CHAPTER TWO 2011 Energy Strategy

INTRODUCTION

Northeastern Vermont Development Association (NVDA) has prepared this plan as a supplement to the *Regional Plan for the Northeast Kingdom 2005.* The *2011 Energy Plan* outlines a five-year regional energy strategy for Northeastern Vermont, specifically the counties of Orleans, Essex, and Caledonia. This plan was developed to address the changing market of the energy industry and its potential affects on our region. As the regional planning commission, NVDA is responsible for guiding the region's energy development in a way that complements our economy, land use, environment, resources, and lifestyle.

Background

Traditionally, NVDA approached energy planning from a strictly "supply-and-demand" perspective. Therefore, NVDA has generally supported the traditional systems that have continued to meet our regional energy needs. Today however, NVDA is faced with the challenge of addressing a much broader perspective that transcends current energy production and usage. At this time there are several factors that are creating a contentious climate for the future planning of our energy systems. Because of this, NVDA has expanded both its approach to energy planning and its role in regional energy policy.

This new role has stemmed from the public response to our proposed *Regional Plan for the Northeast Kingdom 2005.* In the fall of 2005, NVDA held two public hearings on the proposed plan, which outlines goals and strategies on regional land use, energy, utilities, facilities, historic resources, cultural elements, scenic resources, housing, economic development, natural resources, and transportation. At the hearings, public comment continually criticized the energy section of the plan, specifically the position on commercial-scale wind energy generation. The energy section included the following statements:

> *"Wind Towers should be seen as beneficial to the region."*
>
> *"As a statement of policy, NVDA supports the construction of wind towers. We believe this is too important a power source to be excluded from our overall energy mix. At the same time, the Board does not believe wind towers should be imposed on communities that don't want them within their borders. Therefore, town plans that exclude the construction of wind towers will still be in compliance with the Regional Plan."*

In both hearings, NVDA received support for the proposed position from a few individuals, but the vast majority was adamantly opposed. There are currently two commercial wind generation projects proposed in our region, creating a very divided and emotional situation in our communities. Arguments center on economic, environmental, and social reasons to either support or oppose the facilities. Many disclosed concern over local decision-making for this type of development, citing both unfair representation in their own communities and the potential impact to neighboring municipalities. Attendees also stated that the proposed energy section did not comprehensively evaluate alternative energy sources, nor address the scale of proposed commercial generation projects, siting requirements, their affect on regional image, and potential negative impacts. In both the hearings and submitted written statements, all parties agreed that NVDA holds an important role: to address this type of energy development as a regional issue.

NVDA Energy Committee

To take on this role, the NVDA Board appointed an Energy Committee and assigned the task of revising the energy element of the regional plan. The following Board members were appointed to this committee:

Jim Greenwood, Chair	Rep. John Morley
Rep. Bill Johnson	Ken Davis
Marty Feltus	Chuck Kezar

NVDA committee staff included Executive Director, Steve Patterson, and Regional Planner, Laurie Zilbauer.

Strategy Outline

The Energy Strategy aims to guide the region's energy development for the next five years. In order to accomplish this task, the Energy Committee has analyzed the current conditions of the region, calculated future growth, and evaluated the potential for resources to meet future needs. From the findings, the Energy Committee has developed regional portfolio recommendations, and overall energy goals and strategies. The basic components of the Energy Strategy are organized into four main sections:

REGIONAL OVERVIEW

This section provides an evaluation of local consumption, energy sectors, electricity infrastructure and demand, and anticipated future growth in energy usage.

RESOURCE ANALYSIS

In this section resources are analyzed for their current and future potential as part of the overall energy portfolio. Both traditional sources are addressed, including fossil fuels, hydro-power, and nuclear power, as well as the advancing renewable sources, such as solar, methane, wind, and biomass. Efficiency/conservation is also addressed as an important piece to meeting future needs.

NORTHEAST KINGDOM PORTFOLIO*

This section provides recommendations for each resource addressed within the Resource Analysis. It also addresses other important non-resource aspects of the portfolio, such as net-metering, and efficiency/conservation.

REGIONAL GOALS & STRATEGIES*

This section presents the main goals for the next five years of energy planning and identifies clear strategies to meet those goals.

* Both the Northeast Kingdom Portfolio and the Regional Goals & Strategies include the guiding language for future energy development in the region.

Current Status of the Region

The Northeast Kingdom's energy trends have mimicked those of the state, and while the state has been subjected to the same energy issues occurring nationally, Vermont still remains a national role model for energy. Throughout the U.S., energy prices are rising due to the stress on traditional resources and increasing consumption levels. To address rising energy costs, Vermonters are turning more and more towards supplemental fuels, small renewables, co-generation facilities, and efficiency/conservation efforts. Vermont currently ranks 50th out of the entire U.S. in per capita consumption of both electricity and petroleum products (U.S. Energy Information Administration).

In the past few years, the Northeast Kingdom has hosted electricity projects that have decreased transmission losses and improved reliability. The region also houses two major renewable generation facilities, the Ryegate Wood-Chip Plant and the Coventry Landfill methane-generator, which together produce 75% of the region's total electricity generation. The Vermont State Legislature has made several advances with energy legislation as well, including policies pertaining to distributive generation (net-metering), renewable energy (portfolio goals and incentives), the creation of an efficiency utility, and alternative fuels/vehicles.

While Vermont continues to make advances in energy policy and infrastructure, there are still many elements of the current energy system that negatively affect our region. The following overview proceeds to review all of the aspects of our energy system and pinpoint major elements that impact our region.

CONSUMPTION

Energy consumption has grown rather steadily since the 1950s. Historically, leaps in consumption are associated with major economic growth, low energy prices, population growth, and an overall increase in the number of vehicle miles driven. Vermont has traditionally ranked one of the lowest per capita energy consumption states in the nation. Table 2.1 represents the amount of energy consumed in the state in 2001. Regional figures for energy consumption are unavailable, but the Northeast Kingdom's consumption by source is similar to the state's breakdown. Petroleum products are by far the leading source of fuel in the state, most of which is used in the transportation sector and residential sector (Table 2.2).

Table 2.1 Vermont Energy Consumption by Source 2001

Source	Trillion BTUs
Coal	0.1
Natural Gas	8
Petroleum Products	88.9
Wood and Wood Waste	8.7
Other*	9.2
Nuclear Electric Power	43.6
Hydro Electric Power	9
Net Interstate Flow of Electricity/Loses	-3.8
Total	163.6

*geothermal, wind, photovoltaic, solar thermal energy, and net imports of electricity.

(Source: Energy Information Association)

Table 2.2 Vermont Petroleum Product Consumption 2001

	Trillion BTUs
Motor gasoline	41.8
Heating oil and diesel fuel	31.3
Liquid petroleum gas	8.8
Kerosene	2.3
Other	4.8

Since 1993, energy sector consumption has been changing in the state. As seen in Table 2.3, Transportation energy usage has remained relatively steady. This is most likely a result of an increase in fuel efficiency and conservation efforts. During this same time frame, residential sector consumption increased 38.2%. This residential growth is considered to be normal - resulting from general population growth, an increase in the average house size, and additional modern conveniences. By far the largest growth occurred in the commercial and industrial sectors, which have more than doubled their energy consumption levels between 1993 and 2001. Most of this growth can be attributed towards the advancement of computer technology and its widespread use in the workforce.

Table 2.3 Statewide Energy Use by Sector (Trillion BTUs)

	1993	2001	% change
Transportation	50.7	51.9	2.4%
Residential	34.6	47.8	38.2%
Commercial	15.2	32.7	115.1%
Industrial	14.2	31.2	119.7%
Total	114.7	163.6	42.6%

(Source: Energy Information Administration)

Energy Usage by Sector

TRANSPORTATION

According to the U.S. Energy Information Administration, approximately 32% of all energy used in the state is for transportation, almost entirely for cars and trucks. While the benefits of automobiles are obvious, they account for about 60% of all fossil fuels used in Vermont, 47% of the greenhouse gases released in the state and are the largest sources of several other pollutants. Since 1993, Vermont has seen very little energy growth related to transportation use.

While transportation isn't growing as quickly as other energy sectors, the dramatic increase in crude oil prices over the past few years has resulted in increased household transportation costs. According to the Vermont Fuel Price Report, the average retail cost of gasoline was $1.51 in January of 2001. In only 5 years the costs per gallon has risen 37% to $2.34 (Table 2.4). On average Americans spend 13 cents out of every dollar on transportation. Transportation costs now rank second only to housing costs for families throughout the country with food costs narrowing out a close third.

Table 2.4 Average Retail Petroleum Prices (per gallon)

	Jan-01	Jan-06	% change*
No. 2 Fuel Oil	$1.50	$2.45	44%
Kerosene	$1.71	$2.81	45%
Propane	$1.69	$2.30	20%
Unleaded Gasoline	$1.51	$2.34	37%

*Adjusted for Inflation (Vt. Department of Public Service)

In order to reduce the transportation portion of energy usage, regional and statewide development should concentrate on the following land use principles:

1. Encourage the location of new development in traditional village and city centers to reduce both sprawl and the number of vehicle miles driven.
2. Support transit oriented development that fosters the expansion of public transportation.
3. Encourage the construction of Park and Ride facilities to support carpooling efforts.
4. Encourage the expansion of bicycle and pedestrian facilities such as sidewalks and bike lanes.

(Note: For a complete list of Transportation Goals please see the *Regional Transportation Plan for the Northeast Kingdom*, which is included as Volume III of the Regional Plan.)

RESIDENTIAL

Residential uses account for 29.2% of the energy used in Vermont. Most of this energy is for residential heating. According to the 2000 Census, heating oil is the most common fuel source in the Northeast Kingdom, accounting for 68.5% of total home usage. Sixteen percent of homes are heated by wood, 11.8% heated with propane gas, and 2.5% heated with electricity. All other fuels accounted for less than 1% each. Table 2.5 below compares the cost of different heating fuels in the region and their percent change in the last five years.

Table 2.5 Comparing the Cost of Heating Fuels, January 2001& January 2006

Type of Energy	January 2001				January 2006				% Change*
	BTU/Unit	Adj. Effic	$/Unit	$/MMBtu	BTU/Unit	Adj. Effic	$/Unit	$/MMBtu	
Fuel Oil (gallon)	138,200	80%	$1.49	$13.54	138,200	80%	$2.45	$22.14	44%
Kerosene (gallon)	136,600	80%	$1.70	$15.60	136,600	80%	$2.81	$25.73	46%
Propane (gallon)	91,600	80%	$1.69	$23.10	91,600	80%	$2.30	$31.41	20%
Natural Gas (therm)	100,000	80%	$0.86	$10.85	100,000	80%	$1.36	$17.00	38%
Electricity (kWh)	3,412	100%	$0.14	$41.39	3,412	100%	$0.13	$37.51	-20%
Wood (cord - green)	22,000,000	60%	$125.00	$9.47	22,000,000	60%	$170.00	$12.88	20%
Coal (ton)	24,000,000	60%	$182.00	$12.64	24,000,000	60%	$242.50	$16.84	18%
Pellets (ton)	16,000,000	75%	$181.00	$15.08	16,400,000	80%	$210.00	$16.01	-6%

*Adjusted for Inflation (Source: Vermont Fuel Price Report, January 2001 & January 2006, Department of Public Service)

Almost every heating fuel source has seen a dramatic price increase over the past five years. Fuel oil, the number one household heat type in the region, had costs rise by 44% since January of 2001. Electric heat decreased in cost by 20%, but still remains the highest cost heating source in the state. Wood pellets also saw a decrease in cost, due to a steady decrease in resource costs and an efficiency increase in heating technology. Overall, wood heat still remains the cheapest source of home heating, even after a 20% increase. Due to the dramatic cost increases in heating sources all around, wood's popularity as a cheap supplemental heating source is expected to continue to grow (Vermont Residential Fuel Wood Assessment 1997-1998).

Electric usage is the other major energy component in the residential sector. The majority of the electricity consumed in the state is for residential usage (Table 2.6). Since 1990, the percentage of electric usage in the residential sector has been declining while overall usage continued to grow. Some of this is a result of improved efficiency and conservation measures provided to homeowners by the state's energy efficiency utility, Efficiency Vermont. In 2005 alone, Efficiency Vermont assisted in saving roughly 2,840 MW hours through the participation of 3,379 homeowners in the Northeast Kingdom. The importance of Efficiency Vermont towards future energy savings is outlined in the Northeast Kingdom Portfolio.

Table 2.6 Vermont Annual Electric Sales by Sector (MWH)

Year	Residential Sales	Comme rcial Sales	Industrial Sales	All Sectors
1990	1,945,064	1,491,213	1,370,642	4,808,909
1991	1,904,515	1,503,791	1,386,353	4,796,650
1992	1,930,492	1,516,170	1,437,969	4,886,623
1993	1,999,721	1,531,886	1,391,148	4,924,748
1994	2,038,681	1,562,852	1,392,490	4,996,017
1995	1,973,273	1,604,645	1,484,095	5,064,008
1996	2,006,213	1,648,630	1,537,131	5,193,970
1997	1,992,280	1,674,921	1,560,517	5,229,715
1998	1,951,338	1,786,461	1,533,907	5,273,704
1999	1,998,569	1,896,439	1,587,448	5,484,455
2000	2,036,935	1,909,515	1,645,856	5,594,306
2001	2,034,191	1,930,469	1,604,272	5,570,933
2002	2,075,543	1,948,072	1,608,325	5,633,942
2003	2,128,702	1,911,512	1,561,371	5,643,089

(Source: 2005 Vermont Electric Plan)

COMMERCIAL/INDUSTRIAL

Combined, commercial and industrial activity account for the largest percentage of state-wide energy usage (39%). Most of the commercial/industrial energy usage can be attributed to space heating and process heating (Dept. of Public Service).

Electric costs are a major factor in attracting and retaining major commercial/industrial operations in the region. New England retains the highest electric costs in the lower 48 states for both sectors. In December 2005 the state's average electric retail price was 11.49 cents/kWh in the commercial sector and 8.28 cents/kWh in the industrial sector. Nationally, the December '05 average electric retail prices for both the commercial and industrial sectors were 8.74 cents/kWh and 5.75 cents/kWh respectively (U.S. Energy Information Administration, Electric Power Monthly).

To combat high electricity costs a few of the large industrial operations in the region have developed the ability to create their own power. The Dirigo Paper Mill, located in Gillman Vermont has a wood-fired boiler that they use to create steam generation. The facility also has a large dam on the property, served by a reservoir from the Connecticut River. The Dirigo Paper plant uses approximately 5 MWH of electricity throughout the day. Any excess electricity generated is sold to Central Vermont Public Service (CVPS), and CVPS also provides any additional power the plant may need.

The Ethan Allen manufacturing facility in Beecher Falls, Vermont already uses scrap wood to generate heat for their facility and will be adding an electrical generator component by the end of 2006. The facility is currently developing a high-efficiency steam turbine generator, which will be powered through 'waste' steam from other manufacturing processes. The new steam generator will serve the facility directly and receive a 'host credit' from Vermont Electric Cooperative. Generation costs are expected to be around $.04/ kWh.

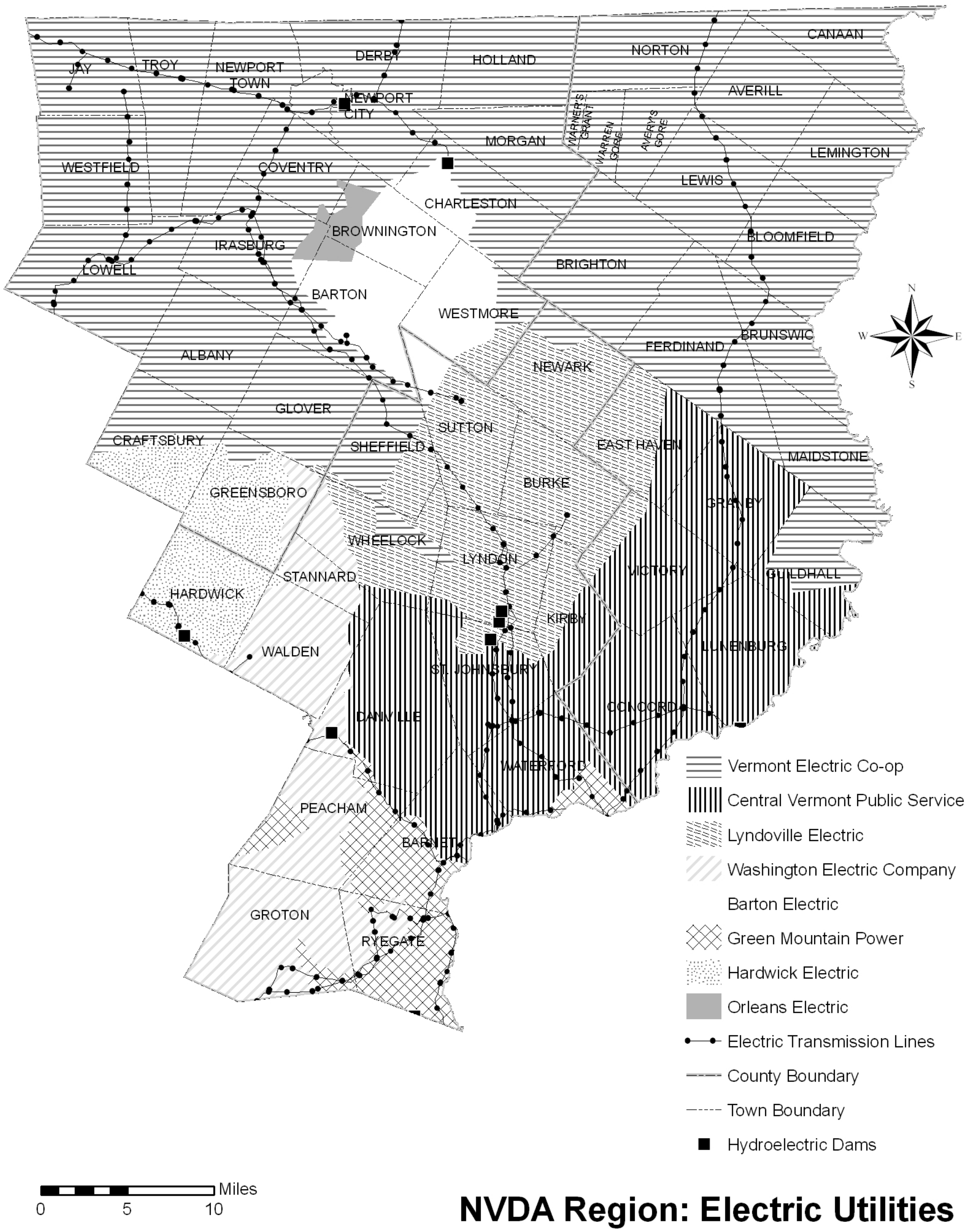
Electricity

Electric systems today are part of large regional networks that extend beyond state boundaries. Vermont belongs to a network that encompasses the six states of New England. These regional networks are responsible for the general organization and operation of the electric businesses and market territory. However, the vast diversity in state-to-state infrastructure can influence the energy climate in surrounding network states. For Vermont this translates into major effects on the affordability, cost, and reliability of electrical systems.

REGIONAL UTILITIES

The Northeast Kingdom is served by eight electric utilities. Map 4 depicts the coverage areas of the region's utilities and the major transmission lines. Vermont Electric Co-Op serves the largest area, covering over 19 towns in Northern Essex and Orleans Counties. Central Vermont Public Service also covers a large area in Caledonia and Southern Essex Counties, with the remainder of the region served by Green Mountain Power, Washington Electric, and four municipal-owned electric companies. The municipal electric utilities include Barton Electric, Orleans Electric, Lyndonville Electric, and Hardwick Electric. All of the smaller publicly owned utilities throughout the state are represented by the Vermont Public Power Supply Authority (VPPSA). VPPSA represents the utilities in the regional buying and selling of power and provides rate studies, central computer services, load forecasting, and tax free financing of certain capital projects.

MAP 4:



NVDA Region: Electric Utilities

REGIONAL GENERATION FACILITIES

The Northeast Kingdom has a very large share of generation resources compared to other regions of the state. Table 2.7 below provides a list of the region's generation sources. In 2004, the region's generation capability was roughly 224,509 MWH. In 2005, the region's generation capability grew tremendously though the addition of the Coventry Landfill methane generator. Altogether, the Northeast Kingdom's current generation capacity is roughly 270,000 MWH.

Table 2.7 Generation Facilities in Caledonia, Essex, and Orleans Counties

Owner/Operator - Facility Name	Facility Type	2004 MWH Produced*	2005 MWH Produced	Location
Great Bay Hydro Corp. (IPP) - Newport Units 1,2,3	Hydro	2,802.00	15,678.22	Newport
Great Bay Hydro Corp. (IPP) - Newport 4-10	Diesel	0	0	Newport
CVPS - Emerson Falls	Hydro	550.00	undisclosed	St. Johnsbury
CVPS - Arnold Falls	Hydro	1,670.00	1,510.70	St. Johnsbury
CVPS - Gage	Hydro	2,704.00	2,968.00	St. Johnsbury
CVPS - Passumpsic	Hydro	2,814.00	2,158.70	Barnet
CVPS - East Barnet	Hydro	8,713.00	9,855.70	Barnet
Barnet (IPP)	Hydro	1,760.00	1,767.38	Barnet
Village of Barton - Diesels	Diesel	14.00	3.83	Barton
Village of Barton	Hydro	3,901.00	3,678.92	Barton
Great Bay Hydro Corp. (IPP) - North Troy	Hydro	0	0	Troy
Norton Hydro	Hydro	0	0	Norton
Lyndonville Electric - Vail & Great Falls	Hydro	1,939.00	4,455.91	Lyndonville
CVPS - Pierce Mills	Hydro	1,467.00	1,411.40	St. Johnsbury
Dirigo Paper	Hydro	0	undisclosed	Lunenburg
GMP – Joe's Pond	Hydro	2,675.00	11,122.50	Danville
Dodge Falls (IPP)	Hydro	23,500.00	23,500.00	Ryegate
Ryegate Power Station (IPP)	Wood Chip	170,000.00	167,627.41	Ryegate
WEC - Coventry Landfill	Methane		25,000.00	Coventry
Total		224,509.00	270,738.67	

*2004 figures are a mixture of actual & projected (Source: VT Dept. of Public Service & IPPs)

There are also three very large generation assets located on the border of the region that deserve to be mentioned. The Comerford Dam, McIndoe Falls Dam, and the Moore Dam are all located on the Connecticut River, which is owned by New Hampshire. Table 2.8 presents their generation figures. According to the Department of Public Service, they are not considered Vermont generation assets, but their mere proximity to the region may pose a future benefit to our area.

Table 2.8 State Line Generation Facilities (Technically located in New Hampshire) MWH

TransCanada - Moore Dam*	Hydro	271,000.00	Waterford, VT & Littleton, NH (state line)
TransCanada - Comerford Dam*	Hydro	315,000.00	Barnet, VT & Monroe, NH (state line)
TransCanada - McIndoe Falls Dam*	Hydro	52,000.00	Barnet, VT & Monroe, NH (state line)
Total		638,000.00	

ELECTRICITY CONSUMPTION

The Northeast Kingdom is an importer of electricity. In 2004, the total electric usage for the region was 379,859,727 kWh (Table 2.9). In this same year the region was only capable of producing 224,509,000 kWh of electricity (Table 2.7). Even with the addition of the Coventry Landfill generation facility in 2005, the region depends on Canada, New Hampshire, and the rest of Vermont to meet its energy needs.

Table 2.9 2004 Annual Electric Usage by County

County	kWh (all sectors)
Caledonia	171,372,083
Essex	38,716,182
Orleans	169,771,462
Total	**379,859,727**

(VT Dept. of Public Service)

CONTRACTS

The state receives majority of its power through two long-term contracts with Entergy (Vt.Yankee) and Hydro Quebec. Entergy's contract allots for roughly 35% of Vermont's total usage. In 2006, Entergy received approval for an uprate of their generation to 120%, but Vermont Utilities will not necessarily receive the additional generation. Entergy's contract is set to continue thru to 2012 and costs Vt. utilities 3.9 to 4.5 cents per kWh. Their current utility license will also expire in 2012. The utility will most likely seek to extend their utility license within the next year; they must apply for an extension by 2007.

The long-term Hydro Quebec contract actually includes several steps with different time frames and kWh rate pricing for each. The contract is set to phase out slowly, with majority of the generation provided expiring between 2012 and 2015. The first step of the contract expires in 2012, the second step expires in 2015, the third step in 2016, and the last step in 2020. The Hydro Quebec contract provides roughly 33% of Vermont's electric needs. The average rate price at this time is 6.7 cents per kWh.

At this time the Public Service Board is optimistic that contracts with both Entergy and Hydro Quebec will be renewed. However, due to the current volatility of energy prices, it is expected that any new contracts will cover much shorter time frames. Contracts covering 20 to 30 years seem to be a thing of the past.

PURCHASE & DISTRIBUTION

The state of Vermont belongs to the ISO-New England Regional Transmission Organization (RTO). The ISO-New England RTO operates all of New England's bulk electric power system and works in coordination with the New England Power Pool (NEPOOL). NEPOOL is Vermont's regional representative of the electric power businesses, including utilities, independent power producers (IPP), suppliers, end-users, and transmission providers. In 1997, the RTO was developed as a means to create competitive wholesale electricity markets. Their responsibilities include developing, overseeing and operating the New England wholesale electric market, as well as managing and planning for regional electric needs.

At this time the RTO wholesale electric market operates on a per-hour bid system that incorporates some short-term and long-term contracts. The bid system requires generation units to bid into the system based on what it costs them to produce for that hour. The hourly price is then set based on the most expensive facility needed to meet demand. As demand increases, the higher-priced facilities are pulled online to meet the increasing load. New England is heavily dependent on natural gas generation facilities, a rather expensive generation resource that has set the hourly price 85% of the time. Due to the price volatility of natural gas, New England households - which consume only two-thirds of the average U.S. household - retain the highest electric costs in the country (Table 2.10). As part of the RTO, Vermont is subject to these higher electric costs, even though there is only one natural gas generation facility in the state.

Table 2.10 December 2005 Average Electric Retail Price (all sectors)

State	Cents/kWh
New Hampshire	13.86
Rhode Island	13.76
Massachusetts	13.29
Connecticut	12.11
Vermont	11.24
Maine	9.96
National Average	7.38

(Source: Energy Information Admin.)

TRANSMISSION

A majority of Vermont's electric transmission system is operated by the Vermont Electric Power Company (VELCO). VELCO is responsible for bulk transmission lines with a voltage rating of 115kV and above. Lines with a rating of 34.5kV, 44kV, and 69kV are considered sub-transmission lines. The Northeast Kingdom has roughly 325 miles of transmission and sub-transmission lines (Map 4) and serves as an important gateway for electricity coming from both Canada and New Hampshire.

At this time, Vermont is considered a constrained zone due to transmission grid congestion. Constrained states have a limited transmission network and transport electricity over long distances, creating congestion on the lines and restricting the ability to receive additional electricity from outside the state during increasing demand. The majority of the constraint has been caused by the considerable growth in the Northwest region of the state. The increasing demand has congested the Northeast Kingdom's transmission network – limiting the capacity to receive additional electricity from out of state when needed. Constraint issues usually result in increased electricity costs. Because of transmission line congestion in-state facilities must be brought online (started up) in order to meet the new demand, even though less expensive generation facilities might be available out of state.

VELCO's recently completed Northern Loop Project has alleviated the congestion of the Northern transmission grid. In our region, the project installed new lines between Irasburg and Newport; upgraded the St. Johnsbury substation; upgraded the Irasburg substation; and reconfigured the Hydro Quebec interconnection at Highgate – resulting in a significant amount of new transmission capacity on existing lines. The Northern Loop Project increased the reliability throughout Northern Vermont and should provide the transmission capacity needed to meet the Northeast Kingdom's electrical growth for the next several years.

NET-METERING

In 1998 the Vermont State legislature passed a bill allowing the practice of net-metering. Net-metering requires electric utilities to permit customers to reduce their electric bills by generating their own power using small-scale renewable energy systems. The excess power generated by net-metered systems can be fed back to the utilities, actually running their electric meters backwards. Approved net-metering systems include photovoltaic, wind, fuel cell, and biogassification facilities of 15kW or less. Larger scale farm methane systems, which can generate up to 150 kW, and multiple-farmer grouped systems are also allowed.

According to the *2005 Vermont Electric Plan*, there are currently 155 permitted systems, majority of which are residential. Net-metered renewable systems are a win-win for Vermont. Besides producing green power and providing monthly electric bill credits, the systems reduce the capacity pressure on local transmission systems during peak demand times. However, the net-metering capacity of each electric company is limited to only 1% of their 1996 annual peak demand.

Other Energy Facilities

The electricity system is the major energy network in the region. However, it is important to mention the Northeast Kingdom's other major energy resources. The Portland Pipeline is a major crude oil pipeline that stretches from Portland into Canada. In our region the pipeline runs from Guildhall northwest to Jay before crossing into Canada. While Vermont doesn't tap into the pipeline, its existence in our region as major transporter of oil is important for potential future use.

The Portland Natural Gas Transmission system also runs through the region, even though the Kingdom is not serviced by it. The transmission line also runs from Portland into Canada and is owned by TransCanada, a major Canadian energy supplier. The line just barely passes through the state in Canaan before reaching Canada. A spur has recently been created from this line, but only serves the Ethan Allen Manufacturing Plant in Beecher Falls. Future potential to expand this transmission system into the region remains possible.

Anticipated Future Growth

According to the *2005 Vermont Electric Plan*, energy consumption will increase in coordination with economic growth and population growth. Unfortunately, county population projection figures exist only up to 2004, but the region's growth is expected to be consistent with the overall state growth in population. According to the U.S. Census Bureau's *Interim State Population Projections 2005*, Vermont is expected to grow by roughly 5% by 2010. This equates to roughly 1% a year for the next five years.

Economically, Vermont is expected to grow mildly through 2008 as compared to the rest of New England. According to the *New England Economic Outlook 2003-2008*, Vermont's economic base will grow by 3% per year. Although this figure represents the State's growth, the Northeast Kingdom should plan to incorporate a small percentage of this growth into the region (approximately .2-.5%).

From the economic and population projections, we can expect the future growth in energy demand for the Northeast Kingdom to be between 1.2 – 1.5%/year for the next five years. This is only slightly higher than the compound annual growth rate of 1% (forecast to 2020) predicted for the state by the Department of Public Service. Based on the amount of power already consumed by the region (Table 2.9), the Northeast Kingdom will consume an additional 40,000 MW of power by 2011.

RESOURCE ANALYSIS

Traditional Resources

FOSSIL FUELS

Fossil fuels account for over 60% of Vermont's energy consumption. Transportation and household heating are the two leading uses of fossil fuels. Fossil fuels include: natural gas, propane, heating oil/diesel fuel, gasoline, coal, and kerosene. As mentioned previously, the Northeast Kingdom is not served by natural gas; instead heating oil and propane are major resources. There are also no crude oil processing facilities in the state, the nearest facility is located in Quebec and is served by the Portland Pipeline, which runs through the region. Coal and kerosene are also used, though minimally.

Fossil fuels are not a renewable resource and the consumption of fossil fuels has brought significant pollution and global warming. In the past, the abundance of cheap fossil fuels has influenced the development of our energy systems. Unfortunately, we are at a point where fossil fuels are no longer cheap or abundant. Their current price volatility has dramatically affected the economy and the cost of living. In order to stabilize the country's energy structure, many states are encouraging diversification of energy portfolios through renewable resources. In the last few years, fuel costs have grown to the point where renewable energy is now competitive within the energy market.

HYDRO

Hydro-power is second leading generation resource in the Northeast Kingdom. Fifteen of the 19 generation facilities in the region are hydro. The largest electric producers include Green Mountain Power's facility on Joe's Pond, Lyndonville Electric's Vail & Great Falls facilities, Central Vermont Power Service's East Barnet Dam, and Great Bay Hydro's facilities in Newport (Table 2.7). The three Connecticut River Dams, though not considered part of our regional generation, are some of the three largest hydro facilities in the Northeastern U.S. Together the Moore, Comerford, and McIndoe Falls Dams produce roughly 638,000 MWH of electricity annually (double what the region consumes). Altogether, the Northeast Kingdom can produce roughly 78,000 MWH of hydro-electric power.

Hydro facilities can be a good source of base-load power when regular rainfall is received. For river run facilities, power generation is dependent upon continuous levels of rainfall and must run when the flow is at optimum levels. This can mean producing electricity when it might not be needed. Dams, on the other hand, have the advantage of storing their resource for later use. Unfortunately, low rainfall levels can severely limit the production capacity of dams as well. Overall hydro-power is considered a long-term resource and is relatively secure and stable. Many of the facilities in the region were built in the early 1900's and have needed significant upgrades over the years. Upgrading hydro-facilities can prove to be very costly and consequently raises the production costs for the facility. Generation costs for hydropower vary considerably between facilities.

NUCLEAR

Nuclear power constitutes roughly 35% of Vermont's electric needs. Vermont only has one nuclear facility located in Vernon, Vermont and owned by Entergy. This facility is extremely important to the current operation of Vermont's electricity grid. The Entergy contracts provide roughly 55% of the power generated to Vermont utilities, averaging 4 cents/kWh. As mentioned previously Entergy will be required to renew their utility license in 2012. Nuclear energy is produced using an atomic reaction. The process needed for this type of generation produces a lot of radioactive waste and environment temperature increases. Because of these two outputs, there is a lot of apprehension towards this type of energy production. Facility safety is another major concern for nuclear plants.

The large plants built in the 1960's and 70's generate very large amounts of electricity, but also have a greater range in the event of a disaster. Over the decades, nuclear power has evolved towards smaller more efficient reactors which in turn serve a smaller area. The proto-types for these systems have been around for decades: in both submarine development and for research facilities in remote areas of the globe. New designs allow a plant to be built underground or underwater, reducing the risk in the event of a disaster. The smaller design also allows the facility to be built and decommissioned in a much shorter time frame. Small reactors still retain a life-span similar to the large reactors, but are surprisingly more efficient. There are several U.S. companies and European companies developing these small-scale reactors today. They plan to be ready for mass production by 2010.

Renewable Resources

As fossil fuels and other traditional resources cause stress on our economy and environment, through rising prices and costly infrastructure, we should look towards newly emerging technologies and renewable energy sources to meet our needs. In June 2005, Vermont enacted the Renewable Portfolio Goal. The Renewable Portfolio Goal calls for utilities to meet growth in electricity demand (between 2005 and 2012) by using energy efficiency and new renewable-energy resources. This law encourages each retail electricity provider to supply an amount of new renewable energy equal to its total incremental energy growth between January 1, 2005 and January 1, 2012. However, the amount of renewable energy that each utility is encouraged to supply is capped at 10% of its total 2005 retail electric sales. If this goal is not achieved by 2012, then the policy will become a mandatory Renewable Portfolio Standard in 2013.

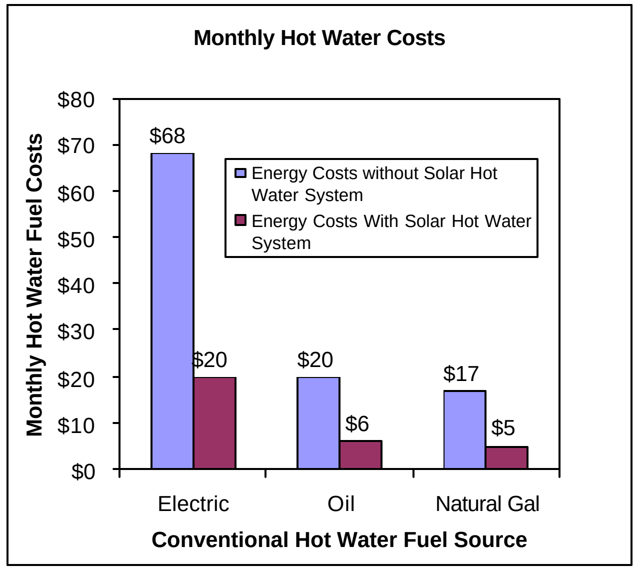
According to the *2005 Vermont Electric Plan*, Vermont's electric capacity is already 13% renewable. Renewable resources generally include solar, wind, methane, hydro, and biomass generation. However, due to the large quantity of hydro-power already utilized by the state, the Renewable Portfolio Goal restricted hydro-power from being considered part of a utility's Renewable Portfolio Goal. Only newly developed renewable resources are allowed to meet this need.

SOLAR

While Vermont may not receive enough solar radiation to provide for the complete electrical or heating needs of individual buildings, solar energy can be harnessed effectively as a supplementary resource. As a small scale renewable, solar energy can provide hot water, space heating, lighting, and electricity.

Solar space heating can be maximized through Green Building Design. This includes orienting buildings close to true south, as well as using appropriate windows on the south wall, installing thermal mass (brick, concrete, or water) to store the sun's energy, and using appropriate levels of insulation. Through these designs, as much as 60% of a building's space heat can be derived from the sun. This type of heating is termed "passive solar" because no moving parts are needed, the collection and storage system is built into the structure. Active solar systems require collector panels, pumps, and fans. Green Building Design principles also attempt to maximize the amount of natural light a building receives, in order to reduce the energy costs associated with daytime lighting.

Solar water heating systems typically utilize collectors to capture the sun's energy, a pump to circulate a solution through the collectors to extract heat energy, and a well-insulated storage tank to hold the heated water for use as needed (this can be integrated with an existing water-heating system). An appropriate size solar water-heating system can provide one-half to two-thirds of a household's annual hot water needs – typically almost 100% in summer, but as little as 25% in winter. In Vermont, these types of systems tend to pay themselves off in 5 to 10 years. The chart to the right compares the estimated monthly hot water costs for conventional systems and solar integrated systems.



For many homeowners in our region, solar electricity systems may prove more cost effective than extending power lines into remote areas. A typical system consists of photovoltaic (PV) modules that convert solar energy to electricity, batteries that store the electricity, and an inverter that converts DC power to AC for use in conventional electric appliances. The size and cost of PV panels limit the types of feasible uses. As advancements in PV technology continue, the price for solar electricity is expected to continue to drop sharply. Twenty years ago the average price for solar electricity was $30/kWh, while today the price is 30 cents/kWh. Solar cells are steadily increasing in efficiency as well, by generating approximately 15% of the solar energy received into electricity. In 1950 the average PV cell converted only 4% of solar energy into electricity.

New Federal and State incentives and programs are now available to help finance solar systems. Federal Tax Breaks cover 30% of the cost of the solar system, including installation, for both businesses and households. USDA Rural Development's Renewable Energy & Energy Efficiency Funding Program offers small business owners and farmers both grant funds (25%) and loan funds (25%) to cover of the cost of installing a renewable energy system. Small-scale wind and solar systems are now sales tax-exempt within the state of Vermont and the Vermont Solar and Small Wind Incentive Program provides 25% of the cost of developing a small scale wind or solar system. Through the Vermont incentives, the Department of Public Service expects to save approximately 17,000 gallons of fuel oil a year.

METHANE

Methane, a common gas found in the environment, can be burned to produce electricity. Large amounts of methane are produced through the anaerobic digestion of manure, agricultural wastes, and other organic wastes. Both large farms and landfills offer the best potential to utilize this resource. In agricultural practices, manure is collected in a large concrete tank, where it is heated up, and methane is produced and collected. The remaining manure by-product can be spread on fields as fertilizer, and the dry solids can be used for animal bedding.

In agricultural practices, the procedure also destroys harmful pathogens, reduces water quality impacts, reduces manure odors, and provides a new source of income to local farmers. The Blue Spruce Farm in Bridport, Vermont was the first farm in the state to develop a manure-methane generation system. The farm began producing in January of 2005 and estimates production at 1.7 million kWh annually. The project is supported through the Central Vermont Public Service's (CVPS) Cow Power Program, which grants financial assistance for the development of methane generation systems. Through this program, farmers receive 95 percent of the market price for the electricity produced plus the additional fees (4 cents/kWh) from participating rate payers.

With landfills, facilities are capped and have special extraction systems to remove the methane for generation. If not utilized, methane - which is 20 times more potent as a green house gas than carbon dioxide - escapes into the atmosphere. In late 2005, the Coventry Landfill began producing electricity from the facility. According to the Washington Electric Cooperative, this facility currently provides one-third of the Co-op's power demand, which is rated at approximately 3.5 MW. After future expansions, the Co-op expects the Coventry facility will be able to provide one-half of their current demand.

WIND

Today wind energy is on the forefront of the renewable energy movement. The U.S. Department of Energy has announced a goal of obtaining 5% of U.S. electricity from wind by 2020, a goal consistent with the current rate of growth of wind energy nationwide. According to the Battelle Pacific Northwest Laboratory, Vermont is currently ranked 34th out of the lower 48 states for wind energy potential.

At this time, our region harnesses wind energy only through small-scale individual systems; however, there are two commercial-scale wind energy projects proposed in the region. The Sheffield-Sutton Project, currently under review by the Public Service Board, proposes a 52 MW facility with 26 turbines on four different mountain tops. On East Mountain, four 1.5 MW towers are proposed as the first-phase of a demonstration project. The East Haven Project is also under review by the Public Service Board at this time. Several meteorological towers are already stationed on other ridgelines throughout the region to study the possibility of commercial-scale systems in Lowell, Ferdinand, and Brighton.

The siting of wind turbines has raised concerns about aesthetic impacts, erosion, noise, effects on wildlife, property values, public health, and economic impacts. Because of our region's mountainous terrain, the ideal location for commercial-scale wind turbines is on North-South oriented ridgelines with elevations between 2000 and 3500 feet above sea level. Each tower can range in height from 135 feet to over 400 feet tall, requiring specified FAA lighting for towers over 200 feet. Smaller individual owner-consumption towers are usually below 135 feet high and can generate on lower terrain. Larger ridgeline generation facilities may contain as few as 5 to as many as 40 turbines and are subjected to review and approval by the Public Service Board (30 VSA Section 248). As with the development of any energy generation facility, a Certificate of Public Good must first be issued by the Public Service Board. Prior to issuance, the Board takes into account the environmental, economic, and social impacts of a proposed facility. Municipalities are allowed to participate in the Section 248 review process. However, towns may only regulate the development of individual owner-consumption towers that are not connected to the utility grid.

Wind generation facilities are considered “must-run” facilities, which mean they must operate when the wind is blowing. Unfortunately, wind doesn’t necessarily equal power generation. Wind speeds need to be within an optimum range specific to the tower technology. If any wind speeds or gusts are registered over the optimum range the wind tower is usually shut down for safety purposes. Because of the variations in wind speed, on average a tower operates within 25 – 30% of its generation capacity. At this time, the Northeast Kingdom has 58 MW of commercial-scale wind generation facilities proposed. If the facilities operate within 30% of their capacity, the facilities would generate roughly 152,424 MWH annually.

There are considerable federal incentives that support the market for commercial scale wind generation in Vermont. Without the tax credits and green energy credits, wind would not be an economically viable resource. There are currently five major tax credits supporting the development of renewable energy facilities. The Production Tax Credit (PTC) provides residential and business generators of renewable power a credit of 1.5 cents/kWh. The PTC also provides relief from the Alternative Minimum Tax (AMT) for the first four years of operation. The Modified Accelerated Cost Recovery System is extremely important to wind farms at this time, due to the short life-span of turbines. This system provides specific tax depreciation deductions for solar, wind, and geothermal facilities. Business Investment Tax Credits are another major contributor to the renewable energy market. Investors receive deductions of up to 10% of the cost of investing, purchasing, or constructing renewable energy projects. There are also tax exemptions for grants and subsidies supporting the development of renewable energy.

Valuable Green Energy Credits are also a major supporting factor in the development of wind farms. Green Energy Credits are derived from the Renewable Portfolio Standards (RPS) mandatory in Massachusetts, Connecticut, Rhode Island, Maine, and New York. Although similar to Vermont’s Renewable Portfolio Goal, the standards require utilities to have a certain percentage of renewable power in their mix. Commonly the RPS starts at 1-5% in the first year and increases to as much as 20% in ten years. Most RPS policies involve a credit trading mechanism, so that companies with extra renewable power can sell the extra "green-credits" to suppliers who haven't met their RPS requirement. Because of the unrealistic standards of surrounding states, Vermont now has a considerable market for green energy credits.

BIOMASS

Biomass is organic material that is burned to generate energy. The most common forms of biomass are wood, municipal solid waste (biogas), and biofuels such as ethanol and biodiesel. Wood is already an abundant renewable resource in the region and commonly comes in the form of cordwood, wood chips, and wood pellets. Wood chips are either mill residue or whole tree chips - both are well suited for combustion to supply heat, hot water, or steam in institutional, commercial, and industrial settings. Wood by-products can be burned for energy as well and include sawdust, bark, dry shavings and dry waste wood.

Wood chips/pellets have become popular as a heating resource in the region, through the Vermont Fuels for Schools Program and other industrial/commercial applications. The Vermont Fuels for Schools Program encourages the development of school biomass systems that burn small-diameter waste wood (that must be cut to improve the health of our forests). The program has been successful in installing 25 schools with wood heat systems in the last 15 years, mostly for facilities previously using electric heat. Currently the Lyndon Town School, North Country High School, and the Hazen Union High School utilize wood heating systems. Due to the abundance of wood, wood-related businesses are a large part of the economy and many local businesses already use scrap wood for heating purposes. Co-generation may be a cost-effective energy option for these businesses as well. Co-generation is the simultaneous production of both heat and power through one source. In our region, the North Country Regional Hospital in Newport generates a third of its electricity from a wood-chip co-generation system and the Ethan Allen Plant in Beecher Falls will soon be installing a co-generation system that utilizes process heat to generate electricity. Ethan Allen's system could easily be supplemented with the scrap wood the facility generates.

The region already supports a large scale generation facility that uses wood chips. The Ryegate Wood-Chip Plant is the largest electric generation facility in the region, capable of generating 172,367 MW annually. In 2005 the plant operated at an average capacity of 93.4%. Electricity generation from this plant ranges in price based on the different seasons. For the summer of 2006, the plant is expected to produce electricity at an average of 10.92 cents/kWh. Overall, the ease of handling, abundant local availability, low emissions, and low costs of wood resources allows the region an excellent opportunity to expand this resource.

By diversifying transportation fuels with ethanol or biodiesel, the region would be able to reduce a significant portion of our fossil fuel consumption and stabilize transportation costs. Ethanol based fuels such as E85 are a combination of ethanol and gasoline. Corn is the most common element used to produce ethanol, even though it can be produced from a variety of elements, including wood. Ethanol burns cleaner than gasoline and is very effective in lowering fuel emissions. The fuel also has significant problems in cold-weather, which make it less useful for Vermont's climate. In April 2006, Ethanol fuel prices ranged between $2.34 - $2.56/gallon across the country.

Biodiesel is a better fit as a biofuel in the state of Vermont, as it can easily be supported in the existing infrastructure of the region. Existing diesel engines and heating oil furnaces do not need to be altered in any way to use biodiesel. Both systems can use pure biodiesel, but combination fuels are being developed for maximum output, such as B10 and B20. At this time the New England prices for B10 and B20 are 10 to 20 cents more per gallon than standard heating oil, but this is mostly due to the lack of a local processing facility. Suppliers currently ship biofuel from Florida. Biodiesel is commonly made from soybeans, rapeseed (canola), and sunflowers; all of which can be grown in Vermont. Currently the Vermont Biodiesel Project is working to expand the usage of biofuels for heating and transportation in the state.

Grass pellets are another major up-and-coming resource that may significantly reduce heating costs. Switchgrass is a woody fibrous grass that can essentially be grown by everyone, even homeowners, and creates a pellet product similar to wood. It's a tough, fast-growing crop, and suitable for many climates and soils. A 2001 study by The Agricultural Adaptation Council of Ontario found that grass pellets could heat the average 2,000 Sq. ft. home for $1213 (CAN) annually. Heating costs may even be lowered for farmers or homeowners willing to grow their own and have it pelletized at a regional facility. For a 1,000 Sq. ft. home it would take approximately 5 tons of pellets to heat the home for a year. According to James Wuertele, owner of the Vermont Agrifuels Institute, the estimated cost of yielding 4 tons/acre of grass pellets in Vermont (on rented land with additional production costs added in) is $125/ton.

Efficiency & Conservation

Energy efficiency is a very significant part of any long-term energy strategy, yet it is often overlooked when adopting an energy plan. Energy efficiency and energy conservation are also terms that are often confused and used interchangeably. Conservation involves reducing or eliminating unnecessary energy use and waste. Efficiency involves improving equipment or operating practices so that energy is saved, or less energy is used – not wasting energy or effort. Efficiency can be improved in any number of ways (e.g. insulating an attic, driving a more fuel efficient vehicle, tuning up a piece of machinery so that it runs longer, or replacing older equipment with new technologies that consume less energy). The net result is that less energy is used, while the overall costs needed for energy are reduced.

EFFICIENCY VERMONT

In 1999, the Vermont Public Service Board created an energy efficiency utility for the state, called Efficiency Vermont. The utility is funded by an energy efficiency charge on consumer electric bills, similar to a system benefits charge. Efficiency Vermont offers energy and money-saving programs to consumers that allow them to install and use energy-efficient construction designs, products and equipment. They also offer low-income energy assistance programs.

Over the last five years, Efficiency Vermont has had a tremendous impact on the statewide growth in energy consumption. According to *Efficiency Vermont's 2005 Preliminary Annual Report Summary*, the cumulative savings from their programs have met 5% of Vermont's total electrical energy needs. In 2005 alone, they were responsible for saving 62,081 MWH. In the Northeast Kingdom, their programs accounted for 7,416 MWH of electricity savings, 3,614 MMBTU of fuel savings, and 2,746 CCF of water savings in 2005 (Efficiency Vermont Year 2005 Preliminary Annual Report and Annual Energy Savings Claim). The 7,416 MWH of electricity savings surpasses the 5,318 MWH of electricity consumption growth experienced by the region in 2005.

In 2006, Vermont Energy Investment Corporation signed a new three-year contract with the Public Service Board to provide services through Efficiency Vermont that will raise the annual energy savings goal to 204,000 MWH and provided a $14.5 million dollar budget to do so. The economic benefit goal for the contract term has also increased, aiming for $139 million in total resource (lifetime) benefits to the Vermont economy. This translates to a total resource benefit of $1.30 for every dollar spent by Efficiency Vermont (Highlights of Efficiency Vermont's Plans for 2006). The Northeast Kingdom should expect to receive approximately 12% of the annual energy savings goal for the next three years, equaling 24,480 MWH.

Portfolio Recommendations

As we look at meeting the energy needs for the Northeast Kingdom it is important to remember that there are several distribution companies that supply the region with power and each will need to focus on their individual future needs. All distribution companies are planning for greater diversity in their resources as well as evaluating fuel sources, contract lengths, and contract terms.

The following recommendations express how each resource should fit into the regional energy portfolio for the next five years:

FOSSIL FUELS

Determining the future extent to which fossil fuels can remain a part of the region's energy mix is difficult. For years, experts have been trying to determine the time frame in which world oil production will peak and just how long worldwide supplies will be able to keep up with demand. At this time, world oil production is growing more slowly than demand, causing a major increase in fuel prices. These climbing prices are expected to continue as fewer and fewer new supplies are discovered and world oil reserves continue to decrease. In order to combat rising prices additional production capacity will need to be developed, but this only translates into a short-term fix. For the next five years fossil fuels should play a reduced role in the region's energy mix.

HYDRO

While this energy source is renewable and has only minor impacts to the environment, the ability to create new hydro-power generation is limited. Some of the best hydro resources in the region are already generating. At this point the focus for hydro-power should shift towards maintaining facilities with renewed permits, upgrades to aging infrastructure, improved safety standards. The development of new facilities should be pursued where practical.

NUCLEAR

The Vermont Yankee plant provides a significant portion of the state's electricity that would be difficult to replace in the short-term. Over the next five years, nuclear energy should remain a consistent generation resource to the utilities serving the Northeast Kingdom.

SOLAR

While the solar capacity of the region is low, solar energy can be utilized successfully as a supplemental resource. Solar power can prove beneficial to businesses and homeowners as an electric and heating cost stabilizer. Green Building Design principles are the most cost-effective way to help reduce energy consumption and should be incorporated into any new or renovated building in the region. Over the next five years, solar energy should continue to be expanded with the help of federal and state incentives, and services from Efficiency Vermont.

METHANE

Methane proves to be a significant resource to meet our short-term energy growth and also support agricultural practices in the region. The only large-scale landfill in the region is already being utilized for methane generation, but there are roughly 26 dairy farms with enough capacity to sustain a manure-methane generation facility (2002 Census of Agriculture). Farms with over 200 cows can produce a favorable amount of generation, potentially over 1,000 MWH/year. The development of such systems can be costly however. If state and federal grants, tax credits, and incentives remain in place to combat the high start-up costs, manure-methane generation can be added to the region's energy mix.

WIND

Wind energy needs to be considered as a resource to meet some of our current and future needs. There are significant, legitimate issues surrounding commercial-scale wind generation. Many of these issues will be considered by the Public Service Board in its Section 248 review; however, other significant issues may not be considered under the present Section 248 criteria. Specifically, NVDA requests the Public Service Board, in its review, also consider the following criteria:

1) The consistency of the proposal with not only the region's plan and the host town's plan and zoning bylaws, but also the plans and bylaws of other towns which may be impacted by the proposed project;
2) A weighing of the potential benefits as well as negative impacts on not only the host town but other impacted towns, including a possible outline of tax payment benefits to impacted towns.
3) Applicants must include a comprehensive de-commissioning plan when filing for a Certificate of Public Good.
4) Appearance and operation of facilities should be weighed as an aspect to change the essential character of the area.
5) Proposed turbines should be sited to minimize the visual impacts.

Differing towns may take positions on wind energy facilities which may be at significant variance with each other. Town plans will be deemed compatible with this regional plan and with other town plans so long as the plans demonstrate that wind energy was taken into consideration in the development of the town's energy component.

BIOMASS

Biomass has the most potential to reduce the region's fossil fuel consumption than any other renewable resource. Majority of our fossil fuel consumption is for transportation and home heating uses, only a small portion of fossil fuels are used in electricity generation for the region. Wood chips, wood pellets, biodiesel, and grass pellets hold the greatest potential for Vermont to transition these uses towards renewable energy. The expansion of these resources will also offer the greatest support for our traditional economy (forestry and agricultural) and stabilize regional fuel costs. In the next few years, biomass usage should be promoted and expanded as a significant resource to diversify the region's energy portfolio and meet future energy needs.

NET-METERING

The regional plan supports renewable and local generation of different types, those that are currently available and those that are evolving so as to lower our dependency on fossil fuels and meet environmental goals. While net-metering will not provide a significant portion of our energy demands, it remains an important element in lowering regional consumption levels.

ENERGY EFFICIENCY & CONSERVATION

The Northeast Kingdom can expect energy efficiency improvements to meet a significant portion of the growth in energy demand. Efficiency programs, such as the ones offered by Efficiency Vermont, and conservation efforts should be promoted and utilized as much as possible.

REGIONAL GOALS & STRATEGIES

Policy Statement

This region recognizes its responsibility to provide for production, storage, and distribution to meet its local energy demand. Individuals, businesses, and organizations are encouraged to develop distributed generation that meets accepted environmental standards in order to satisfy their power demand and allow for net metering to the extent allowed in Vermont statute.

New industrial/commercial energy development shall meet the highest standards required by law. Permitting authorities shall first consider current and historical land use and the culture of the region as well as the land owner's rights. Any development shall to the extent possible be done so as to mitigate adverse impacts to the region.

Any project deemed acceptable shall carry with it a plan that distributes benefits to the towns in the region proportional to the adverse effects experienced by that town. Long term maintenance, safety issues and decommissioning procedures required at the end of the energy project's life must also be included in the project plan.

Regional Energy Goals

- Provide an adequate, reliable, and secure energy supply to meet the region's needs.
- Support affordable energy to the region's users.
- Encourage a diversified energy portfolio.
- Maximize the net-metering capacity in the region.
- Promote energy generation that provides the best cost-benefit to the region.
- Minimize environmental impacts of energy generation and usage.
- Encourage conservation and efficiency as an integral part of the energy portfolio.
- Minimize energy safety risks.
- Limit the negative aesthetic impacts of power generation and distribution facilities.
- Provide for broad public participation in the decision-making process.
- Support documented local needs and values for new energy development.
- Ensure energy needs will be met in the event of a natural or man-made disaster.

Strategies

- Support the re-establishment of energy contracts with Hydro Quebec and Yankee Nuclear.
- Investigate the potential for short-term contracts with generation from the Connecticut River Dams to minimize transmission losses due to other sources.
- Promote the upgrade of regional transmission systems to reduce gateway constraints.
- Encourage municipalities to reduce their energy costs through conservation and efficiency programs.
- Encourage ISO-New England to address the grid's dependence on natural gas.
- Support rail infrastructure as a cost-effective transportation resource for the energy industry.

- Sustain and upgrade the infrastructure of existing hydro-generation facilities.
- Promote wood-based energy generation as a complementary resource to the wood-related industries in the region.
- Assist in the development of businesses that support alternative energy use.
- Promote energy efficient building design and construction methods.
- Support the stabilization of energy costs through the use of supplemental sources (wood) and the development of small renewables, such as wind and solar.
- Encourage energy audits and weatherization programs.
- Encourage the development of energy facilities that assist local agriculture and forestry (i.e. grass/wood-pellets, small-wind, solar, farm-methane, wood-chip, biodiesel).
- Assist businesses to develop energy efficient production methods.
- Encourage the PSB to examine the long-term sustainability of proposed facilities.
- Ensure developments subject to Act 250 consider new energy requirements.
- Assist businesses/municipalities to develop cogeneration and other alternative energy strategies.
- Promote the coordination of Vermont Emergency Management and local responders to adequately provide energy resources during the event of a long-term disaster.