Still the First Fuel: National Review of the Cost of Utility Energy Efficiency Programs

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ABSTRACT

Over the past two decades, U.S. energy efficiency programs have been widely documented as a least-cost resource option compared to new electricity generation. As efficiency programs gain traction as a robust resource option for energy planners, there is an increasing need for high-quality, comprehensive, and consistent data metrics on the costs and benefits of efficiency programs. This paper summarizes the results of a recent meta-review of energy efficiency program costs for 2009–12 in about 20 states (Molina 2014). Data metrics utilized in this review include the levelized cost of saved energy for both electricity and natural gas programs, and costs by customer class. This paper dives deeper into the results to identify trends among jurisdictions about the relationship between costs and savings thresholds. Finally, the paper makes recommendations to improve cost reporting and consistency for efficiency programs. While utilities and program administrators in some regions have begun to report in standardized formats, other jurisdictions still lag far behind in efficiency program reporting and could learn from studying programs in other states and regions.

Introduction

ACEEE conducted two previous reviews of utility-sector energy efficiency program costs in 2004 and 2009. The 2009 review identified levelized costs of saved energy (CSE) ranging from $0.016/kilowatt-hour (kWh) to $0.033/Wh[1] for electricity portfolios, and an average of $0.025/kWh (Friedrich, Eldridge, and York 2009). The 2004 review identified a range from $0.023 to $0.044/kWh (Kushler et al. 2004). Both studies clearly found that energy efficiency programs are least-cost compared to supply-side energy options. These studies used a limited data set, with the first review covering utilities in 6 states and the second covering 14 states.

Energy efficiency programs have a decades-long history in the United States, but have expanded rapidly in recent years. This means increased availability of new data sets and higher visibility for efficiency. And as program administrators face rising energy efficiency targets that require more comprehensive portfolios, they have increasing concern about the impact on program costs. These recent trends call for an updated and more detailed review of energy efficiency program costs. Here we present an update of this research with data for 2009 to 2012 (see Molina 2014 for the full set of results and data sources).

[1] The term “CSE” refers to the costs incurred by utilities or program administrators to run energy efficiency programs, and "levelized” means that the costs are amortized over the lifetime of the efficiency measures at an assumed discount rate.

Methodology and Caveats

The goal of the ongoing analysis conducted by ACEEE is to collect aggregate, recent data on energy efficiency program costs and cost-effectiveness from jurisdictions across the United States as a comprehensive source of information for stakeholders. Our primary focus is on the costs to utilities or other program administrators to run efficiency programs, but we also include some data on the broader costs and benefits to participants and to society. We do not aim to compare one state's efficiency portfolio results to others, but rather to present overall results. We also aim to advance the discussions on how to improve reporting and consistency of efficiency program cost metrics.

We collected data for 20 states for electricity programs and 10 states for natural gas efficiency programs (see Tables 1 and 2) from 2009–12, pulling from utilities' and other program administrators' program results. We selected states that were included in past ACEEE studies on this topic and additional states that have readily available data in consistent formats. Some states have a statewide program implementer, while for other states the data represent an individual utility or combination of utilities.

Table 1. States and program administrators covered in the review: Electricity programs

	State	Program Administrator Covered		State	Program Administrator Covered
1	Arizona	Arizona Public Service Company	11	New Mexico	Public Service of New Mexico
2	California	IOUs	12	New York	NYSERDA
3	Colorado	Xcel Energy	13	Nevada	NV Energy
4	Connecticut	CEEF (all IOUs)	14	Oregon	Energy Trust of Oregon
5	Hawaii	Hawaii Energy	15	Pennsylvania	IOUs
6	Illinois	Ameren and Com-Ed	16	Rhode Island	National Grid
7	Iowa	IOUs	17	Texas	IOUs
8	Massachusetts	IOUs	18	Utah	Rocky Mountain Power
9	Michigan	All utilities	19	Vermont	Efficiency Vermont
10	Minnesota	Xcel Energy	20	Wisconsin	Focus on Energy

Note: IOUs = investor-owned utilities

Table 2. States and program administrators covered in the review: Natural gas programs

	State	Program Administrator Covered
1	California	IOUs
2	Colorado	Xcel Energy
3	Connecticut	CEEF
4	Iowa	IOUs
5	Massachusetts	IOUs
6	Michigan	All utilities
7	Minnesota	Xcel Energy
8	Oregon	Energy Trust of Oregon
9	Rhode Island	National Grid
10	Wisconsin	Focus on Energy

Note: IOUs = investor-owned utilities

We collected the necessary cost and savings data to calculate the levelized CSE, which is the best way to compare energy efficiency to other energy resource options. We also calculated the first-year cost of energy efficiency resources, which is often called “acquisition costs”; however, we caution that this metric is not reflective of the full resource value of efficiency because it only captures the first-year savings, whereas efficiency measures continue saving energy throughout their useful lifetime.

Our definition of “energy efficiency costs” includes: 1) direct program costs incurred by program administrators, which includes incentives to customers and all non-incentive administrative, marketing, education, and evaluation costs; and 2) shareholder incentives or performance fees, which reflect the rate of return utilities earn in some states to meet or exceed certain thresholds of energy savings levels. We also collected some data on participant costs, however these data are much more sparsely reported and therefore the data set includes only seven states.

A host of challenges make the task of data collection and comparison difficult, such as: variation in reporting formatting, nomenclature, and frequency; variation in energy savings evaluation approaches; accounting of demand-response programs; and structural differences in program portfolios. These differences make it difficult to directly compare values among states. While we do not aim to directly compare one state’s efficiency portfolio results to others, we still attempted to make the data as consistent as possible. For example, we calculated the CSE for each state using the same real discount rate, and used data reported by program administrators for net energy savings values (rather than gross savings), savings reported at the meter level (rather than at the generator level), and measure lifetimes. All data are expressed in real 2011$.

In the 2009 review, we presented the CSE as reported by the state in many cases, and calculated the CSE for some states. Reported values have the limitation that input assumptions may not be clear, creating inconsistencies in the data set. For this update, to attempt a more consistent review and methodology, we instead calculate the CSE for each state, as shown in

Table 3 (in Excel, this is equivalent to the “payment” or “PMT” function). To calculate the CSE, we multiply annual energy efficiency program costs (C) by a capital recovery factor and then divide by the annual energy savings (D). The calculation for the capital recovery factor, which is used to levelize, or spread the costs over a specified period of time and assumed interest rate, is shown in Table 3. For each jurisdiction, we use the same real discount rate (A) for all jurisdictions for consistency, and use each state’s estimated measure lifetime (B), program costs (C), and net energy savings (D).

Table 3. Cost of saved energy calculation

Cost of saved energy (in $/kWh) = (C) x (capital recovery factor)/(D)
Capital recovery factor = [A * (1 + A) ^ (B)] / [(1 + A) ^ (B) – 1]
Where:
A = Real discount rate (5%)
B = Estimated measure life in years
C = Total annual program cost in dollars (2011$)
D = Incremental net* annual energy (kWh or therms) saved by energy efficiency programs

*Note: Net savings were used when available; some states assume that net savings = gross savings (i.e., net-to-gross (NTG) ratio = 1.0); a couple of states do not estimate net savings, in which case we estimated net savings using a NTG ratio of 0.9.

The choice of discount rate used for energy efficiency cost–benefit analysis depends on the specific cost-effectiveness test used. For the utility cost test and TRC, typical current practice is for jurisdictions to use the utility’s weighted average cost of capital (WACC).[2] We collected some utility data on WACC rates, and found that they ranged from 7–8% nominal over the 2009–12 period.[3] We also collected some data on assumed social discount rates used for cost-effectiveness screening and found they ranged widely, from about 1.2 to 6.0% (real). For this analysis, we assume a real discount rate[4] of 5% (A in Table 3) for the overall presentation of the results. This is meant to be fairly consistent with the weighted average utility cost of capital in real terms, but at the low end of the range to reflect the lower risk that energy efficiency expenditures incur.

The estimated measure lifetime in years (B) is based on data from the program administrator, if available. In some cases, average measure lifetimes were derived by dividing life cycle savings by annual energy savings. For some states (Colorado, Illinois, Michigan, Nevada, Pennsylvania, and Texas), we were unable to track down estimates of average measure lifetime for the entire portfolio. These states in some cases did report program- or measure-specific measure lifetimes; however, due to time constraints we were unable to go through all program data to develop an average portfolio-wide estimate ourselves. Instead, for these states

[2] The current practice of assuming the WACC for energy efficiency cost-effectiveness screening, however, has been criticized as undervaluing the reduced risk of energy efficiency program expenditures vs. supply-side investments (Woolf et al. 2012).
[3] Assuming 1% inflation, these nominal WACC rates of 7–8% would range from 6–7% in real-dollar terms.
[4] Real discount rates do not include inflation, whereas nominal discount rates do include inflation. In deciding whether to use a nominal or real discount rate, the key is consistency. This analysis examines energy efficiency program costs in real (2011$) terms, and therefore we apply a real discount rate.

we assumed an overall 11-year measure lifetime, which was the overall average of states that did provide data. Similarly, to estimate CSE values by customer class, if state-specific data were not available, we assumed an 8-year measure lifetime for the residential class and 12.5 years for the business class, which were the average values for states that did provide data.

Total program costs (C) and incremental net annual energy savings (D) are based on data collected from the program administrators, as previously discussed and defined.

Results

Electricity

The cost of saved energy for electric energy efficiency programs ranged from $0.013 to $0.056/kWh across the 20 states from 2009–12, as shown in Figure 1. We calculated four-year averages (2009–12) for each of the 20 jurisdictions and display the average, median, minimum, and maximum for the data set in Table 1. The simple average utility CSE was $0.028/kWh for electricity programs.

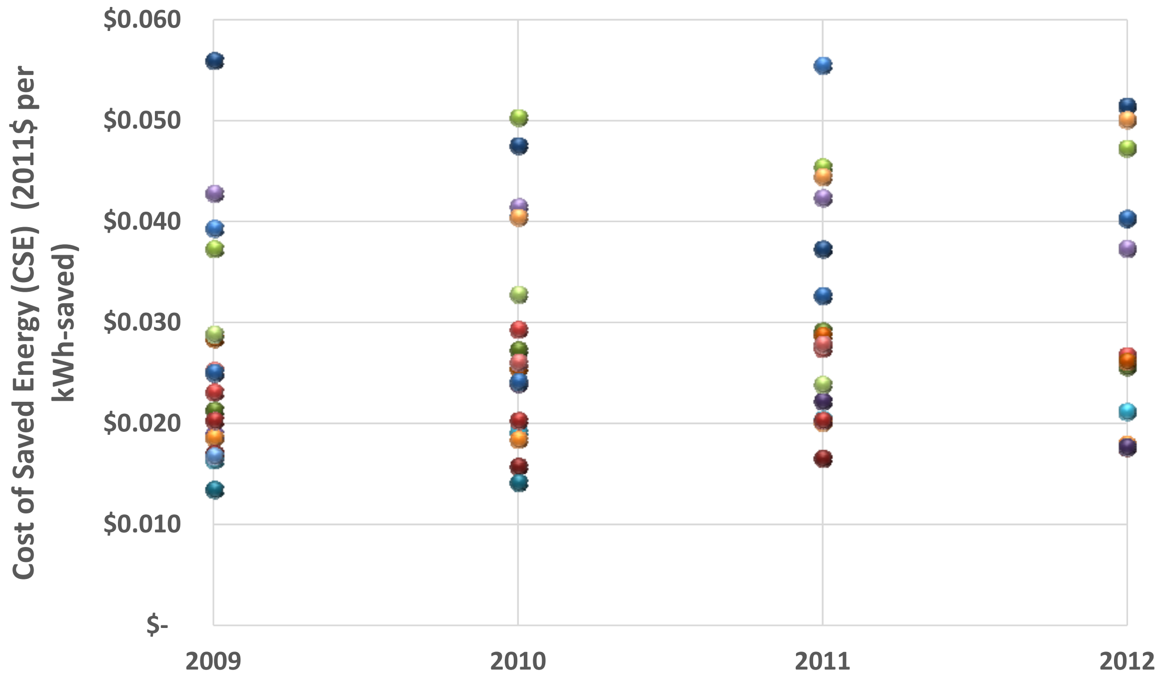


Figure 1. Cost of saved energy for electricity energy efficiency programs (2011$).

Table 4 presents the average for each state for each year, and its four-year average from 2009–12. We were unable to calculate data for every state for each year due to missing data points, which means that the overall average for each year represents a varying number of jurisdictions. For the four-year average values in the column farthest to the right, we find an overall national average of $0.028/kWh and a range of $0.016 to $0.048/kWh. As shown later in the discussion section, these typical efficiency program costs compare very favorably to the typical costs of new electricity generation: about one-half to one-third the cost of alternative new electricity resource options.

Table 4. Cost of saved energy in $ per levelized net kWh at meter (2011$; 5% real discount rate)

State	2009	2010	2011	2012	Four-Year Average (2009–12)
Arizona	$0.016	$0.019	$0.020	$0.021	$0.019
California	$0.039	$0.041	$0.056	N/A	$0.045
Colorado	$0.023	$0.029	$0.027	$0.027	$0.027
Connecticut	$0.037	$0.050	$0.045	$0.047	$0.045
Hawaii	$0.025	$0.024	$0.033	$0.040	$0.031
Illinois	N/A	N/A	$0.019	N/A	$0.019
Iowa	$0.019	$0.018	$0.020	$0.018	$0.019
Massachusetts	$0.056	$0.048	$0.037	$0.051	$0.048
Michigan	$0.017	$0.016	$0.017	$0.018	$0.017
Minnesota	$0.021	$0.027	$0.029	$0.026	$0.026
Nevada	$0.013	$0.014	$0.016	$0.020	$0.016
New Mexico	$0.025	$0.024	$0.022	$0.018	$0.022
New York	$0.020	$0.020	$0.020	N/A	$0.020
Oregon	$0.028	$0.025	$0.029	$0.026	$0.027
Pennsylvania	N/A	N/A	$0.017	N/A	$0.017
Rhode Island	N/A	$0.040	$0.044	$0.050	$0.045
Texas	$0.025	$0.026	$0.028	N/A	$0.026
Utah	$0.029	$0.033	$0.024	$0.029	$0.029
Vermont	$0.043	$0.041	$0.042	$0.037	$0.041
Wisconsin	N/A	N/A	$0.022	$0.015	$0.019
Average	$0.027	$0.029	$0.028	$0.030	$0.028
Median	$0.025	$0.026	$0.026	$0.026	$0.026
Minimum	$0.013	$0.014	$0.016	$0.015	$0.016
Maximum	$0.056	$0.050	$0.056	$0.051	$0.048

Note: N/A means that we were unable to track down sufficient data for the calculation. Average for each year represents a varying number of states, so they are not directly comparable.

The CSE values in Figure 1 and Table 4 represent costs per net electricity savings and assume a 5% real discount rate, which is meant to be roughly consistent with typical nominal utility-weighted average cost of capital of about 7%. In addition, we wanted to calculate and compare the values under different real discount rate assumptions, and also examined real discount rates of 3% and 7%. The 3% assumption resulted in an average CSE of 2.5 cents/kWh, and the 7% rate resulted in an average CSE of 3.1 cents/kWh (compared to 2.8 cents/kWh with the 5% discount rates. These results demonstrate that a difference in 2% for the choice of discount rate assumption can impact the CSE values by about 10–12%. While this is a relatively small impact, it can affect whether specific programs on the margins are deemed cost-effective. From a utility resource planning perspective, analysts should use appropriate discount rates for energy efficiency and supply-side resources, considering their relative risks and other characteristics, in any levelized cost analyses.

Savings and Costs by Customer Class

We also reviewed savings and costs by customer class. Seventeen states report electricity savings by customer class, and the average portfolio was 45% savings from residential customers and 55% from business (commercial and industrial) customers. This varies significantly by state. For example, the share of savings from residential programs ranges from 60% to 26% due to many factors that program planners must consider, including customer equity, efficiency potential by customer class, as well as costs.

We can discern some trends in the electricity CSE results by customer class. First-year costs are comparable for residential and business programs; however, because business energy efficiency measures tend to have longer measure lifetimes (an average of 12.5 years in this electricity data set) than residential measures (8.1 years), the levelized CSE is on average lower for business program portfolios than residential portfolios. We calculated electricity CSE values by customer class for nine states (complete data were not readily available for the other jurisdictions) and identified an average CSE of $0.037/kWh for residential portfolios and $0.027/kWh for business portfolios.

System Benefits and Participant Costs

While the focus of this report is on the utility costs and benefits to deliver energy efficiency programs as the least-cost resource to their customers, it is also important to recognize the wider multitude of benefits that energy efficiency delivers. For example, in addition to the lower energy costs to all customers, energy efficiency programs also result in reinvestment of local dollars in local jobs and industries and reduce pollution.

To capture this wider viewpoint, we also examined some results for the total resource cost (TRC) test, which considers both program costs and additional participant costs. The TRC test results from nine states (we only collected data that were readily available) show benefit–cost ratios that range from 1.24 to 4.0. In other words, in these jurisdictions each dollar invested by program administrators and customers in energy efficiency measures yields $1.24 to $4.00 in total benefits to all customers in the system. However, the benefits side of the TRC equation (e.g., avoided energy and capacity costs, customer benefits, environmental benefits, etc.) can also vary significantly. We collected some limited data on estimated participant costs; however, these cost data were not readily reported by many states. We found that the combined program and participant costs in seven states averages $0.054/kWh. We caution that these results are based on a limited data set, however, and need to be compared to the appropriate and complete set of benefits that are yielded to the system and to participants.

Costs by Type

We examined the breakdown of efficiency program costs by type, including customer incentives, performance incentives, and non-incentive program costs (such as program design; marketing; evaluation, measurement, and verification; and administrative costs). Definitions of these cost types vary from state to state, and therefore there is significant uncertainty in directly comparing states. For example, in our sample of eight states that had readily available data, we discovered non-incentive program costs ranging from about 15–40%. One factor that could explain this range is mass marketing–based programs. As programs ramp up, so might marketing and outreach designed to increase participation and spur market transformation. Spending associated with this ramp up would fall into the "non-incentive" cost category. However, the spending may have the same if not higher energy savings impacts than spending on direct incentives alone. As next-generation efficiency programs develop, the need to account for different categories of spending may shift.

Natural Gas

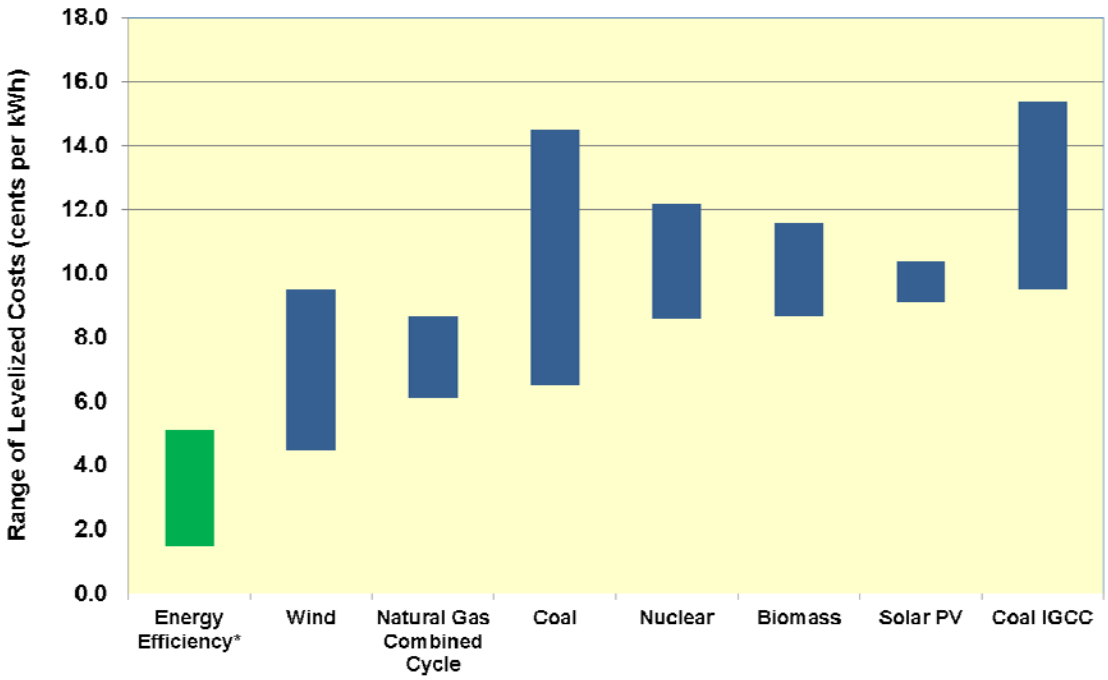
For natural gas programs, Table 5 shows the CSE values by state for each year, as well as the average, median, minimum, and maximum values for each year across the ten jurisdictions, and for the average of 2009–12. The CSE ranges from $0.15/therm to $0.71/therm across the time period, with an overall four-year average of $0.35/therm. By way of comparison, the average natural gas price in 2013 was $0.47/therm.

Table 5. Cost of saved dnergy in $ per levelized net therm at meter (2011$ per therm; 5% real discount rate)

State	**2009**	**2010**	**2011**	**2012**	**Average 2009–12**
Colorado	$0.39	$0.42	$0.37	$0.29	$0.37
Connecticut	$0.37	$0.42	$0.35	$0.38	$0.38
California	$0.32	$0.52	$0.49	N/A	$0.44
Iowa	$0.32	$0.34	$0.38	$0.34	$0.34
Massachusetts	$0.43	$0.58	$0.71	$0.64	$0.59
Michigan	$0.26	$0.25	$0.22	N/A	$0.25
Minnesota	$0.15	$0.22	$0.22	$0.20	$0.20
Oregon	$0.47	$0.32	$0.34	$0.36	$0.37
Rhode Island	N/A	$0.38	$0.42	$0.56	$0.45
Wisconsin	N/A	N/A	$0.11	$0.09	$0.10
Average	$0.34	$0.38	$0.36	$0.36	$0.35
Median	$0.34	$0.38	$0.36	$0.35	$0.37
Minimum	$0.15	$0.22	$0.11	$0.09	$0.10
Maximum	$0.47	$0.58	$0.71	$0.64	$0.59

Discussion and Recommendations

The results of this analysis clearly demonstrate that energy efficiency programs are the least-cost resource option to utilities. As shown in Figure 2, electricity efficiency programs, at a range of about 2–5 cents/kWh and an average of 2.8 cents/kWh, are about one-half to one-third the cost of alternative new electricity resource options (estimates for supply costs are from Lazard 2013). The costs for all resource options in Figure 2 are presented as a range, which is indicative of the variability implicit in any electricity resource option. Similarly, we find that energy efficiency costs can vary across jurisdictions based on many factors. Across jurisdictions, natural gas efficiency programs also remain a least-cost option, at an average cost of $0.035/therm, compared to the average natural gas fuel prices in 2013 of $0.047/therm.[5] Many regions face higher natural gas commodity prices, especially during the recent extreme cold winter, which makes efficiency programs even more cost-effective.



*Notes: Energy efficiency program portfolio data from this review; All other data from Lazard 2013. High-end range of coal includes 90% carbon capture and compression.

Figure 2. Cost of new electricity resource options in 2012.

Both electricity and natural gas efficiency costs on average have remained very consistent with past efficiency program cost reviews, demonstrating the reliable nature of efficiency as a long-term resource. For example, the results of our 2004 review identified a CSE range of 2.3 cents/kWh to 4.4 cents/kWh in seven states (Kushler et al. 2004). The results of our 2009 review identified an average CSE of 2.5 cents/kWh (Friedrich, Eldridge, and York 2009). Some caution

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[5] This was the average citygate price, which refers to the "point or measuring station at which a distributing gas utility receives gas from a natural gas pipeline company or transmission system" per EIA.

is warranted in drawing direct comparisons among studies because of differences in the jurisdictions and methodologies. For example, the 2009 study did not review whether the CSE captured net or gross energy savings, and it did not include utility shareholder incentives, both of which were addressed in this updated analysis. Despite these differences, it is still worthwhile to note the general trend that average utility energy efficiency program costs are holding steady at 2–3 cents/kWh.

We present a large quantitative data set in this review, which demonstrates that efficiency is clearly a least-cost resource; however, further analysis is needed in order to discern specific trends over time in CSE values and the relative impact of various metrics on CSE values. For example, many analysts have hypothesized that program costs will increase over time as program administrators increase energy savings levels. Figure 3 shows the results of an initial correlation analysis that examines the relationship between electricity program CSE and the size of the program portfolio measured in savings as a percent of total retail electricity sales.

The *r*-value for this data set in Figure 3 is 0.27, which is indicative of a positive, but low or weak correlation between CSE and electricity savings as a percentage of sales. These findings reject the hypothesis that programs with higher electricity savings levels are associated with higher CSE values. These findings indicate that robust program portfolios can save 1–2% savings as a percentage of sales while maintaining low-cost programs. Further research should explore this more, perhaps by examining trends within individual jurisdictions alone, to correct for the myriad differences in energy savings and cost reporting.

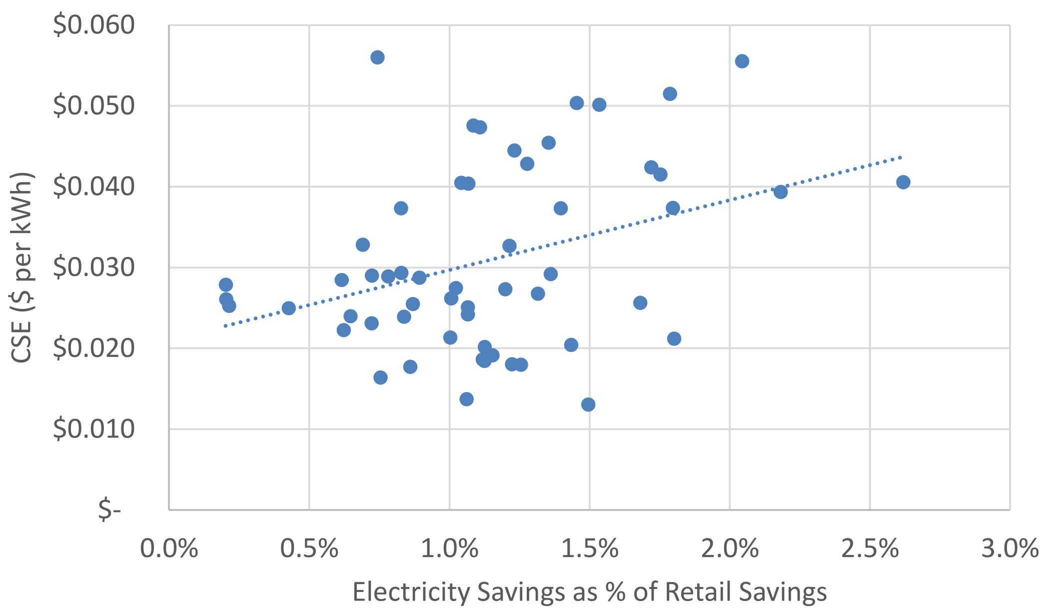

Figure 3. CSE values relative to electricity savings as a percentage of sales.

Finally, we discuss many of the challenges in energy efficiency reporting consistency around the country. We recommend that utilities, regulators, and program administrators in all states discuss these issues, perhaps also at a regional level, and work toward adopting best reporting practices. We offer the following specific recommendations to improve consistency and transparency in reporting. Guidelines are already available for program administrators interested in improving the transparency and consistency of their reporting metrics.[6]

Location and Frequency of Reporting

First and foremost, annual program reports and evaluations should be easily accessible on a common website and follow a consistent annual schedule if possible, or provide public notification of schedule and availability. The website may be an individual program administrator's site, a common docket established by the commission, or an independent advisory group website. Regulators or advisory groups should require at least some minimum threshold of reporting and provide sample templates building on best practices such as those laid out by NEEP. In cases where there are multiple utilities or program administrators reporting, it makes sense and is in the interest of all stakeholders to have one dedicated entity to aggregate key metrics across all territories.

Improve Transparency of Energy Efficiency Metrics and Assumptions

We recommend that program administrators and regulators adopt or improve the following (this is not an exhaustive list):

- Report spending and impacts of energy efficiency program portfolios separately from those of demand-response and renewable energy programs; also report CHP separately.
- Separate electricity and natural gas program spending and savings; for combined programs, develop methodologies for attributing spending and savings to gas or electric.
- Report estimated customer costs by customer class; report number of participants.
- Indicate whether electricity savings are reported at site (meter) or at generation, and if at generation, make clear the assumption of transmission and distribution line losses so they can be converted to site.
- Clearly identify whether energy savings are net or gross, and the assumptions used.
- Provide a succinct but transparent description of the methodologies used to estimate gross and/or net savings, with links to more detailed information.
- If the emphasis is on cumulative (i.e., multiyear) energy savings and cost-effectiveness impacts, incremental annual impacts should also be provided to indicate trends over time and facilitate comparisons with other jurisdictions.

Expand Reporting and Disaggregation of Key Metrics

More often than not, energy efficiency reporting has left out some of these critical metrics or assumptions that are necessary to calculate the cost of saved energy:

- Report both net and gross energy savings values, by customer class.

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[6] See the Northeast Energy Efficiency Partnership's *Common Statewide Energy Efficiency Reporting Guidelines* and Regional Energy Efficiency Database (REED) (NEEP 2010, 2013) and *Energy Efficiency Program Typology and Data Metrics: Enabling Multi-State Analyses through the Use of Common Terminology* (LBNL 2013).

- Report measure lifetime estimates by customer class.
- Disaggregate data by customer class (e.g., residential, commercial, and industrial). Most jurisdictions currently report business customers (commercial and industrial); however, we recommend that programs work toward disaggregating data in a way that provides meaningful data for program development (e.g., commercial vs. industrial customers or small vs. large business customers).
- Disaggregate cost data at least by the following at the program level: customer incentives, non-incentive program costs, and performance/shareholder incentives; include definitions of what is included in incentives and non-incentive costs.

Conclusions

This analysis finds that energy efficiency is holding steady as the least-cost energy option, and that efficiency provides the best value for America's energy dollar. At an average cost of 2.8 cents/kWh, electricity efficiency programs are one-half to one-third the cost of the alternatives of building new power plants. Natural gas energy efficiency programs also remain a least-cost option at an average cost of 35 cents/therm, which is less than recent (2013) average natural gas prices of 47 cents/therm.

These data represent a large number of diverse jurisdictions across the nation and show that energy efficiency has remained consistent as the lowest-cost resource, even as the amounts of energy efficiency being captured have increased significantly. Energy efficiency also provides additional benefits beyond the avoided energy costs, including reductions in water usage, avoided transmission and distribution costs, and non-energy benefits to society such as reduced pollution and job creation. As utility and state planners face increasing uncertainty over the long term, such as fuel price volatility and needs for environmental compliance, they should look to energy efficiency as a reliable and consistent "first fuel" in their loading order of energy options.

As efficiency programs gain even wider adoption and traction as the least-cost energy resource option, the need increases in step for high-quality and consistent data and reporting. We found that jurisdictions collect a wealth of data on efficiency programs. However, we also identified a host of challenges that make a national review of energy efficiency cost data collection and comparison difficult, such as variation in reporting formatting, nomenclature, and frequency. To improve data transparency and consistency, we recommend that utilities, regulators, and program administrators in all states discuss these issues and adopt best reporting practices.

References

Friedrich, K., M. Eldridge, and D. York. 2009. *Saving Energy Cost-Effectively: A National Review* Washington, D.C.: American Council for an Energy-Efficient Economy (ACEEE).

Kushler, M., D. York, and P. White. 2004. *Five Years In: Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies*. Washington, D.C.: American Council for an Energy-Efficient Economy.

Kushler, M., S. Nowak, and P. Witte. 2014. *Examining the Net Savings Issue: A National Survey of State Policies and Practices in the Evaluation of Ratepayer-Funded Energy Efficiency Programs.* Washington, D.C.: American Council for an Energy-Efficient Economy (ACEEE).

Lazard. 2013. "Levelized Cost of Energy Analysis - Version 7.0."New York, NY: Lazard, Ltd.

[LBNL] Lawrence Berkeley National Laboratory (LBNL). 2013. *Energy Efficiency Program Typology and Data Metrics: Enabling Multi-State Analyses through the Use of Common Terminology.*

Molina, M. 2014 forthcoming. *The Best Value for America's Energy Dollar: National Review of the Cost of Utility Energy Efficiency Programs.* Washington, D.C.: American Council for an Energy-Efficient Economy (ACEEE).

Northeast Energy Efficiency Partnership (NEEP). 2010. *Common Statewide Energy Efficiency Reporting Guidelines. Version 1.0.* http://www.neep.org/Assets/uploads/files/emv/emv-products/EMV%20Forum_Statewide_EE_Reporting_Guidelines_12-30-10.pdf.

____. 2014. Regional Energy Efficiency Database (REED). Accessed September 2013. http://www.neep-reed.org.

Woolf, Tim et al. 2012. *Best Practices in Energy Efficiency Program Screening: How to ensure that the Value of Energy Efficiency is Properly Accounted For*. Prepared for the National Home Performance Council by Synapse Energy Economics. http://www.synapse-energy.com/Downloads/SynapseReport.2012-07.NHPC.EE-Program-Screening.12-040.pdf.