DRAFT

UPDATE TO THE 2005 VERMONT ELECTRIC PLAN

October 20, 2006

TABLE OF CONTENTS

INTRODUCTION………………………………………………………………….. 5

SECTION 1: FRAMING THE CHALLENGES: RECENT DEVELOPMENTS AND EMERGING REQUIREMENTS………………………………………………………… 7

- A. The Emerging Supply Gap……………………………………………….. 8
- B. Wholesale Market Price Volatility; Regional Dependence on Natural Gas for Generation………………………………………………………………… 9
- C. Threats to System Reliability……………………………………………... 10
- D. Environment……………………………………………………………. 11

SECTION 2: POLICY INITIATIVES, RESOURCE DECISIONS SINCE THE JANUARY 2005 ELECTRIC PLAN……………………………………………... 14

- A. Statutory – Federal
  1. The Energy Policy Act of 2005 (EPACT)……………………………... 14
  2. The Clean Air Interstate Rule and the Clean Air Mercury Rule………. 15
- B. Statutory – Vermont
  1. Act 61: Renewable Energy, Efficiency, Transmission, and Vermont's Energy Future…………………………………………………………... 16
  2. Act 74: An Act Authorizing Vermont Yankee to go Before the Public Service Board to Seek Permission for Dry Cask Storage……………… 16
  3. Act 208: The Energy Security and Reliability Act…………………….. 16
  4. Act 201: An Act Relating to Agricultural Energy and Fuel Production.. 16
  5. Act 168: An Act Relating to Establishing Greenhouse Gas Reduction Goals and a Plan for Meeting Those Goals……………………………. 17
  6. Act 160: An Act Relating to a Certificate of Public Good for Extending the Operating License of a Nuclear Power Plant…………… 17
  7. Act 152: An Act Relating to Establishing Energy Efficiency Standards for Certain Appliances………………………………………………… 17
  8. Act 123: An Act Relating to Vermont's Participation in the Regional Greenhouse Gas Initiative ("RGGI")…………………………………... 17
- C. Rules, Workshops, and Regulatory Changes
  1. Rulemakings – SPEED Program and Interconnections Standards for Small Generation……………………………………………………… 17
  2. Technical Workshop – Energy Efficiency Utility Budget……………... 18
  3. Docket 7081 – Investigation into Least Cost Transmission Planning…. 19
  4. Docket 7109, 7176 – Alternative Regulation Plans……………………. 19
  5. Technical Workshop – Time of Use Pricing/Metering………………… 20
  6. Docket 7174 – Transco, LLC………………………………………….. 20
  7. Electricity Affordability Program……………………………………… 20
  8. Clean Energy Development Fund……………………………………… 20
  9. Technical Workshop: Integrated Resource Planning Process…………. 21
- D. Public/Stakeholder Initiatives
  1. Participatory Energy Planning – Mediated Modeling Project…………. 21
  2. Public Engagement in Power Planning………………………………… 22

3. Citizens' Guide to the Vermont Public Service Board's Section 248 Process………………………………………………………………. 22
4. Vermont's Electric Energy Future: Report of the Thirtieth Grafton Conference…………………………………………………………….... 22

E. Regional/National Market Developments
1. The Regional Greenhouse Gas Initiative (RGGI)……………………… 22
2. Forward Capacity Markets…………………………………………….... 23

F. Vermont Yankee
1. Vermont Yankee Uprate……………………………………………….. 25
2. Vermont Yankee Steam Dryer…………………………………………. 25
3. Vermont Yankee License Renewal Process…………………………… 25
4. Vermont Yankee Dry Fuel Storage Facility…………………………… 26

G. Other In-State Generation
1. Coventry Landfill………………………………………………………. 27
2. East Haven Wind Petition……………………………………………… 27
3. UPC Vermont Wind Petition………………………………………….... 27
4. Farm Methane Energy…………………………………………………. 28
5. Ludlow Wood Energy Generation…………………………………….. 28
6. Net-Metered Generation……………………………………………….. 28

H. Transmission Projects
1. Lamoille County Transmission Upgrade Project………………………. 28
2. The Northwest Reliability Project……………………………………... 29
3. The Southern Loop…………………………………………………….. 29

I. Vermont Utilities
1. Credit Rating……………………………………………………………. 29
2. CVPS Purchases……………………………………………………….. 30
3. Gaz Metro Proposed Acquisition of Green Mountain Power………… 30

J. Completed Studies
1. Efficiency Potential Study……………………………………………... 30
2. Update to Fuel Price Forecasts and Avoided Costs……………………. 31
3. State Agency Energy Plan for State Government……………………… 32
4. The Climate Neutral Working Group Biennial Report………………… 32

K. Legislative Reports
1. Electricity Clearing Price Impacts from Efficiency and Renewables….. 32
2. Potential for Aggressive Regional Approach to Energy Efficiency and Renewables to be Integrated with Regional T&D Planning and Greenhouse Gas and Air Emissions Reduction……………………….... 32
3. Obstacles and Opportunities for Creating a System of Energy Efficiency Credits Analogous to Renewable Energy Credits in Vermont………………………………………………………………... 33
4. Policy Options facing Vermont in the Event of a System of Tradeable Carbon Emission Allowances in Established in the Region…………… 33
5. Options Being Considered by Vermont's Retail Electricity Providers and Transmission Companies for Meeting Vermont's Electric Supply Requirements in Light of the Expiration of Long-Term Supply Contracts……………………………………………………………….. 33

L. In Progress or Future Studies 33
1. All Fuels Potential……………………………………………………… 33

2. Affordability Study.. 33
3. Clean Energy Fund.. 34

SECTION 3: CURRENT AND FORECASTED PRICE AND DEMAND FOR ELECTRICITY.. 35
Wholesale Prices.. 35
Historical Demand.. 37
Demand Forecast.. 38
Base Electric Demand (Base Load Forecast).. 40
Seasonal Peak Demand (Peak Load Forecast).. 41

SECTION 4: PUBLIC INVOLVEMENT IN POWER PLANNING.. 44

APPENDICES:
Appendix A – List of Issues for Resolution in Docket 7180.. 46
Appendix B – Forecast Methodology.. 46

INTRODUCTION

In January of 2005, the Department of Public Service (DPS) released *The Vermont Electric Plan*. This document is an update to that Plan. The purpose of this update is to serve as a supplement to the 2005 Electric Plan, acting as a bridge of support for the public engagement process leading to the development of the next Vermont Electric Plan, in 2007. This update is not intended to present a comprehensive exposition of electricity issues facing Vermont.

Vermont is confronting key challenges and decisions over the next decade. The Department of Public Service believes that public and stakeholder involvement in these decisions is essential to a sound energy planning environment. This update provides up-to-date information about key features of the electricity environment that have emerged since the release of *The Vermont Electric Plan-2005*, centering on the facts in order to properly frame the challenges and opportunities ahead, and facilitating an informed dialogue.

The Update to the 2005 electric plan frames issues within the statutory directive provided by the legislature in 30 V.S.A. §202, which requires that the electric plan ensure,

> . . . to the greatest extent practicable, that Vermont can meet its energy service needs in a manner that is adequate, reliable, secure, and sustainable; that assures affordability and encourages the state's economic vitality, the efficient use of energy resources and cost effective demand side management; and that is environmentally sound.

Although not mandated, organizing the update to structure issues following this framework eases the transition to the public dialogue for the development of the *Vermont Electric Plan – 2007*.

Section 1 begins with a summary of emerging challenges and recent developments that have elevated energy issues as a major concern to the public and to policy-makers. No issue in Vermont seems to loom larger in the present energy planning environment than the approaching gap between committed electricity supply and expected demand. In addition, the environment, reliability, system adequacy, costs of electricity and associated drivers, and the changes in New England wholesale markets represent other important areas of concern to policy-makers.

Section 2 presents major policy responses and areas of activity by federal and state lawmakers, regulators, and Vermont utilities since the 2005 Plan was issued. Both federal and state lawmakers have been active in advancing new energy and environmental legislation. The same can be said of federal and state regulators. Vermont utilities are in the process of developing a plan to replace existing resource contracts and commitments.

Section 3 follows with an updated forecast of electric sales and demand. For the first time, the forecast incorporates systematic treatment of Demand Side Management (DSM) program activities in the State, both past and future, by incorporating the influence of those programs, and adjusting for the decay of DSM programs activities. The last forecast of electricity demand performed by the Department was in 2002. In the future, the Department plans to place increasing reliance on an all-fuels, integrated planning model using system dynamics as the basis for the DPS forecast.

Planning efforts among Vermont utilities, at the Department, and more recently, the Vermont General Assembly have emphasized the importance of more effective public outreach and involvement in our resource decisions. Section 4 will discuss recent initiatives and describe the broader public engagement process that is underway as a joint effort of the Department of Public Service and the Vermont General Assembly to help inform future Plans.

It should be reiterated that this update is not intended to set or advocate for particular policy choices. Instead, it is hoped that the information within the following pages will encourage informed dialogue about our energy future with an eye toward creating a Vermont *Electric Plan - 2007* representing the collective interest of the State of Vermont.

SECTION 1 – FRAMING THE CHALLENGES: RECENT DEVELOPMENTS AND EMERGING REQUIREMENTS

Despite the brief interval of time since the last Vermont Electric Plan was published, there has been a steady flow of significant events surrounding electric energy policy, fueling a mounting focus for policy solutions. Stimulating this flow are significant developments in energy markets, particularly natural gas markets.[1] Natural gas is the key driver of electricity prices in New England; the region learned how vulnerable it is to events up the pipeline, as evidenced by the effects of Hurricanes Rita and Katrina in the 3rd quarter of 2005 on natural gas supplies to New England. When infrastructure was damaged, the price of natural gas and in turn the price of electricity rose dramatically. The nature of electricity markets themselves has also changed significantly and we are seeing the evidence of those changes largely in wholesale markets in New England, but also with recent increases in Vermont retail rates.[2]

The emerging gap between consumer demand for electricity and contracted or owned generation has emerged as a primary concern to the public and policy-makers. Nearly two-thirds of our current electricity requirements are met through major power contracts for generation with Hydro-Quebec and Vermont Yankee. The bulk of these contracts are due to expire in 2012 and 2015. When these contracts end, Vermonters will still have access to the vast resources inside New England and neighboring areas through the spot market. However, the State may be exposed to more price uncertainty and volatility associated with wholesale electricity. This stands in sharp contrast to our existing long-term contracts. Vermont can manage its market exposure to the short-term market through investments in generation or new replacement long-term contracts; however, these resource decisions also present their own challenges and risks to Vermonters and the State's utilities.

The challenges and opportunities ahead are a consequence of Vermont's present circumstance and the events that led us here. In the late 1990s, Vermont resisted the movement toward industry unbundling and retail choice while the rest of New England and the Northeastern U.S. moved toward a more competitive environment that increased exposure to short term and spot market prices. Recently, this has led to a sudden increase in retail prices among most of our immediate neighbors. Under current market conditions, Vermont appears to have benefited by maintaining a vertically integrated structure, as the retail rate for electricity in Vermont is the lowest, on average, in New England.[3] This advantage may diminish with the expiration of the aforementioned

[1] Oil markets have only a marginal effect on electricity, especially in the New England region where natural gas is often "on the margin," meaning it is fueling the next generator that is turned on when demand increases. This "marginal" generation is what sets the market price for electricity in each hour. Natural gas is on the margin and setting the price of electricity 55% of the time. As a result, retail prices consumers see at gasoline stations, while often the impetus for energy policy, have little influence on electricity.

[2] The rate changes experienced in Vermont, however, are small in comparison to sudden rate increases seen throughout most of the northeastern US. The reasons for the differences will be discussed further below.

[3] As of June 2006, the average retail price of electricity in Vermont for residential, commercial, and industrial customers was 13.86, 11.92, and 8.41 cents per kWh, respectively. The New England average for the three sectors was 16.37, 14.76, and 10.53 cents per kWh. The only customer class in New England with lower prices than Vermont's equivalent class was Maine's industrial class, at 3.15 cents per kWh.

existing contracts with Hydro Quebec and Vermont Yankee. On the other hand, Vermont could have greater flexibility on a going forward basis to choose to directly invest in new generation or to rely on markets for purchased power.

Wholesale markets first emerged in New England in 1997 and were modified in 2003 to reflect a Standard Market Design that includes a day-ahead market, a real-time market, and a forward reserve market. These markets were added to a pre-existing capacity market. Other Ancillary Service Markets are currently under design and the capacity markets are in the process of being redesigned. Designing capacity and other markets is a complex and involved process, as evidenced by the debate surrounding the Locational Installed Capacity (LICAP) proposal set forth by ISO-New England. The original proposal was widely opposed by interest groups and state agencies alike, including Vermont. The parties have subsequently settled their differences by creating a Forward Capacity Market (FCM). It remains to be seen if FCM and other ancillary markets will encourage the development of additional capacity or foster diversity in supply resources.

For the time being Vermont's decisions have helped to reduce exposure to energy markets, and the changing "rules of the game." Over time, our exposure will gradually increase. It is therefore important that Vermont continue to remain active in market development. At present, the region faces an apparent challenge to develop adequate capacity, especially in certain constrained areas due to the threat of inadequate peaking capacity, and challenges to create fuel diversity. Vermont, by reason of its size, can provide limited direct impact on the regional mix, but can impact market design through regional advocacy.

Many other recent developments and challenges are confronting Vermont as well. For the most part, they present new challenges:

- Wholesale electricity price volatility;
- Threats to system reliability and resource adequacy;
- Risks and harm associated with the environment; and
- Security concerns relating to protection of grid infrastructure

These topics are discussed in more detail below.

<u>A. The Emerging Supply Gap</u>

The current contract with Entergy for unit-contingent power from Vermont Yankee at very favorable prices is due to expire in 2012. The bulk of the Hydro-Quebec contracts expire by 2016. These two resources comprise nearly 2/3 of Vermont's energy supply portfolio. Only a portion of the remaining electric supply comes from utility-owned resources. Demand continues to grow, albeit at a slower rate than most of the surrounding region. The emerging supply gap presents planning challenges to utilities, regulators, and citizens to ensure stably and reasonably priced service that meets Vermont's criteria for energy planning.

Public engagement efforts to address the resource gap are underway. The Vermont General Assembly, in passing Act 208, focuses a public engagement process on the "electric energy supply choices facing the state beginning in 2012." The DPS has initiated a Mediated Modeling process in order to provide an easy-to-use model of energy scenarios that will use agreed upon facts in order to inform this debate. Vermont utilities are also engaged in parallel efforts to examine the feasibility of alternatives through integrated resource planning (IRP) and other efforts.

The replacement of these long-term contracts can begin before and end after these contracts end in 2012 through 2015. If we intend to replace these contracts without a gap (i.e., exposure to shorter term markets) by investing in new resources, time becomes a concern. Options can diminish as time passes as the permitting, siting, and (if approved) construction of electric generation requires long lead times. However, there are a variety of reasons to move at a measured pace and consider new strategies for replacing these resources.

First, New England enjoys a competitive wholesale market for electricity. This market can be relied on to help bridge any gaps; it can and undoubtedly will provide at least a portion of the Vermont electricity portfolio for the foreseeable future (almost all Vermont utilities rely on market purchases for a portion of their existing resource mix).

Second, Vermont has historically relied on large single resource or supplier contracts in its resource mix. Although Vermont has benefited from this strategy ongoing reliance on similar arrangements or strategies could create undue risks. Vermont utilities may need to break-up some of its large resource contracts into smaller contracts whose start and end dates vary over time to create less exposure to prevailing market conditions during critical dates.

Third, the relative merits of a significant new generator in Vermont should ultimately be determined by careful consideration of its economics and risk. How much of a cost premium might Vermont be willing to pay in order to protect itself from exposure to the open market? And how well do we understand the underlying economics of either building a generator or relying on the open market?

No single supply resource will be able to fill the gap; replacement contracts with existing suppliers will continue to enjoy favor. Greater consideration will need to be given to meeting our needs through a more diverse mix of resources. In order to meet the electrical needs of Vermonters, the emerging supply gap should be addressed with an informed dialogue and even-handed policy decisions.

B. Wholesale Market Price Volatility; Regional Dependence on Natural Gas for Generation

The New England region saw unprecedented levels of wholesale electric price increases and volatility in 2005. Some responsibility is owed to the effects of Hurricane's Katrina and Rita, but the region's heavy reliance on natural gas to generate electricity also plays a large role. This dependence on one fuel source is a fairly recent phenomenon. In 1995, less than 10 percent of the regional energy mix was natural gas. Currently, roughly 40% of the energy sold on the wholesale market is from natural gas. 98% of the region's capacity additions since 1999 have come in the form of high efficiency natural gas combined cycle generation facilities. Natural gas now sets the market price of wholesale electricity in most hours.

Despite the increases in average prices between 2002 and 2006, natural gas remains a low cost source of generation. Although combustion of natural gas creates emissions far greater than renewable energy facilities, it remains less costly. Among fossil fuels it is by far the cleanest. Thanks to advances in combustion technology with the evolution of gas combined cycle generation, gas enjoyed an advantage over other fuels for fuel conversion efficiency. Historically, natural gas has been delivered to the region via pipeline and has remained free of disruption from instabilities in overseas regions. In broad terms, it has offered both an inexpensive and relatively environmentally benign source of energy. However, the resulting demand increases early in the decade have culminated in concerns over the region's heavy dependence on the fuel and the risk for supply disruptions.

On a forward going basis, liquefied natural gas (LNG) figures to be an important source of fuel. Continued low prices for natural gas depend on siting liquefied natural gas terminals in the region before 2011, and pipeline capacity from the McKenzie Delta in 2011 and from Alaska in 2015. There are approximately 40 applications with the Federal Energy Regulatory Commission (FERC) nationwide to construct new LNG facilities, however it is expected that only about 12 will ever be built. For any new terminals to affect prices in New England at least one or two may need to be sited in or around the region in order to alleviate infrastructure constraints resulting from transporting the fuel long distances via pipeline. For purposes of the DPS forecast and analysis, it was assumed that one LNG terminal would be sited in the New England or Eastern Canada region.

As noted above, natural gas is not as environmentally friendly as renewable energy, but it is less expensive. It costs more than coal, but is a far cleaner resource than coal or other fossil fuels. In balance, natural gas generation has a competitive advantage to other fuels. However, exposure to supply disruptions, the region's heavy dependence on a single fuel source, and CO2 emissions associated with the fuel are causes for concern. The relation of natural gas to wholesale market prices is discussed further in Section 3.

C. Threats to System Reliability

The disruptions to supplies caused by Hurricane's Katrina and Rita did not only create high prices in wholesale markets, they also highlighted the risk that the region saw to the delivery of reliable electric service during critical periods of peak demand for natural gas. In New England, this risk is amplified in the winter when electric generation competes with demands for natural gas as a source of heat. The cold snap that occurred in January 2004 resulting in concurrent regional winter peak electricity and space heating demands also highlighted these emerging tensions in the region.[4] At that time, the New England's dependence on natural gas as the dominant fuel source for generation came under closer scrutiny. Today, there is growing consensus that fuel diversity, even from single generators in the form of dual or multi-fuel capabilities, has surfaced as a critical requirement for the region as a whole.

Threats to system reliability also were revealed in 2003 when a major power blackout affected portions of the mid-western and northeastern US and eastern Canada. The

[4] See, ISO-NE's report, "Northeast Natural Gas Infrastructure Assessment", April 1, 2005, available at http://www.iso-ne.org/pubs/spcl_rpts/2005/cld_snp_rpt/7_northeast_natural_gas_infrastructure_assessment.pdf

power outage affected approximately 50 million people and 61,800 MW of electricity demand.[5] Power was not restored for portions of the affected area for 4 days. Estimates of the cost of the blackout range between $4 and $10 billion. A task force was created to determine the causes of the blackout and recommend policies to avoid a recurrence of the problem. System operational management inefficiencies were found to have caused the physical problems, but the root causes were found to be failures to perform effectively relative to the reliability policies, guidelines, and standards of the North American Electric Reliability Council (NERC). Deficiencies in the voluntary standards themselves were also identified as problems. There were 46 recommendations to address the failures that led to the blackout; however, chief among the task force recommendations was that the U.S. Congress should enact provisions to make compliance with reliability standards *mandatory and enforceable*. As discussed below, the Energy Policy Act of 2005 responded by creating policies to make reliability standards mandatory and enforceable with responsibility for such enforcement resting ultimately with the Federal Energy Regulatory Commission.

As demand grows in New England, the capacity needed to supply generation on the peak demand days is becoming increasingly scarce. On August 2nd, 2006, ISO-NE reported record electricity demand, at 28,021 MW, approximately a 4% increase from the 2005 peak of 26,885 MW. Since 2004, peak demand has grown from just over 24,000 MW to over 28,000 MW.[6] Five out of six of the highest electricity demand days have been in 2006, and nine out of ten have been in the last two years. However, over the same time period little capacity has been added to the region, even though forecasts call for increasing demand and a continually increasing peak. While the recent peak was managed well by ISO-NE, concerns over capacity constraints threatening reliability and leading to emergency actions and volatile prices have led to the development of Forward Capacity Markets (discussed in detail in Section 2, subsection E-2). These markets encourage the construction of capacity to ensure the regions electric system reliability.

D. Environment

The threat of global warming and climate change has continued to gather attention in the US, the region, and in Vermont. A broad-based consensus has emerged among the scientific community that global warming is real, and man-made sources are a major contributor.[7] Vermont, although it plays a small role due to its small size and population, contributes to the emissions of greenhouse gases through its home heating, transportation, and electric power demand.

The State initially responded to climate change through participation in the Northeastern Governors and Eastern Canadian Premiers Conference and the subsequent creation of a regional climate action plan. More recently, Vermont and other northeast states have

[5] See, Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations, April 2004. https://reports.energy.gov/BlackoutFinal-Web.pdf

[6] ISO-NE, "New England Consumers set record for Electricity Use" Press Release August 2, 2006 and "New England's Electricity Use Sets New All Time Record," July 18, 2006

[7] Vermont Governor Douglas, in Executive Order 14-03 requiring a Climate Change Action Plan for State Government Buildings and Operations, found first that the "scientific evidence . . . indicates greenhouse gases are accumulating in the Earth's atmosphere as a result of human activities." He reiterated this in Executive Order 07-05, where he created the Governor's Commission on Climate Change. Both orders are available at http://www.vermont.gov/governor/orders/executive-orders.shtml

established the Regional Greenhouse Gas Initiative (RGGI), which caps region-wide carbon dioxide (CO_2) emissions at 121 million short tons. Vermont's share of this cap is roughly 1.2 million short tons, of which it currently needs only a small fraction to meet the cap on emissions from in-state generation.[8]

Among the major effluents from electric generation (mercury (Hg), sulfur dioxides (SO_2), nitrogen oxides (NO_x), and carbon dioxide CO_2), CO_2 is the only effluent projected by the Department of Energy to increase, by 1.2% per year throughout the US over the coming decades. The criteria pollutants (Hg, SO_2, NO_x) are limited under the EPA's Clean Air Interstate Rule and Clean Air Mercury Rule, cap-and-trade programs that should limit emissions growth, except that associated with leakage outside the boundaries of the program.[9] Vermont and the New England region has long been the recipient of upstream pollution from Midwestern sources and have been impacted by the consequences of acid rain, ozone and mercury accumulation in the biosphere; these rules attempt to mitigate future damage.

Additionally, in an effort to displace some of the fossil fuel generated emissions with cleaner energy, neighboring states have established Renewable Portfolio Standards, and associated markets for renewable energy credits. These standards are generally met through the establishment of a targeted level of new renewable resources relying on environmentally friendly technologies. Vermont contributes to these standards through the sale of attributes from Vermont generators, such as wind and biomass. Through the sale of such credits or attributes, however, Vermont forgoes claim to the associated green energy resources. In a parallel effort, Vermont developed the SPEED program, which encourages power purchase contracts between developers of renewable energy projects and Vermont utilities.

The environment is significantly affected by state, regional, and national electric demand, as much of our power comes from fossil fuel generation plants with associated emissions. In order to effectively mitigate the damage, Vermont has participated in projects and initiatives that attempt to limit emissions from fossil fuel generation, even though very little is located inside the State. Vermont's efforts in the broader context of the region will continue to ensure a healthy environment.

---

[8] To put this figure in the broader context of the globe, the Energy Information Administration estimates that there were 25 billion *metric* tons of CO_2 emissions in 2003. EIA estimates that this figure will grow to 44 billion metric tons in 2030. Growth of CO_2 emissions is affected disproportionately by coal consumption and growth in currently less developed economies of the world, particularly in Asia. In 2003, CO_2 from OECD nations accounted for well over half of the 25 billion metric tons of emissions. By 2030, CO_2 missions from non-OECD nations are expected to account for roughly 60% of the 44 billion metric tons of CO_2 emissions. Contributions from North America are expected to increase by 43% between 2003 and 2030.

[9] Annual Energy Outlook with Projections to 2030, Report #: DOE/EIA-0383(2006) February 2006**,** http://www.eia.doe.gov/oiaf/aeo/emission.html**.** Vermont is among that states that is not impacted directly by the rule because pollution from the state does not contribute to down wind non-attainment for ozone and particulates. Further information on these rules can be found in Section 2, subsection A-2.

Summary

The flow of energy policy activity summarized in Section 2 can be attributed in large part to the challenges and regional and national developments mentioned above. The emerging supply gap is at the forefront of Vermont policy issues, while regional participation in markets to diversify fuel sources, stabilize prices, and maintain system reliability is essential to Vermont's social, environmental, and economic well being.

Major decisions are made today in a much different environment than in years passed. Vermont's neighbors have moved to a competitive retail electricity market, while Vermont continues to remain vertically integrated. Greater public knowledge and involvement adds insight and breadth to the debate over various options. The impact of our energy choices on the environment is more prevalent than ever before. Threats to the security of the electric grid have become a priority concern.

The choices made today will affect Vermont for years to come. Vermont will continue to be active responding to energy issues in the future and the public dialogue resulting from the development of the 2007 energy plan will aid in this process.

SECTION 2 – POLICY INITIATIVES, RESOURCE DECISIONS SINCE THE JANUARY 2005 ELECTRIC PLAN

Over the course of the past 18+ months, changes to Vermont and Federal law, significant regulatory initiatives before the Vermont Public Service Board, stakeholder engagement efforts, and developments in the market have altered the energy landscape in Vermont. These high activity levels show that there is no lack of response or effort by the public, industry, and governments in the region to respond to the challenges and opportunities highlighted above. This section will provide a snapshot of the changes initiated since the *Vermont Electric Plan – 2005*.

A. Statutory-Federal:

(A-1) The Energy Policy Act of 2005 (EPACT):
The Energy Policy Act of 2005 (EPACT) is the first major piece of federal energy legislation since 1992. The policy is comprehensive, and will have a significant effect on Vermont electric utilities, developers, and ratepayers. EPACT endeavors to provide consumers with reliable, low cost service, while attempting to reduce the nation's dependence on fossil fuels. The primary avenue contemplated for affecting change is through production tax credits and incentives for research and development. They are offered for nearly every source of electrical energy, including efficiency.[10] In addition, EPACT emphasized the Federal Energy Regulatory Commission's (FERC) authority to site infrastructure, particularly electric transmission lines and Liquefied Natural Gas (LNG) terminals.

Electric Reliability: In its report on the 2003 blackout, the US-Canada Power System Outage Task Force listed mandatory reliability standards *first* in its recommendations to prevent future blackouts.[11] EPACT created mandatory, enforceable electric reliability standards, under which noncompliance penalties will be enforced. In addition, EPACT gave FERC authority over the siting of electric transmission by requiring FERC to designate "National Interest Electric Transmission Corridors." After designation, States will have discretion as to where and how the transmission lines will be built, but if the state attempts to obstruct the construction of the line, FERC will assume authority to issue a permit. Vermont was not among the areas chosen for initial designation.

For Public Service Board Consideration: EPACT offered five standards that State Public Utilities Commissions must consider adopting:

1) Net Metering- Vermont has a net metering program (described subsection G-6); the PSB determined no further action was necessary concerning EPACT.

[10] A detailed summary of EPACT's provisions is beyond the scope of this update. For a summary of the EPACT, see the Senate Committee on Energy and Natural Resources Press Office http://energy.senate.gov/public/_files/PostConferenceBillSummary.doc. The full text of EPACT '05 is available from Federal Energy Regulatory Commission, www.ferc.gov.

[11] US-Canada Power System Outage Task Force *Final Report on the August 14th Blackout in the United States and Canada*, April 2004

2) Fuel Diversity Planning- The PSB determined that the State's Integrated Resource Planning Process considers fuel diversity in long range planning, and that no additional action was necessary.
3) Ensuring efficiency of Fossil Fuel Generation- Again the PSB determined that the State's integrated resource planning process considers this subject sufficiently, and no additional action is necessary
4) Smart metering- The PSB has determined it needs to consider this standard. A workshop has been held; this standard is discussed further in subsection C-5
5) Interconnection standards- The PSB has considered this standard, and offered a proposed model rule (rule 5.5) for interconnection of distributed generation. It is discussed further in section C-1.

Other major provisions: Other than tax incentives and credits, and research and development initiatives, of which there are many, EPACT creates a federal renewable energy purchase requirement, clarifies FERC's authority to site natural gas infrastructure, creates new standards for appliances and heating equipment, and provides for federal building efficiency requirements.

EPACT 2005 will have a significant effect on Vermont into the future, and the DPS and PSB will continue to monitor the implementation of EPACT and potential new federal legislation.

<u>(A-2) The Clean Air Interstate Rule and the Clean Air Mercury Rule</u>
The Clean Air Interstate Rule (CAIR), implemented by FERC in 2005, creates a federal cap and trade framework requiring 28 eastern states to substantially reduce emissions of Sulfur Dioxides (SO2) and Nitrogen Oxides (NOx). The rule is an attempt to deal with the fact that many states have been unable to meet Clean Air Act Standards because of power plant emissions from states upwind. Vermont is not one of the 28 states the rule applies to, but will benefit from the implementation of the rule as upwind states reduce emissions of SO2 and NOx. The rule will be phased in until 2015; it is expected to reduce SO2 emissions by over 70% and NOx emissions over 60% from 2003 levels. Reductions are expected primarily from power plants.

The Clean Air Mercury Rule is designed to work together with CAIR, creating a cap and trade framework for mercury emissions from coal-fired power plants. The rule intends to reduce mercury emissions from 1999 levels by 69% by 2018. Vermont has no obligations related to this rule as it has no in-state coal-fired power plants, but will benefit from its results if it is successful, as mercury emissions from plants upwind will be reduced.[12]

B. Statutory-Vermont:

During the 2005-2006 session, the Vermont Legislature was actively engaged in energy policy, passing eight significant laws concerning efficiency, renewable energy, and Vermont Yankee, among others. A short summary follows. Major issues considered in each statute are discussed in greater detail in sections below.[13]

---

[12] For more information on these rules, visit www.epa.gov/cair/index.html
[13] The entire text of each of the Acts listed below can be found at http://www.leg.state.vt.us/docs/acts.cfm?Session=2006.

(B-1) *Act 61*: Renewable Energy, Efficiency, Transmission, and Vermont's Energy Future

Act 61, passed in 2005, considered a wide range of energy issues. It created the Sustainably Priced Energy Enterprise Development (SPEED) Program. SPEED encourages Vermont utilities to engage in purchase power contracts with renewable resource developers (Discussed in subsection C-1). In establishing the SPEED program, the Vermont General Assembly targeted instate efficiency and renewables in meeting all incremental load between 2005 and 2013. Act 61 also removed the cap from the energy efficiency utility budget, directing the PSB to determine the optimal level of funding (Subsection C-2). In addition, Act 61 formalized the transmission planning process, requiring more public and local engagement in long range transmission planning (Subsections C-3 and H-2).

(B-2) *Act 74:* An Act Authorizing Vermont Yankee to go Before the Public Service Board to Seek Permission for Dry Cask Storage

Act 74 supplemented regulatory conditions necessary for Entergy (the owners of Vermont Yankee) to receive a Certificate of Public Good (CPG) to construct Dry Cask Storage at the Vernon facility. These conditions were in addition to those already set in place by the Public Service Board under 30 V.S.A. §248. (see discussion of the petition in subsection F-4). In addition, Act 74 created the "Vermont Clean Energy Development Fund," a fund intended to help foster the development of stably priced local renewable resources (see subsection C-8).

(B-3) *Act 208*: The Energy Security and Reliability Act

During the 2006 session, the Vermont General Assembly passed another omnibus energy law, Act 208. Included among the provisions of Act 208 was a provision for better and broader public engagement on key issues of the day. Act 208 provides for a "comprehensive statewide public engagement process on energy planning, focused on electric energy supply choices facing the state beginning in 2012." (See D-2 for more detail on the public process area of this statute) It also creates an advisory committee for the "Vermont Clean Energy Development Fund." The Act established Commercial Building Energy Standards, requires the PSB to create an "Electricity Affordability Program" by January of 2007 (See subsection C-7), and requires the DPS to complete an Affordability Study. The legislature also required the PSB to expand the scope of Vermont's net-metering program, increasing the maximum kilowatt capacity of facilities that may participate and allowing "group net-metering" systems (See subsection G-6).

(B-4) *Act 201*: An Act Relating to Agricultural Energy and Fuel Production

Act 201 provides assistance from the agricultural economic development special account for aid to a farmer or group in converting biomass to energy. It also provides for the development of an informational assistance website to farmers who wish to develop energy on their farm.

(B-5) *Act 168*: An Act Relating to Establishing Greenhouse Gas Reduction Goals and a Plan for Meeting Those Goals

Act 168 creates the goal of reducing greenhouse gas emissions 25% from 1990 baselines by 2012, and 50% by 2028. It provides for the creation and implementation of a climate action plan for Vermont, following the goals of the New England Governors and Eastern Canadian Premiers Conference as stated in Governor Douglas's Executive Order of December 2005.

(B-6) *Act 160*: An Act Relating to a Certificate of Public Good for Extending the Operating License of a Nuclear Power Plant:

Act 160 reiterates State policy that a nuclear energy generating plant may be operated in Vermont only if approved by the General Assembly. The Act establishes a statutory process with respect to the operation of Vermont Yankee beyond its current operating license.

(B-7) *Act 152*: An Act Relating to Establishing Energy Efficiency Standards for Certain Appliances

Act 152 establishes minimum efficiency standards for certain products sold or installed in the state.

(B-8) *Act 123*: An Act Relating to Vermont's Participation in the Regional Greenhouse Gas Initiative (RGGI)

Act 123 ensures that as Vermont designs a carbon cap and trade program, it is designed so as to permit holders of credits to trade them through the RGGI (See subsection E-1). The Act also outlines a process for allocation of the tradeable credits, and requires the DPS report to the legislature in January of each year detailing implementation and operation of RGGI, including revenues collected and expenditures made.

C. Rules, Workshops, and Regulatory Changes:

The Public Service Board and the Department of Public Service have been diligent in implementing changes in law and maintaining a sound regulatory environment. Listed below are the major rulemakings, technical workshops, and formal investigations that have been opened by the Board to address changes in the law and in response to major utility filings.

(C-1) Rulemakings -- *SPEED Program and Interconnection Standards for Small Generation*:

The PSB, in establishing the SPEED program and the standards for interconnecting small and renewable generators, proposed rules 4.300 and 5.500 on February 28, 2006. Act 61 required that new rules be in place for each by January 2007. The proposed rule 4.300 "is designed to encourage Vermont's electric utilities to purchase in-state renewable power. . . . Vermont ratepayers will see some increased stabilization of electricity rates as the Vermont utilities' rates are largely influenced by the market price for electricity. . . . " Proposed rule 5.5 "provides a standard procedure for the interconnection of distributed electrical generation with electric utilities. . . . [It] should benefit both the developers of distributed generation and the interconnecting electric utilities by providing a predictable, understandable, and efficient process for the interconnection of electric generation."[14] Technical workshops were held April 2006, the PSB responded to comments and has issued "final proposals" for rules. The Legislative Committee on Agency Rules and the Vermont Secretary of State must approve the rules before they can take effect.

In broad terms, the SPEED rule is designed to encourage contracts between developers of renewable energy projects and Vermont utilities. This serves as a complement to the establishment of Renewable Portfolio Standards in many states neighboring Vermont, and the associated renewable energy credits (RECs). The contracts that Vermont is promoting through SPEED are for the energy (the actual electrons), only allowing RECs (which represent the green attributes of renewable projects) to be sold elsewhere.[15] Combined with the new interconnection standards, SPEED provides a clear mechanism for increasing the amount of distributed, renewable generation in Vermont.

(C-2) Technical Workshops -- *Energy Efficiency Utility Budget*:
Act 61 removed the pre-existing statutory cap on the efficiency utility budget, previously set at $17.5 million. In response to the change, the PSB held a series of public workshops to fulfill the objectives of the statute and determine the appropriate level at which to set the efficiency budget. To aid the process, the DPS submitted analysis of rate and bill impacts of various funding scenarios and an Efficiency Potential Study. The Department's analysis revealed that the achievable potential relative to 2015 loads was a 19.4% reduction in electricity demand at a cost of roughly $34 million annually. If the analysis is limited to non-fossil-fuel-switching programs, then the potential is roughly 15.4% of 2015 loads, at a cost of $26.4 million in 2008. The DPS recommended that the budget for the Efficiency Utility be funded to the full level of cost-effective achievable potential ($26.4 in 2008), with the figure be transitioned into beginning with the remainder of the 2006 fiscal year.

In August of 2006, PSB concluded that the Efficiency Potential Study and DPS recommendations included conservative assumptions, and that there is greater potential for reasonably available, cost-effective energy efficiency.[16] Thus, the Board determined that the funding level for the EEU will be $19.5 million for the remainder of 2006, and $24 and $30.75 million for 2007 and 2008, respectively. The decision will increase rates by approximately 0.2, 0.5, and 1.2 percent in 2006, 2007, and 2008. The PSB will reconsider the funding amount for 2008 in 15 months or sooner, and is conducting a process to determine the range and feasibility of various ways to finance energy efficiency in order to mitigate the short-term rate impacts of the efficiency charge.[17]

---

[14] Vermont PSB http://www.state.vt.us/psb/rules/proposed/4300_5500/prop4300.htm

[15] Both initiatives help to foster the development of new renewable energy projects. However, it is the owners of the attributed or renewable energy credits (RECs) that can claim the green resource.

[16] For example, the DPS efficiency potential study assumed 50% cost incentive levels for an efficiency measures incremental cost paid to participants. The Board acknowledged that this a common assumption for efficiency potential studies, and the National Energy Efficiency Best Practices Study recommends against an 100% incentive level, but still concluded that many measures would still be cost effective at a higher incentive rate. In addition, the study did not include early-retirement measures, which replace existing appliances or equipment before the end of its useful life. Some of these measures would be cost effective.

[17] For access to all parties comments and a detailed summary of proceedings, see http://www.state.vt.us/psb/document/act61.htm#issues

(C-3) Docket 7081 – *Investigation into Least Cost Transmission Planning*:
Docket 7081 was opened to investigate the opportunities for better and more effective least cost planning for transmission system and reliability needs of Vermont Electric Power Company, Inc. (VELCO) and Vermont's distribution utilities with respect to least-cost integrated resource planning. In Docket No. 6860 (See subsection H-2), the PSB approved a transmission system upgrade proposed by VELCO and Green Mountain Power, but concluded that the upgrade might have been deferred or prevented with better long range planning by VELCO and its owners. Subsequent to this decision, Act 61 was passed, requiring VELCO to create a long-range transmission system plan and a public engagement process to implement the plan. Act 61 addressed some of the higher level concerns raised by the Board's decision in Docket 6860. It left the door open for closer review of detailed issues of coordination between VELCO and the Vermont distribution utilities, the Energy Efficiency Utility, and reliance on market mechanisms to complement transmission planning efforts in delivering least cost service. These topics are the central focus of a settlement proposal in the Board's open investigation. Given the unique and fragmented nature of the Vermont utility environment, there are no clear models from which to build.

Even without Vermont's fragmented utility environment, transmission planning represents one of the most complex areas of utility planning. Because transmission system planning is so closely tied to electricity reliability, it is also critical to public health and safety. Integration of generation planning, energy efficiency, open public process, coordination with regional entities, and overlapping regulation from federal regulators adds to the challenges for Vermont utility planners. A list of these issues and others identified by the Board for resolution is included in Appendix B to this update.[18]

Currently, parties are in the late stages of discovery and negotiation. A negotiated Memorandum Of Understanding will likely be presented to the PSB in September of 2006.

(C-4) Docket 7109, 7176 *Alternative regulation plans*:
30 V.S.A. 218d allows utilities to propose alternative regulation plans to the Board in order to move away from traditional cost-of-service regulation. Two utilities have proposed alternative regulation plans: Vermont Gas Systems (Docket 7109) and Green Mountain Power (Docket 7176). Under these plans, companies are allowed to change their rates to reflect recent actual costs caused by market dynamics, which gives assurances to investors resulting in lower capital costs and savings for ratepayers. Further, these plans are intended to provide incentives for company efficiency, by creating a "dead band," a capped margin above and below forecasted earnings. The company could keep some profits if they perform better than anticipated, and would be responsible for some losses if they perform worse. The Public Service Board has approved the Memorandum of Understanding negotiated by the DPS and Vermont Gas in Docket 7109. Testimony for Docket 7176 has been heard and the parties are awaiting the Board's decision.

[18] Vermont Public Service Board, Docket No. 7081, Order Re: Scope of Issues, 10/7/2005

(C-5) Technical Workshop -- *Time of Use pricing/metering*:
EPACT offered four standards for State Public Utility Commissions to consider adopting. The fourth standard relates to time-of-use pricing:

> Each electric utility shall offer each of its customer classes, and provide individual customers upon customer request, a time-based rate schedule under which the rate charged by the electric utility varies during different time periods and reflects the variance, if any, in the utility's costs of generating and purchasing electricity at the wholesale level. The time-based rate schedule shall enable the electric consumer to manage energy use and cost through advanced metering and communications technology. Each electric utility shall provide each customer requesting a time-based rate with a time-based meter capable of enabling the utility and customer to offer and receive such rate, respectively.

Time-of-use pricing and metering is a demand-side management technique that allows the customer to see the real-time price of electricity and adjust consumption levels based on that price. This type of load response is most effective at peak times of electricity use when prices are high. A relatively small decrease in demand could produce a relatively large drop in clearing price. This technology has great potential to help reduce the price of electricity not only in Vermont, but regionally and nation-wide. On March 15th, 2006, the PSB held a workshop on smart metering and time-based rate issues. Comments have been received and the PSB is contemplating its next steps in considering the standard.

(C-6) Docket 7174 – *Transco, LLC*:
On June 20, 2006, the PSB conditionally approved a Certificate of Public Good for VELCO, CVPS, and GMP to form Vermont Transco, LLC. Transco will acquire and VELCO will transfer substantially all of VELCO's transmission and related assets, assume most of VELCO's liabilities, and become responsible for the future of transmission infrastructure in Vermont. The transaction promises to deliver income tax savings to Vermont's retail electric utilities, to be passed onto ratepayers in the form of lower rates.

(C-7) *Electricity Affordability Program*:
Act 208 requires the PSB to draft legislation for an electricity affordability program, submitting draft legislation to the General Assembly for consideration in January 2007. The PSB held an initial workshop July 17th with the purpose of gathering collaborative input leading to the development of draft energy affordability program legislation and is considering its next steps in the process.

(C-8) *Clean Energy Development Fund*:
Act 74 created the Clean Energy Development Fund. The purpose of the fund "shall be to promote the development and deployment of cost-effective and environmentally sustainable electric power resources, for the long-term benefit of Vermont electric customers." The fund will consist of proceeds from the negotiated agreement of the state with Entergy in Docket 6812 (during the sale of VT Yankee), which will amount to $6-7.2 million per year until 2012. A revised draft report, which outlines recommendations for program design, and funding areas, along with how the first $1.3 million will be

spent, is posted to the DPS website for public comment. In addition, a public hearing will be held in summer of 2006, and the final 5-year strategic plan and annual program plan, is expected by October of 2006.

(C-9) Technical Workshop: *Integrated Resource Planning Process*:
The 2005 Vermont Electric Plan notes that the Integrated Resource Planning (IRP) process has been in place since 1991, and that the time might be ripe to revisit the process and its requirements. On June 22nd, the PSB held a workshop to "discuss specific issues associated with the preparation of the next round of utility IRPs." The Board agreed to consider short-term extensions of the IRP deadline on a case-specific basis, to give the E-23 group[19] opportunity to develop trade off criteria to potentially be used in creation of the next round of IRPs, if it chooses. The Board also acknowledged the DPS position that alternatives to decision analysis and scenario analysis may be appropriate provided the analytic methods employed accomplish similar ends. No further action is planned, unless the E-23 group or another party makes a new filing and requests another workshop.

D. Public/Stakeholder Involvement Initiatives:

The Department of Public Service recognizes the value of public involvement in the planning process, from idea generation to molding those ideas into policy. The policies created in the electric plan should be representative of the values of Vermont's citizens. The public process for the development of the *Vermont Electric Plan – 2007* is described in Section 4. Initiatives and projects have been undertaken that are designed to enhance the public process in the development of the 2007 plan and energy planning in general. They include:

(D-1) *The Participatory Energy Planning - Mediated Modeling Project*
"Mediated Modeling" is a series of ongoing workshops about the electrical energy future of Vermont. The workshops were initiated by a grant given by the Northeastern States Research Collaborative to Mediated Modeling Partners, LLC, with the goals of creating a shared understanding of the electrical energy realities in Vermont; collaborating to build a computer model which simulates interrelationships that affect cost, reliability, and environmental impact; and reaching for consensus on recommendations for Vermont's energy future.[20]

Participants were selected to represent a cross-section of stakeholders in Vermont's energy future, including participants from industry, government, non-profit organization, and consumers of electrical energy. The final workshop is in October of 2006. It is anticipated that this process will provide preliminary recommendations for Vermont's electrical energy future, providing a baseline for further public discussion during broader public outreach efforts, which are expected to include deliberative polling and public forums.

[19] The E-23 group consists of all Vermont distribution and transmission utilities and the Vermont Public Power Supply Authority.
[20] For more information on the Mediated Modeling project, see http://www.publicservice.vermont.gov/planning/mediatedmodeling.html

(D-2) *Public Engagement in Power Planning*:
Act 208, Section 2, mandates that the state "conduct a comprehensive statewide public engagement process on energy planning." The DPS and the joint energy committee shall develop this process through a request for proposal process that meets the requirements of 1) providing a strong information dissemination component, in order to develop a credible foundation of information from which to start; 2) realizing that as time passes certain options may become unavailable to Vermont; 3) engaging a broad base of Vermonters; and 4) reaching throughout the state. In addition, Act 208 requires the DPS to assist communities to identify local and regional opportunities for energy supply that will fit into the community, and to assist the communities in developing climate action plans or energy plans.

(D-3) *Citizens' Guide to the Vermont Public Service Board's Section 248 Process*:
30 VSA §248 requires companies to obtain a Certificate of Public Good from the PSB before beginning site preparation or construction of electric transmission or generation facilities and certain gas pipelines. It also requires PSB approval for some long-term contracts for purchasing power from outside Vermont and for some investments in transmission and generation facilities outside Vermont. The *Citizens' Guide*, published in March 2006, has the intent of informing the public dialogue on these issues, providing a general introduction to the process used by the Board to consider requests for approval pursuant to Section 248.[21]

(D-4) *Vermont's Electric Energy Future: Report of the Thirtieth Grafton Conference*:
The Windham Foundation is a not-for-profit organization that develops projects that will benefit the general welfare of Vermont and Vermonters. Every year they hold a conference in Grafton, VT, bringing knowledgeable participants from around the state together to discuss important issues in a free flowing, open-minded manner. The topic for the 2005 Grafton Conference was Vermont's Electric Energy Future.

The Conference focused directly on the energy challenge ahead for Vermont. Participants acknowledged that choices ahead would require trade-offs, balancing environmental, affordability, and reliability concerns, among others. They also recognized that changes are needed in the planning process, agreeing that the Legislature should give guidance to planners directing how to weigh and trade policy choices against one another. Other areas addressed include integrated resource planning, alternative regulation, and public participation.[22]

E. Regional/National Market Developments:

(E-1) *The Regional Greenhouse Gas Initiative (RGGI)*:
The Regional Greenhouse Gas Initiative is a cooperative effort by 9 Northeast and Mid-Atlantic States to design a regional cap-and-trade program initially affecting carbon dioxide emissions from power plants in the region. On December 20, 2005, seven states announced an agreement to implement the RGGI, as outlined in a Memorandum of Understanding (MOU) signed by the Governors of the participating states: Connecticut,

[21] The guide can be found at http://www.state.vt.us/psb/document/Citizens_Guide_to_248.pdf
[22] Copies of the report can be obtained by contacting the Windham Foundation at (802) 843-2211 or winfound@sover.net.

Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont.[23] On August 15, 2006, the participating states issued a model rule for the RGGI program, which details the model set of regulations as outlined in the MOU. Development of the model rule was subject to detailed public input; the response to comments resulted in an amended MOU on August 8th, 2006. The finalized rule will form the basis of individual state regulatory and/or statutory proposals to implementation. It is yet to be determined the actual impact of RGGI on Vermont.[24]

<u>(E-2) *Forward Capacity Markets*</u>:
Electricity capacity markets have been established in New England and other areas of the country in order to ensure electricity suppliers have sufficient incentive to maintain an adequate supply of generation capacity. As regional demand continued to grow in the early part of the decade, consensus built that the capacity market in New England was flawed, as 1) it became apparent that there may not be enough capacity in the region to assure reliability as early as 2008, and 2) historical capacity payments have been near zero, giving new generators and demand response providers no incentive to develop supply because fixed costs could not be recouped. This was especially true for peaking units, since they did not operate enough hours of the year to enable fixed cost recovery. Concern grew that price signals would be inadequate to spur development of new peaking generation and that both consumers and suppliers would be exposed to highly volatile prices and the risk of blackouts.

In response to these problems, ISO-New England (ISO-NE) proposed the Locational Installed Capacity (LICAP) mechanism in 2004, which FERC accepted in 2005. However, there was a broad community of interest that opposed LICAP, feeling the program was too costly and not assured to encourage any new development. EPACT 2005 encouraged FERC to "carefully consider" alternatives to LICAP; the parties negotiated a settlement mechanism called the Forward Capacity Market (FCM). In addition to lowering transition payments, the settlement:

- Treats demand response and energy efficiency as capacity eligible for payments
- Treats Self-supply as capacity eligible for payments
- Creates a market-based auction rather than have administratively set prices
- Severely penalizes generators who do not perform when called upon
- Favorably promotes intermittent resources through market rules
- Recognizes locational installed capacity needs, providing the option for ISO-NE to create another auction based on congestion problems
- Provides incentives for new generation by restricting the ability of existing capacity to set the clearing price.

The FCM is an attempt to create binding obligations to bring new capacity into the New England region and keep existing capacity available, through an auction to be held once per year for commitments three years ahead. The first auction is planned for late 2007/early 2008, for obligations to be called upon in 2010. Every year, ISO-NE will

[23] Massachusetts and Rhode Island, although cooperatively collaborating on the RGGI, elected not to sign the MOU at this time. Maryland, originally an observer to the process, has passed legislation affirming participation in RGGI.
[24] For more information on RGGI, or to see the Model Rule, go to www.rggi.org

develop an "Installed Capacity Requirement" (ICR), a three-year forecast of the required generation capability that will be used for the "Descending Clock" style auction. ISO-NE will name the starting price of the auction (two times the cost of new entry), and suppliers will indicate the quantity of supply they are willing to offer at that price. If there is extra supply, the price is lowered, and the auction is run again until a clearing price is reached. All selected facilities receive this clearing price, but only a new facility can set the clearing price (to ensure the price is not so low as to discourage new capacity from coming online). In the period before the first auction (planned for 2010), transition payments will be made to installed capacity to ensure reliable power, deferring the retirement of necessary plants, or assisting efficiency programs, etc. Penalties will be levied on facilities that receive payments and are not operational when called upon.

The extent to which Vermont utilities are exposed to or benefit from FCM payments depends on the amount of contracted or owned capacity each utility has secured in relation to their customers' demand. Those utilities that have contracts for more capacity than their demand will receive installed capacity payments, and those with higher demand than secured contracts will be forced to make payments. Vermont's anticipated short term costs and benefits associated with FCM payments are listed below in Table 2-1. Vermont can expect cost benefits in 2006 and 2007, but payments will be due in the following years. The balance is subject to change if any utility enters into a significant contract for power that includes capacity. In 2012, contracts with Vermont Yankee expire. The longer-term effect of FCM on Vermont utilities and ratepayers after 2011 depends on the replacement contracts entered into by Vermont utilities and the effects of the FCM design and incentives on electricity providers in New England.

	Variance (MW-YR)	$ Cost/(benefit)
Dec - 2006	93.12	($284,009)
2007	2.84	($103,824)
2008	-18.38	$762,653
2009	-43.15	$2,047,309
2010	-83.81	$4,475,311
Jan – May 2011	-92.84	$2,181,691
Total		$9,079,131

Table 2-1 Forward Capacity Market costs/benefits to Vermont[25]

The cost of transitional payments and FCM are considerable, but inaction could have been costly as well. Vermont’s electric industry remains vertically integrated, with load serving entities owning generation resources and long-term contracts (including FCM amounts), resulting in somewhat muted overall cost impacts to ratepayers. However, individual utilities have varying levels of exposure. The State of Vermont will continue to play an active role in the development and modification of forward capacity markets, ensuring the reliability, security, and affordability of the region’s electric grid.

[25] Variance is the annual average of contracted supply in relation to demand. The variance is multiplied by the weighted average of the transition payments from 2006-2009. 2010 and 2011 figures are estimated. All figures are subject to change as contracts are entered into by Vermont utilities.

F. Vermont Yankee:

(F-1) *Vermont Yankee Uprate*:
In 2003, Entergy Nuclear filed a proposal with the PSB to increase Vermont Yankee's generating capacity by 20%. It was given approval by the PSB in March 2004, conditioned on 1) Vermonter ratepayer protections in the sum of $4.5 million should the reliability of the plant decrease due to the uprate for a period of three years, and 2) the Nuclear Regulatory Commission (NRC) completion of an independent engineering assessment. In March of 2006, the PSB found that those conditions had been met. The PSB noted that the "NRC completed an assessment of Vermont Yankee that accomplishes the objectives of our request for an independent engineering inspection."[26] The inspection report showed no significant safety problems with Vermont Yankee, but did find several minor problems, which were remedied by Entergy before the uprate. The Memorandum of Understanding between the DPS and Entergy, among other economic benefits to the state, included over $16 million in revenues to the state from the sale of uprate power. The NRC approved the uprate on March 2, 2006. Entergy immediately began power ascension testing. The plant has been producing approximately 120% of its original power output since early June of 2006.

(F-2) *Vermont Yankee Steam Dryer*:
Because of the experiences at other uprated nuclear power plants with a similar steam dryer design to that at Vermont Yankee and the reanalysis necessary during the power ascension testing leading up to the full uprate, the Department had entered into an agreement with Entergy that if the Department had concerns about the steam dryer under uprate conditions after the power ascension testing was completed, that the Department could bring an investigation before the Public Service Board. The Department did have concerns about reliability of the steam dryer under uprate conditions. The Board on September 18, 2006, ruled that Entergy must provide additional ratepayer protection to be effective should a derate of the Station take place due to an uprate related steam dryer problem.

(F-3) *Vermont Yankee License Renewal Process*:
On January 27, 2006, Entergy Nuclear VY filed an application with the Nuclear Regulatory Commission to extend the facility's operating license for 20 years. The NRC's license renewal process is based on only two principles:[27]

1. That the regulatory process is adequate to ensure that the current licensing basis of the operating plant provides an acceptable level of safety, with the possible exception of the detrimental effects of aging on certain systems, structures, and components, and possibly a few other issues related to safety only during the period of extended operation, and

2. Each plant's current licensing basis is required to be maintained during the renewal term.

[26] Federal law preempts the PSB from addressing safety concerns of nuclear power. The engineering assessment was intended to assure reliability of the plant.
[27] Nuclear Regulatory Commission, www.nrc.gov

Issues such as Emergency Action Plans and Nuclear proliferation are considered “today” issues, meaning that they will not be addressed by the NRC in the license renewal process because they are issues that should be dealt with and considered now and at all times during the operation of a nuclear facility.

The DPS filed three contentions with the NRC Atomic Safety and Licensing Board (ASLB) regarding the License Renewal Application:

1. The application must be denied because there is no age management program for the primary containment concrete.

2. The application must be denied because the Applicant failed to include new and significant information regarding the likelihood that spent fuel will have to be stored at Vermont Yankee longer than contemplated in the General Environmental Impact Statement, and perhaps indefinitely. The necessary environmental information regarding land use has not been provided.

3. The application must be denied because the Applicant has not identified facility systems and structures that are non-safety related but if failed could prevent safety related systems and structures from accomplishing intended functions.

On September 22, 2006, the ASLB ruled that the first contention was admissible. The New England Coalition (NEC) had four contentions accepted. The DPS has adopted the contentions of the NEC and the NEC has adopted the DPS contention. A pre-hearing date has been scheduled and the parties are exchanging information related to the accepted contentions.

<u>(F-4) *Vermont Yankee Dry Fuel Storage Facility*</u>:
On April 26, 2006 the PSB conditionally approved in Docket 7082 the construction of a facility to temporarily store spent nuclear fuel at Vermont Yankee in dry casks.[28] The Board found that construction of the facility could occur without undue harm to the natural environment, without increased safety risk, and without affecting the reliability of Vermont Yankee. The Board also found that the facility was necessary in order to provide Vermont ratepayers with the continuation of favorably priced power from Vermont Yankee.

The Board found that the dry cask storage facility would further the general good of the State only with several conditions, including:

- Entergy VY must submit additional financial assurances to show that it will continue to manage spent fuel through the decommissioning of Vermont Yankee;
- Entergy VY must make changes to its Spent Fuel Management Plan to address the removal of the spent nuclear fuel, the management of the spent fuel assuming that the federal Department of Energy does not remove the fuel as presently scheduled, and management of the spent fuel until the site is returned to a "greenfield" state.

---

[28] PSB Press Release, April 26, 2006. **http://www.state.vt.us/psb/orders/2006/files/7082pressrelease.pdf**

Entergy VY has also made commitments that, in large part, meet the additional requirements that were enacted by the legislature for approval of a nuclear waste storage facility. These include:

- The total amount of spent nuclear fuel stored at Vermont Yankee will be limited to the amount derived from the operation of the facility up to, but not beyond, the end of its operating license, March 21, 2012;
- Entergy VY may not store spent nuclear fuel derived from any other source;
- Entergy VY will pay at least $15.6 million into the Vermont Clean Energy Development Fund between now and 2012;
- Entergy VY will construct a visual barrier to the storage site.

G. Other In-State Generation:

(G-1) *Coventry Landfill*:
Washington Electric Co-op (WEC) has built and opened a Landfill Gas electric generation facility in Coventry, at the state's largest landfill. Construction started in December 2004, and the plant was online fulltime by July. It currently has a capacity of 4.8 MW, and WEC has, as planned, filed a petition with the board to increase capacity to 6.4 MW.

(G-2) *E. Haven Wind Petition*:
In November of 2003, EMDC, LLC proposed a 6 MW, 4 turbine wind generation facility on East Mountain in East Haven. The case was considered in Docket No. 6911. In July of 2006, the PSB denied EMDC's request for a Certificate of Public Good to construct the facility, concluding that it would not promote the general good of the state because EMDC "failed to provide sufficient evidence concerning the impacts of the proposed Project on bats and birds – in particular, EMDC failed to conduct studies necessary to assess those potential impacts. [The Board was thus] unable to make a finding, under 30 V.S.A. § 248(b)(5), that the project would not have an undue impact on wildlife."[29]

The Board was clear that it was not sending any type of signal regarding future wind project proposals in Vermont, stating that the decision should not be read "as a rejection of the possibility of siting wind turbines on any Vermont ridgeline." They explain that §248 process and each proposal is very site specific, and a decision must be made on the merits of an individual project.

(G-3) *UPC Vermont Wind Petition*:
On February 22, 2006, UPC Vermont Wind, LLC, submitted a petition for a Certificate of Public Good, pursuant to 30 V.S.A. § 248, to the PSB requesting the authorization of the construction and operation of a 52 MW wind electric generation facility, consisting of 26 wind turbines, and associated transmission and interconnection facilities, in Sheffield and Sutton, Vermont. UPC has since filed an amended project plan with the Vermont Public Service Board, reducing the number of turbines to 16 (14 in Sheffield and 2 in

[29] Vermont PSB, Docket 6911, Board Discussion, available at http://www.state.vt.us/psb/orders/2006/files/6911fnl.pdf

Sutton), and the potential output to 40MW. The case will be considered in Docket 7156, a decision is not expected until 2007.[30]

(G-4) *Farm Methane energy*:
CVPS has created CVPS Cow Power, a voluntary tariff added to the electric bill of ratepayers who wish to support this emerging technology. Subscriptions are to capacity (extra funds go into a Renewable Energy Development Fund or to the purchase of Renewable Energy Credits, so customers know that they are guaranteed to be supporting renewable energy). One farm currently produces power under the program, and 4 others are under construction. The total electricity produced by these five grid-connected farms will equal approximately 1MW.[31]

(G-5) *Ludlow Wood Energy Generation*:
Access Energy is considering proposing a 25MW wood burning plant in Ludlow. If proposed and approved, plans call for operation to commence in the beginning of 2009. The plant would burn approximately 300,000 wet tons of wood per year, 75% of which would be transported by rail. Access Energy studied 4 southern counties in VT and concluded that there is 1-2 times the amount of wood available for sustainable harvest than what is currently being consumed.[32]

(G-6) *Net-Metered Generation*:
Net metering, originally allowed by Vermont Statute 30 VSA §219a in 1998, permits small scale, independent electric generation systems to be connected to the electric grid, running the customers meter backward when it produces more electricity than is used by the facility. Act 208 has directed the PSB to expand the scope of the net-metering program, considering a number of factors including the appropriate cap level and how to allow group net-metering systems, in a report due in December of 2006. A workshop was held in August 2006, comments have been submitted, and the PSB is considering its next steps in the process. As of August 30th, 2006, 65 Wind systems, 187 PV Systems, and 1 farm methane system have been issued certificates of public good to net-meter, for a total output capacity of 1.028 MW.

H. Transmission Projects:

(H-1) *Lamoille County Transmission Upgrade Project*:
The Vermont Electric Power Company (VELCO), along with Stowe Electric Department and Green Mountain Power Corporation, in December of 2004 filed a petition before the PSB to construct a new 115 kV transmission line from northern Duxbury to Stowe, Vermont. The purpose of the transmission line is to increase the reliability and adequacy of electric power supply to Lamoille County and adjacent areas. The line was considered in Docket 7032, and conditionally approved in March of 2006.[33]

[30] Up to date information on the UPC Wind Proposal can be found at http://www.state.vt.us/psb/document/7156upc/upc-main.htm
[31] CVPS new release, April 3, 2006
[32] DPS meeting with Dave O'Brien, Sarah Hoffman, Dave Lamont, Kevin Elliss and Bill Behling 3/15/06
[33] Vermont PSB, Docket 7032, Final Order, available at: http://www.state.vt.us/psb/orders/2006/files/7032fnl.pdf

(H-2) *The Northwest Reliability Project*:
On June 5, 2003 VELCO filed for a permit to upgrade the high-voltage transmission system between Rutland and Burlington. VELCO asserted that the project was needed to reinforce the power delivery system in Northwest Vermont, via construction of new and upgraded transmission lines and substations to satisfy reliability criteria and avoid congestion charges. The Northwest (Burlington) area of the state is the fastest growing, and is expected to continue growth. This controversial case was considered in Docket 6860. This project led directly to Docket 7180 (discussed above, subsection C-3), which is investigating Least Cost Integrated Resource Planning for VELCO's transmission system.

(H-3) *The Southern Loop*:
The Southern Loop is a 46 kV transmission line spanning 66 miles from Bennington to Brattleboro, serving approximately 40,000 customers. The "loop" receives power from 2 major sources on either side – Vermont Yankee from the East, inputs from New York and Massachusetts from the West. The increasing demand in the area puts stress on this transmission line, and if either major power source fails, some or all of the 40,000 customers would lose power 60% of the time. Even with both major generation sources operational, just a 5% increase in demand could exceed the physical capability of the loop.

Options to proactively address the potential problems of the Southern Loop are both complex and costly. They range from reducing demand through demand response or demand side management programs to adding transmission lines, or new generators at critical locations. Before proposing solutions to the Public Service Board, VELCO and CVPS (who are responsible for the reliability of the line) have taken steps to involve the public. A conference was held in January of 2006 in order to discuss the prevalent problems, and a Community Working group, which holds meetings regularly about the Southern Loop, has been developed.[34] The group has met throughout the summer and fall, holding several "open houses" to gather additional input from the public, recently resulting in recommendations provided to CVPS.

I. Vermont Utilities:

(I-1) *Credit Ratings*:
It is important for Vermont utilities to maintain solid bond ratings in order to keep ready access to capital. This preserves options to build generation and to meet the requirements for delivery of necessary transmission and distribution, when needed. Volatile market conditions can also impose unexpected demands for capital, putting a strain on Vermont's utilities. A credit rating below investment grade alerts investors to a heightened risk of default, and lenders want a higher return as compensation. In addition, utilities seek to purchase long-term contracts for power in order to hedge against the market, and sellers of power require collateral for assurances that the contract will be honored. That collateral is at a higher price if the utility is saddled with a low investment grade. And, because Vermont remains a vertically integrated cost-based environment, low investment grade ratings translate into higher costs of retail service.

[34] More information can be found at http://www.velco.com/Templates/default.asp?pageId=48

In 2005, Standard and Poor's downgraded Central Vermont Public Service Co.'s rating to "below investment grade." The other two rating companies followed suit. This downgrade does not have an immediate financial impact on CVPS or its ratepayers, as it appears that the utility has no need to issue debt or equity for capital in the short-term. However, if the company is not upgraded to "investment grade" before capital intensive projects are necessary, the poor credit rating could add approximately 0.2-0.3% to the interest rate they will pay on borrowed funds. In addition, it is possible that a low credit rating could alter management's policy decisions, shying away from capital-intensive projects that may benefit ratepayers in the long run.

(I-2) *CVPS Purchases*:
On April 7th, 2006, CVPS submitted a petition to the PSB for approval of their purchase of Rochester Electric Light and Power. The PSB approved the transaction, finding it furthers the public interest. 900 customers were affected by the acquisition, which took effect September 1st, 2006.

On July 28th, 2006, CVPS announced that it plans to purchase, with PSB approval, the southern Vermont franchise area of Vermont Electric Cooperative. The PSB has opened a proceeding to investigate. The case is being considered in Docket 7210. The transfer of assets would affect over 2700 customers.

(I-3) *Gaz Metro proposed acquisition of Green Mountain Power*:
Green Mountain Power (GMP) and Northern New England Energy Corporation (NNEEC), a subsidiary of Gaz Metro Limited Partnership who also owns Vermont Gas, have entered into an agreement where, if approved by the PSB and FERC, NNEEC would purchase GMP. Under the proposal, GMP would continue to operate as a Vermont-based company, with little changes to operating structure. The proposal has not yet been assigned a docket number, and the parties are in early stages of discovery.

J. Completed Studies:

The Department of Public Service and the Public Service Board have been busy providing studies, reports, and investigations to the legislature and the citizens of Vermont in order to ensure informed policy choices are made. Completed documents include:

(J-1) *Efficiency Potential Study*:[35]
The Department of Public Service commissioned GDS Associates, Inc. to estimate the achievable cost effective potential for electric energy and peak demand savings from energy-efficiency and fuel conversion measures in Vermont. The study, using primarily the Vermont Societal Test, shows that there is still significant savings potential in Vermont for cost effective electric energy-efficiency and fuel conversion measures. The technical potential savings for electric energy efficiency measures in Vermont was found

[35] Vermont Electrical Energy Efficiency Potential Study, executive summary. Available at http://www.state.vt.us/psb/document/ElectricInitiatives/FinalReport-05-10-2006.doc

to be 35 percent of projected 2015 kWh sales in the State, and the cost effective achievable potential was found to be 19 percent of projected 2015 kWh sales.[36]

Capturing the achievable cost effective potential for energy efficiency in Vermont would reduce electric energy use by 1,287 GWh annually by 2015. Load reductions from load management and demand response measures, which were not analyzed in this study, would be in addition to these energy efficiency savings. Table 2-2 provides a summary of the achievable cost effective energy efficiency and fuel conversion potential savings for Vermont by the year 2015. The level of cost effective energy efficiency could increase on an area specific basis in constrained or potentially constrained areas with higher T&D avoided costs.

Table 2.2 – Achievable Cost Effective Electric Energy Efficiency Potential By 2015 in Vermont

Sector	Achievable Cost Effective kWh Savings by 2015 from energy efficiency measures/programs for Vermont (Cost Effective According to Societal Test)	2015 kWh Sales Forecast for This Sector	Percent of Sector 2015 kWh Sales Forecast
Residential Sector	567,511,161	2,659,831,768	21.3%
Commercial Sector	450,383,577	2,115,167,148	21.3%
Industrial Sector	268,928,672	1,851,792,067	14.5%
Total	**1,286,823,410**	**6,626,790,983**	**19.4%**

(J-2) *Update to Fuel Price Forecasts and Avoided Costs*:
In the spring of 2005, the DPS joined with the other New England states in developing fuel price forecasts and the avoided costs for use in screening Demand Side Management (DSM) programs. The intent of this process was to determine energy supply components that will be applied for the purposes of DSM planning, evaluation, and implementation and not be regarded as proxies for the market prices of any commodity. This 2005 Avoided Energy Supply Component (AESC) Study updates prior studies, which were based on various methods including a survey of forecasts of market prices for electricity and fuels, production cost modeling, and actual experience in the energy markets (Vermont did not participate in these prior studies). The Study Group expanded the previous study scope to include estimates of avoided costs for electricity, natural gas, fuel oil, and wood. The report was finalized in December of 2005, and the results were adjusted to reflect the impacts of the damage from Hurricaines Katrina and Rita on Gulf production facilities.[37] The AESC study is essentialy a wholesale price forecast, and was used in the development of the retail price forecast, which in turn was a factor in the demand forecast (these forecasts are discussed further in Section 3). On August 25th, 2006, the PSB held a technical workshop to inform the determination of whether to adopt the DPS proposed avoided costs. The PSB is receiving comments and is considering its next steps in the process.

---

[36] A prior energy efficiency potential study for Vermont completed by Optimal Energy in January 2003 found that the maximum achievable potential savings in Vermont for electric energy efficiency measures was 30.8% by 2012. The title of this 2003 study was "Electric and Economic Impacts of Maximum Achievable Statewide Efficiency Savings, 2003 to 2012, Results and Analysis Summary".
[37] Study is available at DPS or http://publicservice.vermont.gov/pub/aescstudy.html

(J-3) *State Agency Energy Plan for State Government:*
Completed in July of 2005, this plan sets a goal of cutting energy use of state operations 15% by 2012. This plan was the first re-issuance of the State Agency Energy Plan since 1993.

(J-4) *The Climate Neutral Working Group Biennial Report*:
The Climate Neutral Working Group (CNWG) was formed by an executive order of Governor Jim Douglas in 2003. The CNWG was formed to pursue goals set by the NEG/ECP for reducing greenhouse gas emissions by state and provincial governments. In April of 2005, the CNWG produced its first biennial report to the Governor, attempting to provide a clear summary of the energy consumption and greenhouse gas inventory of Vermont, and providing potential emissions reduction strategies.[38]

K. Legislative Reports:
Act 61 required that the DPS investigate five issues and report back to the legislature. These reports were completed January 31, 2006.

(K-1) *Electricity Clearing Price Impacts from Efficiency and Renewables*:
In this report, the DPS estimated that Demand-Side Management creates an average annual reduction of $0.51/MWh for programs that reduce load by an average of 100 MW across all hours of the year. These price effects reflect lower prices, and therefore costs to ultimate retail consumers in the short term (3-5 years). However, caution is warranted in interpreting these impacts as they have policy implications. Short-term price benefits could serve to displace long term investments or actions, which could then lead to an eventual higher price.

(K-2) *Potential for Aggressive Regional Approach to Energy Efficiency and Renewables to be Integrated with Regional T&D Planning and Greenhouse Gas and Air Emissions Reduction*:
The DPS in this report notes that the potential for aggressive regional action related to energy efficiency and renewables in the short term is best tied to the actions of ISO-NE, through the development of stable and well designed markets for energy, capacity, and ancillary services. Vermont is working to ensure that the capacity market is well designed (see subsection E-2) and allows for efficient price signals to both producers and buyers, and includes adequate incentives for demand-side resources. In addition, the DPS argues that there is room for the Regional System Plan developed by ISO-NE to expand beyond transmission solutions.

With respect to the Regional Greenhouse Gas Initiative, Vermont is in a unique position as it is the only participating state with vertically integrated and fully regulated distribution utilities. Market implications of the RGGI will flow through to ratepayers, but allowances granted to Vermont will buffer the price impact of the RGGI. Funds collected from the sale of allowances can be directed to consumers and projects that are consistent with the goals of the Initiative.

[38] For the CNWG's report: http://www.anr.state.vt.us/air/Planning/docs/CNWG_1st_Biennial_Report.pdf

(K-3) *Obstacles and Opportunities for Creating a System of Energy Efficiency Credits Analogous to Renewable Energy Credits in Vermont*:
The DPS concluded that the key issues of feasibility for developing a system of tradable energy efficiency credits depend on the goals of the program. If the goal of the program is to realize additional funding for the Energy Efficiency Utility, then there is no real advantage over the existing charge. However, if the goal is to expand the opportunity for alternative sources of delivery, then further investigation may be warranted.

(K-4) *Policy Options facing Vermont in the event a System of Tradable Carbon Emission Allowances is Established in the Region*:
In December 2005, Governor Douglas signed the seven-state agreement that committed Vermont to participate in the RGGI. Vermont has also established the legislative vehicle for further progress on the issue and is the first to adopt legislation authorizing participation in the regional greenhouse gas initiative. Further progress necessary to establish and implement the RGGI system includes rules from the Agency of Natural Resources, Public Service Board rules or decisions regarding the allocation of credits or allowances, and further regional models on the details of implementation.

(K-5) *Options Being Considered by Vermont's Retail Electricity Providers and Transmission Companies for Meeting Vermont's Electric Supply Requirements in Light of the Expiration of Long-Term Supply Contracts*:
While nearly two thirds of Vermont's current energy contracts expire from 2012 through 2015, many of Vermont's utilities face contracts amounting to a sizeable share of their resource mix conclude sooner. The DPS found in this study that a common theme in the plans and goals of the electric utilities is that they are pursuing a greater diversity in fuel sources, contract types, contract lengths, start and end dates, and the size of resource contracts in proportion to load in order to limit their exposure to the uncertainties of the marketplace. Vermont's investor-owned utilities appear to be focused on market solutions, while publicly owned entities envision a broader mix of market and owned facilities.

L. In Progress or Future Studies:

(L-1) *All Fuels Potential*:
Act 208, §18 directs the DPS to "conduct a study that analyzes the related costs and benefits of establishing a coordinated and comprehensive program to maximize cost-effective energy efficiency in all buildings, regardless of a particular building's source of fuel and regardless of the income of the building owner." The study is due January 15, 2007.

(L-2) *Affordability Study*:
Act 208, §10b requires the DPS to investigate and prepare, with the department for children and families and the department of disabilities, aging, and independent living, a comprehensive report on all of the statewide public and private programs that address poverty. The study will compare Vermont's programs with others in the region and nation. It is due January 15, 2007. In addition, the PSB is required to propose draft legislation of an affordability program.

(L-3) *Clean Energy Fund*:
Act 208 amended 10 VSA §6523 requiring the DPS to "develop a five year strategic plan and an annual program plan, both of which shall be developed with input from a public stakeholder process." The initial stages of this plan are underway; the study is due by October of 2006.

The above changes illuminate the significant focus the state has placed on electrical energy issues since the 2005 *Vermont Electric Plan* was published. Many events, proceedings, or proposals in isolation may have only a small effect, but taken together significantly impact Vermont's electrical system – its adequacy, reliability, security, affordability, and sustainability.

SECTION 3: CURRENT AND FORECASTED PRICE AND DEMAND FOR ELECTRICITY

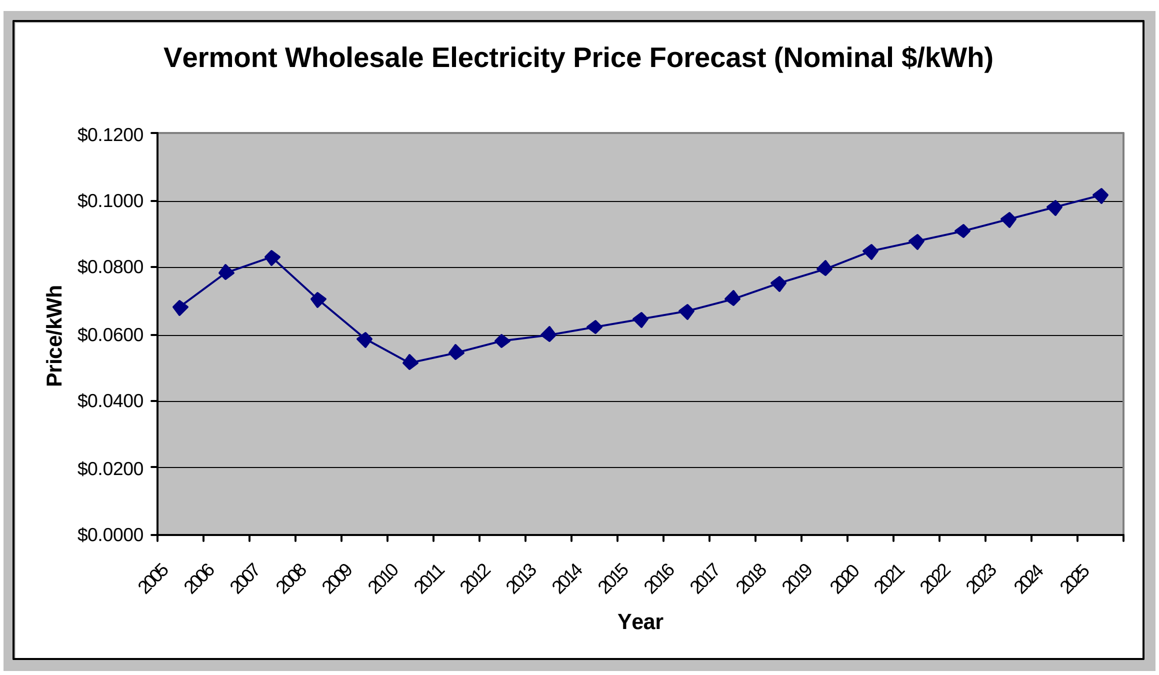
The *Vermont 2006 Electric Plan Update* provides forecasts for base electricity demand, summer peak electricity demand, winter peak electricity demand, wholesale electricity prices and retail electricity prices in Vermont for the 2006 through 2026 time period. First, the wholesale price forecast is presented as it was used in the development of the retail price forecast. Next, the retail price forecast is discussed, followed by the forecasts of Vermont's total electricity demand and peak demand. It must be emphasized that with any forecast, but especially with long-term (20 year) forecasts as presented here, certain assumptions must be made regarding future events. The Department of Public Service has made every effort to provide for the accuracy of these forecasts. However, forecasting is far from a precise science, and these forecasts are subject to revision as the facts demand.

WHOLESALE PRICES

The wholesale electricity price forecast was developed through the 2005 Avoided Energy Supply Component (AESC) Study, a regional collaboration designed to analyze the potential for avoiding energy supply costs (including electricity) through the implementation of energy efficiency programs in New England. The study's avoided costs are in essence a forecast of wholesale electricity prices. This wholesale forecast was used by the DPS in the development of its Vermont retail price forecast.

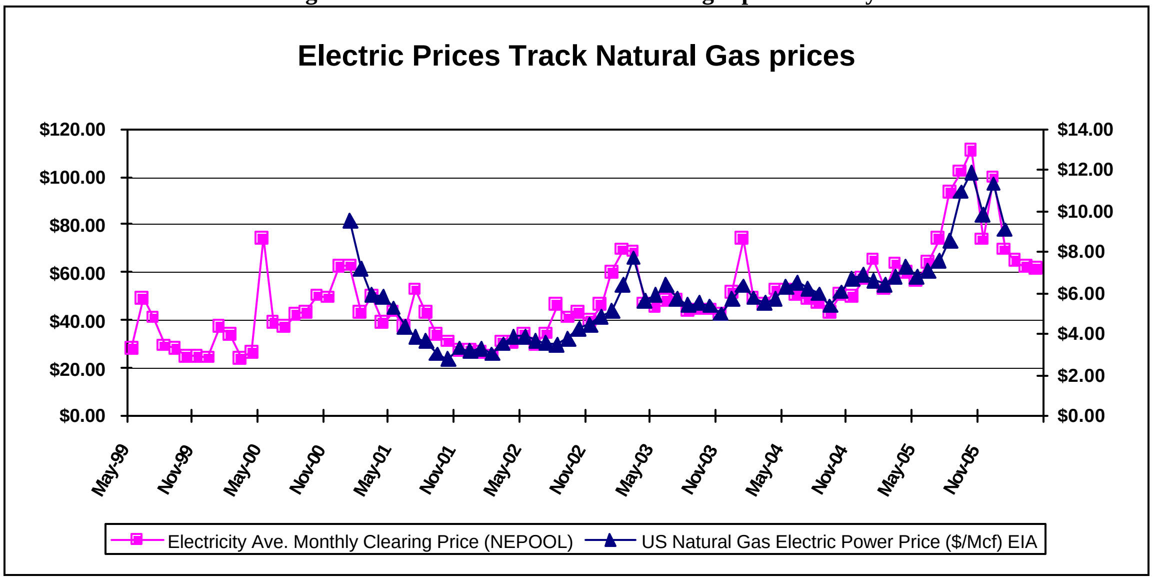
As Figure 3-1 shows, there is an expected near-term decrease in the price of wholesale electricity, which bottoms out at $0.0516/kWh in 2010 from a short-term high in 2007 of $0.829/kWh. This forecasted decrease in price is closely related to the forecasted price of natural gas.

Figure 3-1. Wholesale Electricity prices from AESC Study



Approximately 40% of the electric generation capacity in New England is fueled by natural gas. These generators are often on the margin and setting the price of electricity in most hours. As a result, electricity prices have tracked prices for natural gas (Figure 3-2). This is expected to continue, particularly in the near-term.

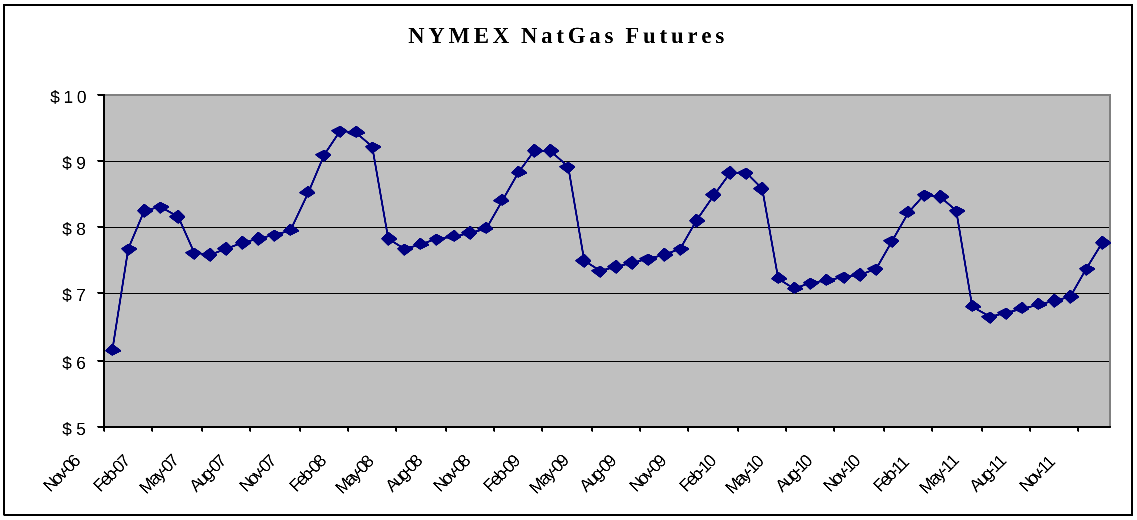
Figure 3-2. Electric Prices track natural gas prices closely



Energy traders are expecting the price of natural gas to drop in the near future (Figure 3-3). This is primarily due to the expected development of Liquefied Natural Gas (LNG), but also from new production from the Gulf of Mexico and the Rocky Mountains. Six LNG terminals are already operating on the East Coast, Puerto Rico, and Alaska. Approximately 40 more LNG terminals have been proposed and are currently either before the Federal Energy Regulatory Commission (FERC) or being discussed by the LNG industry for North America. Many analysts predict that only 12 of the 40 terminals considered will ever be built,[39] but those dozen would significantly impact supplies to the United States. The Energy Policy Act of 2005 gave FERC clear authority over the siting of LNG terminals.

[39] www.ferc.gov

Figure 3-3, NYMEX Natural Gas Futures as of 10.13.06



As an energy source for Vermont and the region, LNG brings with it significant uncertainties. For the fuel resource to affect prices and reliability in New England, siting of terminals and storage in or near the region is necessary. One plant has been proposed for Fall River, MA, another in Canada. In addition to infrastructure needs, New England and the rest of the country will be competing for supply with developing nations. It is not certain the United States will be able to gain access to LNG in quantities great enough to meet demand. Prices of natural gas, and wholesale prices of electricity, will depend heavily on the infrastructure for and access to LNG. These prices will, in turn, affect the retail rate.

HISTORICAL DEMAND

The annual demand for electricity in Vermont averaged a 1.27% growth rate from 1990-2000. From 2000 - 2005, the average annual growth rate was only 0.89%. The slower rate over the last 5 years can be attributed to a number of factors, including a greater emphasis placed on demand-side management programs. Tables 3-1 and 3-2 present the historical electrical sales data for Vermont since 1990.

Table 3-1. Vermont total electricity sales by sector, 1990-2005

Year	Residential Sales (MWh)	Commercial Sales (MWh)	Industrial Sales (MWh)	Other Sales (MWh)	All Sector Sales (MWh)
1990	2,044,016	1,486,247	1,391,374	39,483	4,961,121
1991	1,998,359	1,495,404	1,388,779	40,446	4,922,989
1992	2,052,048	1,528,585	1,440,803	42,187	5,063,623
1993	2,010,568	1,566,231	1,431,005	40,024	5,047,828
1994	2,016,298	1,585,439	1,425,882	40,094	5,067,713
1995	1,978,870	1,600,953	1,476,087	39,416	5,095,326
1996	2,005,686	1,643,057	1,531,469	38,358	5,218,570
1997	1,986,464	1,672,972	1,609,000	38,195	5,306,631
1998	1,951,304	1,853,217	1,514,356	38,930	5,357,806
1999	1,993,991	1,897,410	1,593,169	38,650	5,523,220
2000	2,034,715	1,900,823	1,652,163	40,505	5,628,205
2001	2,009,279	1,920,847	1,611,750	41,182	5,583,058
2002	2,046,101	1,943,752	1,592,436	41,576	5,623,866
2003	2,128,702	1,911,512	1,561,371	41,505	5,643,089
2004	2,141,488	1,926,616	1,638,954	41,366	5,748,424
2005	2,188,784	2,036,654	1,619,018	38,028	5,882,483

Table 3-2. Change in electric sales

	Residential Sales (MWh)	Commercial Sales (MWh)	Industrial Sales (MWh)	Other Sales (MWh)	All Sector Sales (MWh)
Time Period	**Average Annual Percent Change**				
1990-2000	-0.05%	2.49%	1.73%	0.26%	1.27%
1990-2005	0.46%	2.12%	1.02%	-0.25%	1.14%
2000-2005	1.47%	1.39%	-0.40%	-1.25%	0.89%

DEMAND FORECAST

This Electric Plan Update provides an annual forecast for base electricity demand in Vermont, at the retail level, for the 2006 – 2026 time period. It also provides an annual forecast for summer and winter peak demand, at the wholesale level, over the same time horizon. The forecast considers what the future demand (both base and peak) for electricity in Vermont may look like under two scenarios: 1) If new Demand Side Management (DSM) programs are pursued to their full cost-effective and achievable potential[40] and 2) if no new DSM programs are implemented after 2008. This second scenario is not a projection of the status quo. DSM programs have been in place in Vermont for 16 years and can be expected to continue at some level. The "Without Future DSM" scenario is intended to examine what Vermont's electric energy demand may look like if these programs ceased all together. The forecast includes the existing stock of DSM, annual additions to this stock and annual reductions attributable to decay. The decay rate is a measure of the life of an efficiency measure and can range between 1 and 30 years. For example, compact florescent light bulbs (CFL) have an estimated life expectancy of 4 years; the electricity savings attributed to CFLs installed in 2006 can be expected to exist through 2010, after which electricity demand would rise by an amount equivalent to 100% of the savings. In order to capture present and future changes in technology, Energy Star requirements, consumer behavior, etc, that could lead to

---

[40] See the Vermont Electric Energy Efficiency Potential Study, GDS Associates, Inc., July 21, 2006. A Summary can be found in section J-1

increased efficiency, this forecast uses a decay rate that is half of the current rate for historical DSM measures. The lower decay rate serves as a proxy for a multitude of factors that can be expected to partially mitigate the decline in historical DSM measures. The "With New DSM" scenario assumes new additional DSM savings averaging approximately 88,624 MWh per year, through the year 2015. These incremental savings are then expected to decline to an average annual amount of 51,797 MWh of new savings. The "Without New DSM" forecast calls for no new DSM programs after the current EVT contract expires at the end of 2008. The only DSM effects that persist will be those of the existing, but declining, DSM stock. This stock is assumed to decay just as the DSM stock does in the "With New DSM" scenario.

The forecast does not assume any structural changes in rate design or pricing mechanisms per se, but it does include a price forecast that considers the impacts of increased or decreased levels of DSM on price. The forecast also includes projected future values for DSM under the two scenarios. The methodology used to develop the forecast, along with the associated statistical tests, can be found in Appendix B.

Figure 3-4. Historic & Projected Vermont Electric Sales

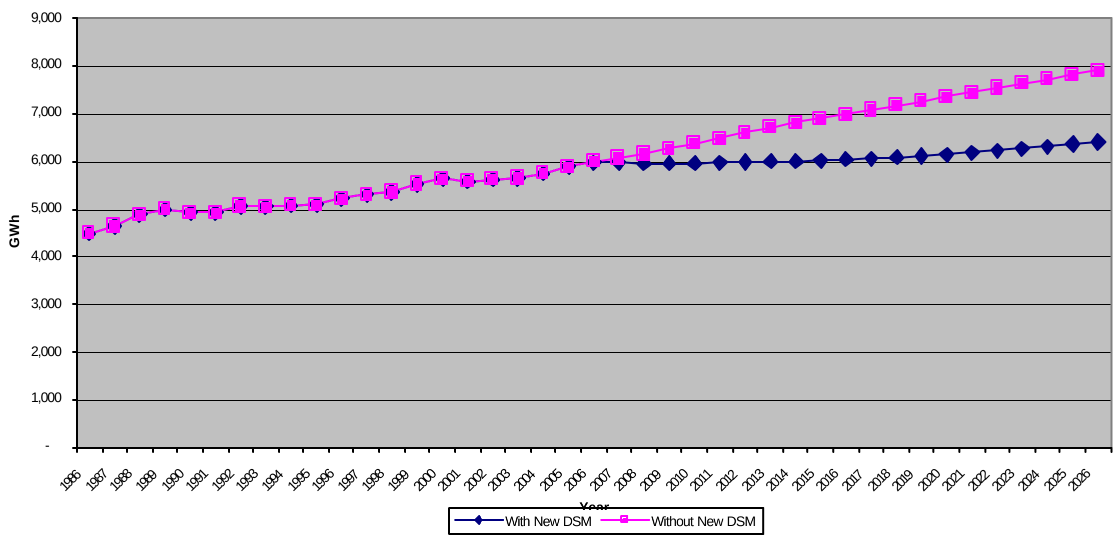


Table 3-3. Historic & Projected Vermont Electric Sales

Year	Total Sales with New DSM (GWh)	Total Sales W/o New DSM (GWh)	Year	Total Sales with New DSM (GWh)	Total Sales W/o New DSM (GWh)	Year	Total Sales with New DSM (GWh)	Total Sales W/o New DSM (GWh)
1986	4495	4495	2000	5628	5628	2014	5965	6761
1987	4642	4642	2001	5583	5583	2015	5967	6847
1988	4885	4885	2002	5624	5624	2016	5985	6930
1989	4995	4995	2003	5643	5643	2017	6002	7012
1990	4926	4926	2004	5748	5748	2018	6024	7099
1991	4923	4923	2005	5882	5882	2019	6042	7186
1992	5064	5064	2006	5911	5941	2020	6065	7277
1993	5048	5048	2007	5918	6020	2021	6102	7364
1994	5068	5068	2008	5925	6114	2022	6136	7449
1995	5095	5095	2009	5929	6237	2023	6172	7535
1996	5219	5219	2010	5932	6342	2024	6207	7617
1997	5307	5307	2011	5937	6447	2025	6243	7697
1998	5358	5358	2012	5952	6564	2026	6278	7777
1999	5523	5523	2013	5961	6669			

Base Electric Demand (Base Load Forecast)

Base electric energy demand represents the overall amount of electricity consumed by Vermont in a given year. This analysis considers base electric demand at the retail level (after all losses that occur between the point of entry to the grid through to the consumer's meter). The forecast model includes factors representing the amount of electricity provided historically by utilities, the estimated DSM savings provided by Efficiency Vermont and Vermont utilities, population, real disposable personal income, the unemployment rate, and the retail price of electricity. Historical data series over the 1986 – 2006 time period were used to estimate the l coefficients for each of these variables.

If DSM programs are implemented as prescribed in the Department's recent report, Vermont Electric Energy Efficiency Potential Study, Vermont's base demand for electricity is expected to grow at an average annual rate of 0.30% (See Figure 3-4).[41] If the current levels of DSM, as proposed by the energy efficiency utility, are not continued beyond the 2008 contract period, then Vermont's base demand for electricity is projected to grow at an average annual rate of 1.36%. Vermont base electric sales have grown at approximately 1.45% per year over the past decade (1995 to 2005). These figures demonstrate both the potential and risk of new DSM programs. If DSM programs are continued at sufficient levels and their anticipated effectiveness is realized, this forecast suggests they could significantly reduce annual base load growth. However, if they are not continued at sufficient levels and/or their anticipated effectiveness is not realized,

[41] Report date is July 21, 2006 as prepared by GDS Associates, Inc. The forecasted values used in the projection do not include DSM savings attributable to fuel switching.

then Vermont's base load growth can be expected to continue to grow as it has recently or potentially at larger rates not seen in several years.

Seasonal Peak Demand (Peak Load Forecast)

Seasonal peak electric demand is defined as the greatest use of electricity, in an hour, within the summer and winter periods. Peak electric demand is a major determinant for setting the capacity of an electric supply system because a reliable electrical system is one that can meet every hour of demand. Winter and summer demand peaks are forecasted by applying winter and summer seasonal load factors to a base energy forecast. For purposes of this analysis, the previously described base model is used with an adjustment for line losses that are incurred on the local wire systems. Seasonal load factors are then applied to these "gross" sales figures. The seasonal load factors are essentially the same load factors derived by ISO-NE for Vermont as part of its annual reporting requirements.[42]

Peak electric use is determined by several factors, most notably the weather and the size of the underlying base demand. In the summer months, temperature and/or humidity can create excessive demand for electricity to run air conditioners. In the winter, extremely cold temperatures can create excessive demand for electricity to provide heat. Such conditions will typically only produce a spike in demand on weekdays when businesses are operating. Furthermore, these spikes in demand typically are part of a larger weather pattern or cycle. In other words, a peak in demand does not usually occur as the result of an isolated hour's event, but rather occurs at the end of a "build-up period".

In addition to weather factors, peak electric demand is also determined by the overall size and characteristics of the customer base and how this base responds to changes in the weather over time. Vermont's economy and population have grown over time and are expected to continue to do so. As this base grows there are more customers to respond to a heat wave/cold snap, so the peaks will grow in size. Since the 1980s Vermont has been moving away from electric heat and has instituted demand management programs such as interruptible service contracts. The effect of these changes has been to moderate the size and growth of the winter electric peak. However, with the growing use of air conditioners in private homes and commercial office space retrofit, the summer peak levels have increased in recent years. The seasonal peak forecast methodology used for this updated Electric Plan considers all of these factors.

The seasonal peak forecast used for this updated Electric Plan is based on work performed by ISO-NE. ISO-NE has developed a comprehensive database that allows it to consider: historic weather patterns (including hourly data), how peak electric demand has reacted to those patterns, and also how peak demand has changed with base electric demand, in each of the six New England states, over time. The forecast methodology developed by ISO-NE is complex and not published. A summary description of the methodology can be found in Appendix B.

In the "With New DSM" scenario, Vermont's summer and winter peak demands for electricity are expected to grow at average annual rates of approximately 0.53% and –0.86%, respectively (See Figures 3-5 and 3-6, below). In the "Without New DSM"

[42] 2006 Forecast Report of Capacity, Energy, Loads and Transmission. ISO-New England, April 2006.

scenario Vermont's peak demand for electricity is projected to grow at an average annual rate of approximately 1.64% and 1.26%, respectively. This growth is higher than recent history because after 2008, without new additions to the DSM stock, decay in the existing measures can be expected to reduce the state's consumption-efficiency and correspondingly increase its demand for electricity. Vermont's summer and winter demand peaks have grown at approximately 2.14% and 0.99% respectively, over the past decade (1995 to 2005), with DSM measures in place. These projected and historical figures indicate both the large potential and risk of DSM, as a tool for managing Vermont's capacity requirements. The forecast anticipates both larger and more effective DSM initiatives than have historically occurred. Programs of this anticipated size have never been tried before n Vermont. If these expectations are realized, the forecast demonstrates the very large potential for reducing Vermont's peak load growth.. Likewise, recent history demonstrates the potential risk—continued higher growth in peak demand—if these programs are not sustained at sufficient levels and/or their anticipated savings are not realized.

Figure 3-5. Historic and Projected Vermont Summer Peak Load

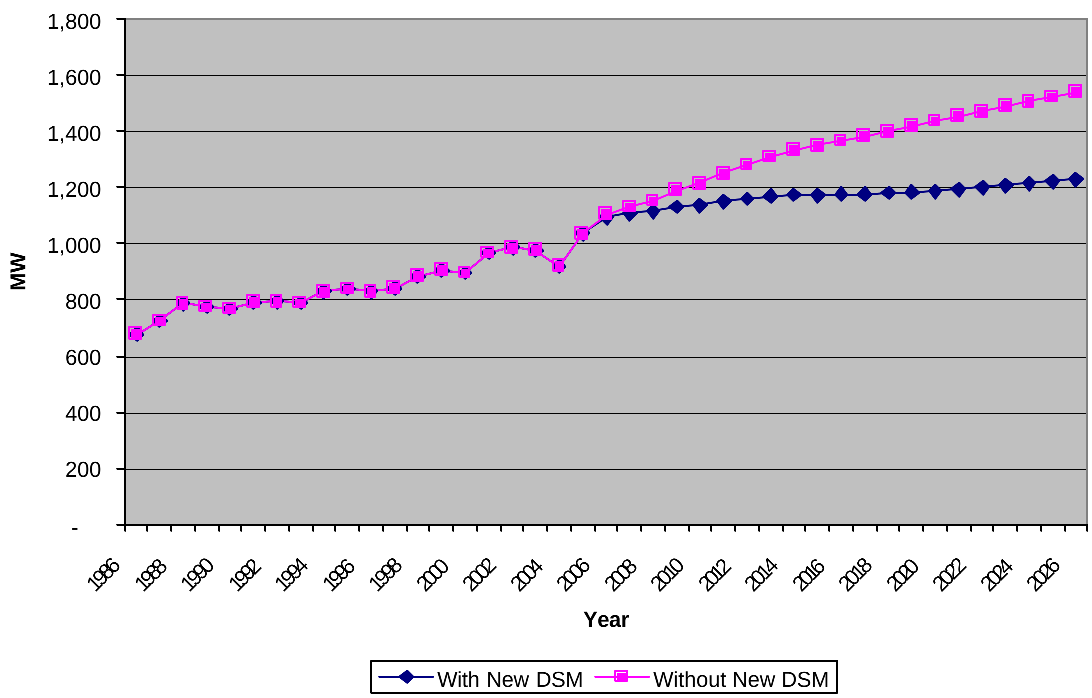


Figure 3-6 Historic & Projected Vermont Winter Peak Load

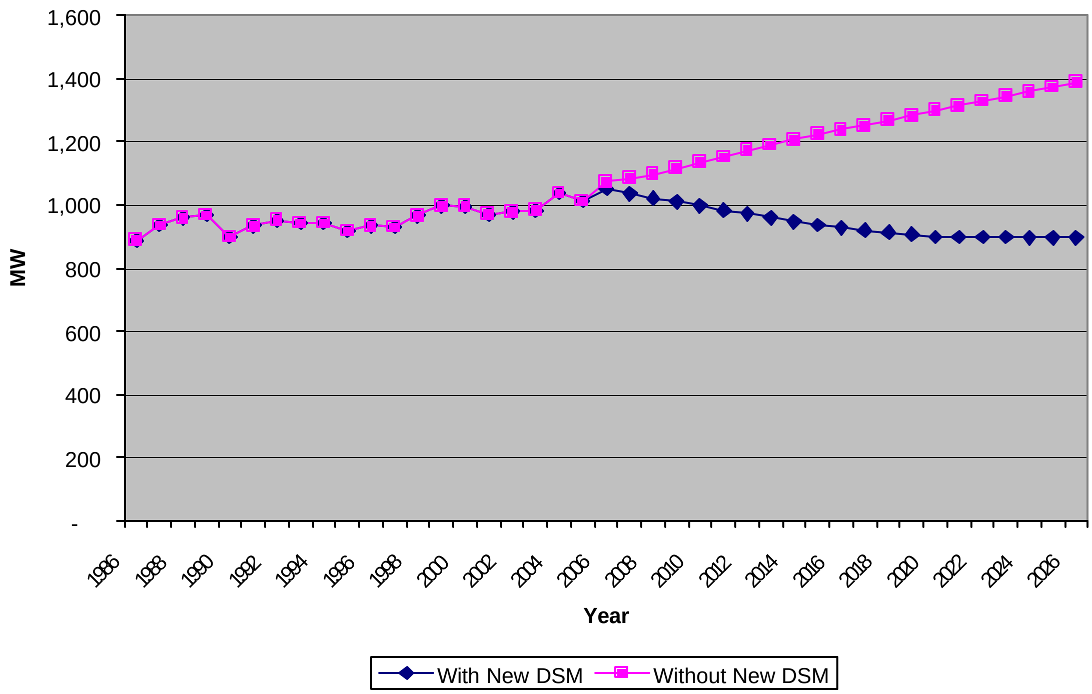


Table 3-3. Historic & Projected Vermont Electric Sales

Year	Summer Peak With New DSM (MW)	Summer Peak Without New DSM (MW)	Winter Peak With New DSM (MW)	Winter Peak Without New DSM (MW)
2006	1,084	1,094	1,040	1,063
2007	1,098	1,123	1,027	1,076
2008	1,109	1,147	1,016	1,090
2009	1,126	1,185	1,005	1,110
2010	1,131	1,210	991	1,128
2011	1,144	1,243	978	1,146
2012	1,154	1,274	966	1,165
2013	1,162	1,302	953	1,183
2014	1,166	1,325	940	1,198
2015	1,163	1,341	927	1,214
2016	1,165	1,357	919	1,228
2017	1,166	1,372	910	1,241
2018	1,168	1,389	902	1,255
2019	1,170	1,405	894	1,270
2020	1,172	1,422	886	1,285
2021	1,178	1,439	885	1,299
2022	1,183	1,454	883	1,313
2023	1,188	1,470	881	1,326
2024	1,193	1,486	879	1,340
2025	1,199	1,501	877	1,353
2026	1,204	1,516	875	1,365

SECTION 4: PUBLIC INVOLVEMENT IN POWER PLANNING

The Department of Public Service will conduct, in partnership with duly appointed members of the Vermont General Assembly, a comprehensive, statewide public engagement process on energy planning related to the *Vermont Electric Plan – 2007* and *Vermont's Comprehensive Energy Plan*, especially focused on energy supply choices facing the state beginning in 2012 and beyond. The purpose of the process will be to gather meaningful and informed public input about values and preferences of Vermonters regarding energy supply and to educate the public about the energy supply challenges facing the state. This process will be comprised of the following components:

A. A scientific polling method, such as deliberative polling, designed to involve members of the State of Vermont, through a representative sampling;
B. A facilitated web-oriented process, intended to broaden the reach of the overall public engagement; and
C. Town meetings and community outreach activities.

The choices to be made have great implications for the social, economic, and environmental condition of Vermont. Due to the significance of the choices, public input, understanding, and support for the ultimate choices is essential. However, too often the traditional public processes tend to draw committed advocates rather than a broad cross-section. Too many times public engagement means nothing more than people lining up to speak into a microphone for the record without the dialogue necessary to make the difficult choices. Furthermore, the level of perceived urgency is high among advocates but low (although probably increasing) within general public. All Vermonters are stakeholders, demanding approaches that reach throughout the state. The department seeks to educate the public on a highly technical subject matter in a relatively short amount of time, and then utilize the informed input in policy choices for the future.

The Legislature, in Act 208, has re-emphasized the need for public engagement in power planning, recognizing that much of Vermont's contracted power supply expires in 2012. The Legislature attempts to ensure the public has a credible foundation for meaningful dialogue, that all Vermonters are engaged, and that all beneficial energy opportunities are realized.

To begin this process, the Department of Public Service has sponsored an independent project called Mediated Modeling. This is a small group (22) of diverse, representative stakeholders that meet 12 half-days to seek consensus on what constitutes valid data and a supportable model for energy resource decision-making. The process seeks to create credible data and a robust model for use in future dialogue and decision-making around energy issues. The model will provide a user-friendly tool to help inform the public of various policy choices, allowing high quality input into the planning process.

The opportunities emerging energy trends noted in Section One must be considered with informed, thoughtful, non-partisan debate leading to fundamentally sound policy choices that further the public interest. The DPS believes that the public involvement process ahead is vital to a useful plan that will offer a menu of strategies for implementation by both public and private entities.

THIS PAGE IS LEFT BLANK INTENTIONALLY

APPENDIX A – LIST OF ISSUES FOR RESOLUTION IN DOCKET 7081

1. What is the scope of VELCO's current transmission planning, and should it be modified?
2. Should VELCO be required to develop a least-cost integrated resource plan for bulk transmission needs? If so, who should be responsible for identifying, implementing, and funding the least-cost solution for meeting those needs?
3. Are additional planning tools needed to achieve the goal of meeting resource needs at the lowest societal cost?
4. Should regulatory or market mechanisms or standards be modified to promote the identification, development, and implementation of least-cost solutions?
5. What should the public's involvement be in the planning process for Vermont's bulk transmission system?
6. How can the interests of ratepayers be sufficiently protected in the development and implementation of a least-cost integrated resource plan for bulk transmission needs?
7. Should a rate-impact assessment, a financial-impact assessment, and an integrated financial plan be included in least-cost transmission planning? If so, should the impact assessments and overall financial plan reflect the financial impacts on Vermont ratepayers, Vermont utilities, and the Vermont economy of implementing and funding various transmission and non-transmission alternatives?
8. How should Vermont distribution utilities coordinate with VELCO and with each other in (i) developing and implementing least-cost solutions for meeting bulk transmission needs, and (ii) undertaking other planning activities, including the distribution utilities' least-cost integrated resource planning, distributed utility planning, and issuance of Act 250 "ability to serve" letters?
9. How, and to what extent, should VELCO and the distribution utilities coordinate with other providers of services, including the Energy Efficiency Utility and market providers, to promote delivery of least-cost solutions to bulk transmission needs? What standards of performance should apply to any entity that proposes to implement a market-based solution?
10. How, and to what extent, should VELCO and the distribution utilities coordinate with the Agency of Natural Resources and other permitting agencies to develop least-cost solutions to bulk transmission needs?
11. What barriers exist to the planning and implementation of least-cost solutions for bulk transmission needs? How can those barriers be overcome?
12. How should planning in Vermont for bulk transmission needs be integrated with (i) the NE-ISO's regional market and planning responsibilities and (ii) federal regulatory requirements (principally, FERC regulation and homeland security requirements)?
13. How should VELCO and the Vermont distribution utilities be developing their forecasts of need for purposes of determining the adequacy of bulk transmission facilities?
14. What should be the roles of the Public Service Board and the Department of Public Service in the development and implementation of a least-cost integrated resource plan for bulk transmission needs?

15. Should any new entities be created, or existing entities modified or relied upon, for the development and implementation of a least-cost integrated resource plan for bulk transmission needs?
16. How should we ensure that non-transmission alternatives are given timely consideration in the identification of least-cost solutions? Conversely, at what point should consideration of non-transmission alternatives stop, and traditional, transmission solutions be implemented?
17. To what extent should planning for Vermont's bulk transmission system needs be integrated with planning efforts for the replacement of existing, significant power supply resources that are scheduled to expire over the next decade?
18. Does the Board need to revisit its decisions in Dockets 5980 and 6290?
19. What measures, if any, should be put in place to improve the accuracy of cost estimates for transmission and non-transmission alternatives?
20. How should the plan for Vermont's bulk transmission system be updated? In particular, what should be the scope of updates, the interval between updates, and the regulatory process for review of updates?

APPENDIX B: FORECAST METHODOLOGY

Appendix A outlines the methodology used by the Department of Public Service's Planning Division to create the base electric demand and peak electric demand models. For a more detailed description of the full methodology and data sets used, please contact the Vermont Department of Public Service's Planning Division.

DEMAND FORECAST MODEL

The Demand Forecast Model can be expressed in general notation as follows:
$(E_t + DSM_t) / Pop_t = f([RDPI_t / Pop_t], Urate_t, RPrice_t)$ where:

E_t is the amount of electricity utilities reported providing to consumers in a calendar year (t).
DSM_t is the estimated Demand Side Management savings in each year (t).
Pop_t is the population for Vermont in each year (t).
$RDPI_t$ is the amount of Real Disposable Personal Income for Vermont in each year (t). Real Disposable Income is income that is measured after the affects of inflation and income taxes are accounted for. Everything else equal, the more income people have to consume with, the greater their demand for goods and services (including electricity).
$Urate_t$ is the annual unemployment rate for Vermont.
$RPrice_t$ is the annual average real price of electricity (across all sectors).

- The Adjusted Coefficient of Determination (Adj. R^2), which provides a measure of the models ability to explain the demand for electricity, is 0.97 (1.0 being the maximum score).
- The price elasticity for the demand forecast model is -0.14. For every unit increase in price, the demand will drop 0.14 of a unit.
- The Durbin-Watson score is 2.11. This indicates there is no significant tendancy for the model to systematically under or overestimate the demand for electricity.
- The Belsley Test indicates multicolinearity in the data set. Multicolinearity describes a condition in which one or more of the model's drivers (RDPI, Urate, Price, Pop) can be combined with one or more other drivers to predict one of the drivers. While a mis-specified model can introduce multicolinearity, it is ultimately an artifact of the data being used and is a frequently encountered problem when examining time series data. The presence of multicollinearity in the data set does not adversely affect the overall predictive power of the model, but it can make it difficult to assign a measure of influence to any one of the model's drivers (coefficients). Various statistical techniques for dealing with multicollinearity were tried, including Ridge Regression, but none could improve the results. The Pearson correlation coefficients suggest some collinearity between the RDPI and Urate drivers.

Summer Peak Forecast Model
The Summer Peak Forecast Model can be expressed in general notation as follows:
$\text{Summer Peak}_{Day,Time} = f(\text{temp. \& humid.}_{Day,Time}, CLI, CBLI, MDV, FDV, Base_t)$
where:

Temp. & humid$_{Day,Time}$ is a weighted temperature and humidity index obtained from 37 years of weather data;

CLI is the Cooling Load Index, designed to provide a measure of peak load sensitivity to temperature and humidity;

CBLI is the Cooling Base Load Index, designed to provide a measure of peak load sensitivity to economics and demographics;

MDV and FDV are Monday and Friday dummy/indicator variables. Peaks occur on weekdays when businesses are open but the weekdays of Monday and Friday do not tend to have peaks because they occur at the start and end of the work week or in other words when activity is just getting started and diminishing, respectively. Accordingly, treating Monday and Friday like any other weekday would not provide an accurate measure of when peaks occur.

Base$_t$ is the annual base energy demand but in this case is derived using wholesale electric sales data from the Vermont Electric Company (VELCO). This data excludes power transmitted to New Hampshire via the VELCO system.

The Summer Peak model includes five equations, one for each month (May through September). The coefficient of determination (R^2 , it provides the measure of the ability of the model to explain peak summer demand) for each of these months are, respectively: .49, .81, .85, .89 and .65.

Winter Peak Forecast Model

The Winter Peak Forecast Model can be expressed in general notation as follows:

Winter Peak$_{Day,Time}$ = f (temp$_{Day,Time}$, HLI, HBLI, MDV, FDV, Base$_t$) where:

Temp. $_{Day,Time}$ is a weighted temperature index obtained from 37 years of weather data;

HLI is the Heating Load Index, designed to provide a measure of peak load sensitivity to temperature;

HBLI is the Heating Base Load Index, designed to provide a measure of peak load sensitivity to economics and demographics;

MDV and FDV are Monday and Friday dummy/indicator variables. Peaks occur on weekdays when businesses are open but the weekdays of Monday and Friday do not tend to have peaks because they occur at the start and end of the work week or in other words when activity is just getting started and diminishing, respectively. Accordingly, treating Monday and Friday like any other weekday would not provide an accurate measure of when peaks occur.

Base$_t$ is the annual base energy demand as described in Section 1, but in this case derived using wholesale electric sales data from the Vermont Electric Company (VELCO). This data excludes power transmitted to New Hampshire via the VELCO system.

The Winter Peak model includes an equation that captures all the months using additional dummy variables for each month (October through April). The R^2 (measuring accuracy) for this model is .84.