New Opportunities in Low-Income Energy Conservation Programs

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ABSTRACT

Utility-sponsored, low-income, weatherization/energy-conservation programs traditionally have leveraged resources through the U. S. Department of Energy's(DOE) Weatherization Assistance Program (WAP). In past years, many delivery agencies and utility funders relied on DOE funding to help provide a sustained infrastructure to deliver a full range of energy-efficiency upgrades to participating homes. The programs also helped utilities achieve savings goals, while offering an important service to low-income customers, who generally cannot participate in more traditional,demand-side management offerings.

Recently, the landscape for low-income programs has changed dramatically. DOE WAP funding averaged around $200 million a year between 2002 and 2008. Dollars attributed to weatherization during the Recovery Act period (2009 to 2012) increased the funding to $5 billion. Following the Recovery Act, however, federal funding dropped to a fraction of its prior levels: in 2013, DOE WAP dollars will total $68 million across the United States.

This significant funding reductionwill require utilities to play a larger role in these programs. Most utilities face constraints resulting from mandates to run cost-effective energy-efficiency programs. Many low-income programs struggle to pass the Total Resource Cost (TRC) test without the inclusion of non-energy benefits.

The potential decimation of low-income programs—whichcannot be considered an option—can be addressed by treating them as another resource acquisition program: finding approaches to make them cost-effective. Real-time evaluations, associated course corrections, and targetingoffer viable program options. Corrective actionsmust be taken when a program's cumulative impact over a given period falls below its cost-effectiveness limits.

In a recent experiment funded by DOE, the authors' evaluation team built a data tracking tool for an agency in Ohio. This tool tracks agency activities, including homes weatherized, measures installed, and costs incurred. In addition, the tool computes a TRC value per participant, and alerts the agency when potential deviations from the path appear likely. The agency then takes corrective actions (e.g., changes the mix by introducing homes with higher potential savings per invested dollar).

Based on this case-study and on the authors' work with utilities, delivery agencies, and commissions across many jurisdictions, this paper presents options for successfully delivering utility, low-income, conservation programs, given the new paradigm of limited federal leveraging.

History of Low-Income Conservation Programs

Program Overview. The Weatherization Assistance Program (WAP), provided through the U.S. Department of Energy (DOE) since 1976, has a long history of providing low-income households with energy-efficiency and/or health and safety upgrades for their homes or rental units. In 1982, the Low-Income Home Energy Assistance Program (LIHEAP), administered by the U.S. Department of Health and Human Services (HHS), allowed states to allocate additional dollars in concert with WAP

funding to weatherize and provide health and safety-related repairs and equipment upgrades to participant households.

Weatherization funding from DOE and HHS flows to individual states, territories, and some tribes, where it can be dispersed among: community action programs (CAPs); non-profit organizations; local governments; and tribes (collectively referred to as "agencies"). These organizations provide services within an agreed-upon geographic area, generally defined by county, with many agencies serving multiple counties.

Many states and agencies support their weatherization efforts through funding from additional sources. These may include: state general funds, Petroleum Violation Escrow, and utility dollars. In the past, such funds have been spent similarly to federal funds, with utility dollars usually stipulated only to serve company customers.

In most states, a home beginning its weatherization process undergoesa complete energy audit, which assesses: the building shell; leakage; appliance conditions and efficiency; and health and safety. If the home cannot be safely weatherized or requires significant repairs before weatherization can begin, CAP staff must "walk away" from the building, and cannot provide weatherization services. Though limited funds exist to provide home repairs, generally these have been insufficient to undertake larger repair efforts. A few agencies have been able to raise funds from private parties or to secure grants to provide a more extensive repair services. These can be quite transformational for a home, and, while expensive, can contribute to significant energy savings.

For many years, utilities have been able to leverage federal funds, contribute funding, and secure energy savings through a highly developed, federally supported delivery vehicle. Historically, utilities have only paid for materials and labor costs associated with measure installations (including some health and safety measures), and have provided a small budget percentagefor program administration. Federal funding largely has covered costs for work trucks, warehousing supplies, training and technical assistance costs, and supporting reporting infrastructure.

Recovery Act. The Recovery Act of 2009included a $5 billion allocation to increase: the number of homes served through the weatherization program; the depth of weatherization services offered to each individual home; and the capacity and training of agencies and states providing weatherization. Recovery Act dollars had to be expended by the beginning of 2012.

Administered to states and cycled into agencies, Recovery Act funding included changes to WAP execution guidelines. Eligible income levels increasedfrom 150% to 200% of the poverty level. In some cases, homes qualified for re-weatherization if insufficient or ineffective measures had been installed. Average WAP costsallowed per unit increased from $2,500 to $6,500. Initial funding released to states sought to provide agencies with greater training and technical assistanceto accommodate the resulting expansion in funding and eligibility.

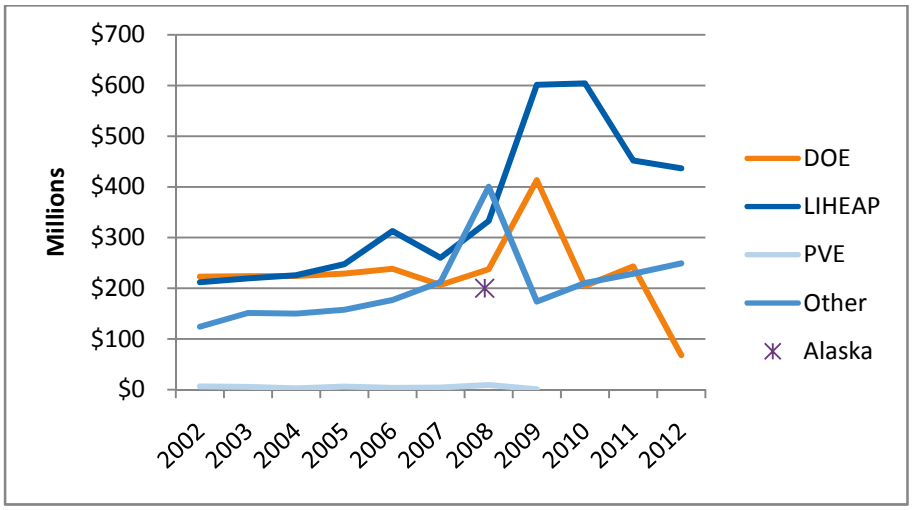
This unprecedented funding increase allowed states and agencies to train new weatherization staff, and many began to seek subcontractors to perform the work. This often resulted inreduced spending of private funds, such as ratepayer dollars,giventhe time-sensitive nature of distributing Recovery Act dollars. As this federal funding increase has not been sustained, its reductions have greatly affected the low-income agency infrastructure.

In 2012, two factors dramatically affected low-income weatherization funding, and, in many states, marked a decisive change in standard operations:

1. In March 2012, the Recovery Act spending deadline marked the end of the$5 billion windfall funding.
2. DOE significantly reduced program contribution levels below pre-Recovery Act levels ($68 million versus prior levels of $200 million).

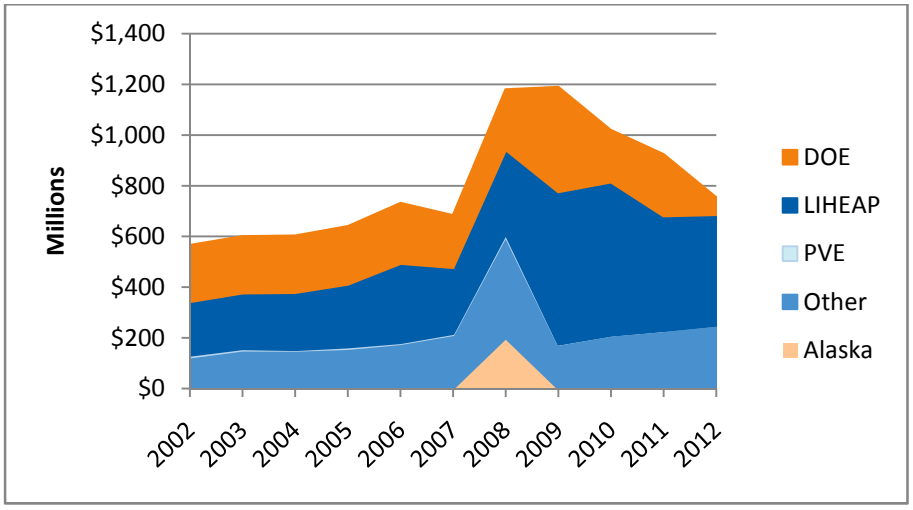
Recovery Act funds required significant changes to agency infrastructures to meet demands, with many agencies increasing fuel-time staff and/or contractors from their 2009 levels. The exhaustion of Recovery Act funding resulted in significant reductions in staffing and contracting for low-income weatherization.

While Recovery Act exhaustion was anticipated, the programs experienced a more critical setback from the 2012 drop in DOE funding. Standard DOE WAP funding began scaling back in 2010, with an understanding that Recovery Act funds had provided substantial resources at that time. The continued decline in DOE WAP funding in 2012, however,was largely unanticipated. The nearly $175 million reduction between 2011 and 2012 caused substantial cuts across nearly every state, with 20 states losing all funding. Figure 1 provides a historical view of low-income weatherization funding by source, highlighting steep declines in DOE funding, beginning in 2009 (the figure does not include Recovery Act funding). Figure 2 shows cumulative WAP funding by source for the same period. (National Association for State Community Services Programs2013)



Notes:Recovery Act funding, thoughnot depicted, represents a $4.7 billion allocation over 2010 and 2011.As a one-time allocation in 2008, Alaska received $200 million in state funding.

Figure 1. Historical WAP Funding by Source



Notes: See Figure 1.

Figure 2. Cumulative Historical WAP Funding by Source

Agency Approach to Weatherization under WAP. Using a whole home approach, low-income weatherization home energy audits, as traditionally provided under DOE/WAP, determine the mix of measures necessary to optimize a home's energy efficiency. Projects must be cost-effective under the savings-to-investment ratio (SIR) criterion, calculated by considering energy saved, valued at the electric or natural gas rate paid by the customer, versus total investments. Generally, unless associated with health and safety, energy-related measure costs must deliver a 1.0 SIR or greater. (Russell 2010)When CAP agency staff perform an energy audit, and develop a work order for a participating home, they calculate the SIR for the project as a whole, determiningwhether costs will be approved for reimbursement.

The agency conducting weatherizationoften leverages dollars from multiple sources for each home to ensure the best, most comprehensive measure package. Under the old paradigm (and even now), jobs may receive funding from more than two sources, with as many as five or six different funding sources paying for different pieces of the same job. A home could have a furnace replaced using LIHEAPdollars, insulation blown in the walls and ceiling using DOE funding, a refrigerator replaced and compact fluorescent lamps (CFLs) installed using utility funds, and duct sealing completed using general funds secured through the state legislature. Every home differs, requiring its own mix of measures, and drawing upon varied funds for each measure. With their many years of experience, CAP staff have become adept at determining how best to leverage funding sources to meet the needs of an individual home.

Funding changes presented new challenges for agencies spending utility dollars:that is, how does one leverage utility funds against other funding sources that may no longer exist? In many jurisdictions, utilities now may be able to serve asa major funding sourcefor low-income weatherizationprograms.

The New Low-Income Energy-Efficiency Landscape

The phenomenal funding increase for low-income weatherization, followed by the lowest funding in decades for DOE WAP,resulted in a number of changes. Most weatherization agencies have had to layoff staff. In some areas, utilities have stepped up to fill part of the gap left by the DOEfunding. In Massachusetts, the Public Utilities Commission asked utilities to pull these funds together, responding to a $6.7 M reduction in DOE WAP funding from 2009 to 2010. In Michigan, Consumer's Energy expanded its low-income, energy-efficiency offerings, introducing three new programs targeting different segments of this population. Ameren Missouri, which traditionally has funded additional weatherization through the state structure, focused its energy on low-income multifamily programs during the Recovery Act, and currently is expanding that model to include low-income, single-family neighborhoods.

Benefits for low-income program funding have been well documented. Not only can utilities generate additional energy savings to meet their program or regulatory goals, but low-income energy programs have a strong history of helping households more effectively meet their energy bill obligations. The programs also help residents' health and safety. While there are many benefits to utilities and their ratepayers for offering low-income energy programs, we review below some of the restrictions and barriers to participating.

Barriers to SuccessfulLow-Income Programs

Cost-Effectiveness. For some utilities, funding low-income energy programs must meet a number of regulatory requirements. For example, in certain states,programs or groups of programs must

pass aTotal Resource Cost(TRC) test.[1] Fundamentally, inherent conflicts have occurred when considering cost-effectiveness for traditional low-income weatherization programs, which baseexpected energy-savings on one cost test (SIR), but are evaluated using a different cost test (TRC).

These tests primarily differin that SIR does not include costs associated with program administration, evaluation, marketing, ornon-energy related health and safety measures (e.g., electrical repair, roof replacement). More importantly, SIR values savings using utility retail rates, and TRC values the same benefits using utility avoided costs. As such, TRC (if calculated without non-energy benefits [NEBs]) always yields a lower benefit/cost ratio for utility-sponsored programs.

While exact tests vary between states, and slightly differ in utility commission interpretations, the TRC serves in several jurisdictions as acommon test required for evaluating utility programs.[2]The TRC values savings based on utility avoided costs, with the TRC benefit-cost ratio computed using the total investment in the home. This presents a problematic starting point: programs are delivered in the field using SIR, and evaluated later using TRC—a significantly more difficult test to pass. When regulatory commissions require utilities to pass a TRC, they cannot allow a program to continue operating without being cost-effective. This issue plays out in the following ways:

- Low-income programs are evaluated as part of a portfolio of utility programs, with TRCs calculated at that level.
- The commission (in several states)simply requires utilities to fund low-income programs at a certain level.
- The utility only pays a portion of costs for each measure:that which they can, on average, cost-effectively spend towards a measure.
- The state regulatory body does not require meeting cost-effectiveness tests for energy-efficiency programs in general, or for low-income programs specifically.

The authors have found, however, many low-income services can be delivered cost-effectively, and need not be "carried" by other programs.

While some low-income programsmay not prove cost-effective for utilities from a simple resource acquisition perspective, other motivations encourage offering these programs:

- ***Equity:***Directing ratepayer dollars for energy-efficiency to the low-income residential segment, including ratepayers contributing to demand-side management (DSM) funded tariffs, but less likely to participate in other rebate-oriented programs requiring participant upfront costs.
- ***Resource Acquisition:***Securing DSM-resources within a hard-to-reach residential sector segment.
- ***High-Cost Customers:***Reducing delinquency in payments, disconnects, or other utility expenses associated with some low-income customers.
- ***Public Relations:***Maintaining positive public perceptions by contributing funds to prominent social programs.

[1]According to the California Standard Practice Manual, benefits include: avoided energy costs; avoided capacity costs; and line losses. Costs include those incurred by the utility and the participant. Non-energy benefits associated with program effects should also be considered in a true TRC test scenario. Including these benefits more accurately depicts the full spectrum of benefits associated with program activities, in addition to balancing the cost component (which includes all costs). Common NEBs considered in low-income weatherization programs include economic, environmental, payment (i.e., reduced arrearages), and impacts related to health, comfort, and safety.

[2] For this discussion related to low-income weatherization programs, which do not present participant costs, the TRC and utility cost tests reflect the same costs and benefits.

Despite these motivations, when utilities must meet cost-effectiveness requirements, either at the program or portfolio-level, they often look to non-traditional program designs.[3]Today, asfunding opportunities increase with the decline offederal investments, utilities may advantageously consider ways to include low-income, energy-efficiency, DSM resources in their portfolios.

Low-Income Program Evaluation Methods. Multiple methods exist for evaluating savings from low-income weatherization programs. The most rigorous billing analysis approach requires evaluators to compare weather-normalized, participants' pre- and post-treatment consumption against a control group. This allows evaluators to isolate the average effects of program services across the participant population, not only determining measure savings, but including savings from any energy-using behavior changes in a household. In theory, comparing the control group's consumption accounts for changes in energy-using behaviors due to economic circumstances, and mimics other variances in households within the overall low-income population.

In practice, billing analysis proves the most punitive method of calculating savings from energy-efficiency programs. In addition,it is not a standard applied to most other programs and "penalizes" low-income programs for common takeback effects (e.g., turning upthermostats to safe and healthy levels, usage increases resulting from increases in household members). Evaluations of many other DSM programs (such as individual measure rebate programs, or programs in states requiring TRM-based reporting) use engineering methods that do not incorporate such effects explicitly.

Baseline Assumptions of Existing Equipment. Many states and utilities have started developing technical reference manuals (TRMs) that provide energy-saving algorithms or deemed savings numbers to help standardize the process of reporting claimed savings. These processes frequently do not include measure algorithms or assumptions applicable to low-income programs or the low-income customer segment. Therefore, low-income programs can encounter issueswhen required to use residential engineering calculations for reporting measure savings. Typical residential measure algorithmsused to calculate savings compare efficient equipment to an assumption of existing equipment, set to the federal standard efficiency by equipment type. For example, replacement of an ENERGY STAR® refrigerator with a top-mounted freezer (using 397 kWh/year) would compare to the federal standard (497 kWh/year), resulting in annual savings of 100 kWh.

Using a federal standard as the baseline for this calculation assumes, in the program's absence, a customer would still purchase a refrigerator of standard efficiency. Therefore, only the incremental difference in usage would be attributed as measure savings. This assumption proves inappropriate for low-income customers, given a lack of disposable income renders these households unable to purchase equipment meeting federal standards, much less to participate in a rebate program. More appropriately, installations occurring through low-income, energy-efficiency programs (which pay 100% of participant costs) should be considered existing equipment as the baseline for savings estimates.

Some TRMs have started to draw such distinctions for measures specific to low-income participants. For example, the Ohio TRM differentiates residential time-of-sale refrigerator savings from a low-income, early refrigerator replacement, assuming average baseline equipment usage of 500 kWh/year for a unit representing the federal standard efficiency, and 1,376 kWh/year for existing low-income equipment. This represents an estimated savings difference of nearly 900 kWh/year. While this TRM provides low-income specific algorithms for refrigerator and room air conditioner replacements, other measures offered through weatherization (such as furnace replacements or shell applications [e.g., insulation, air sealing]) rely on standard residential baseline characteristics.

[3] Other programs in the utility portfolio that fail to pass TRC (possibly due to program design issues or avoided costs), may also benefit from a similar exercise of real-time tracking.

Until TRMs begin to differentiate savings algorithms specific to the low-income customer segment, these standardized assumptions used in reporting energy savings might not accurately characterize existing equipment,thus underestimating impacts of certain measures.

Traditional Agency Delivery. A pronounced distinction emerges between stakeholder perspectives and values or criteria guiding contributions to low-income weatherization programs. Such programs face challenges in the wake of federal funding shifts; specifically: how can agencies work more closely with utilities to continue delivering services to low-income customers while meeting autility's objective for achieving cost-effective energy savings? This may ultimately require cultural shifts for agencies and changes in their traditional delivery methods.

The whole-house comprehensive retrofit approach to delivering low-income weatherization, part of DOE's program doctrine since 1999 (Millennium Committee 1999),remains consistent with many agency missions. Agenciesfocus on serving low-income households to improve health and safety and to increase energy affordability for the residents. Consequently, agencies often stretch all available funding to provide homesthat have as many cost-effective upgrades and measures as possible. While this helps meet their goals and betters their clients' lives, such an approach can result in lower cost-effectiveness results.

Moving agencies from a whole-house approach toward more targeted,measure-driven, utility-funded programs has been sensitive in some areas. While the whole-house approach utilizes sound logic, seeking to maximize benefits to participants and avoiding lost opportunities, such operations may not, in all cases,prove cost-effective under a TRC. Agencies can increase funding for low-income energy programs by helping utilities capture DSM resources from this hard-to-reach residential segment. While this means not every home may receive the whole-house treatment,such approaches may allow agencies to ensure long-term viability and secure utility funding.

Additionally, this approach entwines with agencies' greater ability to work within the parameters of conventional DSM program implementers, perhaps providing abridged services with utilities dollars, while delivering these benefits to larger volumes of constituents in need. This should be viewed as a framework for agencies and utilities to orient a program around joint objectives, with both seeking to improve energy affordability for households, along with securing energy-savings opportunities.

Solutions Overview

This section explores the following three key strategiesfor helping utilities and agencies to deliver cost-effective, low-income,energy-efficiency programs:

1. Real-time evaluation.
2. Changing program elements, structure, and offerings.
3. NEBs.

Our research suggests these solutions address changes in mechanical delivery and design aspects, while considering a wider range of benefits to include in cost-effectiveness testing.

Real-Time Evaluation

Real-Time Evaluation Elements

Some utilities use real-time program evaluationsto ensure their DSM programs operate cost-effectively and reach their stated goals. At aprogram's outset, evaluators look for issuesarising in: data

collection strategies; information captured through program operations; and determining the accuracy of assumed measure savings.

Low-income programs often do not use real-time program tracking, despite its common use in utility-offered, non-low-income rebate programs. Real-time tracking incorporates all installation, household, and participation data into a dataset that program implementers and sponsors can review to gauge progress to date—in real-time—as needed. This helps managers understand whether the program installs the number and type of measures expected, and can generate estimates of measure savings, home-level savings, and overall savings. Real-time tracking also can provide estimates of cost-effectiveness at each level: measure, home, and for the overall program.

Benefits from tracking low-income programs in real-time include: fewer surprises at year-end regarding program savings and cost-effectiveness;and opportunities for prioritizingindividual homes at different points in the delivery year. This can ensuresufficient program-level savings to address homes with the potential for minimal (or negative) savings.

The authors have found real-time tracking helpslow-income agencies better reporttheir program results to utilities by providing accurate, regular updates on installed measures. More sophisticated tracking systems may use home-specific or baseline data that affect measure savings for homes with characteristics significantly different than average. In a recent real-time tracking system developed by Cadmus, the tool allowed users to determine, at the point of reporting, sets of algorithms or deemed savings estimates to be used for reporting to different funders. For one funding source, the sponsor requested savings based on algorithms populated with participant-specific data, while another funding source required reporting on savings by strict TRM-defined deemed savings.

Course Corrections. Real-time tracking offers a number of benefits for utility sponsors, delivery agencies, evaluators, and other stakeholders. Leveraging information supplied through real-time tracking, resulting data can be used to institute course corrections, as necessary. Low-income weatherization agencies commonly ensure programs pass SIR testsat the home level. Though important facets of low-income weatherization programs, health and safety work and repairs can reduce cost-effectiveness specific to utility metrics (e.g., TRC). Real-time tracking can identify whether a low-income program has achieved too few savings for the investment at a specific time or over the course of amonth, quarter, or program year.

These tools also can contain a set of indicators to be triggered when a project or overall program may be deviating from course. This can provide a nudge givingprogram staff the opportunity to target homes they know will generate higher amount of savings or that incur lower costs. Typically, these opportunities include: multifamily units; high energy users; and homes with much older baseline equipment. Such actions can ensure that a widow living alone with low-usage can still receive services, recognizing work on her home will not generate as much in savings, but the house down the street, home to an active family with three children, will likely generate enough savings to compensate for the low-saving home.

When targeting high-use customers, it is important that tracking tools can use adjusted algorithms or baseline characteristics to more accurately model savings generated by the home.

Participant Targeting. In addition to continuous tracking and course corrections, participant targeting offers another strategy for allowing weatherization programs to provide services to low-saving homes, while achieving cost-effectiveness requirements. To balance cost-effectiveness, program delivery can allow a mix of energy users, from low-usage/low-saving customers to high-usage/low-efficiencycustomers. While such customer mixesoccur naturally, identifying and distinctly considering these customer types can allow a blend to be planned. Then, when monitored cost-effectiveness levels

fall below a 1.0 TRC ratio, high-usage participants can be prioritized to bring the program back to equilibrium.

Using a metric such as energy intensity (usage per square foot), along with other available household or demographic data, one can identify high-usage customers, despite variations in home sizes. While customer usage and square footage data can be more readily procured, demographic or household data can be collected through intake forms, allowing a more rigorous analysis, and modeling usage to control for other variables affecting variations in energy consumption (such as the number and age of occupants, the home's age, and poverty levels).

Translatingefficient targeting into differentiated participant impacts, requires distinct savings algorithms or baseline information to differentiate measure-level savings between high- and low-usage customers. For example, one has an annual heating load of 5,000 kWh and another has a load of 15,000 kWh, shell measure installations (e.g., insulation, air sealing) may result in 5% to 8% savings of pre-period usage, reflecting larger absolute energy savings for the higher consumer.

Clearly, integrating a process for participant targeting remains distinct from developing a program targeting only high-usage customers, but incorporating a process for participant targeting offers a method to balance program cost-effectiveness, while allowing a mix of participants to receive program services. This would enable, for example, a program to serve a low-usage, high-need customer that may be in dire need of assistance (despite smaller estimated savings) by offsetting this project with a high-usage customer, whose energy-saving impacts prove sufficient to keep the program on-track regarding cost-effective delivery.

Recent DOE WAP guidance expands participant prioritization protocols to include high-energy usage and high-energy burdens as two additional criteria agencies can use for targeting their services. (Sperling 2008)Though DOE funding traditionally has prioritized households with elderly, disabled, or children under the age of six, this guidance offers agencies more flexibility in delivery.

Practical limitations to targeting participantsby usage characteristics include: choosing who identifies high-usage participants, and which method should be used. Agencies may not have access to utility consumption data, available staffing, or other resources to allow identifying and tracking usage in-house. When accounting for high usage, some utilities will compare simple summations of 12-month consumption across customers. This does not control for several significant factors required to identify true "high-usage" customers, such as the number of occupantsper home, square footage, equipment fuel types, and geography/weather. Using a few model households, Table 1compares energy intensity (annual kWh usage per square foot).

Table 1. Examples of Household Energy Intensity

Household	Annual Usage (kWh)	Number of Occupants	Elevation	Sq. Ft.	Energy Intensity (kWh/Sq. Ft.)
A	5,000	1	Low	1,500	3.3
B	10,000	4	High	3,000	3.3
C	5,000	2	Low	2,000	2.5
D	10,000	2	Low	2,500	4.0

For households A and B, the latter indicates absolute higher usage; this may, however, be result from a larger household size or more extreme weather. When considering energy intensity (controlling only for one of these exogenous factors), households A and B must be considered equal. In considering households C and D, the energy intensity measure reveals household D has higher usage patterns, despite differences in square footage.

Case Studies

OR REACh. In 2004, the State of Oregon's Office of Housing and Community Services (OHCS) received a Residential Energy Assistance Challenge (REACh) grant. As part of the grant application, OHCS worked with Quantec, LLC, (the evaluation firm now known as Cadmus) to institute evaluation and program monitoring, and to provide early feedback on program delivery and operations.

The program included energy education as a key component, offered most frequently in group settings, coupled with a kit of low-cost energy-efficiency measures that participants would take home and install themselves. As part of the evaluation, Quantec tracked the program's progression and expected energy savings associated with energy education and installation of low-cost, energy-efficiency tools.

After several months of program implementation, survey responses regarding installation of kit measures indicated a number of participants did not install showerheads, even though these had been promoted through the program as the highest-saving measure. Quantec's follow-up with agency case managers and program participants found many households with older or disabled members required a hand-held showerhead. Quantec identified this issue early in the delivery process, and recommended OHCS provide fixed and handheld showerheads for participants, based on the individual household's needs. An easy fix for the program, this increased installation of showerheads significantly from earlier results.

People Working Cooperatively(PWC) Pilot Study and Evaluation. In 2011, Cadmus, began developing a real-time tracking tool for use by a non-profit organization that offered energy conservation services, home repairs, and modifications to increase the ease of mobility for seniors and disabled customers (such as wheelchair ramps and grab bars). PWC of Cincinnati, Ohio, provides services to low-income households in Ohio, Kentucky, and Indiana. It derives much of its fundingfrom utilities seeking not only to support low-income customers, but to run cost-effective programs, generating electric savings that the utility can claim beforeits commission.

The tracking tool developed for PWC used data uploaded monthly from the agency's tracking database. It allowed Cadmus and PWC toreview: the number of homes served; expected energy savings for each home; numbers of measures installed; andprogram costs per home and overall. Most importantly, the tracking process producedTRC estimates for each participant and each installed measure. This data level allowed PWC to conduct outreach to potential participants with characteristics indicating their households possibly could behigh savers.

Ultimately, the tool and its outputs served to promote a new pilot program to the area's major investor-owned utility (IOU). Once approved by the commission, the pilot program will allow the agency to deliver its traditional weatherization services to participants, while the area IOU will pay a flat rate for first-year kWh savings associated with each measure installed. Though it bases savings on TRM algorithms, some have adjusted baselines to account for installations in low-income households. This arrangement offered the agency an opportunity to install measures in homesitconsidered appropriate, while reassuring the utility that itsprogram contributions would prove cost-effective.

Changing Program Elements, Structure, and Offerings

Diversify Program Offerings

Historically, utility DSM offerings have secured residential, low-income, segment resources by leveraging dollars with existing,low-income, weatherizationprograms run by CAP agencies. While the conventional vehiclerequires limited utility effort, some utilities have sought to diversify low-income

program offerings beyond this weatherization model. Specific elements for a diversified low-income portfolio may include: initiatives dedicated to energy-saving education; home audits and low-cost recommended actions;workshops or neighborhood-focused efforts;triage services; or measure-specific efforts (e.g., direct-installation initiatives). Additionally, some utilities (e.g., California, Texas) offer sovereign programs in parallel to DOE WAP, without overlapping specific contributions.

Case Study: Consumers Energy. Consumers Energy expanded its low-income program offerings prior to close of Recovery Act, creating a portfolio of programs with two primary, distinct initiatives: weatherization though the local agencynetwork; and an audit/direct install initiative called Helping Neighbors.

Helping Neighbors, targetedsingle-family and multifamily low-income participants, providing the following:a home audit and walk-through; energy education; direct-install measure installations (including CFLs, showerheads, aerators, programmable thermostats, and furnace tune-ups); and recommendations for additional work designed to save energy, and for other utility programs that could lower installation costs. Distinct from weatherization, Helping Neighbors provided a vehicle to reach qualifying customers, while offering higher frequencies and flexibilities than weatherization. While some participant intake originated through sign-ups, implementation staff also solicited participants by going door-to-door when visiting participants' neighborhoods. This arrangement offered unique degree of flexibility, compared to standard low-income weatherization programs, which typically require on-site intake at a local agency.

In 2012, Consumers Energy experienced a reduction in agency capacity and matching funds compared to those the program had prior to the Recovery Act. Consumer's diversified portfolio allowed the company to ramp up delivery of Helping Neighbors, despite the absence of weatherization funding and staff. Utilizing this shifted focus, the utility continued to offer benefits to low-income customers, despite the diminished capacity of its traditional delivery mechanism.

Non-Energy Benefits

While programs should be designed for cost-effectiveness, based on energy-efficiency merits, genuineNEBs also should be considered, some of which can be quantified and included in the TRC test.

In addition to considering approaches to run more cost-effective programs, NEBs associated with program activities should be identified and quantified, and, if appropriate, maximized. Regulators often use nonspecific language in providing guidance for inclusion of NEBs and calculation methodsappropriate in benefit-cost analysis. Still, such NEBs can present genuine benefits, occurring through program activities, and, from a participant perspective, may better alignwith their motives for participation. Best practice considers three primary NEB categories, each specific to the stakeholdergroups that receive them: societal, utility, and participant. (Skumatz 2010)

While quite a lengthy list of potential NEBs (attributable to program activities) occur in each category, fewer defensible methodologies quantify these benefits and assign a dollar value. Primary challenges regarding NEBs in cost-effectiveness testing involve:choosing the appropriate methodologies to quantify/dollarize the benefits; and determining which NEBs prove appropriate for inclusion in utility cost-effectiveness reporting (for example,adding to a TRC).

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