Clean Energy For Vermont:

A Plan Today for Tomorrow

Vermont Public Interest Research and Education Fund

Summer 2004

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Executive Summary:

Energy planning in Vermont stands at a crossroad. In little more than a decade, the sources of two-thirds of our energy may be shut down or priced out of reach. The Vermont Yankee nuclear plant's federal license expires in 2012; the state's contract with Hydro Quebec expires in 2016. The Bush administration's federal energy policy continues to push increased reliance on coal, oil and nuclear power, forcing a critical decision on Vermont: Do we remain reliant on dirty, dangerous and expensive energy sources, or do we create a new vision for our energy future, one relying on efficiency and renewable energy, stressing energy independence?

The last time Vermont wrestled with an energy agenda this momentous, the state's utilities -- with approval from regulators -- signed a disastrous 25-year contract with Hydro Quebec. Rates paid through that contract continue to be at above-market levels -- one reason Vermont has some of the highest electric rates in the country. That contract was negotiated largely in secret, with the public unable to participate or comment on the deal. Similarly, the Department of Public Service's first draft of its 20-year energy plan was written behind closed doors -- only to be rescinded in the face of public outcry. A second draft was made public only after VPIRG Open Documents requests forced the department to share its work with the outside world and a promised public comment process has not yet been outlined. VPIRG believes full, open discussion is essential to energy planning, as it is to all public planning. Decisions made today will affect Vermonters for generations; all Vermonters must have the right raise their voices in the process.

In the last decade Vermont has fallen behind neighboring New England states in its commitment to clean, renewable, local energy resources. As we look beyond our reliance on Vermont Yankee and Hydro-Quebec, we should see the opportunity to take responsibility for our energy future to save money, improve our environment and strengthen our economy.

We must re-envision our energy portfolio, seeing beyond the narrow perspectives of old fuel sources and market rates. Our new vision must be grounded in the real world with its real limitations, but we must not be blind to opportunities and technologies that were unavailable in the past.

An important concept clearly absent from the administration's energy proposal is Least Cost Integrated Planning (LCIP or Least Cost Planning). LCIP directs us to examine not just the market rate for electricity, but the total societal cost of energy's production, transmission and use. The administration's approach to energy planning -- even in its current, revised draft -- is the opposite of Least Cost Planning -- a narrow, short-term focus on reducing rates for the biggest consumers in the state. This ignores the effect of energy choices on our health, our environment and results in higher rates for residential consumers and Vermont society as a whole. VPIRG seeks to correct this oversight. LCIP is the foundation upon which VPIRG's vision is based.

VPIRG's vision of Vermont's energy future is bright. Vermonters are known for tackling difficult questions and leading the nation with innovative solutions. A few of our many resources: Efficiency Vermont, a nationally-recognized leader in energy innovation, saves energy and money for Vermont businesses, protects the environment and strengthens our economy almost immediately with every cent it receives from taxpayers. Burlington's municipal electric utility, Burlington Electric

Department, uses in-state, renewable energy sources and invests aggressively in efficiency - yet still charges rates a third lower than the state average, proving clean energy and affordability not only can thrive together, but are in fact connected. Finally, VPIRG has the support of thousands of Vermonters for our energy plan and concrete proposals to increase funding for efficiency and renewables and make these our primary energy solutions, rather than bigger nuclear plants. Around the state we see that elements of our vision are not only possible, but are already taking root and need only be nurtured to blossom into a sustainable energy future

At VPIRG we also know good planning considers structural and institutional change and involves the public. We believe the best decisions about Vermont's energy future will be made by listening to Vermont citizens. In a democracy, the public has a moral and civic right to be involved in decision making, and public ownership of those decisions will expedite implementation. Our plan not only discusses what mix of energy can be created in Vermont but how discussion, debate and dialogue can create an energy future as homegrown as the renewable energy sources Vermonters prefer.

The Electric Energy Mix in 2025

Vermont can create an electric energy portfolio by 2025 that is: adequate, reliable, secure, sustainable, efficient, primarily renewable, affordable for all and environmentally sound. Such a portfolio would include the following components in roughly the percentages shown below:

- Energy Efficiency 25%
- CT River Hydro-Electric Dams 17%
- Commercial Wind Energy 15%
- New Biomass 8%
- Existing Biomass 4%
- Hydro: Independent Producers 2%
- Other Vermont Hydro (existing) 5%
- Customer-Sited Generation 4%
- Innovative Partnerships 5%
- Market Purchases/In-state Peaker 15%

It will take coordinated planning and implementation to assemble the components of this 2025 electric energy portfolio. But ambitious goals are not unattainable goals; we should neither be slow to act nor afraid of consequences. It may be that new obstacles and opportunities arise to change the ultimate portfolio. But without a vision for the future, utilities and businesses will use money and political influence to secure their own interests and the public interest will be overlooked and underserved. Failure to plan aggressively will leave Vermont with higher rates, more pollution and vulnerability to supply interruptions and price escalation. With so much at stake, failure to plan or refusal to plan due to "the uncertainty of the future" is unacceptable.

VPIRG believes this report is the beginning of a vision for Vermont's energy future. How to implement this plan warrants extensive discussion and VPIRG welcomes all parties to that discussion. There are opportunities in this proposal for legislators, regulators, utilities, businesses and Vermont citizens. It will take all of us, working together, to build an energy future for the next 20 years and for many years thereafter.

Introduction:

Vermont has an opportunity to take responsibility for its energy future in ways that save money, improve our environment and strengthen our economy.

- A Vermont family buys a new home, selecting one with the highest "Energy Star" rating. They find lower total energy consumption in their home, both for fossil fuel and electricity on the order of 30-40% over the life of the building. They spend less on their combined mortgage and energy bills from the first day of ownership than if they had purchased a slightly less expensive but less efficient home. As energy costs increase significantly their investment will look even smarter.

- A municipal sewage treatment plant installs a modern gas turbine and sophisticated control system so it can generate electricity from the methane. Heat from the turbine helps speed the bacterial activity that produces the methane.

- An elderly couple on a fixed income has their home insulated by Vermont's Weatherization program. At the same time their refrigerator is replaced and new compact fluorescent lighting is installed by Efficiency Vermont. Their energy bills decline by 25%, improving their comfort and allowing them to remain in their home and community.

- A Vermont business decides to expand. With the help of Efficiency Vermont, it hires an energy efficiency consultant who works with the architect, engineers, and builders to design a building that uses 40% less energy than it would have using conventional building techniques. Passive solar design, super-efficient lighting and ventilation and a substantial solar photovoltaic array are all part of the building's energy system. Employees are proud to work in a modern, convenient space and productivity improves by 5%, yielding even larger benefits than the significantly reduced energy bill.

- A community that converted to a wood-chip heating system for its school five years ago considers installing a wood-chip-fired community heating system for its downtown and its nearby industrial park. The new system will generate some electricity, will help create a market for low-quality wood from thinning nearby forests, and will provide an incentive for locating businesses and apartments in the downtown area.

Barre Town Elementary School is initially equipped with wood chip heating.
Photo by Paul Frederick courtesy of NREL PIX, (www.nrel.gov)

- A Vermont electric utility conducts its required planning process and identifies wind energy as an important potential resource to help stabilize rates and lower the environmental impact of its mix of energy sources. The utility engages its customers and the communities it serves in planning to develop commercial-scale wind power in a way that will minimize aesthetic and land impacts, maximize revenues to landowners and towns, and create jobs in the local economy.

- A Vermont farmer decides to install a new manure management system and includes a methane digester that allows him to produce electricity he can sell back to his utility to reduce his

growing power bill. The system will also reduce the odor from his farm operation and allow for better use of nutrients in the farm's manure.

- A Vermont business installs a propane-fired electric generating system that gives it consistent electric service for its critical industrial process. The "waste" heat from the generator provides hot water and space heat for a growing business.

- Using Vermont's "net metering" law, a family chooses to install a solar photovoltaic panel that generates a portion of its electric energy throughout the year. The panel generates much of its electricity during the summer when demand on the electric system is greatest and has the highest value.

This home in Strafford uses solar panels to meet almost all its electric needs.
Photo by Alan Ford courtesy of NREL PIX, (www.nrel.gov)

- A state agency coordinates an open, fair and deliberative public process for deciding Vermont's energy future. That process incorporates public values into the decision-making process culminating in innovative policies that move Vermont toward a sustainable energy future. The broad public support developed through the process gives decision-makers the backbone needed to make the tough policy choices – choices that future generations look back on as visionary.

VPIRG believes the examples above illustrate a growing and potentially dramatic change in the way Vermont can provide for its energy needs.

These actions - and thousands like them - are being made possible by significant changes both in energy-using and energy-producing technologies. More and more Vermonters will make choices like these if state policy is crafted to encourage and educate them on these options.

Vermonters must act together to create a sea change in our energy use if we want to reduce the pollution that comes from producing and using energy. Thousands of decisions we make in concert with our neighbors across the state can make energy more affordable and reliable. These decisions will also strengthen local businesses and keep more of our dollars in state so they can create good jobs here.

The challenge we face now is to build on what we have learned so Vermonters are increasingly given the opportunity to take responsibility for our energy future.

Vermont's Energy Use

Energy in its various forms (electricity, transportation fuel, thermal energy for buildings and industrial process) is vital to Vermont. Over $1.4 billion is spent each year in Vermont for energy, and as much as a billion dollars of that money flows out of the Vermont economy. Hundreds of millions of dollars go for petroleum-derived fuels (gasoline, diesel fuel, heating oil, propane and natural gas). The annual

Number of consumers	Residential	Commercial	Industrial
New England	5910739	725257	25469
Vermont	289218	43258	446
Average Monthly Consumption (kWh)	**Residential**	**Commercial**	**Industrial**
New England	626	5663	67955
Vermont	590	3749	297399
Average Monthly Bill	**Residential**	**Commercial**	**Industrial**
New England	$69.98	$561.47	$5,789.80
Vermont	$75.35	$416.10	$23,492.34

electricity bill for the state is about $600 million, roughly $110 million of which flows to out of state to pay our more than one third of our tab to Hydro-Quebec while another third goes to Vermont Yankee that supports some local jobs but is owned by a Louisiana-based corporation and its stockholders.

The energy purchased by those dollars helps provide essential services to all of us, but it also has enormous impacts on our economy, our environment and our quality of life. Energy production and use is the world's single largest source of environmental degradation. Some of that production and use takes place in Vermont and has local impacts. Much of that production and use takes place elsewhere in our nation and world, but even these distant impacts effect Vermont. Acid rain and mercury deposition from coal burning in the Midwest are impacts that affect us locally even though they are generated elsewhere. The growing threat of global warming affects us all.

Convenience and Vulnerability

For most Americans over the past half century, energy has increasingly become a commodity purchased at the gas pump, delivered by the fuel oil dealer, and sent over the wires that run to our homes and businesses.

We have come to expect a stable, reliable and low-cost energy supply, compared to what much of the world has. At the same time the very sophisticated and "convenient" systems we have built to meet our energy needs have fostered changes in the pattern of energy use from what prevailed in earlier generations. The changes are complex, but there are five significant features:

- We are dependent on and vulnerable to the energy systems that support us to a degree we have never been before. The blackout of August 14, 2003 demonstrated the dramatic effect poor maintenance and management by one utility can have on the whole northeastern part of the country. The critical communications and information systems on which our society is increasingly dependent require electric reliability. We barely acknowledge the vulnerability of this system to terrorism. The consequences of apparently "small" events, like the unplanned shutdown of a key generator at a time of peak demand are now greater than they have ever been in the costs and the effects they impose.

- As ordinary citizens we understand less and less about the energy systems that support us. As we have become increasingly dependent and vulnerable, the systems that provide our energy

have become more and more complex. The businesses and institutions that own and manage them are steadily increasing their economic power and influence. They are more difficult for ordinary citizens to understand and influence. While the rhetoric of some economists is that "consumer choices dictate the direction of economic development," the experience of most citizens is that we have less and less choice about the real direction of energy decisions that affect their lives. And, there seems to be less and less effort to involve citizens in the decisions about energy choices that impact our future and our children's future.

- Concerns about the environment, the local economy, the quality of life in our homes, businesses and communities seem increasingly "disconnected" both from the businesses that provide our energy and from the daily energy decisions we make. It is often hard for ordinary citizens who care about doing the right thing to understand how both our individual choices and our more public advocacy can have a significant impact on the issues that most concern us. How do our choices as consumers and local community officials interact with the reality of our electrical grid where the power we pay for may have nothing to do with the electrons that run our lights?

- Low cost natural gas, which buttressed the energy economy of the US for the last fifteen years, is no more. Increased global demand and the depletion of lower cost sources have doubled the price of gas in the last few years, driving up other prices too. The National Petroleum Council , an advisory group to the current secretary of energy, warns that significant economic effects are on the way, and policy support for energy efficiency and alternative sources are critical right away[i].
- Citizen action in energy policy tends to galvanize in opposition to specific projects (a new power plant or high-voltage line) and is often incorrectly dismissed by utility and government officials as "alarmist," "NIMBY behavior" or "missing the big picture." Understanding the complexities of energy technology, economics and policy and effectively engaging in regulatory processes is time consuming and resource-intensive. Often citizen groups simply do not have the capability to participate on an equal footing with government and utilities. Yet many of these decisions are about public values, and should not be confined to the world of technical policy experts. Unfortunately, it is also frequently true that a full and fair discussion of the options available for meeting our energy needs and the public values that underlie those options is not taking place as critical decisions get made. The discussion is often framed in ways that systematically ignore new ideas, new approaches and innovative technologies. Technical rationality is used to obscure the value choices behind the decisions.

The "One Big Answer Mindset"

The greatest challenge in U.S. energy policy has more do with a mind-set that looks for big, apparently simple "solutions" to our energy needs than with the attributes and availability of any particular energy source.

One of the major criticisms leveled against energy efficiency, wind, solar and biomass energy as well as other renewable alternatives is that they are not "big" enough answers to address the scale of energy needs the nation faces. What often goes unchallenged is that the "big" energy answers now in place have their own limitations and vulnerabilities as well. Maximizing the contribution from these sources minimizes the energy challenges we

face. Certainly, the concept of LCIP, which instructs energy planners to look for the energy sources that have the *fewest costs to society as a whole*, as opposed to those that are simplest or generate maximum profit for shareholders, has not informed much of the nation's energy planning.

For years, the "obvious" energy source was oil; then it was massive hydropower projects; then nuclear power was going to be the solution to our energy problems; then coal was offered as the cheap answer. In recent years natural gas has been touted as a solution. Now, with much higher costs of natural gas, one hundred pulverized coal units are proposed in the United States. The Bush administration has largely embraced energy sources of the past. But even President Bush's statement that hydrogen is the fuel of the future is misleading, because although hydrogen has many attractive features, it is not likely to be "the answer" or even a significant part of the answer to our energy problems any time soon.[ii]

All these energy sources are now, have been, or may become important parts of our energy mix. But the reality is that each of them is only a *part* of the energy mix, and each has major environmental, supply, risk, or price features that make them only a "part of the answer" to our energy needs. In some instances those features are so significant they become "part of the problem" in addition to being part of the "answer."

This approach to energy planning and policy is really the opposite of LCIP. It could be termed the One Big Answer Mentality, or "OBAM."

The One Big Answer Mentality is partly informed by and reflective of the immensity of our energy use and the level of need created by the increasing energy intensity of our economy and the economies of emerging nations. There are, however, four significant difficulties with the OBAM approach to energy planning. They are:

1. **"Picking" one major energy source tends to downplay the risks and the negative health and environmental aspects of that resource.** The history of our national energy policy is that we have rushed to develop and subsidize each major form of energy without at the same time anticipating and accounting for the negative impacts and costs of that energy form. We bet heavily with public money in the form of research and development, direct subsidies, tax breaks, liability protection, military defense, and limited health and environmental requirements on one energy resource after another. We encourage significant investment of private money to develop these resources under this umbrella of public support. Once a particular energy form is embedded in the energy mix it becomes very difficult from an accounting perspective *and politically*, to identify and quantify the subsidies, direct and indirect, that make its market price less than the "real" price of that energy.

2. **"Alternative" energy options are often evaluated not by what they can actually contribute to meeting our energy needs, but by the OBAM standard -- that each alternative has to pretend to be able to solve the "whole" problem.** For years, energy efficiency investments have been under-valued by energy planners because efficiency cannot "replace" all supply. Efficiency, by its nature, has

never been capable of making other forms of energy unnecessary, but the fact that it could effectively meet 30-50% of our energy need makes it a massively under-valued resource. Wind power is being criticized for its intermittency while we have come to accept and deal with the intermittency of hydro-power. Wind and solar energy are criticized by opponents for receiving small government subsidies when, in fact, the lion's share of subsidies go to nuclear and fossil fuel energy.

3. **The OBAM approach to planning tends to "miss" or undervalue the benefits of alternative energy strategies.** Because energy efficiency is effectively "invisible" once it is in place, its valuable contribution to minimizing or avoiding peak energy problems is regularly ignored. While we worry about protecting our nuclear plants and high voltage power lines from terrorist attack, we ignore the fact that solar panels, wind turbines, efficiency and combined heat and power are really unattractive terrorist targets even as they supply needed energy. Even as energy markets become increasingly complex and volatile, and elaborate "hedging" arrangements are devised to protect against fuel volatility, the price stability of wind, solar and efficiency are undervalued.

4. **The OBAM approach tends to take for granted the incentives and rewards that are firmly established to favor current energy production and delivery systems while ignoring the "disincentives" those structures pose for alternative forms of energy.** Utilities are regulated in a manner that tends to reward them for selling more rather than less energy. As a result, efficiency efforts and distributed generation are "swimming upstream" against the economic system that provides our energy. Consumers have been taught to look at the price per unit for energy (a gallon of gas, a kWh of electricity) rather than their total energy-use bill.

The Department of Public Service's Failed 2004 Plans

Vermont Energy Policy states that Vermont should meet its energy 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."

The first version of the 2004 Plan began its discussion of planning goals with the following statement:

The plan then reduced the legislative list that includes nine goals to three "long-term overall goals" of its exercise: 1) lower energy prices, 2) reduced risk, and 3) reduced environmental impacts. The clear implication is that the other attributes included in the Vermont Energy Policy are not adequately "quantifiable" and therefore will not "…provide decision makers with much useful guidance."[iii] Presumably it is for this reason that the other Vermont Energy Policy goals are ignored in the 2004 plan. The decision to winnow this list to three categories was done without public involvement or discussion. This is an example of how value decisions are made in the policy process without public consultation.

The 2004 plan's discussion of the dramatically reduced set of planning

> *Identifying the attributes that will embody good choices requires that those attributes be measurable. Choosing an energy strategy based on non-quantifiable attributes cannot provide decision makers with much useful guidance.* [1]
>
> (Dec. 2004 Vermont Comprehensive Energy and Electric Plan, Final Draft, p.55)

goals then moved promptly to the need for "balancing" among them:

> *These goals can sometimes work at cross-purposes. The cleanest resources, for example, are typically more expensive than less environmentally benign resources. Moreover, reducing supply risks and price volatility requires buying "insurance" of some form, and insurance is never free. Therefore, Vermont must balance the energy choices it makes to ensure that all of the goals receive appropriate consideration.* (Dec. 2004 plan, p. 55)

This statement, perhaps more clearly than any other in the plan, reveals the approach the department now takes to planning. It *assumes* planning is primarily a process of "balancing" and "trading-off" among costs and benefits. While this may be the case in some instances, it is clearly *not* the case in others.

Underlying this statement is an ideological approach that now appears to inform the department's conduct of its planning process. The department has chosen to limit the scope of its planning not in order to better serve the public interest, but to bolster their existing ideology.

The message is:

We will ignore what we find it hard to quantify or what we are not interested in quantifying; and we will "balance" what we identify as the "obvious" attributes of various energy options by making sure that the first objective -- "lower energy prices"-- always receives "appropriate consideration."

While the identical language does not appear in the August version of the 2004 electric plan, it is not clear that the planning approach specified in the earlier draft has been abandoned. One telling sign of the similarity of these two documents is that when DPS released the August version of the plan to the media, it emailed a few key reporters the executive summary of the December report as a primer.

While this simple editing gaffe is not necessarily a true reflection of the plan's intent, the body of the report bears out the concern that the August plan is in fact the same poorly-constructed energy plan with substantially more charts, graphs, and filler. The truth is the department has done an excellent job in their August report of cataloging the history of Vermont's energy supply for the last 50 years, but fails at planning for Vermont's energy future.

The plan spends 200-plus pages cataloging the history of Vermont energy use, generation and purchasing. It delves into Vermont's load variance through the year and thoughtfully describes a number of different generating sources. Chapter 11, the section dealing with the state's 20-year action plan for developing new energy sources to meet our needs as Vermont Yankee and hydro-Quebec shut down, however, is a scant seven pages long.

Chapter 11 acknowledges the immensity of the problem, noting diversification of the Vermont energy portfolio is especially important because "Vermont Yankee, which because of dry cask storage capacity on site could be forced to shut down as early as 2007."[iv] The report claims "Hydro Quebec remains a promising and reliable source of electricity for now and the long term" [v] without explaining why or how the state might extend those contracts.

Chapter 11's plan for meeting future needs is directionless and frustrating. On renewable energy the primary action items are for the

- *No later than December 2005, affected utilities should complete a study of the impacts and power costs alternatives of a potential shutdown of Vermont Yankee as early as 2007. The alternatives for replacing power as early as 2007 should be carefully evaluated for their financial and environmental feasibility. …*
- *If Vermont Yankee is unlikely to be shutdown prematurely in 2007 or 2008 because of a lack of new spent fuel storage space, it will be important to begin planning for the expiration of our contract in 2012.*

August 2004 DPS 20 year energy plan Public comment draft, Sec 11, p2

legislature and key agencies to study the feasibility of renewables "and assess cost effectiveness and applicability in Vermont",[vi] and "encourage" use of net metering applications without providing concrete mechanisms to get new sources up and running. The only program to encourage renewables the plan supports is voluntary green pricing standards, which amount to allowing utilities to charge their consumers more for renewable energy regardless of whether it costs more to provide it. These programs are little more than a smokescreen, allowing utilities to pocket extra profit from well-meaning consumers while allowing elected officials to claim they care about the environment while opposing development of clean technologies in state. Later sections of this report lay out broadly, but substantively, how the DPS might foster the development of renewables through changes in Vermont law, regulation, use of administrative testimony before the Public Service Board, and smart investments of public money.

The plan claims to support Efficiency Vermont and calls for the state to "maintain its strategy of capturing energy efficiency savings through an efficiency utility."[vii] At the same time, the plan recommends no increase in funding or expansion of EVT's mandate. In fact, the plan recommends outside economists be brought in to whittle back the program's existing work through "evaluating the effectiveness of EEU programs, making adjustments as warranted by these evaluations."[viii] These recommendations coupled with the department's long-standing failure to advocate for increase efficiency funds or even for delivering statutorily-required budget increases imply the department is unwilling to deliver more than words. The department also fails to consider or recommend policy or regulation shifts that could 'institutionalize' efficiency in consumer products or building construction.

Perhaps most dangerous, the plan appears blasé about developing strategies to replace either Vermont Yankee or Hydro Quebec BEFORE the loss of their power becomes a crisis. The plan devotes two paragraphs to Vermont Yankee in Chapter 11, which we have reproduced in full on the previous page.

To anyone who has planned a long term investment like a mortgage, a child's college education or the purchase of a new car, the inherent fallacy of the state's plan is immediately apparent: *Beginning* to plan for a huge capital outlay only one year before the project will need to be *completed* is irresponsible. Just as no responsible parent would begin setting aside money for their child's college education in his or her senior year of high school, no responsible public official should begin to plan to replace Vermont Yankee two years before the plant may shut down.

Building the generating capacity to replace Vermont Yankee will take longer than two years. Permits must be filed under the Section 248 process and developers will need time to line up investors and do research in order to present their case to the Public Service Board. Beginning this process in December of 2005 is too little, too late.

The implicit message of future electric supply planning in the

August plan is identical to that of the December plan: *The market will solve all our problems, efficiency and renewables are not realistic sources to replace our current energy supplier, and allowing utilities to maximize profit will produce the power necessary without any other planning. We will therefore work hardest to suit the needs, not of Vermont ratepayers, but of major corporations and the utility companies and trust that these actors will take good care of us.*

Leaving aside the idea that energy planning for the benefit of corporations and utilities runs contrary to the mission of the Department of PUBLIC Service and the principles guiding energy planning; such a plan simply does not work. In California, state officials regulated their electricity market on the presumption that without 'cumbersome' regulations utilities would more efficiently be able to produce and sell power. What happened was energy companies like Enron jerry rigged the system to maximize profits while the state was struck by rolling blackouts and massive energy shortages. In the northeast, multiple states trusted utilities to act in the public interest, to ensure there would always be enough power to meet needs. Instead, several companies chose to sell their supply of natural gas into a more profitable market, causing a shortfall in energy supply and the largest blackout in American history a year ago. Time and again, the lesson is the same: without careful oversight and guidance, energy markets can run wildly astray because of greed or mistakes of a few energy companies and it is ALWAYS consumers and small businesses that are hit hardest and left with the largest bill.

The Right Way to Plan

Least Cost Planning

Least Cost Planning is an approach to planning that proceeds by addressing long-term impacts, effects on society as a whole, and by attempting to maximize benefits to all parties. It involves an important underlying assumption that is not always clearly stated:

The purpose of least cost planning is not simply to "pick the winner" in some theoretical "free and self-regulating market."[ix] It is to understand the structure, the dynamics, and the "interests" of the various participants in energy decision-making. Its goal is to identify where real improvements can be made and decisions supported that have lasting benefits for all participants over the long term.

Least Cost Planning includes the assumption that structural and institutional change are "on the table" for discussion. This means that new forms of regulation, new incentive structures, new requirements, public support for innovation and alternative ways to meet our energy needs are appropriate arenas for citizen and government action.

We believe a superior decision about Vermont's energy future will be made by listening to Vermont citizens. Research indicates better citizen participation processes produce better outcomes by injecting "local knowledge" and public values into the decisions. Second, public ownership of the decision will give policy-makers the support needed for implementation. Third, in a democracy the public has a moral and civic right to be involved in the decision-making process. A fair and deliberative process will contribute to better public decisions and better public processes in the future. Finally, an important aspect is continuity. Planning should be a continuous activity of expert work and public engagement. It should produce a report periodically (and that report should guide actions), but the process should be active all the time, and able to react as changes and needs present themselves. In this way, the public has the opportunity to have meaningful engagement.

The Question is not "Whether to Plan" but "How to Plan"

Vermont law already provides an excellent Policy Statement to guide the state's energy planning. We hope this paper and the VPIREF greenhouse gases (GHG) study *A Blueprint for Action* will help advance the planning effort in a manner that implements the Energy Policy laid out in 30 V.S.A. §202a:

> It is the general policy of the state of Vermont:
>
> *(1) To assure, 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.*
>
> *(2) To identify and evaluate on an ongoing basis, resources that will meet Vermont's energy service needs in accordance with the principles of least cost integrated planning; including efficiency, conservation and load management alternatives, wise use of renewable resources and*

environmentally sound energy supply.

The term "least cost integrated planning" is the truly innovative concept in this policy statement. Though it sounds complicated and technical, it really is an application of sound "common sense." Least Cost Integrated Planning ("LCIP" or "least cost planning") involves looking at the "big picture" in which planning is done. For practical purposes it has meant that over the past two decades Vermont has had a focus on three important questions that are relatively simple to ask if not always easy to answer:

1. What will be the costs and benefits of different choices *over their lifetimes*? As one advertising campaign put it "You can pay me now or pay me later." The impacts of energy decisions are felt for a long time.

Electric heat for Vermont homes was promoted in the 1960s because it was inexpensive to install and electricity from new nuclear power plants was going to be "too cheap to meter." In fact the low initial cost of installing electric heating systems quickly turned into a very high lifetime cost as monthly electric bills went through the roof.

The goal of sound energy policy should be to make choices that meet our needs most effectively -- not just in the near term but for the long term as well. Vermonters do not want slightly cheaper energy for a few years if the choices made lead to much higher risks, costs, and environmental impacts for decades to come.

2. What are the costs and benefits *to all parties affected by a decision*? Good energy policy will consider the costs and benefits of energy decisions with attention to the impacts on *all affected parties*, not just from the point of view of a single party or perspective. Almost every energy decision has significant impacts not only on the producer or seller (for instance) but also on the consumer, other businesses, the environment, local communities and, of course, future generations.

Midwestern coal plants, responding to concerns about air pollution around their generating facilities, built huge smokestacks that force toxic emissions into the upper atmosphere where it drifts eastward and damages forests and waters in northern New York and Vermont -- good for Midwestern utilities -- certainly not good for Vermont.

While it is not surprising that individuals and organizations tend to make decisions based on their own perceived costs and benefits, the task of good energy planning is to look at the costs and benefits to as many affected parties as possible so expensive unintended consequences and perverse incentives are avoided.

3. What decisions have the opportunity to provide *the greatest benefits to society in the long run?* The first two questions try to anticipate costs and benefits of decisions over a longer period of time, and to a wider circle of parties than are usually considered in energy planning. This third question calls for an even more creative aspect of planning. It invites planners to promote solutions that can help create "new wealth" for society. This "wealth" is the positive dynamics, the new learning, and surprising opportunities that can be engendered by good energy choices.

Vermont's Low Income Weatherization Program improves upon the erratic and inadequate funding of the Federal Weatherization effort. It levies a

small tax on electricity and most other fuels to create a stable funding source (about $4 million annually) to provide energy efficiency retrofit services to low and modest-income Vermonters and saves customers on average 20-25% of their energy bills. What is more remarkable is that the program, while justified on energy savings alone, also provides a very high level of other social benefits. The program improves comfort, health and safety; allows older Vermonters to remain in their homes and communities; reduces pollution; stretches funds in the Low Income Home Energy Assistance program; reduces unpaid electric and oil bills and associated collection costs; and creates Vermont jobs. Due to the stable funding provided by the Vermont element of this program, weatherization contractors have become highly skilled and innovative installers of quality insulation and air sealing services.

The department has also strict goals for involving the public that have been ignored in the present planning process. For example, the state agency plan delineates the institution's mission statement and guiding principles, including; "To encourage citizen participation at all levels of the planning process, and to assure that decisions shall be made at the most local level possible commensurate with their impact." (The Vermont Department of Public Service State Agency Plan (Vermont Department of Public Service.) (1997). State Agency Plan.)

Lessons Learned from LCIP

1. Vermont's investment in utility LCIP is paying significant benefits and should remain the basis for future utility planning.

Some utilities have considered LCIP to be an imposition of unfamiliar and complex concepts on their operation. Some have resisted aspects of LCIP actively and passively over Vermont's nearly 15 years of experience with it.

Some Vermont utilities, on the other hand, have embraced it. For well over a decade, Burlington Electric Department, Washington Electric Cooperative and the Vermont Electric Cooperative have embraced energy efficiency as an essential part of the service offered to customers as they have successfully managed their portfolios to lower the purchased power component of bills. They have been able to realize the long-term benefits of LCIP by managing load and power supply commitments in a coordinated manner that has lowered their exposure to increasingly volatile energy markets. Both Burlington Electric Department and Ludlow Electric have used energy efficiency, active partnerships with their customers and careful supply portfolio management to keep both their load growth *and* rates low for years.

Even utilities that have not wanted to continue energy efficiency programs came to recognize the value of energy efficiency services, and developed new, closer working relationships with their customers through the delivery of efficiency programs, which most utilities call Demand Side Management (DSM), over the years.

Utility Integrated Resource Planning (IRP) is the requirement that Vermont energy utilities use the principles of LCIP in devising plans for their own operations.[x]

The current round of IRP preparation is significantly different from earlier rounds. Since the requirement for LCIP by Vermont's regulated energy utilities was first articulated, there have been dramatic changes in the global,

national, regional and state contexts within which Vermont utilities operate. Markets, technologies and regulatory structures have changed and each of them promises to keep changing and evolving.

No utility planner can now assume a predictable set of rules about how energy markets will function or even how regulatory entities will guide and judge an energy utility in the years to come.

As it re-instituted the IRP process, the Public Service Board (PSB) emphasized that an IRP should lead to the development of a plan that would be robust under a variety of different possible scenarios, and it urged a commitment to "accuracy" over a vain struggle for "precision" in the development of plans. These priorities reflect in part the Board's concern that market and regulatory uncertainties will affect and should inform Least Cost Planning in the present context.

In other words, Vermont utilities are being asked to plan as if they would continue in the future to be fully regulated; but at the same they are being asked to anticipate the uncertainties in supply and technology markets, in demand for energy, and in regulatory changes that might prove any specific plan dramatically flawed.

The challenge the Board has posed to utilities in this round of IRPs is thus a very significant one.

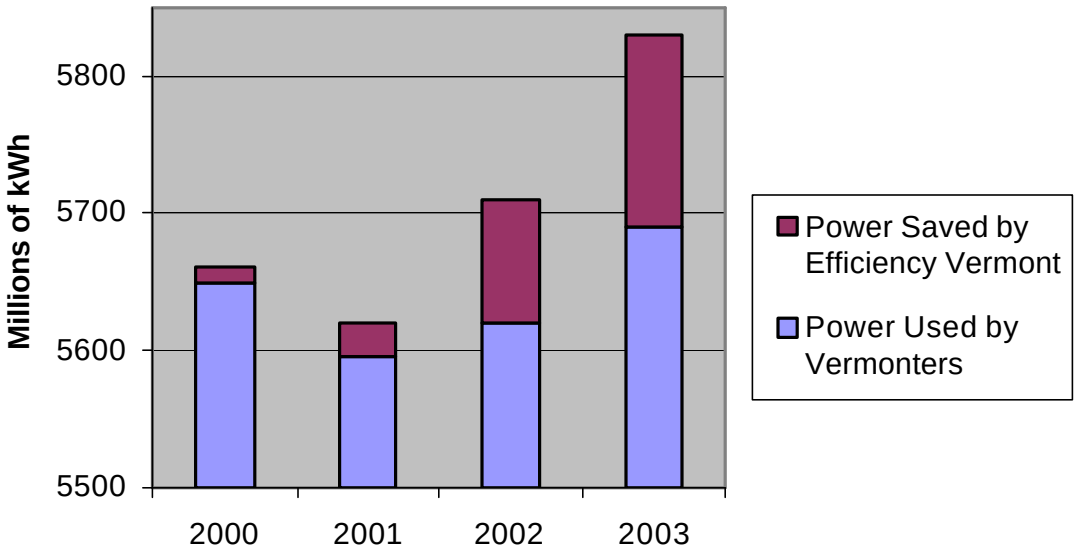
The Board's request is that Vermont utilities do LCIP and *then* test the directions it suggests for resiliency by subjecting them to "Scenario Analysis."[xi] Presumably the discovery of unanticipated risks through Scenario Analysis would then be used to inform and modify the original LCIP strategy.

In bringing these planning tools together there is a risk that the introduction of Scenario Analysis into the LCIP process could simply lead to the abandonment of LCIP if preliminary LCIP paths are found to have significant vulnerabilities. Indeed, Scenario Analysis could be conducted with an LCIP-derived approach as just one of the options, and if that option does not pass the first cut of the analysis it may not be re-visited.

VPIRG supports the PSB recommendation for Scenario Analysis, but also believes utilities must base their planning solidly on the principles of LCIP – that is, an analysis of the lowest long-term societal cost strategy for meeting the energy needs of its customers. Utilities should treat LCIP not just as a regulatory requirement, but as a fundamental principle by which they operate. By doing so, they can operate in a way that supports the long-term interests of their customers and the communities they serve. They will also find the best strategies for lowering risk, enhancing safety and reliability, and improving the economic health of their service territories.

2. LCIP is already creating new and innovative ways to solve energy problems in the state.

VPIRG believes the fundamental question facing Vermont utilities is:



How can utilities stabilize rates, maintain their financial health and bond rating, improve reliability and the quality of electric service, and help customers lower their bills and total costs of operation so their service to customers contributes to the long-term economic health of society and the communities they serve?

It is troubling that most recent utility IRPs have, in effect, heaved a sigh of relief that they no longer have direct responsibility for implementing energy efficiency programs, and have assumed the resource efficiency represents is "taken care of" by the creation of a new delivery mechanism -- and therefore does not need to be a serious part of their future energy supply and distribution system effort.

In fact, Efficiency Vermont ("EVT"), the Energy Efficiency Utility, is a stunning success and a model for delivery of energy efficiency services. It is an example of LCIP leading to the creation of a new institution to deliver services**.**

Vermont has now had four years of field-testing, learning, refinement and evolution of the EEU concept and the simple message is: it is working better than anyone could have anticipated. EVT has exceeded its savings goals in every year of operation, as the graph at the top of this page illustrates.

Savings acquired by EVT now represent over 3% of Vermont's total energy mix, at a cost of 2.6 cents/kWh.[xii]

The EEU is an innovative response to the difficult lessons learned from the early years of energy efficiency program implementation. Clearly, there is benefit from paying attention to the dynamics of markets being open to making strategic changes in the institutions trying to affect those markets.

EVT, operating under its carefully designed performance contract, has continually improved its understanding of how to reach customers, how to package offerings and how to gain market acceptance for the efficiency measures and strategies it promotes.

3. Experience with Least Cost Planning has illustrated the importance of paying attention to the current structure and economic incentive system under

which utilities and other organizations operate.

Why do some utilities not want to embrace energy efficiency and other least-cost partnerships with their customers? While there is no single answer, the way utilities are structured and rewarded has a great deal to do with their decisions about whether to become "least-cost" providers of energy services to their customers.

Simply put, under the current regulatory structure, growth in electric sales between rate cases tends to increase the likelihood of meeting allowed rates of return for investor-owned utilities. Reducing sales significantly can create risk that earnings goals will not be met and that more frequent rate increases will be needed. This basic dynamic of utility regulation more than any other single factor tends to drive utility decision-making and works against investments in customer-sited efficiency and generation.

Requiring utilities to conduct energy efficiency programs was, in the short run, asking them to decrease their revenues and pay customers to do it. The tension between the short-term effects of efficiency investments (reduced sales) and the long-term benefits (reduced need for investment in risky supply and costly poles and wires, as well as environmental improvement) was clearly weighted to favor consideration of the "negative" short-term effects.

The creation of Efficiency Vermont addressed this structural problem by "removing" the implementation of efficiency programs from the utility, and by contracting it out to an independent entity.[xiii] EVT has as its *only* purpose, the delivery of cost-effective energy efficiency services. Its contract is structured to provide rewards for meeting a variety of goals including electric savings, total social benefits, equity of service provision by region of the state and customer class and other policy goals – and penalties for failing to meet them.

Utilities, however, retain a disincentive to seek additional cost-effective energy efficiency opportunities within their systems. One of the questions that Vermont should now be asking is whether there are structural changes that would provide Vermont utilities an incentive to become least-cost energy providers to their customers. The Senate bill S. 261, which passed the Senate in 2004 contained language intended to address this structural problem.[xiv]

Another instance in which the existing regulatory structure provides an incentive that actively works against LCIP is the way transmission projects are paid for by the New England Power Planning entity.

Stated simply, the rules by which regional transmission projects and upgrades operate provide a substantial regional cost-sharing for building poles and wires, but do not offer the same sharing for efficiency and distributed generation solutions. Language to address this issue was also included in S. 261.[xv]

The 2025 Energy Mix

VPIRG believes Vermont can transform its portfolio of electric energy resources by 2025 into a mix that is:

- Adequate,
- Reliable,
- Secure (including protection from threats of terrorism),
- Sustainable (and protected from fossil fuel price fluctuations),
- Highly efficient,
- Primarily renewable,
- Affordable to all Vermonters
- Environmentally sound, and
- Good for Vermont's economy.

VPIRG believes that by 2025, Vermont's electric energy mix can be composed of the following components in roughly these percentages:[xvi]

- Energy Efficiency 25%
- CT River Hydro-electric dams 17%
- Commercial Wind Energy 15%
- New Biomass[xvii] 8%
- Existing Biomass[xviii] 4%
- Hydro: Independent Producers 2%
- Other Vermont Hydro (existing) 5%
- Customer-sited fossil generation[xix] 4%
- Innovative Partnerships[xx] 5%
- Market Purchases/In-state Peaker 15%

Components of the 2025 Mix

It will take a bold, coordinated planning and implementation effort to assemble the components of the potential 2025 electric energy mix for Vermont. Each component is discussed briefly below. VPIRG is also committed to a public process to involve the public in the decisions about Vermont's energy future. Decisions of this size and impact should be made in consultation with the public.

Energy Efficiency – 25%

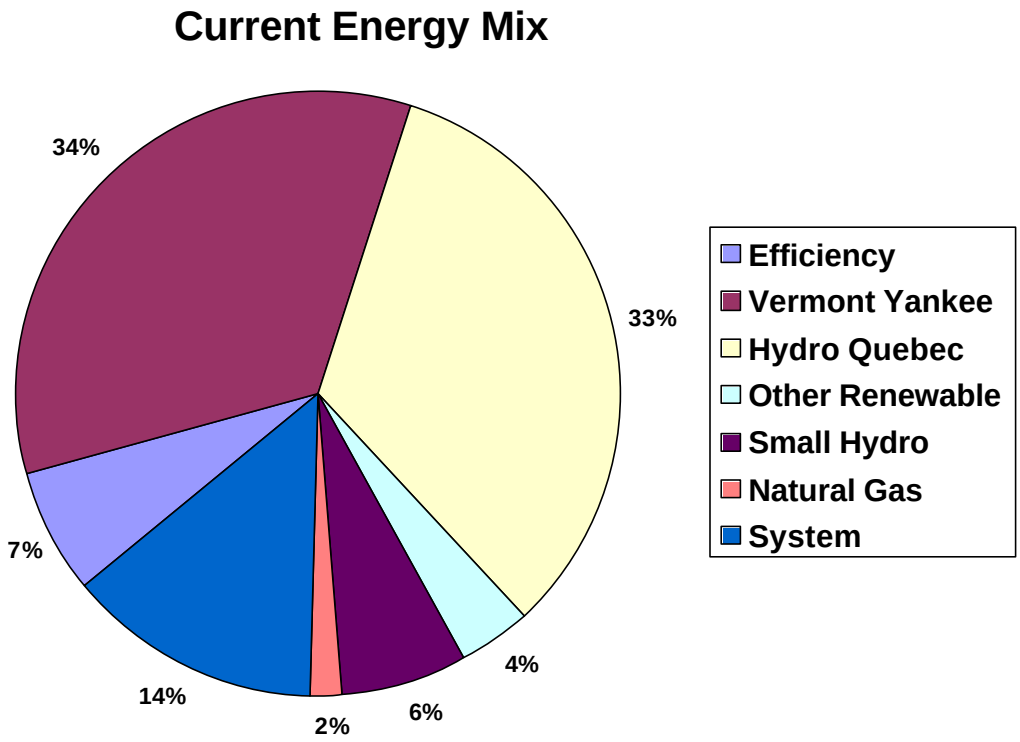
Energy Efficiency can be the single biggest source of Vermont's electricity supply by 2020, meeting 25% of currently forecasted electricity needs. This means electricity that would have been generated somewhere, creating some impact, would not be needed, would not be used.

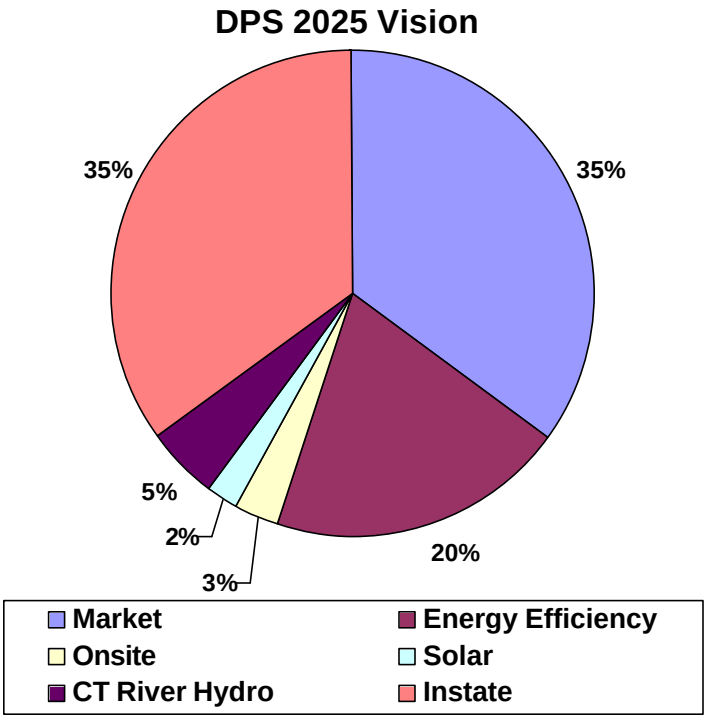
A Department of Public Service study in 2002 estimated that 30% of Vermont's electric energy needs could be met cost-effectively by 2012 through investments to increase the efficiency of our electric energy use.[xxi]

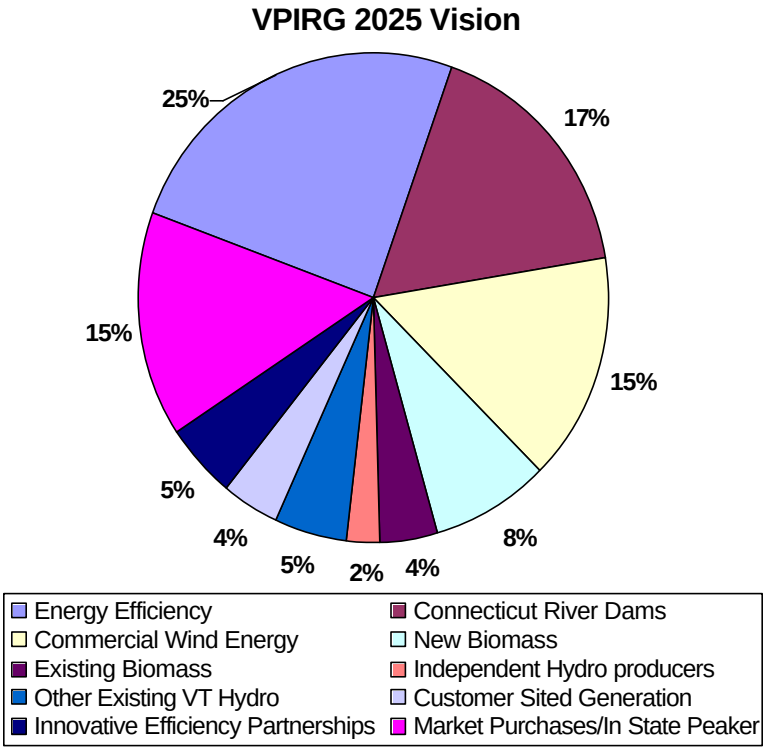
For the purposes of this proposal VPIRG is assuming an annual rate of growth in electric consumption of 1.5%. Over the next 16 years (through 2020) this would represent an increase from (projected) 2004 consumption of 6,000 GWh, to a 2020 level of 7,600 (roughly a 27% increase).

VPIRG projects that Vermont, with an aggressive and cost-effective energy efficiency strategy, could more than offset this growth, actually reducing consumption compared to current levels.[xxii]

Efficiency Vermont ("EVT"), Vermont's innovative and nationally recognized Energy Efficiency Utility ("EEU") has been operating for four years (2000-2003). Cumulative annual savings for that period are 156 MWh, just less than 3% of Vermont's current annual electricity consumption.[xxiii]


Current Energy Mix
34%
33%
7%
4%
14%
2%
6%
Efficiency
Vermont Yankee
Hydro Quebec
Other Renewable
Small Hydro
Natural Gas
System


DPS 2025 Vision
35%
35%
5%
2%
3%
20%
Market
Energy Efficiency
Onsite
Solar
CT River Hydro
Instate


VPIRG 2025 Vision
25%
17%
15%
15%
5%
4%
5%
2%
4%
8%
Energy Efficiency
Commercial Wind Energy
Existing Biomass
Other Existing VT Hydro
Innovative Efficiency Partnerships
Connecticut River Dams
New Biomass
Independent Hydro producers
Customer Sited Generation
Market Purchases/In State Peaker

Transportation: An Additional Challenge

Another possible challenge to Vermont's future energy needs is the need to move meet all or part of our transportation energy needs with electrical energy generation. VPIRG has for years been a strong advocate of the California Low Emission Vehicle program (LEV II), which Vermont presently uses to great effect to decrease vehicle emissions of NOx, SOx and other dangerous pollutants. But for all its benefits, the LEV II program has never been fully implemented.

Specifically, LEV II's requirement that manufacturers offer zero emissions vehicles for sale in Vermont was never fully enforced. Changes to the law presently being implemented by Agency of Natural Resources staff, however, may re-open this debate as the new law attempts to place more zero emission cars, especially hydrogen fuel cell vehicles, onto our roads.

Commercial manufacturing of Hydrogen requires the use of large amounts of electricity to separate the molecules form Oxygen or other bonding elements. Should fuel cell vehicles become a larger part of Vermont's passenger car fleet in the next few years, commercial production of hydrogen would have to increase dramatically in accordance, creating a new and (at least in this report) un quantified demand for electricity.

In addition, many observers and experts on climate change have noted that to fully reverse our impact on Global Warming, we must transition our transportation sector off of fossil fuels in the next 15-20 years. This would mean shifting at least. In over-simplified terms this would mean adding 100-200% more electrical energy to our 2024 demand.

VPIRG supports incremental steps to transition our transportation sector off of fossil fuels, and for that reason has estimated electric energy demand based on DPS predictions that do NOT include transportation sector needs. However, it is critically important that regulators and legislators considering this proposal bear in mind that these demand projections are the absolute *best case* scenario for electricity demand.

By 2007 that number, under current funding levels, is projected to grow to 7%. At the current level of funding EVT reduces Vermont's load growth by about 50% annually. On average, the measures installed by EVT have a useful life of about 14 years. So by 2020, it would be conceivable, at the current rate of investment, for EVT's efforts to constitute 15% of Vermont's electric energy resource.[xxiv]

It will take an increased commitment to incorporating efficiency into Vermont's energy mix to achieve VPIRG's goal of having efficiency supply 25% of our electricity by 2025. Not only is this increased investment both pound and penny wise, it is one of the simplest to achieve using smarter state policies.

If spending for EVT is ramped up gradually, building and appliance standards are regularly raised to "institutionalize" energy efficiency and EVT remains successful in establishing efficient products as the "norm" in Vermont markets, it is reasonable to assume that by 2025 at least 25% of Vermont's total electric needs could be met by efficiency.

This is consistent with a study done in 2002 for the Department of Public Service, which estimated that over 30% of Vermont's current electric usage could be provided cost-effectively through investments in efficiency. This study was based on current efficiency technologies, but new and more efficient technologies are being brought to market steadily.

We are learning from the experience of EVT that having a statewide presence in the energy markets that consistently works with designers, builders, developers, product vendors and retailers as well as customers, leads to:

- Increased awareness of efficiency opportunities and the benefits of efficiency among consumers and key players in the markets,
- Growing demand for efficiency services and products,
- Significant changes in designer, builder, vendor and customer behavior,
- Increased willingness to accept efficient products as the "standard," and
- Increased interest in trying "new" efficiency strategies and products.

In other words, it is clear that Vermont's unique and sustained approach to energy efficiency markets is having the desired effect of both "purchasing" efficiency from consumers by promoting investment of specific measures in Vermont's buildings, *and* "transforming" the energy service and product markets by continuously shifting the levels of market acceptance of efficiency to higher levels. This dual effect suggests that the assumed "measure life" of efficiency installations may be longer than 14 years, because rather than going back to (for instance) an inefficient incandescent bulb when the first efficient compact fluorescent bulb burns out, customers will increasingly replace the bulb with an efficient product *without incentives*.

A sustained efficiency program may well be installing a form of "permanent" energy savings, the cost of which will continue to decline over time.

Because of this effect it is not clear just how much the level of spending by EVT would need to increase over time to meet the 25% goal by 2025. It is likely a doubling of the EVT budget of from approximately $16 million a year to $32 million a year over the next decade would be sufficient. It is also possible higher increases would be required, but given current EVT costs represent just under 3% of utility revenues the prospect of meeting 25% of future energy need with an expenditure of 6-8% of utility revenues is a sound investment strategy. Because of the benefits of this approach, VPIRG believes it would have the support of the public in a fair and open public process.

In addition, efficiency directly lowers individual customer bills, produces little or no pollution, lowers the "line losses" involved in delivering power[xxv], and is not subject to the volatility of energy prices that are now driven by global fossil fuel markets. Efficiency increases investment in our homes and businesses, and decreases the flow of dollars out of state. It is not subject to terrorism, and it helps avoid building new power lines.

It creates new jobs here in Vermont, and will stimulate innovative businesses in the retail, design, and specialized installation markets.

Finally, the Department of Public Service and Vermont utilities have entered into a stipulation that may increase the level of energy efficiency investment dramatically in areas experiencing electric system load growth exceeding the capacity of distribution and transmission lines.[xxvi] To the extent this takes place, the "growth" of the efficiency slice of our future energy mix would be even greater.

In summary, an aggressive strategy of increasing efficiency investment is the single most effective, low-cost and environmentally beneficial step in meeting Vermont's future energy needs.

CT River and Deerfield River Dams – 17%

The 14 hydroelectric dams on the Connecticut and Deerfield Rivers could provide as much as twenty percent of Vermont's current electric energy needs. The total of 1,300 GWh of electricity annually would constitute about 17% of Vermont's estimated 2025 electric consumption (including efficiency).

When Pacific Gas and Electric/ National Energy Group, the owner of these dams, went bankrupt in 2002, it was clear to a number of Vermonters that there was an opportunity to acquire the dams to provide stably-priced renewable power to Vermonters for the long term. Some legislators, including Rep. Steve Darrow and Senator Vince Illuzzi fought hard to establish, in the 2003 legislative session, a vehicle that would have the power to investigate and possibly acquire these dams.

The Vermont Renewable Energy Power Supply Acquisition Authority ("VRPSAA") is currently negotiating for the possible purchase of those dams. At present the publicly available information is that Vermont intends to bid for the dams in partnership with one of more Canadian transnational firms (Brascan and Emera) and would receive 25% of the power from these dams, which is equivalent to approximately 4.5% of Vermont's 2025 energy needs. There has been talk about a possible provision in the agreement between Vermont and its prospective partner to allow Vermont to purchase an additional 25% of the power at a later time. Nothing is known about the terms of the proposed partnership, the cost of the dams, or the projected price of the power available from them, so there is no confirmation that this is even an option for Vermont.

Dams along the Connecticut and Deerfield Rivers. Photo courtesy of UMass Outing Club

While recent increases in the market price for electricity may have the effect of increasing the cost of the dams and decreasing the benefits of the purchase, aggressive pursuit of a purchase of 100% of the power from the dams should be a major priority of energy policy for Vermont. Recent speculation that Vermont would purchase only 25% of the available power is simply not sufficient.[xxvii]

Unfortunately, the immediate response of the Douglas administration was hostility to the idea of public ownership of the dams. The administration is now principally responsible for negotiating the partnership with other possible bidders, and the nature of the bid (when made).

VPIRG was perplexed that an administration that has consistently emphasized the importance of lowering rates in Vermont was so resistant to the possibility of buying the dams and finding a way to include their low-cost, renewable and stably-priced power in Vermont's energy mix.

There is particular urgency to taking action since Vermont utilities will lose their contracts with Hydro-Quebec by 2015, and the contracts that provide nuclear power from Entergy Nuclear Vermont Yankee (ENVY) will expire in 2012.

Prompt and aggressive action by the Douglas administration might have put Vermont at the table with the bankruptcy court and would have protected Vermont's interests in water quality and river basin management. Additionally, the tax

base in Vermont towns in which dams are located could have been protected and the jobs of workers in the dams could have been assured.

Since the annual production of the plants is highest in the winter and spring months, Vermont might need to sell into the New England market during times of peak generation and buy from those markets during months of lower production.

The Douglas administration and VRPSAA must aggressively pursue every option to purchase not only a percentage, but all of the power produced by the Connecticut and Deerfield River Dams. Plans to purchase a smaller percentage of power in the years immediately following the sale are acceptable only if coupled with a long-term agreement for Vermont to purchase an increasing amount of the electricity at fair prices in future years.

This is another opportunity to involve the public in the decision-making process about an issue that will impact the state. The last time the state signed off on a contract this size was the Hydro-Quebec contract, a decision whose results have been disastrous. The answer is not "a more rigorous process" as the present draft plan argues, but instead a process that involves the public.

Commercial Wind Energy – 15%

Although there is a great deal of discussion now about a number of issues relative to installing commercial wind energy systems in Vermont, VPIRG believes it is reasonable to assume 15% of Vermont's electric energy could be provided by wind farms in the year 2025.

The current utility-scale wind technology is a tower of 1.5 MW installed capacity. At a "capacity factor" of 32% this would mean that an average wind turbine produced 4.2 GWh of electricity a year. It would take 272 such turbines to produce 1,140 GWh of electricity, or 15 % of projected 2025 Vermont consumption (7,600 GWh). The vast majority of Vermonters support wind power development, as evidenced by the 11,000 signatures VPIRG gathered in summer 2003 in support of renewable energy and the more than 1,000 Vermonters who testified or wrote comments in support of siting wind power on state lands during winter 2004 ANR hearings. It is not only reasonable, but prudent to presume the 10 to 20 wind projects needed to supply 15% of our power could be sited by 2025.

As global warming, air pollution from coal plants and fossil fuel prices increase and the dangers of terrorism escalate, VPIRG believes thoughtfully developed wind power will become attractive to Vermonters, and the fears of the small but vocal minority who oppose their construction will decrease. Although the design of wind turbines has improved dramatically in recent years, new, more efficient designs are being developed that could increase the affordability of wind, make wind affordable in different locations, and decrease the number of towers.

As Vermont works through the issues of siting, aesthetics, impact on bird and land species and other issues, a growing knowledge base will both help mitigate adverse impacts of wind power and provide the opportunity to integrate wind technologies into Vermont's economy, culture and energy mix. Most important wind energy is clean, renewable and has steadily come down in price. It has no fuel cost and thus provides significant insurance against the variability of fossil fuels. It can be designed to minimize potentially negative visual and habitat impacts and can provide significant benefits to the Vermont economy.

Despite these facts, the Douglas administration has consistently opposed the development of wind power in Vermont. The Agency of Natural Resources has gone out of its way in the last nine months to set unnecessary hurdles in the path of the East Haven Wind Farm's Section 248 Permit, and the Douglas administration has ignored the opinions of thousands of Vermonters and the Vermont legislature by recommending a moratorium on the construction of wind power until further study can be completed.

The Douglas administration should reverse its position on wind and follow the recommendations of the Vermont legislature and tens of thousands of Vermonters by aggressively encouraging the development of wind power on the less than 1% of state land appropriate and available for commercial use. Additionally, Gov. Douglas should instruct his staff at ANR to support and encourage the development of this clean and renewable energy source rather than forcing it to meet stricter environmental guidelines than any other generating source in the state.

Despite Douglas administration opposition, wind farms like this one in Searsburg VT can provide more than 15% of Vermont's energy needs.
Photo by David Parsons courtesy of NREL PIX (www.NREL.gov)

Small-Scale Biomass – 8%

With forests covering 80% of its land area and dairy farms still a dominant part of the landscape mosaic, Vermont is ideally positioned to make biomass a significant and sustainable part of its long-term energy strategy. ***Biomass*** refers to any organic matter that can be used to make energy. In Vermont this typically means wood chips (and other forms of low-grade wood residues) and cow manure.

Biomass can fill a unique niche in Vermont's renewable energy future, complementing wind and solar. Unlike wind and solar, woody biomass is directly applicable to providing heat to large numbers of buildings, particularly when used in community or district heating systems where a whole downtown area can be aggregated into a single heating system with a central plant. For power production, wood-fired plants are dispatchable and can produce power 24 hours a day, 365 days a year. Wood-fired combined heat and power is also a good match for the size of energy loads in Vermont and an effective component of a statewide distributed generation vision.

Farm methane systems are a distributed generation technology providing green power from dairy farm wastes, also helping with farm nutrient management and odor reduction. When biomass energy systems displace fossil fuels (as they do in heating applications and, to some extent, in power production) the result is net reductions in the buildup of CO_2 in the atmosphere and significant progress in meeting climate change goals. In the future biomass could become one component of the "the hydrogen economy," acting as a source of local renewable energy for producing hydrogen.

Because biomass can be used in community-scale applications

across the state, the economic development benefits of forest and farm-derived biomass will accrue to rural areas and Vermont towns and cities alike.

The MacNeil biomass facility in Burlington meets a majority of Burlington's electric needs by burning wood chips. The plant also uses state-of–the-art emissions controls to produce less pollution than comparably-sized fossil fuel plants.
Photo courtesy of Burlington Electric Department

These benefits include jobs in rural areas, support of the forest products industry and creating markets for forest wood wastes – a necessary component of sustainable forestry. To the extent biomass directly replaces fossil fuels, biomass reduces the huge outflow of energy dollars from Vermont's state and local economies.

Energy from Forest Biomass:

The volume of wood in Vermont's forests increased 20% between 1983 and 1997. While 5.9 million green tons of wood are added to the forest each year through growth, currently the annual harvest for forest products is 2.6 million tons per year (of which 30-40 percent is used for energy). The net increase of 3.3 million tons of forest wood annually represents a resource for significant additional renewable energy production in Vermont over the next 20 years. New biomass growth, plus the need to thin existing low-grade wood out of forests could allow a doubling of wood for energy on a sustainable basis, compared to year 2000 levels.

Using technologies described below, the forest resource base is sufficient to heat all Vermont's public schools (up from 10% today) and many of the state's larger communities and college campuses on a sustainable basis while at the same time improving the health and vitality of our forests. In addition, the forest biomass resource could provide as much as 100 MWh of new power production capacity in distributed generation settings throughout the state. VPIRG has used a very conservative estimate of 608 GWh of annual production from biomass energy in 2025.

Vermont now uses biomass energy for power production, residential cordwood, community and district heating, school heating and steam production for dry kilns in the forest products industry. As recently as 1994, the major wood-for-energy use was wood stoves for home heating (about 640,000 tons per year). Vermont's two power plants, currently at 500-600,000 tons per year, may have passed wood stoves in biomass use. Schools, district heat systems and the forest products industry cumulatively use about 50,000 tons of wood per year for producing heat.

The future of wood energy in Vermont belongs to new, more efficient, cleaner technologies that are now close to commercial availability - principally biomass gasification and combined heat and power (CHP). Current technology for producing electricity from wood has been around for nearly a century. Today's wood-fired central power plants (using steam

turbines to produce electricity), are only 15-25% efficient, depending on size and design. Gasification for power production will almost double efficiency, compared to old technology, using engines, biogas turbines and fuel cells. When waste heat from these gasification applications is captured and used for heating, total CHP efficiencies greater than 50% are possible. In addition, the gasification technologies have significantly lower particulate matter (PM) and other emissions, compared to current wood energy technology.

For Vermont, the promise of wood gasification and CHP is not in central power plants, but in much smaller distributed generation applications. These applications will make power from wood in settings where there is a need for large amounts of heat as well as electricity: community energy systems, hospitals, greenhouses, industry, public buildings, college and university campuses, housing developments, and commercial complexes.

Liquid Fuels from Biomass:

In addition to solid biomass as fuel, there is significant promise in the production of liquid fuels from biomass feedstocks. These include bio-diesel (to partially or fully displace diesel fuel in many types of applications), pyrolysis oil (made from solid biomass and used as a substitute for fuel oil) and ethanol (a gasoline additive and substitute that can be made from cellulosic or crop biomass). Over the next 20 years, it is anticipated that these biomass-derived fluid fuels will come into production at a variety of scales, some of which will be applicable to Vermont. Whether produced in-state or not, biomass fluid fuels will become an important part of Vermont's energy mix.

Farm Methane from Manure Digesters:

In 2003 there were 148,000 cows on about 1,400 farms in Vermont. While the number of farms and cows, has dropped over recent decades, the number of cows per farm continues to increase. To be successful, Vermont's dairy farms will need to be more efficient, reduce negative water quality impacts on streams and lakes, reduce energy costs and be good neighbors to the non-farm members of their communities. Using farm manure in digesters as a feedstock for methane production can help accomplish all these objectives.

Anaerobic digesters process animal manure and other organic wastes to make methane gas. This biogas can then be used in reciprocating engines, micro-turbines and (in the future) fuel cells to make electricity or the gas can be burned directly to make hot water or steam for on-farm applications. Today's technology is now cost-effective for larger farms (greater than 300 cows) and technology for smaller farms is under development. Farm digesters could supply as much as 28 MWh of new renewable power in Vermont in the future.

Currently there is one Vermont dairy farm with 20 years of experience operating a methane recovery system (125 KW). A second methane system (65 KW) is now under construction and several more are in the planning stages. Methane digester technology is being developed aggressively around the US and penetration is expected to increase sharply over the next decade, nationally and in Vermont. Over the next 20 years, use of digester gas could be commonplace on many Vermont dairy farms.

Vermont should do more to encourage the use of biomass energy. State programs can be established to educate farmers on methane digester systems and small loans would enable more

farmers to set these systems up. In addition the legislature should continue to expand its support for wood heating of school and municipal buildings, and provide incentives for community energy systems, hospitals, greenhouses, industries, public buildings, college and university campuses, housing developments, and commercial complexes to install this technology.

Existing Biomass – 4%

Vermont has two facilities that generate electricity from wood chips. The Ryegate plant is an Indepent Power Producer of 20 MW capacity. It generates about 150 GWh a year, or about 2 % of Vermont's current load.

Burlington Electric Department's McNeil plant has a larger capacity (over 50 MW) but runs less time than the Ryegate plant so its total production in a year is often close to that of Ryegate (130 GWh in 2003). It has the capacity to run significantly more than it did in 2003 and it may be that it will need to do so for reliability purposes in future years. If the market price of fossil fuel increases significantly and the renewable energy benefits of biomass generation are recognized by market or regulatory forces, it may be appropriate for McNeil to operate far more than it does now.

VPIRG projects these plants will remain in service, although their combustion processes might be modified, and continue to provide about 4% of Vermont's power in 2025.

Independent Power Producers (Hydroelectric) – 2%

Vermont currently has just over three percent of its electric load met by 20 small-scale hydro-electric facilities in the state. The power from the dams (which range in size from 25 MW to 100 KW) is sold to Vermont utilities under the provisions of the Public Utility Regulatory Policy Act ("PURPA"), which was passed by Congress in 1978. This power is delivered to Vermont utilities and the sale and purchase of the power is managed by Vermont Electric Power Producers, Inc (VEPPI).

VPIRG assumes that although the contracts for the power under which their production is now sold to Vermont utilities will expire before 2025, the dams will remain in production, and whether through VEPPI or some other contract arrangement that power (annual production of about 170 GWh) will constitute approximately 2% of Vermont's power mix by 2025.

Other Vermont Hydroelectric – 5%

Vermont utilities own and manage many dams around the state that in 2003 produced nearly 400 MWh of electricity.

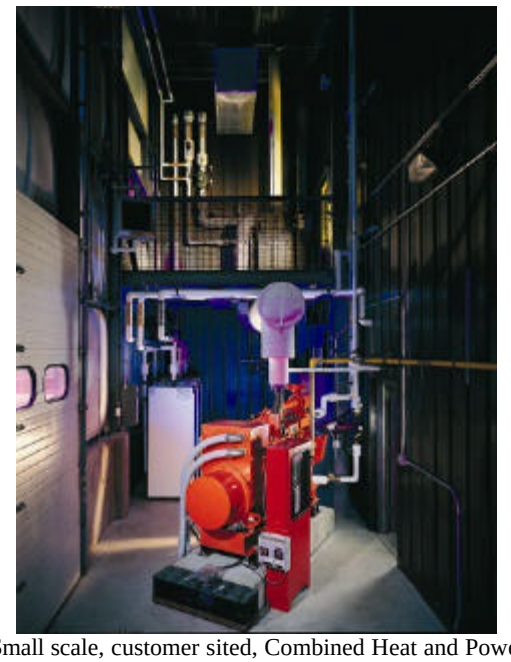
VPIRG estimates these dams will remain in place, and some increased generating capacity through repowering of the dams will mean they continue to produce about 5% of Vermont's electricity in 2025.

Customer-sited generation – 4%

Vermont's net metering law permits households and businesses to install systems of up to 15 kW capacity, in some cases 100 kW and in the case of farm methane systems 150 kW. Wind, solar photovoltaic, biomass gasification and fuel cells are permitted in addition to farm methane systems. Vermont has installed over 100 net metered systems, almost all of them small wind or photovoltaic.

Vermont is now providing a renewable energy investment incentive program to promote small-scale renewable energy systems. Vermont law provides for a limited number of net metered systems per year of up to 100 kW in size. This can apply to commercial, industrial or institutional customers.

Vermont businesses are also experimenting with on-site generation using fossil fuels such as propane and natural gas. In most cases these systems make sense financially only if the waste heat from generation can be used to offset fossil fuel for space, water or industrial process heat. The use of energy for both generation and thermal applications is referred to as "combined heat and power" ("CHP"). Green Mountain Coffee Roasters in Waterbury has over 200 kW of propane fired generation installed providing useful waste heat and a high degree of reliability in its coffee-roasting process.



Small scale, customer sited, Combined Heat and Power applications, like this one recently installed at Green Mountain Coffee Roasters, provide a number of important benefits to Vermont's economy and energy mix.
Photo courtesy of Green Mountain Coffee Roasters

As small-scale biomass gasification matures as a technology, the potential for biomass-fired CHP will increase significantly.

VPIRG projects that both households and businesses will increasingly turn to "on-site" generation. Though generally more costly than utility power, it can have additional benefits as concern for reliability and increased peak load management, worry over price fluctuations and commitment to renewable energy grows. Significantly, these systems also serve the public interest from an electric system perspective these installations can reduce line losses, congestion charges, and the need for new transmission and distribution lines.

Vermont should move to reinstate and increase tax rebates for customer sited renewable generation systems. In the long term it may be advantageous to allow EVT to offer technical advice and loans to small businesses and consumers to install these systems, as they already do with efficiency products. This increase in EVT's mandate, however, should only be undertaken if the aforementioned increase in their funding and additional funds for this additional responsibility are approved first.

Innovative Partnerships – 5%

Vermont's leadership in energy efficiency, through EVT, will provide significant direct benefits to Vermont and Vermonters, but it is also possible the knowledge of markets and technologies developed here may open a possibility for Vermont to "free up" and purchase at reasonable rates, electric energy from other jurisdictions where there is little investment in energy efficiency.

For instance, Hydro-Quebec power is now being purchased by Vermont utilities for nearly 7 cents a kWh. The production cost of that power is not known for certain but is probably in the range of 1-2.5 cents/kWh. Electric rates in Quebec are very low, and growth in electric usage there has been significant. Hydro-Quebec, which once had vast amounts of power to sell into New

York and New England markets is now facing increasing demand for power within the province. It is uncertain, given current projections, that HQ will seek to sell more power to Vermont when current contracts with Vermont utilities expire.

It is possible Vermont utilities, working with EVT, could offer HQ efficiency services in Quebec. Under such an agreement EVT would offer efficiency program designs, information management and accounting systems and strategies for transforming markets. For a period of time, EVT might contract to provide a specified kW reduction and kWh savings resource to Hydo Quebec which would be fulfilled by delivering efficiency services directly to HQ customers by EVT.

EVT would set specific savings goals and for every kWh HQ "saved" by their customers HQ would agree to sell a portion of that power to Vermont for a specified number of years at an agreed-upon price. EVT would help HQ build its own efficiency capability and indicate the legislative, regulatory and other changes the province and HQ can make to save additional electricity.

Financial arrangement would cover the costs of EVT's presence and costs and would provide power at less than the current Hydro-Quebec cost to Vermont.

Vermont would get "clean" power by mining efficiency in Quebec. Quebec's low cost of power and the relatively high cost of power in Vermont would make the finances work. In addition Quebec would be purchasing a long-term capacity to deliver efficiency in its own service territory. This would also help Quebec and our region comply with the greenhouse gas reduction goals of the New England Governors and Eastern Canadian Premier's agreement.

VPIRG projects that at least 5% of Vermont's 2025 load could be met through innovative partnerships where we trade efficiency services for low-cost power.

Market Purchases/Peaker –15%

Since Vermont would need to correlate the "shape" of its portfolio of energy resources to the pattern of usage in the state (use at different times of day, week, year), Vermont would need to be in the regional energy market buying and selling power on a regular basis. This happens now with Vermont utilities, and VPIRG estimates the net amount to be purchased from the market would be in the range of 15% of the state's total need. These purchases could be a mix of "spot" market purchases, and short-term purchases (a month to two years). This would allow Vermont to take advantage of low prices in the market, while limiting the state's exposure to risks of price spikes.

It is also possible that Vermont could invest in a "peaking unit" (or units) that could generate only at the very high-price times, when running such a unit would be economically justified. Such units could lower transmission costs and congestion costs in addition to helping limit the effect of high market prices. They would be acceptable only after careful consideration of the peaker's fuel type and its net effect on climate change and air pollution impacts.

In summary, the fluctuating nature of Vermont's energy needs season-to-season and hour-to-hour make purchase of spot market power and/or the use of a 'peaking' generator a necessity. These purchases should be made with a concern for our regional contribution to greenhouse gas emissions and air pollution however.

A Case Study in Clean Energy: The Burlington Electric Department

1978
78% of Burlington voters support BED's plan to invest in biomass.

1984
McNeil station comes on line to meet Burlington's growing power needs.

1990-2002
BED invests $11.3 million in efficiency programs.

2000
BED uses a wind turbine on the waterfront to power it's offices.

2002
BED signs 20-year purchase power contract to buy 9 MW's of energy from wind project to be constructed in Vermont.

2004
BED customers enjoy some of the lowest electricity rates in the state.

How It Could Happen: Working in a New Way with Customers

How can this portfolio of energy resources be put in place by 2025? It will take many actions, some regulatory, some legislative, some in the private sector.

Before detailing ideas, we want to re-emphasize the importance of involving the public in these decisions. The best decisions come through fair and open public processes where the lay public and experts get to share ideas, argue and discuss their vision for Vermont's energy future. At a minimum that process should be:

1) Open to all who want to participate
2) Provide a fair and open discussion between the public and the experts
3) Transparent decision-making
4) Deliberative conversations where people and energy officials listen to each other
5) Recognize that the public are equal partners in the discussion
6) Involve the public at the very beginning of the process and right through to implementation

Our experience in Vermont with the creation and operation of a statewide Energy Efficiency Utility, Efficiency Vermont, provides an excellent model for how to deliver and provide many of the energy resources described above efficiently and effectively. While Efficiency Vermont investments are made on behalf of electric utility ratepayers, the planning and implementation of efficiency efforts takes place on a statewide basis through an independent entity which is not controlled by the utilities. Vermont utilities could similarly be required to support the provision of other non-traditional electricity resources through existing or newly created statewide entities. These entities should be empowered to make the investments that can lower customer bills, improve reliability, and strengthen the local economy.

Vermont electric utilities, which are still fully regulated by the PSB, remain obligated to ensure Least Cost Energy Services are provided for their customers both through traditional delivery of electric service and innovative approaches to providing customers and communities in Vermont with more comprehensive energy services. These additional approaches include customer efficiency, on-site generation, combined heat and power installations (CHP), renewable energy development and acquisition and price and efficiency improvements in the use of other forms of energy.

More aggressive pursuit of these innovative approaches to meeting our electric needs would be consistent with Vermont's Energy Policy. Additional benefits would be strengthened local and state economies, increased reliability and

price stability and an improved environment.

Based on the current utility regulatory requirements for provision of "least cost" service, but with integrated statewide planning and implementation, Vermont could find a new path to achieve the more balanced, economic and desirable energy supply mix proposed in this report. Vermont utilities would play a key role, re-directing investments into increasing amounts of alternative resources instead of traditional generation and market purchase options. This would help stabilize rates for customers over the long term while significantly lowering total customer bills in both the near and long terms.

Vermont utilities would need to work through effective statewide delivery systems to ensure that customers find the best packages of information, support and services. They should work cooperatively to plan for renewable energy development that is effectively integrated with utility resource portfolios and meaningfully coordinated with distribution and transmission system planning.

The idea of "partnerships" in this effort is critical, and must be steadily developed.[xxviii] The goal is to plan with customers in a way that helps them and the utility system as a whole. This means utilities will provide information up front to delivery entities and customers so the design and delivery of services continues to help improve service for all utility customers as well as for individual customers.[xxix]

What follows is a brief discussion of several services Vermont utilities should be required to provide through effective, efficient statewide delivery mechanisms to Vermont customers and communities. Each discussion notes some of the interactions the service can have with ongoing utility planning and operation as well as strategies for delivery:

1. Load Control and peak management services: This is an area in which customer action (with utility support) can help lower customer *and* utility cost by managing both customer and system peak. System peak management is of increasing concern to the PSB, the DPS and ISO [what's ISO?]. The capacity for load management should be considered broadly, however, to manage the utility system and customer load profiles for a variety of purposes, including, for instance, Distributed Utility Planning (DUP).

Technologies to help customers manage loads are evolving rapidly, should be monitored actively and should be marketed to customers through EVT in partnership with approved vendors. Effective deployment of these technologies can provide significant benefits to the electric system by reducing high cost purchases during times of system peak. Utilities would need to stay current with DPS/ISO activities and incentive programs for peak management. An ongoing goal should be to find technologies and energy pricing arrangements to make load management capability affordable to smaller customers.

2. Enhanced Efficiency Services: It is in the utilities' interest to maximize customer benefit from the statewide services offered by EVT. Each utility should consider efficiency as a vital part of its resource portfolio and contract with EVT to provide appropriate increases in their efforts. In addition, utilities should take a variety of additional actions, from promoting those services more aggressively to offering complementary services. Examples include: a) offering on-the-bill financing for the customer share of more expensive electric efficiency measures; b) supporting the packaging of small-scale renewable energy technologies with electric efficiency offerings (solar hot

water, photovoltaics, small-scale wind). There may be additional benefits to utilities from the peak shaving and load-reduction effect of some to these combined packages.

In addition, Vermont utilities may at some point want to consider a variety of options regarding fossil fuels that range from direct sales, to partnerships that secure a discount for customers. Support for efficiency investments could help lower usage of these fuels as well. Providing alternative fuels would require careful deliberation and planning. These efforts could provide additional benefits to utility customers. The savings from reduced fossil fuel use could provide an additional source of funding to help customers invest in renewable energy.

3. Offerings of small-scale renewable energy technologies: There is increasing customer interest in small-scale, distributed renewable energy generation. Vermont's net metering law promotes these systems, as does a sales tax exemption for qualifying equipment. New incentives are being provided by state and federal action. As mentioned above, utilities should promote these technologies through a statewide coordinated system and/or entity. It could offer financing packages that help improve renewable energy technology cost-effectiveness by packaging renewable systems with energy efficiency measures. Utilities should consider their peak management benefits, their usage reduction effects (similar to efficiency) and their distribution system benefits and risks.

"Off-the-grid" incentive packages to customers requesting long line extensions or currently at the end of costly, high-maintenance feeder lines should also be considered. A service offering could be developed that is specifically designed to help maintain on-site systems.

4. Combined heat and power installations: CHP technologies are evolving and some Vermont utilities have begun to get some direct experience with analyzing and evaluating these technologies. They can be fossil fuel-based (propane, #2, natural gas) or biomass systems. Many of these systems can be cost-effective for large customers or communities and campuses in the form of district energy systems with an adequate heat load. The barriers to adoption are likely to be: a) up-front capital cost, b) lack of knowledge and design barriers, c) interconnection and backup charges and related hassles, and d) management and maintenance.

Again, a statewide entity, either EVT or a closely cooperating parallel organization, should provide assistance in analyzing, installing, operating and possibly owning these systems to help overcome significant market barriers. The amount of potential generation this strategy represents is unknown at this point since a mix of economic factors, technology development and capacity building will determine what kinds of situations offer cost-effective opportunities.

As technologies evolve and become more cost-effective, however, a utility history of supportive partnership with customers will be beneficial in maintaining customer confidence that the utility truly seeks to integrate these distributed technology systems into its provision of service in a way that is also beneficial to customers. It may be that offering CHP systems could become a more significant part of total utility service in the future.

5. Farm and other methane generation systems: The potential for farm methane generation from anaerobic digestion of manure may be significant in parts of Vermont. Vermont's net metering law provides an opportunity for farms of significant size to qualify for net

metering treatment for all their meters. In the alternative, a utility can negotiate to buy the generation from a farm system under a long-term contract. The critical requirement for developing this generation technology is a "turnkey" approach to installing these systems on Vermont farms. Design, financing, interconnection, management and maintenance need to be integrated into a single simple offer to farmers. No utility in the state is yet doing this in a way that will work for farmers. Utilities must cooperate to help create and standardized analytical installation, interconnection and financing services. A statewide initiative could help farmers package these systems in a way that helps protect farm income and viability, improves manure management, and provides a small but important part of the supply mix. "Green tags" or tradable renewable energy credits can be sold from these projects to help lower the total cost of power from them to something approaching the market price of power.

6. District energy systems: As mentioned in item # 4 above, district energy systems for college campuses, industrial parks and downtown areas may have a future in Vermont. Montpelier is actively considering such a system. Montpelier is exploring the possibility, and other communities have discussed it in the past. In addition to the potential generation component which could help utilities with supply portfolios, utilities could be in a position to offer services to help operate district energy systems. Their operation and maintenance capability and customer-relations and billing capability, for instance, could be adapted to administer district energy systems. Utilities, again working through an effective joint effort could partner with municipalities or campuses, or evolve a development, financing and management capability that would help make these systems viable.

7. Renewable energy development: In broadening their power supply portfolios, utilities should consider how to integrate local renewable energy from utility-scale wind projects being proposed for Vermont. The distribution and sub-transmission system will need to be examined to consider the impacts of these systems as well. Such projects could be simply a part of utility supply acquisition, either by contract or direct investment.

It is also possible a number of the concerns expressed about renewable energy development in Vermont could be effectively addressed by a new power supply "joint action" entity that was a cooperative effort among Vermont utilities. A coordinated utility approach to wind and methane generation could be structured to maximize economic benefits of these projects for Vermont businesses and communities.

The perception of risk in making long term commitments to power supply is driving Vermont more and more to a position in which significant portions of new electric supply are acquired through short-term contracts. Utilities should develop a working partnership with DPS and PSB support for development of long-term renewable energy projects in Vermont.

Conclusion and Recommendations

Changing Vermont's energy future is not simple as throwing a switch to change from the energy sources and strategies of the past to a cleaner, safer future. To achieve the changes VPIRG and most Vermonters want will be the work of many, from individual consumers, to investor-owned utilities to government regulators. VPIRG believes this proposal for Vermont's 2025 power supply mix is reasonable and attainable. It is our hope this document will serve as a starting place for the conversation that builds a more sustainable electricity plan for the state.

Undoubtedly, new obstacles and opportunities will arise to change the ultimate mix. That is why leadership from DPS and the governor's office is essential. Without a plan for moving forward, every small bump will derail energy planning and Vermont will end up with higher rates, higher bills, more pollution and greater vulnerability to supply interruptions and price escalation. It is also critical that DPS, as the public's advocate on energy, lead our conversation on energy so the public can be meaningfully involved in decision-making.

With the administration leading the call for VPIRG's energy vision and bringing together stakeholders and the public to further refine and perfect our proposal, Vermont can put aside the failed plans of the past and look forward to becoming a national leader in sustainable energy. In the long run, VPIRG believes there are 13 steps to fully implement our vision. **The DPS should champion and Vermont should pursue the following policies**:

1. Abandon the failed OBAM mindset and re-embrace Least Cost supply, distribution and transmission planning at all levels;
2. Double funding for Efficiency Vermont and expand its mandate to allow it to work with businesses to install CHP and net metering applications and work more directly with residential consumers;
3. Implement tough appliance efficiency standards for common products not already regulated (and therefore pr-empted) by federal law;
4. Establish a uniform set of legally binding building efficiency codes based on the Leadership in Energy and Environmental Design Gold certification;
5. Work with Vermont towns to purchase ALL, not just 25%, of the power from the Connecticut and Deerfield River dams;
6. Re-write the ANR policy banning wind development on state lands to accept proposals for commercial wind power;
7. Work with developers, the public and utilities to find appropriate sites for 10-20 commercial wind farms in Vermont and expedite their permitting;
8. Expand state efforts to educate farmers, municipalities and school districts on the benefits of biomass energy, and create programs to encourage this technology;
9. Implement a state Renewable Portfolio Standard requiring at least 20% of Vermont's power to come from local renewable sources by the year 2020;
10. Have state government lead the charge for renewable energy by purchasing 20% of its power from local renewable sources by 2010;
11. Re-instate and increase the now-expired tax rebates for net metering renewables;
12. Decouple utility profits from sales;
13. Institute full performance-based ratemaking, providing rewards for least-cost alternatives, fuel diversity, modularity and survivability.

Taken together, these 13 steps will begin to shift our economy to new energy sources and re-envision our energy needs in terms of providing power to Vermont with a focus on lowering total societal costs, not just rates for the biggest consumers.

Today Vermonters face a challenge, to re-envision our electrical energy needs in a way that is safe, sustainable, clean and inexpensive, despite the nay-saying of 'conventional' wisdom.

VPIRG feels confident Vermont will become a beacon of inspiration to the rest of the nation as a state with the courage to create an energy vision matched by our conviction to preserve our local economy, working landscape and natural beauty for the future.

Notes:

[i] Balancing Natural Gas Policy: Fueling the demands of a growing economy. Volume 1 SUMMARY of findings and reccomendations. National Petroleum Council. September 2003.

[ii] Unfortunately, hydrogen is not naturally available in its pure state as a fuel. It is perhaps better described as a "form" or "carrier" of energy (as is electricity) than as a "resource" like petroleum, biomass or coal. At this point, hydrogen needs to be "produced" either from natural gas, from water by electrolysis or from other "feedstocks."

[iii] Interestingly, the three attributes selected do not appear to be uniquely "quantifiable." While "lower energy prices" certainly can be considered quantifiable if the "rates" charged for electricity are considered; it is equally possible to adopt a quantitative measurement for "affordability" by considering average bills for customers. "Reduced risk" is certainly a laudable goal, but the plan provides no suggestion as to how to quantify it. The same is true of "reduced environmental impacts" which certainly could be measurable, but no guidance is offered in the plan as to how they should be quantified.

[iv] August 2004 DPS 20 year energy plan public comment draft, Sec 11, p1.

[v] August 2004 DPS 20 year energy plan public comment draft, Sec 11, p1.

[vi] August 2004 DPS 20 year energy plan public comment draft, Sec 11, p2.

[vii] August 2004 DPS 20 year energy plan public comment draft, Sec 11, p3.

[viii] August 2004 DPS 20 year energy plan public comment draft, Sec 11, p3.

[ix] Any pretense that there are "free and self-regulating markets" in the energy business is simply a way of ignoring the entrenched interests and organizations that operate in and shape those markets. *This is not to say that there are no supply and demand dynamics in these markets.* It simply recognizes that supply and demand operate in the context of very significant entrenched interests. Some of those interests may function to promote public well-being; others may not. VPIRG believes it is our responsibility to understand those institutional structures and interests. Where the long-term health of society can be improved through institutional change, strategies for change should be identified and promoted.

[x] An Integrated Resource Plan, is a "least cost integrated plan" for an individual utility and is the planning tool required of Vermont's electric and gas utilities to implement LCIP in their planning and practice. It is required by 30 V.S.A.§218c. which states in part: *"A "least cost integrated plan" for a regulated electric or gas utility is a plan for meeting the public's need for energy services, after safety concerns are addressed, at the lowest present value life cycle cost, including environmental and economic costs, through a strategy combining investments and expenditures on energy supply, transmission and distribution capacity, transmission and distribution efficiency, and comprehensive energy efficiency programs."*

[xi] Scenario Analysis is a planning tool that tests various planning options under a variety of hypothetical future "scenarios." Scenario Analysis is indifferent to LCIP. It simply helps identify unanticipated vulnerabilities in a variety of possible "paths" a utility might choose.

[xii] Source: "Efficiency Vermont: Preliminary Report 2003"

[xiii] It should be emphasized, however, that other reasons for creating the EEU had to do with creating economies of scale in implementation, consistency of program offerings, flexibility of program changes, and reduced regulatory conflict. In fact, these were the primary reasons offered by the DPS in its "Power to Save" filing.

[xiv] The relevant language, as passed by the Senate was:

Sec. 8. 30 V.S.A. § 218d(n) is added to read:

(n) The public service board shall by rule or general order establish standards and procedures for revising the rate designs of distribution electric companies to ensure that the financial success of distribution utilities between rate cases is not linked to increased sales to end-use customers and is not harmed by decreases in such sales, especially decreases due to improvements in end-use energy efficiency by Vermont customers. The board shall issue a proposed rule or general order to implement this section by December 1, 2004.

[xv] Sec. 7. ELECTRICITY RELIABILITY POLICY

It shall be the policy of the state of Vermont, in negotiations and policy-making at the New England Independent System Operator, in proceedings before the Federal Energy Regulatory Commission, and in all other relevant venues, to support an efficient reliability policy, as follows:

(1) When cost recovery is sought through regionwide regulated rates or uplift tariffs for power system reliability improvements, all available resources – transmission, strategic generation, targeted energy efficiency, and demand response resources – should be treated comparably in analysis, planning, and access to funding.

(2) A principal criterion for approving and selecting a solution should be whether it is the lowest-cost solution to a system need on a total cost basis.

(3) Ratepayers should not be required to pay for system upgrades in other states that do not meet these least-cost and resource-neutral standards.

(4) For reliability-related projects in Vermont, subject to the review of the public service board, regional financial support should be sought and made available for transmission or distributed resource alternatives to transmission on a resource-neutral basis.

(5) The public service department, public service board, and attorney general shall advocate for these policies in negotiations and appropriate proceedings before the New England Independent System Operator, the New England Regional Transmission Operator, the Federal Energy Regulatory Commission, and all other appropriate regional and national forums. This subdivision shall not be construed to compel litigation.

(6) In addressing reliability problems for the state's electric system, Vermont distribution utilities and transmission companies shall seek regional cost support for the lowest cost solution with equal consideration and treatment of all available resources, including transmission, strategic distributed generation, targeted energy efficiency, and demand response resources on a total cost basis.

(7) The department of public service shall develop and the public service board shall review and adopt a comprehensive, long-term evaluation and plan of Vermont's transmission system's future reliability needs and alternative distributed resource solutions on or before December 1, 2005, with identification of the responsibilities of distribution and transmission companies to implement the plan.

[xvi] This does not account for New York Power Authority purchases by public entities, which at its current level would be less that 1% of 2020 electric consumption.

[xvii] This would include: Generation at biomass district energy sites, customer biomass Combined Heat and Power ("CHP"), farm methane, and landfill methane.

[xviii] This includes the McNeil plant and the Ryegate plant.

[xix] This would include CHP applications fired by fossil fuels, and non-CHP fossil generation for peaking purposes (primarily industrial).

[xx] On the chart, Innovative Partnerships are combined with Energy Efficiency to reach 30 %.

[xxi] Citation

[xxii] Traditionally Vermont has not shown "efficiency" as a percentage of the total energy mix. This is in part because efficiency is the "decreased use" of electricity and as such becomes somewhat "invisible" in the supply mix. Efficiency can also be expressed as a change in the "rate of growth" in energy consumption; but since there are other significant factors affecting consumption (price, supply, the economy, unanticipated new or departing customers) this is not the best way to represent its effect. VPIRG proposes to include efficiency as a part of the "supply" mix to isolate it from those other variables that would affect the total level of consumption irrespective of efficiency investment. Clearly, should the VPIRG proposal be adopted, both the reporting of saved GWh *and* a careful monitoring of actual consumption from year to year would be helpful in gauging the level of success.

[xxiii] Burlington Electric Department ("BED") runs comparable efficiency programs in its own service territory and the efforts of BED are integrated with those of EVT for statewide coordination purposes. When we speak of "EVT Programs" we refer to *both* the EVT and BED efforts.

[xix] EVT is currently acquiring efficiency at less than 3 cents a kWh while the current market price of electricity is close to twice that amount.

[xxv] To the extent Vermont is identified as a transmission-constrained area in New England there may be additional charges to Vermont for delivery of power. Efficiency both reduces line-losses, *and* lowers the

need for imported power and the additional charges that accompany it.

[xxvi] In an Order issued January 15, 2003, the Board approved a stipulation offered by settling parties to the Phase II collaborative in Docket #6290. This stipulation described "Distributed Utility Planning" which would consider efficiency investments, load control and distributed generation as alternatives to building new power lines. That settlement included a compendium of supplemental agreements that identified the areas where "the T&D system of the signatory utility concerning which, as of September 12, 2002, DUP analysis and implementation should be performed." (Id. at 5). In some instances the supplemental agreements provided for the establishment of one or more Area Specific Collaboratives ("ASC") to serve as an ongoing settlement negotiation process to address DUP issues in the context of identified areas of distribution system constraint.

[xxvii] Of course, since the dams are likely to be purchased through an auction, it may be that the price of the dams becomes higher than a reasonable projection of market price. The failure of state government to respond swiftly to this opportunity in 2003 may have led to a situation in which the market price of the dams no longer provides a significant benefit to Vermonters.

[xxviii] Utilities must cooperate in providing these services, by enhancing their partnership with EVT and by supporting the creation of other cooperative ventures that would provide services (and new employment in Vermont communities) statewide.

[xxix] Customer partnerships have the potential to accomplish in an immediate, concrete, and sustained way many of the goals customers and regulators sought in proposing "retail choice." What customers want most is "help with energy costs." They do not want to add on a new corporate capability in power purchasing or generation. An energy service delivery system that is genuinely open to lowering total customer costs over the long term is likely to meet many of the positive goals sought in the pursuit of "retail choice."