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INTEROFFICE MEMORANDUM

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**To:** Molly Lunn, Deputy Director, Office of Energy & Recycling  
Illinois Department of Commerce and Economic Opportunity

**From:** Ian M. Hoffman, Steven R. Schiller, Electricity Markets and Policy Group,  
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**Subject:** Policy, Administration and Implementation Options for addressing Cost  
Effectiveness of the DCEO Low Income Programs and Possible new Low  
Income program Opportunities

**Date:** March 31, 2016

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The Illinois Department of Commerce and Economic Opportunity (DCEO) administers three statewide energy efficiency programs aimed at income-qualified households. To inform design of its proposed portfolio of low income programs for the upcoming program year, DCEO asked LBNL to examine two issues:

- I. How might DCEO address suggestions that its programs are not cost effective?
- II. What other program types (or innovative variants on existing programs) might DCEO consider as it assembles its low income portfolio?

The first two sections of this memo present some policy and program administration and implementation considerations associated with cost effectiveness. The first section discusses options for cost effectiveness testing and factors considered in those tests. The second section discusses mechanisms for potentially reducing administration and implementation costs or increasing savings. The third section addresses potential new market and program opportunities, which in turn also may address cost effectiveness on a portfolio level.

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## **I. ASSESSING COST EFFECTIVENESS**

In testimony regarding the current DCEO low income programs, petitioners raised questions about the cost effectiveness of the residential retrofit program, making reference to the total resource cost (TRC)<sup>1</sup> test.

The latest ICC order approving the current DCEO portfolio (“ICC Approval of IL DCEO Energy Efficiency Portfolio and Plan”, Document 13-0499) reaffirmed that the total resource cost test (TRC) is not applicable to low income programs<sup>2</sup> but directed the DCEO to consider ways to improve cost effectiveness and “explore whether more customers can be served under the low income program.” DCEO was tasked specifically with examining potential changes in project screening and selection of measures to be installed in order to maximize total program savings and the number of households served and thus ensure effective use of ratepayer funds.

Cost effectiveness is a function of many factors, the more fundamental being:

- Which test(s) are used
- Which costs are recognized
- Which benefits are counted
- What time frame (measure lives) and discount rates to apply

These choices are informed by economic perspective, the selection of which is often an “eye of the beholder” decision. In reviewing the cost effectiveness of its low-income programs, the commission and the DCEO and its stakeholders might consider the

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<sup>1</sup> For definitions of the TRC and other energy efficiency cost-effectiveness tests see: National Action Plan for Energy Efficiency (2008). Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy- Makers. Energy and Environmental Economics, Inc. and Regulatory Assistance Project. <https://www.epa.gov/sites/production/files/2015-08/documents/cost-effectiveness.pdf>

<sup>2</sup> The Illinois Public Utilities Act (220 ILCS 5/8-103, -104) states that low income energy efficiency programs and measures, unlike all other energy efficiency programs funded by utility customers, “shall not be required to meet the total resource cost test.”

context and purposes of the programs and thus how cost effectiveness might be weighed and what role it should have in review of DCEO programs.<sup>3</sup>

Other states have addressed cost effectiveness of low income programs in a variety of ways, but there is general recognition that cost-effectiveness screening should be aligned with the policies and benefits that the programs are intended to address. Low income programs are typically offered to address multiple policy objectives. These include but are not limited to:

- Ensuring equitable access to energy bill savings
- Reducing rate assistance/LIHEAP payments
- Reducing bad collections and arrearages
- Improving household economic wellbeing by relieving energy poverty
- Reducing risks to health (including reduced exposure to allergens and other respiratory irritants) and associated societal costs
- Increasing the property value of the weatherized home and its longevity in the market for affordable housing
- Ensuring the safety of the household (including combustion safety)
- Enhancing productivity and reducing school absenteeism
- Enhancing comfort for the household

States rarely treat low income energy efficiency primarily as a source of energy and capacity resources or emissions reductions. Many other states do not require low income programs to be cost effective. Others assess low income cost effectiveness at the portfolio level,<sup>4</sup> so that the benefits of other programs compensate for the higher costs of savings generally found in the low income sector. Where an assessment of cost effectiveness is required, states are increasingly moving toward using either the Societal

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<sup>3</sup> Matters related to project-level screening and work scoping are covered in a separate section below on potential implementation considerations.

<sup>4</sup> Colorado and California calculate cost effectiveness on a sector basis.

Cost Test (SCT)<sup>5</sup> or adding a substantial percentage onto avoided costs to account for societal and participant benefits.<sup>6</sup> Part of the rationale for accounting for non-system benefits is an acknowledgement in some states that low-income programs in particular generate significant non-energy benefits for program participants and society as a whole and that it is thus appropriate to take those benefits into account.

Low income programs present a uniquely broad set of policy and programmatic considerations. The dialogue over the current DCEO low income portfolio suggests that cost effectiveness of those programs is a matter of stakeholder and regulator interest, but Illinois statutes do not appear to indicate whether and what other tests of cost effectiveness might be appropriate for low income programs. Thus, there is little guidance to the parties on what cost effectiveness means, what metrics might be applied or how those metrics might inform the conversation. It therefore may be useful to weigh several possible solutions that generally reduce program costs or increase savings in the realms of policy, program administration and program implementation. The next section is devoted to these topics.

## **II. PROGRAM ADMINISTRATION AND IMPLEMENTATION OPPORTUNITIES**

### *Alternative Program Administration Models and Implementation Enhancements*

The DCEO administers its low income programs chiefly as a grant-making agency that awards ratepayer and other funds to program implementers and partners and receives documented claims of savings in return (Lunn, personal communication<sup>7</sup>). The DCEO also has promulgated work standards for implementation contractors to follow and contracted with the University of Illinois and its weatherization training center to train implementation contractors in delivering projects that meet those standards. More recently, the DCEO has been examining 10% of weatherized homes for quality control

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<sup>5</sup> One of the latest examples is Washington, where regulators are assessing cost effectiveness for low income programs using three tiers of societal and participant benefits. Tier I benefits are generally easily quantifiable and well documented (e.g., reduced bad debt, collections and arrearages and income impacts) and are fully accounted for in analyses. Tier II benefits are more difficult to quantify or monetize (e.g., the cost of carbon or other avoided pollutants) and may be accounted for using approximations. Tier III benefits are very difficult to quantify with confidence (e.g., increased participant comfort, reduced illness and school absenteeism), and these benefits are taken into account more qualitatively or covered by an avoided cost adder.

<sup>6</sup> Vermont, for example, uses a 15% adder for all programs, with an additional 15% for low income programs.

<sup>7</sup> All citations to personal communications refer to phone conversations and email exchanges in February and March 2016.

and using those findings to identify additional training needs for contractors (Hartel, personal communication).

A number of other states use a similar administration model for low income programs. However, some program administrators that are government or quasi-governmental entities have found that more direct oversight or program requirements are needed in order to ensure the desired balance between the priorities of the program administrator and those of the community action agencies (CAAs) that typically serve as weatherization contractors. The CAA mission as advocate and service provider for low income households is manifest as multiple objectives: maximizing health, safety, comfort, income stability, bill savings, employment benefits and more (Hepinstal and Gerardi, personal communications). Efficiency program administrators, including governmental entities using ratepayer funds, tend to share those objectives but place somewhat greater emphasis on saving energy.

In order to ensure energy savings remains a priority, some states have built additional requirements into their program administration models. Eligibility screening and/or prioritization is handled by the state program administrator and based in large part on targeting homes with high usage (Gerardi, personal communication). In some states, program administration staff or independent contractors perform the energy audits – especially with large, complex multi-family structures – and assemble the work scopes for the implementation contractors to execute. The contractors are subject to specific training and certification requirements, and consistently lower-scoring contractors are culled from the program. QA/QC inspections are performed by state contractors or staff on as many as 100% of retrofitted structures to ensure program benefits for all parties are realized. Of course, this level of assurance on quality and costs also requires that the administrator have the capabilities and resources to effectively provide this greater oversight and relatively more direct program input. The intent of this greater oversight and review, as outlined above, is to increase energy savings.

Another administration and implementation model preserves more of the autonomy of the implementation contractors by, in effect, turning low-income energy savings into a commodity and thus potentially reducing the cost of energy savings. The program administrator and the community action agency or other implementer negotiate a price per kilowatt-hour or therm for energy savings keyed to a benefit-cost ratio of 1.0 (Khawaja, personal communication). The program administrator then agrees to “purchase” all savings delivered at that price, with the total payment often subject to a cap. The parties can negotiate on how savings are quantified and what QA/QC processes are appropriate to ensure all program objectives are met – and there is not simply ‘cream-skimming’ or other unintended consequences.

Given time constraints, LBNL did not become acquainted with implementation details for each of the three DCEO low income programs. Implementers of those programs may thus already be using some of the following strategies.

First, to increase the likelihood that savings and customers served are being maximized, it is important for implementation contractors to screen projects for cost effectiveness. At the project level, the most common cost-effectiveness screen for low income energy efficiency is the Savings-to-Investment Ratio (SIR), where:

$$SIR = \frac{\text{energy savings} * \text{retail rates}}{\text{measure costs}}$$

Application of the SIR can ensure that low income retrofit initiatives are cost effective on a project and program basis. Standard weatherization auditing software will rank measures by SIR value, and the implementation contractor generally could install all measures with an SIR of 1.0 or greater. Some jurisdictions allow installation of all measures with an SIR of 0.9 or greater if some other source of funds is used for some of the work, including cost sharing with the household.

Typically, a jurisdiction will exempt a certain percentage of the total project costs (usually up to 10%-15%) or a certain set amount (e.g., up to \$1,000) for work or measures installed to ensure health or safety of the household or to enable installation of the energy efficiency measures. For example, with an absolute cap on non-energy work, \$1,200 might be spent repairing a leaky roof so that the attic could be properly sealed and insulated, and \$200 would be included in the SIR cost term but \$1,000 would not.

In some jurisdictions, implementers may still install measures not meeting an SIR of 1.0 as long as any resulting deficit in cost effectiveness is made up in other projects. Maximizing energy savings in every project is ideal but does limit flexibility and the reach of the program. Instead, projects can be assessed on their own merit and the viability for the program at large; it sometimes can be beneficial to take a longer view of projects, as described below in the section on tiered or phased implementation.

In calculating savings, it also can be appropriate to define a savings baseline based on existing equipment versus a code standard. Many homes for low income households are older and have not been renovated in recent years and/or will have aged HVAC equipment.

Cost-effectiveness screening also can be streamlined by prioritizing high energy-use households. This practice can ensure large energy savings from the installed measures

but also help relieve low-income customers who carry high energy burdens<sup>8</sup> (Kelly/Cadmus, personal communication). It also allows for the treatment of other homes that are unlikely to be as cost effective. One useful practice is to maintain a log of jobs done over some time period (e.g., one month) and try to maintain some \$/kWh value *on average*. The program administrator or implementer can make course corrections over the following months as needed.

In another approach, the ratepayer-funded program administrator can simply add on and fund specific measures to weatherization or affordable housing projects that are driven by other funding sources, e.g., Habitat for Humanity. Efficiency Vermont supplements the state weatherization program in this way with ENERGY STAR appliances, smart power strips, heat pump water heaters, and mini-split heat pumps (ACEEE, 2016).

#### *Recruitment, Eligibility Screening and Prioritization*

Participant recruitment and eligibility screening can be a significant cost for low income programs. Participant recruitment costs can possibly be managed by ensuring the program administrator or implementers have robust information flows, and direct assistance, from:

- The servicing utility - for consumption data and eligibility for rate assistance
- Social assistance agencies – for eligibility for public assistance programs with similar income guidelines. In some jurisdictions, applicants found to qualify for public assistance are signed up on the spot for a weatherization audit appointment
- Community organizations – for identification of likely eligible households and signup for audits
- Federal and state/local housing agencies – for signing up eligible households and identifying savings opportunities and likely eligible structures and neighborhoods

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<sup>8</sup> The ratio of energy expenditures to household income

All recipients of rate assistance or most state/federal entitlement programs (WIC, several HUD section subsidies, etc.) can be assumed income qualified (known in some jurisdictions as “categorical enrollment”) and targeted for direct solicitation or added to calculations of densities of income qualified households in order to qualify neighborhoods or multi-family structures. For direct solicitations, some program administrators and implementers have found cost savings in recruiting and screening participants – and arranging for in-home audits and installations – using call centers.

Consumers Energy in Michigan uses an online appointment scheduling tool (Bob Roh, personal communication). The [tool](#) is located on Consumers’ Helping Neighbors website and allows customers to select their preferred time and date for a high-level audit, during which contractors install multiple low-cost measures. Average time to a scheduled audit is 12 days.

A number of jurisdictions also have streamlined eligibility screening by adopting thresholds for bulk income qualification. Projects funded strictly with WAP funds are subject to rules that allow income qualification of a whole multi-family structure if 66% of occupant households are income qualified. But program administrators/implementers using ratepayer funds exclusively for a subset of projects can use any density threshold. At least one California investor-owned utility uses 50%, for example. San Diego Gas and Electric uses PRIZM market segmenting codes,<sup>9</sup> such that anyone living in a neighborhood with certain low-income market codes is automatically qualified. Another approach scales the density percentage to the levels of poverty, e.g., the whole building qualifies if 25% of the households make 30% or less of area median income.

#### *Tiered or Phased Program Implementation*

Some program administrators are finding success with tiered approaches that progressively phase in more expansive measures or work over time. Through this approach, the program administrator/implementer may be able to reach more homes with some, perhaps limited, assistance and, for a subset of homes, achieve greater savings through more comprehensive measures such as system change outs, full

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<sup>9</sup> PRIZM is a market segmentation schema that combines demographic, consumer behavior, and geographic data and serves as a standard descriptive language for marketers to identify and understand potential customers. All U.S. households are characterized via defines every U.S. household in terms of 66 demographically and behaviorally distinct types or " PRIZM segments" that help marketers discern consumers' likes, dislikes, lifestyles and purchase behaviors.



insulation, etc. This implementation scheme therefore may achieve a balance between breadth and depth of savings across the qualified housing stock.

The tiers for qualifying households in single-family units can be defined in this fashion (Kelly/Cadmus, personal communication):

1. First Tier: Basic entry point programs where customers would get basic direct install measures, energy education and a plan/timeline for future comprehensive work on their homes.
  - Pairing with bill assistance programs
  - Provides basic services to home, such as direct installed measures and simple weatherization (single family example). For Consumers Energy's regular and income-qualified retrofit programs, implementation contractors arrive in Consumers Energy-branded vehicles and uniforms and direct install lighting, nightlights, programmable thermostats, hot-water pipe wrap, faucet aerators, etc. Customers then are given recommendations for further work, including air sealing, attic insulation, and furnace and air conditioning tune-ups.
  - Coordination with CAP agencies to provide services (direct install/simple weatherization) to neighborhoods
2. Second Tier: Once a customer's home has been visited by program implementer/CAA staff, the implementer puts that customer on a path for future assistance.
  - Sets mutual expectations on what can or needs to happen in the house (i.e. attic insulation, wall insulation, furnace replacement) and establish timeline.
3. Third Tier: *If* the program is meeting savings goals and does not require the deeper dive of savings into *all* homes, the program administrator/implementer can set up these timelines up so that the program can (a) continue providing first-tier services to new customers and (b) ensure second-tier customers will receive additional services in a timely fashion. For example, one household needs a new furnace immediately because their current one is unsafe or otherwise about to fail. They would be on track to receive a replacement in the next month. Another household will

need a furnace in next year. They can be put on a waitlist, and program can tap them in next program year for deeper savings.

Implementing tiered or phased programs does require significant coordination among implementation contractors, CAAs and any other program-sponsored contractors/trade allies to ensure energy efficient upgrades are provided to the low-income residents' home in a timely manner. One way to address this challenge is continuous project tracking by the participating CAAs. At end of every time period (perhaps one month), the CAA reviews their total savings and total costs for all installations; if the ratio is lower than the planned monthly target, they revise delivery the next month to bring in more cost-effective measures or homes.

Rather than coordinate through multiple email exchanges and calls, some program administrators and implementers are using automation. Clearesult, the implementation contractor for Consumers Energy's income-qualified retrofit program, is testing a new portal that coordinates the projects and funding of the community action agencies that perform the work (Diaz/Clearesult, personal communication). CAAs can submit project plans and reserve Consumers Energy ratepayer funding on the portal and receive clear, real-time answers on whether the necessary eligibility paperwork and other documentation is in order. If a project is declined for funding, the portal provides an explanation so the CAA can cure the deficiency or adjust its schedule and allocation of other funding.

Variants on the tiered or phased approach also can be applied to multi-family projects. The program administrator and/or implementer may agree to retrofit a landlord's properties in tranches, e.g., five in the first year, five in the next (Khawaja/Cadmus, personal communication). Or they can agree on wholesale installations of specific measures, e.g., common area lighting and occupancy sensors in year one, water-heating systems or boiler replacements in year two, energy management systems in year three.

Other phases can include enhanced or more expansive in-unit energy upgrades (Kelly/Cadmus, personal communication):

1. Partner with low income advocates, housing authorities, affordable housing contractors and implementers/CAAs for outreach. These relationships can help solidify the legitimacy and the benefit of the program for property managers and nonprofits, which is critical to gaining the attention of busy and resource-constrained organizations.
2. Start with simple, low cost energy efficient measure installations in each unit.

3. Expand to offer replacement and decommissioning of older room air conditioners and through-the-wall air conditioners, and cleaning, tuning, and coolant charging for central air conditioners.

Such a program approach can pose coordination challenges and require staff to invest time in assisting the various multifamily stakeholders (i.e., property owners, managers, maintenance staff, and tenants) in navigating the required energy audits, program paperwork, funding, retrofits, and any QC inspections. It is possible to mitigate those costs through information technology, however.

### III. NEW OR EXPANDED MARKET SEGMENTS AND PROGRAM DESIGNS

Other program administrators have found several merits in presenting a comprehensive low income portfolio that targets a broad set of measures and multiple market sub-segments, including all qualifying multi-family units and mobile homes. Some program administrators also are expanding their measure offerings beyond the traditional low-income focus on shell and system measures (ACEEE 2016). U.S. Energy Information Administration data suggest that energy consumption associated with HVAC and shell is declining as appliances, electronics (including home entertainment and rechargeable devices) and other plug loads assume a larger share of household energy use.

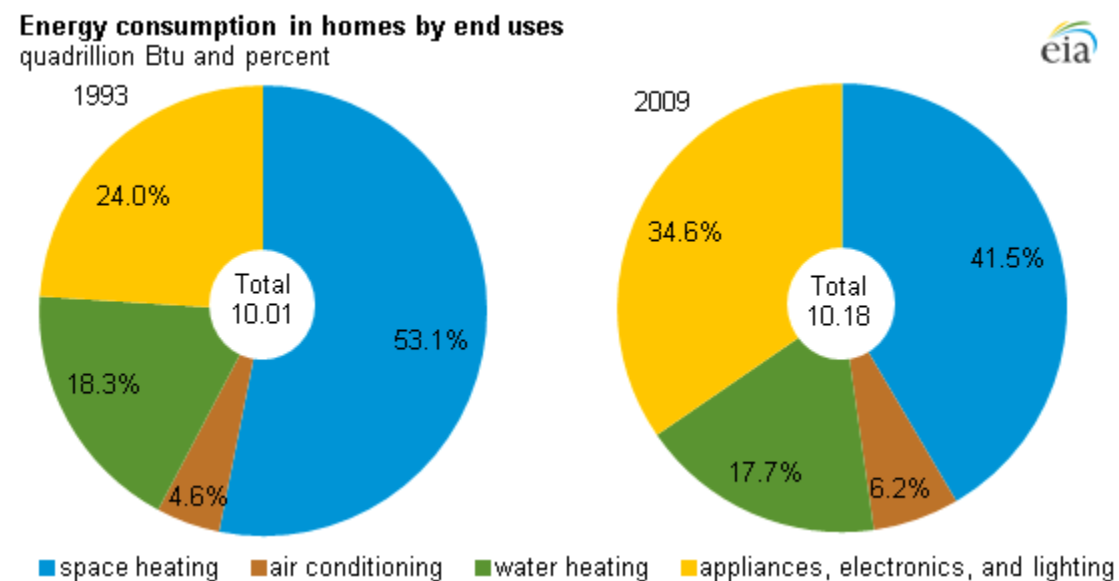


Figure 1. Percent of household energy consumption by end uses and systems

**Source:** U.S. Energy Information Administration, Residential Energy Consumption Survey

A comprehensive portfolio makes efficiency services available to all income-qualified households and thus achieve equitable access to energy savings for all utility customers. But it also can ensure that the program administrator has a program or set of measures to pursue all savings opportunities in the low income sector.

#### *Non-Public Multi-Family*

The most recent evaluation of the Public Housing Authority Efficient Living program identified one of these expanded market opportunities: extension of the program to owners and developers of non-public affordable housing subsidized by the U.S. Department of Housing and Urban Development (HUD). Limiting program participation to public housing authorities leaves private opportunities for savings unaddressed, makes successful execution of projects highly dependent upon relationships with key decision makers within PHAs, and is subject to the requirement to complete projects within one year.

Working solely with PHAs also may limit behavioral savings opportunities (Khawaja/Cadmus, personal communication). Utility costs in public housing often are included or covered by a monthly allotment to the tenant; PHA tenants therefore may not receive as much direct benefit from energy efficiency projects and may not have as much incentive to save energy as tenants in private subsidized housing. Extending low income efficiency to private multi-family units usually eases energy costs for tenants and may increase per-unit savings by serving households that are more directly exposed to energy costs and more motivated to conserve energy.

In other jurisdictions, HUD has provided lists of apartment complexes and neighborhoods where the number of subsidized units meets or exceeds a specific threshold and thus can be deemed a low income-qualified structure or neighborhood. As noted earlier, identifying and qualifying entire structures or neighborhoods can result in significant cost reductions and increases in the number of households served.

#### *Mobile/Manufactured Homes*

Mobile homes constitute a relatively small share of total housing stock in Illinois – about 2% - much less for example than in states in the South and Southwest. However, LBNL

analyses of U.S. Census data on housing<sup>10</sup> suggests that many of these units – about 20,000 – are concentrated in neighborhoods where 50% or more of households are income qualified.

Mobile home programs can triage neighborhoods of income-qualified households into homes needed complete replacement and homes best suited to retrofits (Kelly/Cadmus, personal communication). Homes built prior to HUD regulation of mobile home manufacturing in 1976 can be difficult to retrofit and should be considered for replacement. Programs in Vermont, Montana, Maine, Arizona, North Carolina and possibly other states make these programs work by pulling together multiple funding streams: ratepayer funds; WAP/LIHEAP; HUD; and bank loans. This program track can be lengthy and costly to assemble the necessary funding and get the replacement home in place so that the homeowner can enjoy a safer home and lower bills and the program can begin counting savings

Mobile home retrofits can be delivered as direct-install programs geared toward bulk qualification of entire mobile home parks. The process can look like this (Kelly/Cadmus, personal communication):

1. Conduct home audit:
  - a. basic direct install measures - LEDs, energy efficient showerheads, aerators)
  - b. weatherization (infiltration) installations – window caulking, door seals
  - c. provide energy education to residents
2. Conduct duct testing and sealing.
3. Consider overlaying the roof with a new insulated roof.

Duct sealing alone can save on average 800 kWh per year in a mobile home (Khawaja/Cadmus, personal communication) and can save even more from CFLs or LEDs and showerheads that are directly installed when the contractor visits the home. Implementers will need to balance quantity of duct sealing jobs with available incentive funding to maintain cost effectiveness, however. Targeting neighborhoods/mobile home parks can manage this balance.

#### *Potential New Delivery Channels*

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<sup>10</sup> Unpublished analyses for the DOE Office of Energy Policy and Systems Analysis, December 2015-January 2016.

Program administrators increasingly are getting efficient products to low-income households through non-energy-related organizations and channels, such as food banks, social assistance agencies and faith-based institutions. Program administrators using this approach include the DC Sustainable Energy Utility (DC SEU), Efficiency Vermont, the Low Income Usage Reduction Program in Pennsylvania, AEP in West Virginia, and Dayton Power and Light in Dayton, Ohio (ACEEE 2016). The DC SEU program, for example, distributes CFLs through church food pantries, community events, and mobile food markets. Efficiency Vermont worked with the federal Women, Infants, and Children (WIC) program to provide refrigerator replacements (ACEEE 2016).

*Clean Energy Incentive Program (CEIP)*

The CEIP will award two emissions reductions credits for compliance with the Clean Power Plan for each megawatt-hour saved (or equivalent short ton of carbon dioxide avoided) in 2020 and 2021, possibly including savings remaining from prior years' installations. Rules for the CEIP are still under development by U.S. EPA, but there is a strong likelihood that the CEIP will present opportunities for expanded low-income markets and additional program types. An investigation of their implications for the DCEO portfolio must await finalization of those rules and thus was beyond the scope of LBNL technical assistance at this time.