E Source

Weatherstripping and Door Sweep Savings and Customer Targeting

An Ask E Source Answer

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Question

What are the estimated heating energy savings associated with weatherstripping and door sweeps, and how have utilities targeted these measures to customers?

Answer

Based on savings estimates from six state or utility technical reference manuals (TRMs), electric savings estimates for weatherstripping and door sweeps varies depending on the geographical climate. We are also aware of several utilities that have applied targeting and segmentation strategies to residential weatherization. You can review much of this information through the E Source Measure Insights tool, which compiles measure-specific data from demand-side management TRMs into a structured database.

TRM Weatherization Data

The Independent Electricity System Operator in Ontario offers its 2015 Prescriptive Measures and Assumptions List (PDF), which estimates first-year electric heating savings from the following measures:

- New weatherstripping (door): 38.3 kilowatt-hour (kWh) annual savings
- Replace weatherstripping (door): 28.7 kWh annual savings
- Augment weatherstripping (door): 19.1 kWh annual savings
- New weatherstripping (foam/v-strip): 24.2 kWh annual savings
- Replace weatherstripping (foam/v-strip): 18.1 kWh annual savings
- Augment weatherstripping (foam/v-strip): 12.1 kWh annual savings

The Connecticut 2015–2016 TRM estimates the following savings:

- Door sweep kit (electric resistance heating): 173 kWh
- Door sweep kit (Heat pump): 86.5 kWh
- Weatherstripping (electric resistance heating): 11.5 kWh
- Weatherstripping (Heat pump): 5.75 kWh

The Efficiency Maine 2015–2016 TRM estimates 32 kWh savings annually per air sealing project, noting, "This measure involves sealing air leaks in windows, doors, roof, crawlspaces and outside walls resulting in decreased heating and cooling loads."

The Tennessee Valley Authority 2015–2016 TRM describes a residential weatherization measure that includes a number of weatherization applications (weatherstripping attic access, caulking, door weatherstripping, and installation of outlet gaskets). The estimated annual savings per 1,000 square feet are:

- Heat pump: 459 kWh
- Gas heat: 63 kWh

The Arkansas TRM 5.0 provides deemed savings from door sweeps for electric resistance, heat pump, and gas heating (**Table 1**).

TABLE 1: Arkansas Technical Reference Manual 5.0 door sweep savings (per linear foot)

Weather zone	**Gap width (inch)**			
	1/8	**1/4**	**1/2**	**3/4**

Zone 9: Fayetteville	Electric resistance (kWh)	125.19	253.13	502.35 754.10
	Heat pump (kWh)	37.94	76.71	152.23 228.51
	Gas (therms)	5.34	10.80	21.43 32.16
Zone 8: Fort Smith	Electric resistance (kWh)	108.83	220.04	436.67 655.51
	Heat pump (kWh)	32.98	66.68	132.32 198.64
	Gas (therms)	4.64	9.38	18.62 27.96
Zone 7: Little Rock	Electric resistance (kWh)	91.75	185.61	268.27 552.83
	Heat pump (kWh)	27.81	56.24	122.76 167.52
	Gas (therms)	3.91	7.92	15.71 23.58
Zone 6: Eldorado	Electric resistance (kWh)	67.78	137.41	272.41 408.93
	Heat pump (kWh)	20.54	41.64	82.55 123.92
	Gas (therms)	2.89	5.86	11.62 17.44

Source: Arkansas Technical Reference Manual 5.0

The June 2016 Illinois TRM provides annual electricity savings estimates for door sweeps and window/door weatherstripping (**Table 2**).

TABLE 2: Illinois Technical Reference Manual door sweep and weatherstripping annual energy savings

Climate zone		**Electric resistance**	**Heat pump**
1 (Rockford)	Door sweep savings (kWh/sweep)	202.4	101.2
	Weatherstripping (kWh/foot)	13.5	6.7
2 (Chicago)	Door sweep (kWh/sweep)	195.3	97.6
	Weatherstripping (kWh/foot)	13.0	6.5
3 (Springfield)	Door sweep (kWh/sweep)	169.3	84.7
	Weatherstripping (kWh/foot)	11.3	5.6
4 (Belleville)	Door sweep (kWh/sweep)	134.9	67.5
	Weatherstripping (kWh/foot)	9.0	4.5
5 (Marion)	Door sweep (kWh/sweep)	137.9	68.9
	Weatherstripping (kWh/foot)	9.2	4.6

Note: kWh = kilowatt-hours. Source: Illinois Technical Reference Manual, June 2016

Targeting and Segmenting Customers

Generally, we've seen energy-use and delinquency rates as just some of many inputs into the segmentation process for residential customers (business customers, of course, are a different ball game, and segmenting by usage is quite common). Austin Energy is one example of a utility that has segmented

and targeted its residential customers by high energy usage. Most utilities do not target customers with high delinquency rates unless these customers are on a low-income rate.

We are aware of one utility that has targeted non–low-income customers with a high propensity for delinquency. Salt River Project (SRP) launched a new low-income education initiative in 2009. It sent letters to 500 customers that had called customer service about high bills. For those that weren't eligible for a special low-income rate, the utility offered them the opportunity for an SRP rep to go to their house, give them a free energy-efficiency kit, and teach them ways to save energy around the house. During the visit, SRP did some direct install of items such as CFLs. SRP has calculated savings of 536 kWh from each kit, which includes 8 CFLs, weatherstripping tape, caulk, outlet sealers, etc. The utility also offers a weatherization assistance program for low-income customers.

According to market research data compiled in the E Source Residential Customer Insights Center, customers who were most likely to report participation in weatherization programs during the past year:

- Were well-educated (post-college graduate level or higher)
- Had an annual household income of $75,000 or more
- Lived in single-family homes (as opposed to condominiums, apartments, or multifamily units)
- Were homeowners (as opposed to renters)
- Lived in homes built before 1980
- Lived in larger homes (at least 2,000 square feet)

To provide more insight on customer targeting, we identified four utilities that have residential segmentation/targeting strategies for their energy-efficiency programs. These include Austin Energy, Arizona Public Service (APS), Pacific Gas and Electric (PG&E), and Duke Energy.

Austin Energy uses segmentation for weatherization programs, Home Performance with Energy Star, and the Better Buildings Program. It uses a combination of customer data (usage and survey), census data, and PRIZM segments to create its segmentation plans. It tries to individualize the segments to the program so the targeting is most effective. In general, the utility starts by looking at usage data to determine which customers are high energy users. Then it uses MapInfo to link usage data, PRIZM data and US Census data (*e.g.*, household characteristics at the block group level) to identify households that would benefit from and be more likely to participate in a program.

The utility looks for similarities between customers who have participated in the program in the past with customers who have similar characteristics (*e.g.*, live in the same area and have similar home sizes,

home ages, etc.) and have not yet participated but are more likely to do so. Program managers then use the end results for targeting. Austin Energy recommends that the best thing a utility can do is get to know the data that is available and figure out how it all links together; look for patterns to help determine who is most likely to participate in the program.

APS uses segmentation to develop propensity scores for customers for specific energy-efficiency and renewable energy programs as well as for revenue-producing products and services. APS segments its customers by energy usage, lifestyle/behaviors, energy-savings opportunities, and revenue-generating opportunities.

To segment its customers, APS conducts online and phone segmentation surveys to identify motivators and barriers to participation. It also dives into its customer information system to gather information such as past program participation, energy usage history, and payment information. It then marries that information with Nielsen PRIZM data, customer survey data, J.D. Power segmentation profiles, and county assessor data to define its customer profiles and propensity scores. Lifestyle and behaviors is one of the parameters that APS uses in thinking about segmentation and offers.

PG&E presented at the 2012 E Source Forum about how the utility is trying to engage its customers better through segmentation (see Increasing Energy-Efficiency Engagement Through Relevancy). PG&E has used its own data, enriched with third-party data, to segment residential customers into four segments (based on high/low engagement propensity) and then further into 11 personas. PG&E also developed an energy-efficiency opportunity score for every customer—based primarily on energy-use data and attributes such as house size, income, and location—to determine how efficient a customer is. The utility then created a self-service heat-map tool that shows where the largest opportunities are.

Duke Energy, in its 2012 E Source Forum presentation, A Targeting and Segmentation Toolkit, shows how the utility developed propensity modeling using demographic and sociographic data to help fine-tune direct marketing efforts. It found that bundling program messages and targeting promotions improves marketing cost-effectiveness. In addition, the utility offers better customer service by offering programs to customers that they are more likely to be interested in. It tracks the cost per lead and cost per acquisition, timing of response, when marketing went out, and who responded to what messages.

The utility found that the biggest driver of participation is participation in other programs. Utilizing cross-selling opportunities (even across regulated and unregulated products/services) has helped product sales and program participation. Smart Window, the utility's call center tool, has been very successful. The tool,

which uses PRIZM to help target customers, ranks products based on a customer's likelihood to participate so that call center agents can promote appropriate products and services. Duke Energy markets a range of residential energy-efficiency programs as well as unregulated products such as surge protection and HVAC warranty services.

The top lesson we see in segmentation data and utility segmentation efforts is that absolute energy use is most useful as a measure—and as a guide to segmentation—when viewed in the context of other variables about the customer, especially demographics and engagement with utility programs. This, of course, is the theory behind behavior-change programs such as OPower: to present energy-use comparisons of a household with its peers, not just an overall average. Since both energy use and the propensity to participate in programs are correlated with income and household size, utilities should include those demographic variables in the segmentation—either by explicitly including those demographics in an existing segmentation methodology or even creating a measure of energy use that is relative to a certain income or housing type. Utilities can also use those demographics to help design the right messaging.