Testimony of Peter A. Bradford to the Vermont House and Senate Natural Resources Committees 3-28-07 For Vermont Energy Conservancy, Inc.

The path to a hotter planet will be paved with good intentions. In Vermont and across the country, the global warming debate has shifted away from existence and causes to focus more on what's to be done. This is certainly progress.

However, the necessary reductions in carbon emissions are likely to be very large. We have neither time nor money to waste. This will require changes from past energy policy debates, which have sometimes proceeded as though we had infinite amounts of both.

Any individual, state or nation seeking to reduce its emissions (and to curtail its oil dependence) needs to begin with a clear understanding of the sources of its emissions and its oil dependence. It can then develop the most cost effective ways of reducing them. Otherwise time and money will go into "solutions" that in fact do little while other, more promising approaches are allowed to languish.

Trying to squeeze additional CO2 and oil consumption out of a New England electric sector that has relatively little CO2 per kilowatt hour and almost no Middle Eastern oil is such a false "solution". Other approaches promise higher and faster returns for less money.

By a rough estimate focused only on the residential sector, Vermonters emit more than 80% of their CO2 by heating their homes and driving their cars. In other words, we emit more than twice as much CO2 from our home heating use (and almost another twice as much from our automotive use) as from our use of electricity. This differs from the rest of the country because New England's electric system emits only about two-thirds of the national average CO2 per kwh (and less than half that of the as the upper Midwest) while consuming little or no Middle Eastern oil. We differ also because we use far more heating oil per household than the rest of the country, which relies on natural gas, with its lower CO2 content. Something on the order of 80% of all the heating oil consumed in the U.S. is used in the Northeast.

These facts point strongly to the conclusion that reducing Vermont's CO2 emissions as well as its oil dependence require a strong focus on buildings and transportation, because even a 20% reduction of electric sector emissions cannot produce more than a 4% reduction in CO2 emissions (and an even smaller reduction in imported oil usage). However, a 20% reduction in home heating oil usage would produce something closer to a 10% reduction in CO2 emissions.

Here are two plausible fallacies frequently heard during Vermont energy policy discussions:

1) **The global warming problem is so great that we have to promote every solution, starting immediately; and**

2) **Vermont will lose access to Vermont Yankee when the current license expires and to Hydro-Quebec power when those contracts expire. Therefore, we must develop equivalent electric production within Vermont before then.**

Let me explain why these two oft-echoed statements invite public policy errors:

The global warming problem is so great that we have to promote every solution, starting immediately.

Attempting to "promote everything" has a long and expensive history for electric energy consumers, a history in which problems and solutions are often mismatched. In the 1960s, regulators approved rates promoting electric heat in order to build load because new power plants offered the economies of scale that had characterized the electric industry before that time. But the load growth of the late 60s collided with OPEC and runaway nuclear plant construction costs.

In the frantic 1970s effort to get the electric sector off of oil – never mind that none of the oil burned in power plants came from the Middle East – billions of dollars were wasted on nuclear construction, including plants with staggering cost overruns and plants on which hundreds of million of dollars were spent before they were deemed unnecessary and canceled.[1] During that decade, electric rates tripled nationally.

After Amory Lovins suggested in 1976 that energy efficiency was a cheaper, faster option than nuclear power to reduce dependence on foreign oil, the response of many nuclear proponents – after outright ridicule didn't work – was "Of course we should do energy efficiency too. We need to promote everything to reduce oil dependence."

But reform can't work that way. For one thing, money is limited. The best buys should come first, just as any of us would proceed in reducing our personal carbon footprint. For another thing, some remedies are inconsistent with others. Once a power plant is built, the value of a kilowatt hour in that market falls, as does the value of energy efficiency.

Buying and filling a 5000 gallon heating oil tank to avoid shortage and price volatility would be a needlessly expensive approach for a residential customer with a drafty house, but the person who has just done that is not likely to want to spend more to put in better insulation. Similarly, utilities will resist spending money to conserve away the demand that they've just bought the power to meet.

After the nuclear construction experience, many states, including Vermont, used discounts from the cost estimates that the utilities had provided in support of nuclear construction to set prices to acquire independent power production. These prices proved

[1] Vermont electric rates soared because of this experience, especially from the costs of the completed and the canceled Seabrook units.

as excessive as the nuclear construction that they had originally stimulated. The resulting electric energy price increases in upstate New York (on the order of 30% over four years) caused pain to industrial and residential customers alike, producing a political backlash that contributed to the 1994 defeat of Governor Mario Cuomo. The excessive prices resulting from nuclear construction also influenced election outcomes in Connecticut, Massachusetts and New Hampshire in the 1970s.

In the 1990s, many states legislatures, though not Vermont, embraced retail competition as way to end the paradigm under which utilities and regulators had produced such rising prices. Following California's trauma in 2000-2001 (and the resulting recall of Governor Gray Davis), the retail competition movement has come to halt, with some of the initial enthusiast states returning to versions of the old regulatory paradigm.

In short, sweeping and well motivated changes in the electric sector have a way of producing backlashes that discredit the very reforms and reformers that called them into being. One wouldn't want that to happen to energy efficiency and renewables in Vermont in the 21st century.

Yet the danger is real. Renewable Energy Credits (RECs) currently add 5 cents per kwh to the price of renewable energy in New England and nearly as much to the profit of the developers. A Vermont RPS would increase the demand and therefore the price, at least until substantial renewable development offset the demand increase.

Under a 10% renewable portfolio standard, five cents per renewable kwh is a price increase of half a cent per retail kwh, or $36/year for the typical residential customer. If the RPS reaches 20%, the retail price increase is one cent/kwh, or $72/year, assuming that renewable energy credit prices do not increase. At the level of consumption of a ski area or a large industrial customer, the dollar impact is much greater, and the debates over production shifts to other states and lost jobs in Vermont are exactly the stuff from which political backlashes have been made before.

More importantly, this expenditure is unlikely to be the best use of Vermonters' money when it comes to reducing carbon emissions or oil dependence.

A surcharge as large as five cents per gallon on fuel oil use would add $37.50 to the bill for 750 gallons per year of home heating oil, about the same as the cost of a 10% RPS. However, the potential CO2 and oil dependence reduction from the home heating sector is much larger. Obviously the discrepancy is even greater for a 20% RPS.

The unique circumstances of the Northeast lead to a conclusion that probably would not hold for the coal burning regions. This conclusion is that each million dollars spent on CO2 reduction in New England would be less cost effective in the electric sector than if it were spent on displacing home heating fuel or gasoline, and each million dollars spent on renewable electricity would be better spent in the Midwest than in New England. Put another way, a Vermont RPS would do far more for climate change if it required that the RECs be purchased from Ohio or Indiana than from facilities in New England.

It is hard to imagine that Vermont would be considering an RPS ahead of a home heating or a gasoline surcharge were it not for the fact that the costs of the more expensive RPS are hidden in customer electric bills while the price of the more cost effective fuel oil surcharges are easily condemned as taxes.

None of this deprecates the value of renewable energy deployed wisely in New England. Installation of a wood stove in a building heated by fossil fuels is clearly a gain as to CO2 reduction as well as oil dependence. So is use of biodiesel in a vehicle. Furthermore, New England renewable electricity projects that make economic sense and meet environmental standards will help modestly with climate change. The problem arises when Vermont subsidizes such projects beyond the substantial support conveyed by the federal production tax credit and the existing New England renewable portfolio standards, and before undertaking the less expensive options that will displace larger quantities of green house gases and foreign oil.

Federal limits or taxes on CO2 emissions could allow market economics to value all measures according to the green house gas reductions that they actually achieve. Until that time, however, the best evidence is that an RPS in Vermont is worth less both than other measures available to us and than a comparable RPS would be in coal country.

One technique that has evolved as states have sought to avoid expensive reliance on faulty prophesies is the approach known as integrated resource planning (IRP). IRP allows ongoing comparison of all different approaches to an energy challenge, with incorporation of the resulting social costs of each approach. It allows for consideration and valuing of uncertainties, such as the future availability to Vermont of Hydro-Quebec and the future status of Vermont Yankee. Though normally applied to choose among potential projects within the electric sector, IRP can discover and adopt the most cost effective ways to prevent CO2 and other green house gas emissions throughout a state's energy sector.

Without such a plan, a state – and particularly a legislature with all of the claims on its time and its expertise – is subject to the often unverifiable claims of the enthusiastic proponents of individual solutions and technologies, forces that have contributed to past unforeseen and unpleasant effects. Vermont has long been a leader in IRP within the electric sector (and has recently done an extensive review of the cost effectiveness of conserving home heating fuels), but it has never applied this technique to its energy sector as a whole or to reducing CO2 emissions.

To do so need not be a lengthy undertaking. A standing committee of the legislature could oversee such a procedure in time to have the results ready for next year's session, as long as it begins quite soon. Such a measure would help to assure that the hard choices to be made in the future were cost effective in the senses 1) that the biggest green house gas reduction were obtained for each dollar spent and 2) that the impact on Vermont's total energy bill was as benign as possible.

Such a review need not become an excuse for doing nothing now. Certain parameters are already clear from experience and studies. One of these parameters is that energy efficiency is a "best buy" by any reasonable measure. Legislation to activate Efficiency Vermont in the heating sector and legislation to improve the efficiency of Vermont vehicles are safe bets even in advance of such an integrated resource plan. So are many specific measures designed to conserve or replace heating fuels and gasoline.

2) A second argument that does not stand up well to close scrutiny is **"Vermont will lose access to Vermont Yankee when the current license expires and to Hydro-Quebec power when those contracts expire. Therefore, we must develop equivalent electric production in state before then".**

These are complex issues with several variables. It is helpful to consider the two sources separately.

A) The Hydro-Quebec power – The contracts may be renewed, though in all likelihood at some approximation of the market prices in the year of the renewal. Even if the contracts are not renewed when they expire, an equivalent amount of power is likely to be sold by Hydro-Quebec into the New England system (of which Vermont is a part) and/or into New York. The hydro facilities themselves will not be closed, and more are being built. A polar bear on a dwindling ice shelf in the Arctic cares only about whether the hydro units continue to run, not about who gets the output.

So the net CO2 impact of the expiration of the Hydro-Quebec contracts is likely to be zero. The valid concerns for Vermonters have to do with price increases and the best ways to mitigate them. While near term consideration of electric sector renewables in this context may have a role to play, the impact on Vermont customers is hard to foresee and may in some circumstances be quite large, at least for the customers of the privately owned developers who – unlike cooperatives and government-owned utilities – will keep almost all of the difference between their costs and the market price of the power plus the RECs as profit.

B) Vermont Yankee – As to Vermont Yankee, three general scenarios are possible. Under one, the plant's license is extended for 20 years and Vermont utilities buy the same or more power from this source. Under a second, the license is also extended but the power is sold elsewhere in New England (as is half of the current Vermont Yankee output). Under a third, Vermont Yankee closes when its existing license expires in 2012.

The first two scenarios produce no change in New England's green house gas emissions until 2032. The aforementioned polar bear is indifferent between them. The third scenario would increase green house gas emissions somewhat unless an additional 650 megawatts of low carbon electricity with a high capacity factor were developed in New England before 2012. This is a considerable increase above present New England RPS requirements and would therefore increase the price of RECs for an extended period.

The Nuclear Regulatory Commission has never rejected a license extension, so the likelihood that it will do so in this case is small. Vermont Yankee operation after 2012 seems to depend first on continued safe operation and second on whether the State decides to close the plant and third on whether it is successful in defending such a decision in court.

In evaluating the significance of the expiring contracts, one should consider again that the New England electric system is relatively clean. And of course, Vermont's own system is cleaner still, though it is really the New England system that matters. Still, if the Legislature had three decades ago required that Vermont reduce the carbon content of its electric system to minimal levels, it could now consider that task complete.

Replacing these two sources within new power plants in Vermont would be expensive and unlikely to be cost effective. If, as is almost certain, the effort fell short, it would probably leave Vermont – though not necessarily New England – more green house gas intensive than it is today because some of the needed power would be likely to come from New England fossil fuel plants.

All in all, the likelihood that the New England power supply will have to do without these two low carbon sources seems small, though in the Vermont Yankee case it is not negligible. The possibility justifies a serious inquiry into the best ways to strengthen Vermont's bargaining position, but not a crash construction program that may raise Vermonter's electric bills, confer windfalls on private developers and lessen the money available for more cost effective measures aimed at reducing the oil use that drives Vermont's CO2 profile, its Middle Eastern oil dependence and the volatility of its energy prices. .

Anyone familiar with New England's energy history knows all too well the relevance of the phrase "been there, done that." A more prudent and less risky course is to take direct aim at unnecessary oil use, preserving the energy services but not the waste. The funding need not come from a tax, but it is clear that a reasonable fuel oil or gasoline surcharge will be more than offset by reductions in the total Vermont energy bill.

As to other measures, where the costs are higher and the results less certain, a comprehensive energy IRP process with ample opportunity for public input is the best way to assure that today's conventional electricity wisdom doesn't once again become tomorrow's punch line.

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Peter Bradford advises and teaches on utility regulation, restructuring, nuclear power and energy policy in the U.S. and abroad. He has advised on energy restructuring issues for many states and private clients and has testified on aspects of electricity and telecommunications restructuring in California, Connecticut, Florida, Massachusetts, Maryland, New Hampshire, New Jersey, Pennsylvania, Louisiana, Michigan, and Vermont. He advised House and Senate Committees of the Vermont Legislature on Electric Restructuring in the 1990s.

Mr. Bradford has been a visiting lecturer in energy policy and environmental protection at Yale University, and has taught courses on Electric Restructuring and on Nuclear Power and Public Policy at Vermont Law School He is also affiliated with the Regulatory Assistance Project, which provides assistance to state and federal energy regulatory commissions regarding economic regulatory policy and environmental protection. He is vice-chair of the Board of the Union of Concerned Scientists and a member of the Keystone Center's Nuclear Power Steering Committee.

He has advised on energy, telecommunications and water utility restructuring issues in China, Armenia, Azerbaijan, Georgia, India, Indonesia, Mongolia, Canada, Russia, South Africa, St. Lucia and Trinidad and Tobago. He is a member of the China Sustainable Energy Program Senior Policy Council, a joint project of the David and Lucille Packard Foundation and the Energy Foundation. He served on a panel advising the European Bank for Reconstruction and Development on how best to replace the remaining Chernobyl nuclear plants in Ukraine and also on an expert panel advising the Austrian Institute for Risk Reduction on regulatory issues associated with the opening of the Mochovce nuclear power plant in Slovakia. He advised the Town of Wiscasset, Maine, on issues related to the storage of spent nuclear fuel at the site of the former Maine Yankee nuclear power plant.

Mr. Bradford chaired the New York State Public Service Commission from 1987 until 1995 and the Maine Public Utilities Commission from 1982 until 1987. During these years, New York resolved its stalemate over the Shoreham nuclear power plant and Maine resolved its similarly controversial involvement in Seabrook, both on favorable economic terms. He was Maine's Public Advocate in 1982 and was President of the National Association of Regulatory Utility Commissioners during 1987.

He served on the U.S. Nuclear Regulatory Commission from 1977 until 1982. During his term, the NRC undertook major upgradings of its regulatory and enforcement processes in the wake of the Three Mile Island accident.

Prior to becoming a member of the NRC, he had served on the Maine Public Utilities Commission (1971-1977) and was Chairman in 1974-1975.

Mr. Bradford was an advisor to Maine Governor Kenneth Curtis from 1968 to 1971, with responsibilities for oil, power and environmental matters. He assisted in preparing landmark Maine laws relating to oil pollution and industrial site selection and was Staff Director of the Governor's Task Force on Energy, Heavy Industry and the Coast of Maine.

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He is a 1964 graduate of Yale University and received his law degree from the Yale Law School in 1968.