

Making Sense of 1,000 Program Results: How are DSM Programs Really Performing?

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ABSTRACT

Program planners carefully outline DSM portfolio plans to accurately predict system impacts, balancing funding implications with costs and benefits to respective stakeholder. However, most programs do not achieve the results that plan lays out, as evidenced by evaluation studies and program administrator compliance filings. In fact, 40% of total program spending over the past few years goes to programs that don't meet stated goals, a proportion that grew to 47% in 2013. From 2010 to 2013, we have seen a 20% increase in the share of program funding supporting programs falling short of goals. On a regional basis, these phenomena tend to have been concentrated in the Midwest and in Canada, though gas program performance to goal has also stumbled dramatically in the South and West.

With program administrators spending such high percentages of program budgets on underperforming programs, it is worth investigating how performance varies across sectors and program categories to determine if there is any insight to be gained. Our investigation finds that there are program categories across both residential and non-residential sectors that have proven to be less reliable in meeting forecasted targets.

Our study of thousands of DSM program results across several metrics suggests the program categories portfolio designers may want to scrutinize more carefully in order to better ensure success in reaching planned goals for energy savings. At present, our industry is consistently spending ratepayer money on programs that consistently don't perform up to stated performance goals. The key questions that this paper poses are:

- Should we alter the goals so they are more attainable?
- Are there ways to be more precise in planning efforts to account for results from other programs?
- Are we best served by focusing portfolios on the specific categories of programs that are most likely to meet expectations?

Introduction

To help program administrators get the most bang for their buck with public money for DSM, we set out to determine which programs were most likely to achieve intended savings, or—from a different perspective—how accurately program energy savings goals reflect what could be achieved with a given level of resources. To examine this, we looked at how programs actually performed against their goals from 2010-2013. We looked regionally and by market sector to see if there were differences, as well as by program category/type to see if there were certain programs that consistently didn't perform.

We are able to form these conclusions by drawing on our proprietary database, E Source DSM Insights, which aggregate spending and impacts data sourced from program administrator portfolio plans and annual reports, including program evaluation findings. 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 45 states and provinces, which together account for more than 85% of North American DSM program spending.

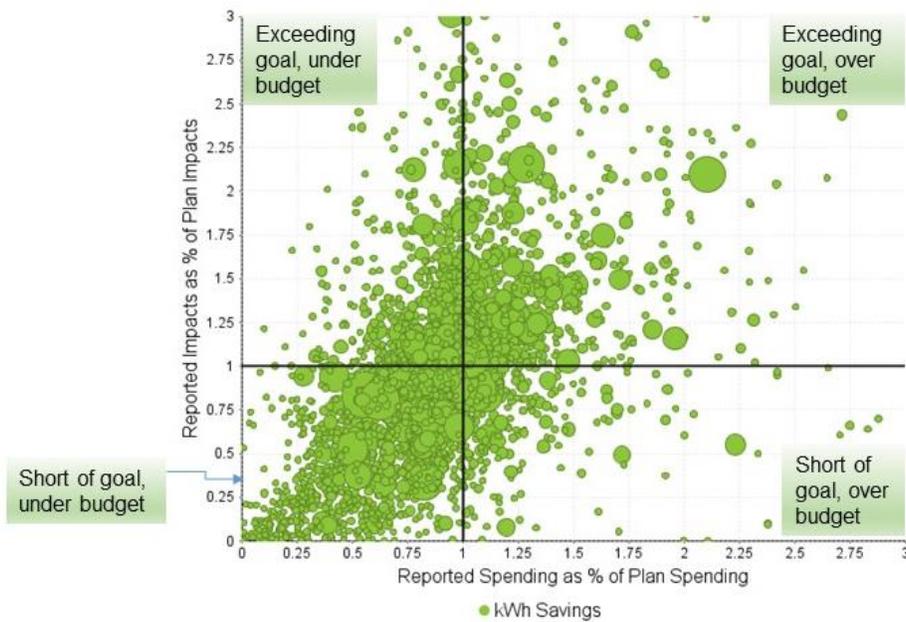
Our methodology was to investigate all programs tracked in the E Source DSM Insights database between 2010 and 2013 where both plan and actual impacts and spending had been reported. In order to focus on programs with a reasonable level of planning accuracy and program maturity (that is, to eliminate the noise of outliers), the dataset was limited to programs that spent between 0% and 300% of stated plan budgets and had also achieved reported impacts between 0% and 300% of the stated plans. Overall this translated to 1,481 distinct programs among 103 program administrators and accounted for just over \$10 billion dollars in ratepayer dollars spent.

This study is intended to be a first cut of such a research effort. We have taken a broad-brush, aggregate perspective on each topic and then tried to disaggregate the assertions by discerning patterns in the regional or state breakdowns and the program categories.

DSM Program Performance: Plan Versus Actual

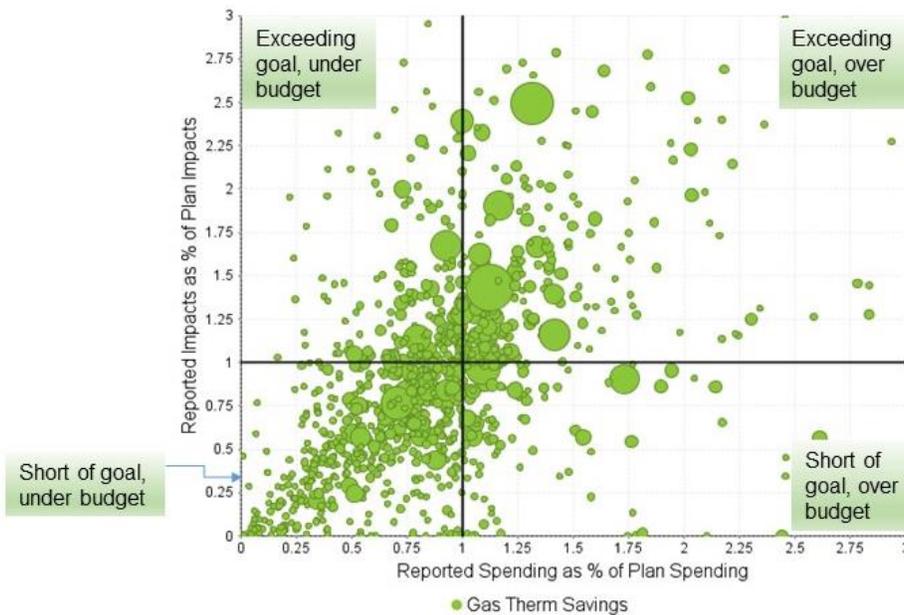
Program administrators and service providers alike recognize that managing ratepayer-funded energy-efficiency program resources to achieve savings goals can be a challenging business.

Overall, more than 40% of the dollars spent on DSM programs in recent years went to programs that failed to achieve the targeted savings goal, and another 10% of spending went to programs that failed to reach goals while exceeding budgets. This is evidenced by **Figure 1** below, which represents reported results from more than 100 of the largest electric and gas program administrators in North America. Each dot represents real people working to bring value to utility customers and striving to achieve their DSM plan goals. The size of the dot represents relative spending, while the position reflects reported actual program spending and energy-savings achievement in comparison to a previously documented program budget plan and savings goal. All dots to the left of 1 on the x axis represent programs that did not meet targeted savings goals. The y-axis shows actual spending relative to plan, whereby anything below 1 depicts unspent budgets and anything above 1 is overspending. A program falling in the crosshairs shown would have reported actual program spending and energy-savings impacts identical to stated plan targets.



Source: E Source, DSM Insights 2015

Figure 1a: Electric plan vs. actual performance of North American DSM programs

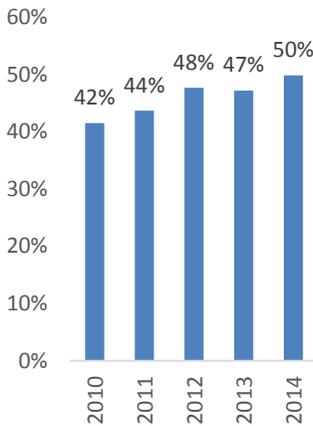


Source: E Source, DSM Insights 2015

Figure 1b: Gas plan vs. actual performance of North American DSM programs

The distribution reflects what DSM program professionals know all too well, that myriad factors—from technology challenges to human resource constraints, inaccurate planning assumptions, and underlying market conditions—introduce uncertainty in the results that can be achieved.

In recent years it has become increasingly common for utilities to spend money on programs that don't meet targets. As indicated by **Figure 2**, the proportion of DSM funds supporting programs that fail to reach planned savings goals has grown by close to 20%, rising from 42% to 50% from 2010 to 2014.



Source: E Source, DSM Insights, 2015

Figure 2: Percentage of program spend for programs falling short of goals

Regional and State Performance

Looking closer, the rise in underachieving programs is found to be a regional phenomenon. As **Table 1** shows, from 2010 to 2013 program administrators in Canada and in the US Midwest experienced a larger increase in the proportion of program budgets spent on programs that didn't achieve their goals than did program administrators in other regions.

Table 1: Proportion of spending on programs reporting savings less than goal, by region

	Overall		Electric (kWh)		Gas (therms)	
	2010	2013	2010	2013	2010	2013
Canada	38%	68%	32%	67%	78%	71%
Midwest	25%	42%	26%	38%	22%	53%
Northeast	50%	50%	47%	49%	63%	52%
South	50%	48%	55%	50%	5%	35%
West	48%	44%	51%	41%	9%	53%
Total	42%	47%	43%	46%	36%	52%

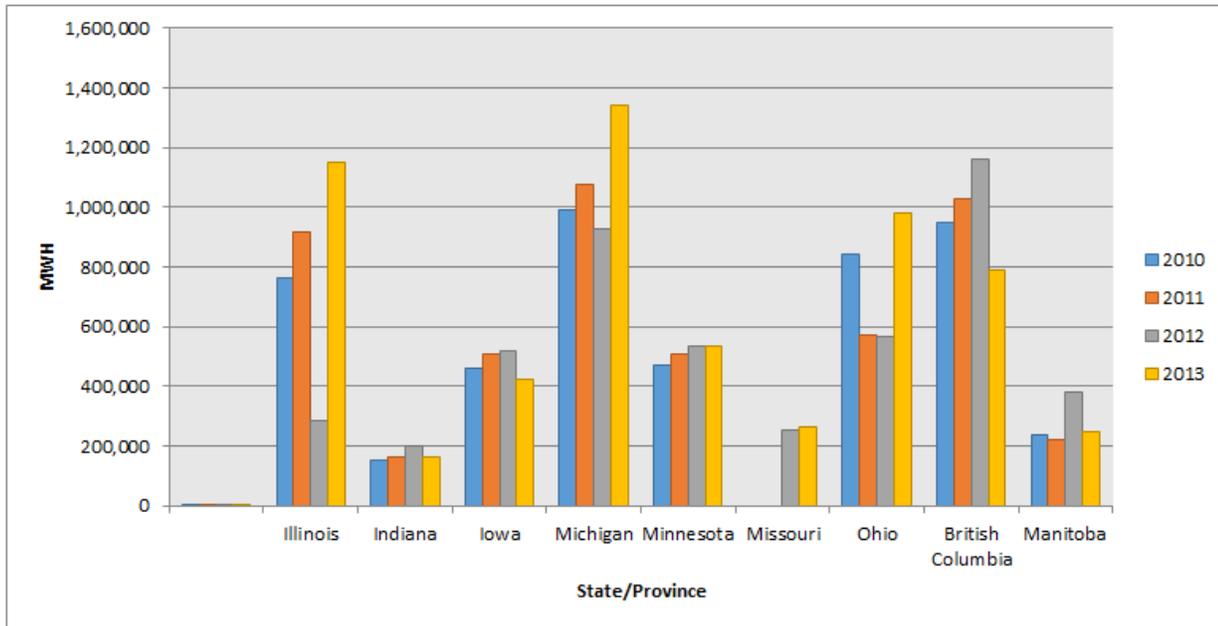
Source: E Source, DSM Insights, 2015

For electric programs, the shift has been notably significant among Canadian programs (going from 32% to 67%) and among Midwest gas programs (going from 22% to 53%), with the share of spending attached to underachieving programs—or overly-optimistic forecasts, depending on your perspective—more than doubling in both cases.

The cause of these shifts is likely the result of DSM goals in the Midwest and in Canada ramping up quickly from 2010 to 2013. As **Figure 3** indicates, the savings targets for utilities in the Midwest states as well as for two Canadian provinces, have, for the most part, increased from 2010 to 2013. These aggressive targets make it more difficult for utilities to meet their goals for the following reasons:

- They may not have the correct delivery mechanisms in place.

- They may be trying new program models that take time to gain experience with implementing.
- They have been shifting to using more third parties to implement programs.
- Increasingly-stringent equipment efficiency standards and Energy Star specifications have raised the baseline from which utilities can claim incremental savings.



Source: E Source, DSM Insights, 2015

Figure 3: Electric DSM goals by state (MWh)

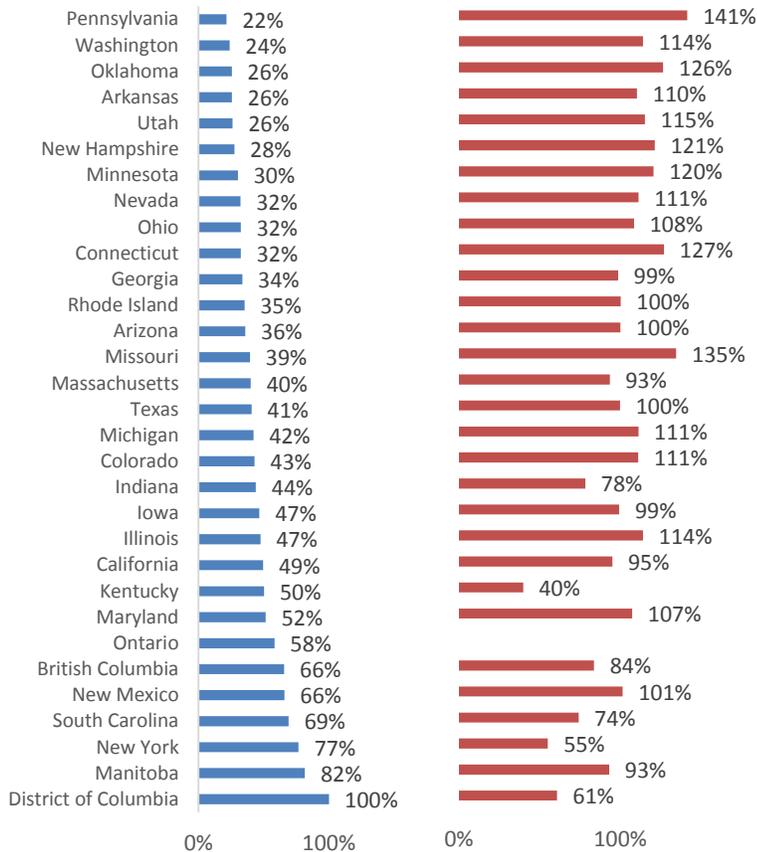
For gas programs, there is an even more dramatic shift in program performance in both the South and West regions of the US, though the reality is masked in overall performance due to improving electric program achievement relative to goals in the West. Lower gas commodity prices could certainly be a major driver of more gas programs underperforming in recent years.

If we take the regional analysis to the next level by looking at state-level results (see **Figure 4**), we can determine the tipping point where more dollars are going to underperforming programs than to those reaching or exceeding goal. This tipping point occurs where there are enough programs not meeting goals that it is likely to yield shortcomings at the portfolio level as well. As the left column in Figure 4 indicates, when we get to about 40% of spending going to underperforming programs, we start to run the risk of the states not meeting planned savings in the right column.

From the state data in Figure 4, it seems that one can have one-third of programs not meeting goal and still meet overall portfolio goals. However, as a higher percentage of programs fail to meet goals, it becomes more likely that that state won't meet overall portfolio goals either.

Percentage of funds spent on underperforming programs

Achieved kWh savings as percentage of plan



Source: E Source, DSM Insights, 2015

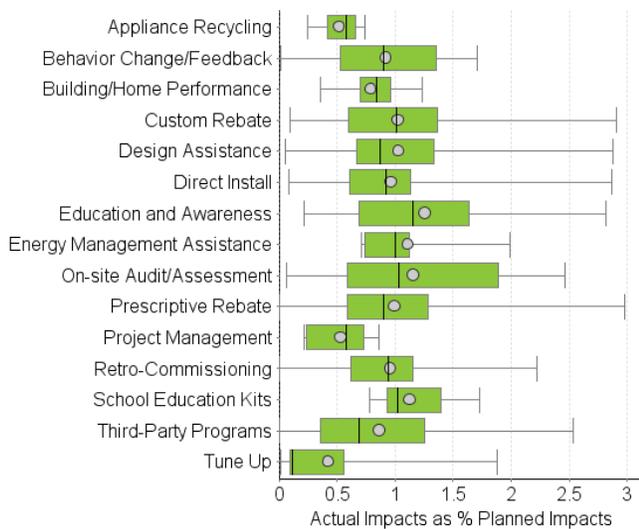
Figure 4: Impacts of state program spending on underperforming programs, 2013

With program administrators spending such high percentages of program budgets on underperforming programs, we examined whether or not there were certain categories of programs that are consistently the culprits for missing performance targets goals.

Performance by Program Category

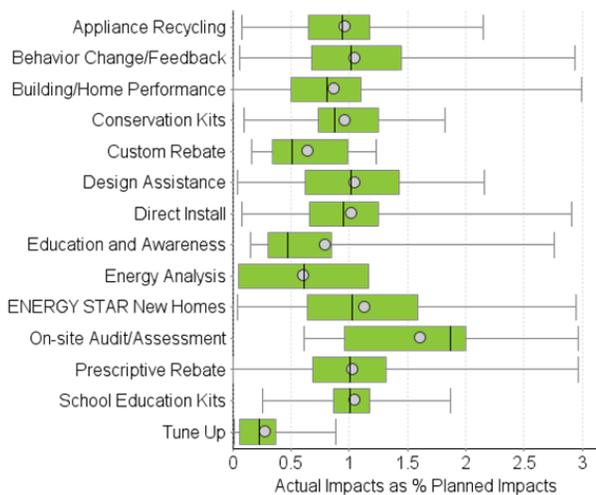
Looking at the distribution of program achievement across major market sectors and program categories yields additional insights. We are aware that most program administrators are required to run certain types of programs for specific sectors for customer equity purposes. Even if those programs aren't cost-effective or don't meet goals, the utilities still need to run the programs. However, our intention is to help program administrators more-accurately forecast what the results of those programs might be.

The box-and-whisker plots in **Figure 5** show the relative spread and center of program impacts as a percentage of planned impacts by program category. The green box represents the inter-quartile range (25th percentile to 75th percentile of programs) while the vertical black line represents the median and the gray dot represents a raw average.



Source: E Source, DSM Insights, 2015

Figure 5a: Distribution of non-residential electric (kWh) program savings performance by program category



Source: E Source, DSM Insights, 2015

Figure 5b: Distribution of residential electric (kWh) program savings performance by program category

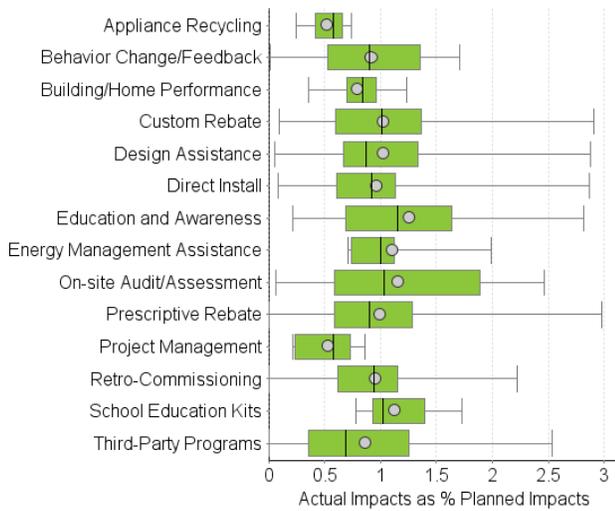
Several observations can be made:

- The large majority of A/C tune-up programs have significantly failed to reach goals across all sectors.
- Appliance recycling, project management, and building performance programs in the non-residential sector are also not as reliable in meeting targets.
- In the residential sector, on-site audit and inspection programs have tended to exceed projections.

The challenge seen for custom rebate, energy analysis, and education and awareness programs in residential contexts may suggest that programs that aim to create greater engagement through

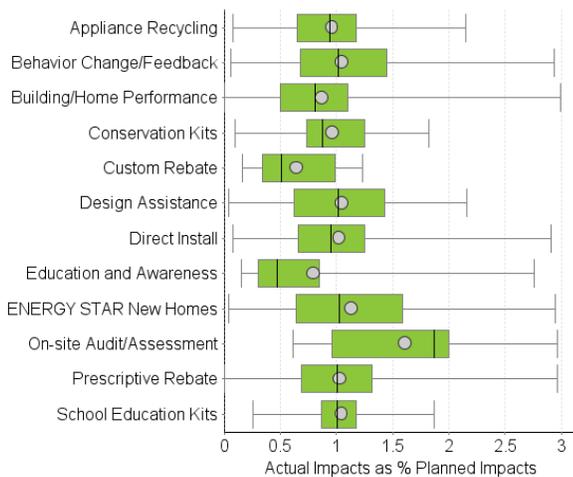
customized resources and incentives are finding it harder to gain traction than projected. The behavior-change program category, which is mostly made up of home energy report programs, is closer to the center than education and awareness programs. The cause for this is likely that the program administrators don't have to coordinate as many activities where customers have to directly engage. School education kits deliver some of the most predictable program performance results.

Examining program category-level performance for programs targeting natural gas consumption in **Figure 6** highlights additional industry trends.



Source: E Source, DSM Insights, 2015

Figure 6a: Distribution of non-residential gas (therm) program savings performance by program category



Source: E Source, DSM Insights, 2015

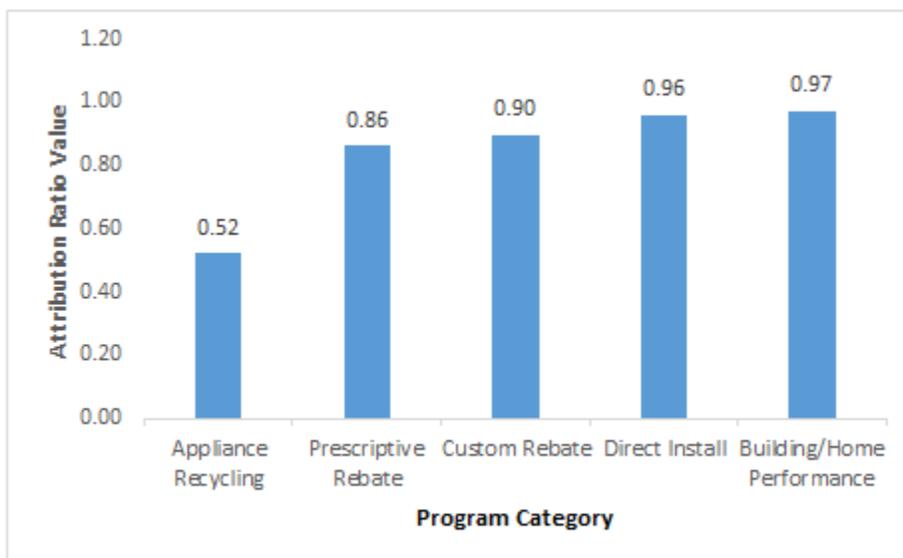
Figure 6b: Distribution of residential gas (therm) program savings performance by program category

Again, on-site audit and assessment programs stand out and are among the most likely to exceed savings projections, with close to 75% of residential audit programs exceeding goals. The majority of third-party programs have fallen well short of program projections. Although median savings achieved

for home performance programs is in line with goals for electric savings, the achievement of targeted gas savings is only occurring in a minority of residential programs. Gas savings from building performance programs targeting non-residential customers has typically fallen short of goals. Programs leveraging the Energy Star New Homes resources typically meet or exceed targeted goals. And although education and awareness programs tend to reach targeted gas savings in non-residential contexts, more than three-quarters of residential education and awareness programs fall well short of stated savings goals. This is consistent with the results for the electric programs.

It is important to have a variety of program offerings that address multiple market sectors, but for more-accurate energy savings plans, it may be worthwhile for program administrators to focus on programs that tend to produce verified savings results that are close to reported savings impacts. This is the attribution ratio, or net to gross ratio, where the verified energy savings are calculated by removing free-ridership and spillover. The closer the attribution ratio is to 1 for any given program, the fewer free-riders and the less spillover there is, and program administrators can recognize nearly all the savings that they report.

Figure 7 shows the distribution of verified attribution ratios by program category within the C&I, low-income, and residential market sectors. The appliance recycling program category has the lowest attribution ratio, meaning that program administrators may not be able to claim energy savings that are as high as they had planned for or reported. Building/home performance programs and direct-install programs reveal an attribution ratio closer to 1, meaning that program administrators can recognize nearly all the savings they report.



Source: E Source, DSM Insights, 2015

Figure 7: Verified attribution ratios by program category, 2010 to 2013

Overall, the differences in the distribution of program performance to plan across program categories and sectors may raise more questions than they answer. Program evaluation results and the reproducibility of program achievements are key areas to investigate in future research.

Conclusion

Our research reveals that our industry is spending ratepayer money on programs that consistently

don't perform up to stated performance goals. Even the traditional program categories, such as appliance recycling, are more likely to not meet performance targets than to meet them. And the programs that aim to create greater engagement and customized resources and incentives are proving slower to gain traction than projected. Our industry needs to adapt to changing technologies and new program models, but doing so means dealing with even more uncertainty about how programs are going to perform.

The big question is what's the source of program underperformance? In future research we could further examine whether it's that there are simply fewer participants in programs than planned, or that each participant isn't producing as much savings as planned.

With all the efforts that go into program and portfolio planning, as an industry we should be able to run programs that are likely to achieve the results stakeholders are expecting. To do that, we need to either (a) alter the goals so they are more attainable, (b) be more precise in planning efforts to account for results from other programs, or (c) focus portfolios on the specific categories of programs that are most likely to meet expectations.

References

E Source. 2015. *DSM Insights*. Accessed March 2015. Boulder, CO: E Source.
<http://www.esource.com/about-dsminsights>