

Insights on Shifting Trends in the Segmentation and Dynamics of Utility-Funded Energy Efficiency Programs

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ABSTRACT

Recent survey data reported by U.S. demand-side management (DSM) program sponsors shows a significant slowdown in the rate of growth of DSM portfolio budgets, particularly among the major program administrators that account for the majority of spending. Data collected from filed portfolio plans shows further slowing, with significant variation across regions. At the same time, program administrators are finding it harder to meet targeted energy savings goals, with the proportion exceeding goals within the projected budget declining from 51% of major program administrators in 2010 to only 27% of administrators in 2012. The most acute symptom of this trend is seen in the residential sector where plan \$ per kWh (first-year savings) cost effectiveness has increased 40% from 2010 to 2014, from \$0.18 per kWh to \$0.27 per kWh. In order to counter this trend portfolios are increasingly relying on behavioral programs, shown to be highly cost effective, or shifting funds into commercial sector programs that achieve savings at a lower cost.

Introduction

This study draws insights on DSM program trends from two primary sources. One is a survey conducted annually by the U.S. Energy Information Administration (EIA) gathering sector-level reporting on energy efficiency and load management program expenditures and energy impacts. The other is a proprietary database aggregating spending and impacts data sourced from program administrator portfolio plans and annual reports including program evaluation findings.¹ The database includes historical budgets and planned impacts along with reported actual expenditures and achieved energy-savings impacts from more than 130 major program administrators from 43 states and provinces in that together account for more than 80% of North American DSM program spending.

While by its nature the DSM program industry is highly transparent, with most program plans and results publicly available through state commission dockets and case proceedings, the disaggregated nature of these sources and the density of the documentation creates opacity. Additionally, reporting conventions, definitions and requirements vary from state to state, creating inconsistency in the data (York et al. 2012). Nevertheless, better aggregation and synthesis of this information reveals greater insights into macro trends, market segmentation, and the relative performance of programs across different sectors, engagement approaches, and incentive strategies.

The near-term outlook for the industry suggests strong headwinds in terms of slowing budget growth and deteriorating cost effectiveness. That said, there is evidence that emerging program designs and new technologies can help to overcome these challenges.

¹ E Source DSM Insights: <http://www.esource.com/DSMI>

Trends in DSM Spending

The U.S. Energy Information Administration (EIA) has been gathering data on electric DSM program spending and activity for more than two decades through its Annual Electric Power Industry Report Survey, Form EIA-861 (EIA 2013).² The most recent survey data for 2012 includes reporting on DSM activities from 789 electric utilities operating in the United States, with total spending across energy efficiency and load management programs totaling just over \$6 billion, as illustrated in Figure 1.

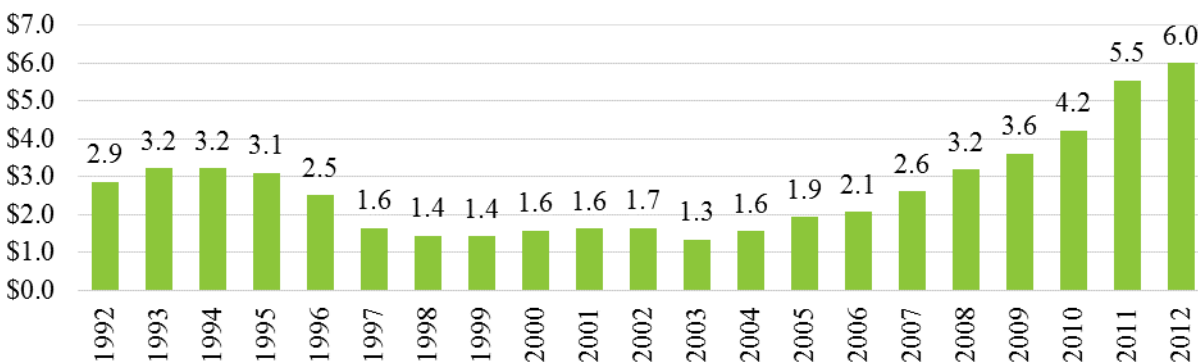


Figure 1. Total EIA-reported annual electric DSM spending (\$ billion) – 1992 to 2012. *Source:* EIA 2013.

Reported spending over the last two decades shows an industry that declined significantly in the mid-1990s before growing dramatically since 2003. Over the last five years, spending has nearly doubled from just over \$3 billion in 2008, a compound annual growth rate of more than 17%.

A closer look shows annual growth as more variable, with rates in the most recent years going from a 31% increase in 2011 reported spending to an 8% increase in 2012, shown in Figure 2 below. Importantly, much of the growth in 2011 was due to the inclusion of data provided by several statewide programs for the first time in the EIA survey (e.g., Wisconsin Focus on Energy, Energy Trust of Oregon, NYSEERDA, etc.) that combine to contribute a third of the 31% growth over the prior year total reported spending.

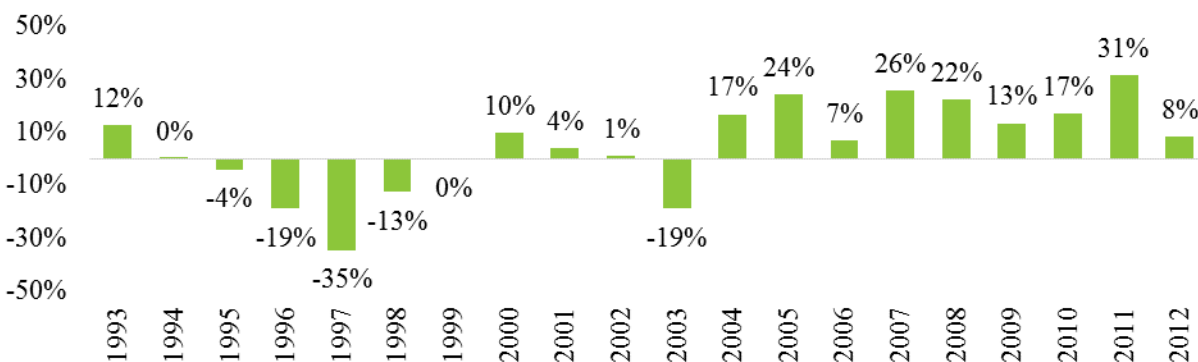


Figure 2. Annual growth in EIA-reported electric DSM spending – 1992 to 2012. *Source:* EIA 2013.

² EIA -861 data is self-reported by program administrators, and not verified for accuracy by EIA. (York et al, 2012).

While the EIA-reported DSM portfolio totals bring the inherent risk of misinterpreting trends based on such additions and omissions (e.g., a program administrator not reporting survey results in a particular year), when data is consistently reported by program administrators year over year, insights can be gleaned from the trends in the growth of existing portfolios. Figure 3 provides the trend in growth for existing portfolios (defined as those with some reported DSM spending in both the current and prior year).

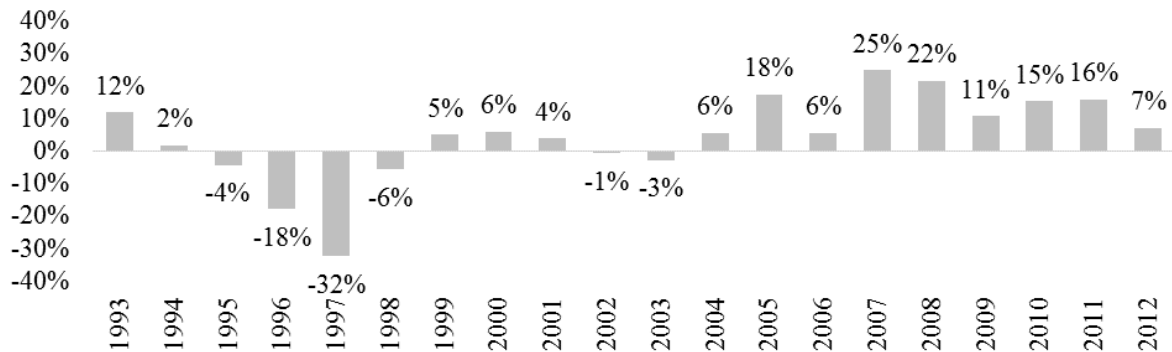


Figure 3. Annual growth in DSM spending – existing portfolios – 1992 to 2012. *Source:* EIA 2013.

The data show that existing portfolios have in aggregate seen double-digit annual growth since 2007, prior to a slow down to a 7% increase observed in 2012.

Of the \$6 billion of electric DSM spending reported in 2012 by more than 750 respondents, nearly two thirds (\$3.7 billion, 66%) was accounted for by 30 program administrators with budgets over \$50 million. Segmenting the population to look at the trend in these largest, established portfolios yields additional insights. As Figure 4 highlights, total spending among these large portfolios (>\$50MM) actually decreased from 2008 to 2009 during the height of the global financial crisis and related economic slowdown. Growth rates have remained in the single digits since, at 4% year-over-year growth in 2011 and 2012.

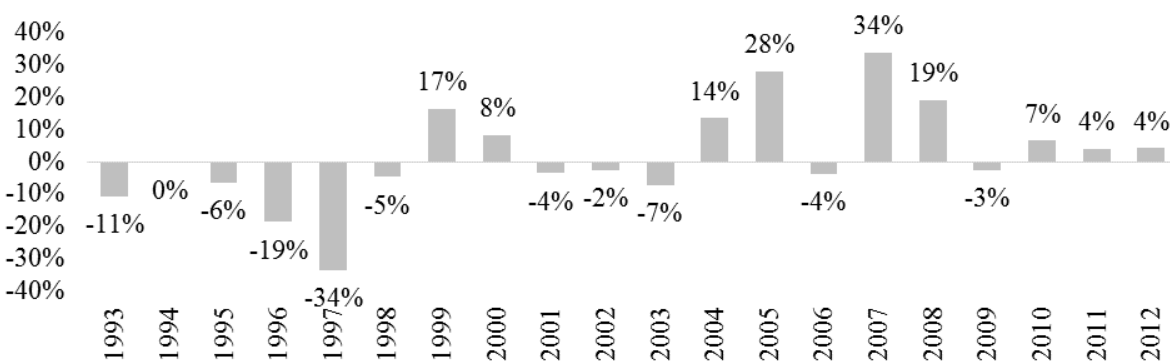


Figure 4. Annual growth in DSM spending – existing portfolios >\$50MM in prior year. *Source:* EIA 2013.

A much different picture is seen for the aggregate spending level among smaller existing portfolios, including many in states that have seen new and expanding energy efficiency resource standards (EERS). Total growth in spending for portfolios with prior year spending of under

\$30MM exceed 25% for each of the four years from 2007 to 2011, prior to a significant slowdown in 2012 with total spending growing by less than half the rate in prior years, at 13%.

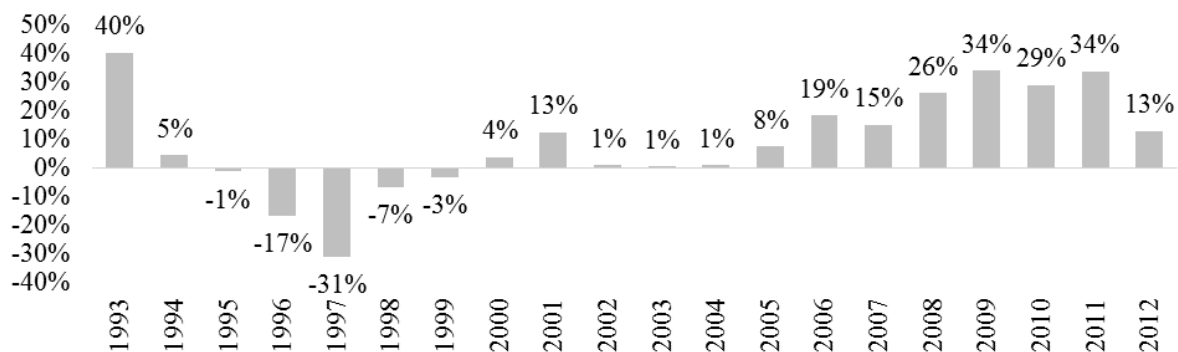


Figure 5. Annual growth in DSM spending – existing portfolios <\$50MM in prior year. *Source:* EIA 2013.

Slowing Growth

The tracking of multiple historical program year cycles and available approved and submitted program portfolio plans, a clearer picture for the industry spending growth outlook emerges, as illustrated in Figure 6.

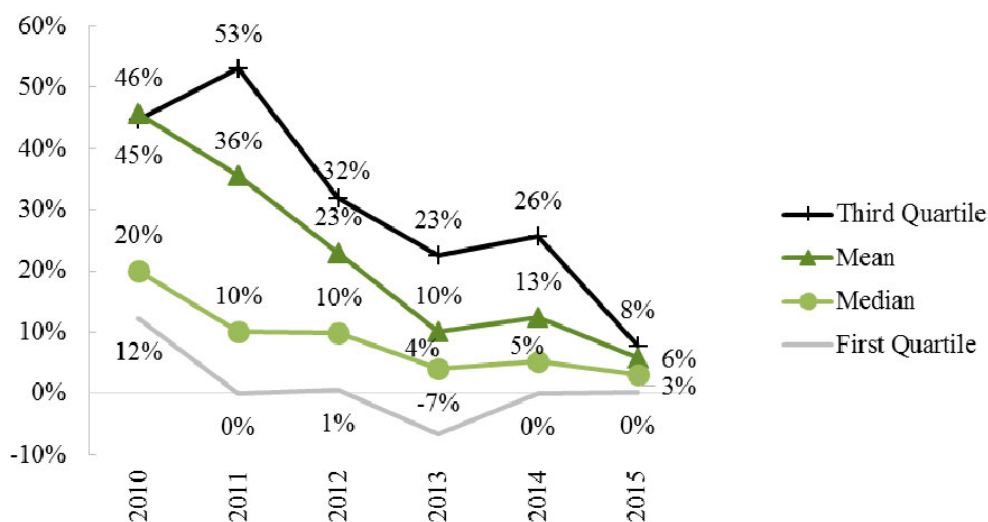


Figure 6. Annual growth in EIA-reported electric DSM spending – 1992 to 2012. *Source:* EIA 2013.

Recent portfolio plan submissions show that the slowdown in spending growth will continue. While the median year-over-year growth for tracked portfolios (currently all portfolios with annual spending over more than \$10 million) was 20% in 2010, that observed rate has fallen to 10% in 2011 and 2012. Preliminary reporting and committed budgets for 2013 and beyond suggest that low-to-mid single-digit growth will be the norm, with a significant share of portfolios contracting during the previous year and/or beyond. The observed distribution center statistics for 2015 spending growth – median of 3% and mean of 6% – straddle the 5% per year

median program growth predicted by a 2013 Lawrence Berkley National Labs study on the future of customer-funded EE spending through 2025, suggesting that this growth level may be the new norm (Barbose et al. 2013, 17).

Of course, the trajectory of DSM program spending is most directly a matter of state-level policy and mandates, so growth is highly variable across different geographic regions. As Figure 7 illustrates, the Midwest region continues to experience substantial growth with half of tracked portfolios exceeding 17% growth and the top quartile seeing 30% year-over-year growth in spending.

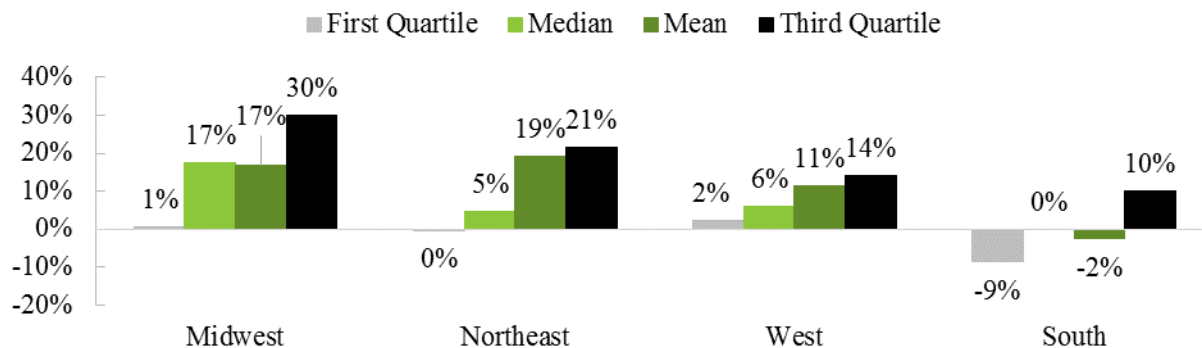


Figure 7. Regional portfolio growth rate distribution – plan budget growth 2014. *Source:* E Source DSM Insights.

Despite a fair number of portfolios still experiencing double-digit annual growth, a significant proportion of South region portfolios are contracting in 2014. Western states, with some of the longest-tenured major portfolios, and strong legislative and policy supports, demonstrate the most stability with the majority of tracked portfolios growing between 2% and 14% in 2014.

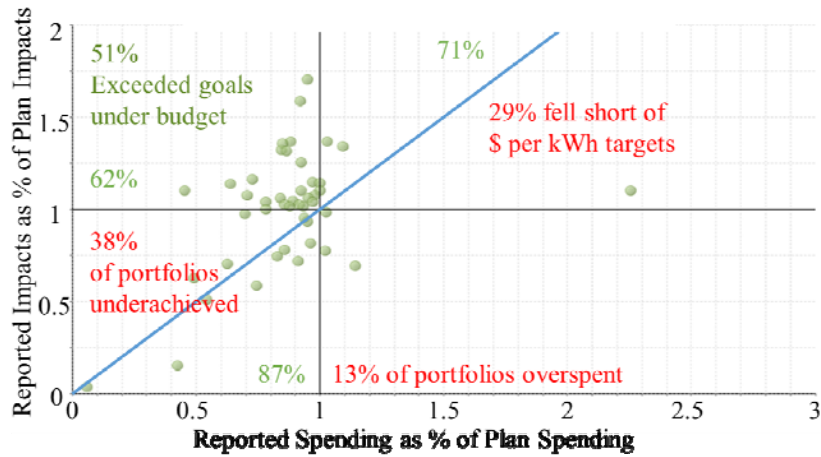
Pressure on Portfolio Performance

The challenge of slowing budget growth is not the only macro-industry dynamic that can be observed. The three charts shown in Figure 8 on the following page provide actual achievements for several dozen major electric program portfolios over the last three years – as reported by the program administrators and third-party evaluators to state regulators. The data show that while 51% of tracked portfolios exceeded goals and were under budget in 2010, only 27% did so in 2012.

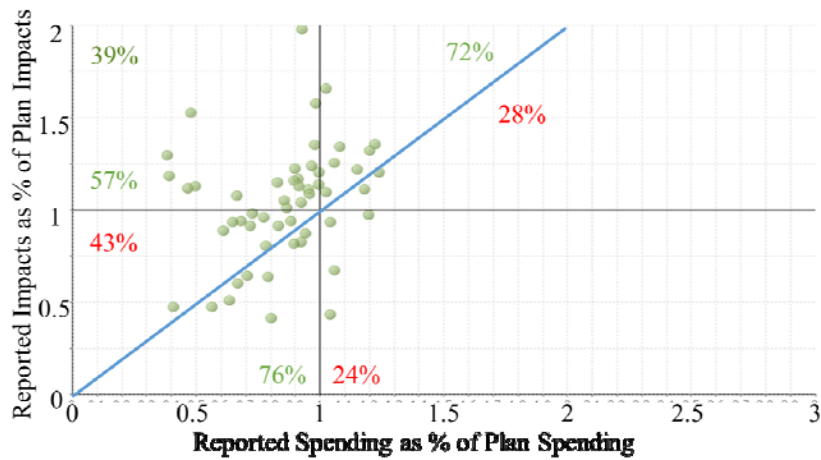
Furthermore, while only 13% of tracked program administrators exceeded budgeted spending in 2010, that proportion had more than doubled within two years with 31% overspending in 2012. Nearly half - 48% - of tracked program administrators did not reach their overall kWh savings goal in 2012, up from 38% in 2010.

While fewer portfolios are meeting goals, and more are exceeding budgets, the proportion of portfolios falling short of cost effectiveness (\$ per kWh) targets has remained constant at 29%. This suggests that budget levels have not kept pace with goals, and program administrators have had to do more with less.

PY
2010:



PY
2011:



PY
2012:

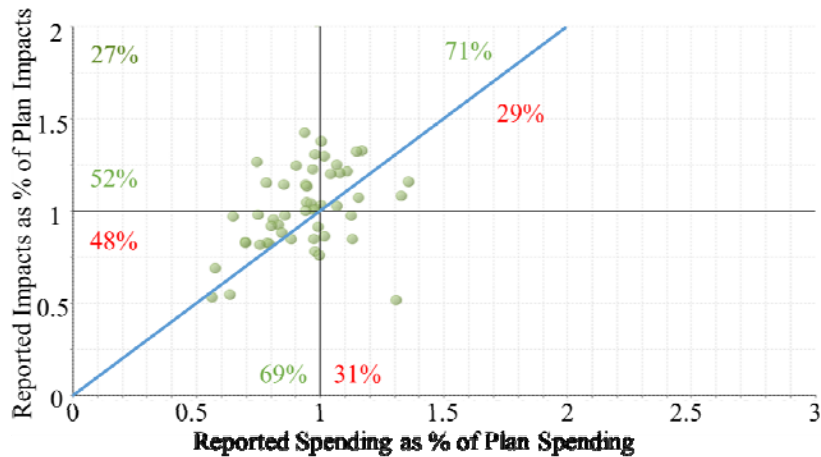


Figure 8. Trends in North American electric DSM portfolio performance – kWh Savings. *Source:* E Source DSM Insights.

Evidence to support this comes from examining the trend in the share of spending by targeted market sectors. From 2010 to 2014, the overall share of spending on residential-focused programs is projected to decline by 17% - from a 32.4% share in 2010 to a 27.0% share in 2014 budget plans – driven largely by funds shifting to programs serving the commercial and

industrial sector. To be fair, programs specifically targeting low income populations have grown as a share of spending accounting for some of the decrease in general residential program spending. However, budgets in other key segments including small businesses and multifamily are shrinking.

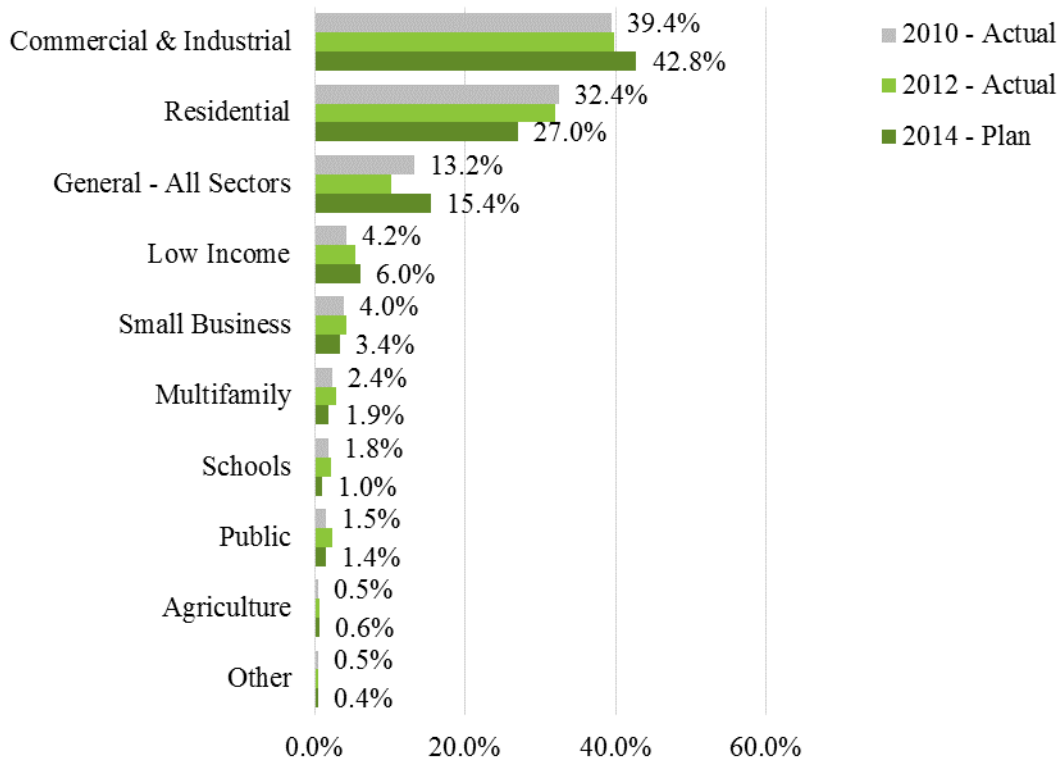


Figure 9. Share of portfolio spending by market sector – 2010 to 2014. *Source:* E Source DSM Insights.

Looking more closely at the cost effectiveness of residential programs, there is clear evidence as to what may be forcing these shifts, particularly in the face of slowing budget growth. In 2010, on a net savings basis, the first-year \$ per kWh saved by general residential programs was \$0.18, falling comfortably under the \$0.20 per kWh targeted portfolio plan average, as shown in Figure 10 below. Despite the higher average targeted \$ per kWh of \$0.23 in 2012, overall savings came in at an even higher cost of \$0.26 per kWh in aggregate. Further escalation is anticipated based on 2014 budgets as the industry works to continue to adjust to contextual factors including changes in lighting efficiency standards mandated by the Energy Independence and Security Act of 2007, (EPA).



Figure 10. Trends in aggregate residential first-year \$ per kWh cost effectiveness. *Source:* E Source DSM Insights.

While residential programs have seen a jump in the achieved \$ per kWh, programs have been delivering significantly more cost effective savings for hard-to-reach segments including low income and multifamily residents - both seeing a more than 30% drop in \$ per kWh from 2010 to 2012 - as well as small and mid-sized business. See Figure 11.

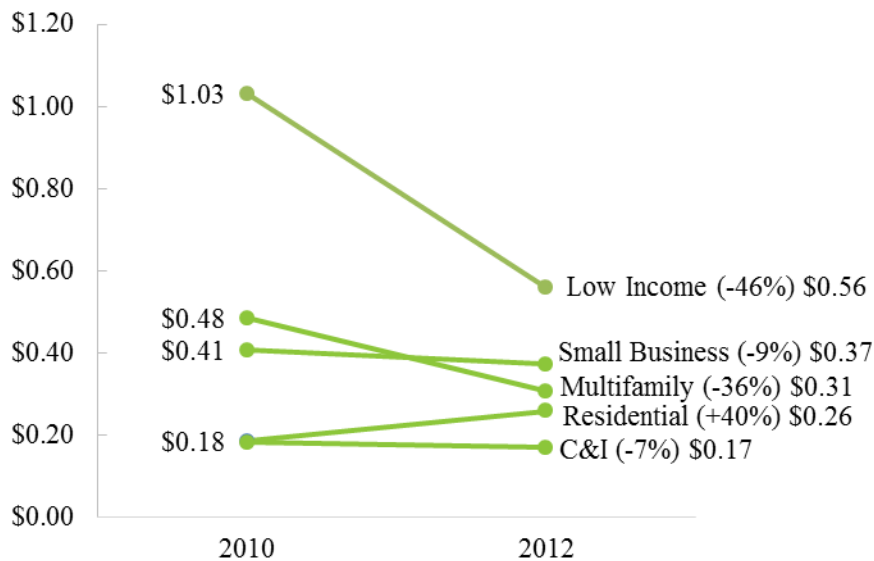


Figure 11. Observed trends in reported overall electric program \$ per kWh cost effectiveness by targeted sector. *Source:* E Source DSM Insights.

Despite these advances, budget plans for 2014 show a shrinking share to small business programs and those targeting multifamily housing without income eligibility constraints. While low income programs continue to see an increased share of spending, the relatively higher cost per unit of savings for these programs puts added pressure on portfolio budgets.

Differences by Program Model

In efforts to reach a broader market and bring targeted measure technologies to customers, program administrators have always relied on a mix of program designs and models for customer engagement, assistance, and the provision of financial incentives. Table 1 outlines

how program impacts and spending breakdown by category across residential and non-residential sector for North American administrators in aggregate.

Table 1. Program category share of portfolios targeting kWh impacts – 2012 actual results

Residential				Non-Residential			
Program Category	% Impacts	% Spending	Ratio	Program Category	% Impacts	% Spending	Ratio
Prescriptive Rebate	70.1%	51.5%	0.73	Prescriptive Rebate	52.6%	44.4%	0.84
Building/Home Performance	4.5%	18.4%	4.11	Custom Rebate	28.2%	27.0%	0.96
Direct Install	6.1%	16.6%	2.72	Direct Install	5.0%	8.7%	1.74
Appliance Recycling	6.1%	4.6%	0.77	Retro-Commissioning	5.8%	8.5%	1.47
ENERGY STAR New Homes	1.1%	2.5%	2.20	Design Assistance	5.5%	7.5%	1.36
Behavior Change/Feedback	9.0%	2.2%	0.24	Building/Home Performance	0.7%	1.8%	2.57
Conservation Kits	1.6%	1.5%	0.93	Project Management	0.9%	1.0%	1.11
Custom Rebate	0.3%	0.6%	2.09	Education and Awareness	0.3%	0.5%	1.67
School Education Kits	0.6%	0.5%	0.93	On-site Audit/Assessment	0.3%	0.3%	1.00
Energy Analysis	0.2%	0.4%	2.40	Behavior Change/Feedback	0.2%	0.1%	0.50
Tune Up	0.1%	0.4%	3.41	Third-Party Programs	0.3%	0.1%	0.33
Design Assistance	0.1%	0.3%	3.73				
Education and Awareness	0.1%	0.2%	1.96				
On-site Audit/Assessment	0.1%	0.2%	1.21				
Retro-Commissioning	0.0%	0.1%	4.04				

Source: E Source DSM Insights.

In terms of program performance – both with respect to cost effectiveness and achieved impacts vs. plan, there is a wide range of results across programs targeting residential electric savings, as illustrated in Figure 12.

Among the various program models, behavior change and feedback programs have the best first-year cost effectiveness, at \$0.05 per kWh on average, \$0.09 below the next closest category.

Appliance recycling and conservation kits – both those delivered via school-based programs and other means – are the only other program categories with \$ per kWh averages near the prescriptive rebate programs facing growing cost pressure (and constituting 70% of achieved 2012 impacts).

Notably, home performance programs addressing weatherization and deep retrofit opportunities are the least cost effective, averaging over \$0.80 per kWh. As budgets tighten and it becomes harder to maintain prescriptive rebate programs at \$0.14 per kWh, perhaps it is a

combination of low-cost behavioral programs and deep impact performance programs targeting vulnerable populations that can help maintain portfolio cost effectiveness.



Figure 12. Residential electric program performance by program category – 2012 actual. *Source:* E Source DSM Insights.

The emergence of behavioral programs as a major source of residential impacts has been significant. As Figure 14 illustrates, programs including energy use feedback through home energy reports and online engagement channels have become a major contributor to program portfolios.

The proportion of program administrators that have incorporated behavioral programs into their portfolios has grown dramatically as well. In 2010, around 1 in 10 program administrators (with portfolio budgets in excess of \$10MM) had introduced some form of behavioral engagement program. The share has nearly quadrupled with 4 in 10 administrators utilizing customer engagement and energy use feedback to drive portfolio results in 2014.

Overall behavioral programs accounted for 2% of 2012 spending, but more than 9% of kWh savings, over half of which were verified by a third-party evaluator. In some states the share of reported residential impacts attributable to behavioral programs exceeds 1 in 5 kilowatt hours saved, as shown for select states in Figure 13.

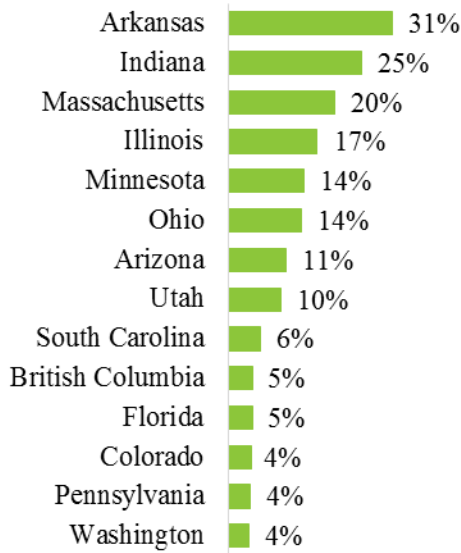


Figure 13. Behavioral programs as a share of Residential sector impacts – 2012 Actual.
 Source: E Source DSM Insights.

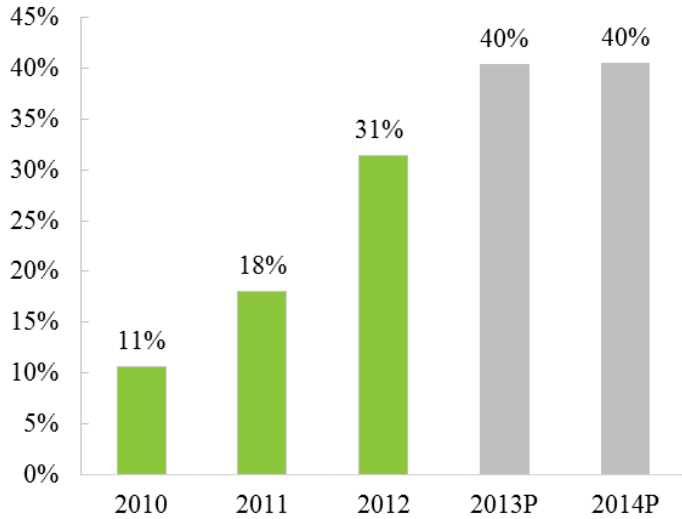


Figure 14. Proportion of program administrators utilizing residential behavioral programs.
 Source: E Source DSM Insights.

In terms of non-residential electric programs, behavioral programs also proving to be among the most attractive from a cost-effectiveness standpoint.

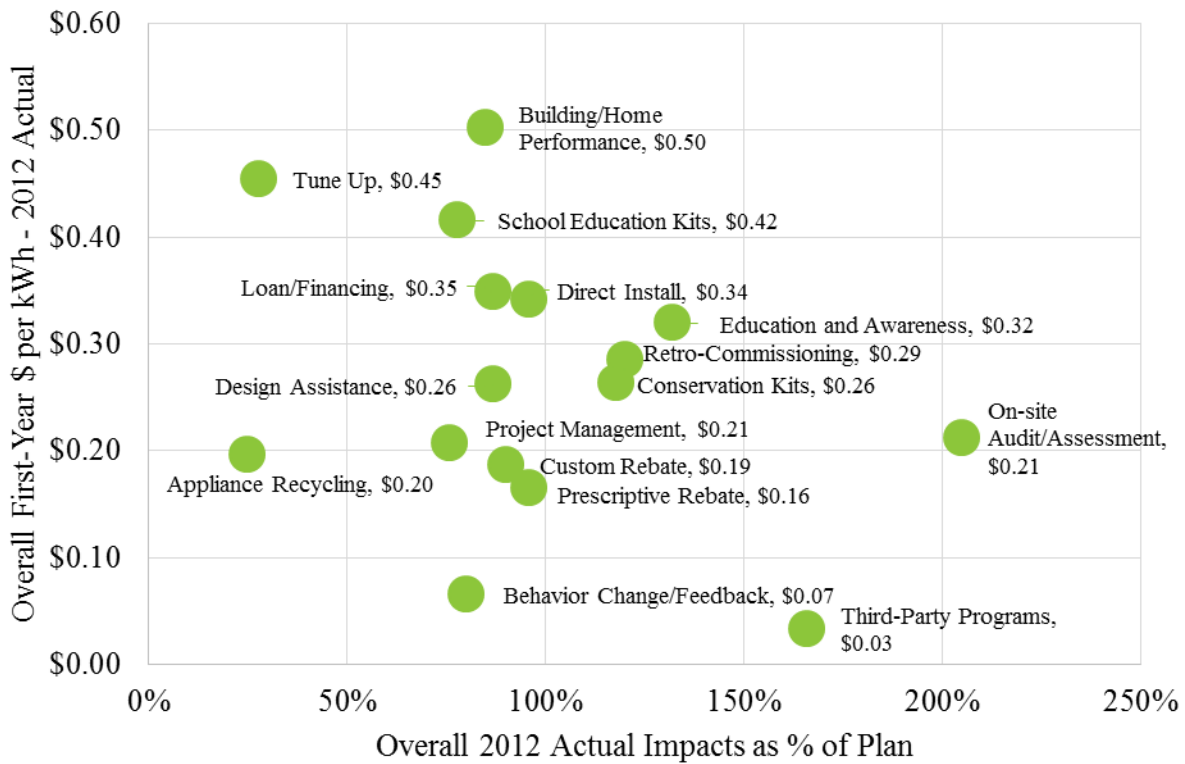


Figure 7. Non-residential electric program performance by program category – 2012 actual. Source: E Source DSM Insights.

Conclusion

Aggregation of program budgets and results brings to light the challenges and opportunities facing the DSM program industry. There has been a dramatic slowdown in the growth of energy efficiency program budgets at a time when the cost to achieve savings, particularly for residential programs, has grown substantially as a result of underlying technological and policy contexts. Fewer administrators are achieving targeted savings goals within planned spending levels, even as the industry has found ways to drive down the cost to serve hard-to-reach segments including low income and small business customers.

Opportunities exist in new program designs, notably for programs achieving savings through behavioral intervention, though it is only recently that there has been substantial adoption of these program types among major program administrators. With more experience and evaluation, it will become more evident whether the low cost per unit of energy savings of these models can be maintained and translate to persistent savings.

In this dynamic environment, better tools to access program-level results give industry decision makers the ability to make more informed tradeoffs, especially as they seek to balance both equity and cost effectiveness in the application of ratepayer funds. The variability observed in program performance across program delivery models, market segments, and geographic regions highlights the significant opportunity for increased learning and productivity. It is a worthwhile pursuit to continue to ensure energy efficiency remains the lowest cost energy resource (Molina 2014).

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