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### THE VERMONT ENERGY EFFICIENCY CHARGE

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#### *Assessing the Distribution of Program Costs and Benefits*

Presented to the  
Vermont Senate Committee on Natural Resources and Energy

PRS Policy Brief 1415-06

April 15, 2015

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*This report was written by undergraduate students at Dartmouth College under the direction of professors in the Rockefeller Center. Policy Research Shop (PRS) students produce non-partisan policy analyses and present their findings in a non-advocacy manner. The PRS is fully endowed by the Dartmouth Class of 1964 through a class gift in celebration of its 50<sup>th</sup> Anniversary given to the Center. This endowment ensures that the Policy Research Shop will continue to produce high-quality, non-partisan policy research for policymakers in New Hampshire and Vermont. The PRS was previously funded by major grants from the U.S. Department of Education, Fund for the Improvement of Post-Secondary Education (FIPSE) and from the Ford Foundation and by initial seed grants from the Surdna Foundation and the Lintilhac Foundation. Since its inception in 2005, PRS students have invested more than 50,000 hours to produce more than 130 policy briefs for policymakers in New Hampshire and Vermont.*



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## **EXECUTIVE SUMMARY**

Created in 2000, the Energy Efficiency Charge in Vermont funds incentives and subsidies aimed at reducing energy consumption and electricity costs for residents and businesses throughout Vermont. Promoting energy efficiency through the Energy Efficiency Charge remains an important policy goal in the state. In 2011, Governor Shumlin and the Vermont Department of Public Service released a Comprehensive Energy Plan that emphasizes “efficiency and conservation as first priorities in all energy sectors.”<sup>1</sup>

Despite strong public support for Vermont’s energy efficiency programs, some policymakers, businesses, and residents express concern that the costs may be disproportionately borne by certain customer classes. The distribution of costs and benefits of Vermont’s energy efficiency policies has received little systematic research attention to date. This report examines the savings and costs associated with the Energy Efficiency Charge for residents at different income levels, and small and large businesses. We analyze data on all Vermont towns from 2006 to 2011 to assess the distributional effects of the Charge. Additionally, we report the results of interviews with a diverse sample of business representatives to qualitatively assess the perceived impact of the Charge on the business community. While the quantitative results suggest that the Energy Efficiency Charge has similar effects in low- and high-income areas, interviews with business representatives indicate that the Charge is perceived to disproportionately benefit larger businesses.

## **1. INTRODUCTION**

The Vermont Energy Efficiency Charge is mandatory for all residences and businesses in Vermont. It is currently a line item on customers’ electric bills, calculated based on energy consumption. There are six classes of customers, each taxed at a different rate. The classes include residential, commercial (with and without a demand charge), industrial (with and without a demand charge), and unmetered street and security lighting customers. The funds collected through the Energy Efficiency Charge are deposited into the Energy Efficiency Utility Fund, which finances incentives and subsidies to reduce the cost of upgrading to energy efficient technologies through the Energy Efficiency Utility Program.

Prior analysis indicates that Vermont’s energy efficiency programs generate many environmental benefits, but less is known about the distribution of economic costs and benefits associated with the Energy Efficiency Charge. Some policymakers, industries, and residents are concerned that the efficiency programs may impose disproportionate costs on certain classes of customers. In part due to such concerns, legislation proposed this year seeks to freeze the Energy Efficiency Charge for two years.<sup>2</sup> This project consequently seeks to clarify the benefits and costs associated with the Energy Efficiency



Charge. The project originated from discussions with Vermont Senator Bob Hartwell. Specifically, the report has two goals:

1. Identify the electricity savings and costs associated with the Energy Efficiency Charge for different categories of consumers.
2. Evaluate perceptions of the Energy Efficiency Charge among stakeholders and businesses in Vermont.

In addressing the first goal, the report analyzes both aggregate and town level data on electricity savings in recent years. To address the second, we conduct interviews with business representatives and stakeholders to clarify the rationales among commercial and industrial energy consumers for supporting or opposing the Energy Efficiency Charge. Commercial and industrial consumers may derive fewer electricity and installation savings from the incentive program than residential consumers, or devote a higher share of income to the Charge. However, some commercial consumers in Vermont's tourism sector also appear to significantly benefit from the Charge by heavily utilizing its rebates. The report therefore examines whether Vermont businesses perceive energy efficiency programs as benefiting the entire Vermont business community or a few of its wealthiest and largest businesses. Are businesses homogenously opposed to the Energy Efficiency Charge? The report also investigates whether the Charge is perceived to provide sufficient financially feasible and readily usable programmatic benefits for making businesses sustainable.

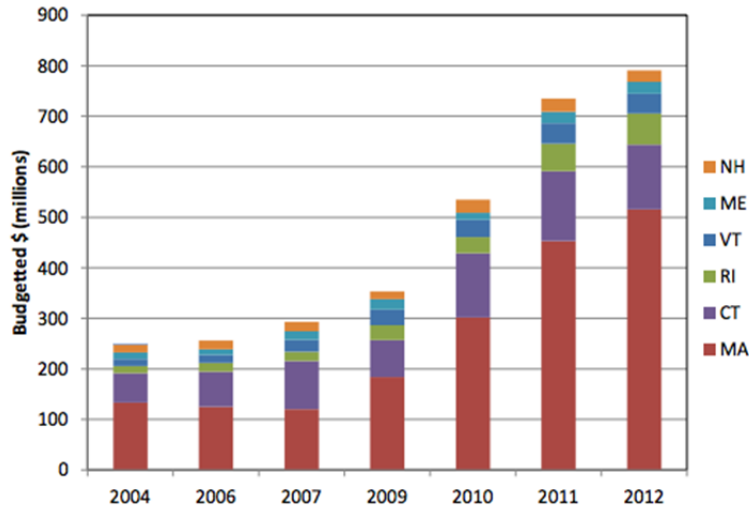
## **2. ENERGY EFFICIENCY FUNDING SOURCES AND TRENDS**

Funding for Vermont's energy efficiency programs has grown significantly. From 2004 to 2012, state funding for all energy efficiency programs approximately tripled, to \$35.6 million in 2012.<sup>3</sup> Figure 1 presents the budget trends for New England states, according to ISO New England. Vermont spends about 50 percent more per capita than Connecticut, the next highest state in per capita spending on energy efficiency programs.

Not all funding for Vermont's energy efficiency programs comes from the Energy Efficiency Charge. The Public Service Board of Vermont contracts out its energy efficiency utility efforts to the Vermont Energy Investment Corporation (VEIC), a private, non-profit investment body. The VEIC implements Efficiency Vermont, the program that provides subsidies, rebates, and technical assistance to help Vermont residences and businesses become more energy efficient.<sup>4</sup> Though ratepayers are the primary funding source for *electric* energy efficiency efforts in Vermont through Efficiency Vermont, the program also works on other efficiency initiatives. For its heating and process fuel initiatives, funding comes from the Regional Greenhouse Gas Initiative and the Forward Capacity Market.<sup>5</sup> As a result, not all of the aggregate savings estimated by Efficiency Vermont may be attributed exclusively to the Energy Efficiency Charge.



**Figure 1: Trends in State Funding for Energy Efficiency Programs, New England**



Source: ISO New England, “Energy Efficiency Forecast Report for 2018 to 2023.”  
[http://www.iso-ne.com/static-assets/documents/2014/08/eef\\_report\\_2018\\_2023\\_final.pdf](http://www.iso-ne.com/static-assets/documents/2014/08/eef_report_2018_2023_final.pdf)

### 3. ECONOMIC BENEFITS OF ENERGY EFFICIENCY PROGRAMS

Vermont and other New England states are frequently viewed as national leaders in promoting energy efficiency. Energy efficiency initiatives in those states are found to be both economically and environmentally beneficial. Whereas the national baseline for annual growth in energy consumption is about one percent, ISO New England predicts that from 2018 to 2023 New England’s annual energy usage growth rate will be virtually flat, at only one-tenth of a percent. The forecast is more optimistic in Vermont, Maine, and Rhode Island, with energy usage in those states projected to decline by 2023 to below 2014 levels.<sup>6</sup> In Vermont, efficiency measures installed in 2010 were estimated to decrease electricity supply requirements by two percent.<sup>7</sup>

While the report focuses on economic outcomes, the environmental benefits of Vermont’s energy efficiency programs are substantial, and provide useful context. Reductions in Vermont’s energy consumption in 2010 reduced CO<sub>2</sub> emissions by 718,000 tons, roughly equivalent to the combined yearly emissions of 128,000 cars, according to Efficiency Vermont.<sup>8</sup>

#### 3.1 Lower Energy Costs

Lower energy costs are the primary economic benefit of state energy efficiency programs. Residential and commercial consumers can take advantage of subsidies to purchase energy efficient appliances and modifications for existing buildings or homes, and also in new construction. The reduced electric consumption in turn lowers



consumers' energy bills. For the period from 2012 to 2014, Efficiency Vermont estimated electric savings of 293,119 megawatt-hours—for 6,540 business participants and 124,553 residential participants.<sup>9</sup> The estimated lifetime savings from Efficiency Vermont's programs total over \$292 million.<sup>10</sup> In general, the savings have far surpassed Vermont's goals. From 2012 to 2014, the ratio of electric benefits to spending was 2.0, far exceeding the program's three-year goal of 1.2.

### *3.3 Jobs and State Economic Benefits*

Energy efficiency programs also generate economic benefits besides electricity cost savings. The economic benefits reported in the prior subsection are therefore understated. The money residents save on electricity can be spent in Vermont, stimulating the state and local economies and also job growth. Most of the energy purchased by utilities in Vermont is produced in other states, whereas subsidized energy efficiency purchases are local transactions that strengthen the state's economy.<sup>11</sup> Additionally, the programs create the need for jobs and services associated with installing and building energy efficient measures and buildings.

An analysis of the overall economic impact of Vermont's energy efficiency programs in 2012 reports a net increase of 370 job-years, \$14 million in personal income, and \$14 million in Gross State Product that year.<sup>12</sup> Since the 2012 program activities were particularly busy, the forecast also estimates these benefits for 20 years. Each million dollars spent in energy efficiency programs creates 43 job-years, \$2.2 million in personal income, and \$5 million in Gross State Product for the 20-year period.<sup>13</sup>

### *3.4 Distribution of Benefits*

The economic benefits have so far been reported for all customers, rather than separately for residential and business customers. Overall, more energy efficiency program spending is devoted to the business sector than the residential sector in Vermont, but residential sector customers also receive more in incentives for each dollar paid into energy efficiency programs. In short, economic benefits of the Energy Efficiency Charge accrue to both the residential and business sectors in Vermont.

As an initial examination of the distribution of benefits, Figure 2 reports estimated lifetime savings from energy efficiency programs, separately for each program category. The estimates are from Efficiency Vermont's *2014 Savings Claim Summary*. The figure suggests that businesses benefit more from energy efficiency programs than residential customers. However, the distinction between residential and business customers is not immediately clear. For example, the retail sale of energy efficient products, generating an estimated \$21.7 million in lifetime benefits, helps retailers who sell the products at lower prices—but also helps residential, commercial, and industrial customers who buy the products at reduced prices. Counting retail products as a residential sector benefit, the





residential sector receives 38 percent of total lifetime benefits; and business customers receive 62 percent.

**Figure 2: Total Estimated Lifetime Savings Due to Energy Efficient Electric and Thermal Programs, 2014**

Business New Construction	\$13.7 million
Existing Businesses	\$51.0 million
Retail Efficient Products	\$21.7 million
Residential New Construction	\$7.0 million
Existing Homes	\$11.4 million
Customer Credit	\$28 thousand

Source: *Efficiency Vermont, "2014 Savings Claim Summary."*  
[https://www.encyvermont.com/docs/about\\_encyvermont/annual\\_reports/evt-2014-savings-claim-summary.pdf](https://www.encyvermont.com/docs/about_encyvermont/annual_reports/evt-2014-savings-claim-summary.pdf)

These data have several limitations. Besides the issue of overlapping benefits and definitions mentioned above, the data do not include indirect economic benefits such as jobs and economic activity stimulated by energy programs. Additionally, it is difficult to determine the substantive significance of the savings without information about residents' and businesses' incomes, or what they pay into the programs. Ratios of program benefits to funds paid in might provide better context. Finally, these data do not describe which companies and residents are benefiting most. Do smaller or larger businesses or wealthy or poor residents primarily take advantage of the subsidies?

To address several of these limitations, we calculate the distribution of lifetime benefits, program costs, and participant costs for energy efficiency programs, separately for residential and business participants. The calculations are derived from budget information in Efficiency Vermont's *2014 Savings Claim Summary*. Table 1 summarizes the results, which describe all cumulative program benefits and costs for installations made in 2012, 2013, and 2014.

The first noteworthy result in Table 1 is that Vermont's energy efficiency programs appear highly cost-efficient. The ratio of lifetime resource benefits to program costs is well above one for both residential and business sector installations. Business sector installations made through the program yield \$3.70 in lifetime benefits per dollar of program costs, and the residential sector installations yield \$2.30 in benefits per dollar of program costs. The second notable result is that participants experience substantial benefits relative to their costs, and the benefits are similar for both business and residential sector participants. For each dollar in participant costs, installations yield \$5.20 and \$5.80 in lifetime resource benefits for business sector and residential sector participants, respectively. In sum, while business participants receive a greater share of total program spending, residential participants see a somewhat higher rate of benefits for each dollar contributed into program-incentivized installations. Finally, it should be noted Efficiency Vermont's estimates of lifetime resource benefits include electric savings,



fossil fuel savings, and water savings—but do not include the broader set of indirect economic benefits, such as job creation and increased economic demand.

**Table 1. Energy Efficiency Program Costs and Benefits (2012-2014 Combined), by Sector**

	Business Sector	Residential Sector
Participants with Installations	7,156	132,257
Program Costs (\$millions)	62.2	55.1
Participant Costs (\$millions)	43.9	22.1
Lifetime Resource Benefits		
Total (\$millions)	227.2	128.7
<i>Per Participant (\$s)</i>	<i>31,755</i>	<i>973</i>
<i>Ratio to Program Costs</i>	<i>3.7</i>	<i>2.3</i>
<i>Ratio to Participant Costs</i>	<i>5.2</i>	<i>5.8</i>

Notes: Includes electric and thermal programs, excluding customer credit. Derived from Efficiency Vermont, *2014 Savings Claim Summary*. Lifetime resource benefits are expressed in 2012 dollars, and include electric savings, fossil fuel savings, and water savings.

#### 4. QUANTITATIVE ANALYSIS OF RESIDENTIAL SAVINGS AND INCOME

To further assess the redistributive effects of the Energy Efficiency Charge, we analyze data on Vermont towns' residential electricity savings due to subsidized energy efficiency measures. Specifically, we compare average monthly electricity cost in the residential sector, the average residential electricity savings due to energy efficiency measures, and the towns' poverty rates. Data on costs and savings are derived from official Efficiency Vermont estimates in each year from 2006 to 2011.<sup>14</sup> Efficiency Vermont calculates the average monthly electricity savings from program-subsidized energy efficiency measures in kWh per town, and electricity usage in kWh per town. We converted the average savings and usage estimates to dollar values, using publicly available electricity surcharge information. Poverty rate information is for local school districts, since the Census does not report poverty rates using the identical town definitions as Efficiency Vermont.

Figure 3a displays Vermont towns' average electricity savings from the program by poverty rate. Each circle represents one town in one year. The figure suggests that towns with higher poverty rates experience somewhat lower electricity savings from the program. A 10 percent increase in the poverty rate is associated with a statistically significant \$4.50 reduction in average monthly savings.

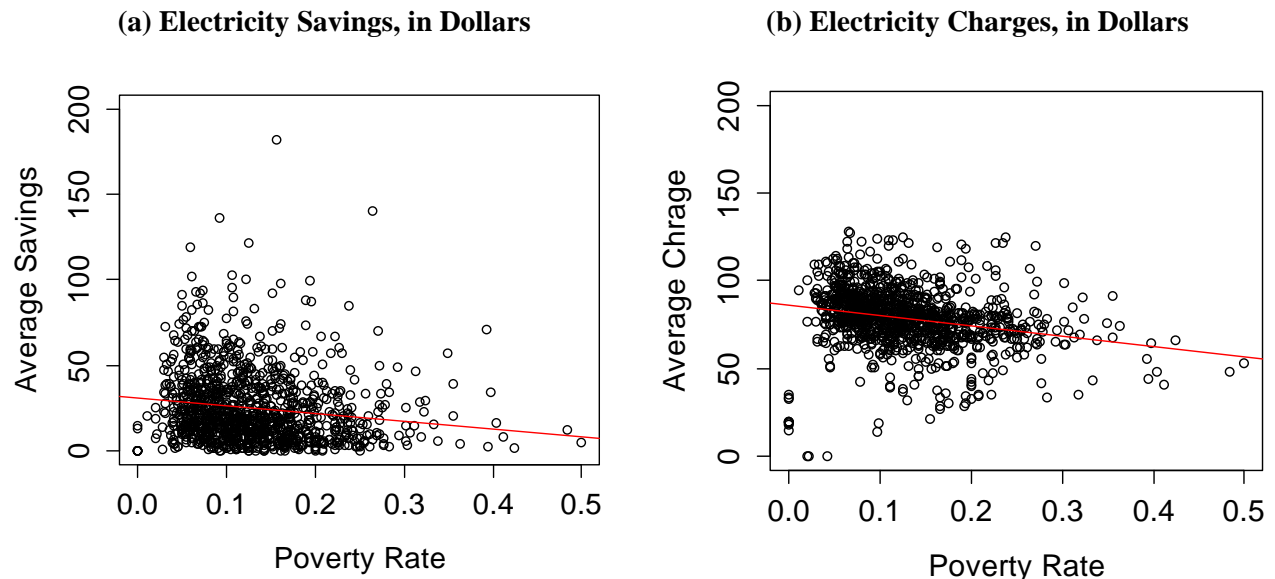
While financially well-off towns have higher electricity savings, those towns also pay somewhat more in electricity. Higher income towns pay into the program somewhat





more. Figure 3b summarizes Vermont towns' electricity charges from 2006 to 2011. The figure indicates that a 10 percent increase in the poverty rate is associated with a \$5.80 reduction in the average residential charge. Therefore, when considering the average usage in each town, the energy efficiency subsidies do not appear to substantially benefit wealthier towns more than poorer towns. The figures suggest that the net effect of the program is relatively flat in terms of income.

**Figure 3: Average Household Electricity Savings from Energy Efficiency Measures and Electricity Charges by Poverty Rate, Vermont Towns, 2006-2011**



*Notes: Based on authors' analysis of 2006-2011 Efficiency Vermont data for all Vermont towns, <https://www.encyciencyvermont.com/About-Us/Energy-Efficiency-Initiatives/energy-data/Town-Energy-Data>.*

There are several limitations of the analysis. The estimates do not include the up-front costs or subsidies for installing an energy efficiency device—only the expected electricity savings experienced after installations. Insofar as higher income households purchase and install more energy efficient appliances, they may benefit more from the reduced up-front costs derived from the subsidies. Additionally, if program subsidies are reduced in the future, residences already benefiting from upgraded devices may have compounded gains over time. In sum, the benefit structures could change over time, and it is likely that benefits to higher income households are understated by these data.

All factors considered, Vermont's energy efficiency programs appear to benefit higher income residences only slightly more than lower income residences. The savings estimates in Figure 3a would have to be less than half the true savings to confidently conclude that the program generates a net disproportionate benefit for richer or poorer towns. The estimates nevertheless have a relatively large degree of statistical uncertainty. Future research might seek to disaggregate electricity savings and charge data further, by examining smaller geographic areas or households. Policy researchers might also



estimate the benefits for renters relative to homeowners, who have different incentives to install energy efficient appliances.

## **5. ACCESS TO PROGRAM SUBSIDIES**

As demonstrated in the statistical analysis above, the overall effect of the tax is complicated. The electricity savings from installing energy efficient devices appear relatively flat with respect to income, but the up-front subsidy benefits for installing energy efficient appliances must also be considered. This section considers access to those subsidies.

In a report for the Vermont Public Service Department, GDS Associates surveyed a random sample of participants who received subsidies for energy efficiency devices.<sup>15,16</sup> The results indicate that subsidies are predominantly accessed by households with annual incomes between \$60,000 and \$150,000. By comparison, the median household income in Vermont is \$51,841, suggesting that less well-off Vermont households rarely access the energy efficiency programs. This is especially problematic because it means that they pay into the fund at similar rates as their wealthier residential counterparts—because the energy efficiency charge is tied to energy consumption—but receive less in subsidies.

Homeowners must complete an audit by a private contractor in order to access subsidies in the Vermont Home Performance with Energy Star Program. The cost of the audit alone is between \$100 and 500 for most participants surveyed by GDS Associates, and less than \$100 for only a small percentage of participants.<sup>17</sup> This cost may be prohibitive for many households. After the audit is complete, the most common reason cited by participants for not pursuing recommended home upgrade projects is cost. From the consumer's perspective, discounting for time is an important consideration, since these projects pay for themselves gradually. One participant responded, "for the program to be really effective they need to find a better way to offer more financial incentives. I can't imagine how low income people could afford to do the program. The return on investment needs to be shorter."<sup>18</sup>

In addition to low-income residential consumers, there are concerns that smaller businesses receive proportionally fewer program benefits than larger businesses. The analysis of Efficiency Vermont's *2014 Savings Claim Summary* in Table 1 indicates that business and residential customers receive similar economic benefits per dollar of costs incurred. However, it is possible that smaller businesses may have reduced access to subsidies relative to larger firms. The next section investigates this issue, especially since it could affect the political feasibility of maintaining or expanding the energy efficiency charge.

## **6. BUSINESS AND STAKEHOLDER PERSPECTIVES**



It is important to understand how businesses perceive the economic costs of the Energy Efficiency Charge in order to gauge the future prospects of Vermont's energy efficiency programs. In particular, legislatures may consider whether stakeholders favor expansion or contraction of the charge based on its perceived economic impact. To gauge stakeholder opinions, this project administered a survey intended to capture the perspective of the Vermont business community.

We surveyed several businesses in Vermont representing a diverse sample of industries and business types in the state. In order to account for the perspectives of both large and small businesses, we administered our survey to one representative large business, the Energizer plant in Bennington, and six small businesses. We identified the small business subjects using the Vermont Chamber of Commerce online database, which allowed us to vary our selection based on industry. The range of industries included printing, automotive shops, hotels, home service contractors, and marketing and advertising. A representative at each business was contacted by telephone. In the case of small businesses, the representative was usually an owner or office manager. We asked each if they had heard of Efficiency Vermont, if they were aware of the Energy Efficiency Charge, if they had heard of the energy efficient utility subsidy, and if their company at any time made use of the subsidies. Each respondent was also asked if they had any further opinions on Efficiency Vermont that were not discussed in the survey but which he or she thought to be relevant to the Vermont business environment.

As a representative case for large businesses in Vermont, we contacted Energizer's facility in Bennington, Vermont and spoke to a representative of their energy efficiency team. Energizer's Bennington plant has a small team that works closely with Efficiency Vermont representatives. Efficiency Vermont conducts weekly meetings with Energizer staff and sends representatives to the site frequently. It has also assigned an account manager and two technical engineers to work with the Energizer plant. The energy efficiency charge levied on Energizer amounted to roughly \$60,000 in 2014. However, through a combination of subsidized heat pump installation, reduced-cost lighting projects, and Efficiency Vermont providing metering services that would otherwise be contracted to independent engineers, Energizer more than recoups this expenditure in savings.

Overall, Energizer has been very pleased with their interactions with Efficiency Vermont, and endorsed them for their professionalism, impartiality, and diligence. However, the Energizer representative also offered two opinions that were somewhat less optimistic about Efficiency Vermont: first, he suggested that awareness of the program might be low for the average Vermonter. Second, he commented that the program's marketing and structure make it easier for large businesses to take advantage of it than small businesses. However, every small business surveyed expressed awareness of Efficiency Vermont and gave a reasonably accurate description of its function. Their descriptions of the program were vague but usually included some mention of a program intended to help people in Vermont make their homes more energy efficient and save money. However, only one-



third of respondents were aware of the energy efficiency charge. Two-thirds of respondents knew about the energy efficient utility program, but no respondent reported having used it for business purposes, although one respondent had used it at home. This finding suggests that small businesses in Vermont derive less value from the subsidy program than do large businesses. We can reasonably conclude that small businesses make a proportionally greater financial contribution to the utility program relative to big businesses.

Only one respondent volunteered an independent opinion on Efficiency Vermont and its impact on the Vermont business climate. Although she knew of the energy efficiency charge and her firm did not use the subsidy program, she was of the opinion that “Efficiency Vermont is not bad for the Vermont business environment.” No respondents registered any significant opposition to Efficiency Vermont, even if they failed to make use of the program. This may be because, even if the average Vermonter does not completely understand the benefits of Efficiency Vermont, the charge is small enough that it is not perceived as very burdensome. It may also be because respondents see the environmental aspects of the program to be worth their money; our survey did not assess this question, but it seems plausible given the general popularity of environmental initiatives in Vermont.

Overall, our survey results support the supposition that big businesses in Vermont are better positioned to make use of Efficiency Vermont’s subsidy program profitably. To put the findings in context, we describe the opinions of a large sample of Vermont residents polled at regional workshops and deliberations about electricity choices in 2007.<sup>19</sup> The sample was broadly representative of the state population according to a Center for Deliberative Opinion Research report, with a mix of individuals employed at large, medium, and small businesses, and residents not working and self-employed.<sup>20</sup> Respondents were asked which options “should be the highest or lowest priorities to meet Vermont’s future electricity needs considering all factors (cost, environmental attributes, reliability, etc.)?” As Figure 5 indicates, Vermonters ranked energy efficiency efforts as their highest priority.



**Figure 5: Public Priorities for Meeting Electricity Needs in Vermont**

*mean n=507*

Resource	High %	Low %	Difference <sup>s</sup>	Rank
Energy Efficiency	25%	1%	24%	1
Wind	22%	2%	20%	2
Hydro	15%	0%	15%	3
Solar	16%	2%	14%	4
Wood	8%	2%	6%	5
Methane from farms or landfill	7%	2%	5%	6
Natural gas	1%	8%	-6%	7
Nuclear	6%	24%	-19%	8
Oil	0%	27%	-27%	9
Coal	1%	32%	-32%	10

*Source: Raab Associates, Ltd., Vermont's Energy Future Final Report (2007).  
[http://www.cbuiding.org/sites/default/files/CBI\\_VT\\_Energy\\_Workshops\\_Report.pdf](http://www.cbuiding.org/sites/default/files/CBI_VT_Energy_Workshops_Report.pdf)*

## 7. CONCLUSION

Programs funded by the Energy Efficiency Charge generate a wide and overlapping set of benefits for businesses and residents in Vermont. Determining the distributional effects of the Charge is not straightforward. Analysis of state and town level data suggests that lower income residents install energy efficient measures at a somewhat lower rate than higher income residents, and therefore experience fewer benefits from the programs. However, since poorer residents also use less energy, the overall effect of the Energy Efficiency Charge appears mostly flat with regard to income. Future research might utilize data that are further disaggregated, perhaps on the household level, to estimate these distributional effects more precisely. However, there are still concerns in the public that some businesses are benefiting disproportionately. The interview results suggest that small businesses in Vermont derive less value from the subsidy program than large businesses, and that they make proportionally greater financial contribution to the utility program relative to big businesses.

The report's findings have implications for future implementation of the Energy Efficiency Charge. The Charge appears enormously successful as an energy efficiency and environmental initiative. However, greater efforts might be made to ensure wide access to the subsidies in the future. Property owners who rent to individuals, and do not have as much incentive to install energy efficient measures, could be further targeted through program outreach efforts. Additional outreach to small business owners might also ensure greater access to subsidies.



Finally, the impact of the programs on the business community might be monitored closely as the Energy Efficiency Charge becomes a more permanent fixture of the state's tax portfolio. Data on the program's energy savings is thorough, but the subgroups that experience the greatest savings in Vermont are not clear from existing data and research. Aggregate data on energy savings and costs can obscure the differential impacts of the Energy Efficiency Charge. Enhancing transparency of the methodology for calculating resource benefits and energy cost savings might also boost the impact of the state's existing data, and spur analyses that can yield even greater improvements in energy efficiency.





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- <sup>16</sup> All participants sampled by GDS Associates received an energy audit, whether the energy efficient device was installed or not. The report concludes that participants with completed installations and those with “stalled” projects were similar with respect to income and education.
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- <sup>18</sup> *Ibid.*, p.2-13.
- <sup>19</sup> Raab Associates, Ltd., *Vermont’s Energy Future Regional Workshops: Final Report* (November 2007), [http://www.cbuilding.org/sites/default/files/CBI\\_VT\\_Energy\\_Workshops\\_Report.pdf](http://www.cbuilding.org/sites/default/files/CBI_VT_Energy_Workshops_Report.pdf).
- <sup>20</sup> Robert Luskin, David Crow, James Fishkin, Will Guild, and Dennis Thomas, *Report on the Deliberative Poll on Vermont’s Energy Future*, Center for Deliberative Opinion Research (2008).