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Benchmarking of Vermont's 2008 Electric Energy Efficiency Programs: A Comparative Review of Efficiency Vermont and Burlington Electric Department

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Executive Summary

1.1 Introduction and Purpose of Report

In 2009, the Vermont Public Service Board approved a change in the structure of energy efficiency service delivery in Vermont. As part of the transition process, an "Overall Performance Assessment" (OPA) of entities currently delivering efficiency programs in the state (Efficiency Vermont and Burlington Electric Department) is required. As part of this assessment, the Vermont Department of Public Service (DPS) selected Navigant Consulting (NYSE: NCI) to assist with benchmarking 2008 electric energy efficiency service delivery performance in Vermont versus service delivery in other jurisdictions. Burlington Electric Department (BED) provides electric energy efficiency services in its territory. Vermont Energy Investment Corporation (VEIC) is currently contracted to provide electric energy efficiency service delivery to the balance of the state as Efficiency Vermont (EVT). Both entities are referred to as an Energy Efficiency Utility (EEU) and the results of this benchmarking study profile the comparative DSM savings and costs of both BED and EVT to a group of approximately 25 other organizations across the Northeast, Midwest, and Western states.

1.2 High-Level Overview of Benchmarking Approach

To complete this project, Navigant Consulting (NCI) reviewed the 2008 electric energy efficiency demand-side management (DSM) performance of 25 organizations compared to Efficiency Vermont's (EVT) and Burlington Electric Department's (BED) 2008 DSM results. The selection of organizations included investor-owned utilities, statewide agencies, and municipal utilities, each having run aggressive, large scale DSM programs for at least seven years. This selection provided a broad comparison group of mature DSM programs. Given the selection of organizations, the typical performance of this group is likely not typical of all DSM programs; this group's performance is likely better than the national average. Thus, in this study, when we describe a result as typical, we mean it is typical of this select group.

In some instances, the availability and format of reported DSM data limited the ability to perform preferred in-depth comparison (e.g., NYSERDA). The review was structured into three peer groupings and three levels of analysis, with each additional level providing a more detailed review and finer normalization to Vermont's EEU service delivery context.

Further, it is important to note that any one metric presented in this report, or even the entire benchmarking result itself, must be considered in the broader policy context including specific required initiatives such as EVT's geotargeting, goals such as comprehensive treatment of customers, or such initiatives that do not directly result in electric savings.

Key Questions

Upon conclusion of the benchmarking analysis, the results of the report will help the reader address the following questions:

- What is the overall performance of Vermont's EEUs compared to 25 other mature DSM programs?
- How do Vermont's EEU's compare in terms of DSM savings as a percent of sales and DSM spending as a percent of electric revenues?
- Are the performances of Vermont's EEU's noticeably above, below, or average with respect to performance and cost for sector-level program results (residential and C&I)?
- How do Vermont's EEUs compare in terms of levelized costs of energy savings, $/kWh, with their peers?
- Does the presence of decoupling or performance incentives, or the level of electric rates impact portfolio performance?

These questions and many others are addressed through graphical presentation of benchmarking results at three progressively detailed levels of analysis as explained in the Methodology section below.

Methodology

The benchmarking method includes three levels of review each with its own group of organizations. In the first level, the benchmarking starts with a peer group of 25 other DSM organizations; levels two and three analyze in increasingly greater detail and discrimination to normalize results for each group. By design, each level of analysis narrows the group size.

Although every effort is made to collect comparable data, given the inherent variation in organizations' evaluation and reporting practices, the results cannot be considered a perfect "apples-to-apples" comparison. Utilities may report estimated savings at meter, busbar, or generator; some utilities' methods for estimating savings may be more accurate than other utilities'; only some annual DSM reports included savings that were verified; and few distinguish net savings from gross savings. For example, utilities in Iowa, Minnesota, and Efficiency Maine generally report gross savings while organizations in other states perform net-to-gross analysis and report verified net savings.

1.2.1 Level 1: Standard Benchmarking

The Level 1 analysis is the highest level, in terms of detail. The Level 1 analysis reviews 27 organizations in mature DSM markets across the Northeast, Midwest, and Western states. The review focuses on a straight comparison of unmodified reported energy and demand savings and associated DSM total program delivery costs for 2008. DSM savings and spending are then normalized with 2008 energy sales, peak demand, and revenue and are presented as "savings as

a percentage of sales" and "spending as a percentage of revenue."[1] Thus, while the size of DSM territory may vary greatly among the comparison group, this approach normalizes to territory sales, peak, and revenue, providing an equal footing for comparing portfolio performance. As the simplest analysis, this Level 1 review makes no attempt to fine-tune the benchmarking performance of Vermont's EEUs to peers with respect to DSM portfolio composition or depth and comprehensiveness of savings (reflected in lifetime savings).

The benchmarking data for each organization are prepared as follows:

1. **Collected reported DSM program incremental results for 2008:[2]**

» Expenditures[3],[4]
» Energy savings, and
» Peak demand savings.

The sources for almost all of the DSM program data were the organizations' annual reports reflecting their 2008 DSM program activities.

2. **Collected baseline data for 2008:[5]**

» Revenues,
» Energy sales, and
» Peak demand.

3. The main source for the baseline data was FERC Form 861 from the Energy Information Administration's web site (www.eia.doe.gov).[6]

4. **Calculated costs of savings on a first year basis:**

» Divided DSM expenditures by DSM program energy savings, $/kWh, first year, and
» Divided DSM expenditures by DSM peak demand savings, $/kW.

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[1] DSM spending as a percent of revenue by itself, is not an indicator of portfolio performance. This metric is used to normalize across different utilities and compare energy savings and associated costs to achieve savings.
[2] 2007 data are used for some utilities because 2008 data were not available. These utilities are indicated in the graphics with "07."
[3] Estimates of EEU delivery costs associated with costs incurred outside of the direct control of EVT and BED such as evaluation costs, fiscal agent, etc, were not included in this analysis.
[4] Expenditures for load management programs exclude rate discount incentives.
[5] Baseline data excludes one of the two major opt-out customers, as discussed further in the C&I Section of Level 1 results. The other major opt out customer was inadvertently included. The DPS determined that the magnitude of the error was not significant enough to recreate the entire benchmarking analysis. The impact of the error on overall and C&I results is discussed in a footnote in Section 4.1.2
[6] EIA's "Energy" and "Bundled" values were collected for retail sales and revenue. EIA's "Delivery" values were excluded here. In contrast to this report, EVT, when comparing results to baseline sales, uses a baseline that adds reported sales plus the savings achieved (as what the sales would have been absent the program intervention).

5. **Identified medians of normalized spending, savings, and costs of saving for the Level 1 organizations.**

1.2.2 Level 2: Normalized Benchmarking

The Level 2 analysis furthers the normalization process in two key ways: 1) the group reviewed is more selective, and 2) spending and impacts of uncommon programs are omitted. Specifically, Level 2 benchmarking analyzes a sub-set of the Level 1 group: organizations that are in a climate zone very different from Vermont's (e.g., utilities in California) are excluded. This reduces the number of organizations included in the Level 2 analysis to 20. In addition, to reduce variation in results due to unique regulatory programming requirements or uncommon practices, all costs and savings associated with three programs are excluded from all results (including EVT and BED): 1) fuel switching programs, 2) low-income programs, and 3) demand response programs. The statistics calculated for Level 1 are also calculated for the adjusted results and more selective group for Level 2.

1.2.3 Level 3: Organizations with High Savings and Low Costs and Peer Group Benchmarking

In the Level 3 analysis, NCI further focuses the benchmarking to a group of 11 organizations, selected on the basis of the results of the Level 2 analysis, and exacts a more detailed review. The selected organizations are identified as having achieved above median savings at below median costs or are key peers to Vermont (being in the Northeast, a state agency, or a publicly-owned utility (POU)). Additionally, Level 3 includes collecting and analyzing detailed program-level results and collecting measure life or lifetime energy savings to estimate levelized cost of energy savings. The Level 3 review provides in-depth comparisons of relative program level performance (e.g., comparative results of C&I Existing Facilities programs) and other regulatory frameworks (e.g., decoupling, performance incentives, etc.), which may explain variations in overall portfolio performance among Vermont's EEU's and their Level 3 peer group. While analyzing organizations' total resource benefits and benchmarking over three years of DSM program data can yield additional insights, the demands, complexity, and data consistency concerns inherent in these analyses make them beyond the scope of this study. And with a larger data set, a regression analysis could be used to identify any statistically significant relationship; this is not valid, however, with only 11 data points.

Level 1 Results Summary

This section compares 2008 DSM program results for residential and C&I customer sectors combined for the Level 1 organizations. The analysis, over all customer sectors, identifies typical results (i.e., the median value for each statistic) and identifies organizations that achieved above median savings at below median costs. See Appendices for complete data and statistics.

1.2.4 Level 1 Results Over All Sectors

This section reviews 2008 DSM program spending, savings, and costs in terms of baseline revenue, energy sales, and peak demand over all customer sectors for the Level 1 organizations.

Table 0-1 shows the median result for DSM spending, savings, costs, and energy costs over all customer sectors for the Level 1 organizations. Given that some of the datasets are skewed or contain outliers, the median is used here as it is a better indication of central tendency than the average. As shown in the following table, EVT spent 4.8% of total electric revenue on DSM and achieved 2.8% energy savings as a percent of baseline sales. This compares to the overall medians of 1.9% spending as a percent of revenue and energy savings of 1.0% as a percent of electric energy sales. BED spent 3.4% of electric revenues on DSM, and conserved 2.0% of baseline electric sales.

Table 0-1. Level 1 Medians for Overall 2008 Results

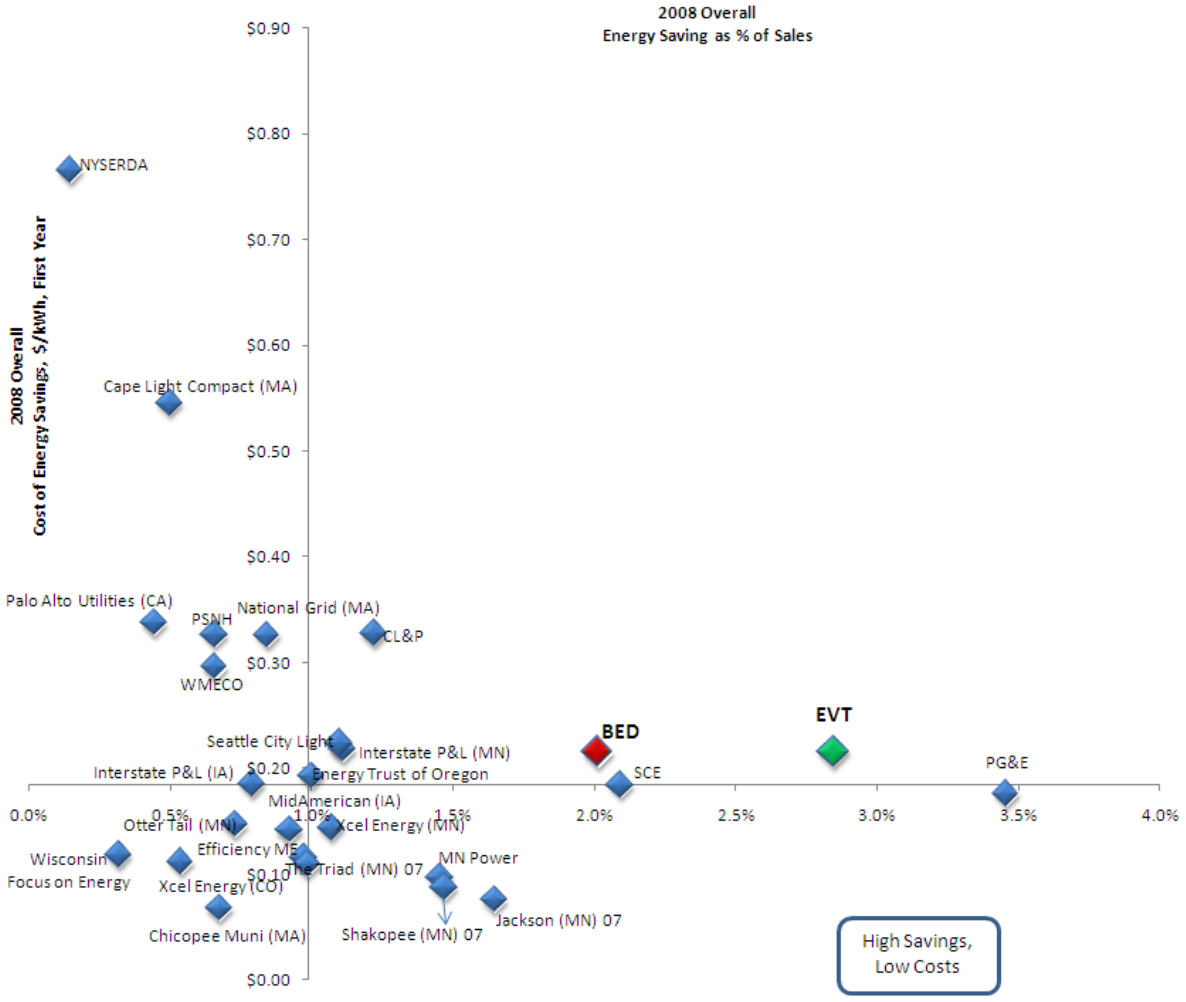
	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Retail Cost of Energy $/kWh	Cost of First Year Savings	
					$/kWh	$/kW
Overall	1.9%	1.0%	1.1%	$0.09	$0.18	$869
EVT	4.8%	2.8%	2.1%	$0.13	$0.22	$1,535
BED	3.4%	2.0%	1.3%	$0.13	$0.22	$1,775

Note: Cost of first year savings should not be confused with a levelized cost of conserved energy. Levelized cost of energy savings for EVT is $0.033/kWh and $0.030/kWh for BED.[7]

For the Level 1 organizations, the scatter plot in Figure 0-1 illustrates where each organization falls relative to median electric energy savings and median costs of savings. Energy savings as a percentage of sales is on the horizontal axis; first year cost of energy savings is on the vertical axis; and the axes are set at the median values. Thus, the organizations in the bottom right quadrant are the ones that achieved above median energy savings and costs below the median, i.e., high savings, low costs.

[7] Because the data required to estimate levelized cost of energy savings are generally not readily available, cost of energy savings is presented here and in the Level 2 analysis in terms of *first year* $/kWh. Data to estimate levelized cost of energy savings were collected for the Level 3 organizations, and analysis of those lifetime costs are presented in that section.

Figure 0-1. Level 1 2008 Energy Savings and First Year Costs ($/kWh) [8]



	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.9%	$0.18/kWh
EVT	2.8%	$0.22/kWh
POU Median	1.3%	$0.16/kWh
BED	2.0%	$0.22/kWh

[8] Although every effort is made to collect comparable data, given the inherent variation in organizations' evaluation and reporting practices, the results cannot be considered a perfect "apples-to-apples" comparison. For example, utilities in Minnesota report gross; other states covered by this benchmarking analysis such as Iowa and Maine also generally report gross savings instead of net savings. In contrast, organizations in other states perform net-to-gross analysis and report verified net savings.

These Level 1 results show that EVT and BED achieved significantly larger energy savings than almost all of the utilities and agencies benchmarked. However, EVT and BED had first year cost of conserved electricity that is somewhat higher than the median for the benchmarked Level 1 organizations. Based on our benchmarking of DSM programs for previous studies, this performance is typical of organizations that achieve energy savings in the top 15% of the reviewed group: their cost of savings is usually at median or a little above median.

Level 2 Results Summary

The Level 2 analysis furthers the normalization in two key ways: 1) Level 2 reviews a subset of Level 1 organizations, excluding organizations in climates very different from Vermont's (e.g., removes the California utilities); and 2) Level 2 excludes all costs and impacts associated with three program types that are either uncommon or whose budget allocations are typically set by legislative mandate rather than by discretionary portfolio design: demand response, low income, and fuel switching.[9]

1.2.5 Level 2 Results Over All Sectors

This section reviews 2008 DSM program spending, savings, and costs over all customer sectors.

Table 0-2 shows the median result for DSM spending, savings, costs, and energy costs over all customer sectors for the Level 2 organizations. Given that some of the datasets are skewed or contain outliers, the median is used here as it is a better indication of central tendency than the average. As shown in the following table, EVT spent 4.6% of revenue and achieved 2.7% energy savings as a percent of sales. This compares to the overall medians of 1.6% spending as a percent of revenue and energy savings of 1.0% as a percent of electric energy sales. Savings are significantly higher, and correspondingly, costs are significantly higher as well. BED spent 3.3% of electric revenues on DSM and saved 2.0% of baseline electric sales.

[9] Some organizations that meet the criteria for Level 2 are not included due to insufficient or incomplete data such as NYSERDA and Cape Light Compact (MA).

Table 0-2. Level 2 Medians for Overall Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Retail Cost of Energy $/kWh	Cost of First Year Savings	
					$/kWh	$/kW
Overall	1.6%	1.0%	0.6%	$0.09	$0.13	$710
EVT	4.6%	2.7%	2.0%	$0.13	$0.21	$1,480
BED	3.3%	2.0%	1.3%	$0.13	$0.21	$1,696

For the Level 2 organizations, the scatter plot in Figure 0-2 illustrates where each organization falls relative to median electric energy savings and median costs of savings. Energy savings as a percentage of sales is on the horizontal axis; first year cost of energy savings is on the vertical axis; and the axes are set at the median values. Thus, the organizations in the bottom right quadrant are the ones that achieved above median energy savings and costs below the median, i.e., high savings, low costs.

Figure 0-2. Level 2 2008 Energy Savings and First Year Costs ($/kWh)

	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.9%	$0.17/kWh
EVT	2.7%	$0.21/kWh
POU Median	1.4%	$0.08/kWh
BED	2.0%	$0.21/kWh

The Level 2 savings and cost results are generally quite similar to the Level 1 results. One significant exception is that the Level 2 cost of first year savings for publicly owned utilities ($0.08/kWh) is about half the Level 1 cost of savings ($0.16/kWh). These decreased costs are primarily due to eliminating these utilities' costs for conducting demand response programs.

The Level 2 overall median cost of first year energy savings is $0.13/kWh, about 30% less than the Level 1 overall median cost of first year savings, $0.18/kWh. The EVT and BED Level 2 costs of first year savings ($0.21/kWh) are about 5% less than their Level 1 cost of first year savings ($0.22/kWh). Therefore, EVT and BED's Level 2 costs of first year energy savings are farther above the Level 2 medians than was the case for the Level 1 cost of first year savings. This is most clearly shown graphically from comparing Figure 0-1 and Figure 0-2.

Level 3 Results Summary

Level 3 benchmarking involves a more detailed analysis of a select group of organizations. The analysis includes comparison of program-level results, comparison and detailed view of levelized cost of energy savings, comparison of incentive and non-incentive program costs, and a review of regulatory framework and other factors that may affect DSM performance. This analysis is performed on peer organizations and organizations that achieved above median energy savings at median costs or less, a subset of Level 2 organizations. Peer organizations are identified as Level 2 organizations that are state agencies, POUs, or in the Northeast. Organizations with relatively high savings and low costs among Level 2 should be considered to have proven exceptionally good performance, given that only organizations with established and aggressive DSM programs were selected for the initial group of 25 organizations. The Level 3 organizations include Efficiency Vermont, Burlington Electric District, Connecticut Light and Power, Efficiency Maine, Energy Trust of Oregon, Jackson MN muni, National Grid, Public Service Company of NH, Shakopee MN muni, the Triad of Minnesota, and Xcel Energy.[10]

[10] Other Level 2 organizations meet these criteria but are not included in this analysis due to insufficient data.

1.2.6 Level 3 Organizations Residential Results

Table 0-3 shows the median result for spending, savings, and costs for the residential sector for Level 3 organizations (where data are available).

Table 0-3. Level 3 2008 Medians for Residential Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of First Year Savings		Levelized Cost of Energy Savings
				$/kWh	$/kW	$/kWh
IOU and Agency Median	0.9%	0.9%	0.4%	$0.17	$1,513	$0.028
EVT	2.6%	3.6%	2.3%	$0.11	$847	$0.022
POU Median	1.7%	1.0%	1.3%	$0.20	$533	$0.036
BED	5.8%	4.6%	3.1%	$0.18	$1,431	$0.038

As shown in Table 1-3 for residential results, EVT's 2008 spending amounted to 2.6% of residential revenues and achieved energy savings amounting to 3.6% of sales. This compares to the IOU and agencies' median results of 0.9% spending as a percent of revenue and energy savings of 0.9% as a percent of electric energy sales. BED spent 5.8% of electric revenues on residential DSM, and achieved savings of 4.6% of baseline residential sales.

These results show that EVT and BED's residential spending as a percentage of revenue and energy savings are much larger than the other Level 3 utilities and agencies. In addition, EVT and BED's residential costs of energy savings are less than the respective medians for the Level 3 investor owned utilities and agencies and publicly owned utilities. Thus, EVT and BED are high savings and low cost organizations as far as residential DSM programs are concerned. EVT and BED are high savings and low cost organizations for residential savings among Level 1 and Level 2 organizations as well, as is shown in sections three and four of this report.

Lighting programs account for 94% of both EVT and BED's total residential energy savings. Lighting programs account for over 85% of the residential energy savings for seven of the eleven Level 3 organizations reviewed. However, a few organizations reviewed have more balanced residential DSM portfolios. Public Service Company of New Hampshire gets only about 54% of their residential savings from lighting programs, and the Energy Trust of Oregon gets about 39% of their residential energy savings from new construction programs. The predominance of savings from lighting low cost measures together with EVT's and BED's high percentage of residential DSM spending as a percentage of residential revenue, may explain

their achieving the highest rate of energy savings in Level 3 at below median costs. However, relying on one technology for over 90% of residential savings is a riskier strategy than having a balanced portfolio of programs. Future CFL regulations or legislation or increasing market saturation of CFLs could lead to significant decreases of residential portfolio savings for EVT and BED in the future if they continue to rely on CFLs for almost all of their residential energy savings.

1.2.7 Level 3 Organizations C&I Results

Table 0-4 shows the median results for spending, savings, and costs for the C&I sector for Level 3 organizations (where data are available). As shown in Table 1-4 for C&I results, EVT spent 6.3% of 2008 C&I revenues on C&I DSM and achieved 2.1% energy savings as a percent of C&I sales. This compares to the IOU and agencies medians of 2.8% spending as a percent of revenue and energy savings of 1.1% as a percent of electric energy sales. BED spent 2.4% of C&I revenues on DSM and achieved savings of 1.2% of baseline C&I electric sales.

Table 0-4. Level 3 2008 Medians for C&I Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of First Year Savings		Levelized Cost of Energy Savings
				$/kWh	$/kW	$/kWh
IOU and Agency Median	2.8%	1.1%	0.5%	$0.23	$1,704	$0.028
EVT	6.3%	2.1%	2.0%	$0.34	$2,067	$0.042
POU Median	1.6%	1.3%	0.9%	$0.08	$374	$0.011
BED	2.4%	1.2%	0.7%	$0.24	$2,068	$0.027

These results show that EVT is achieving the largest C&I energy savings of the Level 3 organizations reviewed, while BED's C&I energy savings are very close to the median for the publicly owned utilities reviewed. EVT's costs of energy savings is higher than the median for the Level 3 IOUs and agencies, while BED's costs of energy savings are considerably higher than for the Level 3 publicly owned utilities reviewed. However, BED's C&I costs of energy savings are very close to the Level 3 C&I IOUs and agencies' costs of energy savings.

EVT is obtaining slightly more than half (54%) of its C&I energy savings from a direct installation program that focuses on lighting retrofits. These tend to be among the higher cost of conserved energy C&I programs. EVT's program costs per kWh for this program, $0.39 per first year kWh saved, are comparable to the program costs for CL&P ($0.31 per first year kWh saved)

and National Grid ($0.41 per first year kWh saved). However CL&P obtains only 19% of its total C&I energy savings from this program, while National Grid obtains 15% of its C&I energy savings from this program. This variation of program savings distribution among organizations is partly a reflection of the variation of C&I markets among the organizations' territories (e.g. a territory with C&I energy consumption dominated by small businesses will have a greater potential energy savings share in direct small programs than a territory with many large commercial and large industrial customers).

BED obtained 87% of its C&I energy savings from its Business Existing Facilities program. About half of the energy savings from this program come from lighting measures, while about 30% of its energy savings come from Custom measures. BED's cost of saved energy for this program of $0.20 per first year kWh saved is very comparable to the costs of saved energy from similar programs employed by other Level 3 organizations, which range from $0.17 per first year kWh saved to $0.40 per first year kWh saved. BED obtained 10% of its C&I energy savings from its Business New Construction program. BED's costs of saved energy for this program were $0.64/kWh per first year kWh saved. BED's cost of saved energy for this program was higher than for all the other Level 3 organizations except Efficiency Maine. The range of costs of saved energy for this program ranged from $0.09 to $0.77 per first year kWh saved.

1.2.8 Level 3 Incentive and Non-Incentive Costs Results

Overall and per sector, the Level 3 Minnesota municipal utilities have the lowest share of non-incentive costs among the group while Xcel Energy (MN) and the VT EEUs have the highest share. However, over all sectors, the Minnesota utilities and the VT EEUs achieved relatively high energy savings. Given the variation in defining incentive and non-incentive costs, it is impossible to explain this variation of incentive/non-incentive cost ratio among high-achieving programs with any certainty. This variation may reflect a difference in reporting practices, in programming emphasis (e.g. spending more on programs with no participant incentives but substantial impacts, such as upstream programs), other factors, or some combination.

1.2.9 Level 3 Levelized Cost of Energy Savings Results

Levelized cost of energy savings was estimated for all Level 3 organizations with available data. These levelized costs revealed a pattern similar to that revealed by first year costs of energy savings: VT EEUs levelized costs are slightly above median. This comes as no surprise given that their energy savings is the highest, and, in the case of EVT, their C&I savings were achieved with direct installation measures which generally cost more than other C&I programs. EVT's and BED's cost performance is in line with performance NCI has observed in previous benchmarking studies: organizations that achieve energy savings in the top 15% of the reviewed group typically do so at costs at median or a little above median.

1.3 Conclusions

1. **EVT and BED's residential energy efficiency programs had the largest energy savings for any of the organizations benchmarked for all levels of the benchmarking analysis.** EVT's residential programs saved about 3.8% of residential baseline sales, while BED's residential programs saved about 4.6% of residential baseline sales. The median savings for the other benchmarked organizations were less than 1% of residential baseline sales.

2. **EVT and BED's residential cost of saved energy is less than the residential medians for the organizations benchmarked for all levels of the benchmarking analysis.** EVT's residential levelized cost of saved energy is about $0.02 per kWh, while BED's residential levelized cost of saved energy is about $0.04 per kWh.

3. **Lighting programs account for 94% of both EVT and BED's total residential energy savings.** Lighting programs account for most of the residential energy savings for most of the Level 3 organizations reviewed. Relying on one technology for over 90% of residential savings is a more risky strategy than having a more balanced portfolio of programs. Future CFL regulations or legislation or increasing market saturation of CFLs could lead to significant decreases of residential portfolio savings for EVT and BED in the future if they continue to rely on CFLs for almost all of their residential energy savings. This conclusion also applies to peer groups who also achieved most of their residential savings from lighting programs as well.

4. **EVT achieved the largest C&I energy savings of any of the organizations reviewed, about 2.1% of C&I baseline sales**. This amount of savings is about double the medians of the benchmarked utilities for all levels of benchmarking conducted.

5. **BED's C&I energy savings of 1.2% of baseline sales are very close to the medians for the publicly owned utilities reviewed**.

6. **EVT's levelized costs of C&I energy savings of about $0.042/kWh is higher than the $0.028/kWh median levelized cost for the Level 3 IOUs and agencies reviewed.** The main reason for EVT's higher than median costs of saved energy for C&I programs appears to stem from EVT's geo-targeting direct installation program to achieve about half of its C&I energy savings. Direct installation programs tend to be higher cost programs than most types of prescriptive rebate programs. No other Level 3 organization for which data was available reported obtaining more than 19% of its C&I energy savings from a direct installation program.

7. **BED's levelized costs of C&I energy savings of $0.027/kWh are similar to the Level 3 IOUs and agencies reviewed but are considerably higher than for the Level 3 publicly owned utilities reviewed**. The Level 3 POUs reviewed obtain most of their C&I energy savings from very low cost lighting programs.

8. **BED obtained 87% of its C&I energy savings from its Business Existing Facilities program**. About half of the energy savings from this program come from lighting measures, while about 30% of its energy savings come from custom measures. BED's cost of saved energy for this program of $0.20 per first year kWh saved is very comparable to the costs of saved energy from similar programs operated by other Level 3 organizations. The costs for these types of programs for the Level 3 organizations reviewed range from $0.17 per first year kWh saved to $0.40 per first year kWh saved.

9. **BED obtained 10% of its C&I energy savings from its Business New Construction program.** BED's costs of saved energy for this program were $0.64/kWh per first year kWh saved. BED's cost of saved energy for this program was higher than for all the other Level 3 organizations reviewed except Efficiency Maine. The range of costs of saved energy for this program ranged from $0.09 to $0.77 per first year kWh saved. The causes for the high costs for this BED program should be further analyzed in the future.

10. **Based on our experience benchmarking programs across the country, we maintain that the benchmarking approach is useful**. However, it must be viewed with some caution as DSM programs calculate and report savings and assign costs in different ways. Some DSM programs, such as Vermont's employ detailed annual savings verification processes that adjust gross savings results and report net verified savings after an annual savings review audit. Other DSM programs report gross savings (e.g. Minnesota, Iowa, and Maine). Differences also exist with respect to how utilities claim savings, as either from the meter or the generator, and this is another variable that is challenging for the comparative review. Some DSM programs report costs inclusive of evaluation, others such as Vermont do not. Administrative costs are especially difficult to benchmark, as they are often defined differently between organizations.

Introduction

In 2009, the Vermont Public Service Board approved a change in the structure of energy efficiency service delivery in Vermont. As part of the transition process, an "Overall Performance Assessment" of entities currently delivering efficiency programs in the state is required. As part of this assessment, the Vermont Department of Public Service (DPS) selected Navigant Consulting (NCI) to assist with benchmarking 2008 electric energy efficiency service delivery performance in Vermont versus service delivery in other jurisdictions. Burlington Electric Department (BED) provides electric energy efficiency services in its territory. Vermont Energy Investment Corporation (VEIC) is currently contracted to provide electric energy efficiency service delivery to the balance of the state as Efficiency Vermont (EVT). Both entities are referred to as an Energy Efficiency Utility (EEU) and the results of this benchmarking study profile the comparative DSM savings and costs of both BED and EVT to a group of approximately 25 other organizations across the Northeast, Midwest, and Western states.

1.4 Background

The Vermont Public Service Board (the Board), in its Order of 11/24/09, altered the structural model of Vermont's energy efficiency service delivery from a contract-based model to an Order of Appointment model. While the Board found that the contract model has served ratepayers well since its inception in 2000, the Board to conclude that an Order of Appointment will provide additional benefit to Vermont ratepayers. The new structure retains many of the functions of the existing EEU, but provides longer term stability for an EEU to better serve ratepayers. To ensure performance under the new long term structure, the Board provided for enhanced oversight. This oversight includes an initial Overall Performance Assessment (OPA) in which the two current energy efficiency providers – EVT and BED – are subject to a review of services to consider each provider's effectiveness. The OPA is a public and transparent process conducted by the Board to inform a determination as to whether it is in the best interest of Vermont ratepayers to solicit competitive bids for delivery of efficiency services, or to appoint the incumbent. This report does not explicitly address the issue of appointment, however, it is the intent that the results of this report will be one part of many factors used to help inform this decision.

1.5 High-Level Overview of Benchmarking Approach

To complete this project, Navigant Consulting (NCI) reviewed the 2008 electric energy efficiency demand-side management (DSM) performance of 25 organizations compared to Efficiency Vermont's (EVT) and Burlington Electric Department (BED) 2008 DSM results. The selection of organizations included investor-owned utilities, statewide agencies, and municipal utilities, each having run large scale DSM programs for at least seven years[11]. This selection provided a broad comparison group of mature DSM programs. In some instances, the availability and format of reported DSM data limited our ability to perform preferred in-depth comparison (e.g., NYSERDA). The review was structured into three peer groupings and three levels of analysis, with each additional level providing a more detailed review and finer normalization to Vermont's EEU service delivery context.

While NCI's efforts to benchmark the performance of Vermont's EEU's employed a strategic and stratified method as detailed in the methodology section below, NCI recognizes that the ability to conduct a perfect "apples to apples" comparison of performance is challenged by multiple factors that make every state and utility service territory (with associated regulatory and policy mandates and approaches) unique. Given these inherent limitations, this benchmarking serves as an illustration of the Vermont EEU's performance relative to a national peer group.

[11] Given the selection of organizations, the typical performance of this group is likely not typical of all DSM programs; this group's performance is likely better than the national average.

1.6 Key Questions

Upon conclusion of the benchmarking analysis, the results of the report will help the reader address the following questions:

- What is the overall performance of Vermont's EEU's compared to 25 other mature DSM programs?
- How do Vermont's EEU's compare in terms of DSM savings as a percent of sales and DSM spending as a percent of electric revenues?
- Are the performances of Vermont's EEU's noticeably above, below, or average with respect to performance and cost for sector-level program results (residential and C&I)?
- How do Vermont's EEU's compare in terms of levelized costs of energy savings, $/kWh, with their peers?
- Does the presence of decoupling or performance incentives, or electric rates impact portfolio performance?

These questions and many others are addressed through graphical presentation of benchmarking results at three progressively detailed levels of analysis as explained in Section 2: Methodology.

1.7 Report Organization

The remainder of this report is organized as follows:

- Section 2: Benchmarking Methodology
- Section 3: Standard Benchmarking Results
- Section 4: Normalized Benchmarking Results
- Section 5: Organizations with high energy savings and low costs and Peer Group Benchmarking
  Section 6: Conclusion

Benchmarking Methodology

The benchmarking method includes three levels of review each with its own group of organizations. In the first level, the benchmarking starts with a peer group of 25 other DSM organizations; levels two and three analyze in increasingly greater detail and discrimination to normalize results for each group. By design, each level of analysis narrows the group size.

Table 0-1. Organizations Selected for Review

Region	State Agency or Utility	State	Level 1: Standard Benchmarking	Level 2: Normalized Benchmarking	Level 3: Organizations with High Energy Savings and Low Costs and Peer Group Benchmarking
Northeast	Efficiency Vermont	VT	X	X	X
	Burlington Electric Dept.	VT	X	X	X
	CL&P	CT	X	X	X
	City of Chicopee Muni	MA	X	X	
	National Grid	MA	X	X	X
	Cape Light Compact	MA	X		
	WMECO	MA	X	X	
	Efficiency Maine	ME	X	X	X
	PSNH	NH	X	X	X
	NYSERDA	NY	X		
Midwest	Interstate Power & Light	IA	X	X	
	MidAmerican Energy	IA	X	X	
	Interstate Power & Light	MN	X	X	
	Minnesota Power	MN	X	X	
	Otter Tail Power	MN	X	X	
	The Triad Municipal 2007	MN	X	X	X
	Jackson Municipal 2007	MN	X	X	X
	Shakopee Muni 2007	MN	X	X	X
	Xcel Energy	MN	X	X	X
	Wisconsin FoE	WI	X	X	
West	Palo Alto Muni	CA	X		

Region	State Agency or Utility	State	Level 1: Standard Benchmarking	Level 2: Normalized Benchmarking	Level 3: Organizations with High Energy Savings and Low Costs and Peer Group Benchmarking
	PG&E	CA	X		
	SCE	CA	X		
	SDG&E	CA	X		
	Xcel Energy	CO	X	X	
	Energy Trust Oregon	OR	X	X	X
	Seattle City Light	WA	X		
TOTAL			**27**	**20**	**11**

1.8 Level 1: Standard Benchmarking

The Level 1 analysis is the highest level, in terms of detail. Level 1 reviews 27 organizations in mature DSM markets across the Northeast, Midwest, and Western states. The review focuses on a straight comparison of unadulterated reported energy and demand savings and associated DSM total program delivery costs for 2008. DSM savings and spending are then normalized with 2008 energy sales, peak demand, and revenue and are presented as "savings as a percentage of sales" and "spending as a percentage of revenue." Thus, while the size of DSM territory may vary greatly among the comparison group, this approach normalizes to territory sales, peak, and revenue, providing an equal footing for comparing portfolio performance. As the simplest analysis, this Level 1 review makes no attempt to fine-tune the benchmarking performance of Vermont's EEU's to peers with respect to DSM portfolio composition or depth and comprehensiveness of savings (reflected in lifetime savings).

The benchmarking data for each organization are prepared as follows:

Collected reported DSM program results for 2008:[12]

- » Expenditures,[13]
- » Energy savings, and
- » Peak demand savings.

[12] 2007 data are used for some utilities for which 2008 data were not available. These utilities are indicated in the graphics with "07."

[13] Expenditures for load management programs exclude rate discount incentives.

The sources for almost all of the DSM program data were the organizations' annual reports on their 2008 DSM programs.

Collected baseline data for 2008:[14]

- » Revenues,
- » Energy sales, and
- » Peak demand.

The main source for the baseline data was FERC Form 861 from the Energy Information Administration's web site (www.eia.doe.gov).[15]

Categorized reported DSM program results and baseline data by major customer sector:

- » Residential and
- » Commercial and industrial (C&I).

Normalized *incremental* results and expenditures overall and for the two major customer sectors:

- » Expenditures as a percentage of revenue,
- » Energy savings as a percentage of energy sales, and
- » Peak demand savings as a percentage of peak demand.

Calculated costs of savings on a first year basis:

- » Divided DSM expenditures by DSM program energy savings, $/kWh, first year, and
- » Divided DSM expenditures by DSM peak demand savings, $/kW.

Identified median of normalized spending, savings, and costs of saving for the Level 1 organizations.

It should be noted that the cost of energy savings is calculated on a first year basis. It is not levelized cost of energy savings, thus not comparable to supply side $/kWh. The cost of first year energy savings is used in this benchmarking analysis simply to identify 1) typical costs (among each group) on a first year basis and 2) organizations that achieved savings at costs below the typical for the group.

Although every effort is made to collect comparable data, given the inherent variation in organizations' evaluation and reporting practices, the results cannot be considered a perfect "apples-to-apples" comparison. Utilities may report estimated savings at meter, busbar, or

[14]As this information was available, baseline data (retail revenue, sales, and peak data) for each benchmarked organization has been reduced by the baseline data from companies that have opted out of that organization's DSM programs.

[15] EIA's "Energy" and "Bundled" values were collected for retail sales and revenue. EIA's "Delivery" values were excluded here.

generator; some utilities' methods for estimating savings may be more accurate than other utilities'; only some annual DSM reports included savings that were verified; and few distinguish net savings from gross savings. For example, utilities in Minnesota report gross savings while organizations in other states perform net-to-gross analysis and report verified net savings.

Also, given the selection of organizations, the typical performance of this group is likely not typical of all DSM programs; this group's performance is likely better than the national average.

1.9 Level 2: Normalized Benchmarking

The Level 2 analysis furthers the normalization process in two key ways: 1) the group reviewed is more selective and 2) spending and impacts of uncommon programs are omitted. Specifically, Level 2 benchmarking analyzes a sub-set of the Level 1 group: organizations that are in a climate zone very different from Vermont's (e.g., utilities in California) are excluded. This reduces the number of organizations for Level 2 to 20. In addition, to reduce variation in results due to unique regulatory programming requirements or uncommon practices, all costs and savings associated with three programs are excluded from all results (including EVT and BED): 1) fuel switching programs, 2) low-income programs, and 3) demand response programs. The statistics calculated for Level 1 are also calculated for the adjusted results and more selective group for Level 2.

1.10 Level 3: Organizations with High Energy Savings and Low Costs and Peer Group Benchmarking

In the Level 3 analysis, NCI further focuses the benchmarking to a group of 11 remaining organizations, selected on the basis of the results of the Level 2 analysis, and exacts a more detailed review. The selected organizations are identified as being either organizations that achieved above median savings at below median costs or key peers (being in the Northeast, a state agency, or a publicly-owned utility POU). Additionally, the Level 3 includes collecting and analyzing detailed program-level results and collecting measure life or lifetime energy savings to estimate levelized cost of energy savings. The Level 3 review provides in-depth comparisons of relative program level performance (e.g., comparative results of C&I Existing Facilities programs) and other regulatory frameworks (e.g., decoupling, performance incentives, etc.) which may explain variations in overall portfolio performance among Vermont's EEU's and their Level 3 peer group. While analyzing organizations' total resource benefits and benchmarking over three years of DSM program data can yield additional insights, the demands, complexity, and data consistency concerns inherent in these analyses make them beyond the scope of this study. And with a larger data set, a regression analysis could be used to identify any statistically significant relationship; this is not possible, however, with only eleven data points.

Section 3 presents results of the Level 1 standard benchmarking review.

Level 1: Standard Benchmarking Results

1.11 Performance Results for 2008 DSM

Level 1 benchmarking reviews the largest selection of organizations of this study and includes reported incremental spending and impacts for all programs in each organization's DSM portfolio.

This section compares 2008 DSM program results for residential and C&I customer sectors combined for the Level 1 organizations. The analysis, over all customer sectors, identifies typical results (i.e., the median value for each statistic) and identifies organizations that achieved above median savings at below median costs. See Appendices for complete data and statistics.

1.11.1 Results Over All Sectors

This section reviews 2008 DSM program spending, savings, and costs in terms of baseline revenue, energy sales, and peak demand over all customer sectors for the Level 1 organizations.

Table 0-1 shows the median result for DSM spending, savings, costs, and energy costs over all customer sectors for the Level 1 organizations. Given that some of the datasets are skewed or contain outliers, the median is used here as it is a better indication of central tendency than the average.

Table 0-1. Level 1 Medians for Overall 2008 Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Retail Cost of Energy $/kWh	Cost of First Year Savings	
					$/kWh	$/kW
Overall	1.9%	1.0%	1.1%	$0.09	$0.18	$869
EVT	4.8%	2.8%	2.1%	$0.13	$0.22	$1,535
BED	3.4%	2.0%	1.3%	$0.13	$0.22	$1,775

Note: Cost of first year savings should not be confused with a levelized cost of conserved energy.[16, 17]

[16] Because the data that are required to estimate a DSM program's levelized cost of energy savings are generally not readily available, cost of energy savings is presented here and in the Level 2 analysis in terms of *first year* $/kWh. Data to estimate levelized cost of energy savings were collected for the Level 3 organizations, and analysis of those lifetime costs are presented in that section.

[17] As seen in Section 6.3, the estimated levelized lifetime costs for EVT and BED in 2008 were $0.03/kWh.

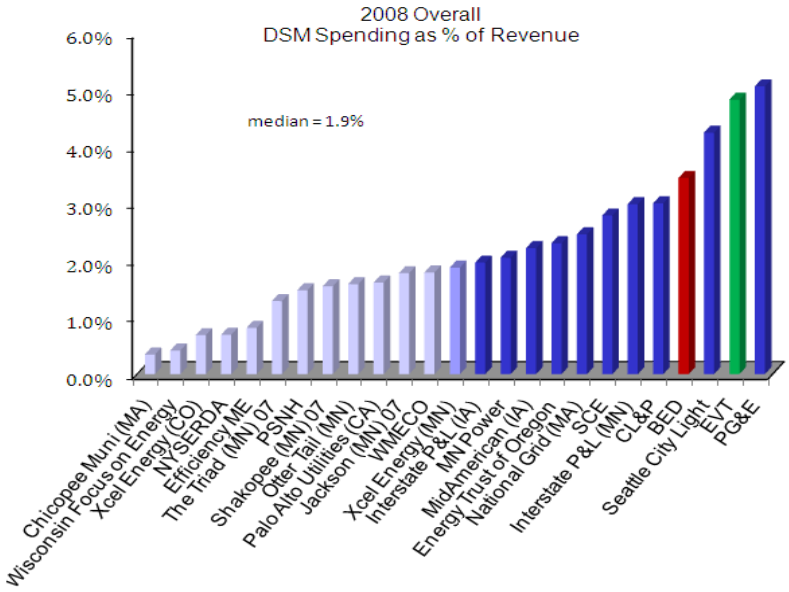
DSM Spending

This section reviews DSM spending as a percentage of all retail revenue over all customer sectors.

For the organizations in Level 1, the spending on DSM as a percentage of revenue ranges widely from 0.3% to 5.1% with the median[18] of all Level 1 organizations at 1.9%. Figure 0-1 shows DSM spending as a percentage of annual revenues.

EVT's DSM spending as a percentage of revenue is 4.8% (the green bar) which is more than twice the median for the IOUs and agencies (2.0%). BED's DSM spending as a percentage of revenue is 3.4% (the red bar) which is twice the median (1.7%) of the publicly owned utilities (POUs).

Figure 0-1. Level 1 2008 DSM Spending as % of Revenue[19, 20,21]



IOU and Agency Median	2.0%
EVT	4.8%
POU Median	1.7%
BED	3.4%

[18] In the charts in this chapter, the median is indicated as the value between the light blue bars and the dark blue bars.
[19] SDG&E is not included in the bar chart because data for 2008 expenditures was insufficient.
[20] Cape Light Compact (MA) is not included in the bar chart because 2008 revenue is not available.
[21] As this information was available, baseline data (retail revenue, sales, and peak data) for each benchmarked organization has been reduced by the baseline data from companies that have opted out of that organization's DSM programs.

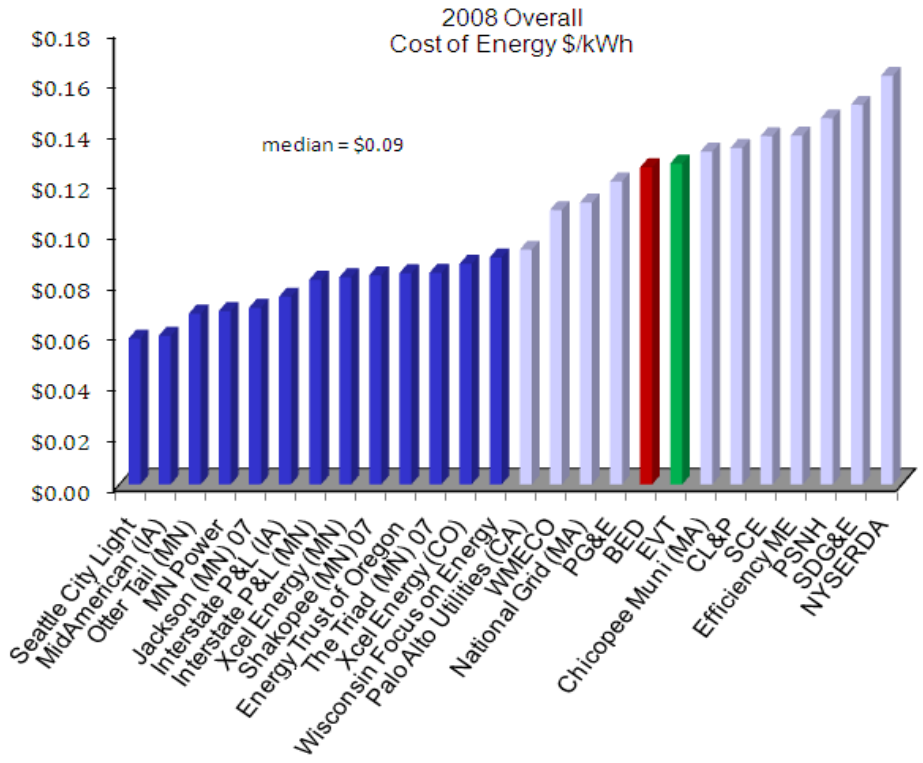
Retail Cost of Electricity

The average retail cost of electricity was calculated by dividing total annual retail revenue by total annual retail sales for each organization and state in Level 1.

For the Level 1 organizations, the average retail cost of electric energy ranges from $0.06/kWh to $0.16/kWh with the median at $0.09/kWh (Figure 0-2).

The average retail cost of electricity in the area served by EVT is $0.13/kWh which is slightly greater than the median ($0.11/kWh) of the IOUs and agencies. The average retail cost of electricity in BED's service territory is $0.13/kWh which is greater than the median ($0.09/kWh) of the POUs.

Figure 0-2. Level 1 2008 Retail Cost of Electricity



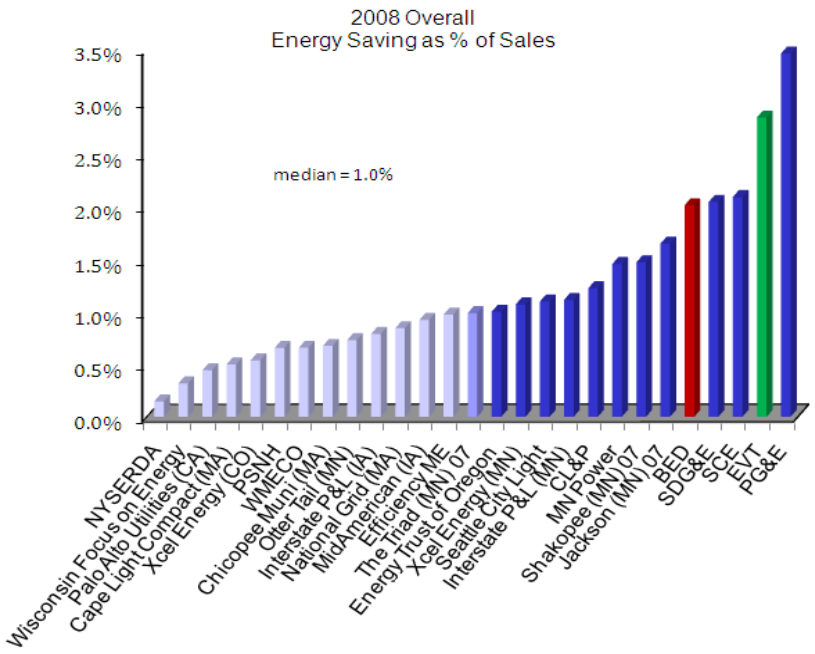
IOU and Agency Median	$0.11/kWh
EVT	$0.13/kWh
POU Median	$0.09/kWh
BED	$0.13/kWh

Electric Energy and Peak Demand Savings

This section details the energy savings (as a percentage of sales) and peak demand savings (as percent of peak demand) by the DSM programs over all customer sectors for Level 1.

For the organizations analyzed in Level 1, energy savings as a percentage of sales ranges widely from 0.1% to 3.5% with the median at 1.0%. EVT's electric energy savings as a percentage of sales is 2.8%, more than twice the median (0.9%) of the IOUs and agencies reviewed. BED's electric energy savings as a percentage of sales is 2.0%, which is greater than the median (1.3%) of the POUs.

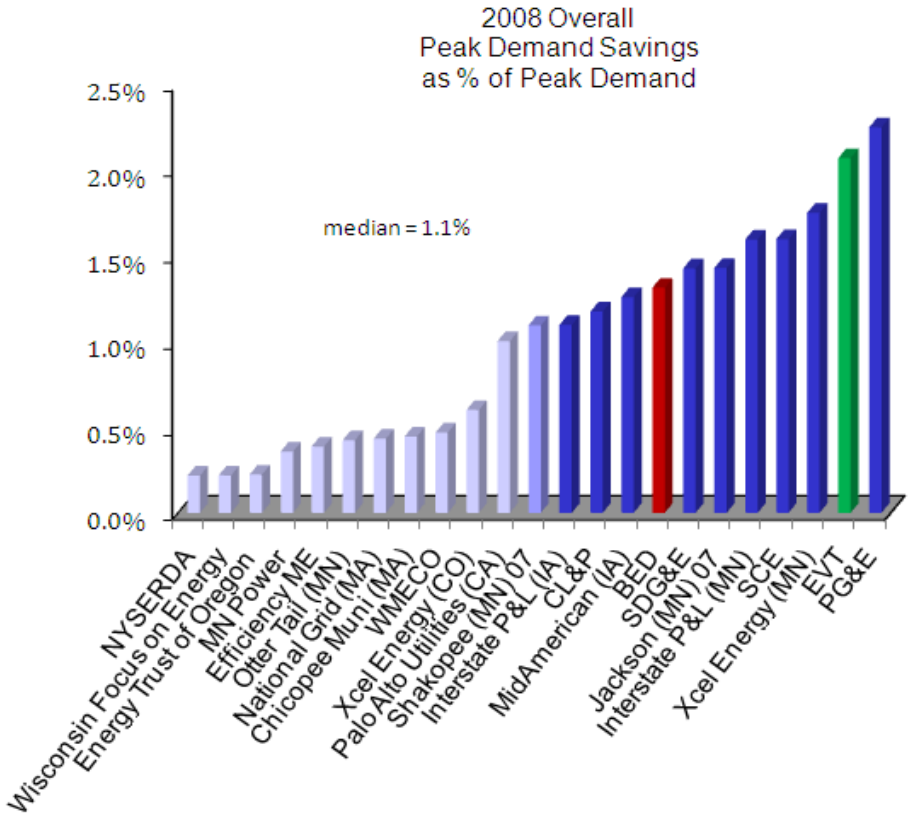
Figure 0-3. Level 1 2008 DSM Energy Savings as % of Sales--First Year



IOU and Agency Median	0.9%
EVT	2.8%
POU Median	1.3%
BED	2.0%

For the Level 1 organizations, Figure 0-4 shows DSM incremental peak demand savings as a percentage of annual peak demand which ranges widely from 0.2% to 2.2%, with the median at 1.1%. EVT's peak demand savings as a percentage of peak demand is 2.1%, greater than three times the median (0.6%) of the IOUs and agencies reviewed. BED's electric energy savings as a percentage of sales is 1.3%, which is greater than the median (1.1%) of the POUs.

Figure 0-4. Level 1 2008 Peak Demand Savings as % of Peak Demand[22]



IOU and Agency Median	0.6%
EVT	2.1%
POU Median	1.1%
BED	1.3%

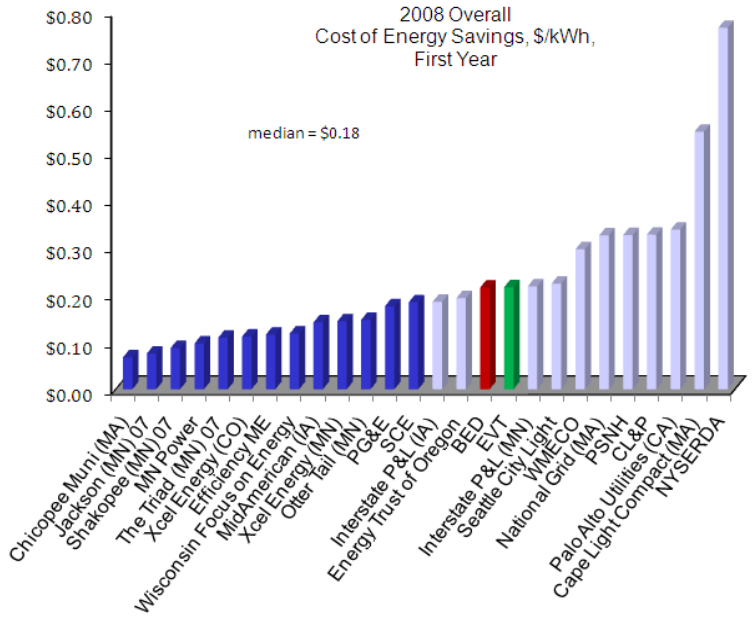
[22] The Triad (MN) 07 is not included in any peak demand bar chart because 2007 peak demand savings were not reported.

Cost of Savings

This section discusses the costs of first year energy savings and of peak demand savings for the DSM program year.[23] For the Level 1 organizations, the cost of first year energy savings ranges from $0.07/kWh to $0.76/kWh, with the median at $0.18kWh.

EVT's and BED's cost of first year energy savings is $0.22/kWh which is greater than the median first year energy savings of the IOUs and agencies ($0.18/kWh) and POUs ($0.16/kWh). [24]

Figure 0-5. Level 1 2008 Cost of Electric Energy Savings ($/kWh) First Year[25]



IOU and Agency Median	$0.18/kWh
EVT	$0.22/kWh
POU Median	$0.16/kWh
BED	$0.22/kWh

[23] The cost of first year energy savings is calculated by dividing the year's total DSM spending by total energy savings from measures implemented that year; cost of peak demand savings is calculated similarly, by dividing total DSM spending by total peak demand conserved by measures implemented that year.

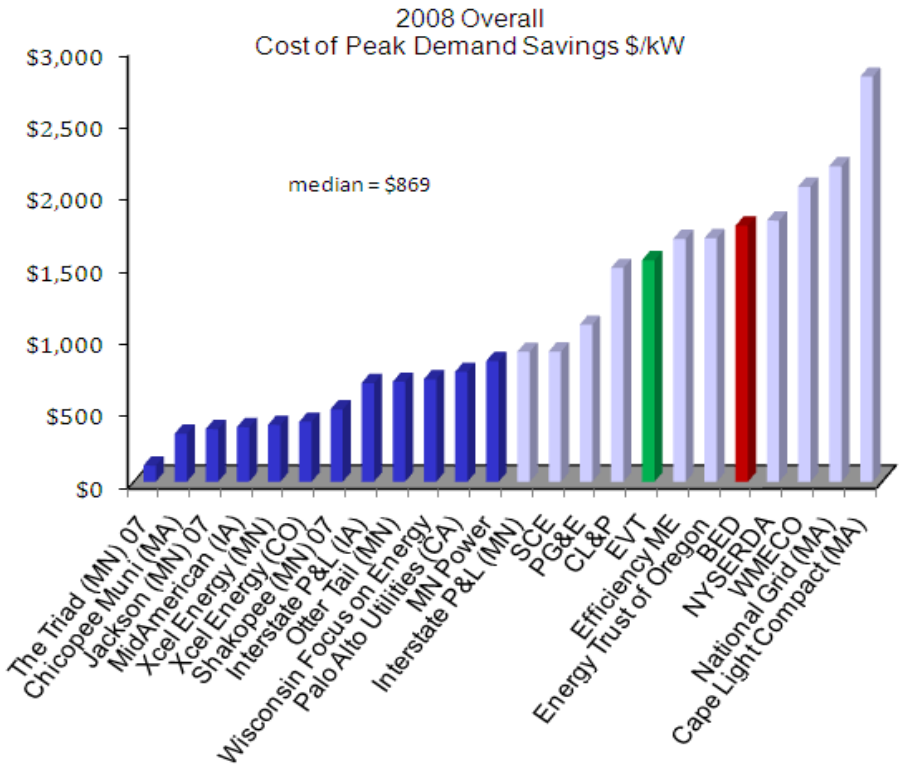
[24] Note, NCI was unaware during the completion of this study that BED has a large C&I demand response contract worth an equivalent of 7 MW of peak demand reduction, as this information was not included in BED's DSM annual report that NCI used as the main source document for BED's DSM savings and costs. These peak demand savings potential and costs were not included in the results detailed in this report.

[25] NYSERDA's 2008 first year costs of energy savings $/kWh are high because some of their programs do not directly result in energy savings, but they do report their costs.

For the Level 1 organizations, the cost of peak demand savings ranges from $112/kW to $2,807/kW, with the median at $869/kW. EVT's cost of first year peak demand savings is $1,535/kW which is greater than the median first year energy savings of the IOUs and agencies ($902/kW). BED's cost of first year energy savings is $1,775/kW which is greater than the median of POUs ($433/kW).

This wide variation in cost of peak demand savings reflects the variation of demand response programs among Level 1 organizations. Generally, higher costs of conserved peak demand indicate a portfolio with no demand response program as in the case of the organizations of the Northeast; only some organizations offered demand response programs (for example Xcel Energy (MN) and (CO)).

Figure 0-6. Level 1 2008 Cost of Peak Demand Savings ($/kW)



IOU and Agency Median	$902/kW
EVT	$1,535/kW
POU Median	$433/kW
BED	$1,775/kW

DSM Programs with High Energy Savings and Low Costs

This section identifies the Level 1 organizations with DSM programs that achieved above median savings at or below median costs.

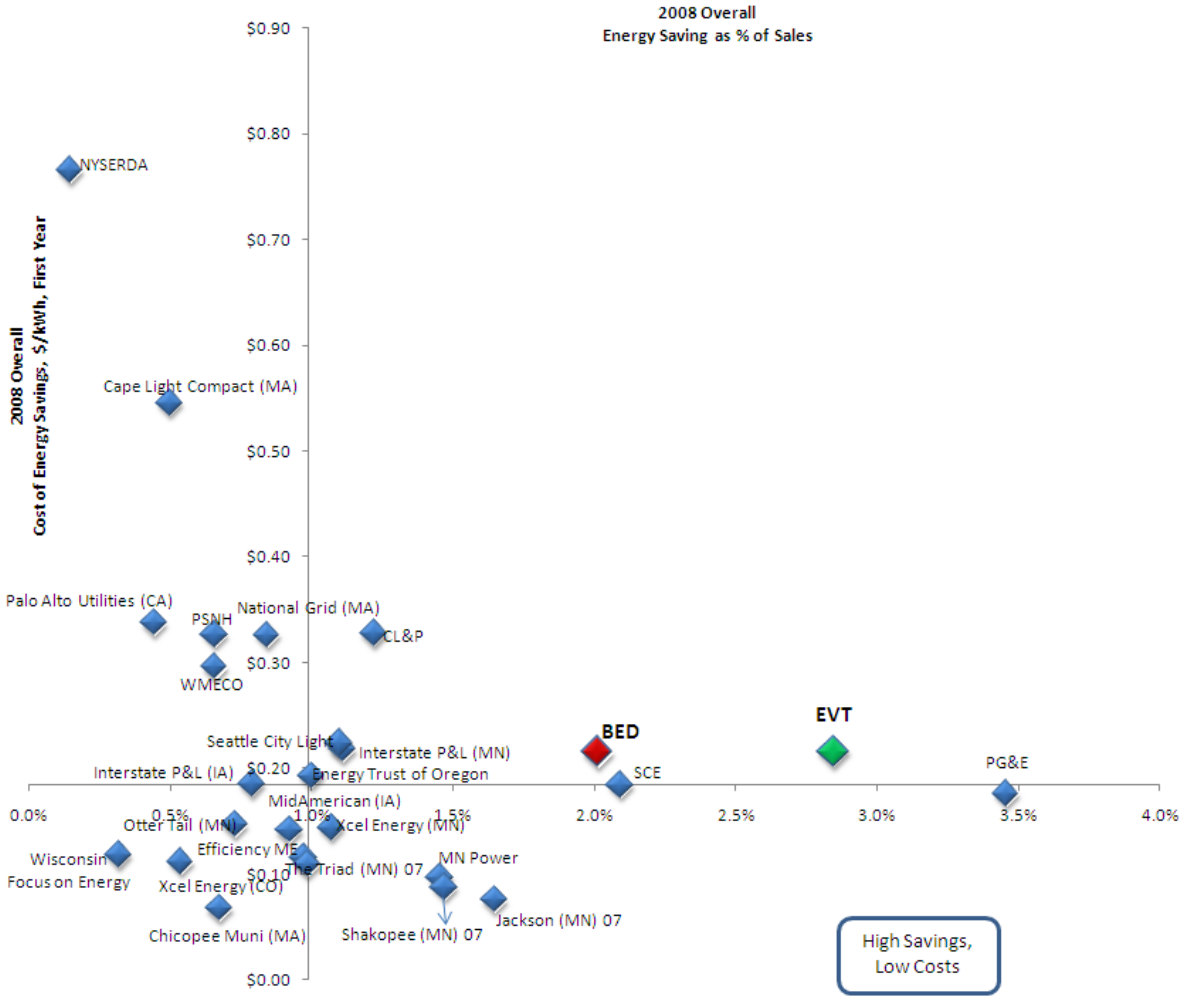
For the Level 1 organizations, the scatter plot in Figure 0-7 illustrates where each organization falls relative to median electric energy savings and median costs of savings. Energy savings as a percentage of sales is on the horizontal axis; first year cost of energy savings is on the vertical axis; and the axes are set at the median values. Thus, the organizations in the bottom right quadrant are the ones that achieved above median energy savings and costs below the median, i.e., high savings, low costs.

The utilities listed below achieved above median electric energy savings, as a percentage of sales, at costs lower than the median cost:

1. PG&E: 3.5%, $0.18/kWh
2. SCE: 2.1%, $0.18/kWh
3. Jackson (MN) 07: 1.6%, $0.08/kWh
4. Shakopee (MN) 07: 1.5%, $0.09/kWh
5. MN Power: 1.5%, $0.10/kWh
6. Xcel Energy (MN): 1.1%, $0.14/kWh
7. The Triad (MN) 07: 1.0%, $0.11/kWh

While EVT's and BED's energy savings as a percentage of sales is greater than most organizations, their first year cost of energy savings is just above the median.

Figure 0-7. Level 1 2008 Energy Savings and First Year Costs ($/kWh)



	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.9%	$0.18/kWh
EVT	2.8%	$0.22/kWh
POU Median	1.3%	$0.16/kWh
BED	2.0%	$0.22/kWh

For the Level 1 organizations, the scatter plot in Figure 0-8 illustrates organizations' results relative to median peak demand savings and median costs. The utilities listed below achieved near median or greater peak demand savings as a percentage of peak demand at costs near or lower than the median cost:

1. Xcel Energy (MN): 1.7%, $394/kW
2. Jackson (MN) 07: 1.4%, $365/kW
3. MidAmerican: 1.3%, $378/kW
4. Shakopee (MN) 07: 1.1%, $501/kW
5. Interstate P&L (IA): 1.1%, $684/kW

Most of the organizations with peak demand savings costs above median did not offer demand response programs which generally conserve peak demand at very low costs. Although EVT and BED offered no demand response programs in 2008[26], their peak demand savings as a percentage of peak demand are greater than most organizations. EVT's and BED's high rates of peak demand savings reflect their high rates of energy savings.

[26] BED began to offer a Demand Response program in 2009.

Figure 0-8. Level 1 2008 Peak Demand Savings and First Year Costs ($/kW)

	Peak Demand Savings as % of Peak Demand	Cost of Peak Demand Savings, $/kW
IOU and Agency Median	0.6%	$902/kW
EVT	2.1%	$1,535/kW
POU Median	1.1%	$433/kW
BED	1.3%	$1,775/kW

1.11.2 Sector Analysis for DSM

The following sections compare 2008 DSM program spending and results for the residential and commercial and industrial (C&I) sectors for Level 1[27].

Residential Sector

This section reviews DSM program spending, savings, and costs for the residential customer sector.

Table 0-2 shows the median result for spending, savings, and costs for the residential sector for the organizations in Level 1.

Table 0-2. Level 1 2008 Median Values for Residential Programs

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of Savings (First Year)	
				$/kWh	$/kW
Overall	1.4%	0.7%	0.9%	$0.25	$912
EVT	3.2%	3.8%	2.4%	$0.12	$975
BED	6.4%	4.6%	3.1%	$0.20	$1,564

[27] DSM results for the CA IOUs were not available at the sector-level, thus they are not included in the sector analysis.

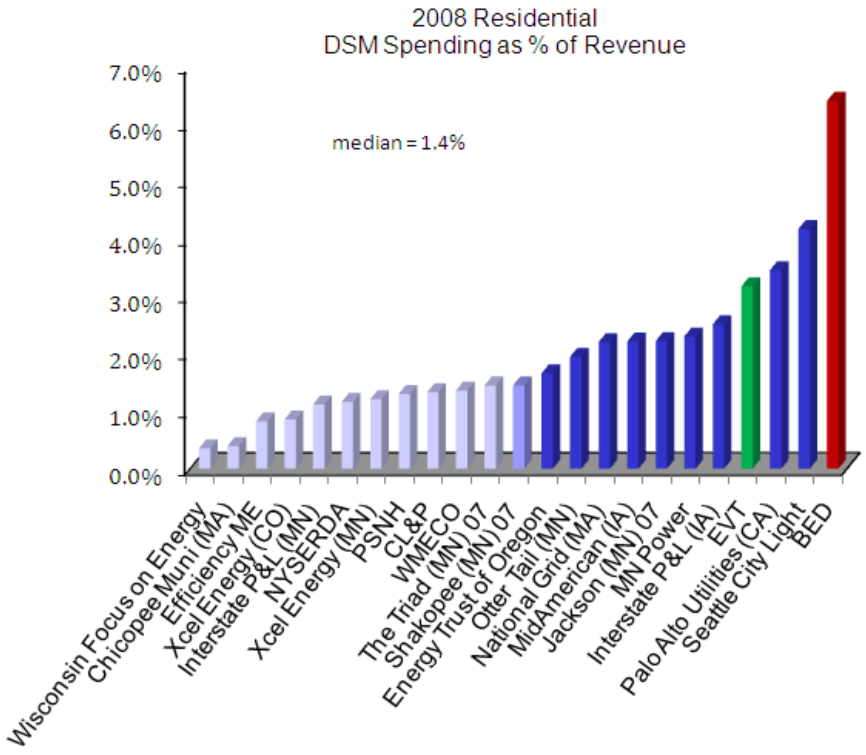
Residential DSM Spending

This section reviews DSM spending for the residential customer sector as a percentage of residential revenue.

For the Level 1 organizations, DSM spending in the residential sector, as a percentage of annual revenue of retail residential energy sales, ranges from 0.4%to 6.4%, with the median at 1.4% (Figure 0-9).

EVT's DSM spending as a percentage of revenue is 3.2% which is greater than twice the median of the IOUs and agencies (1.3%). BED's DSM spending as a percentage of revenue is 6.4% which is also greater than twice the median of the POUs (2.2%) and is the greatest residential DSM spending rate among Level 1 organizations.

Figure 0-9. Level 1 2008 Residential DSM Spending as % of Revenue



IOU and Agency Median	1.3%
EVT	3.2%
POU Median	2.2%
BED	6.4%

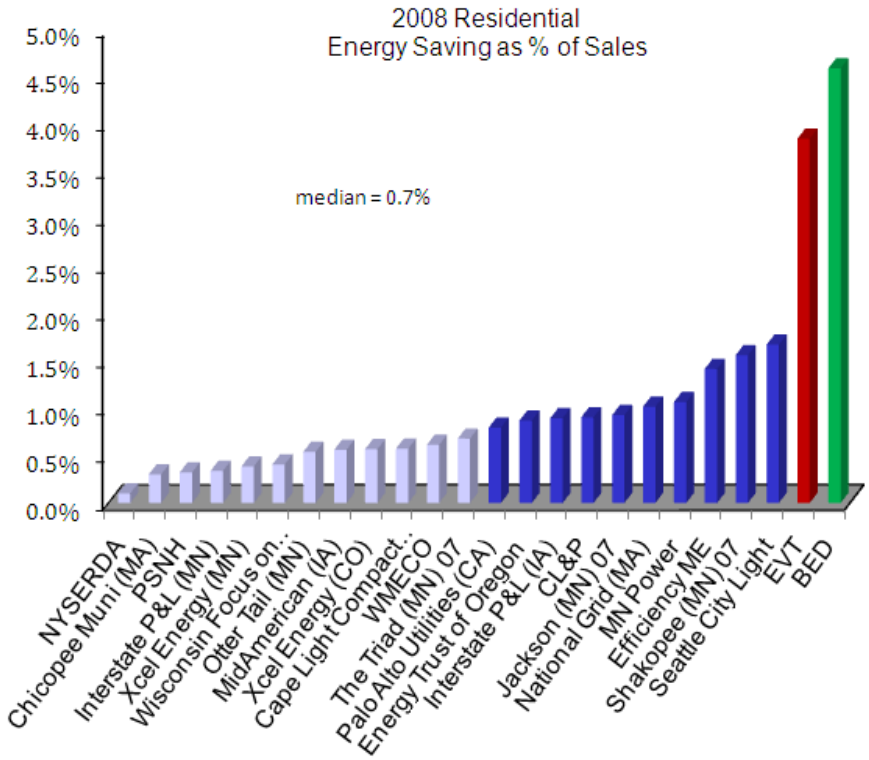
Residential Electric Energy Savings

This section reviews the energy saved (as a percentage of sales) and the costs of first year energy savings achieved by DSM programs in the residential customer sector.

Figure 0-10 shows the energy savings as a percentage of sales in the residential sector. Energy savings as a percentage of sales ranges from 0.1% to 4.6% with the median at 0.7%.

EVT's DSM energy savings as a percentage of sales is 3.8% which is considerably greater than the median of the IOUs and agencies (0.6%). BED's DSM energy savings as a percentage of sales is 4.6% which is considerably greater than the median of the POUs (0.9%).

Figure 0-10. Level 1 2008 Residential Energy Savings as % of Annual Sales First Year

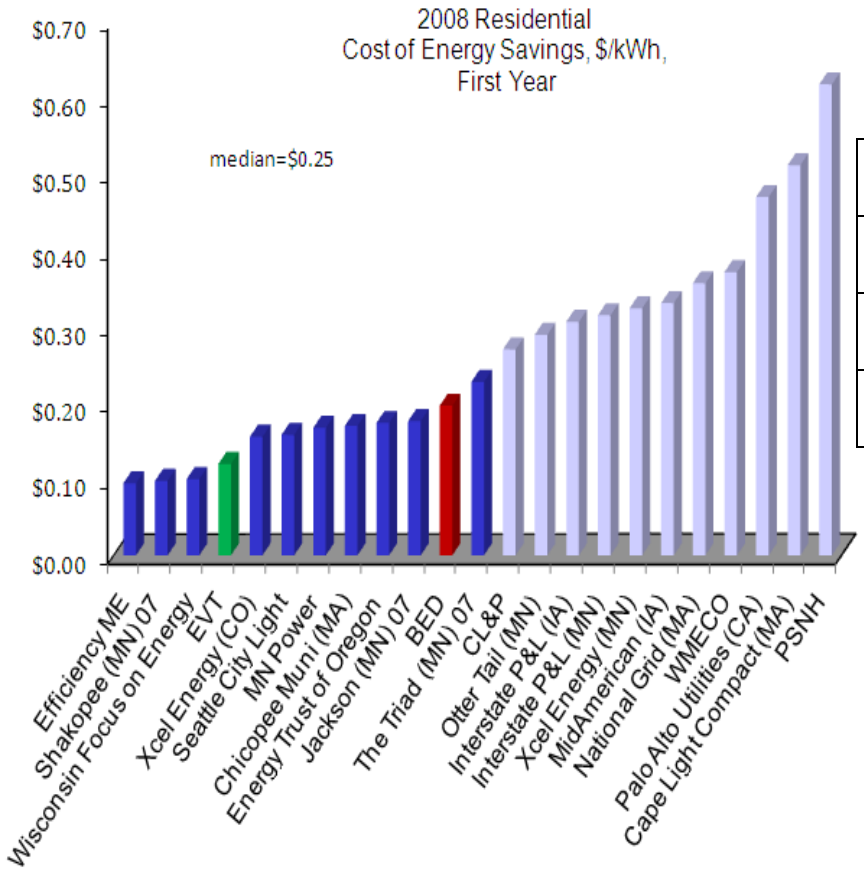


IOU and Agency Median	0.6%
EVT	3.8%
POU Median	0.9%
BED	4.6%

For the Level 1 organizations, the cost of first year residential energy savings ranges widely from $0.09/kWh to $2.07/kWh, with the median at $0.25/kWh (Figure 0-11).

EVT's DSM cost of first year residential energy savings is $0.12/kWh, which is lower than the median of the IOUs and agencies ($0.31/kWh). BED's DSM cost of first year energy savings is $0.20/kWh which is slightly greater than the median of the POUs ($0.18/kWh).

Figure 0-11. Level 1 2008 Residential Costs of Energy Savings ($/kWh) First Year[28]



IOU and Agency Median	$0.31/kWh
EVT	$0.12/kWh
POU Median	$0.18 /kWh
BED	$0.20/kWh

[28] NYSERDA is not included in the bar chart as to not skew the scale.

Residential DSM Programs with High Energy Savings and Low Costs

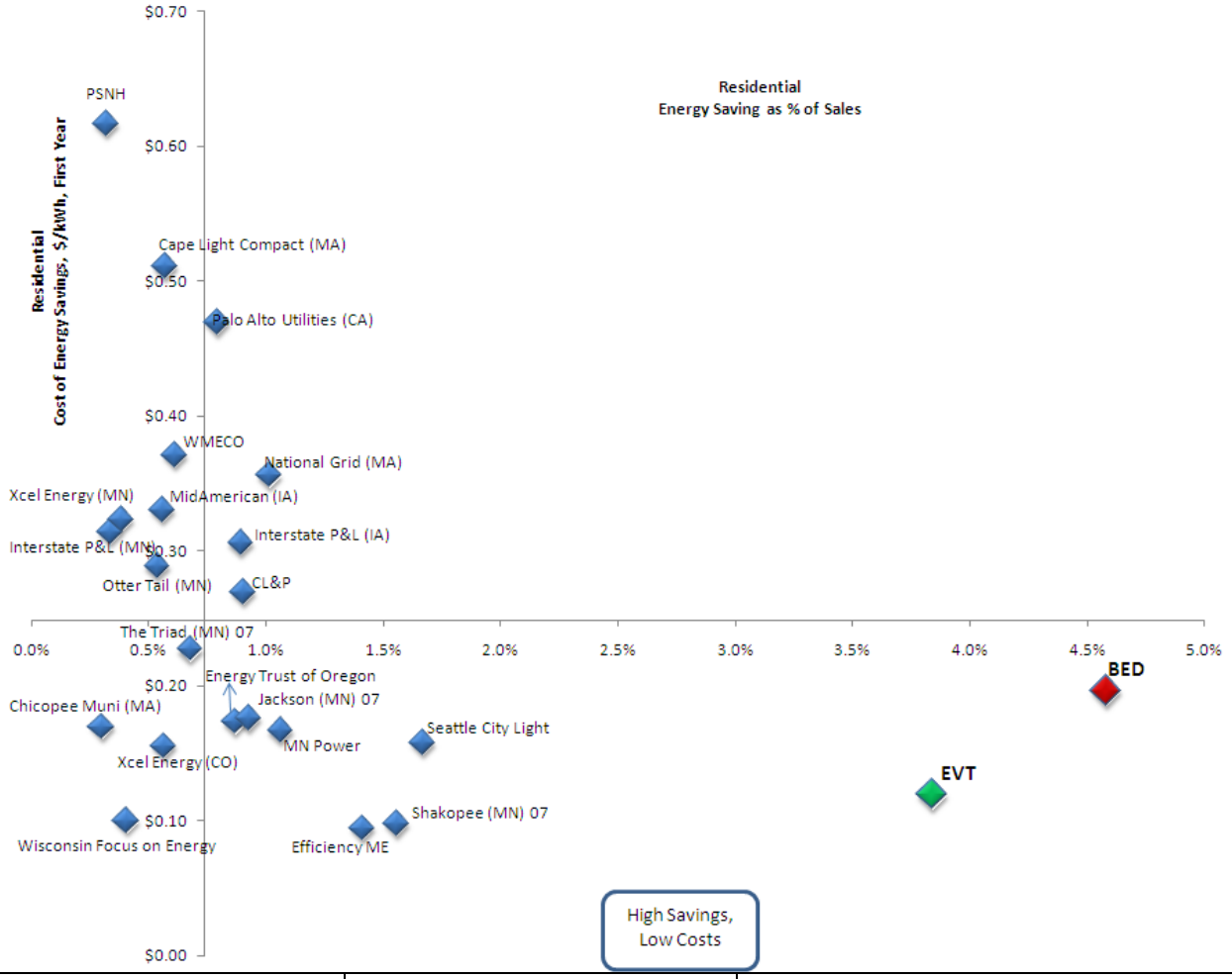
This section identifies the Level 1 organizations with DSM programs that achieved above median electric energy savings (as a percentage of sales) at or below median costs for the residential customer sector and analyzes the performance of each portfolio at the program-level.

For the organizations reviewed, the scatter plot shown in Figure 0-12 illustrates where each organization falls relative to median electric energy savings and median costs. Below is a list of the organizations that achieved energy savings rates above median and at costs/kWh below median:

1. BED: 4.6%, $0.20/kWh
2. EVT: 3.8%, $0.12/kWh
3. Seattle City Light: 1.7%, $0.16/kWh
4. Shakopee (MN) 07: 1.6%, $0.10/kWh
5. Efficiency ME: 1.4%, $0.09/kWh
6. MN Power: 1.1%, $0.17/kWh
7. Jackson (MN) 07: 0.9%, $0.18/kWh
8. Energy Trust of Oregon: 0.9%, $0.17/kWh

Both EVT and BED achieved energy savings as percentage of sales substantially greater than the other organizations and at costs below the median. This result is in line with NCI's findings in previous benchmarking studies: organizations in mature DSM markets that spend above median generally achieve savings rates above median at costs below median.

Figure 0-12. Level 1 2008 Residential Energy Savings and First Year Costs ($/kWh)[29]



	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.6%	$0.31/kWh
EVT	3.8%	$0.12/kWh
POU Median	0.9%	$0.18/kWh
BED	4.6%	$0.20/kWh

[29] Results for NYSERDA have been omitted from this scatter plot so as not to skew the graph.

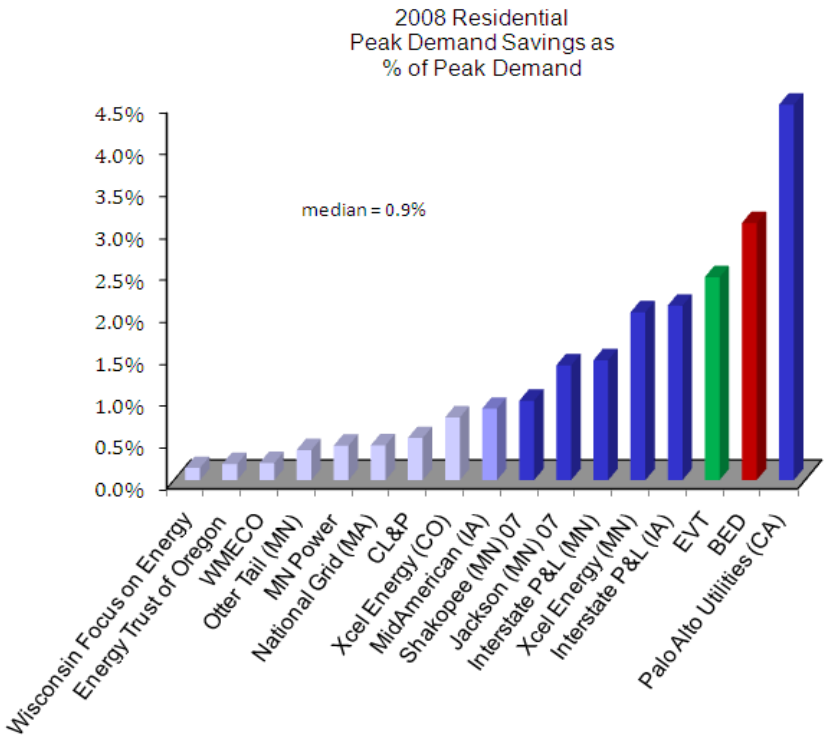
Residential Peak Demand Savings

This section reviews the peak demand saved (as a percentage of peak demand) and the costs of peak demand savings achieved by DSM programs in the residential sector.

For the Level 1 organizations, Figure 0-13 below shows DSM incremental peak demand savings as a percentage of annual peak demand for the residential sector. Residential peak demand savings as a percentage of peak demand ranges from 0.1% to 4.5%, with the median at 0.9%.

EVT's incremental peak demand savings as a percentage of annual peak demand for the residential sector is 2.4%, which is more than four times the median (0.5%) of the IOUs and agencies. BED's DSM incremental peak demand savings as a percentage of annual peak demand for the residential sector is 3.1%, which is greater than the median (2.2%) of the POUs.

Figure 0-13. Level 1 2008 Residential Peak Demand Savings as % of Peak Demand



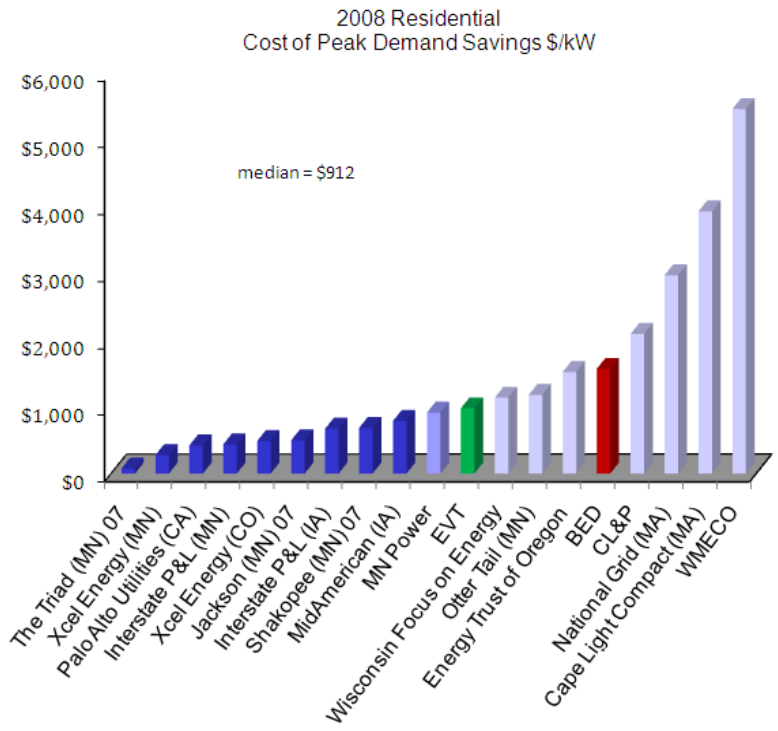
IOU and Agency Median	0.5%
EVT	2.4%
POU Median	2.2%
BED	3.1%

For the Level 1 organizations, Figure 0-14 below shows the cost of peak demand savings for the residential sector. The cost of residential peak demand savings range from $74/kW to $5,453/kW, with the median at $912/kW overall.

EVT's cost of peak demand savings for the residential sector is $975/kW, which is lower than the median of the IOUs and agencies ($1,056/kW). BED's annual cost of peak demand savings for the residential sector is $1,564/kW which is greater than the median (496/kW) of the POUs.

This wide variation in cost of peak demand savings reflects the variation of demand response programs among Level 1 organizations. Generally, higher costs of conserved peak demand indicate a portfolio with no demand response program as in the case of the organizations of the Northeast; only a few Level 1 organizations offered demand response programs in the residential sector (for example Xcel Energy (MN) and (CO)).

Figure 0-14. Level 1 2008 Residential Cost of Peak Demand Savings ($/kW)



IOU and Agency Median	$1,056/kW
EVT	$975/kW
POU Median	$496/kW
BED	$1,564/kW

Residential DSM Programs with High Peak Demand Savings and Low Costs

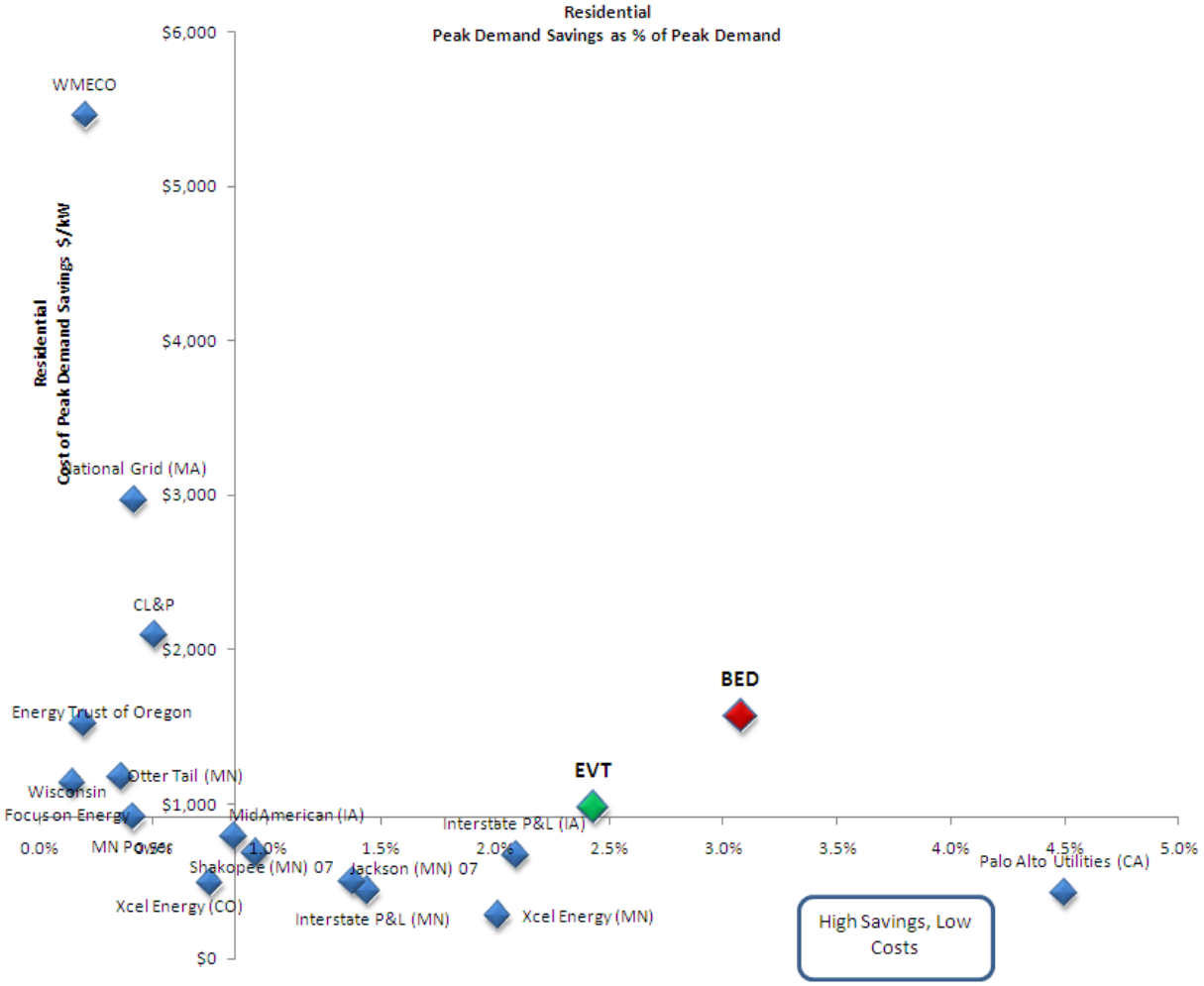
This section identifies the Level 1 organizations with DSM programs that achieved above median peak demand savings (as a percentage of peak demand) at or below median costs for the residential customer sector.

For the organizations reviewed, the scatter plot shown in Figure 0-15 illustrates where each organization falls relative to median peak demand savings and median costs in the residential sector. Below is a list of the organizations that achieved above median percentage of peak demand conserved at or below median costs:

1. Palo Alto Utilities (CA): 4.5%, $420/kW
2. EVT: 2.4%, $975/kW
3. Interstate P&L (IA): 2.1%, $670/kW
4. Xcel Energy (MN): 2.0%, $$277/kW
5. Interstate P&L (MN): 1.4%, $436/kW
6. Jackson (MN) 07: 1.4%, $496/kW
7. Shakopee (MN) 07: 1.0%, $682/kW
8. MidAmerican (IA): 0.9%, $786/kW

Most of the organizations with peak demand savings costs above median did not offer demand response programs which generally conserve peak demand at very low costs. Although EVT and BED offered no demand response programs, they achieved peak demand savings, as a percentage of peak demand, greater than most organizations and at reasonable costs. EVT's and BED's high rates of peak demand savings reflect their high rates of energy savings.

Figure 0-15. Level 1 2008 Residential Peak Demand Savings and First Year Costs ($/kW)



	Peak Demand Savings as % of Peak Demand	Cost of Peak Demand Savings, $/kW
IOU and Agency Median	0.5%	$1,056/kW
EVT	2.4%	$975/kW
POU Median	2.2%	$496/kW
BED	3.1%	$1,564/kW

C&I Sector

This section reviews DSM program spending, savings, and costs for the C&I customer sector.

Table 0-3 shows the median results for spending, savings, and costs for the C&I sector for all reviewed organizations (where data are available).[30]

Table 0-3. Level 1 2008 Medians for C&I Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of Savings (First Year)	
				$/kWh	$/kW
Overall	1.7%	1.0%	0.7%	$0.17	$762
EVT	6.3%	2.1%	2.0%	$0.34	$2,069
BED	2.3%	1.2%	0.7%	$0.24	$2,059

[30] NCI's estimates of EVT's statewide and sector level savings as a percent of sales and DSM budgets as a percent of revenue excluded one major industrial customer who is not required to pay directly into the EEU fund. However, upon conclusion of the analytical portion of this study, NCI was made aware that a second major industrial should have also been excluded. If NCI had excluded this second industrial customer, EVT's s C&I sector budget as a percent of C&I revenue would have increased from 6.26% to 6.67%. C&I savings as a percent of sales would have increased from 2.12% to 2.28%. Overall, for EVT, spending as a percent of revenue would increase from 4.55% to 4.71% and savings as percent of sales would increase from 2.74% to 2.86%

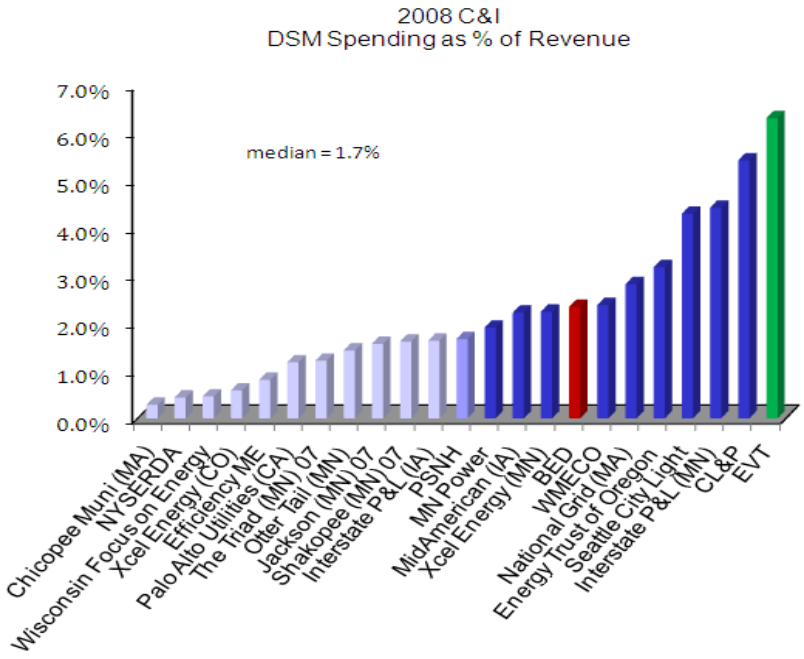
C&I DSM Spending

This section reviews DSM spending for the C&I customer sector as a percentage of C&I electricity sales revenue.

For the Level 1 organizations, DSM spending in the C&I sector, as a percentage of annual revenue of retail C&I electricity sales, ranges widely from 0.3% to 6.3% with the median at 1.7% (Figure 0-16).

EVT's DSM spending as a percentage of revenue is 6.3% which is three times the median (2.1%) of the IOUs and agencies and is the greatest C&I DSM spending rate among all Level 1 organizations. BED's DSM spending as a percentage of revenue is 2.3% which is greater than the median (1.6%) of the POUs.

Figure 0-16. Level 1 2008 C&I DSM Spending as % of Revenue



IOU and Agency Median	2.1%
EVT	6.3%
POU Median	1.6%
BED	2.3%

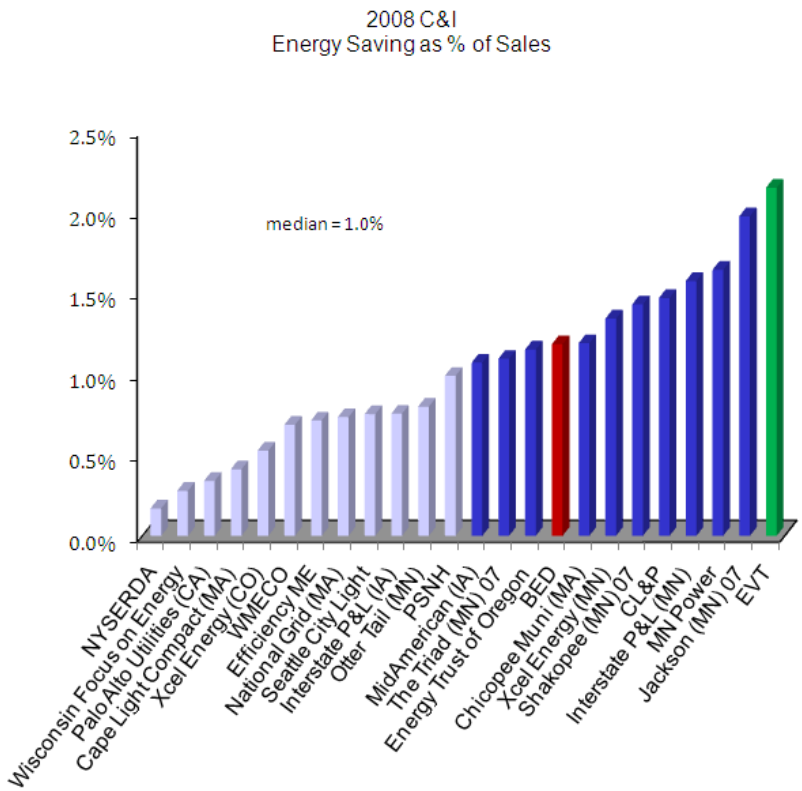
C&I Energy Savings

This section reviews the energy saved (as a percentage of sales) and the costs of first year energy savings of DSM programs in the C&I customer sector.

For the Level 1 organizations, Figure 0-17 shows the energy savings as a percentage of sales in the C&I sector. Energy savings as a percentage of sales ranges widely from 0.2% to 2.1% with the median at 1.0%.

EVT's DSM energy savings as a percentage of sales is 2.1%, which is greater than twice the median (0.8%) of the IOUs and agencies and is the greatest C&I energy savings rate among all Level 1 organizations. BED's DSM energy savings as a percentage of sales is 1.2%, which is the median of the POUs.

Figure 0-17. Level 1 2008 C&I Energy Savings as % of Sales First Year

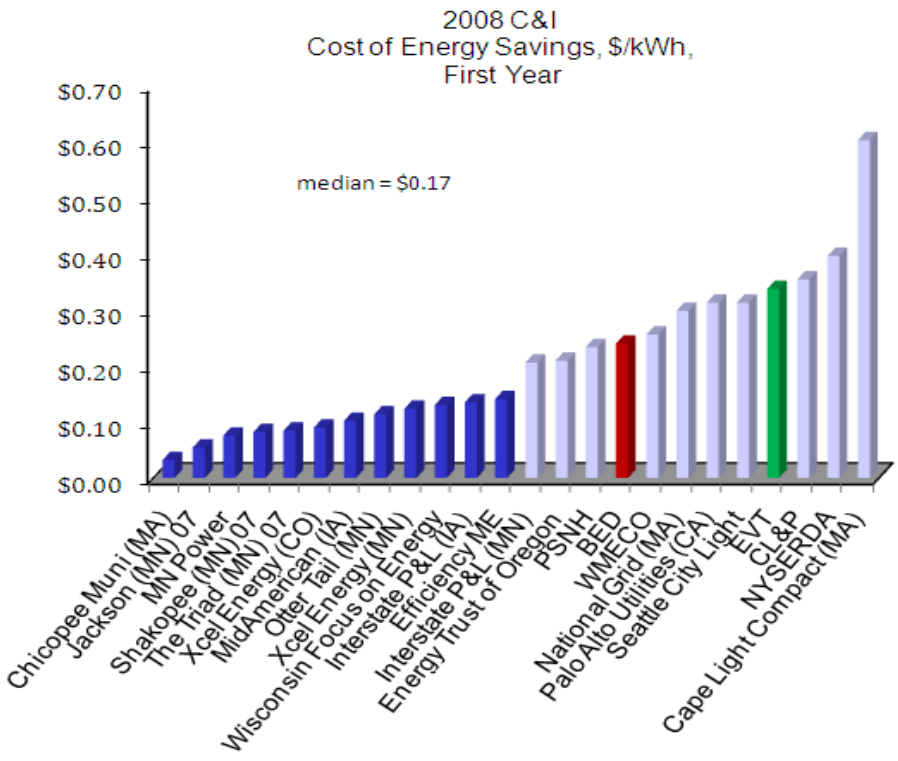


IOU and Agency Median	0.8%
EVT	2.1%
POU Median	1.2%
BED	1.2%

For the Level 1 organizations, costs of first year C&I energy savings ranges from $0.03/kWh to $0.60/kWh, with the median at $0.17/kWh (Figure 0-18).

EVT's DSM cost of first year C&I energy savings is $0.34/kWh which greater than the median ($0.21/kWh) of the IOUs and agencies. BED's DSM cost of first year C&I energy savings is $0.24/kWh which is greater than the median ($0.08/kWh) of the POUs.

Figure 0-18. Level 1 2008 C&I Cost of Energy Savings ($/kWh) First Year



IOU and Agency Median	$0.21/kWh
EVT	$0.34/kWh
POU Median	$0.08/kWh
BED	$0.24/kWh

1.11.2.1.1

C&I DSM Programs with High Electric Energy Savings and Low Costs

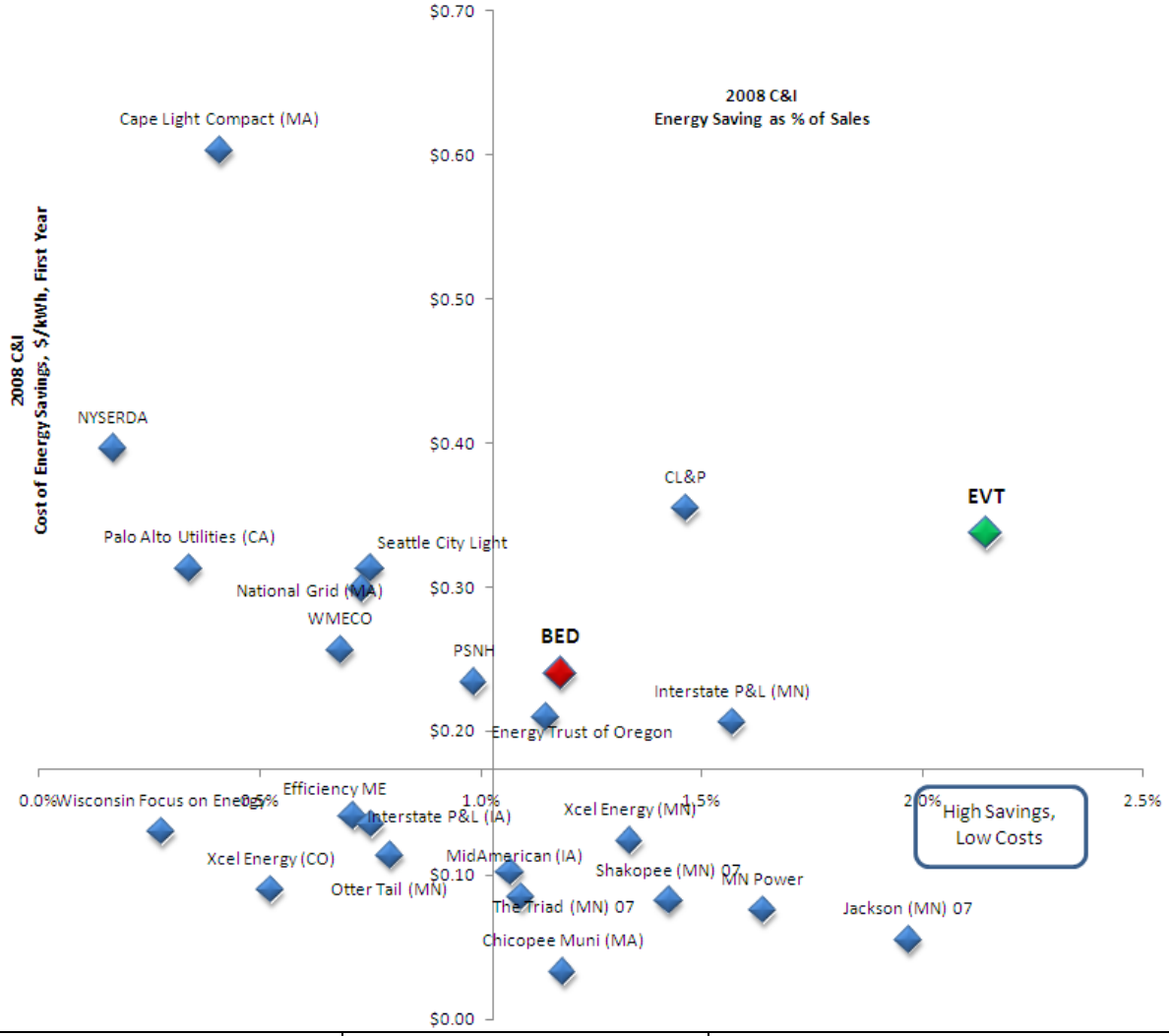
This section identifies the Level 1 organizations with DSM programs that achieved above median electric energy savings (as a percentage of sales) at costs at or below the median of the C&I customer sector.

For the organizations reviewed, the scatter plot shown in Figure 0-19 illustrates where each organization falls relative to median electric energy savings and median costs. The following organizations achieved above median energy savings rates at costs near or below the median:

1. Jackson (MN) 07: 2.0%, $0.05/kWh	5. Chicopee Muni (MA): 1.2%, $0.03/kWh
2. MN Power: 1.6%, $0.08/kWh	6. The Triad (MN) 07: 1.1%, $0.08/kWh
3. Shakopee (MN) 07: 1.4%, $0.08/kWh	7. MidAmerican (IA): 1.1%, $0.10/kWh
4. Xcel Energy (MN): 1.3%, $0.12/kWh	

EVT and BED achieved energy savings as a percentage of sales in the C&I sector greater than most organizations.

Figure 0-19. Level 1 2008 C&I Energy Savings and First Year Costs ($/kWh)



	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.8%	$0.21/kWh
EVT	2.1%	$0.34/kWh
POU Median	1.2%	$0.08/kWh
BED	1.2%	$0.24/kWh

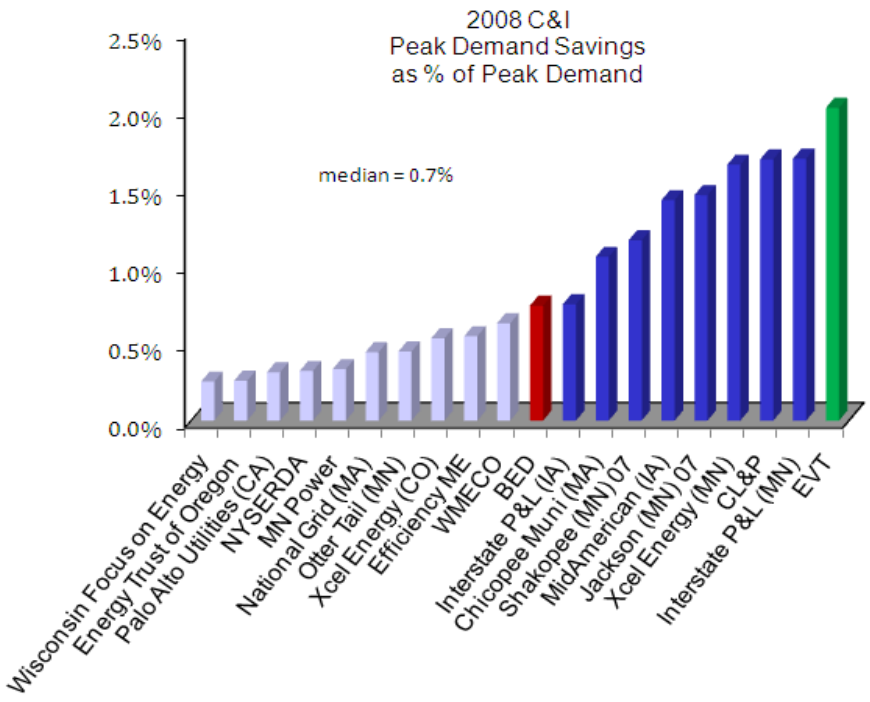
C&I Peak Demand Savings

This section reviews the peak demand saved (as a percentage of peak demand) and the costs of peak demand savings achieved by DSM programs in the C&I customer sector.

For the Level 1 organizations, Figure 0-20 below shows DSM incremental peak demand savings as a percentage of annual peak demand of the C&I customer sector. C&I peak demand savings as a percentage of C&I peak demand ranges from 0.3% to 2.0% with the median at 0.7%.

EVT's incremental peak demand savings as a percentage of annual peak demand of the C&I customer sector is 2.0%, which is four times the median (0.5%) of the IOUs and agencies and the greatest rate of peak demand savings among Level 1 organizations. BED's DSM incremental peak demand savings, as a percentage of annual peak demand of the C&I sector, is 0.7%, which is less than the median (1.1%) of the POUs.

Figure 0-20. Level 1 2008 C&I Peak Demand Savings as % of Peak Demand

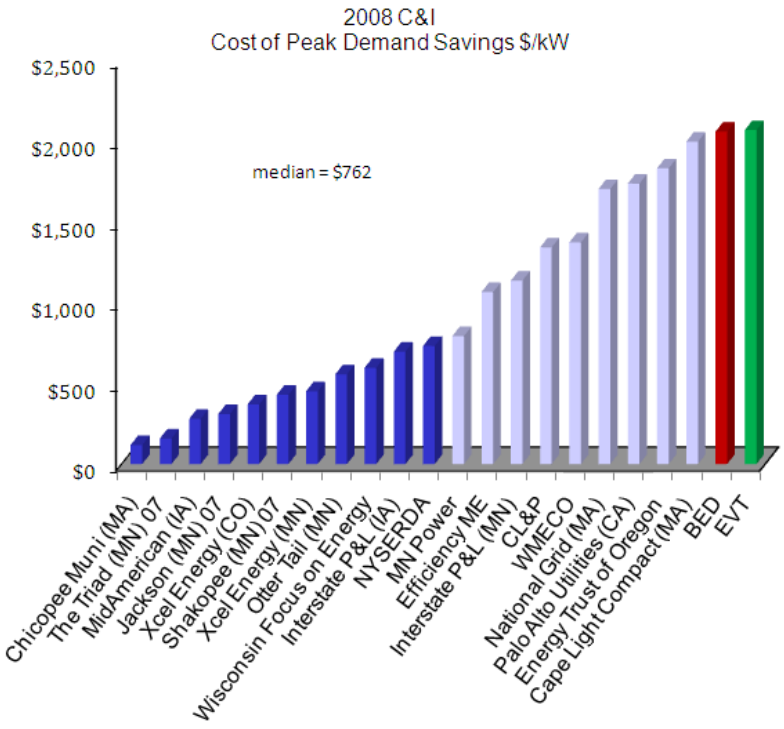


IOU and Agency Median	0.5%
EVT	2.0%
POU Median	1.1%
BED	0.7%

For the Level 1 organizations, Figure 0-21 below shows DSM cost of peak demand savings of the C&I customer sector. The cost of C&I peak demand savings range from $118/kW to $2,069/kW, with the median at $762/kW.

EVT's cost of peak demand savings of the C&I customer sector is $2,069 which is greater than the median ($929/kW) of the IOUs and agencies. BED's DSM annual cost of peak demand savings of the C&I sector is $2,059/kW, which is greater than the median ($429/kW) of the POUs.

Figure 0-21. Level 1 2008 C&I Cost of Peak Demand Savings ($/kW)



IOU and Agency Median	$929/kW
EVT	$2,069/kW
POU Median	$429/kW
BED	$2,059/kW

C&I DSM Programs with High Peak Demand Savings and Low Costs

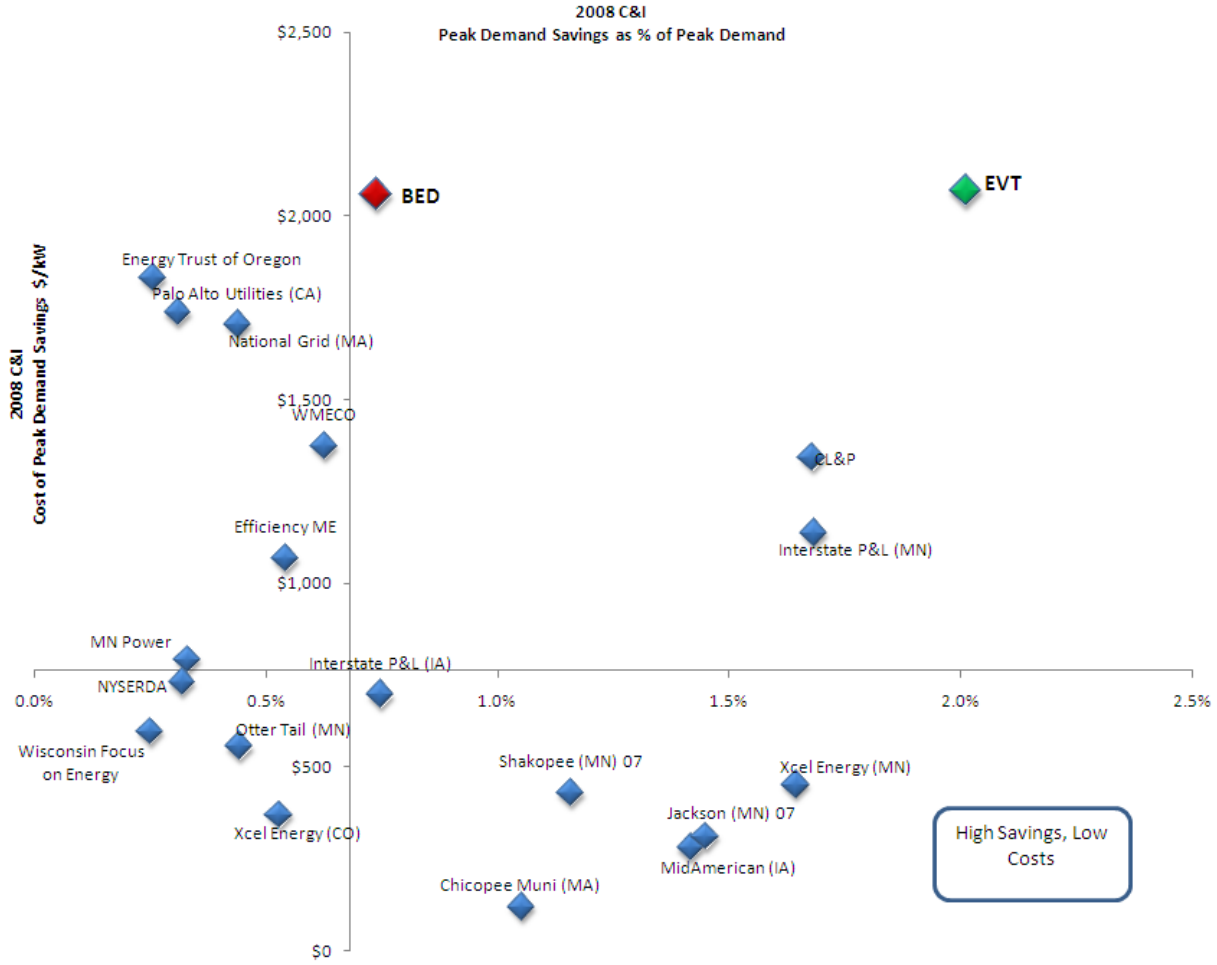
This section identifies the Level 1 organizations with DSM programs that achieved above median peak demand savings (as a percentage of peak demand) at or below median costs of the C&I customer sector.

For the organizations reviewed, the scatter plot shown in Figure 0-22 illustrates where each organization falls relative to median peak demand savings and median costs in the C&I sector.

1. Xcel Energy (MN): 1.6%, $450/kW
2. Jackson (MN) 07: 1.4%, $310/kW
3. MidAmerican (IA): 1.4%, $280/kW
4. Shakopee (MN) 07: 1.2%. $429/kW
5. Chicopee Muni (MA): 1.1%, $118/kW
6. Interstate P&L (IA): 0.7%, $696/kW

EVT and BED achieved peak demand savings as a percentage of peak demand greater than most organizations at costs greater than other organizations. The high peak demand savings is in line with the Vermont organizations' high energy savings, and the above median costs reflect the fact that the Vermont organizations did not offer demand response programs.

Figure 0-22. Level 1 2008 C&I Peak Demand Savings and First Year Costs ($/kW)



	Peak Demand Savings as % of Peak Demand	Cost of Peak Demand Savings, $/kW
IOU and Agency Median	0.5%	$929/kW
EVT	2.0%	$2,069/kW
POU Median	1.1%	$429/kW
BED	0.7%	$2,059/kW

1.12 Summary of All Level 1 Organizations

Table 0-4 shows the median results for all the Level 1 organization reviewed along with EVT and BED's results for DSM spending, savings, costs, and electric energy costs over all customer sectors.

Table 0-4. Level 1 Overall Results for Utilities

	Spending as % of Revenue	Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Retail Cost of Energy $/kWh	Cost of First Year Savings	
					$/kWh	$/kW
IOU and Agency Median	2.0%	0.9%	0.6%	$0.11	$0.18	$902
EVT	4.8%	2.8%	2.1%	$0.13	$0.22	$1,535
POU Median	1.7%	1.3%	1.1%	$0.09	$0.16	$433
BED	3.4%	2.0%	1.3%	$0.13	$0.22	$1,775

For the DSM programs of the IOUs and agencies in Level 1, the overall median energy savings as a percentage of annual sales for 2008 is 0.9%, and the median first year costs of energy savings is $0.18/kWh, but the organizations with the largest relative energy savings and near median costs, achieved their energy savings at about 1.5%- 3.0% of annual sales. The analysis for peak demand savings as a percentage of peak demand finds the median savings is 0.6% of peak demand and the median cost is $902/kW, but the organizations with the largest relative peak demand savings and below median costs saved about 1.5% of peak demand.

For the DSM programs of the POUs reviewed, the overall median energy savings as a percentage of annual sales for 2008 is 1.3% and the median first year costs of energy savings is $0.16/kWh, but the organizations with the largest relative energy savings and below median costs, achieved their energy savings at about 1.5% of annual sales. The analysis for peak demand savings as a percentage of peak demand finds the median savings is 1.3% of peak demand and the median cost is $433/kW.

Efficiency Vermont DSM

EVT's overall savings for electric DSM are generally greater than the typical results of the Level 1 organizations. EVT achieved electric energy savings, as a percentage of sales, of 2.8%, three

times the median of the IOUs and agencies reviewed, at first year costs of $0.22/kWh, also above the median cost.

In the C&I sector, EVT achieved similar results: above median electric energy savings, 2.1%, at above median first year costs, $0.34/kWh. In the residential sector, EVT achieved above median energy savings as a percentage of sales, 3.8%, at below median first year costs, $0.12/kWh.

EVT reported peak demand savings of 2.0% of estimated C&I peak demand, above the median, at above median costs, $2,069/kW and savings of 2.4% in the residential sector, above to the median, at median costs ($975/kW).

Burlington Electric Department DSM

BED's overall savings for electric DSM are generally greater than the typical results of the Level 1 organizations reviewed. BED achieved electric energy savings, as a percentage of sales, of 2.0%, almost twice the median of the POUs reviewed, at first year costs of $0.22/kWh, also above the median cost.

In the C&I sector, BED achieved similar results: above median electric energy savings, 1.2%, at above median first year costs, $0.24/kWh. In the residential sector, BED achieved above median energy savings as a percentage of sales, 4.6%, at below median first year costs, $0.20/kWh.

BED reported peak demand savings of 0.7% of estimated C&I peak demand, equal to the median, at above median costs, $2,059/kW and savings of 3.1% in the residential sector, above the median, at above median costs ($1,564/kW).

Level 2: Normalized Benchmarking Results

1.13 Performance Results for 2008 DSM

The Level 2 analysis furthers the normalization in two key ways: 1) Level 2 reviews a subset of Level 1 organizations, excluding organizations in climates very different from Vermont's; and 2) Level 2 excludes all costs and impacts associated with three program types: demand response, low income, and fuel switching.[31]

This section compares 2008 DSM program results for residential and C&I customer sectors combined for the normalized Level 2 Group. The analysis, overall customer sectors, identifies typical results and organizations that achieved above median savings at below median costs. See Appendices for complete data and statistics.

[31] Some organizations that met the criteria for Level 2 are not included due to insufficient or incomplete data such as NYSERDA and Cape Light Compact (MA).

1.13.1 Results over All Sectors

This section reviews 2008 DSM program spending, savings, and costs over all customer sectors.

Table 0-1 shows the median result for DSM spending, savings, costs, and energy costs over all customer sectors for the Level 2 organizations. Given that some of the datasets are skewed or contain outliers, the median is used here as it is a better indication of central tendency than the average.

The Level 2 overall median cost of first year energy savings is $0.13/kWh, about 30% less than the Level 1 overall median cost of first year savings, $0.18/kWh. The EVT and BED Level 2 costs of first year savings ($0.21/kWh) are about 5% less than their Level 1 cost of first year savings ($0.22/kWh). Therefore, EVT and BED's Level 2 costs of first year energy savings are farther above the Level 2 medians than was the case for the Level 1 cost of first year savings.

Table 0-1. Level 2 Medians for Overall Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Retail Cost of Energy $/kWh	Cost of First Year Savings	
					$/kWh	$/kW
Overall	1.6%	1.0%	0.6%	$0.09	$0.13	$710
EVT	4.6%	2.7%	2.0%	$0.13	$0.21	$1,480
BED	3.3%	2.0%	1.3%	$0.13	$0.21	$1,696

Note: Cost of first year savings should not be confused with a levelized cost of conserved energy.[32]

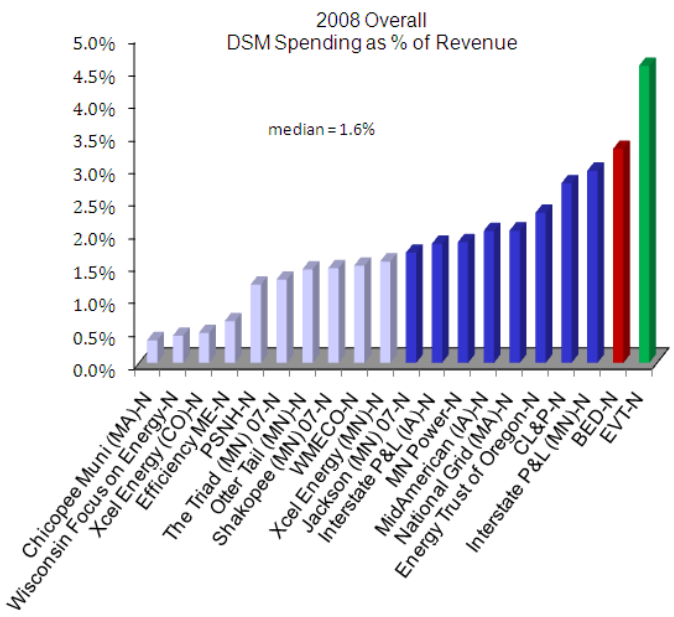
[32] As seen in Section 6.3, the estimated levelized lifetime costs for EVT and BED in 2008 were $0.03/kWh.

DSM Spending

This section reviews DSM spending as a percentage of all retail revenue over all customer sectors. For the Level 2 organizations, spending on DSM as a percentage of revenue ranges widely from 0.3% to 4.6% with the median33 at 1.6%. Figure 0-1 shows the distribution of spending on DSM as a percentage of annual revenues.

EVT's DSM spending as a percentage of revenue is 4.6% which is greater than twice the median for the investor owned utilities (IOUs) and agencies (1.8%) and is the greatest spending rate among Level 2 organizations. BED's DSM spending as a percentage of revenue is 3.3% which is greater than twice the median (1.5%) of the publicly owned utilities (POUs).

Figure 0-1. Level 2 2008 DSM Spending as % of Revenue



IOU and Agency Median	1.8%
EVT	4.6%
POU Median	1.5%
BED	3.3%

[33] In the charts in this chapter, the median is indicated as the value between the light blue bars and the dark blue bars.

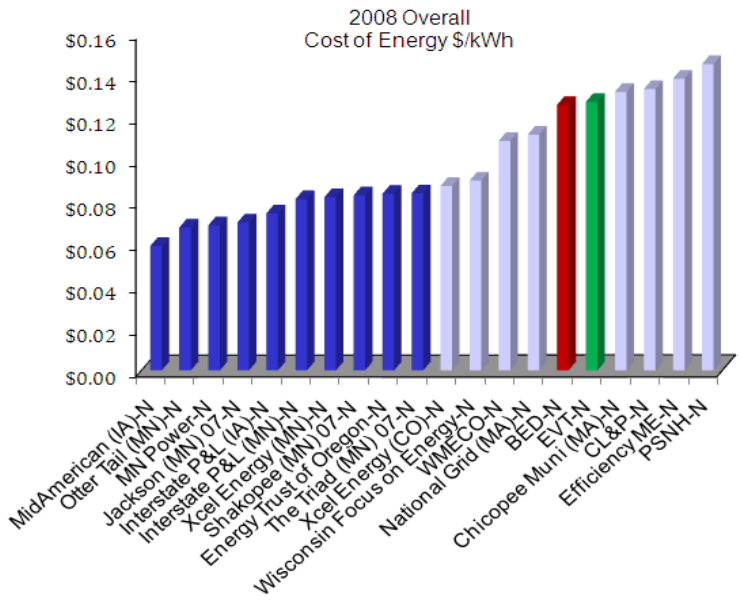
Retail Cost of Electricity

The average retail cost of electricity was calculated by dividing total annual retail revenue by total annual retail sales for each organization and state.

For the Level 2 organizations, the average retail cost of electric energy ranges from $0.06/kWh to $0.15/kWh with the median at $0.09/kWh (Figure 0-2).

The average retail cost of electricity in the area served by EVT is $0.13/kWh which is greater than the median ($0.09/kWh) of the IOUs and agencies. The average retail cost of electricity in BED's service territory is $0.13/kWh which is greater than the median ($0.08/kWh) of the POUs.

Figure 0-2. Level 2 2008 Cost of Retail Electricity



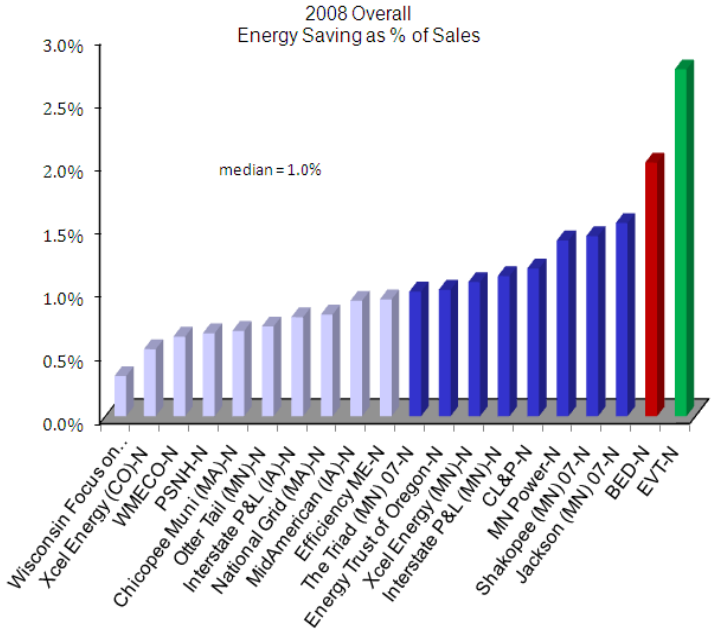
IOU and Agency Median	$0.09/kWh
EVT	$0.13/kWh
POU Median	$0.08/kWh
BED	$0.13/kWh

Energy and Peak Demand Savings

This section details the energy savings (as a percentage of sales) and peak demand savings (as percent of peak demand) by the DSM programs over all customer sectors.

For the Level 2 organizations, energy savings as a percentage of sales ranges widely from 0.3% to 2.7% with the median at 1.0%. EVT's energy savings as a percentage of sales is 2.7%, which is three times the median (0.9%) of the IOUs and agencies and is the greatest rate of energy savings among Level 2 organizations. BED's electric energy savings as a percentage of sales is 2.0% which is greater than the median (1.4%) of the POUs.

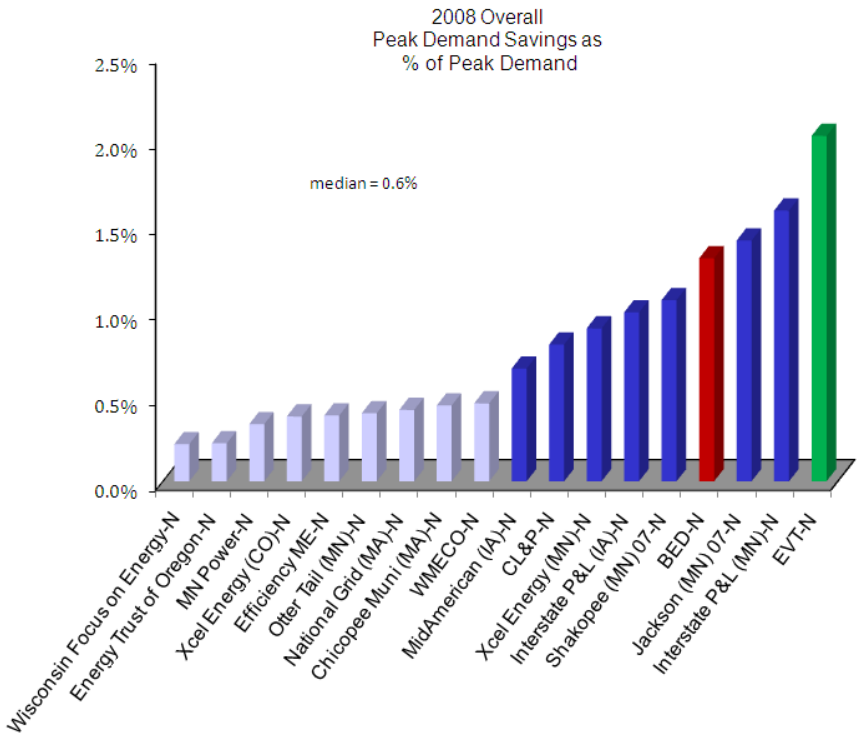
Figure 0-3. Level 2 2008 DSM Energy Savings as % of Sales--First Year



IOU and Agency Median	0.9%
EVT	2.7%
POU Median	1.4%
BED	2.0%

For the Level 2 organizations, Figure 0-4 shows DSM incremental peak demand savings as a percentage of annual peak demand, which ranges widely from 0.2% to 2.0%, with the median at 0.6%. EVT's peak demand savings as a percentage of peak demand is 2.0% which is five times the median (0.4%) of the IOUs and agencies reviewed and is the greatest among Level 2 organizations. BED's peak demand savings as a percentage of peak demand is 1.3%, which is greater than the median (1.2%) of the POUs.

Figure 0-4. Level 2 2008 Peak Demand Savings as % of Peak Demand



IOU and Agency Medians	0.4%
EVT	2.0%
POU Median	1.2%
BED	1.3%

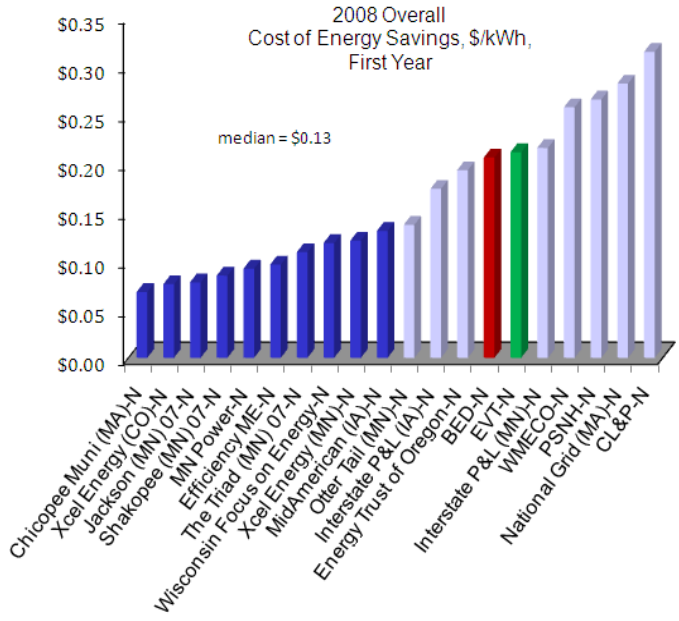
1.13.2 Cost of Savings

This section discusses the costs of first year energy savings and of peak demand savings for the DSM program year.[34]

For the Level 2 organizations, the cost of first year energy savings ranges from $0.07/kWh to $0.31/kWh, with the median at $0.13/kWh.

EVT's cost of first year energy savings is $0.21/kWh, which is greater than the median cost of first year energy savings of the IOUs and agencies ($0.17/kWh). BED's cost of first year energy savings is $0.21/kWh, which is greater than the median of POUs ($0.08/kWh).

Figure 0-5. Level 2 2008 Cost of Electric Energy Savings ($/kWh) First Year

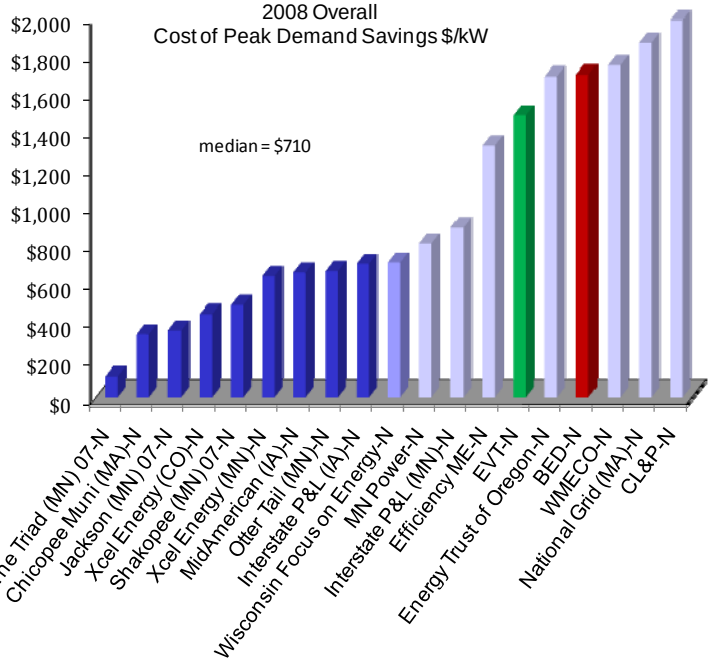


IOU and Agency Median	$0.17/kWh
EVT	$0.21/kWh
POU Median	$0.08/kWh
BED	$0.21/kWh

[34] Cost of first year energy savings is calculated by dividing the year's total DSM spending by total energy savings from measures implemented that year; cost of peak demand savings is calculated similarly, by dividing total DSM spending by total peak demand conserved by measures implemented that year.

For the Level 2 organizations, the cost of peak demand savings ranges from $111/kW to $1,988/kW, with the median at $710/kW. EVT's cost of first year peak demand savings is $1,480/kW, which is greater than the median of the IOUs and agencies ($849/kW). BED's cost of first year peak demand savings is $1,745/kW, which is greater than the median for POUs ($342/kW).

Figure 0-6. Level 2 2008 Cost of Peak Demand Savings ($/kW)



IOU and Agency Median	$849/kW
EVT	$1,480/kW
POU Median	$342/kW
BED	$1,745/kW

Identifying DSM Organizations with High Energy Savings at Low Costs

This section identifies the Level 2 organizations with DSM programs that achieved above median savings at or below median costs.

For the Level 2 organizations, the scatter plot in Figure 0-7 illustrates where each organization falls relative to median electric energy savings and median costs of savings. Energy savings as a percentage of sales is on the horizontal axis; first year cost of energy savings is on the vertical axis; and the axes are set at the median values. Thus, the organizations in the bottom right quadrant are the ones that achieved above median energy savings and costs below the median, i.e., high savings, low costs.

The utilities listed below achieved above median electric energy savings as a percentage of sales lower than the median cost:[35]

2. Jackson (MN) 07: 1.5%, $0.08/kWh
3. Shakopee (MN) 07: 1.4%, $0.08/kWh
5. MN Power: 1.4%, $0.09/kWh
4. Xcel Energy (MN): 1.1%, $0.12/kWh
5. The Triad (MN) 07: 1.0%, $0.11/kWh

EVT and BED achieved energy savings as a percentage of sales substantially greater than the other organizations. Their first year costs of energy savings is also greater than the median.

[35] Given the selection of organizations, the typical performance of this group is likely not typical of all DSM programs; this group's performance is likely better than the national average.

Figure 0-7. Level 2 2008 Energy Savings and First Year Costs ($/kWh)

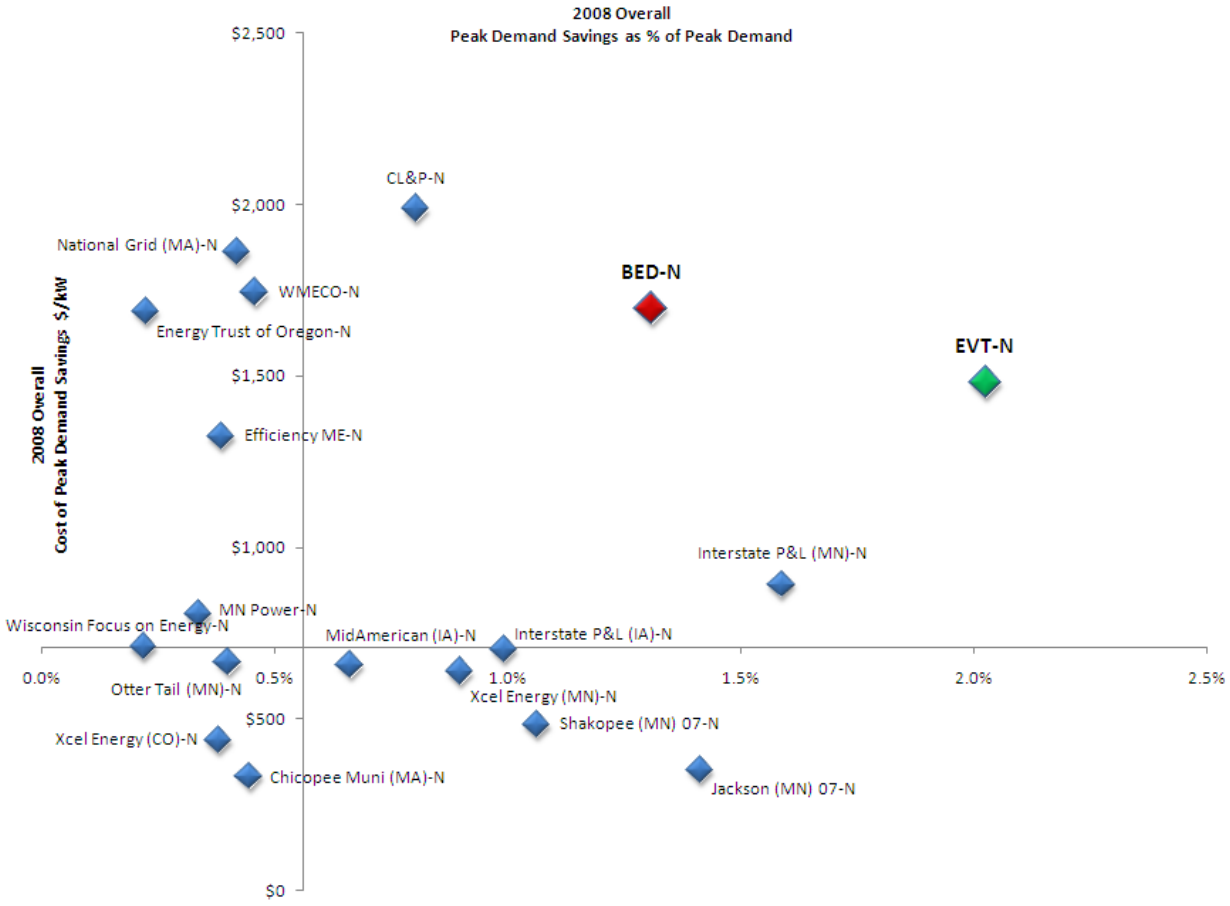
	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.9%	$0.17/kWh
EVT	2.7%	$0.21/kWh
POU Median	1.4%	$0.08/kWh
BED	2.0%	$0.21/kWh

For the organizations reviewed, the scatter plot in Figure 0-8 illustrates organizations' results relative to median peak demand savings and median costs. The utilities listed below achieved near median or greater peak demand savings as a percentage of peak demand at costs near or lower than the median cost:

1. Jackson (MN) 07: 1.4%, $351/kW
3. Shakopee (MN) 07: 1.1%, $484/kW
6. Interstate P&L (IA): 1.0%, $704/kW
5. Xcel Energy (MN): 0.9%, $638/kW
6. MidAmerican (IA): 0.7%, $657/kW

As with energy savings, EVT and BED achieved peak demand savings as a percentage of peak demand greater than most organizations at costs greater than most organizations.

Figure 0-8. Level 2 2008 Peak Demand Savings and First Year Costs ($/kW)



	Peak Demand Savings as % of Peak Demand	Cost of Peak Demand Savings, $/kW
IOU and Agency Median	0.4%	$849/kW
EVT	2.0%	$1,480/kW
POU Median	1.2%	$351/kW
BED	1.3%	$1,696/kW

1.13.3 Sector Analysis for DSM

The following sections compare 2008 DSM program spending and results for the residential and commercial and industrial (C&I) sectors.

Residential Sector

This section reviews DSM program spending, savings, and costs for the residential customer sector.

Table 0-2 shows the median result for spending, savings, and costs for the residential sector for the reviewed organizations.

Table 0-2. Level 2 2008 Medians for Residential Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of Savings (First Year)	
				$/kWh	$/kW
Overall	1.3%	0.6%	0.5%	$0.20	$847
EVT	2.6%	3.6%	2.3%	$0.11	$847
BED	5.8%	4.6%	3.1%	$0.18	$1,431

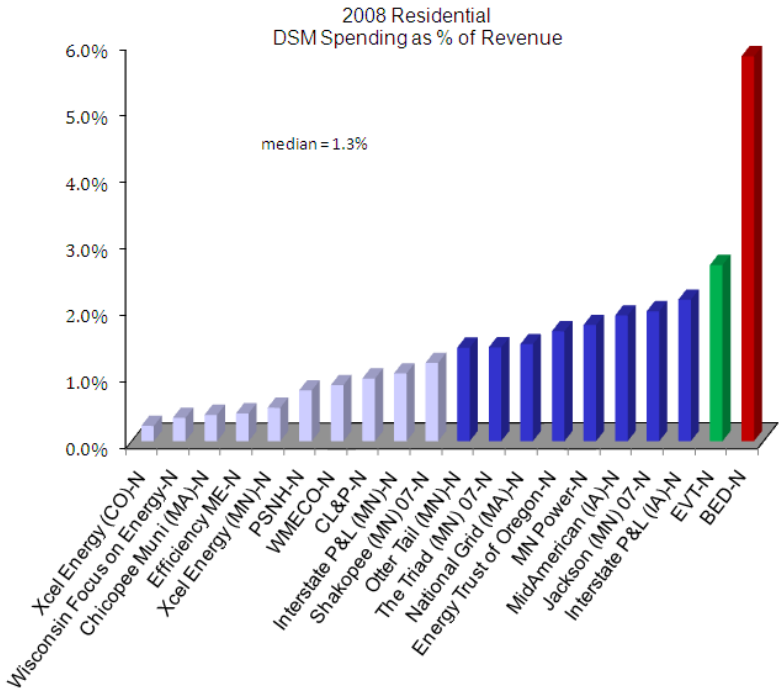
Residential DSM Spending

This section reviews DSM spending for the residential customer sector as a percentage of residential revenue.

For the organizations reviewed, DSM spending in the residential sector, as a percentage of annual revenue of retail residential energy sales, ranges from 0.2% to 5.8%, with the median at 1.3% (Figure 0-9).

EVT's DSM spending as a percentage of revenue is 2.6% which is greater than twice the median of the IOUs and agencies (1.0%). BED's DSM spending as a percentage of revenue is 5.8%, which is three times the median of the POUs (1.4%) and is the greatest of Level 2 organizations.

Figure 0-9. Level 2 2008 Residential DSM Spending as % of Revenue



IOU and Agency Median	1.0%
EVT	2.6%
POU Median	1.4%
BED	5.8%

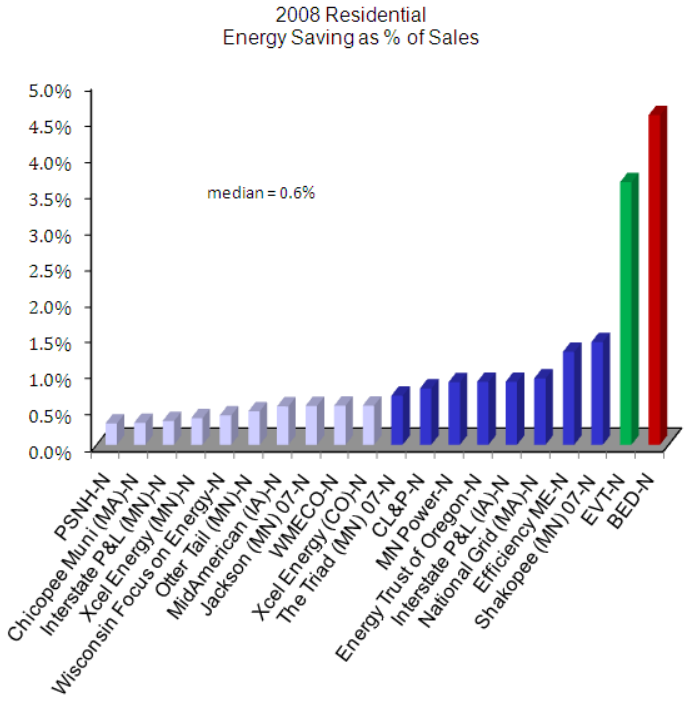
Residential Electric Energy Savings

This section reviews the energy saved (as a percentage of sales) and the costs of first year energy savings achieved by DSM programs in the residential customer sector.

Figure 0-10 shows the energy savings as a percentage of sales in the residential sector. Energy savings as a percentage of sales ranges from 0.3% to 4.6%, with the median at 0.6%.

EVT's DSM energy savings as a percentage of sales is 3.6%, which is greater than seven times the median of the IOUs and agencies (0.5%). BED's DSM energy savings as a percentage of sales is 4.6%, which is greater than six times the median of the POUs (0.7%) and is the greatest of Level 2 organizations.

Figure 0-10. Level 2 2008 Residential Energy Savings as % of Annual Sales First Year

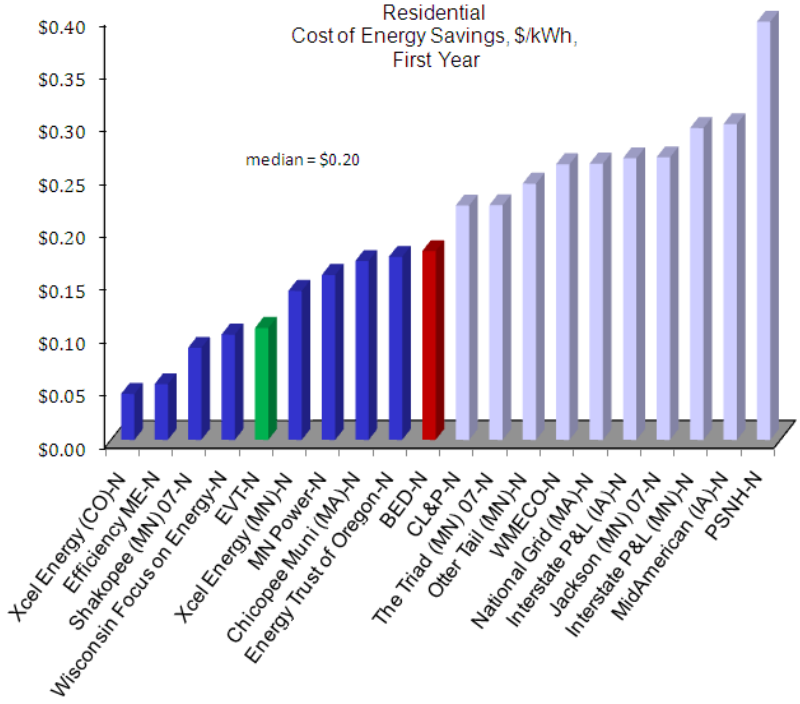


IOU and Agency Median	0.5%
EVT	3.6%
POU Median	0.7%
BED	4.6%

For the organizations reviewed, cost of first year residential energy savings ranges widely from $0.04/kWh to $0.40/kWh, with the median at $0.20/kWh (Figure 0-11).

EVT's DSM cost of first year residential energy savings is $0.11/kWh, which is half the median of the IOUs and agencies ($0.22/kWh). BED's DSM cost of first year residential energy savings is $0.18/kWh, which is equal to the median of the POUs.

Figure 0-11. Level 2 2008 Residential Costs of Energy Savings ($/kWh) First Year



IOU and Agency Median	$0.22/kWh
EVT	$0.11/kWh
POU Median	$0.18/kWh
BED	$0.18/kWh

Residential DSM Programs with High Energy Savings and Low Costs

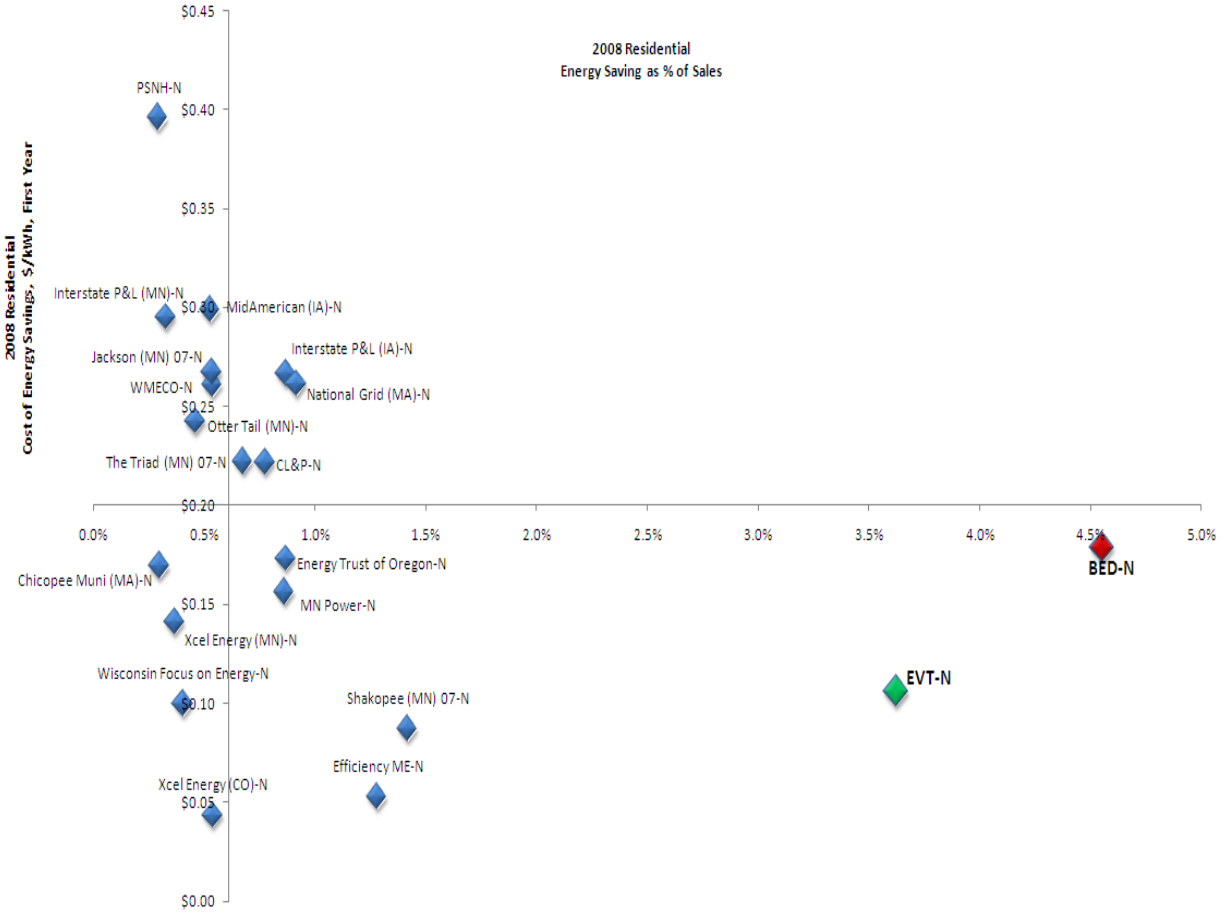
This section identifies the Level 2 organizations with DSM programs that achieved above median electric energy savings (as a percentage of sales) at or below median costs for the residential customer sector and analyzes each portfolio's performance at the program-level.

For the Level 2 organizations, the scatter plot shown in Figure 0-12 illustrates where each organization falls relative to median electric energy savings and median costs. Below is a list of the organizations that achieved energy savings rates above median and at costs/kWh below median:

1. BED: 4.6%, $0.18/kWh
2. EVT: 3.6%, $0.11/kWh
3. Shakopee (MN) 07: 1.4%, $0.09/kWh
4. Efficiency ME: 1.3%, $0.05/kWh
5. MN Power: 0.9%, $0.16/kWh
6. Energy Trust of Oregon: 0.9%, $0.17/kWh

EVT's and BED's residential energy savings in this Level 2 analysis are similar to their results in the first level: both EVT and BED achieved energy savings as percentage of sales substantially greater than the other organizations and at costs below the median. This result is in line with NCI's findings in previous benchmarking studies: organizations in mature DSM markets that spend above the median generally save above the median at costs below the median.

Figure 0-12. Level 2 2008 Residential Energy Savings and First Year Costs ($/kWh)



	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency Median	0.5%	$0.22/kWh
EVT	3.6%	$0.11/kWh
POU Median	0.7%	$0.18/kWh
BED	4.6%	$0.18/kWh

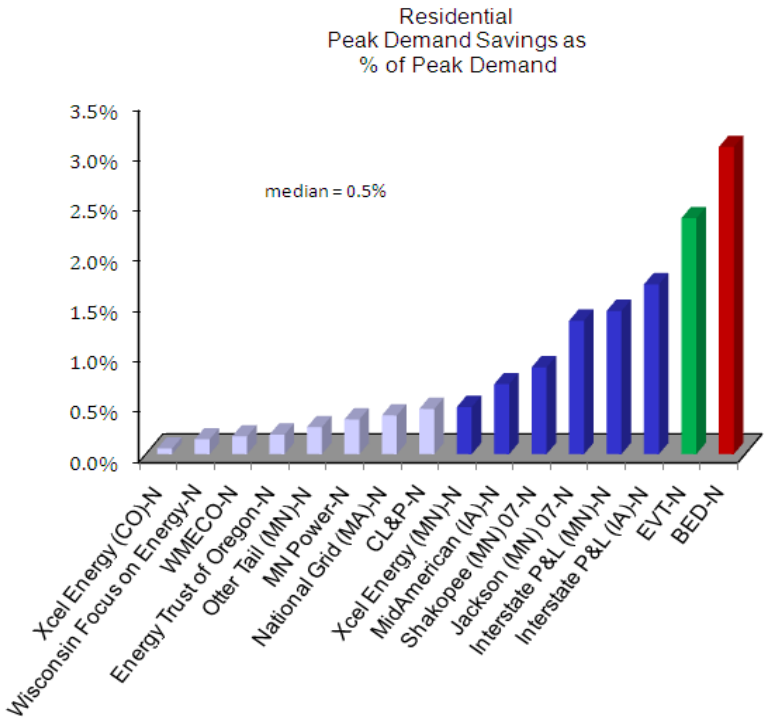
Residential Peak Demand Savings

This section reviews the peak demand saved (as a percentage of peak demand) and the costs of peak demand savings achieved by DSM programs in the residential sector.

For the Level 2 organizations, Figure 0-13 below shows DSM incremental peak demand savings as a percentage of annual peak demand for the residential sector. Residential peak demand savings as a percentage of peak demand ranges from 0.1% to 3.1% with the median at 0.5%.

EVT's incremental peak demand savings as a percentage of annual peak demand for the residential sector is 2.3%, which is greater than five times the median (0.4%) of the IOUs and agencies. BED's DSM incremental peak demand savings as a percentage of annual peak demand for the residential sector is 3.1%, which is more than double the median (1.3%) of the POUs.

Figure 0-13. Level 2 2008 Residential Peak Demand Savings as % of Peak Demand

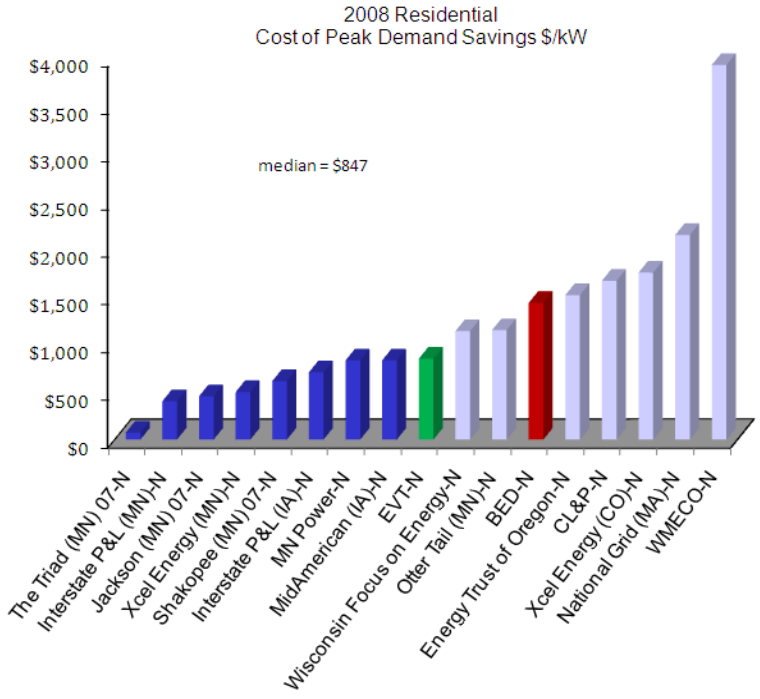


IOU and Agency Median	0.4%
EVT	2.3%
POU Median	1.3%
BED	3.1%

For the Level 2 organizations, Figure 0-14 below shows DSM cost of peak demand savings for the residential sector. The cost of residential peak demand savings ranges less widely than for Level 1 organizations, from $72/kW to $3,923/kW, with the median at $847/kW.

EVT's cost of peak demand savings for the residential sector is $847/kW, which is less than the median ($1,136/kW) of the IOUs and agencies. BED's annual cost of peak demand savings for the residential sector is $1,431/kW, which is greater than the median ($533/kW) of the POUs.

Figure 0-14. Level 2 2008 Residential Cost of Peak Demand Savings ($/kW)



IOU and Agency Median	$1,136/kWh
EVT	$847/kWh
POU Median	$533/kWh
BED	$1,431/kWh

Residential DSM Programs with High Peak Demand Savings and Low Costs

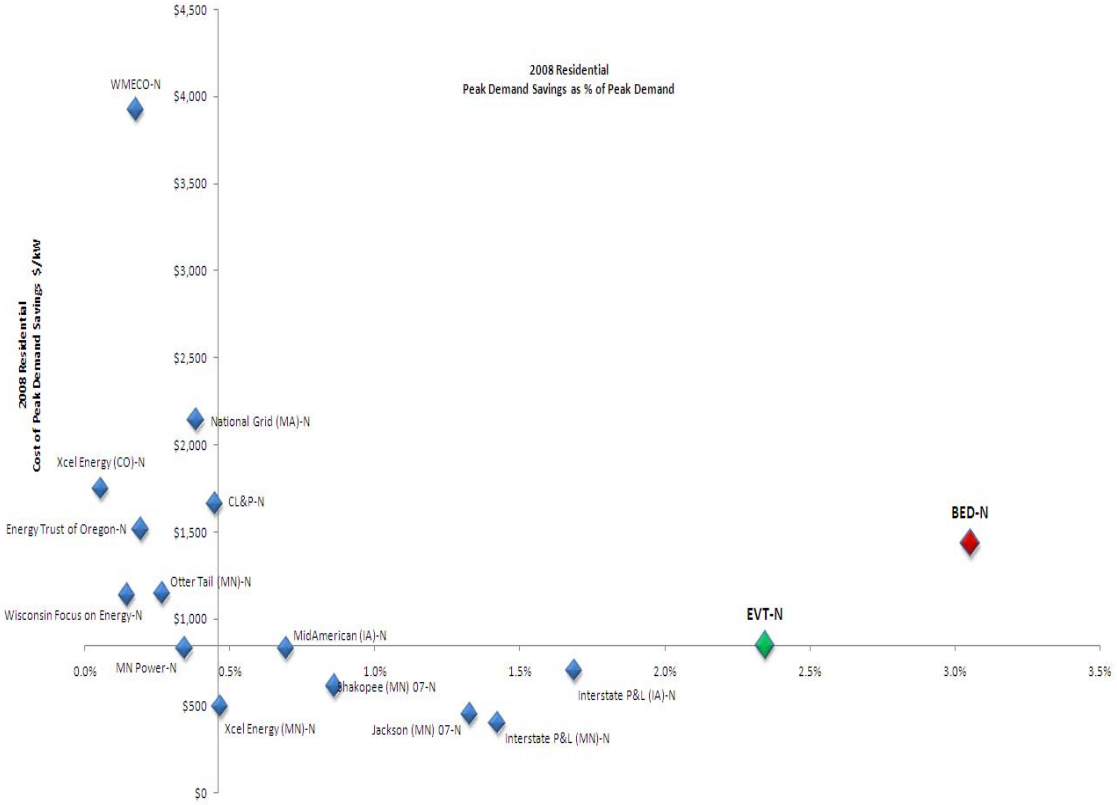
This section identifies the Level 2 organizations with DSM programs that achieved above median peak demand savings (as a percentage of peak demand) at or below median costs for the residential customer sector.

For the Level 2 organizations, the scatter plot shown in Figure 0-15 illustrates where each organization falls relative to median peak demand savings and median costs in the residential sector. Below is a list of the organizations that achieved above median percentage of peak demand conserved at or below median costs are listed below:

1. EVT: 2.3%, $874/kW
2. Interstate P&L (IA): 1.7%, $705/kW
3. Interstate P&L (MN): 1.4%, $402/kW
4. Jackson (MN) 07: 1.3%, $454/kW
5. Shakopee (MN) 07: 0.9%, $613/kW
6. MidAmerican (IA): 0.7%, $830/kWh
7. Xcel Energy (MN): 0.5%, $498/kW

With costs and impacts of all demand response programs removed from all Level 2 portfolio results (as well as costs and impacts for low income and fuel switching), EVT's and BED's residential peak demand results here look similar to their results in the Level 1 analysis: they achieved peak demand savings, as a percentage of peak demand, greater than other organizations and at reasonable costs. EVT's and BED's high rates of peak demand savings reflect their high rates of energy savings.

Figure 0-15. Level 2 2008 Residential Peak Demand Savings and First Year Costs ($/kW)



	Peak Demand Savings as % of Peak Demand	Cost of Peak Demand Savings, $/kW
IOU and Agency Median	0.4%	$1,136/kW
EVT	2.3%	$847/kW
POU Median	1.3%	$533/kW
BED	3.1%	$1,431/kW

C&I Sector

This section reviews DSM program spending, savings, and costs for the C&I customer sector.

Table 0-3 shows the median results for spending, savings, and costs for the C&I sector for all reviewed organizations (where data are available).

Table 0-3. Medians for C&I Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of Savings (First Year)	
				$/kWh	$/kW
Overall	1.8%	1.1%	0.7%	$0.13	$703
EVT	6.3%	2.1%	2.0%	$0.34	$2,067
BED	2.4%	1.2%	0.7%	$0.24	$2,068

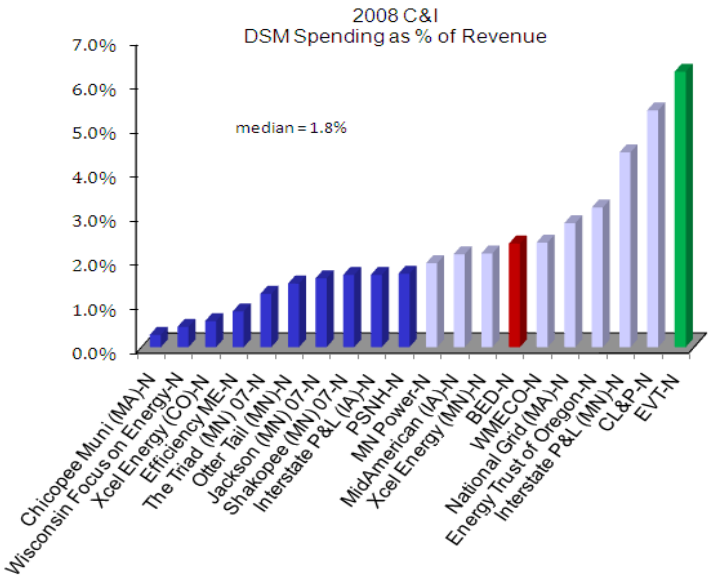
C&I DSM Spending

This section reviews DSM spending for the C&I customer sector as a percentage of C&I sales revenue.

For the Level 2 organizations, DSM spending in the C&I sector, as a percentage of annual revenue of retail C&I electricity sales, ranges widely from 0.3% to 6.3% with the median at 1.8% (Figure 0-16).

EVT's DSM spending as a percentage of revenue is 6.3%, which is three times the median (2.1%) of the IOUs and agencies. BED's DSM spending as a percentage of revenue is 2.4%, which is greater than the median (1.6%) of the POUs.

Figure 0-16. Level 2 2008 C&I DSM Spending as % of Revenue[36]



IOU and Agency Median	2.1%
EVT	6.3%
POU Median	1.6%
BED	2.4%

[36] As this information was available, baseline data (retail revenue, sales, and peak data) for each benchmarked organization has been reduced by the baseline data from companies that have opted out of that organization's DSM programs.

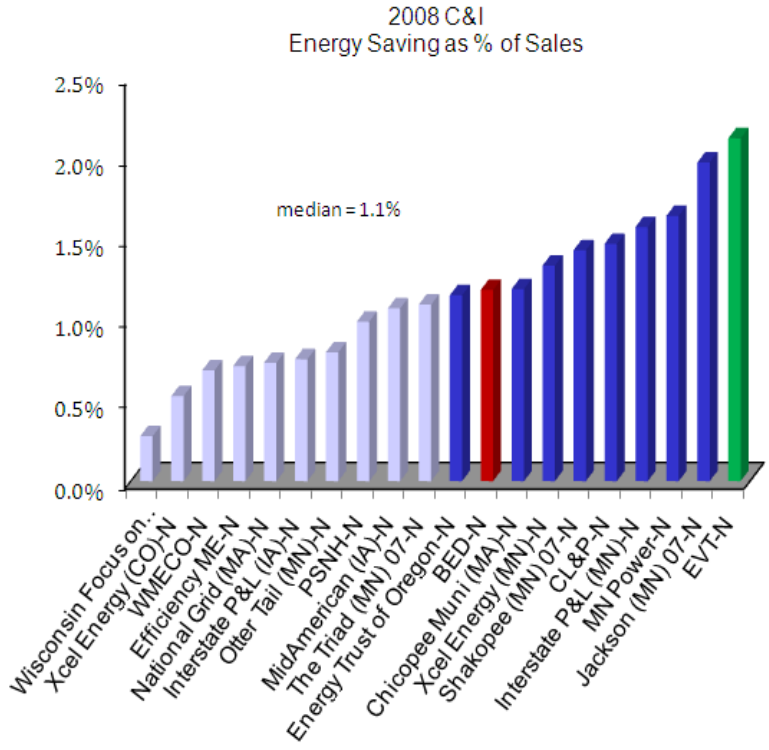
C&I Energy Savings

This section reviews the energy saved (as a percentage of sales) and the costs of first year energy savings of DSM programs in the C&I customer sector.

For the Level 2 organizations, Figure 0-17 shows the energy savings as a percentage of sales in the C&I sector. Energy savings as a percentage of sales ranges widely from 0.3% to 2.1%, with the median at 1.1%.

EVT's DSM energy savings as a percentage of sales is 2.1% which is greater than twice the median (1.0%) of the IOUs and agencies. BED's DSM energy savings as a percentage of sales is 1.2%, which is the median of the POUs.

Figure 0-17. Level 2 2008 C&I Energy Savings as % of Sales First Year

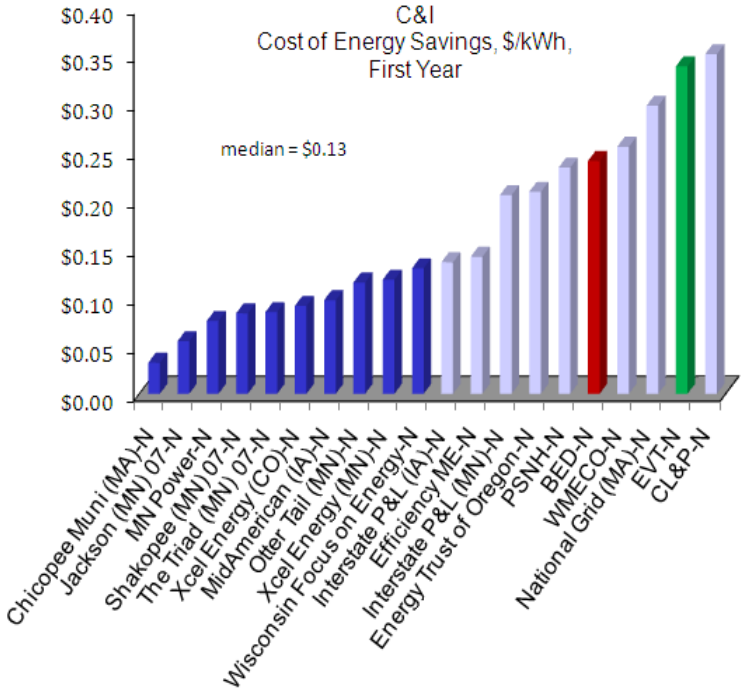


IOU and Agency Median	1.0%
EVT	2.1%
POU Median	1.2%
BED	1.2%

For the Level 2 organizations, costs of first year C&I energy savings ranges from $0.03/kWh to $0.35/kWh, with the median at $0.13/kWh (Figure 0-18).

EVT's DSM cost of first year C&I energy savings is $0.34/kWh, which is greater than the median ($0.14/kWh) of the IOUs and agencies. BED's DSM cost of first year C&I energy savings is $0.24/kWh, which is greater than the median ($0.08/kWh) of the POUs.

Figure 0-18. Level 2 2008 C&I Cost of Energy Savings ($/kWh) First Year



IOU and Agency Median	$0.14/kWh
EVT	$0.34/kWh
POU Median	$0.08/kWh
BED	$0.24/kWh

1.13.3.1.1

C&I DSM Programs with High Electric Energy Savings and Low Costs

This section identifies the Level 2 organizations with DSM programs that achieved above median electric energy savings (as a percentage of sales) at costs at or below the median for the C&I customer sector.

For the Level 2 organizations, the scatter plot shown in Figure 0-19 illustrates where each organization falls relative to median electric energy savings and median costs. The following organizations achieved above median energy savings rates at costs near or below the median:

1. Jackson (MN) 07: 2.0%, $0.05/kWh
2. MN Power: 1.6%, $0.08/kWh
3. Shakopee (MN) 07: 1.4%, $0.08/kWh
4. Xcel Energy (MN): 1.3%, $0.12/kWh
5. Chicopee Muni (MA): 1.2%, $0.03/kWh

Removing the costs and impacts of all demand response programs, one would expect the median cost of energy savings to be lower, as here, Level 2 median C&I $/kWh is lower than that for Level 1. One would also expect the median energy savings, as a percentage of sales, to be the same; however, here, the Level 2 median C&I energy savings rate is greater than Level 1's. This reflects the combined effect of omitting organizations and omitting costs and impacts of certain programs.

Nevertheless, EVT's and BED's C&I results for Level 2 are very similar to their Level 1 results: they achieved energy savings as a percentage of sales greater than most organizations at costs above median.

Figure 0-19. Level 2 2008 C&I Electric Energy Savings and First Year Costs ($/kWh)

	Energy Savings as % of Sales	Cost of Energy Savings, $/kWh, First Year
IOU and Agency	1.0%	$0.14/kWh
EVT	2.1%	$0.34/kWh
POU Median	1.2%	$0.08/kWh
BED	1.2%	$0.24/kWh

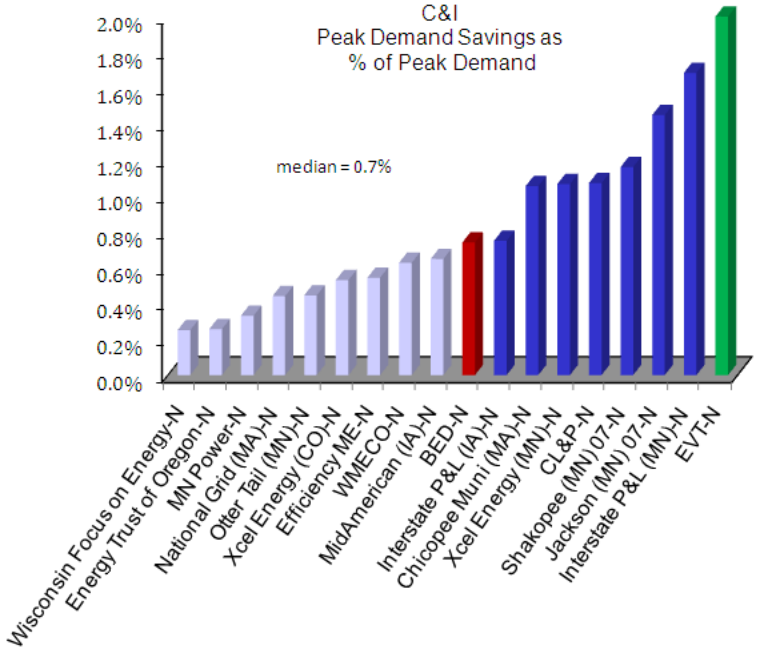
C&I Peak Demand Savings

This section reviews the peak demand saved (as a percentage of peak demand) and the costs of peak demand savings achieved by DSM programs in the C&I customer sector.

For the Level 2 organizations, Figure 0-20 below shows DSM incremental peak demand savings as a percentage of annual peak demand for the C&I customer sector. C&I peak demand savings as a percentage of C&I peak demand ranges from 0.3% to 2.0%, with the median at 0.7%.

EVT's incremental peak demand savings as a percentage of annual peak demand for the C&I customer sector is 2.0%, which is greater than three times the median (0.6%) of the IOUs and agencies and is the greatest among Level 2 organizations. BED's DSM incremental peak demand savings as a percentage of annual peak demand for the C&I customer is 0.7%, which is less than the median (1.1%) of the POUs.

Figure 0-20. Level 2 2008 C&I Peak Demand Savings as % of Peak Demand

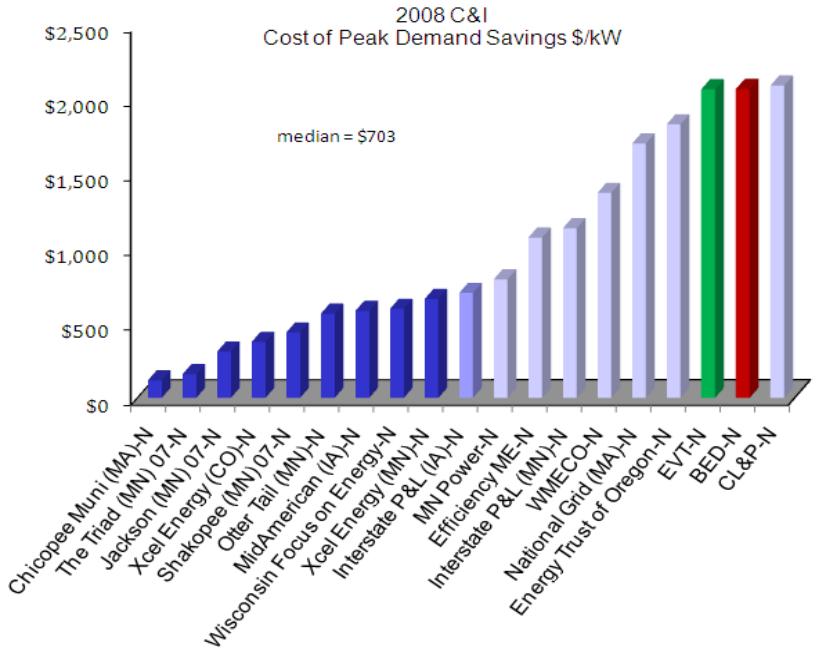


IOU and Agency Median	0.6%
EVT	2.0%
POU Median	1.1%
BED	0.7%

For the Level 2 organizations, Figure 0-21 below shows DSM cost of peak demand savings for the C&I customer sector. The cost of C&I peak demand savings range from $118/kW to $2,091/kW, with the median at $703/kW.

EVT's cost of peak demand savings for the C&I customer sector is $2,067/kW, which is greater than the median ($934) of the IOUs and agencies. BED's DSM annual cost of peak demand savings for the C&I customer $2,068/kW, which is greater than the median ($310) of the POUs.

Figure 0-21. Level 2 2008 C&I Cost of Peak Demand Savings ($/kW)



IOU and Agency Median	$934/kW
EVT	$2,067/kW
POU Median	$310/kW
BED	$2,068/kW

C&I DSM Programs with High Peak Demand Savings and Low Costs

This section identifies the Level 2 organizations with DSM programs that achieved above median peak demand savings (as a percentage of peak demand) at or below median costs for the C&I customer sector.

For the organizations reviewed, the scatter plot shown in Figure 0-22 illustrates where each organization falls relative to median peak demand savings and median costs in the C&I sector.

1. Jackson (MN) 07: 1.4%, $310/kW
2. Shakopee (MN) 07: 1.2%, $437/kW
3. Xcel Energy MN: 1.1%, $662/kW
4. Chicopee Muni (MA): 1.1%, $118/kW
5. Interstate P&L (IA): 0.7%, $703/kW

With costs and impacts of all demand response programs removed from all Level 2 portfolio results (as well as costs and impacts for low income and fuel switching), EVT's and BED's C&I peak demand results here look similar to their results in the Level 1 analysis: they achieved peak demand savings, as a percentage of peak demand, greater than other organizations however at costs above median. EVT's and BED's high rates of peak demand savings reflect their high rates of energy savings.

Figure 0-22. Level 2 2008 C&I Peak Demand Savings and First Year Costs ($/kW)

	Peak Demand Savings as % of Peak Demand	Cost of Peak Demand Savings, $/kW
IOU and Agency	0.6%	$934/kW
EVT	2.0%	$2,067/kW
POU Median	1.1%	$310/kW
BED	0.7%	$2,068/kW

1.14 Summary of All Level 2 Organizations

Table 0-4 shows the median results for all the Level 2 organizations along with EVT and BED's results for DSM spending, savings, costs, and electric energy costs over all customer sectors.

Table 0-4. Level 2 2008 Overall Results for Electric Utilities

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of Energy $/kWh	Cost of First Year Savings	
					$/kWh	$/kW
IOU and Agency Median	1.8%	0.9%	0.4%	$0.09	$0.17	$849
EVT	4.6%	2.7%	2.0%	$0.13	$0.21	$1,480
POU Median	1.5%	1.4%	1.2%	$0.08	$0.08	$351
BED	3.3%	2.0%	1.3%	$0.13	$0.21	$1,696

For the DSM programs of the IOUs and agencies reviewed, the overall median energy savings as a percentage of annual sales for 2008 is 0.9%, and the median first year costs for energy savings is $0.17/kWh, but the organizations with the largest relative energy savings and below median costs, achieved their energy savings at about 1.4% of annual sales. The analysis for peak demand savings as a percentage of peak demand finds the median savings is 0.4% of peak demand and the median cost is $849/kW, but the organizations with the largest relative peak demand savings and below median costs saved about 1.2% of peak demand.

For the DSM programs of the POUs reviewed, the overall median energy savings as a percentage of annual sales for 2008 is 1.4%, and the median first year costs for energy savings is $0.08/kWh, but the organizations with the largest relative energy savings and below median costs, achieved their energy savings at about 1.5% of annual sales. The analysis for peak demand savings as a percentage of peak demand finds the median savings is 1.2% of peak demand and the median cost is $351/kW, but the organizations with the largest relative peak demand savings and below median costs saved about 1.3% of peak demand.

Efficiency Vermont DSM

EVT's overall savings for electric DSM are generally greater than the typical results of the Level 2 organizations. EVT achieved overall electric energy savings as a percentage of sales, of 2.7%, triple the median of the IOUs and agencies reviewed (0.9%), at first year costs of $0.21/kWh, above the median cost ($0.17/kWh).

In the C&I sector, EVT achieved similar results: above median electric energy savings, 2.1%, at above median first year costs, $0.34/kWh. In the residential sector, EVT achieved above median energy savings as a percentage of sales, 3.6%, at below median first year costs, $0.11/kWh.

EVT reported peak demand savings of 2.0% of estimated C&I peak demand, above the median, at above median costs, $2,067/kW and savings of 2.3% in the residential sector, above the median, at below median costs ($847/kW).

Burlington Electric Department DSM

BED's overall savings for electric DSM are generally greater than the typical results of the Level 2 organizations. BED achieved overall electric energy savings as a percentage of sales, of 2.0%, above the median of the POUs reviewed (1.4%), at first year costs of $0.21/kWh, also above the median POU cost ($0.08/kWh).

In the C&I sector, BED achieved similar results: above median electric energy savings of 1.2% at above median first year costs, $0.24/kWh. In the residential sector, BED achieved above median energy savings as a percentage of sales, 4.6%, at below median first year costs, $0.18/kWh.

BED reported peak demand savings of 0.7% of estimated C&I peak demand, at the median, at above median costs $2,068/kW and savings of 3.1% in the residential sector, above median, at above median costs ($1,431/kW).

Level 3 Organizations with High Energy Savings and Low Costs and Peer Group Benchmarking

Level 3 benchmarking involves a more detailed analysis of a more select group of organizations. The analysis includes comparison of program-level results, comparison of incentive and non-incentive program cost components, comparison and detailed view of levelized cost of energy savings, and a review of regulatory framework and other factors that may affect DSM performance. This analysis is performed on a subset of Level 2 organizations: peer organizations, and those that achieved above median savings at costs near median. Peer organizations are identified as Level 2 organizations that are state agencies, POUs, or in the Northeast. Organizations with relatively high savings and low costs in Level 2 should be considered to have demonstrated exceptionally good performance, given that only organizations with established and aggressive DSM programs were selected for the initial group of 25 organizations. Level 3 organizations are listed below:[37]

Efficiency Vermont	Burlington Electric Dept	National Grid
Efficiency Maine	The Triad Muni 07	CL&P
PSNH	Jackson Muni 07	Xcel Energy MN
Energy Trust Oregon	Shakopee Muni 07	

All data used in Level 3 are based on Level 2 data, that is, they exclude costs and impacts for demand response, low income, and fuel switching programs. In this way, Level 3 provides a more detailed analysis on a select group of Level 2 using Level 2 data.

1.15 Program-Level Results for 2008 DSM by Sector

The following sections compare 2008 program-level energy savings and first year cost of energy savings for the residential and commercial and industrial (C&I) sectors.

1.15.1 Level 3 Organizations Residential Results

Table 0-1 shows the median result for spending, savings, and costs for the residential sector for Level 3 organizations (where data are available). Among Level 3 organizations, EVT and BED's spending as a percentage of revenue and energy savings as a percentage of sales for the residential sector are by far the greatest of their respective Level 3 peers. Notably, EVT and BED achieved these high energy savings at first year costs below the median costs of their respective

[37] While other Level 2 organizations meet these criteria (Chicopee Muni, MidAmerican, and MN Power), they are not included in Level 3 due to insufficient data.

peers. EVT achieved residential energy savings at a levelized cost of $0.022/kWh, costs below the peer group median of $0.028/kWh. BED achieved energy savings at a levelized cost of $0.038/kWh, costs very near the median of its peer group, $0.036/kWh.

Table 0-1. Level 3 2008 Medians for Residential Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of First Year Savings		Levelized Cost of Energy Savings
				$/kWh	$/kW	$/kWh
IOU and Agency Median	0.9%	0.9%	0.4%	$0.17	$1,513	$0.028
EVT	2.6%	3.6%	2.3%	$0.11	$847	$0.022
POU Median	1.7%	1.0%	1.3%	$0.20	$533	$0.036
BED	5.8%	4.6%	3.1%	$0.18	$1,431	$0.038

For Level 3 organizations, Table 0-2 shows the distribution of DSM energy savings for the residential customer sector by program and end-use, and Table 0-3 shows program-level first year costs for the residential sector. These tables show EVT's and BED's end-use level impacts but not their end-use level costs per kWh because end-use level costs were not available for EVT and BED. Thus, costs for EVT's Existing Homes and Efficient Products programs and BED's Existing Homes, Retail Products, and Residential Smartlight programs are shown in the "Combination" and "New Construction" categories.

Lighting programs provided the greatest residential energy savings at the lowest costs for almost every organization listed below: CL&P's Retail Products, Efficiency ME's ENERGY STAR Lighting, National Grid (MA)'s Residential Lighting, PSNH's ENERGY STAR Lighting, Shakopee (MN) 07's Residential Lighting Products, and Xcel Energy (MN)'s Home Lighting program. Although EVT and BED offered programs of incentives for multiple consumer products, most of the savings of those programs was achieved by lighting.[38]

[38] In addition to lighting measures, EVT's Existing Homes and Efficiency Products programs offered product incentives for cooling/heating/roofing, ENERGY STAR appliances, water heating, and motors; BED's Retail Products and Existing Homes programs offered incentives for cooling/heating/roofing, ENERGY STAR appliances, water heating, and refrigeration products.

Energy audit programs provided substantial residential energy savings for three of the organizations reviewed: CL&P, Energy Trust of Oregon, and National Grid (MA). Residential energy audit and retrofit programs typically provide an on-site energy audit and incentives for retrofit measures for existing houses. These programs often involve free direct-installation of low-cost measures and rebates and low-interest financing for retrofit measures.[39] CL&P's Home Energy Solutions, Energy Trust of Oregon's Existing Homes, and National Grid (MA)'s Residential Retrofit 1-4 and Residential Retrofit Multifamily, all achieved substantial residential energy savings, however, at above median costs.

ENERGY STAR appliance programs achieved all of the residential energy savings for Jackson (MN) 07 and substantial energy savings for PSNH. Jackson (MN) 07 achieved its entire residential energy savings through its ENERGY STAR Rebate program at above median costs while PSNH's ENERGY STAR Appliance program achieved substantial residential energy savings also at above median costs.

Combination and new construction programs also achieved substantial residential energy savings for four organizations. The Triad (MN) 07 achieved all of its residential energy savings at below median costs with its Conserve & Save – Residential Rebate Program, which included prescriptive incentives for lighting, ES products, geothermal and air source heat pumps, central a/c, and furnace fan motors. Energy Trust of Oregon achieved substantial residential energy savings with its combination program, Northwest Energy Efficiency Alliance, (NEEA)-Residential, at below median costs. Its NEEA-Residential program is a market transformation program that works with NEEA in influencing regional energy efficient design and purchasing practices. New construction programs achieved substantial savings for Energy Trust of Oregon and PSNH at above median costs.

Over all residential end-uses and programs, lighting programs provided the greatest amount of energy savings at the lowest cost for most of the organizations below; seven organizations achieved over 85% of their residential energy savings through lighting programs. However, EVT and BED are part of the subgroup of organizations whose lighting measures provided at least 94% of their total residential energy savings at very low costs. The predominance of savings from lighting low cost measures together with EVT's and BED's high percentage of residential DSM spending as a percentage of residential revenue, may explain their achieving the highest rate of energy savings in Level 3 at below median costs.

[39] It is assumed here that the energy savings reported for energy audit programs are for measures directly installed and for rebated and financed measures.

Table 0-2. Level 3 2008 Distribution of Residential DSM Energy Savings by Program: End Use/Program Energy Savings as a Percentage of Residential Energy Savings[40]

Residential	EVT-N	CL&P-N	Efficiency ME-N	Energy Trust of Oregon-N	National Grid (MA)-N	PSNH-N	Xcel Energy (MN)-N	BED-N	Jackson (MN) 07-N	Shakopee (MN) 07-N	The Triad (MN) 07-N
Program/Measures											
Lighting	94%	86%	100%		84%	54%	89%	94%		90%	
Cooling/Heating/Roofing	<1%				1%	11%	9%	1%		6%	
Building Envelope										1%	
Refrigerator/Freezer Removal		<1%									
ES Appliances	2%				<1%	15%		1%	100%	3%	
Water Heating	<1%							1%			
Energy Audit		12%		23%	14%	7%	<1%				
Combination	1%			38%							100%
New Construction	3%	2%		39%	1%	13%	1%	1%			
Motors	<1%										
Refrigeration								1%			
Total Residential Savings (GWh)	74.2	77.0	55.8	118.8	77.6	9.1	32.0	4.0	0.1	1.8	3.5
Annual Residential Sales (GWh)	2,045.4	9,913.2	4,351.3	13,684.2	8,467.5	3,104.5	8,696.6	88.1	14.2	129.4	511.3
Total Savings (GWh)	135.4	268.3	107.9	258.5	172.7	41.2	328.1	7.2	0.7	5.7	19.9
Residential Savings as % of Residential Sales	3.63%	0.78%	1.28%	0.87%	0.92%	0.29%	0.37%	4.55%	0.54%	1.42%	0.68%
Residential Savings as % of Total Savings	54.8%	28.7%	51.7%	46.0%	45.0%	22.2%	9.8%	55.5%	10.8%	32.4%	17.4%

Table 0-3. Level 3 2008 Costs of Residential Energy Savings by Type of Program First Year ($/kWh)[41]

Residential	EVT-N	CL&P-N	Efficiency ME-N	Energy Trust of Oregon-N	National Grid (MA)-N	PSNH-N	Xcel Energy (MN)-N	BED-N	Jackson (MN) 07-N	Shakopee (MN) 07-N	The Triad (MN) 07-N
Program/Measures											
Lighting	*	$0.07	$0.05		$0.08	$0.16	$0.02	*		$0.03	
Cooling/Heating/Roofing	*				$2.22	$0.23	$0.89	*		$0.20	
Building Envelope										$0.31	
Refrigerator/Freezer Removal		$1.95									
ES Appliances	*				$8.64	$0.47		*	$0.24	$0.87	
Water Heating	*							*			
Energy Audit		$0.77		$0.32	$1.03	$1.63	$0.55				
Combination	*$0.08			$0.02				*$0.13			$0.16
New Construction	$0.94	$1.02		$0.24	$2.26	$0.68	$0.19	$4.88			
Indirect Impact											
Motors	*										
Refrigeration								*			
Total Residential Savings (GWh)	74.2	77.0	55.8	118.8	77.6	9.1	32.0	4.0	0.1	1.8	3.5
Total Residential Costs ($M)	$7.9	$17.1	$2.9	$20.6	$20.3	$3.6	$4.5	$0.7	$0.0	$0.2	$0.8
Total Costs ($M)	$28.6	$84.3	$10.3	$49.8	$48.6	$10.9	$39.5	$1.5	$0.1	$0.5	$2.2
Residential Costs as % of Total Costs	27.5%	20.3%	28.5%	41.3%	41.7%	33.1%	11.5%	48.2%	37.4%	33.5%	35.6%
Costs of Residential Savings ($/kWh)	$0.11	$0.22	$0.05	$0.17	$0.26	$0.40	$0.14	$0.18	$0.27	$0.09	$0.22

[40] EVT and BED did not report costs at the end-use level. EVT and BED reported costs at the program-level, thus, costs for their retrofit and product programs are shown in the Combination category.

[41] Total costs include costs of indirect impact programs, i.e., programs for which energy savings are not accountable.

1.15.2 Level 3 Organizations C&I Results

Table 0-4 shows the median results for spending, savings, and costs for the C&I sector for Level 3 organizations (where data are available). Among Level 3 organizations, EVT and BED's spending as a percentage of revenue for the C&I sector are significantly greater than the medians of their respective Level 3 peers. EVT spent 6.3% on C&I programs as percentage of C&I revenue compared to 2.8% for their peer group of IOUs and agencies. BED spent 2.4% on C&I programs as percentage of C&I revenue compared to 1.6% for their peer group of POUs. EVT's C&I energy savings as a percentage of sales , 2.1%, is by far the greatest among Level 3 IOUs and agencies (median is 1.1%). BED's C&I energy savings (1.2%) is close to the median of its Level 3 peers (1.3%). EVT's and BED's first year and levelized costs for these savings are above the medians of their peers.

Table 0-4. Level 3 2008 Medians for C&I Results

	Spending as % of Revenue	Electric Energy Savings as % of Sales	Peak Demand Savings as % of Peak Demand	Cost of First Year Savings		Levelized Cost of Energy Savings
				$/kWh	$/kW	$/kWh
IOU and Agency Median	2.8%	1.1%	0.5%	$0.23	$1,704	$0.028
EVT	6.3%	2.1%	2.0%	$0.34	$2,067	$0.042
POU Median	1.6%	1.3%	0.9%	$0.08	$374	$0.011
BED	2.4%	1.2%	0.7%	$0.24	$2,068	$0.027

For the organizations reviewed, Table 0-5 shows the distribution of DSM energy savings for the C&I customer sector by program and end-use, and Table 0-6 shows program-level first year costs for the C&I sector.

Lighting measures achieved substantial energy savings for most of the utilities listed in the following table. Lighting measures through EVT and BED's combination program, Existing Facilities, and Efficiency ME's combination program achieved more than half of the program's total energy savings. Xcel Energy (MN)'s three lighting programs combined earned most of the utility's C&I savings at below median costs: CEE One-Stop Shop, a small business direct install program; Energy Management Systems, an automated control system for building lighting and other building systems; and Lighting Efficiency, a prescriptive incentives program. Lighting

programs also achieved most of the energy savings for the three Minnesota municipal utilities: Jackson (MN) 07, Shakopee (MN) 07, and The Triad (MN) 07. These energy savings were achieved at below median costs.

Combination programs achieved substantial C&I energy savings for several organizations. In addition to lighting measures, combination programs typically include cooling/heating/roofing measures, ES appliances, custom measures, and motors. Combination programs achieved substantial energy savings at near median costs for the following organizations: BED (Business Existing Facilities), Efficiency ME (Business program), and National Grid (MA) (C&I Large Retrofit). Energy Trust of Oregon's combination programs, Existing Buildings[42] and NEEA-C&I, achieved substantial C&I energy savings at slightly above median costs. Its NEEA-C&I program is a market transformation program that works with NEEA in influencing regional energy efficient design and purchasing practices.

Custom programs achieved substantial savings for four of the organizations: CL&P, Energy Trust Oregon, Xcel Energy (MN), and Shakopee (MN) 07. Energy Trust of Oregon's Production Efficiency; Xcel Energy (MN)'s Custom Efficiency, Industrial Efficiency, and Segment Efficiency; and Shakopee (MN) 07's Custom Rebates program all achieved substantial energy savings at costs below the median. CL&P's Energy Opportunities program also achieved substantial energy savings but at above median costs.

Direct install and new construction programs achieved substantial energy savings for many of the organizations but, as to be expected, at above median costs. This is so with the direct install programs for National Grid (MA) (Small Business Services), EVT (Geographic Targeting), and CL&P (Small Business program). Substantial savings at above median costs were also achieved by the new construction programs for National Grid (MA) (Lost Opportunity), BED, EVT, PSNH, CL&P (Energy Conscious Blueprint), and Energy Trust Oregon (New Buildings). Xcel Energy (MN)'s Energy Design Assistance program is the only new construction program to achieve substantial energy savings at below median costs in the C&I sector.

PSNH is the only utility to achieve substantial C&I energy savings with its energy audit programs, Small Business Energy Solutions and Large Business Retrofit. It achieved these energy savings at above median costs.

Results for custom and new construction programs should be considered in light of the fact that most custom and new construction projects span more than one program year: costs for one project spent one year may not yield reportable results until the following year. Thus, average annual cost and impact results over two or three program years of these types of programs would yield a more representative description than any single-year analysis can provide.

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[42] Energy Trust of Oregon's Existing Building program offered prescriptive incentives for lighting, HVAC, motors, controls, boilers, as well as services that included technical analysis, energy surveys, contract referrals, project facilitation, and post-installation assistance.

Table 0-5. Level 3 2008 Distribution of C&I DSM Energy Savings by Program: End Use/Program Energy Savings as a Percentage of C&I Energy Savings [43]

C&I	EVT-N	CL&P-N	Efficiency ME-N	Energy Trust of Oregon-N	MidAmerican (IA)-N	MN Power-N	National Grid (MA)-N	PSNH-N	Xcel Energy (MN)-N	BED-N	Chicopee Muni (MA)-N	Jackson (MN) 07-N	Shakopee (MN) 07-N	The Triad (MN) 07-N
Program/Measures														
Lighting	20%				13%				28%	3%	100%	75%	56%	79%
Cooling/Heating/Roofing	3%	5%							8%				2%	5%
Refrigeration														
ES Appliances	3%													
Motors	2%				41%				21%			25%	1%	7%
Compressed Air														
Combination	7%		73%	35%	4%		69%	9%	0%	87%				1%
Custom Rebates		50%		49%	8%	100%			19%				41%	7%
Energy Audit					14%			64%						
New Construction	11%	26%	1%	16%	20%		17%	27%	22%	10%				
Agriculture														
Education			26%											
Direct Install	54%	19%					15%							
Total C&I Savings (GWh)	61.2	191.3	52.1	139.7	143.0	37.4	95.1	31.2	296.0	3.2	1.6	0.6	3.8	16.4
Annual C&I Sales (GWh)	2,889.7	13,041.4	7,322.4	12,162.6	13,389.7	2,278.4	12,991.2	3,165.0	22,214.7	271.9	135.4	31.9	268.0	1,505.5
Total Savings (GWh)	135.4	268.3	107.9	258.5	171.4	46.7	172.7	41.2	328.1	7.2	2.2	0.7	5.7	19.9
C&I Savings as % of C&I Sales	2.12%	1.47%	0.71%	1.15%	1.07%	1.64%	0.73%	0.99%	1.33%	1.18%	1.19%	1.97%	1.43%	1.09%
C&I Savings as % of Total Savings	45.22%	71.29%	48.28%	54.04%	83.41%	80.02%	55.05%	75.83%	90.24%	44.48%	74.23%	89.16%	67.56%	82.59%

Table 0-6. Level 3 2008 Costs of C&I Energy Savings by Type of Program First Year ($/kWh) [44]

C&I	EVT-N	CL&P-N	Efficiency ME-N	Energy Trust of Oregon-N	National Grid (MA)-N	PSNH-N	Xcel Energy (MN)-N	BED-N	Jackson (MN) 07-N	Shakopee (MN) 07-N	The Triad (MN) 07-N
Program/Measures											
Lighting	*						$0.17	$0.11	$0.05	$0.02	$0.05
Cooling/Heating/Roofing	*	$0.21					$0.13			$0.26	$0.30
Refrigeration											
ES Appliances	*										
Motors	*						$0.05		$0.02	$0.87	$0.03
Compressed Air											
Combination	*$0.26		$0.17	$0.20	$0.22	$0.17	$0.40	$0.20			$0.20
Custom Rebates		$0.31		$0.17			$0.09			$0.07	$0.07
Energy Audit						$0.23					
New Construction	$0.20	$0.37	$0.77	$0.34	$0.48	$0.26	$0.09	$0.64			
Agriculture											
Education			$0.01								
Direct Install	$0.39	$0.31			$0.41						
Total C&I Savings (GWh)	61.2	191.3	52.1	139.7	95.1	31.2	296.0	3.2	0.6	3.8	16.4
Total C&I Costs ($M)	$20.7	$67.2	$7.4	$29.2	$28.3	$7.3	$34.9	$0.8	$0.0	$0.3	$1.4
Total Costs ($M)	$28.6	$84.3	$10.3	$49.8	$48.6	$10.9	$39.5	$1.5	$0.1	$0.5	$2.2
C&I Costs as % of Total Costs	72.5%	79.7%	71.5%	58.7%	58.3%	66.9%	88.5%	52.1%	62.6%	66.5%	64.4%
Costs of C&I Savings ($/kWh)	$0.34	$0.35	$0.14	$0.21	$0.30	$0.23	$0.12	$0.24	$0.05	$0.08	$0.08

These results show that EVT is achieving the largest C&I energy savings of the Level 3 organizations reviewed, while BED's C&I energy savings are very close to the median for the publicly owned utilities reviewed. EVT's costs of energy savings is higher than the median for the Level 3 IOUs and agencies, while BED's costs of energy savings are considerably higher than for the Level 3 publicly owned utilities reviewed. However, BED's C&I costs of energy savings are very close to the Level 3 C&I IOUs and agencies' costs of energy savings.

[43] [43] EVT did not report costs at the end-use level. EVT reported costs at the program-level, thus costs for their retrofit programs are shown in the Combination category.

[44] Total costs include costs of indirect impact programs, i.e., programs for which energy savings are not accountable.

EVT is obtaining slightly more than half (54%) of its C&I energy savings from a direct installation program that focuses on lighting retrofits. These tend to be among the higher cost of conserved energy C&I programs. EVT's program costs per kWh for this program, $0.39 per first year kWh saved, are comparable to the program costs for CL&P ($0.31 per first year kWh saved) and National Grid ($0.41 per first year kWh saved). However, CL&P obtains only 19% of its total C&I energy savings from this program, while National Grid obtains 15% of its C&I energy savings from this program. This variation of program savings distribution among organizations is partly a reflection of the variation of C&I markets among the organizations' territories (e.g., a territory with C&I energy consumption dominated by small businesses will have a greater potential energy savings share in direct small programs than a territory with many large commercial and large industrial customers).

BED obtained 87% of its C&I energy savings from its Business Existing Facilities program. About half of the energy savings from this program come from lighting measures, while about 30% of its energy savings come from Custom measures. BED's cost of saved energy for this program of $0.20 per first year kWh saved is very comparable to the costs of saved energy from similar programs employed by other Level 3 organizations, which range from $0.17 per first year kWh saved to $0.40 per first year kWh saved. BED obtained 10% of its C&I energy savings from its Business New Construction program. BED's costs of saved energy for this program were $0.64/kWh per first year kWh saved. BED's cost of saved energy for this program was higher than for all the other Level 3 organizations except Efficiency Maine. The range of costs of saved energy for this program ranged from $0.09 to $0.77 per first year kWh saved.

1.16 Incentive and Non-Incentive Costs of Energy Savings – First Year

This section compares reported 2008 incentive and non-incentive components first year cost of energy savings for the residential and commercial and industrial (C&I) sectors and over all sectors for Level 3 organizations.[45] We collected incentive costs as organizations defined and reported them. For this report, we defined non-incentive costs to be the organization's total DSM program costs less the reported incentive costs. As such, non-incentive costs can include costs for administration, research, planning, marketing, delivery, evaluation, and reporting.

Across the DSM industry, there is considerable variation in defining program costs as incentive or non-incentive. For example, a typical appliance recycling program involves the costs of the rebate incentive, removal of old appliance, and disassembly. Some organizations consider only the rebate incentive as an incentive cost and the rest as non-incentive costs while other organizations consider all three to be incentive costs. Incentive costs are also defined in a variety of ways for low income and direct install programs: some organizations count the labor of direct installation as an incentive cost while others count it as a non-incentive cost.

[45] Incentive and non-incentive cost component detail were not available for CL&P, National Grid, and PSNH.

Additionally, with administrative costs, a component of our non-incentive costs here, it is equally difficult to make a direct comparison of one organization's administrative costs for DSM delivery to another organization's due to differences in how administrative costs may be categorized and reported. In Vermont, for example, "non-incentive" costs include audit and engineering services, among many others. Thus, the comparison provided here should not be interpreted as a surrogate for "administrative costs".

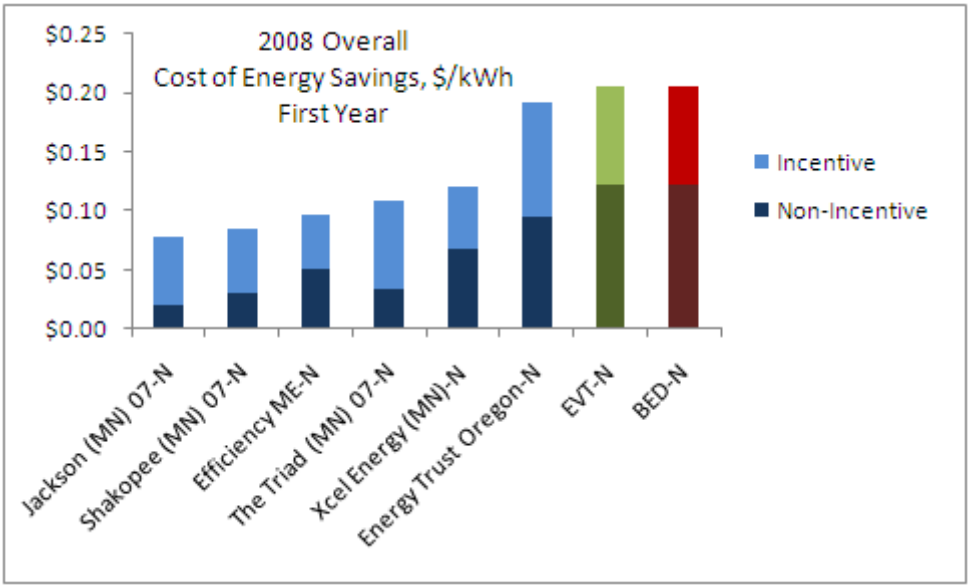
For example, Efficiency Maine, administered by the Maine Public Utilities Commission (MPUC), reports as "administrative costs" the labor costs associated with the five MPUC employees who oversee the DSM program delivery which is subcontracted out to a third party implementation contractor team. Thus, in their annual report, MPUC reports administrative costs as only 3-5% of the annual budget. All administrative costs associated with program delivery by the third party contractor are represented in the "program delivery" line item, which certainly includes a mix of traditional administrative and also program design, planning, database tracking etc. As such, for Efficiency Vermont and BED, which deliver programs primarily with in-house resources, their administrative costs are reported to be significantly higher than as compared to Efficiency Maine. Yet, by understanding the different contexts of how administrative and program delivery costs are categorized, it is clear that a straight comparison is not appropriate. As such, for purposes of this report, NCI focused on the relatively more straightforward incentive to non-incentive cost comparison, although caveats as mentioned previously still apply.

Thus, while informative, the comparison here should not be used as a measure of administrative efficiency.

1.16.1 Overall Results

Figure 0-1 shows first year cost of energy savings for Level 3 organizations over all sectors (where data are available). Non-incentive costs constitute 60% of total program costs for EVT and BED; the median share for non-incentive costs is 51%.

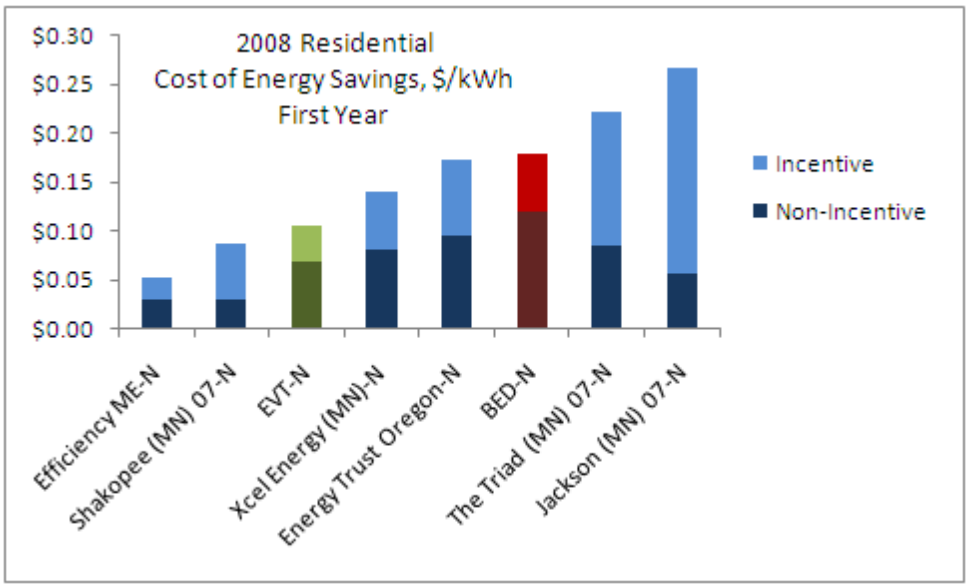
Figure 0-1. Level 3 2008 Incentive and Non-Incentive Cost of Overall Energy Savings – First Year [46]



1.16.2 Residential Results

Figure 0-2 shows first year cost of residential energy savings for Level 3 organizations with available data. Non-incentive costs constitute about 65% of total program costs for EVT and BED; the median share for non-incentive costs is 56%.

Figure 0-2. Level 3 2008 Incentive and Non-Incentive Cost of Residential Energy Savings – First Year

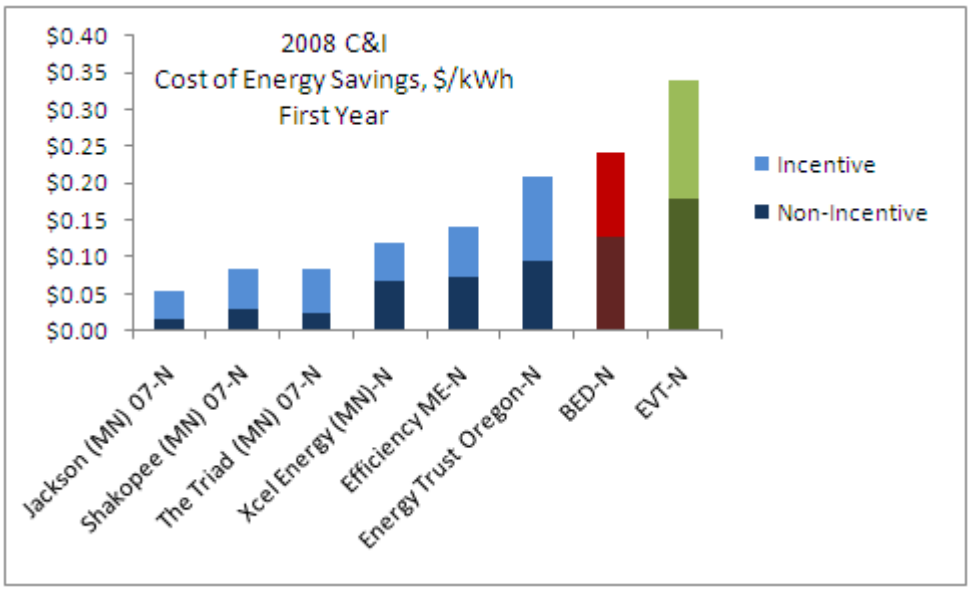


[46] Incentive and non-incentive cost component detail were not available for CL&P, National Grid, and PSNH.

1.16.3 C&I Results

Figure 0-3 shows first year cost of C&I energy savings for Level 3 organizations with available data. Non-incentive costs constitute about 53% of total program costs for EVT and BED; the median share for non-incentive costs is 48%.

Figure 0-3. Level 3 2008 Incentive and Non-Incentive Cost of C&I Energy Savings – First Year



Overall and per sector, the Level 3 Minnesota municipal utilities have the lowest share of non-incentive costs among the group while Xcel Energy (MN) and the VT EEUs have the highest share. However, over all sectors, the Minnesota utilities and the VT EEUs achieved relatively high energy savings. Given the variation in defining incentive and non-incentive costs, it is difficult to explain this variation of incentive/non-incentive cost ratio among high-achieving programs with any certainty. This variation may reflect a difference in reporting practices, in programming emphasis (e.g., spending more on programs with no participant incentives but substantial impacts, such as upstream programs), other factors, or some combination.

1.17 Levelized Cost of Energy Savings

This section compares 2008 estimated levelized cost of energy savings for the residential and commercial and industrial (C&I) sectors and over all sectors for Level 3 organizations.

Levelized cost of energy savings is typically used to compare energy efficiency with supply-side sources. Given the limits of this study and that data required to calculate levelized cost of energy are generally not readily available, levelized cost of energy savings is estimated only for the Level 3 organizations.

NCI estimated levelized cost of energy savings for each organization as follows:

Collected Weighted Average Measure Life (WAML).
Where measure life data were not available, collected lifetime energy savings and divided by first year savings to estimate WAML.

Collected Discount Rate (Disc Rate).
Because discount rates were unavailable for most organizations, one discount rate that was available was applied for all, 7.42% from Xcel Energy (MN).[47]

Collected 2008 energy savings and program spending.

Calculated levelized cost of energy savings:

$$\frac{\text{2008 Program Spending \$}}{\text{2008 Energy Savings kWh}} \times \frac{\text{Disc Rate X (1 + Disc Rate)}^{\text{WAML}}}{(1 + \text{Disc Rate})^{\text{WAML}} - 1}$$

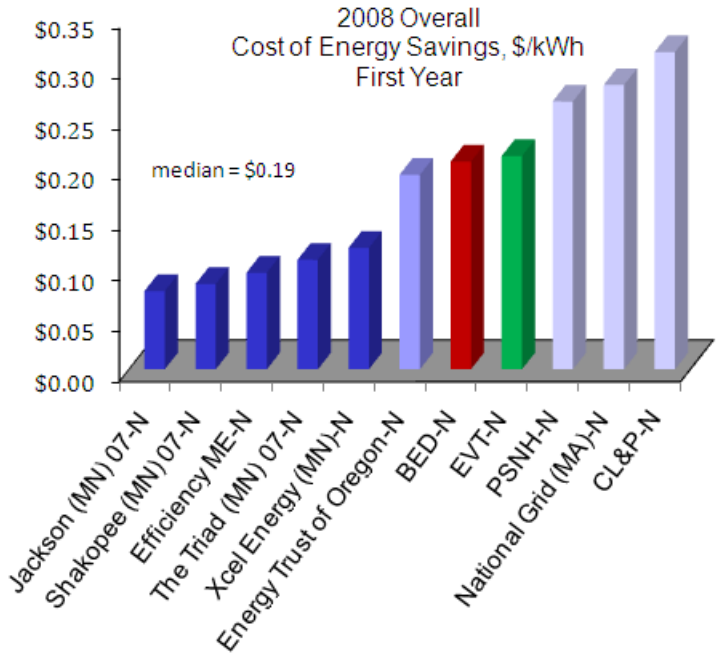
The following charts compare first year costs of energy savings with levelized cost of energy savings for Level 3 organizations. The blue bars represent first year costs; the brown bars represent levelized costs. The median value for the eleven organizations is represented by the bar between the dark and light bars.

1.17.1 Overall Results

Figure 0-4 and Figure 0-5 show cost of energy savings over all customer sectors for Level 3 organizations. EVT's and BED's levelized cost of energy savings are similar, $0.033 and $0.030, respectively. For both first year costs and levelized costs, EVT's and BED's costs are just above the median. Among their respective peer groups, EVT's levelized costs are the median and BED's are the greatest.

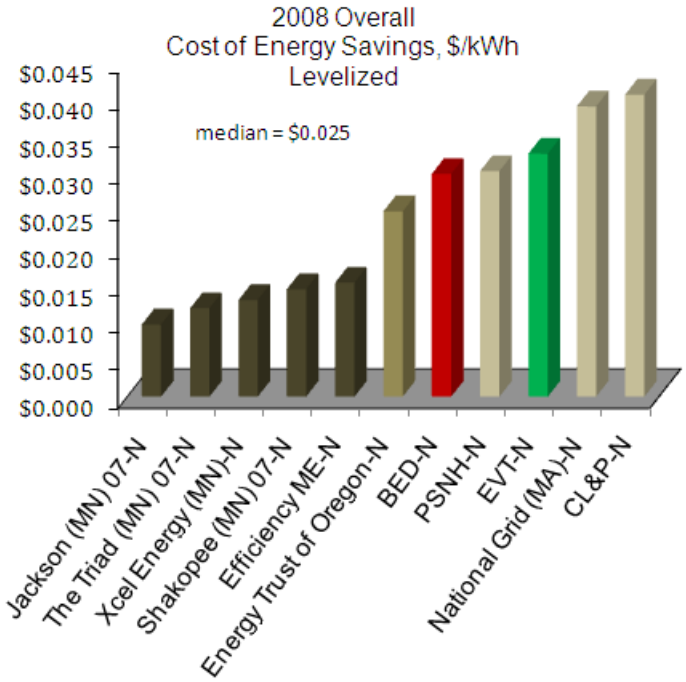
[47] Since the funding for virtually all of these programs are provided by utility ratepayers, using a typical utility discount rate to calculate levelized costs is more appropriate than using a lower "societal" discount rate, as is sometimes done for program benefit-cost analysis.

Figure 0-4. Level 3 2008 Cost of Energy Savings ($/kWh) First Year



IOU and Agency Median	$0.21
EVT	$0.21
POU Median	$0.10
BED	$0.21

Figure 0-5. Level 3 2008 Levelized Cost of Energy Savings ($/kWh)



IOU and Agency Median	$0.030
EVT	$0.033
POU Median	$0.013
BED	$0.030

1.17.2 Residential and C&I Results

Figure 0-6 through Figure 0-9 on the following two pages show cost of energy savings for Level 3 organizations, the first pair for residential energy savings, the second for C&I energy savings.

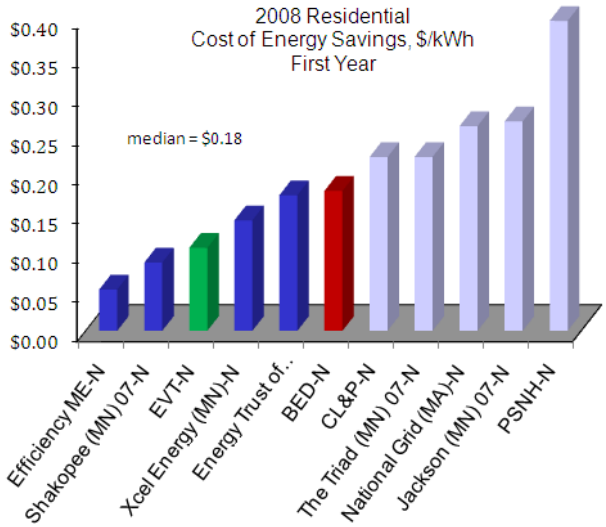
For first year costs of residential energy savings, EVT's costs are the median for the group and below the median for its peer subgroup; BED's first year costs are below the median of the group and the median of its peer subgroup. EVT's and BED's levelized cost of energy savings, however, place them slightly higher in the ascending order.

For C&I energy savings, EVT's and BED's cost of energy savings is above median for both first year costs and levelized costs.

Among all three pairs of charts, the first observation about EVT's and BED's costs is that the relationship of their levelized cost of energy savings relative to their Level 3 peers is about the same as that of their first year costs of energy savings relative to their peers. That levelized cost of energy savings shows similar results for EVT and BED as first year costs of energy savings.

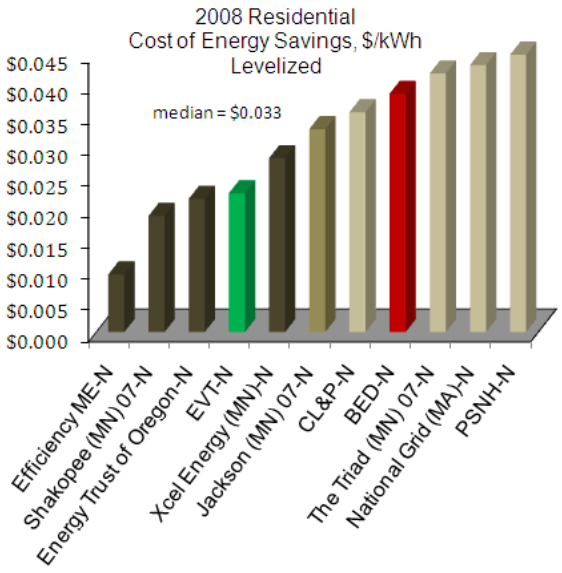
Thus, that the VT EEUs levelized costs are slightly above median is no surprise: their energy savings is the highest, and, in the case of EVT, their C&I savings were achieved with direct installation measures which generally cost more than other C&I programs. EVT's and BED's cost performance is in line with performance NCI has observed in previous benchmarking studies: organizations that achieve energy savings in the top 15% of the reviewed group typically do so at costs at median or a little above median.

Figure 0-6. Level 3 2008 Residential Cost of Energy Savings ($/kWh) First Year



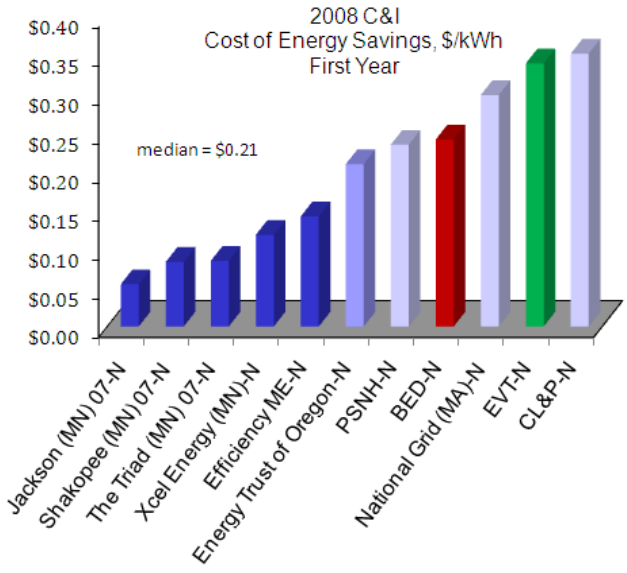
IOU and Agency Median	$0.17
EVT	$0.11
POU Median	$0.20
BED	$0.18

Figure 0-7. Level 3 2008 Residential Levelized Cost of Energy Savings ($/kWh)



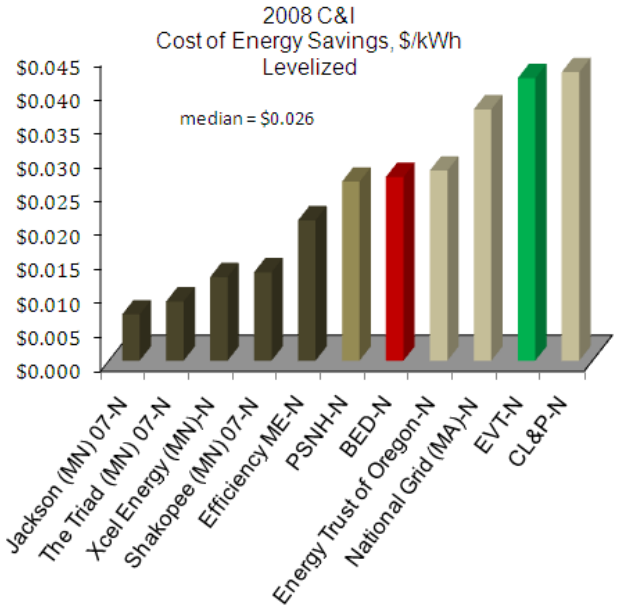
IOU and Agency Median	$0.028
EVT	$0.022
POU Median	$0.036
BED	$0.038

Figure 0-8. Level 3 2008 C&I Cost of Energy Savings ($/kWh) First Year



IOU and Agency Median	$0.23
EVT	$0.34
POU Median	$0.08
BED	$0.24

Figure 0-9. Level 3 2008 C&I Levelized Cost of Energy Savings ($/kWh)



IOU and Agency Median	$0.028
EVT	$0.042
POU Median	$0.011
BED	$0.027

1.18 Regulatory Framework

This section reviews the regulatory framework of the Level 3 organizations to identify any discernible relationship between regulatory factors and DSM performance.

Table 0-7 lists energy savings goals, program funding/cost recovery, performance incentives, and other facts of the regulatory environment in each state of the Level 3 organizations.

Reviewing these factors with Level 3 performance results yields the following observations:

EERS

The Level 3 organizations in the two states that have no energy efficiency resource standards (EERS) established achieved energy savings below median, PSNH and Efficiency Maine. However, the converse is not true: Level 3 organizations in states with EERS achieved savings above, at, and below median.

Decoupling and program cost recovery are practically the same among Level 3 organizations.

Performance Incentives

The only Level 3 state with performance incentives (PI) expressed as a percentage of *net benefits* rather than *program costs* is Minnesota. Maine and Connecticut have no PI, and the remaining states have performance PI expressed as a percentage of program costs. Every Level 3 Minnesota utility has program costs below median while every utility in a state with PI expressed as percentage of program costs has program costs well above the median. This may suggest that basing the amount of incentive awarded on *net benefits* (that is, as defined by the utility cost tests: benefits of avoided costs of energy and capacity less program costs) rather than on program costs motivates more cost-effective programming.

Year Began

Most Level 3 organizations began running DSM programs ten to 20 years ago. Only Minnesota began running DSM programs over 30 years ago. This may be another explanation for the relative high savings and low costs of Minnesota Level 3 organizations.

Delivery Agent

It seems whether DSM is delivered by a state agency or by a utility does not affect performance. When considering sector-level and overall energy savings and costs results, state agencies and utilities are fairly evenly distributed across all four quadrants. For overall and the C&I sector, state agencies are absent in the high savings-low cost quadrant, but they dominate the high savings-low cost quadrant for the residential sector.

Region

For Level 3, every Minnesota utility's overall cost of energy savings is below median while Northeastern utilities' costs of energy savings are above median, except Efficiency Maine. This pattern is also generally reflected in C&I costs of energy savings but not in residential costs of energy savings (where state agencies dominate). This regional difference may be explained by the fact that retail rates of electricity are higher in the Northeast which could allow more spending on less energy savings while still meeting cost-effectiveness.

Table 0-7. Level 3 States and DSM Regulatory Framework

State	Energy Efficiency Goals (Savings as % of Sales)	Decoupling	Program Cost Recovery	Performance Incentives	Year Began	Delivery Agent
Connecticut	All Cost Effective - 1% Annually	Approved	SBC	**% of Program Costs,** 1-8% based on % of goal achieved, 70%-130%**.**	1990s	utility
Maine	**None**	NA	SBC	No	2002	agency
Massachusetts	All Cost Effective - 2.4% Annually	In Planning	SBC	**% of Program Costs,** three-tired, based on % of energy savings goal achieved, starting at 75% of goal. Earnings can amount to about 5% of program costs.	1990	utility
Minnesota	1.5% Annually	Pilot	Rate Case and Rider	**% of Net Benefits** based on % of energy savings goal achieved.	1980	utility
New Hampshire	**None**	No	SBC	**% of Program Costs,** of cost-effective programs (4% of planned times actual CE/planned CE) when achieved savings exceeds 65% of planned.	1996	agency
Oregon	ETO Performance Targets	Pilot	SBC	No	2002	agency
Vermont	Performance Contract (2.0% of 2008 sales/yr)	Yes	SBC	**% of Program Costs.** Incentive of up to $2,180,000 depending on a variety of performance indicators	2000	agency

Considerations for Future Benchmarking

For future benchmarking studies, the DPS should consider the following:

1. Given that DSM activity typically coincides with overall economic activity and/or with targeted and aggressive limited duration promotions/initiatives, selecting a single year and using that as the comparative metric may not be representative of "typical" savings and costs as a general trend. A preferred approach may be taking an average of DSM savings and costs over a three year period, for example to account for variability in DSM delivery cycles and broader economic activity. Note- this approach is especially relevant for programs such as new construction or large custom projects that can take years from initial design planning to project completion and reported savings.

2. This benchmarking analysis focused exclusively on the savings and costs as reported by the DSM organizations in their annual reports. For Vermont's EEU's , additional costs associated with DSM program delivery include costs for evaluation, contract administrator, fiscal agent, etc. These costs are not included in EVT or BED's annual report, and as such, represent an underestimate of full program delivery costs. If a future benchmarking exercise is conducted in Vermont, we suggest these costs be included.

3. Vermont EEU's, per direction from the Public Service Board, place a high priority on the total resource benefit (TRB) metric which is the monetary value of the gross electric benefits, fossil fuel savings, and water savings A key component that determines TRB are the avoided costs applicable to the service territory. As such, in jurisdictions with high avoided costs, TRB will be larger per unit saved, and vice versa. NCI notes that based on our review, no other jurisdictions included TRB in their annual reports, as such, the ability to benchmark TRB was not possible. In the future, with the rise of all-fuels efficiency programs in Massachusetts and Maine, it is likely that these entities will be reporting MMBtu savings which may contribute to a more plausible benchmarking of TRB in the future.

4. NCI focused the Level 1 and Level 2 analysis on costs/first year savings primarily due to the widespread availability of this information. Most DSM organizations typically do not report lifetime savings estimates. All the same, we note that for the small sample in Level 3, where levelized costs were calculated, the general pattern as observed in Level 1 results generally remained in place. For future benchmarking activities, we believe the Level 1-2-3 approach to stratification and normalization of the sample is an appropriate strategy, however, we recommend increasing the sample size for Level 3.

5. Another area of uncertainty in the benchmarking is with respect to whether savings as reported by the utilities in their annual reports are from the meter or the generator. This is often not defined. This could represent potentially a noticeably change in reported energy and demand savings between an organization that reports savings at the meter versus at the generator. In the future, a component of the Level 2 normalization analysis should try to ensure that the analysis is consistent with how EVT and BED report savings.

Appendix B. Level 2 DSM Results by Region[48]

Table B-1, Table B-2, and Table B-3 below show components of first year cost of energy savings in terms of incentive and non-incentive cost at the overall and sector level. These statistics exclude impacts and spending for demand response, low income, and fuel switching programs.

Table B-1. 2008 Overall Incentive and Non-Incentive Cost Components - First Year $/kWh.

Organization	Non-Incentive		Incentive		Total
	$/kWh	% of Total	$/kWh	% of Total	$/kWh
Jackson (MN) 07-N	$0.02	26%	$0.06	74%	$0.08
Shakopee (MN) 07-N	$0.03	35%	$0.05	65%	$0.08
Efficiency ME-N	$0.05	53%	$0.04	47%	$0.10
The Triad (MN) 07-N	$0.03	32%	$0.07	68%	$0.11
Xcel Energy (MN)-N	$0.07	56%	$0.05	44%	$0.12
Energy Trust Oregon-N	$0.10	49%	$0.10	51%	$0.19
EVT-N	$0.12	60%	$0.08	40%	$0.21
BED-N	$0.12	60%	$0.08	40%	$0.21

Table B-2. 2008 Residential Incentive and Non-Incentive Cost Components - First Year $/kWh.

Organization	Non-Incentive		Incentive		Total
	$/kWh	% of Total	$/kWh	% of Total	$/kWh
Efficiency ME-N	$0.03	58%	$0.02	42%	$0.05
Shakopee (MN) 07-N	$0.03	35%	$0.06	65%	$0.09
EVT-N	$0.07	65%	$0.04	35%	$0.11
Xcel Energy (MN)-N	$0.08	58%	$0.06	42%	$0.14
Energy Trust Oregon-N	$0.10	55%	$0.08	45%	$0.17
BED-N	$0.12	67%	$0.06	33%	$0.18
The Triad (MN) 07-N	$0.09	39%	$0.14	61%	$0.22
Jackson (MN) 07-N	$0.06	21%	$0.21	79%	$0.27

[48] Level 2 data exclude costs and impacts of demand response, low income, and fuel switching programs.

Table B-3. 2008 C&I Incentive and Non-Incentive Cost Components – First Year $/kWh.

Organization	Non-Incentive		Incentive		Total
	$/kWh	% of Total	$/kWh	% of Total	$/kWh
Jackson (MN) 07-N	$0.02	29%	$0.04	71%	$0.05
Shakopee (MN) 07-N	$0.03	36%	$0.05	64%	$0.08
The Triad (MN) 07-N	$0.02	28%	$0.06	72%	$0.08
Xcel Energy (MN)-N	$0.07	56%	$0.05	44%	$0.12
Efficiency ME-N	$0.07	51%	$0.07	49%	$0.14
Energy Trust Oregon-N	$0.10	45%	$0.11	55%	$0.21
BED-N	$0.13	53%	$0.11	47%	$0.24
EVT-N	$0.18	52%	$0.16	48%	$0.34

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