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Economic Analysis Associated With The Sheffield Wind Farm Proposed by UPC Vermont Wind

Prepared for
UPC Vermont Wind, LLC
and the Vermont Public Service Board
by Thomas E. Kavet

February 2006

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1) Overview and Summary

The purpose of this analysis is to evaluate the economic impacts and need for the wind turbine development proposed by UPC Vermont Wind, LLC (hereafter, UPC) in the towns of Sheffield and Sutton, in Caledonia County, Vermont. The project consists of the construction and operation of 26 wind turbines with a total nameplate electric generation capacity of 52 megawatts.

The total economic investment associated with this project is expected to exceed $90 million, concentrated in one of the more economically distressed regions of the State. The average net output of the facility is expected to be about 147,600 MWh per year, supplying enough energy to power more than 20,000 Vermont homes. Assuming the necessary permits and approvals are granted, the planned construction of the project is expected to occur in 2007, with full annual operation expected in 2008.

The analysis herein shows the construction and operation of the project will bring significant economic benefits to Caledonia County and the State of Vermont, resulting in the creation of more than 80 jobs in 2007 and 24 permanent new jobs in 2008 and beyond. About one-third of the initial employment gains and two-thirds of the new permanent jobs are expected to be in Caledonia County. This project could generate more than $1 million in State tax revenues during the construction and development phase, with ongoing State revenues totaling more than $12.5 million over the 20 year initial life of the facility. The direct fiscal benefits to the Towns of Sheffield and Sutton are expected to exceed more than $450 per resident per year in Sheffield, where 20 of the 26 turbines are to be located, and just under $100 per resident per year in Sutton, where 6 of the 26 turbines are planned.

This analysis demonstrates a clear need for new electrical generating capacity to meet the economic and population growth of Vermont and New England, and replace expiring energy sources in the near future. This analysis also considers the expressed desire of the Vermont Legislature and Governor, through the enactment of Act 61 during the 2005 legislative session, for the development of clean, renewable energy sources. This project satisfies both of these imperatives, generating significant additional electrical capacity - most of which is expected to be sold within the State – and providing clean, safe, reliable and competitively priced power to Vermont residents.

2) Economic Impacts in Vermont

The proposed UPC development is expected to represent a total investment of at least $90 million in 2007 U.S. dollars, with a development and construction phase in 2007 and full annual operation commencing in 2008. The direct expenditure stream from the operation of the facility is expected to total about $4 million per year, about half of which will be associated with in-State expenditures, including six full-time permanent employees at the facility. The economic impacts associated with the proposed development were evaluated with the use of a detailed regional economic and demographic model.

The core economic model used to perform the regional economic impact analysis herein was developed by Regional Dynamics, Inc. (REDYN)[1]. The REDYN model is a dynamic, multi-regional, nonlinear, endogenous, Input-Output (I/O), computable general equilibrium (CGE) economic and demographic model based on the North American Industrial Classification System (NAICS). The model is based on I/O methodology, with detailed make and use tables and social accounting matrix features for all entities, a comprehensive commodity production transformation function, and impedance-based commodity trade flows developed by Oak Ridge National Laboratories.

The model estimates employment, output, wages, occupations, income, gross product, demand, self-supply, trade flows and demographic impacts associated with user-defined economic events, such as the subject analysis. All model inputs associated with this analysis were developed with general project data from UPC and in consultation with the REDYN model architect, Dr. Thomas Tanner. The model specification included all construction, development, equipment purchases, and estimated operational expenditures. Based on these direct inputs, the REDYN model estimates secondary indirect and induced impacts for the region and state, as well as demographic impacts.

The REDYN model constructed for this analysis consists of three regions: Caledonia County; a Balance of Vermont region combining the remaining 13 Vermont counties; and a Balance of U.S. region encompassing the remainder of the country.

More than three-quarters of the $90+ million total investment will be for specialized wind turbines and associated turbine systems that are not manufactured in Vermont, and thus will result in minimal in-state economic impacts. The only direct in-state manufacturing demand is derived from the purchase of specialized meteorological instruments made by NRG Systems in Hinesburg. The primary economic impacts in Vermont will be associated with the development, construction and operation of the proposed generation facility. Approximately 53% of the roughly $22 million in construction and development expenditures and about 55% of the ongoing $4 million per year in operational expenditures are expected to result in direct Vermont impacts.

During the construction and development phase, this project will generate total employment gains in the State of approximately 83 jobs, with about a third of these in

[1] See www.regionaldynamics.com for additional methodological and background information on the REDYN model

Caledonia County. In 2008 and beyond, operation and maintenance of the wind turbines will generate a total employment impact in the State of about 24 jobs, with about two-thirds of these expected to be in Caledonia County.

In addition to these jobs, the project will generate gains in total State economic output of about $25 million during construction and development, with ongoing annual disposable income gains of more than $2.5 million per year. State General and Transportation Fund fiscal impacts are expected to exceed $1 million during the construction and development phase and total more than $12.5 million over the 20 year life of the project. Direct State and local property tax payments are expected to total more than $750,000 per year, with additional local land lease payments of about $300,000 per year. Via both property taxes and proposed revenue sharing receipts, the Town of Sheffield is expected to receive more than $450 per resident per year, based on estimated 2004 Town population. The Town of Sutton is expected to receive about $94 per Town resident per year through the same combination of revenues. Because the project is expected to generate very little in the way of new demand for state or local services, most of the property tax payments from this project are expected to result in reductions in local property taxes and concomitant increases in personal income among existing Sheffield and Sutton Town residents. It is assumed that most of the State property tax revenues associated with this project will have similar, though more widely dispersed net economic effects.

The net economic impacts associated with this project represent significant economic benefits to the State and region. Given that Caledonia County and surrounding Northeast Kingdom counties persistently suffer from among the highest unemployment rates and lowest economic growth rates in the State, the economic benefits detailed herein have enhanced fiscal, economic and social value.

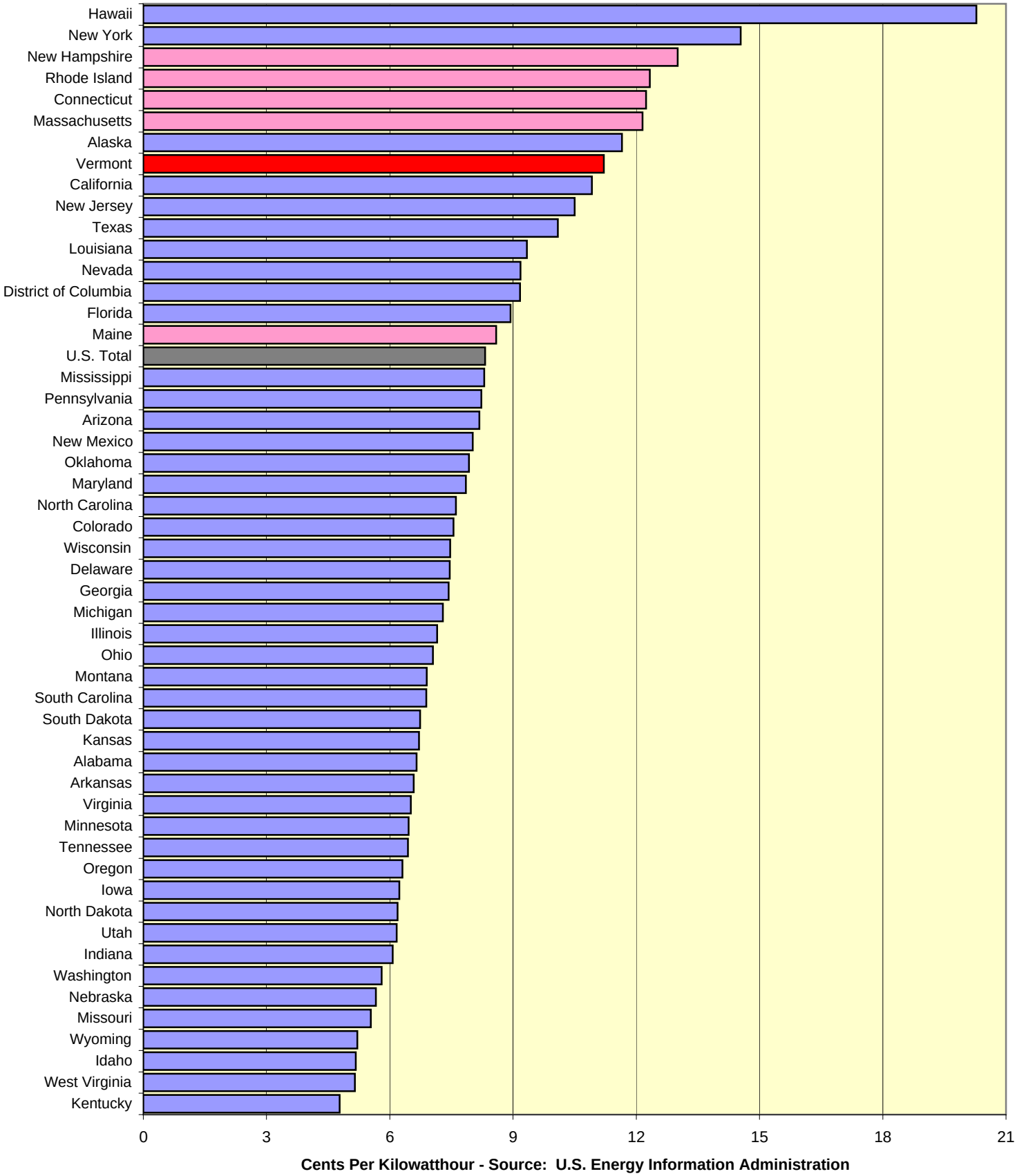
3) Analysis of Need for the Project

Energy Needs, Prices, Negative Externalities and Fuel Source Diversity

Reliable, clean, safe, competitively-priced electric power is essential to the Vermont economy and economic growth in the State and region. The regional power sources Vermont is now reliant upon are among the most expensive in the U.S. (see Figure 3.1, next page, and Figure 3.2, on page 5), are prone to disruption and price escalation, and generate huge volumes of dangerous emissions and waste, some of which remain hazardous for tens of thousands of years and some of which threaten to alter the global climate with serious potential consequences.

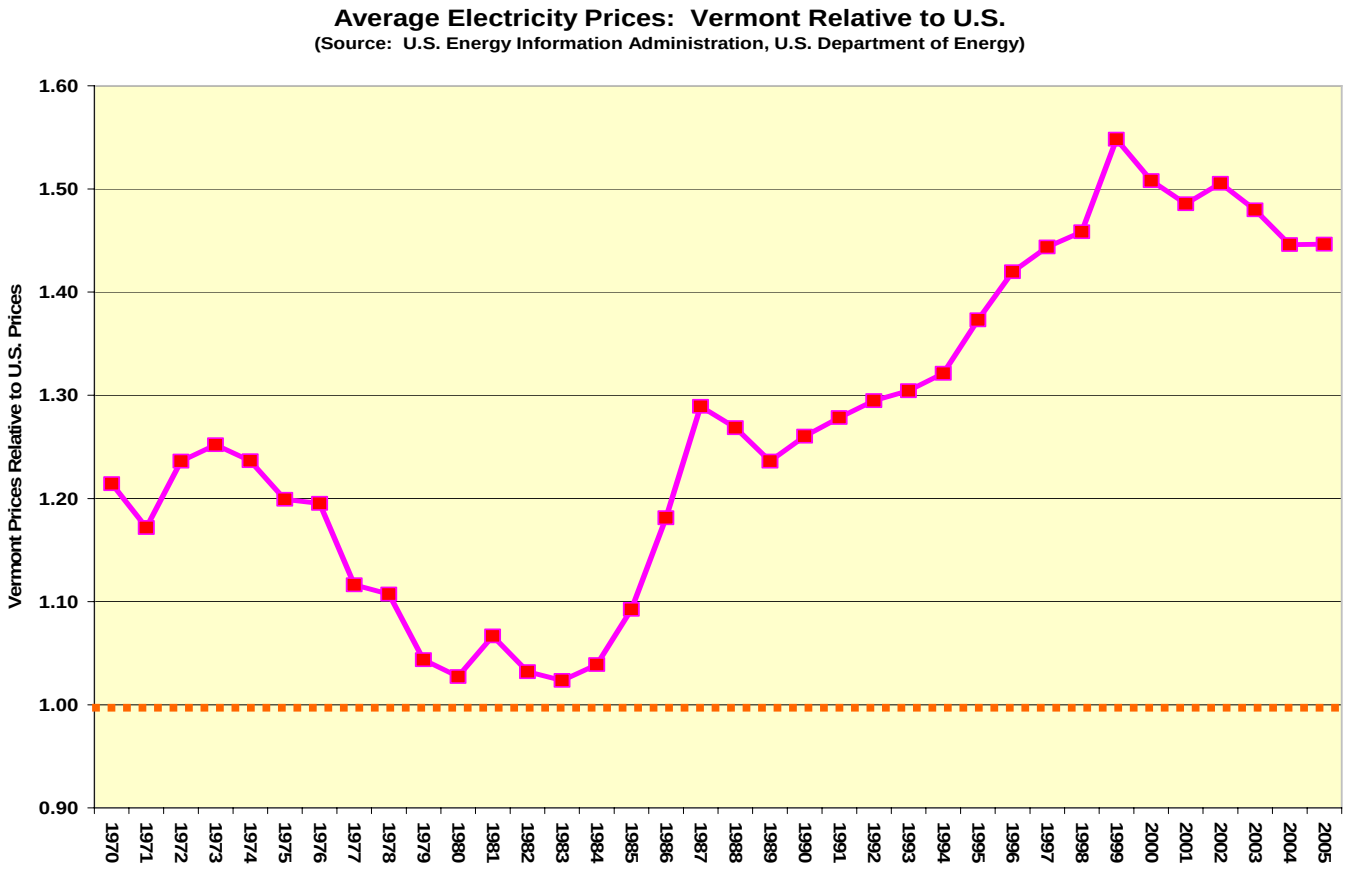
Since 1990, the New England region has become increasingly reliant upon fossil fuel generating capacity, especially natural gas. This has resulted in substantial emissions of greenhouse and other gasses, which included the discharge into the environment of 59,210,542 tons of carbon dioxide, 170,641 tons of sulfur dioxide and 66,905 tons of

Figure 3.1 - Average State Retail Electricity Prices, October 2005



Cents Per Kilowatthour - Source: U.S. Energy Information Administration

Figure 3.2



nitrogen oxides in 2004 alone.[2] Emissions of CO_2, have been linked to global warming, while SO_2 and NO_X emissions cause acid rain, nutrient saturation in costal waters and river basins, crop damage, forest decline and loss of biodiversity.[3]

The changing regional mix of electric energy generation is illustrated in the pie charts, Figures 3.3 and 3.4, on page 6. While Vermont's overall production and reliance on fossil fuel use is lower than most of the New England states (see Figure 3.5 on page 7, and Figure 3.10 on page 12), both the regional nature of the power grid and the fact that air pollution does not respect political boundaries renders this is an issue of regional importance.

The region's increased reliance on natural gas has also created transmission supply vulnerabilities that were illustrated during the pipeline disruptions associated with recent

[2] These emissions are for the six New England states within the New England regional power pool, based on 2004 data from the U.S. Department of Energy, Tables EIA-767 and EIA 906, *1989-2004 Estimated Emissions by State and Fuel Type,* at http://www.eia.doe.gov/cneaf/electricity/epa/epat5p1.html

[3] See: Vermont Agency of Natural Resources, *Wind Energy and Air Emissions Fact Sheet*, available at www.vermontwindpolicy.org/factsheets/Air%20Emissions1.pdf

Figure 3.3

Electric Power Generation by Source in New England 1990
Source: U.S. Energy Information Administration, U.S. Department of Energy

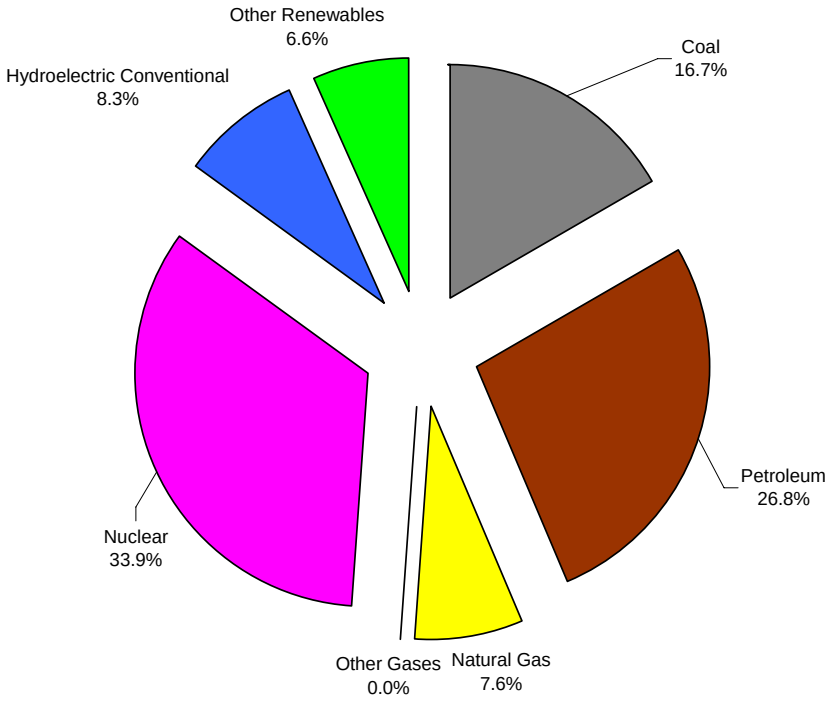


Figure 3.4

Electric Power Generation by Source in New England 2004
Source: U.S. Energy Information Administration, U.S. Department of Energy

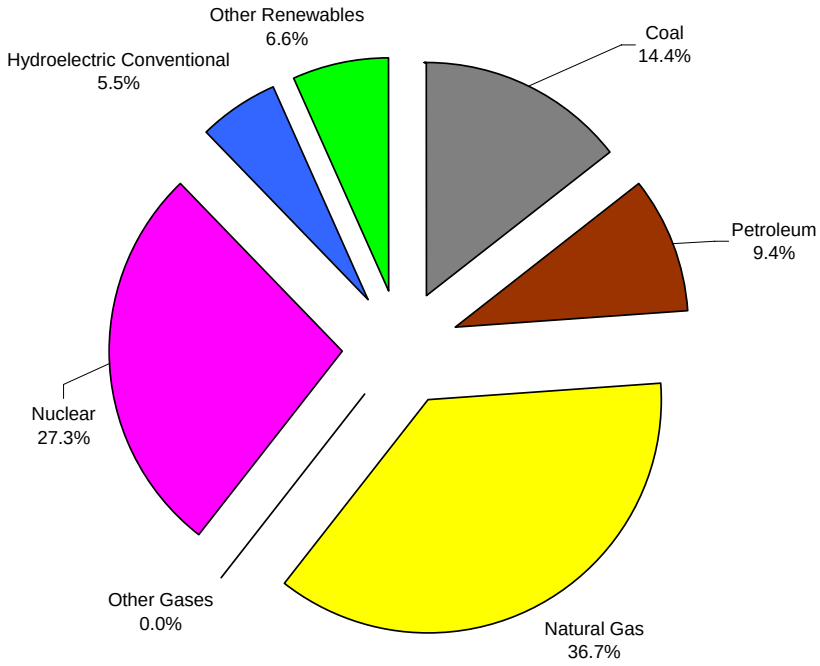


Figure 3.5

Electric Power Generation by Source in Vermont 2004
Source: U.S. Energy Information Administration, U.S. Department of Energy

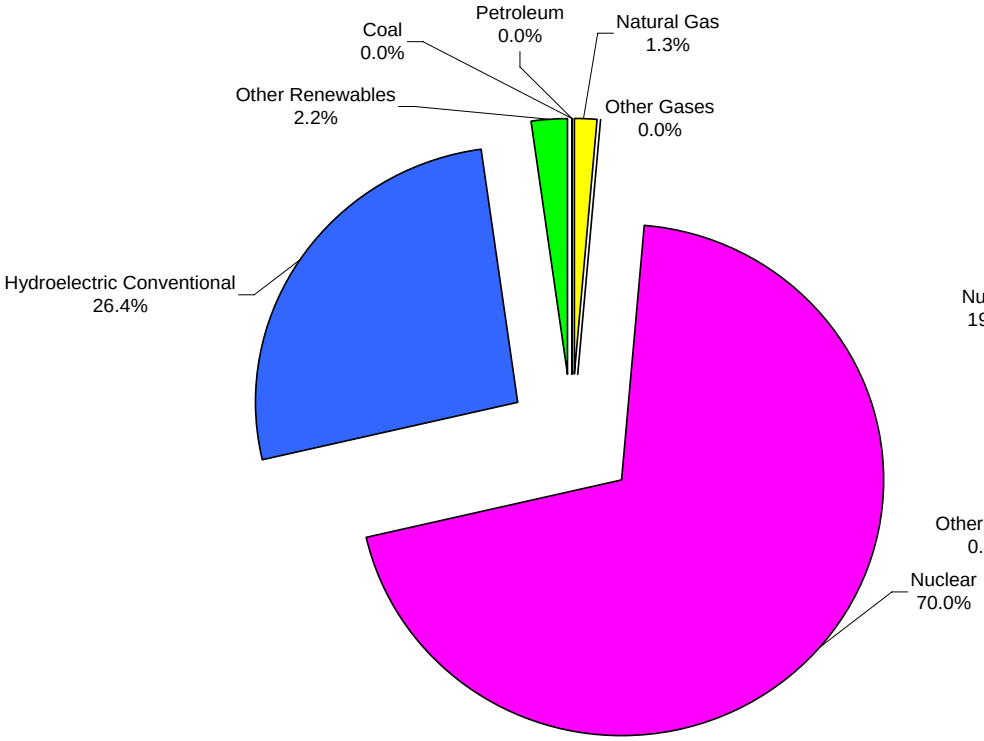
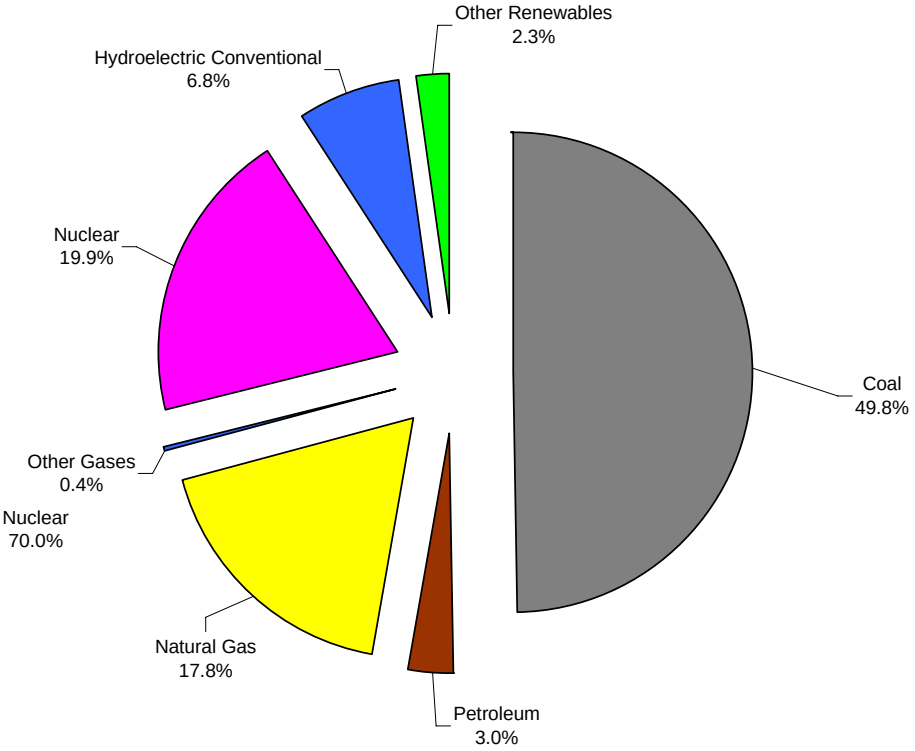


Figure 3.6

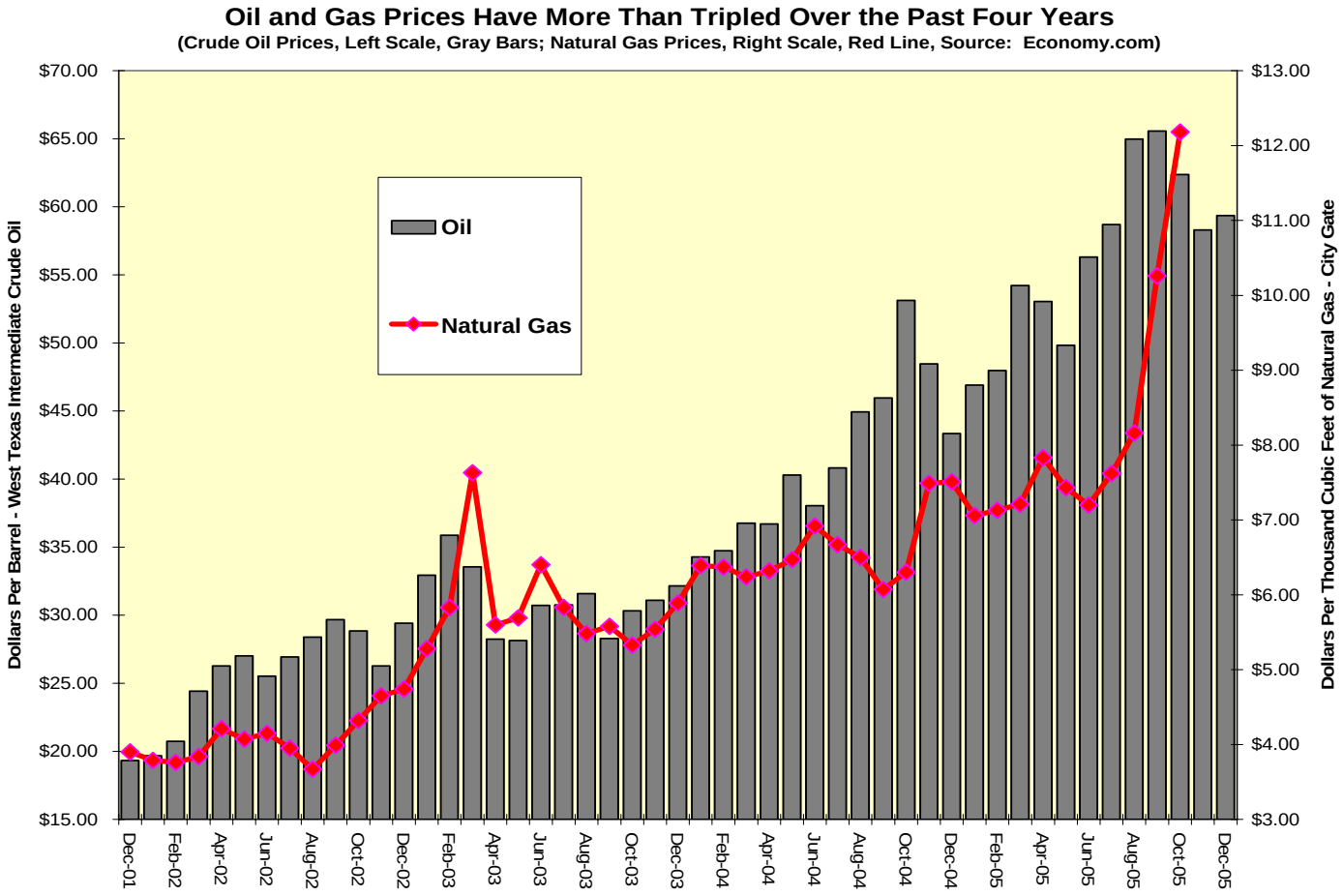
Electric Power Generation by Source in the U.S. 2004
Source: U.S. Energy Information Administration, U.S. Department of Energy



hurricanes that swept through supply origination and distribution points in the Gulf of Mexico. The New England Independent System Operator (ISO), which manages the regional electric system of which Vermont is a part, has warned of possible blackouts in Vermont and other New England states this winter due to pipeline infrastructure damage affecting natural gas fuel supply deliveries to the region.[4]

This also underscores the need for fuel supply diversification. As stated in the 2005 Vermont Electric Plan, prepared by the Vermont Department of Public Service, one of the major State energy priorities is to "ensure that Vermont's overall energy portfolio is sufficiently diverse, especially in light of the potential loss of major generating supplies."[5]

Figure 3.7



Natural gas and petroleum prices, as illustrated in the above Figure 3.7, have risen steeply in recent years, more than tripling since the start of 2002. Coal prices have also been rising of late – increasing more than 15% over the last two years. Because natural

[4] As reported in Washington Electric Co-op, *Currents*, December 2005, pages 1-2, and in the New England ISO 2005 Regional Plan, October 20, 2005, page ES-10, available at: http://www.iso-ne.com/trans/rsp/2005/05rsp_es.pdf

[5] [5] See: Vermont DPS 2005 Vermont Electric Plan, page 9-13

gas and petroleum are often the marginal fuels relied on for New England peak power generation, these price increases and heightened price volatility have rendered effective New England power prices anything but "stable."

Nuclear power is the second most important regional fuel source for electric power generation in New England and the largest single Vermont power source, via the Vermont Yankee facility in Vernon. While nuclear power does not emit greenhouse gasses and other particulates, as do fossil fuels, it does generate radioactive waste, some of which remains hazardous for tens of thousands of years. The long-term storage of this waste has yet to be politically or scientifically resolved, and temporary on-site storage presents local safety and health risks that may also affect near-term licensing and power production. While nuclear power has a substantial record of safe operation, the costs associated with an accident (or intentional terrorist attack) could be truly catastrophic, as evidenced by the Chernobyl disaster. Additionally, even low level discharges of radiation may present long-term health risks to people living nearby or downwind from nuclear reactors.[6]

While power generated by nuclear plants appears to be relatively cheap and stable in comparison to fossil fuels, nuclear power has been, and is, heavily reliant upon federal government subsidization for its development and continued existence. Without massive federal government expenditures on research and development, security, emergency management, waste transportation and storage, and liability insurance, nuclear power would not exist in today's market. The recently enacted Energy Policy Act of 2005 added more than $4.3 billion in new nuclear power subsidies, including $2 billion in cost overrun support for the construction of up to six new nuclear power plants, $1.25 billion for a nuclear test facility, tax breaks for power plant decommissioning costs, provisions for federal disposal of high-level nuclear waste and a 20 year extension of the Price-Anderson Nuclear Industry Indemnity Act, without which no nuclear power plant could afford or obtain operating insurance.[7]

Wind power suffers from none of the negative externalities associated with fossil fuel-based or nuclear power generation. It is safe, producing clean, renewable power with no dangerous air or water emissions, at competitive, stable and predictable prices. It requires no shipping or transportation, no military presence to secure its availability, and does not contribute to global warming, petrochemical smog or groundlevel ozone. As a local resource, it generates not just electricity, but jobs, income and tax revenues for Vermonters and the communities in which they live.

Electricity Supply and Demand

The demand for electricity in Vermont has grown steadily over the past fifteen years, at a compound average annual rate of about 1.5% (see Figure 3.8 on following page). Commercial consumption has experienced the highest growth, at about 2.0% per year between 1989 and 2005, with industrial (+1.1%) and residential (+1.2%) growing more

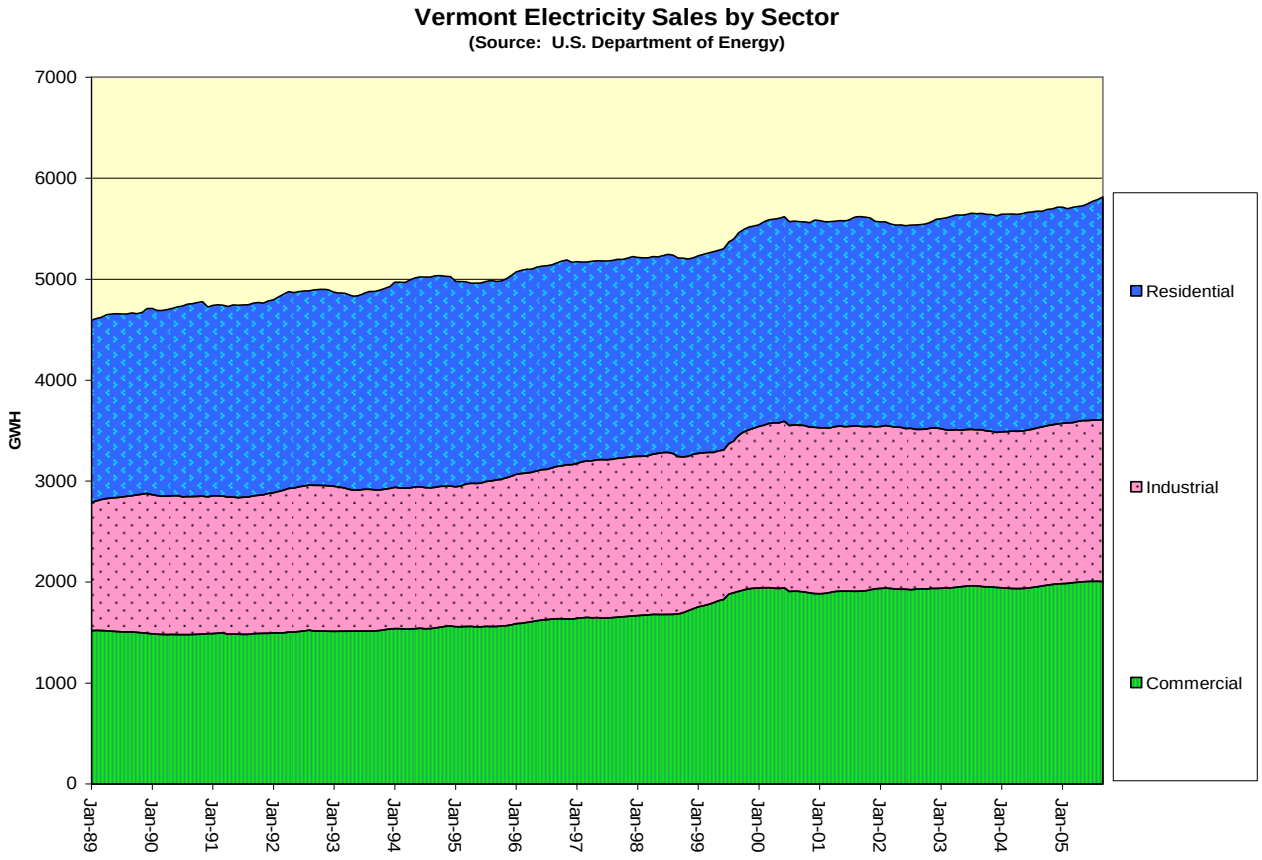
[6] See: The Radiation and Public Health Project, http://www.radiation.org/, for a critical perspective on this issue
[7] See: H.R. 6, enacted August 8, 2005, available at:: http://www.govtrack.us/data/us/bills.text/109/h6.pdf

slowly. According to the ISO New England 2005 Regional System Plan, regional demand growth through 2014 is expected to continue at about 1.5% per year.[8]

In assessing this demand growth against regional system-wide capacities through the next decade, the same ISO New England Regional Plan concludes that,

> "*Taken together, the results of the installed and operable capacity analyses demonstrate that New England will likely face an increased risk of operating with less capacity than needed by 2008. The results also show that the region will not have sufficient capacity to meet the IC Requirement in the 2008 to 2010 timeframe, depending on load growth, weather conditions, generator performance and attrition, and the conditions in specific load pockets... Because the timeframe for building new generation resources is about two to four years, the analysis highlights the urgent need for new generating resources in New England.*"[9]

Figure 3.8

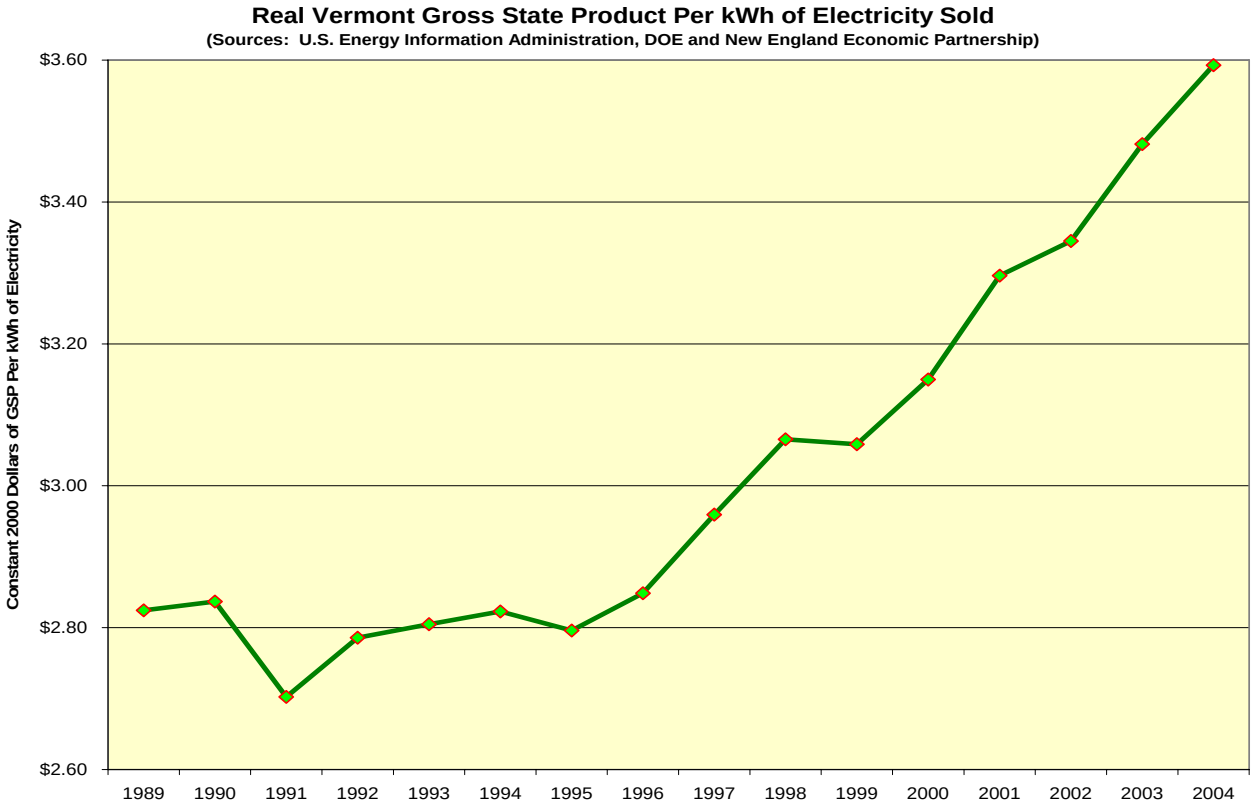


[8] See: ISO New England 2005 Regional System Plan, Executive Summary, page ES-7
[9] Ibid. page ES-9, also available at: http://www.iso-ne.com/trans/rsp/2005/05rsp_es.pdf

Although a recent public policy emphasis on energy efficiency and rising industrial productivity have enhanced the ratio of economic output, as measured by real Gross State Product (GSP), per kilowatt hour of electricity consumed (see below Figure 3.9), there is still a need for additional generating capacity to accommodate economic and population growth in Vermont and New England, in addition to new requirements for expanded renewable energy use.

Current local energy supply shortages were highlighted as a critical Vermont issue in a recent article in the December 2005 Washington Electric Co-op (WEC) newsletter. Featured on the front page of the newsletter, the headline warned, "Rolling Blackouts Possible This Winter," if the "electric generation system is unable to meet regional demands during periods of severely cold weather."[10] The article stated that "major generating stations in the region might have to be shut down for lack of fuel this winter when the demand for electricity is highest – typically during the coldest weather."

Figure 3.9



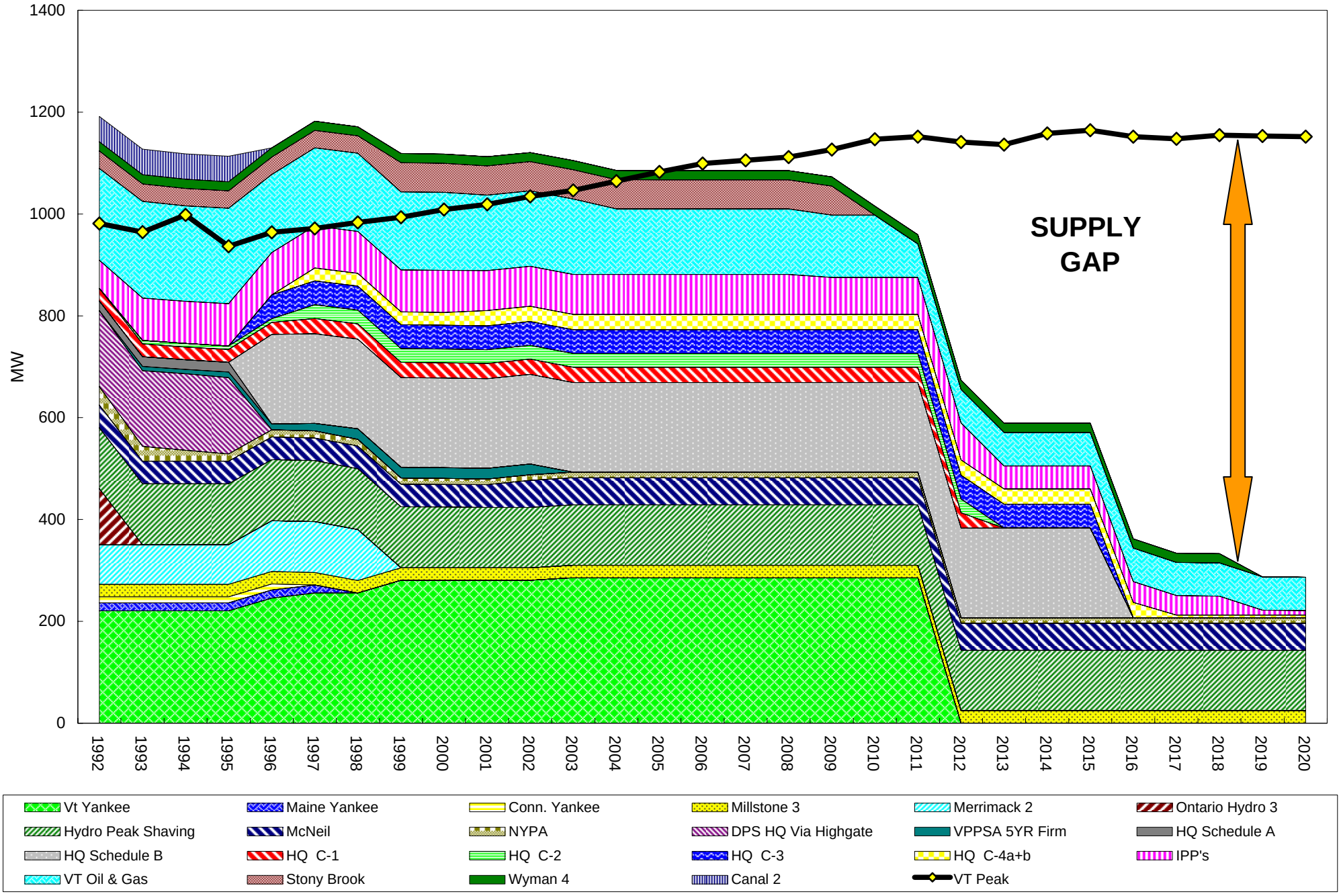
The proposed UPC project could mitigate some of these pressing local supply issues: electric generation output from wind turbines is typically highest in winter months,[11] and

[10] See: Washington Electric Co-op, *Currents*, December 2005, pages 1-2

[11] See: Vermont DPS 2005 Vermont Electric Plan, page 4-3, Figure 4-1, Table 4-1; See also: MIT report on wind energy potential in the Northeast, available at:: www.physorg.com/printnews.php?newsid=9495

Figure 3.10 - Vermont Committed Resources vs. Annual Peak Needs

Source: Vermont Department of Public Service, 2005 Vermont Electric Plan



the Washington Electric Co-op has agreed to purchase 2 MW of capacity (representing approximately 5,677 MWh based upon the project's estimated capacity factor of 32.4%) from the proposed UPC project at competitive prices over a 20 year period.[12] The Vermont Electric Co-op is also negotiating potential purchases of nearly 80,000 MWh, more than half the total output of the UPC project, also at competitive prices for a 20 year period. These two Vermont utilities may, therefore, ultimately purchase as much as 62% of the power generated by the proposed UPC project. UPC has stated that it is engaged in ongoing discussions with other Vermont utilities in order to meet its goal of selling as much of the power within Vermont as possible.

The expiration of contracts and licenses with the State's two largest energy providers, Vermont Yankee and Hydro Quebec, over the next six years (see Figure 3.10, page 12, based on data and illustrations in the DPS 2005 Vermont Energy Plan) accentuates the need for alternative energy sources that are reliable and competitively priced. The impending "supply gap" illustrated in Figure 3.10 demonstrates the magnitude of the issue at hand and the time frame within which action is necessary.

Although the State could still purchase energy at market rates to fill this gap, the price of such power would be subject to volatile fuel prices, supply disruptions, and short term fluctuations in market demand. These factors are behind recent market price increases and could render future electricity prices in Vermont more uncertain and costly. Obviously, wind power cannot replace the two-thirds of Vermont electrical production capacity now represented by these expiring generating sources, however, it can be an important and growing part of the solution by providing renewable and emissions-free energy from a fuel source not subject to fuel cost volatility, supply disruptions or competitive demand pricing pressures.

Renewable Energy and Act 61 in Vermont

Legislation was enacted in Vermont last year to create "renewable portfolio standards for sales of electric energy"[13] (RPS), bringing the State into alignment with similar policies in other New England states. The purpose of this legislation, entitled Act 61, was to formalize relatively flexible requirements to encourage the development and use of renewable energy sources within the State.

Act 61 requires electricity providers in Vermont to supply "an amount of energy equal to its total incremental growth between January 1, 2005 and January 1, 2012 through the use of electricity generated by new renewable energy resources." While this may initially be done through voluntary means, if the utilities fail to meet this goal, the Public Service Board may impose a formal RPS requirement. This legislation further underscores the need for and public interest in the development of renewable energy projects such as that proposed by UPC. Although the rules vary by state and are complex, the ability to satisfy Vermont and other New England state RPS requirements by developing and/or trading renewable energy credits will increase the overall demand for new sources of renewable energy, adding to the clear regional and State need for the type of generating capacity offered by this project.

[12] WEC has an option to purchase an additional 2 MW, for a total of 11,354 MWh per year.
[13] See Vermont Statutes, Sec. 3. 30 V.S.A. § 8004 "Renewable Portfolio Standards for Sales of Electric Energy"

4) Attendant Issues – Avoided Emissions, Property Taxes and Tourism

Estimates of Avoided Emissions

While there is no doubt that the presence of clean, wind-driven electric power generation will reduce the need for some fossil fueled power generation in the region, it is impossible to know in advance exactly which power sources may be displaced by new wind power output at any given moment in time. This is because the ISO New England system operators, who govern the dispatch of generating units to the New England states, choose the mix of supplied energy based on production costs. Lower cost units are favored over higher cost sources, with the mix of plants and fuel sources that provide this marginal capacity changing constantly with demand and available supply. In the short-run, the presence of a low cost energy source, such as wind, will result in the displacement of higher cost marginal units, which in New England are virtually all fossil fuel based (primarily gas-fired combined cycle units and gas and oil-fired units). As a result of this, precise estimates of near-term avoided emissions are reliant upon the assumptions made regarding the mix of marginal power that will be replaced by new wind power at any point in time. This can result in a range of credible avoided emissions estimates, depending upon these assumptions.

The Vermont Agency of Natural Resources in its fact sheet on "Wind Energy and Air Emissions," states that

> *"Every kilowatt-hour (kWh) produced from a wind turbine results in one less kWh being produced by a fossil fuel source. This is the case because in Vermont our primary fuel sources are nuclear, hydro and fossil fuel. Nuclear plants like Vermont Yankee do not change their output at all, and Hydro Quebec may change the timing of water releases, but the water will still flow through the turbine and produce electricity at some point. This means that the power that wind generation displaces is power that would otherwise be produced by fossil fuel generation. Reduction in fossil fuel use means a corresponding reduction in air emissions including CO_2, sulfur oxides and [nitrogen] oxides."*[14]

In this same document, the Agency estimates that a "single utility-scale wind turbine, by displacing power generated by fossil fuels, can prevent the emission of 5,000 tons of CO_2 into the atmosphere each year, as much as could be absorbed by 500 acres of forest." By this estimate, the proposed UPC project would reduce CO_2 emissions by some 130,000 tons per year, as much as could be absorbed by 13,000 acres of forest.

Other estimates may be made by reviewing U.S. Department of Energy generating output and reported emissions from New England utilities in 2004 by type of fuel source. Based on these data, if all displaced power was generated by New England gas and petroleum generating plants (the most likely substitutes), the UPC project would result in annual reductions of about 171,653,400 pounds of carbon dioxide, the primary source of

[14] See: http://www.vermontwindpolicy.org/factsheets/Air%20Emmissions1.pdf

global warming, about 345,800 pounds of sulfur dioxide, which causes acidification in lakes, streams and soils via acid rain, about 101,200 pounds of nitrogen oxides, which lead to ozone formation, smog, and human respiratory damage, and related reductions in other hazardous particulate matter.

If coal is included among the displaced New England generating facilities, the annual CO_2 reductions increase by about 18% to more than 200 million pounds, the annual SO_2 reductions jump 66% to nearly 575,000 pounds, and NO_X emissions would be more than 60% higher, totaling more than 163,300 pounds. As any of these estimates go out in time, they may decline, as the displaced power becomes either cleaner or more efficient, or both.

These emissions represent a significant negative externality associated with the production of power from fossil-fuel sources. Because the ultimate costs of these externalities are unknown, their precise economic value is difficult to quantify. It is impossible to know, for example, how expensive global warming may ultimately prove to be, or the true "cost" of human illness and suffering. By one approach, using very conservative valuations accepted by the Vermont Public Service Board in 1999, adjusted for inflation, the monetized value of the air emissions that would be avoided by this project would exceed $1.2 million per year.[15] Over the project's expected initial operational period of at least 20 years, this would amount to more than $24 million in constant 2006 dollars.[16]

It is clear that the use of any reasonable assumptions associated with the power to be displaced by electrical generation from the proposed UPC wind project will yield significant environmental benefits and avoided environmental costs to Vermont, New England and beyond.

Property Tax Valuations

The net property tax valuations used as model inputs herein considered the issue of offsetting property value declines associated with parcels in close proximity to the proposed wind turbines. After an extensive literature review of the topic, it was determined that there was no empirical basis for any negative town or county adjustment for this effect. Although there is no question that there are individual property owners and potential property buyers who consider the proximity of wind turbines to be undesirable, there is no evidence that that these opinions result in measurable negative impacts in aggregate town or county-wide property sales prices and valuations.

In fact, there may be some net positive property valuation effects beyond the direct property tax payments from the project. By significantly reducing town-wide property taxes, the demand for properties in the affected areas, and hence their valuations, would be expected to increase. These additional positive effects, which would probably occur

[15] See Vermont Public Service Board Docket 5980, page A-22, Order entered on 9/30/1999, which valued avoided negative externalities at 0.7000 cent/kWh. In current 2006 dollars, this would be approximately 0.8275 cent/kWh

[16] As noted in the preceding paragraph, these impacts may diminish over time, if cleaner, more efficient power is ultimately displaced.

over an extended time period, were not estimated or included in the model inputs used in this analysis.

Most extant analyses on the topic of property valuations and proximity to wind farms are based on anecdotal information from affected property owners, local realtors, wind farm proponents or wind farm opponents. Few are scientifically constructed studies with any meaningful statistical significance. The most rigorous and relevant study on this topic to date is an analysis by the Renewable Energy Policy Project (REPP) that included the Searsburg wind farm in Bennington County, Vermont.[17]

The REPP report, published in May of 2003, examined nearly 4,000 individual property transactions in and around the Searsburg wind farm, before and after its construction. As the only commercial wind farm in Vermont, and in a rural setting similar to the proposed project, the Searsburg experience has particular relevance to this project. In all three of the statistical regression models used in this analysis, the authors found that "average sales prices grew faster in the view shed than in the comparable area" following construction of the wind turbines. The analysis of the Searsburg facility concluded that, "there is no significant evidence that the presence of the wind farms had a negative effect on residential property values." The same report, which studied eight other U.S. wind farms in comparable detail, found "no evidence that wind development has harmed property values within the view shed."

While actual property transactions data are the only conclusive basis for measuring valuation changes due to the presence of wind farms, the most objective anecdotal information on this topic probably comes from tax assessors. A recent analysis employing an extensive survey of tax assessors in 13 U.S. counties, containing 22 recently developed wind farms, found "no evidence indicating that views of wind turbines decreased property values."[18] The study also opined that "[o]ne of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbines are undesirable. As reported by the tax assessors, some residents find views [of] the wind turbines attractive. If a homeowner dislikes having a view of the wind farm, they may move and sell their house to someone who likes the view. In this case property values would not be diminished."

Based on the above analysis and review, we find no basis for a negative property valuation adjustment and believe the model inputs for net property tax changes in Caledonia County represent conservative assumptions regarding the economic impact of the proposed development. In addition to using likely minimum local property tax assessments and related revenue sharing valuations for the proposed wind farm, the demand and property valuation effects from lower property taxes in Sheffield and Sutton could provide further economic benefit to the region than presently estimated.

[17] *The Effect of Wind Development on Local Property Values*, by the Renewable Energy Policy Project, May 2003, available at www.crest.org/articles/statis/1/binaries/wind_online_final.pdf

[18] *Economic Impact of Wind Power in Kittitas County*, by ECONorthwest, November 2002, available at www.kvalley.com/phoenix/Kittitas%20Wind,%20final.pdf

Tourism Impacts

Potential tourism impacts – both positive and negative - associated with the proposed wind farm were also considered in specifying the economic impact model. Given Vermont's substantial tourism industry, this is a topic of heightened local importance. Following a thorough literature search of academic and other articles on this topic, we find no empirical basis for a significant adjustment – positive or negative – to likely tourism visitation or expenditures as a result of the proposed wind farm development in Sheffield and Sutton.

As is the case with property valuations and view preferences, there are conflicting perspectives on whether or not the presence of a wind farm will result in any positive or negative tourism response. As is also the case with property valuation impacts, the analyses performed to date are largely anecdotal and, if scientifically designed (which few are), are survey-based, not outcome-based. While surveys can be valuable indicators of future expectations, opinion and preference, they often do not conform to actual expenditure patterns. There have been no empirical studies that measure regional tourism expenditures before and after a wind farm development, with valid control regions. Without such data it is impossible to assign and quantify a meaningful adjustment metric for tourism expenditures.

There is considerable evidence that wind farms in a number of U.S. and international sites have become tourism draws, including the Green Mountain Power facility in Searsburg. A report issued by Renewable Energy Vermont states that "[t]he Mt. Snow Haystack Regional Chamber of Commerce reported that of those who made inquiries, about 10% asked for information about the turbines in Searsburg."[19] Many other wind farm sites are listed as local "tourist attractions."[20] Some sites plan for and encourage tourism, with visitor centers, educational and informational programs, the opportunity to climb wind towers to enjoy the "spectacular views,"[21] and even "the unique experience of staying overnight [at] an operating wind farm" at one Minnesota facility.[22]

If there were formal plans to attract visitors to the proposed UPC facility, including the development of a visitor center, guided tours, tower viewing platforms and related promotional activities, it is possible the development could represent a measurable tourism enhancement to the area.[23] Without this, there will be some tourism interest, especially since the towers will be visible from parts of the nearby Interstate Highway 91, but probably not extensive enough to warrant any upward model adjustment.

[19] See *The Economic Benefits of Wind Farm Development in Vermont*, Renewable Energy Vermont report by Douglas Hoffer, available at http://www.revermont.org/windfarm_benefits.pdf

[20] See, for example, the Green Mountain Wind Farm near Garrett, PA, as listed in the local public library page: www.meyesdalelibrary.com/tgreen.html

[21] As reported at the Swaffham, Norfolk (UK) wind farm, where "over 50,000 tourists have climbed the wind turbine tower." See: http://yes2wind.com/tourism_debunk.html, December 19, 2005

[22] The Buffalo Ridge Wind Towers are listed as a tourist attraction in the Hendricks, MN area, and offer overnight stays. For more information, see: www.hendricksmn.com/wind_towers.html

[23] Due to the high level of tourist interest in the Searsburg wind farm, limitations on visitation have been placed on the facility in order to avoid any potential negative wildlife impacts. Similar restrictions would probably need to apply in the case of the proposed facility if tourism visitation was to be promoted.

It is also worth noting that while tourism is an important part of the regional and Vermont economy, it is not as significant in Caledonia County as elsewhere in the State. Preliminary fiscal year 2005 (FY05) data from the Vermont Tax Department show that Caledonia County comprised only 2% of the taxable rooms revenues in the State, while representing about 5% of the labor force and population. Neither Sheffield nor Sutton were listed as towns reporting FY05 rooms revenues, nor were five of the eight towns that are contiguous to Sheffield and Sutton.[24] The three towns that were listed, Burke, Barton and Westmore, reported a total taxable base for rooms of about $1.5 million in FY05, less than one-half of one percent of the State total.

Based on the above, any potential negative tourism effects from the presence of the proposed wind turbines are likely to be so small as to have negligible net economic impacts.

Conclusions

We find that the proposed UPC Vermont Wind project in Sheffield and Sutton will have significant economic and fiscal benefits to the State of Vermont, Caledonia County and the local host municipalities. We also find that this project is an important component in meeting the present and future demand for competitively-priced electric energy and clean, renewable power in the State, as mandated by Act 61 of the 2005 Vermont General Assembly.

The generation of electricity to power Vermont's homes, industry and commercial businesses over the next decade involves trade-offs in costs, environmental impacts, economic benefits and reliability. As a rare local Vermont energy resource, wind power offers unique advantages when compared to existing and alternative energy sources. It emits no greenhouse gasses or other environmental pollutants and displaces existing generating facilities that foul the air and pose grave ecological risks. It is a renewable energy source with fixed production costs over very long periods of time, enabling price stability at competitive rates. And, it is a sustainable resource that generates not just electricity, but permanent jobs, income, tax revenues and wealth for Vermonters. Wind power from projects such as the proposed UPC Vermont Wind facility is not the only answer to Vermont and New England's energy needs, but it is a critical part of the solution.

[24] It should be noted that the absence of a listing could mean that either there is no taxable rooms revenue, or that there are so few establishments in the town that to report the taxable revenue would violate State disclosure restrictions. In either case, the paucity of taxable rooms revenue and/or establishments renting rooms to tourists suggests that potential negative impacts are relatively minor.