Opportunities to Ramp Up Low-Income Energy Efficiency to Meet State and National Climate Policy Goals

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ABSTRACT

Energy efficiency should be an integral part of any plan to reduce carbon emissions from the electric sector since it is both abundant and low cost. Unfortunately, low-income households face additional barriers to more widespread implementation of energy efficiency. Program administrators have an opportunity to help low-income customers overcome these barriers by implementing policies and practices that serve all customers, with an emphasis on low-income populations.

This component of our preliminary research examines whether and how the level of funding and cost of saved energy for low-income energy efficiency differs across groups of states with poverty rates that are above the national average, as compared to groups of states with poverty rates that are below the national average. To better understand the scale of the opportunity to ramp up low-income energy efficiency for meeting state and national climate policy goals, we compiled a dataset that includes state poverty rate, utility revenues from residential electricity sales, and ratepayer funded, low-income electric energy efficiency program eligibility requirements, costs and savings. Our data suggest (1) despite the savings opportunity, states with above average poverty rates tend to spend less than states with below average poverty rates, and (2) low-income energy efficiency does not cost more per kilowatt-hour (kWh) saved in the states that are spending more. In conclusion, all states—especially states with higher poverty rates—have an opportunity to use low-income energy efficiency to achieve state and national emission targets.

Introduction and Purpose

Energy efficiency is widely recognized as an abundant and low-cost option for states to comply with the requirements of state and national climate policies. In August 2015, the U.S. Environmental Protection Agency (EPA) issued the final Clean Power Plan (CPP) which requires states to meet state-level targets that together would reduce national electric sector emissions to about 30 percent below 2005 levels by 2030. The CPP also recognizes that there is an opportunity to reach low-income residents through the Clean Energy Incentive Program (CEIP), which provides additional incentives to states for low-income energy efficiency efforts (EPA 2015).[1] At COP21 in Paris in December 2015, the United States committed to a national reduction similar to the national reduction in the CPP (US INDC 2015).

States that meet targets set through state and national climate policies by maximizing the large amount of untapped, cost-effective energy efficiency will enjoy a plethora of benefits. It can cost more to invest in low-income energy efficiency as compared to residential energy

[1] While the Supreme Court since issued a stay on the CPP in February 2016, the national commitment to the international agreement stands; and individual states continue to plan for and make progress towards complying with the final rule. See, Georgetown Climate Center, www.georgetownclimate.org/state-statements-following-the-supreme-courts-decision-to-stay-the-clean-power-plan.

efficiency, as the incentives for low-income participants need to be higher to minimize their upfront cost to install efficient equipment. However, the savings and benefits can be greater as well. Beyond reducing greenhouse gas emissions, energy efficiency reduces electricity bills, improves electric system reliability, reduces risk, promotes energy independence, stimulates local economic development and improves health and safety (Woolf et al 2012). Low-income energy efficiency may also provide important benefits for utilities including reduced customer arrearages and fewer bad debt write-offs.

However, budgets for energy efficiency programs that are operated by electric utilities and funded by utility customers are often limited due to concerns about fairness among types of customers. While all customers experience some system-wide benefits of energy efficiency, customers who participate in these programs experience greater benefits than non-participants. The difficulty of reaching low-income households exacerbates this issue, as these households are less likely to experience the direct benefits of program participation. Numerous barriers make low-income energy efficiency implementation difficult, including:

1) Utilities may not have the information they need to identify low-income customers.
2) Low-income customers may be wary of interacting with utilities that have the ability to shut off service for nonpayment.
3) In some areas, language may be a barrier to program participation.
4) Low-income customers typically have limited time and money to commit to energy efficiency projects— though often they have greater energy savings opportunities.
5) Health and safety issues are more common in low-income residences, preventing energy saving improvements.

As a result, states are not serving low-income residents to the same extent as they are serving their non-low-income counterparts. According to a 2016 report, 18 percent of electric energy efficiency expenditures are directed towards low-income programs while 33 percent of the national population can be characterized as low income (Cluett et al 2016). States can tap into this opportunity if they overcome these barriers by implementing policies and practices that enable program administrators to reach and serve all customers, especially low-income populations. It is all the more critical that program administrators reach these households: Beyond the high energy burdens that low-income households have born and continue to bear, they are also likely to experience disproportionate, adverse health and other impacts due to climate change (Hernandez 2013; Horowitz et al. 2015; Drehobl and Ross 2016).

Methodology

We developed a dataset linking state poverty rates and utility revenues from residential electricity sales with ratepayer-funded low-income energy efficiency program eligibility requirements, costs and savings from the most recent program year. [2,3] This dataset contains a representative sample of 74 energy efficiency program administrators across 26 states with a range of poverty rates, geographic regions, levels of energy efficiency experience, and levels of

[2] In some instances, actual performance data were not available and we used plan data.
[3] The dataset contains the most recent actual data at the time that the dataset was prepared, in April 2015.

energy efficiency spending and savings.[4] We did not collect data from the four states (Alaska, Hawaii, Vermont, or the District of Columbia) that are exempted from the CPP. Of the remaining states, we found:

- no readily accessible energy efficiency program data in 11 states,
- low-income electric energy efficiency data not broken out from other electric efficiency programs or from gas programs in five states,
- programs not targeted exclusively to low-income customers in three states, and
- cost or savings data for low-income programs not provided in two states.

We also collected funding data from federal and state programs providing energy efficiency for low-income households. Federal funding includes Department of Energy (DOE) funding for the Weatherization Assistance Program (WAP) and the weatherization component of Low-Income Heating Energy Assistance Program (LIHEAP). Energy assistance and emergency assistance or crisis funds are a major component of LIHEAP funding, but we did not consider them as sources of energy efficiency funding in this paper.[5]

We used U.S. Census Bureau poverty rates to determine relative poverty levels in states and to develop state groupings. The U.S. Census Bureau calculates poverty rates for each state and nationally by dividing the number of individuals living in poverty in the state by the total number of people living in the state. We focused on the definition of the population at or below 200 percent of the federal poverty rates since 200 percent is a common eligibility threshold for ratepayer-funded low-income efficiency programs (Economic Opportunity Studies 2015).[6,7] We determined poverty rates for each state based on the 2014 Annual Social and Economic Supplement of the Current Population Survey (U.S. Census Bureau 2014).

We assessed program performance using two metrics: (1) low-income expenditures as a percent of utility residential electricity revenues and (2) the low-income first-year, levelized program cost of saved energy. We calculated the levelized cost of saved energy by dividing program expenditures by annual energy saved. We applied a 3 percent real discount rate and an average measure life of 11 years to all states.[8] The average measure life is the weighted average measure life for low-income programs across all 26 states in our dataset. We used these metrics to compare programs across poverty rate groups and regions.

Key Findings

Our research implies that states with a greater proportion of low-income residents spend less on low-income energy efficiency, and could benefit by spending more. In our dataset,

[4] Represented in the data are investor-owned utilities (IOUs), third-party energy efficiency administrators (such as the New York State Energy Research and Development Authority), and other state agencies (such as the Colorado Energy Office) responsible for administering low-income energy efficiency programs using ratepayer funds.
[5] We are not including these data in our analysis due to the suspected overlap between data sources.
[6] The 200 percent poverty rate for a state is the number of individuals whose income levels are at or below twice the federal poverty guidelines divided by the state population.
[7] EPA has yet to release guidance regarding eligibility requirements for the CEIP, which would provide incentives for energy efficiency efforts targeted to low-income communities. This guidance will likely be further delayed due to the Supreme Court stay on the CPP.
[8] Verified savings were used where available.

program administrators in the 12 states with above average poverty rates spent substantially less on low-income programs as a portion of the utilities' residential electricity revenues, as compared to program administrators in the 14 states with below average poverty rates. Analysis of these data also showed that there is a much narrower range of values for the states with above average poverty rates as compared to states with below average poverty rates.[9] The box plots in Figure 1 below summarize the median (the black lines in the middle of the grey boxes), mean (the black dots), distribution and range of values (the grey boxes and whiskers) for states with above average poverty rates and for states with below average poverty rates. The detailed data are presented in Table 1 in the Data Table section below.

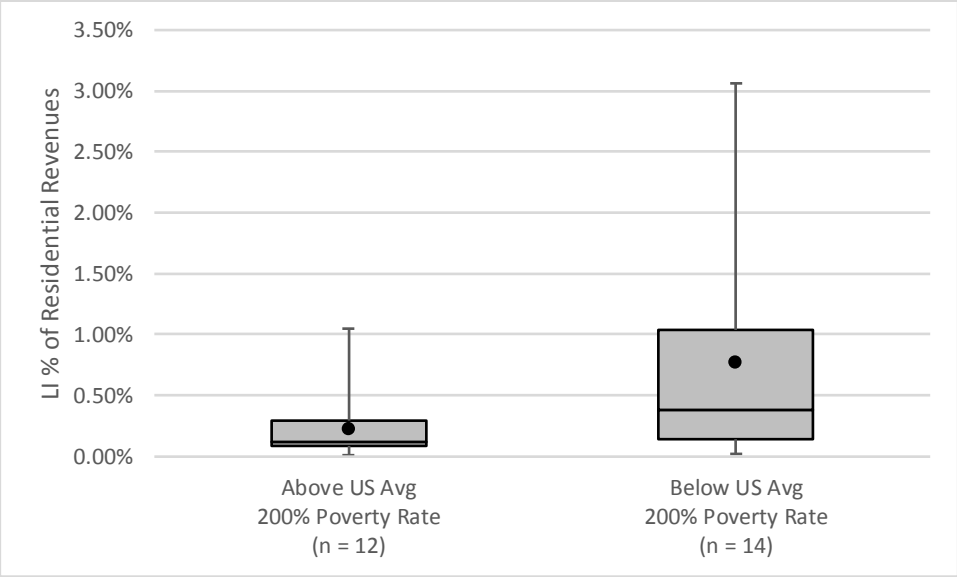

Figure 1. Distribution and range of low-income program expenditures as a percent of utility residential electricity revenues.

The box plots in Figure 2 suggest that it does not cost utility program administrators, and consequently ratepayers, more per unit of energy saved to invest more in the low-income efficiency opportunity in states with above average poverty rates. In our experience, it can cost more to invest in low-income energy efficiency as compared to residential energy efficiency, but the savings opportunities can be greater as well. Program administrators in the 12 states with above average poverty rates had similar levelized costs of saved energy for their low-income programs as compared to program administrators in 13 states with below average poverty rates (excluding Montana). The median value for program administrators in states with above average poverty rates was $0.11/kWh, which was the same as for program administrators in states with below average poverty rates. The figure also shows that there is a narrower range of values for the states with above average poverty rates as compared to states with below average poverty rates.[10]

[9] The maximum value for low-income levelized cost of saved energy in states with above average poverty rates is 1.04% (CA) and the maximum value in states with below average poverty rates is 3.06% (ME).
[10] The maximum value for low-income levelized cost of saved energy in states with above average poverty rates is $0.31 (ID) and the maximum value in states with below average poverty rates is $0.34 (NH).

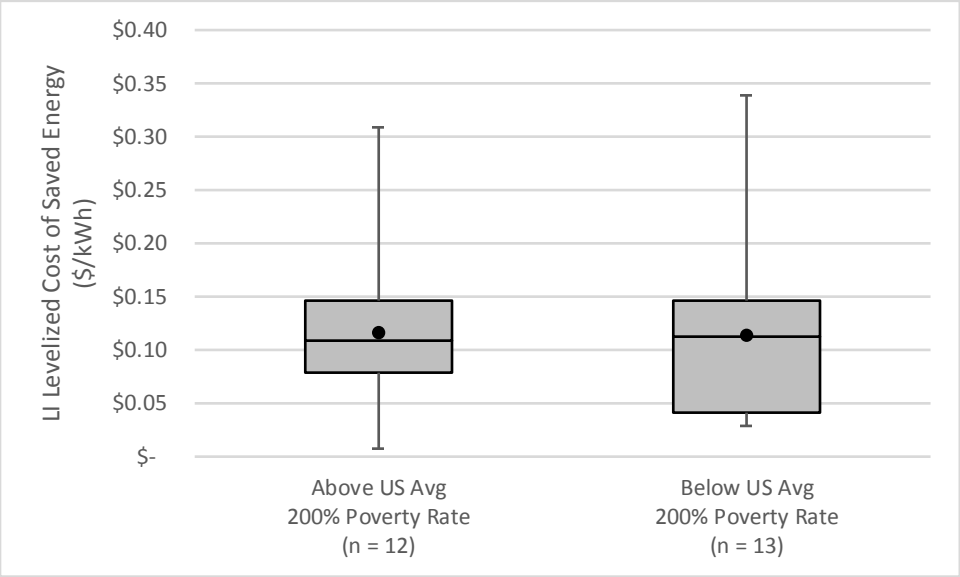

Figure 2. Distribution and range of low-income levelized cost of saved energy ($/kwh).

An additional finding from our research is that there is a need for frequent, standardized reporting of ratepayer funded low-income program cost, savings and participation data for all states. It is more difficult to identify the opportunity, set appropriate goals and measure attainment of the goals without more consistent metrics and reporting. This reporting should also be integrated with other sources of low-income energy efficiency data including the existing reporting for WAP and LIHEAP and data on state or local poverty rates from the U.S. Census Bureau.

Opportunities

All states—especially states with higher poverty rates—have an opportunity to use low-income energy efficiency to comply with state and national emission targets. The CPP's CEIP provides additional motivation for states to ramp up efforts specifically targeting low-income residents. Based on our research across states and low-income programs, we identified several future opportunities.

There is opportunity for low-income energy efficiency efforts to ramp up, especially in states with higher poverty rates. States with higher poverty rates have a greater proportion of low-income residents relative to other states. For equity reasons, these states should be spending a greater proportion of their energy efficiency budgets on low-income efforts.[11] More research on savings potential is needed to inform targets.

States should make the most of whatever mechanism is put into place to incentivize low-income efficiency and to achieve carbon-reduction targets. We are optimistic that either the CPP will survive court challenges, or some other national climate change policy will be implemented

[11] Some states are trying to address this problem by requiring that a threshold portion, e.g. at least ten percent, of the total energy efficiency budget be spent on low-income efforts. However, this metric can be problematic. If spending on energy efficiency in general is minimal, then the spending on low-income will likely also be minimal. Also, this metric does not account for the size of the low-income population. A better approach may be to look at spending as a percent of the utility's residential electricity revenues, as we have done in this paper.

in the United States. If the stay on the CPP is lifted, states should opt into the CEIP and leverage their low-income energy efficiency opportunity to achieve CPP targets. Post 2022, states interested in providing an additional ongoing funding stream for energy efficiency can earmark the funds generated from low-income energy efficiency CEIP allowances created in 2020 and 2021 to support program efforts in a future year or years. On the other hand, if the United States ultimately implements a different climate change policy, it will likely include a mechanism to encourage low-income efficiency.

Whatever happens with the CPP, federal policies are not the only ones that can encourage more investment in energy efficiency generally, and more investment in efforts targeting low income populations specifically. States can ramp up low-income energy efficiency efforts by implementing policies that drive more equitable energy efficiency implementation and improve customer fairness, including energy efficiency resource standards, building codes and appliance standards, and state laws and Commission regulations requiring energy efficiency (Kallay et al. 2015). Also, program administrators can increase the reach of their low-income programs by addressing key barriers to implementation. The following are program design recommendations that address common barriers to low-income participation:

- **Program coordination.** Coordination of program design and eligibility requirements with existing low income emergency assistance, crisis funds, or energy bill assistance programs can maximize participation in energy efficiency programs (Cluett et al 2016).
- **Program partnerships.** Partnerships with other organizations including Community Action Agencies, food banks and food shelf networks can enable efficiency program administrators to better leverage funding sources and access participants that are more trusting of local organizations (Nowak et al. 2013, Cluett et al 2016).
- **One-stop shopping.** In areas with more than one program administrator, designating a single or primary service provider can produce a seamless approach and greatly simplify the process for participants. (Nowak et al. 2013).
- **A range of programs and eligible measures.** Low income efficiency programs should address all relevant opportunities, including those addressed by non-low-income programs. This includes expanding the scope of current low-income programs providing only weatherization and direct install services, to include high efficiency products and segmenting and targeting low-income customers with programs that are specific to their needs (Cluett et al 2016, Energy Efficiency for All 2015).
- **Education**.
    - Customers need to be educated about how energy is currently used, the energy saving technologies that can be installed, and how behavioral changes can drive even deeper savings (Drakos et al. 2007; Kushler et al. 2005).
    - Multi-family building owners need whole-building energy data, combining energy usage and savings across multiple bills (Energy Efficiency for All 2015).
    - Better training of partner organizations and contractors can greatly improve the consistency of communications with customers (Nowak et al. 2013).
- **Resolution of health and safety issues**. Low-income programs should address health and safety issues, as customers are often precluded from participating without at least some repairs (Nowak et al. 2013).

Data Table

Table 1 below provides the complete data used in this analysis. The states are ranked and grouped by poverty rate, with subtotals for states with above and below average poverty rates.

Table 1. Low-income % of residential revenues[12] and levelized cost of saved energy (COSE) by state

States	200% poverty rate (US avg = 33.9%)	Low-income efficiency program expenditures	Residential revenues	Low-income % of residential revenues	Low-income annual kWh savings	Low-income levelized $/kWh COSE
AZ	43.7%	$ 3,068,906	$ 3,718,356,500	0.08%	2,097,483	$ 0.15
KY	42.1%	$ 3,330,000	$ 2,460,673,600	0.14%	3,169,000	$ 0.11
NM	42.1%	$ 718,490	$ 769,384,000	0.09%	1,980,007	$ 0.04
LA	41.4%	$ 954,896	$ 2,514,353,400	0.04%	1,685,564	$ 0.06
NC	40.0%	$ 289,693	$ 5,962,720,300	0.00%	4,117,604	$ 0.01
ID	37.5%	$ 2,007,395	$ 707,181,100	0.28%	679,771	$ 0.31
TX	37.2%	$ 19,394,505	$ 15,087,709,700	0.13%	19,023,000	$ 0.11
CA	36.2%	$ 143,272,256	$ 13,744,464,500	1.04%	81,336,490	$ 0.18
SC	34.6%	$ 3,017,668	$ 3,338,098,300	0.09%	2,753,767	$ 0.11
OH	34.6%	$ 17,887,454	$ 4,084,983,500	0.44%	21,819,599	$ 0.09
IN	34.6%	$ 3,750,730	$ 3,469,890,000	0.11%	2,723,184	$ 0.14
NY	34.5%	$ 21,298,737	$ 7,112,791,200	0.30%	25,551,798	$ 0.09
MT	33.5%	$ 2,242,556	$ 481,802,400	0.47%	n/a	n/a
RI	33.4%	$ 6,750,200	$ 443,004,700	1.52%	6,305,000	$ 0.11
MI	33.0%	$ 7,053,208	$ 4,870,926,700	0.14%	22,293,000	$ 0.03
ME	32.2%	$ 329,636	$ 10,758,800	3.06%	877,345	$ 0.04
WA	30.6%	$ 4,166,326	$ 3,028,281,400	0.14%	2,682,760	$ 0.16
IL	30.1%	$ 3,455,000	$ 4,444,637,800	0.08%	1,682,500	$ 0.21
WY	30.1%	$ 40,558	$ 267,506,300	0.02%	82,787	$ 0.05
PA	29.7%	$ 24,417,319	$ 4,677,977,500	0.52%	59,951,632	$ 0.04
UT	28.5%	$ 129,097	$ 912,329,800	0.01%	475,374	$ 0.03
CO	27.2%	$ 3,555,533	$ 2,087,889,000	0.17%	9,019,000	$ 0.04
MA	26.5%	$ 69,557,367	$ 2,601,971,000	2.67%	49,813,000	$ 0.15
MD	26.1%	$ 10,581,338	$ 2,709,710,600	0.39%	8,281,000	$ 0.13
CT	24.3%	$ 14,449,182	$ 1,196,000,000	1.21%	11,099,000	$ 0.14
NH	22.4%	$ 2,571,389	$ 697,139,900	0.37%	791,029	$ 0.34
Median for states with poverty rates above the US avg				0.12%		$ 0.11
Median for states with poverty rates below the US avg				0.38%		$ 0.11
Median for all states				0.16%		$ 0.11
Mean for states with poverty rates above the US avg				0.23%		$ 0.12
Mean for states with poverty rates below the US avg				0.77%		$ 0.11
Mean for all states				0.52%		$ 0.11

Notes:
1) Levelization assumes a real discount rate of 3% and an average measure life of 11 years (based on data).
2) Levelized cost of saved energy (formula in Excel) = (Low-income efficiency program expenditures* -PMT(real discount rate, average measure life,1,0,1)/low-income annual kWh savings)
3) Low-income levelized $/kWh COSE cannot be calculated for MT.
4) Some of the program administrators researched were not included in the analysis (MI, NY, LA and ME).
5) Subtotals and totals reflect median values. The key findings do not change with the use of mean values.
6) See the State and Program Administrator Data Sources subsection of References for sources.
7) The data in the column entitled “Low-income % of residential revenues” are summarized in Figure 1. The data in the column entitled “Low-income levelized $/kWh cost of saved energy (COSE)” are summarized in Figure 2.

[12] Residential revenues are the revenues from electricity sales to Residential customers, including low-income and non low-income customers.

Conclusions

All states—particularly those with higher poverty rates—have the opportunity to ramp up low-income energy efficiency efforts. Our data suggest that states with higher poverty rates tend to invest less in low-income energy efficiency as compared to states with lower poverty rates. Additionally, our data suggest that greater low-income energy efficiency savings do not come with a higher price tag. Also, the cost to acquire a unit of energy savings does not appear to be different for states that invest more in low-income energy efficiency efforts than states that invest less in low-income energy efficiency. For these reasons, we believe that states with higher poverty rates can and should ramp up low-income energy efficiency efforts to achieve state and national emission reduction targets.

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