generate heat or power.

### **1. Wood**

Wood has historically been an important energy source in the Addison Region. When colonial settlers arrived in the region, it was forested. Trees were felled to clear farmland and the byproducts of that clearing, including timber and potash, were a primary component of the region's early economy. The region's residents used wood as their primary heat source into the 20<sup>th</sup> century. As fossil fuels became available, one of the region's primary energy sources, local wood, was largely replaced by imported oil.

During the oil embargo of the early 1970s, many of the region's residents returned to using wood as a renewable and cost effective fuel. Most of this use was initially in the form of split or chunk wood for use in traditional woodstoves. However, once oil prices declined and residents were faced with the inconvenience of putting up wood several seasons in advance, many returned to the ease of oil heat. Several new residential wood heating alternatives have begun to be used in the region over the past decade. In rural areas of the region, outdoor wood furnaces have seen a rise in use allowing for much of the mess associated with indoor wood stoves to be left outside. Wood pellet burning stoves have offered consumers another option. These stoves and furnaces use a processed wood pellet for fuel that can be automatically fed into the burner and delivered in bulk similar to coal.

In addition to use for residential heating, wood is being used in Vermont to generate energy on a large scale. There are two wood chip fired electrical generation facilities located in Burlington and Ryegate. The McNeil Generating Station located in Burlington has a nominal capacity of 50 MW and has operated since 1984. This plant is the largest U.S. utility-owned plant burning wood. When it was built, it was the largest dedicated wood-fired electric generating station in the world. The plant was retrofit in 1989 to burn natural gas, either alone or in combination with wood. The plant has cycled and switched fuels, as demanded by fuel prices, fuel availability and NEPOOL's requirements.



Between residential use and large-scale generating plants, there are a number of applications for wood as an energy source. Small-scale electrical generation with wood fuel is possible and is most common at forest products manufacturing plants where waste material can be converted to energy. Nearly half of Vermont's mill waste is currently used as an energy source.<sup>39</sup>

Over 20 Vermont schools operate boilers fired by wood chips. This technology has the potential to co-generate electricity in addition to providing heat. The technology used in a number of these schools was developed by a local business, Chiptec. In the Addison Region, Middlebury College has recently begun researching conversion of their heat plant from fuel oil to a wood based system.

## **2. Other Potential Biomass Energy Sources**

As discussed above, cow manure could be another significant source of biomass in the Addison Region. While there is currently no landfill in the region, if one were to be constructed in the future, methane could be captured from that facility and used to generate power. Other potential biomass resources in the region include food waste, cheese whey and brewery residuals.

Biodiesel is another emerging technology for creating energy from biomass. Biodiesel is a fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. The fats and oils are chemically reacted with an alcohol, such as methanol, to produce chemical compounds known as fatty acid methyl esters. Biodiesel is the name given to these esters when they are intended for use as fuel. Glycerol is produced as a byproduct. Biodiesel contains no petroleum, but it can be blended with petroleum products to create a biodiesel blend, which can be used to fuel unmodified diesel engines and to replace fuel oil for heating systems. Biodiesel could provide an opportunity for the region's farmers to create new demand for locally grown crops and since most farm equipment runs off diesel engines, provide alternative fuel supply for farm vehicles.

## **c. Solar Energy**

On average, the energy equivalent of over five megawatt hours of solar energy falls on each acre of land in Vermont annually.<sup>40</sup> Despite long winters and a variable climate, there is a relative abundance of sunshine and potential for utilizing solar energy. Although large-scale photovoltaic generation is not currently cost-competitive, it can be used effectively on a smaller scale. One challenge to using solar energy locally is the seasonal difference in the amount daylight hours between summer and winter. So, it is usually not feasible to rely solely on solar energy as a power source in the region, but it can be used effectively when combined with other sources. However during the 1990s, Vermont's peak use of electricity shifted from winter to summer. Solar generated power could help offset some of that peak summer demand.



### **1. *Passive Solar***

The simplest use of sunlight is passive use for lighting and heating. Many of Vermont's one-room schoolhouses provide historic examples of how buildings can be oriented and windows can be used to take advantage of passive solar energy for lighting and heating. Properly insulated buildings oriented so that their long axis is within 30 degrees of true south with unobstructed south facing windows can offset their space heating costs by 15 to 50 percent.<sup>41</sup> Taking this one step further floors and walls can be built of materials that will capture and store warmth from the sun. In many cases, passive solar buildings can be constructed at little or no extra cost, providing free heat and light – and substantial energy cost savings – for the life of the building.

### **2. *Direct Solar Hot Water***

Solar water heating is another cost-effective solar application for buildings in the Addison Region. Water heating is one of the largest energy costs for the region's households. A water heating system that utilizes solar energy can reduce energy costs by up to 65 percent. A solar water heater cannot generally supply all the hot water needed year-round because of the climate and weather, so a back-up system is required. Consumers currently heating their domestic hot water with electricity would see the largest energy cost savings.

### **3. *Photovoltaic Electricity***

New developments in photovoltaic cell (PV) technology, which converts solar energy into electricity, has led to PVs that are smaller, less expensive and more consumer-friendly – trends that should continue into the future. Photovoltaic cells come in a wide range of sizes and applications, from large collectors for utility-sized power plants to tiny cells built into consumer appliances. Solar power, especially when partnered with wind turbines, has been used as a cost-effective option for new development that would have required lengthy extensions of power lines. Municipal street lighting is another application where communities could use solar power to reduce energy costs. Other uses for photovoltaic cells such as outdoor lighting, battery chargers are cost-effective applications that can offset energy use.

### **d. *Emerging Technology***

As new technologies, such as fuel cells, become available, ACRPC will be open to learning about and distributing information on the wise use of those resources for sustainable economic development.

## **Energy Use**

### **a. *Electricity Use***

#### **1. *Residential Use***

The average household in the Addison Region uses about 720 kilowatt-hours of electricity monthly. At a rate of 10¢ per kilowatt-hour, the average household electric bill is



over \$860 annually. The region's 13,000 households would use about 112 megawatt-hours or more than \$11 million worth of electricity every year.<sup>42</sup>

Residential customers use just under 60 percent of the electricity sold in the Addison Region. According to the 1994 Vermont Electric Plan, electric water heaters and refrigerators/freezers use around 60 percent of the electricity needed by Vermont households. Lighting, cooking and clothes drying represented another 15 percent of residential electricity use. In the Addison Region, fewer than 400 or around three percent of households used electricity as the primary heating source for their homes.

## **2. Commercial Use**

Commercial electricity users in the Addison Region use on average 3,000 kilowatt-hours of power monthly. Commercial customers represent about 30 percent of electricity sales in the region.<sup>43</sup> According to the 1994 Vermont Electric Plan, 40 percent of commercial electricity use is for lighting.

## **3. Industrial Use**

Industrial users consume approximately 15 percent of the electricity sold in the Addison Region. Industrial users vary widely in the amount of electricity they use. According to the 1994 Vermont Electric Plan, over 65 percent of industrial electricity use is to run motors. Lighting accounts for most of the electricity not used in manufacturing processes.

## **b. Other Energy Use**

### **1. Transportation**

The largest portion of energy used in the Addison Region is for transportation and virtually all of it comes from petroleum products imported into the region. In Vermont as a whole, nearly one-third of all energy consumed is for transportation. Of the energy used for transportation, over three-quarters fuels passenger vehicles.<sup>44</sup>

Over the past 20 years, the amount of energy used for passenger transportation in the region has grown. The average commute for a worker in the region has increased from 18 minutes in 1980 to 23 minutes in 2000. Over 750 fewer workers carpooled in 2000 than in 1980. The number driving to work alone doubled over the past 20 years to nearly 13,000 or over 70 percent of the region's workers. In addition to driving further to work, people are making more frequent and longer automobile trips for shopping, errands, etc. According to the Census Bureau, Addison Region residents owned nearly 24,000 vehicles in 2000 or approximately .7 vehicles per person. That is up from around 15,000 vehicles or .5 vehicles per person in 1980.

On average, every Vermonter travels approximately 11,000 miles annually.<sup>45</sup> For the Addison Region with its population of approximately 35,000 people, that translates to 385 million miles driven annually. Assuming the average vehicle in the region gets 20 miles to the gallon, residents are using a total of 19.25 million gallons of gasoline a year. At \$1.75 per gallon, that is a fuel bill of nearly \$34 million.



(Adopter November 10, 2005) **ACRPC**  
Utilities, Facilities and Services

## **2. Residential Energy Use**

Residential users are the biggest user group of energy in the Addison Region. Next to transportation, the largest percent of energy used by residential customers is for space heating and cooling and domestic water heating.

In 2000, two-thirds of households in the Addison Region used fuel oil to heat their homes. Nearly all the remaining households used either gas or wood. Over the past 20 years, there has been a shift away from wood, which in 1980 was used by nearly 25 percent of households, towards gas. Use of electricity for heat has also declined since 1980. There are a handful of households in the region that indicated on the 2000 Census that their homes were heated by solar energy.

The average household in the region that heats with fuel oil uses about 700 gallons annually. At \$1.30 per gallon, the average household heating with fuel oil would pay over \$900 annually. The residential users as a whole use about 6 million gallons or nearly \$8 million worth of fuel oil.

### **Energy Conservation and Efficiency**

#### **a. Efficiency Vermont**

Efficiency Vermont is a statewide energy efficiency utility, the first of its kind in the nation. Efficiency Vermont helps consumers reduce energy costs by making homes and businesses more energy-efficient. It provides technical assistance and financial incentives to help Vermonters identify and pay for cost-effective approaches to energy-efficient building design, construction, renovation, equipment, lighting and appliances. Efficiency Vermont is funded by an energy efficiency surcharge on electric bills.

#### **b. Transportation**

Nationally, the energy efficiency of vehicular passenger travel improved by only one percent from 1990 to 2000. The 1990s marked a shift in vehicle purchases that was largely responsible for bringing gains in energy efficiency to a virtual standstill. Rather than buying cars, many consumers purchased less energy efficient light trucks and sport utility vehicles (SUVs) that use more fuel. As a result, efficiency improvements for passenger cars were virtually offset by the loss in efficiency from light trucks and SUVs.<sup>46</sup>

#### **c. Residential**

Homeowners can reduce the energy consumed in their homes in a variety of ways. Simple, inexpensive measures such as turning off lights in empty rooms or replacing light bulbs with new, more efficient bulbs can substantially reduce energy usage. According to Efficiency Vermont, if every household in the state changed one light bulb, Vermonters would save enough electricity to light 14,500 homes for a year. Using timers to regulate lighting, heating or cooling in a home can also significantly decrease energy consumption. Other conservation measures that can have a profound impact on energy usage include



improved insulation and weatherization of new and existing structures. Additionally, new appliances and mechanical and heating systems can be far more efficient than older models.

## **Impacts of Energy Infrastructure and Use**

There are a variety of impacts from all sources of energy, even renewable sources. Understanding and quantifying those impacts is necessary to accurately weigh the costs and benefits of a particular energy project or source to society. The impacts associated with energy use in the Addison Region are not limited to this geographic area, nor is the region unaffected by energy generated and used in distant places.

### **a. Environmental Issues**

#### **1. Impacts on Surface Water**

The environmental impacts associated with hydropower, the Addison Region's main source of electricity generation, can be significant. The physical character of a power-producing stream is usually markedly changed upstream, downstream and at the dam location. Water chemistry and biology are also altered. Even run-of-river plants can still cause substantial impact on the riverine system depending on the type of system utilized. At a minimum there is often a dam limiting the mobility of fish and blocking passage to spawning areas. The level of water in the reservoirs used in ponding systems can fluctuate greatly, causing shoreline erosion and degrading plant communities and animal habitat. However, properly scaled and managed hydro systems can significantly reduce impacts and present fewer negative environmental impacts relative to other energy sources.

#### **2. Air Quality**

Any fuel that is burned for heat or to generate power produces emissions that contain both particulate matter and greenhouses gases. Gasoline used to power vehicles and the fuel oil or wood heating homes in the Addison Region all produce emissions. The emissions produced by combustion include carbon dioxide, nitrogen and sulfur oxides, nitrous oxide and methane. Carbon dioxide, nitrous oxide and methane are greenhouse gases that contribute to global warming, while nitrogen and sulfur oxides lead to acid rain and acidification of water bodies.

In the Addison Region, the most significant impact on air quality comes from motor vehicle emissions, especially in congested areas where there are regularly lines of slow-moving or idling vehicles. Since 2001, Vermont has required emission control devices and inspections to ensure that emissions standards are being met. Those regulations apply to all gasoline-powered vehicles manufactured from 1996 on and all diesel-powered vehicles weighing less than 8,500 pounds manufactured from 1997 on.

The air quality of the Addison Region is also impacted by the emissions produced at electricity generation facilities, along with other industrial facilities, outside the region and the state. Coal-burning power plants in the Midwest have long been identified as one of the largest sources of emissions contributing to acid rain in the Northeast.



The potential impacts of reducing air quality through ever-increasing energy generation and consumption include increased human respiratory health problems, visibility degradation, damage to vegetation including agricultural crops and timber, corrosion of stone, metal and other structural materials, and acidification of water bodies.

### **3. *Timber Harvesting***

The region's forest resources are a renewable energy source that could be used sustainably for generations if properly managed. However, a number of issues associated with burning large quantities of wood have surfaced over the years, including increased air pollution levels and concerns about over harvesting of available wood sources.

In general, wood products do not burn as cleanly as petroleum products and produce even more air pollutants when fires are contained within airtight stoves. However, newer wood stoves are required to burn more cleanly and many are now equipped with catalytic converters to remove pollution from wood smoke. New woodstoves for residential use are more energy efficient, produce less air pollution and are safer than older models. One benefit of burning wood is that there is little net production of carbon dioxide (CO<sub>2</sub>), a major greenhouse gas, because the CO<sub>2</sub> generated during combustion of wood equals the CO<sub>2</sub> consumed during the lifecycle of the tree.

Concerns about over harvesting of forests have arisen in recent years near large consumers of wood chips, such as the wood fired electric generation plants. The economics of chip harvesting preclude the ability to effectively harvest in a selective manner and some public resistance has surfaced over even aged management techniques. Because of this resistance, the large-scale users of wood chips have taken an active approach to managing forests and have hired full-time foresters to ensure the harvesting is done in a sustainable manner for years to come with the least aesthetic impact possible.

Wood continues to be underutilized in the region as an energy source with far more biomass production grown in a single year than harvested. The ability to market the former waste products from sawlog production allows wood to be grown much more as a crop similar to grain than ever before.

## **b. Health and Safety Concerns**

### **1. *Storage and Transport of Petroleum Products***

There are health and safety risks associated with both the storage and transport of petroleum products in the Addison Region. Throughout the past 20 years, electronically monitored, double-walled tanks have replaced older single-walled underground storage tanks. Unfortunately, many of these older tanks had already leaked and some of the region's groundwater has been contaminated. To date, the costs associated with groundwater contamination in the region have been limited to small-scale clean up and supplying alternative drinking water supplies to homes affected. The long-term health impacts associated with this contamination have yet to be evaluated.



Above ground storage and transport of highly flammable petroleum products also carry fire and explosion risks to the communities that host them. In the 1980s, transport of petroleum products to the region shifted modes from a combination of Lake Champlain barge, rail and truck to primarily truck transport with limited rail use. A 2003 study of the region's major highways indicated that more than three-fourths of all hazardous materials transported within the region fall within the petroleum category. Additionally, all of the region's local roads also have some risk associated with the transport of petroleum products to customers for heating and cooking fuels.

## **2. Electric and Magnetic Fields**

Power lines, electrical wiring and appliances all produce electric and magnetic fields (EMFs). Electric and magnetic fields have different properties. Electric fields are produced by voltage and are easily shielded by conducting objects. Any appliance that is plugged in produces electric fields whether or not it is turned on and using power. Magnetic fields are produced by current and are not easily shielded. An appliance must be turned on and using power to produce a magnetic field. Electric fields reduce in strength with increasing distance from the source.

There has been considerable debate on and research into the potential impacts of EMFs on human health. Due to their greater strength, the fields generated by transmission lines have been the focus of much of the debate. In 1999, the National Institute of Environmental Health Sciences (NIEHS) completed a report on the potential human health affects associated with EMFs. The NIEHS concluded that exposure could not be declared entirely safe because of a weak link research had found between EMF exposure and increased risk of leukemia, especially in children. In its report, the NIEHS recommended that the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards.<sup>47</sup>

## **3. Transport and Disposal of Nuclear Waste**

The Vermont Yankee Nuclear Station, like all nuclear power plants, produces both low-level and high-level radioactive waste. Low-level radioactive waste decays to safe levels within 100 years and includes contaminated metals, filters, resins and other materials used at nuclear plants. High-level waste, which consists of spent fuel, will need to be managed for many thousand years to protect human health.

The high-level waste from plants like Vermont Yankee is currently stored in water-filled pools at reactor sites. For over 20 years, the federal government has been pursuing a policy to construct a single disposal site for the nation's high-level radioactive waste. In 1987, the U.S. Congress designated the Yucca Mountain site in Nevada to be developed as a disposal facility. Little progress has been made on this plan in the intervening years, leaving doubt as to whether a single disposal facility will ever be constructed. In the interim, a number of plants have requested and been granted approval to place waste in onsite dry storage in concrete and metal casks.



### **c. Aesthetic Concerns and Scenic Character**

The Addison Region's landscape is characterized by scenic vistas with long views over rolling farm fields and forested areas to Lake Champlain and the Adirondack Mountains to the west. To the east, the view is of the forested foothills and peaks of the Green Mountains. Given the long, open viewsheds from many locations within the region and the importance many residents and visitors attach to Vermont's rural character, towers, turbines, lines and cleared rights-of-way have significant visual impact.

Electricity infrastructure is often a highly visible feature in the landscape, whether it be the profusion of poles and distribution lines in a historic downtown, a line of 75-foot tall transmission lines through farm fields, a substation ringed with chain link and barbed wire fence alongside the road or a 150-foot tall wind turbine on a ridgeline. When there are plans to construct new or expand existing infrastructure, the infrastructure should be sited to respect the scenic character of the landscape and the aesthetic concerns of the citizens of the region.

### **d. Energy Infrastructure and Growth Patterns**

Infrastructure such as electricity distribution lines and gas pipelines can lead to new or intensified development. Development is easier, less expensive and therefore more likely to occur in places served by infrastructure. So, decisions regarding infrastructure extensions or improvements should consider the impacts on growth and development patterns in the area.

In the Addison Region, there are areas, especially in the mountain towns, that do not currently have access to electric lines. As with roads, whenever a distribution line is extended into a place that previously did not have service, over time additional development is likely to occur along the length of the line.

As discussed previously, there is utility gas both north and south of the Addison Region. In the past, there have been proposals to construct transmission pipelines in the region. One of the reasons for local protest against the Champlain proposal in the 1980s was the fact that the pipeline would have been transporting gas through the region with relatively few benefits for energy customers in the region. If utility gas were available in the region's industrial districts, they would likely be more attractive for additional development. In the future, the positive and negative growth impacts associated with development of new infrastructure like a gas pipeline would need to be weighed.



# 8. FUTURE LAND USE

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## 8.1 Introduction

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The Future Land Use Element establishes overall land use policy for the region. It is composed of four maps and a narrative. The first map shows generalized land use regions. This map is a composite of land use maps from local town plans. The second map is an overlay of regionally significant resources. These are resources which have a physical or service continuum beyond one town, are of statewide or national importance, or are publicly owned natural resources and are designated of regional significance through the regional planning process in the Addison Region. The third map depicts towns with adopted and regionally approved town plans. The fourth map depicts State designated downtowns, villages and growth centers.

The narrative discusses general uses and limitations in each region. The Future Land Use Map is updated annually to reflect changes made in municipal plans since the intent is to honor local land use designations as the basis for the generalized land use regions depicted in this map.

## 8.2 Future Land Use

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The intent of the Commission is to annually update this Future Land Use section to reflect Town Plans adopted during the prior year.

### A. Maps

#### **Future Land Use Map**

The Future Land Use Map for the Addison Region consists of a composite of all municipally adopted municipal plans as of the effective date of this plan. The map included herein attempts to depict the Land Use regions adopted by each municipality in four broad categories: Village, Commercial and Industrial Regions; High Density Residential Regions of 2 acres or less; Rural and Agricultural Regions of greater than 2 acre density and Forestry, Conservation and Floodplain Regions.

As such, the map included herein is a representation only; it should not be used for regulatory purposes. Instead, the Municipal Plan's Future Land Use Region for the region in which any project is located should govern any regulatory participation under this plan. Expired municipal plans are included in the Future Land Use Map. Although the expired plans have no standing, they constitute the best indication of the regulations governing the area, since zoning cannot be changed without an adopted town plan. They are included in the Future Land Use Map to provide some indication of the uses and patterns of development that may be allowed in the area.

#### **Regionally Significant Resources Map**

The Regionally Significant Resources Map is intended as an overlay to the Regional Future Land Use Map. It includes resources identified in the plan as regionally significant resources or facilities to which the Regional Plan policies should apply. This map serves to generally identify significant natural resources. The largest scale map available should be used to review the actual boundaries of the significant resources should the Commission choose to participate in a regulatory proceeding.

#### **Map of Approved Municipal Plans**

This map shows those municipalities who have current locally adopted plans and have also received approval from the Addison County Regional Planning Commission under the directives of 24 V.S.A. § 4350. The map also includes the date of the regional approval.

#### **Map of State Designated Growth Centers, Downtowns and Villages**

In addition to the village or mixed-use districts created by each municipality, the State also has several programs intended to encourage downtown, village or "growth-center" development. Map 8-4 depicts the downtowns and villages with state designation and the growth center approved by the Town of Middlebury and currently (January 2008) pending state approval.

## **B. Land Uses**

As noted above, the Regional Future Land Use Plan constitutes a composite of the municipal land use maps from every municipality in the region. Because the land use regions identified in municipal plans are described in many different ways, the discussion below amalgamates the various planning regions in all municipalities into four generalized land use regions.

### **Village, Industrial, Commercial and Mixed Uses**

Nearly every town in the region has designated a village or mixed-use planning region in their future land use plans. This plan consistently encourages supporting and revitalizing the region's villages with a mix of uses.

These are generally located in area of existing commercial development, and usually coincide with the historic village centers. Middlebury, Vergennes and Bristol have downtown business districts and separately designated industrial areas. Although most of the remaining towns do not have the infrastructure necessary for additional large industrial development, this plan supports commercial and industrial growth in the areas designated by each town.

Because of the availability of infrastructure, and/or to support existing settlement patterns and growth centers, this plan encourages major commercial or industrial development in appropriately designated areas of Middlebury, Vergennes and Bristol, or the creative reuse or redevelopment of "brownfields" or other existing commercial or industrial facilities or infrastructure. This plan supports cluster development within the villages.

### **High Density Residential Use Regions**

This region includes areas designated for residential uses on lots two-acres or less in size. Residential uses are permitted uses subject in most towns to the requirements of locating on-site sewage disposal facilities. Most towns have identified some area of higher density residential use (characterized for the purposes of this plan as two-acres or less). Many areas planned for higher density development lie in the village regions and are depicted in the Village, Commercial and Industrial District for the purposes of this map. Many others are defined by some other variable, ranging from available soils to road frontage. As the provisions of the recent changes to Chapter 117 are adopted, the provisions in each municipality's plan governing these regions and the underlying zoning implementing those plans will most probably be changed to accommodate affordable housing.

These areas are most likely to allow or encourage Planned Unit Developments, although this provision is not widely utilized at present. The Regional Plan supports residential use as permitted in town bylaws, but encourages the use of cluster/PUD developments particularly in developments on agricultural and forest lands, and/or to protect regionally significant resources. As the Regional Commission works with towns in updating plans, zoning bylaws, and subdivision regulations, the Commission will encourage towns to adopt policies which

encourage cluster/PUD development to protect these same resources, as well as other locally significant resources.

Home occupations, home-based businesses and cottage industry are permitted uses in most municipal planning regions that allow for higher and lower density residential development. This is consistent with this plan's economic base policies that encourage smaller, community-based businesses. However, the Commission is aware of problems with administering home occupation/home-based businesses/cottage industry bylaws. It will continue to work with towns to balance the benefits of these uses (bolstering local economies by providing business opportunities) against the burdens they can place on neighboring properties (i.e. large or inappropriate activities).

Several towns also have shoreland districts. The Regional Commission will continue to work with towns to encourage updating of existing districts or adoption in towns that do not have them.

### **Rural and Agricultural Planning Regions**

This region includes areas designated for residential uses on lots greater than two-acres in size. Agriculture constitutes the primary land use in these regions and is generally encouraged to continue in the municipal plans. Agriculture and forestry are exempt from local bylaws (after filing a notice of activity and demonstrating that they constitute a legitimate agricultural use as defined by the Secretary of the Agency of Agriculture Food and Markets) and as such, are permitted throughout the region. This is consistent with Regional Plan policy's supporting continuation of local resource based business and encouraging both land uses. The Regional Plan specifically encourages the use of AMPs, AAPs and BMPs. The region has not identified any type or block of land as regionally significant. However, the Vermont Land Trust has been working steadily to conserve large usable blocks of prime farmland in the region and this plan supports their efforts.

Single-family residences are usually permitted uses on larger lot sizes. In much of Vermont, larger lot designations are used in areas with more severe physical constraints to development in an attempt to discourage development and control density of development. Often the result is a string of development along a road that now requires more maintenance and an inefficient use of resource lands. Towns are gradually learning that the use of PUDs with clusters of housing units works better to meet the above goals than large lot designations. The Regional Commission will continue to work with towns to explain the PUD concept and to encourage its use on appropriate sites.

Some towns include outdoor recreation as either a permitted or conditional use in these land use areas and in Forest or Conservation Land Use areas discussed below. During the re-writing of this portion of this plan, the planning staff and the Utilities, Facilities and Services Committee worked with the State Forests and Parks and Recreation Division and prepared a detailed look at recreation in the region. The Utilities, Facilities and Services section of the

plan addresses recreation and includes appropriate recreational policies and data, which better prepare the Commission to assist towns in planning for recreation.

Several towns also have mineral extraction bylaws. This plan's policies reflect the intent of these bylaws and reinforce the importance of wise use of these resources (sand and gravel), given their uneven distribution in the region and the economic ramifications of a continuing mineral resource in the region.

### **Forestry, Conservation and Floodplain Regions**

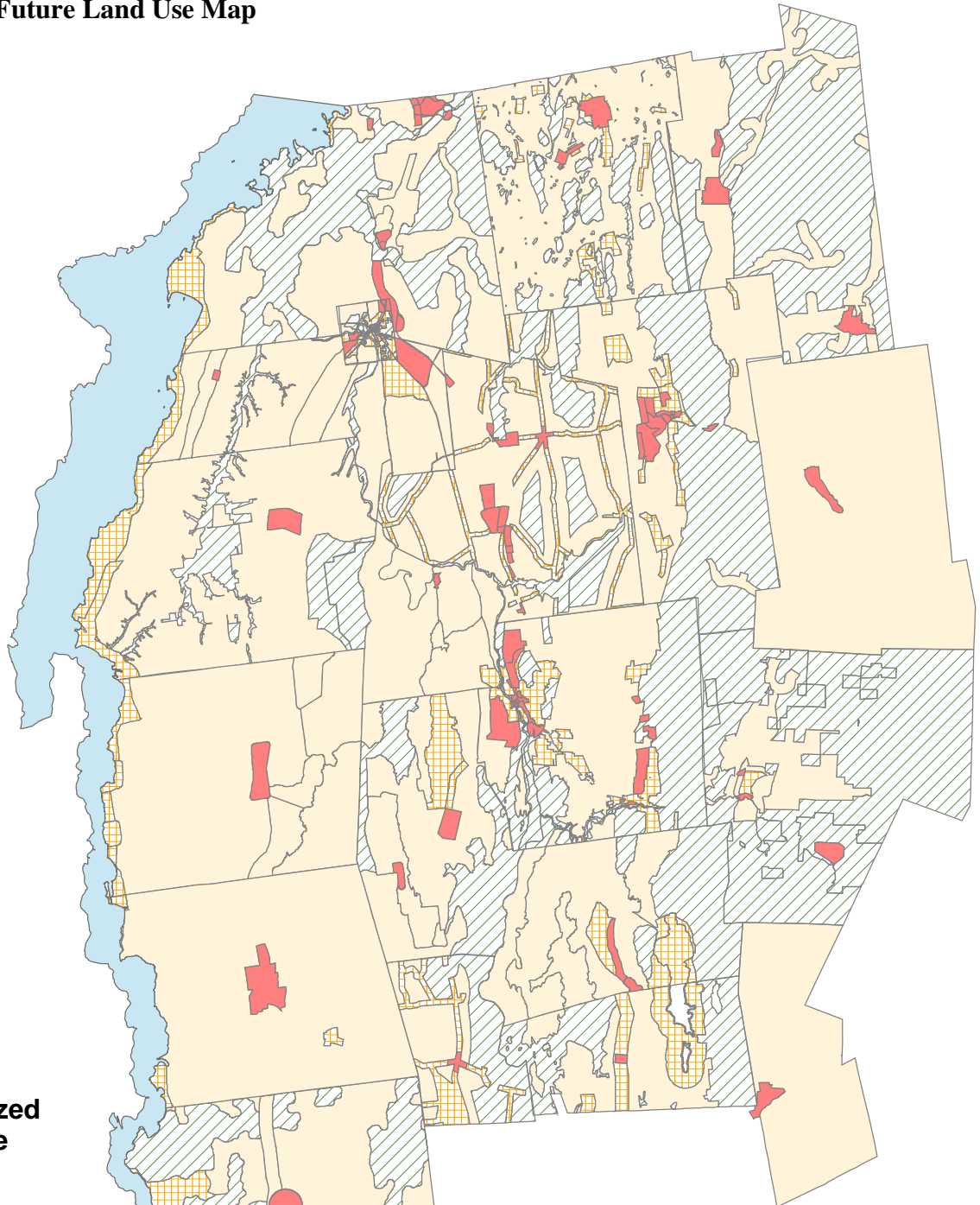
This constitutes the last composite of land uses within most plans in the region. Forestry is recognized, with agriculture, as one of the most important resources in the region. Many municipalities have set up districts to preserve and support it. In addition, maps created based upon work by the Soil Conservation Service located in the agricultural and forestry lands sections of this plan show those lands which are of prime importance under Criterion 9B and those lands rated as secondary agricultural and forest soils under Criteria 9C of Act 250.

Conservation areas are distributed throughout the region. Much of the higher elevation land on the eastern border of the region is designated in 25-acre conservation districts. Land along many rivers and abutting several major wetlands and marshes is also designated conservation. Because of the abundance of the rural landscape, the public and quasi-public opportunities for outdoor recreation and the proximity of the Green Mountains National Forest, most towns generally utilize these regions to promote open space, recreational opportunities and significant natural features.

The only Class I Wetland in the region is a portion of Scanlon Bog located in Leicester. However, as noted above, many towns have planning regions that protect floodplains or other significant wetlands (Class I and II wetlands). The best examples of this are in the vicinity of the Dead Creek, which is identified, in several municipal plans.

Aquifer areas are shown in the water resources section of this plan. Most aquifers are within the town that they serve and so are of local concern. The Regional Commission will provide towns with examples of aquifer protection districts from other regions and encourage their adoption here.

# Map 8-1: Future Land Use Map

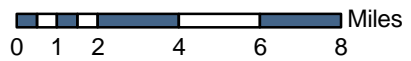


## Generalized Land Use Regions

- Village and Com/Ind  
(includes mixed uses)
- High Density Residential  
(generally lots 2 acres or smaller)
- Rural and Agricultural  
(generally lots larger than 2 acres)
- Forestland and Conservation/Floodplain  
(generally lots larger than 25 acres)

**NOTES:**

1. Regions are generalized from town plans. Please refer to town plans for actual planning regions.
2. Not all regions are depicted at this scale.
3. National Forest and State Forest boundaries are not delineated.



ACRPC Plan Adopted 5/08

**Map 8-2: Regionally Significant Resources**

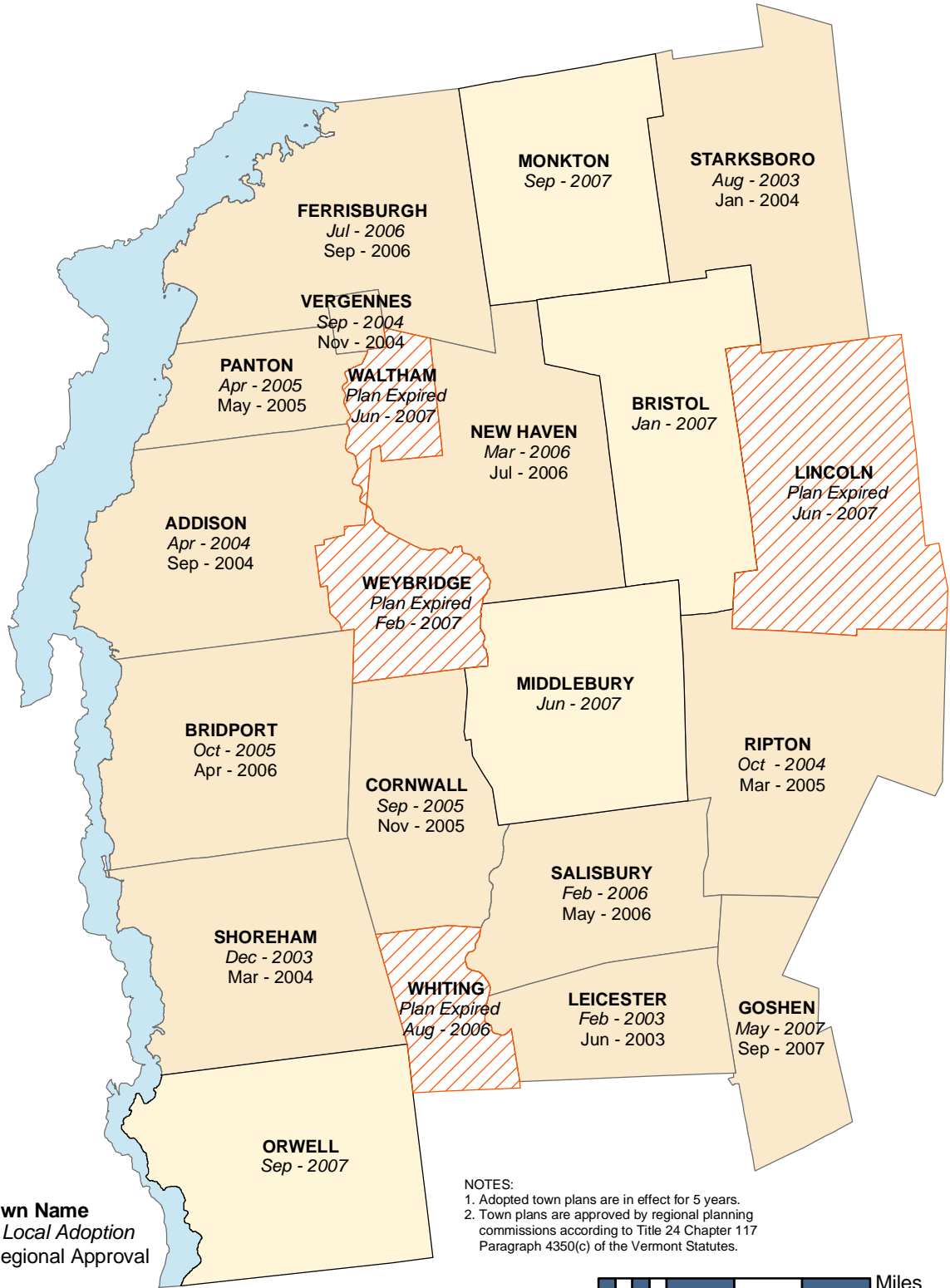


SOURCES:  
 Vermont Center for Geographic Information 1990-92  
 USGS 7.5 min topographic maps of Addison County  
 USDA National Forest Service, 1991  
 Vermont Agency of Natural Resources, 1993



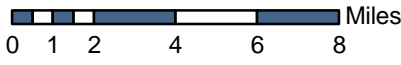
(May 14, 2008) **ACRPC**  
 Future Land Use

# Map 8-3: Regionally Approved Municipal Plan Map



**Town Name**  
*Date of Local Adoption*  
 Date of Regional Approval

NOTES:  
 1. Adopted town plans are in effect for 5 years.  
 2. Town plans are approved by regional planning commissions according to Title 24 Chapter 117 Paragraph 4350(c) of the Vermont Statutes.



ACRPC Plan Adopted 5/08

**Map 8-4: Growth Centers, Downtowns and Villages  
(Designated and Proposed)**

