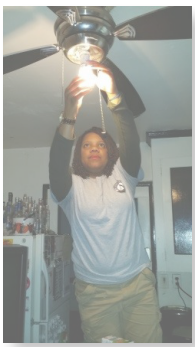
Annual Report to the Public Service Commission for FY2015

Customer Investment Fund

September 29, 2015



Submitted By:
MAYOR AND CITY COUNCIL
OF BALTIMORE CITY

Prepared with assistance by:
Baltimore Neighborhood Indicators Alliance
Jacob France Institute
University of Baltimore

Table of Contents

List of Tables

List of Figures

Executive Summary

The City of Baltimore's, "CREATES": Coordinating Resources to Effectively Align and Transform Energy Services proposal, which was funded from the Customer Investment Fund (CIF) of the Maryland Public Service Commission (PSC), is continuing to build on the City's strong foundation of success in aligning energy services and breaking down traditional program silos. By breaking down silos, and strengthening inter-agency coordination, the City of Baltimore is effectively changing how energy conservation measures and services are provided to our residents, non-profit organizations, small businesses, schools and communities of faith.

In September of 2014, Mayor Stephanie Rawlings-Blake formally announced the CIF funded CREATES proposal to the public renamed as the Baltimore Energy Initiative (BEI). The Baltimore Energy Initiative name better aligns marketing and communication to the public, and is now the umbrella for the CREATES model and programs. A logo and suite of marketing materials were produced and are used now throughout the City.

The City received its first disbursement of funds from the PSC on September 17, 2013. Due to the delay in receiving funds, and in turn a delay in completing City contracts, and procurement - a number of our programs were in startup phase during FY2014. During FY2015, our programs were able to make significant advances in implementation, and consequently have more detailed information and achievements to report.

The City of Baltimore's CREATES model better aligns agency services to ensure agency coordination and efficient delivery of services to residents and businesses. We have successfully utilized our CIF funding as approved in the PSC proposal, while also leveraging opportunities for additional funding. Highlighted below are executive summaries of significant program achievements implemented during FY2015 (Year 2).

- **Community Empowerment** – In FY2015, the Community Empowerment Program (CEP) reached full implementation. CEP staff working with partners in the Baltimore Energy Challenge Energy Efficiency Program and the Community Action Centers had 14,217 Baltimore City residents sign a public pledge committing to reduce energy consumption. CEP staff also handed out 3,916 energy saver kits, recruited 183 energy captains, engaged 30 businesses regarding energy efficiency, partnered with 10 school hubs to provide energy education, and attended 420 city-wide events to present on energy efficiency measures. This was all accomplished despite a severe winter and the departure of the Baltimore Energy Challenge program director.

- **Retrofits and Upgrades** – This program also reached full implementation in FY2015 with loans provided to 27 non-profit facilities who completed a range of weatherization and energy efficiency upgrades. This included providing technical assistance and energy education to facility managers and staff of these non-profits. In addition, this program provided funding to upgrade four city facilities that included a homeless shelter, police station, library, and a multi-use city

building. Another element of this work included robust outreach to non-profit organizations and city agencies about the Retrofit and Upgrade program.

- **Cogeneration** – Baltimore City continued to conduct technical and financial evaluations of four City sites for combined heat and power plants (CHP): Patapsco and Back River Waste Water Treatment Plants; Police Headquarters; and Ashburton Filtration Plant. In addition, the Baltimore City evaluated three schools that operate swimming pools. Back River and Ashburton both received the BGE pre-approval of the project for the EmPOWER CHP incentive. The interconnection agreement for Ashburton has also been approved. The City continues to try to qualify Patapsco but has concluded that the Police Headquarters and three schools will not be good candidates for CHP

- **Urban Heat Island Mitigation** – This program consists of TreeBaltimore and CoolRoofs. For TreeBaltimore, 541 trees were planted throughout the city, 405 new tree pits were created, 134 existing pits were expanded, and 68 old stumps were removed for new plantings. For the new and expanded tree pits, this involved removing 19,480 square feet of concrete which has the benefit of reducing impermeable surface within the city. The Baltimore Energy Challenge Cool Roof Program completed one large commercial/non-profit cool roof installation, as well as 3 residential roof cool roof installations. The program also worked to increase awareness by canvassing door-to-door in two target heat island neighborhoods, reaching over 500 residences. A number of cool roof installations were set-up and planned for implementation after the end of FY2015 and will be reported in the FY2016 report.

- **Energy Assistance** – The Mayor's Office of Human Services (MOHS) Community Action Partnership has improved its ability to provide energy conservation education to all customers that access the agency. In addition, through their enhanced community outreach plan we have increased program awareness in underserved neighborhoods regarding energy assistance and energy conservation. In FY2015, CAP staff were able to provide 1,029 Baltimore City residents with energy assistance in FY2015, while processing 4,307 applications. In addition, Community Action Center staff were able to educate 17,255 residents about energy efficiency measures.

- **Case Management** – The MOHS Community Action Partnership case management model under the Customer Investment Fund centers on a targeted approach to energy assistance customers with excess usage and arrearage problems that meet the needs of both the family and the house in which they reside. During FY2015, CAC staff were able to provide case management for 244 residents who qualified for energy assistance. CAP's diligence in cultivating partnerships with additional human services providers through community outreach has help them generate agreements and consequently staff have supplementary resources for our customers. CAP management has been able to increase their formal partnerships by 35% in this reporting year.

- **Energy Efficiency Program** – During FY2015, the Baltimore Energy Challenge Energy Efficiency Program hit full stride and provided light weatherization and energy efficiency services to 4,715 households. This included 80,710 energy efficient lightbulbs that were installed, 7,903 flow restricting aerators, 3,986 low-flow showerheads, and 7,573 feet of water pipe insulation. This resulted in annualized energy savings of 4,749,160 kWh, coincident peak demand savings of 771.47 kW, and lifecycle energy savings of 35,275,044 kWh.

- **Energy Efficiency Plus** – The Energy Efficiency Plus program operated by Baltimore City Department of Housing and Community Development weatherized 1,071 households in FY2015. This included 521 heating system replacements, 384 roofing replacements, 384 weatherization enhancements, 400 health and safety measures installed, and 113 furnace conversions. This resulted in annualized energy savings of 1,992,961 kWh and lifecycle energy savings of 28,077,415 kWh. In addition, because of CIF funding 536 households that would have been ineligible without CIF funding were able to received weatherization services.

To-date, the City of Baltimore's Baltimore Energy Initiative (BEI) model is advancing implementation efforts. Initial challenges that arose during FY2014 of the program have been addressed, and agencies are continuing to find creative solutions to meet challenges and deliver services to our clients. FY2015 provided a solid year of full funding and capacity for the agencies to diligently ensure their programs achieve overall success and fulfill the program outlines that were provided in our original proposal to the Public Service Commission. Programs such as the Energy Efficiency program, Retrofits program gained significant traction in FY2015. Reported numbers for FY2015 are much stronger than our FY2014 report, and will continue to improve even as we move into FY2016.

Data integration is a key component of the BEI model, and the City of Baltimore will be utilizing a comprehensive data management platform called ClientTrack to manage our data. The product developer concluded its design and constructing of a custom product that assists in better tracking for evaluation and measurement of our programs, while providing the necessary data integration. The program was launched for use in February 2015, and our programs are making adjustments to the database to ensure optimum data tracking. The City of Baltimore has also contracted with WegoWise to collect and analyze raw energy usage data from BGE for clients that have received services. This data will also be integrated into the ClientTrack database to provide comprehensive data management and integration. The process has started, with WegoWise completing a pilot analysis of 100 client BGE bills. This pilot has informed the need for additional data collection to best inform energy savings information, and as of September 2015 a staff person is collecting additional data for 5,000 client accounts. The BGE data analysis for these 5,000 clients will be available in winter of 2015/2016.

Interagency collaboration is a critical piece of the BEI program, and at the core of our program's forward thinking approach to serving the residents of our City. The Department of Housing and Community Development, Mayor’s Office of Human Services, Energy Office, Forestry and Department of Planning are working closely together to ensure coordinated, efficient implementation of our programs. The interagency collaboration is an important component of our ability to expend funds in an effective and timely manner and to deliver our services and meet the goals as outlined in our application

Below are total cost breakdowns for the program funds by agency. In our report you will find program specific budget information.

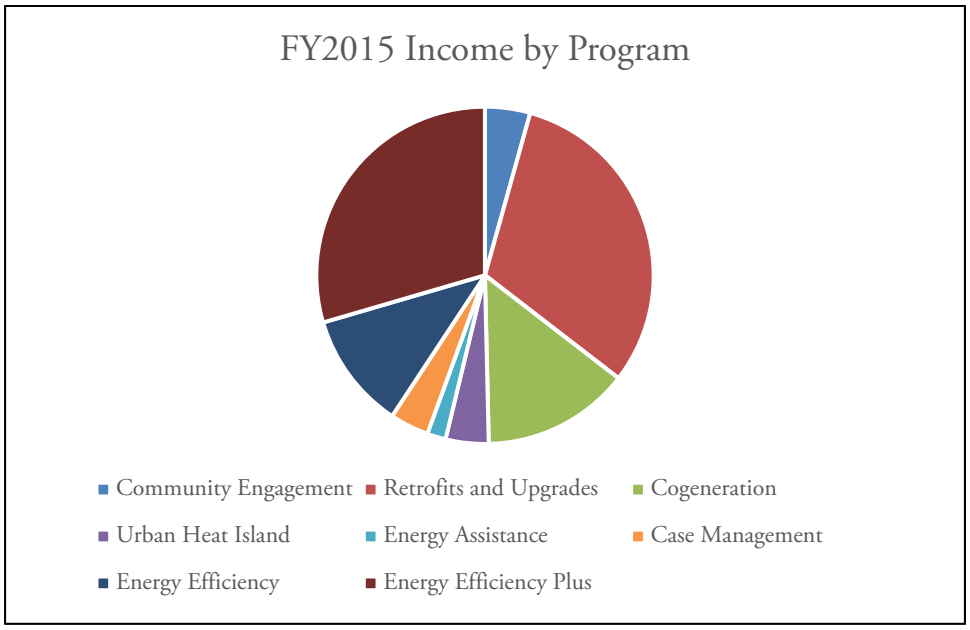


Figure 1: FY2015 Income by Program

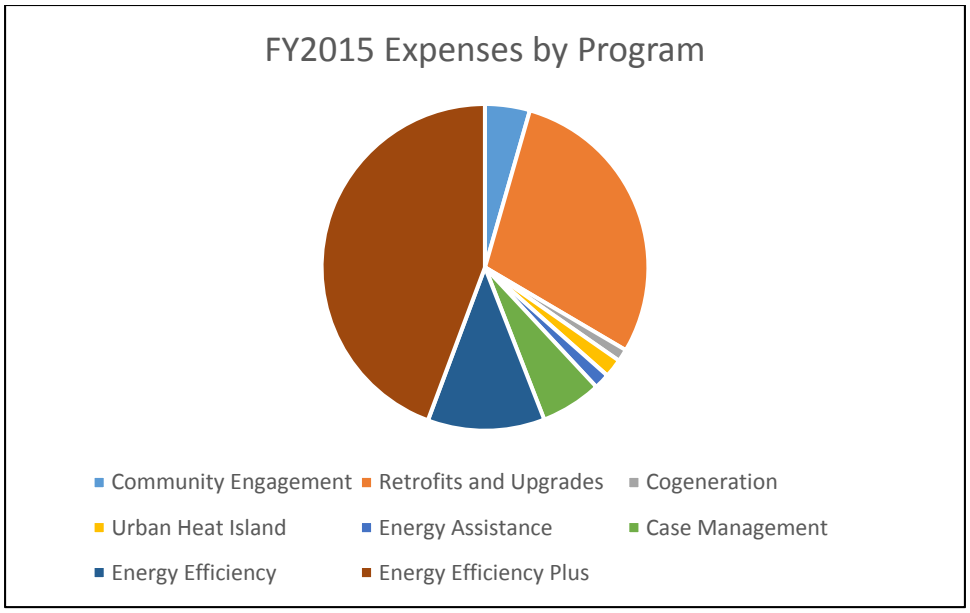


Figure 2: FY2015 Expenses by Program

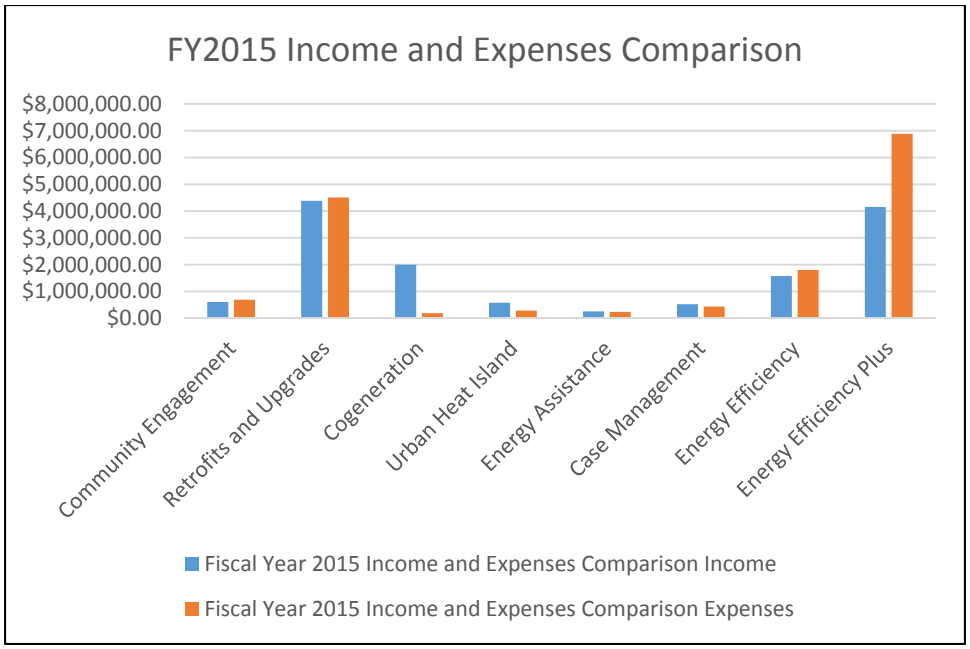


Figure 3: FY2015 Income and Expenses Comparison

During FY2015 (Year 2) of implementation, the agencies have realized many successes, as well as opportunities for improvement and service enhancements. The agencies involved in the BEI have always thought of the program as a living breathing program, which will need to be updated, enhanced or changed in order to best deliver services to our clients. Listed below are notable areas where we have found opportunities for enhancements to our program based on successes or hurdles which we have faced:

- **Energy Retrofit Loans and Grants to Non-profit Agencies Serving Low-income Families and Communities**: Baltimore City operates the non-profit retrofits and upgrades program primarily through two experienced non-profit lenders: The Reinvestment Fund (TRF) and Healthy Neighborhoods, Inc. (HNI). The City will focus on bringing more non-profits into the project pipeline at HNI, marketing to other mechanical and HVAC contractors as well as non-profit and faith-based groups. Providing more technical assistance to groups inexperienced with energy efficiency, even after submitting an application, is expected to help bring pending applications to closing. Since applications must be based on energy audits, the City will work with HNI to streamline the process an applicant goes through to complete and application.

- **Cogeneration** - Baltimore City is capitalizing on the State Department of General Services solicitation for energy service companies (ESCO) to shorten the procurement process for selecting a firm to design, build, and operate the Bureau of Waste Management's Back River and Ashburton facilities. Since Johnson Controls, Inc. already has a maintenance contract related to energy savings, the City has elected to use the company in an ESCO approach. The interconnection agreement takes a fair amount of time so the City is beginning that process even prior to putting JCI under contract. Two consultants already under contract to the City are re-

evaluating the design of an ESCO at Patapsco Waste Water Treatment Plant in the context of other improvements with the goal of reaching a higher efficiency level.

- **Baltimore Energy Challenge Community Engagement**: BEC will expand the reach in schools and increase the number of hub schools receiving the grant that are high schools. The energy educators will educate and empower the high school students on board at these schools to spread energy education throughout their own neighborhoods, increasing the opportunity for civic engagement, service hours and leadership and professional development. This will not only increase our impact as an organization and the amount of energy awareness we spread but will have the dual effect of providing a benefit to the students we engage.

- **Urban Heat Island** - Cool Roofs will expand its reach by expanding education and outreach to community fairs and neighborhood events. While Cool Roofs has experienced great successes in the CARE community, the team is looking to expand to similar communities throughout the Baltimore City area. Representatives will share the benefits of the cool roof technology at these events and encourage residents to take advantage for their homes. Cool roofs will develop partnerships with solar installers working in Baltimore City to provide cool roofs to qualifying homes receiving solar. TreeBaltimore has the opportunity to enhance the current CIF funding, by concentrating more attention on outreach in the specific neighborhoods we are targeting. While continually planting and expanding the canopy along Baltimore's streets, and thus decreasing heat island, connecting the citizens to the trees is vital to their survivability and the overall impact of the program.

- **Energy Assistance and Case Management** - The coordination of benefits through EarnBenefits screening has highlighted that clients are currently receiving government benefits. Therefore, they often are not interested in the Case Management service. In addition, the process is time intensive and minimally lessens their interaction with the government agency. After the screening, customers significantly have to interface with a State agency to complete the process. Therefore, instead of providing screenings, customers will participate in financial empowerment training to increase their ability to be self-sufficient and less dependent on government assistance.

- **Energy Efficiency Program (EEP)** - EEP will serve more multi-unit housing communities to improve the efficiency of the program and the quantity of residents we served. We have found success in the housing communities we have served recently. Moreover, the greater number of people impacted in a shorter timeframe by the program in these large housing unit communities can spread the word more rapidly throughout Baltimore City about our service as they share the information to their connections in Baltimore City. This will increase the pool of prospective homes we may impact in the next fiscal year. Both the property managers and the residents

benefit from the program and help in spreading the awareness of the energy reduction practices and tools we share.

- **Energy Efficiency Plus** – HCD is working collaboratively with new foundation-funded programs to aid seniors with housing upgrades and legal services; a special purpose of this collaboration is to prevent tax sale foreclosures for older homeowners. Revisiting seniors served in the past to check on home safety measures, heating system maintenance and efficiency, and other needs is another new enhancement. HCD is expanding its complementary healthy home improvements to address housing conditions that aggravate childhood asthma attacks. HCD is also working with Morgan State University, DOE, and a number of non-profit agencies to pilot solar installations for low-income families in Northeast Baltimore.

The City of Baltimore made significant strides during FY2015, and will continue implementation as our programs advance from first full year of full-funding into ongoing consistent programming. The City of Baltimore continues its enthusiasm and dedication for implementation of our CIF programs. We strive for creative and efficient solutions and are consistently evaluating our partnerships and programs to achieve optimum leveraging and performance. Moving into FY2016 we are building off of our successes, and learning from our hurdles to better align and transform our work. The City of Baltimore is growing and the continued implementation of the CREATES model, marketed as the Baltimore Energy Initiative, will help our City prosper as a sustainable, efficient and resilient city.

Introduction—CREATES Overview

The City of Baltimore developed an integrated program named "CREATES": *Coordinating Resources to Effectively Align and Transform Energy Services*. Core to the CREATES model is the maxim that energy programs do not and cannot operate in a vacuum. Traditional energy programs working within silos fail to fundamentally shift low-income programs and customers out of reactionary "firefighting." The alignment of a wide nexus of energy and non-energy programs into a highly coordinated and integrated system will enable the City to proactively address the core problems that lead to a constant state of energy insecurity. The goal of CREATES is to not only integrate services within the City, but also to align effectively with strategic community, State, and utility partners.

The key elements of the CREATES model are summarized below. Program details, forecasted and actual outcomes for each element in the CREATES model is provided in subsequent sections of this report.

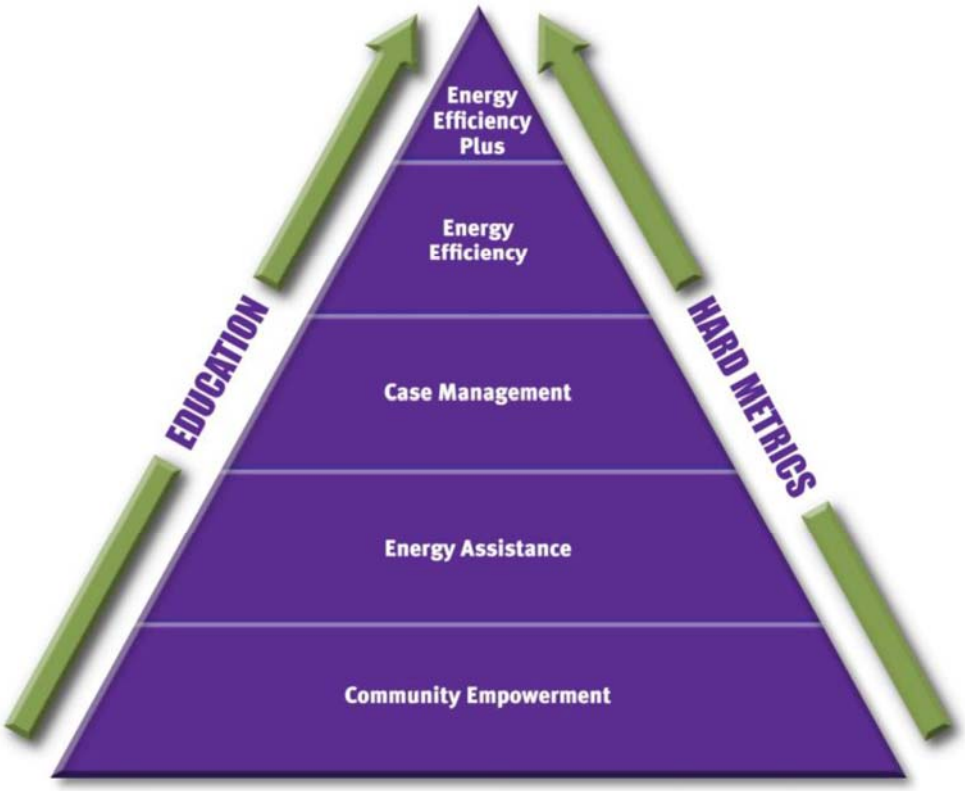


Figure 4: The CREATES Program Model

1. *Community Empowerment* – The City's community centers and other local, grassroots, community-based organizations such as non-profits, schools and neighborhood organizations serve as the first responders to low-income customers with energy needs. These facilities and their constituent organizations need to be sustained as hubs for energy efficiency education and as conduits to refer and leverage resources within the larger CREATES network.

2. *Energy Assistance* – Financial assistance for low-income utility customers is being transformed from a hand-written form to an online portal that directs customers into the optimal levels of education, efficiency and case management requisite to their unique needs.

3. *Case Management* – Low-income customers with complex energy needs require case management to navigate the confusing web of applications, eligibility requirements, constant funding changes and various agencies. CREATES provides more direct access to the services necessary to stabilize households and avoid future energy crises.

4. *Energy Efficiency* – Low-income customers with significant energy usage require in-home energy conservation and education to help reduce utility bills and progress towards energy affordability. CREATES combines cost effective programs to provide customers with low tier retrofit installation and energy efficiency education to maximize savings for clients.

5. *Energy Efficiency Plus* – Customers with extreme usage and affordability issues require a deeper level of intervention. The CREATES network leverages multiple energy efficiency resources and combines them with wrap-around non-energy related services and benefits to break the cycle of household energy insecurity.

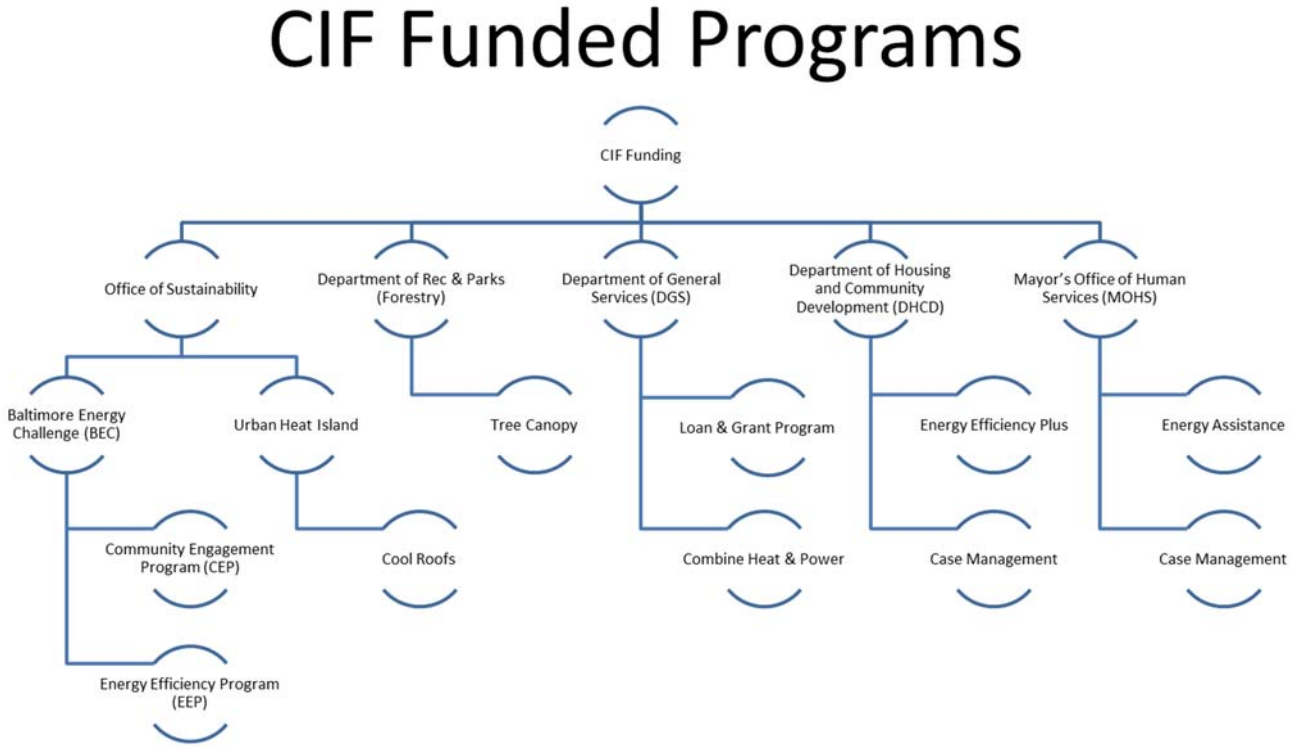


Figure 5: CIF Funded Programs

Program Descriptions—FY2015 (Year 2)

The following provides program specific information for each section of the CREATES model. The City of Baltimore, in September of 2014, announced the Baltimore Energy Initiative, which is the branded public name for the CREATES model. The City will be using the Baltimore Energy Initiative name and logo on outreach and marketing materials to all sectors that are served under this program. This reporting addresses key questions posed by the PSC, and will provide the City of Baltimore a base from which we move into Year 3 of CIF funded programming. While in FY2014 most programs were in startup or initiation phases, in FY2015 the majority of programs have reached the stage of full implementation. The details of each program for FY2015 are presented in the following section.

I: Community Empowerment

The City of Baltimore is mobilizing three of its City agencies to improve building energy systems, educate communities to maximize energy savings, and plant trees and install cool roofs to reduce the urban heat island effect - the Department of Planning's Office of Sustainability's Baltimore Energy Challenge, the Department of General Services, and Recreation & Parks Forestry Division. These three agencies are building off of each other's strengths in achieving energy reduction through the Baltimore Energy Challenge, the Retrofits and Upgrades program, and the Urban Heat Island Mitigation program.

During FY2015, The Baltimore Energy Challenge reached over 3,900 Baltimore residents through its outreach and engagement program by educating residents at events, community meetings, senior centers, and healthcare facilities.

BEC also reached 5,745 students through their Energy Grant schools and another 7,136 through their activities with the Sustainability Grant schools. Overall, we reached 12,881 students with our messages of energy conservation and recruited 211 Jr. Energy Captains.

BEC AmeriCorps participation increased in Year 2, which allowed for a stronger impact in schools. Three extra AmeriCorps were brought on in the winter time to prepare for school outreach and grant coordination. These energy educators made it so that more students could be reach through lesson plans delivery and more schools able to benefit from the grant. Educators focused on creating a school wide component be it through assemblies or fairs to raise the number of individuals that witnessed and gleaned from the work done with BEC. In Year 3 the hiring of a school hubs coordinator will allow for an even greater impact as BEC's school efforts will be more focused and strategic with this portion of the program being that coordinator's main focus. The grant will also be available to more schools and the applicant pool much larger with this increased attention on schools outreach through this new role.

BEC's goal when promoting the community empowerment component is to reach as many residents as possible about behavior change – this would include presentations, tabling events, attendance and presence at meetings. In order to expand its outreach to neighborhoods and residents, marketing for the community engagement program included:

1. Recruiting Energy Captains via mail, phone, community outreach events, and energy efficiency program participation.
2. Connecting with staff and volunteers of other nonprofits to promote and extend BEC services.

3. Contacting managers of libraries, farmers' markets, and senior centers for tabling opportunities
4. Contacting presidents of community associations located in focus areas (energy hubs)
5. Attending and presenting at meetings with organizations of similar interests – typically focused on environment, health, and schools.
6. Surveying energy efficiency program clients approximately 3 months post installation and asking about community outreach opportunities.

The Baltimore Energy Challenge Cool Roof program and Forestry's TreeBaltimore program have coordinated efforts to advance cool roofs and tree plantings in target areas. During FY2015, TreeBaltimore reached full program operation and planted 541 trees in targeted neighborhoods. The Cool Roof program completed initial outreach in target blocks and neighborhoods to over 500 residences, and completed 1 large non-profit installation and 3 residential installations.

The City of Baltimore took a multi-pronged approach to leverage all aspects of its interagency and public-private partnership infrastructure. This involved tactics aimed at reaching nonprofits, community facilities, and schools, businesses, and neighborhoods. It included programs within the City's Department of General Services Energy Division, Office of Sustainability and Forestry Division. Each of the programs listed below contributed to community empowerment towards greater energy efficiency.

Program	Agency	PSC Priorities Addressed
Baltimore Energy Challenge	Office of Sustainability	Targeted energy efficiency programs for businesses; Removing barriers to adoption of behaviors related to energy use; Grants and low interest financing for residential and commercial energy efficiency and conservation projects; and Low-income energy efficiency
Community Energy Savers	Energy Office	
Combined Heat & Power	Energy Office	
Urban Heat Island - Cool Roofs	Office of Sustainability	
Urban Heat Island – TreeBaltimore	Forestry	

The City of Baltimore is utilizing a multi-pronged approach under the Community Empowerment element of the CREATES model to leverage all aspects of community networks in the City:

Targeted Audience/Tactic	PSC Priority Addressed
Non-Profits	Targeted energy efficiency programs for businesses; Removing Barriers to Adoption of Behaviors Related to Energy Use; Grants and low interest financing for residential and commercial energy efficiency and conservation projects
Community Facilities	Grants and low interest financing for residential and commercial energy efficiency and conservation projects;

	Removing Barriers to Adoption of Behaviors Related to Energy Use
Schools, Businesses & Neighborhoods	Removing Barriers to Adoption of Behaviors Related to Energy Use; Low-Income Energy Efficiency; Targeted energy efficiency programs for businesses

During FY2015 (Year 2) of CIF funding, the agencies responsible for advancing the Community Empowerment section of CREATES, worked toward the goals of CREATES in the following ways:

Baltimore Energy Challenge Community Engagement Program

1. Program Description

The Baltimore Energy Challenge (BEC) is a program of the Baltimore City Office of Sustainability in partnership with Civic Works, Inc. and the Baltimore Community Foundation. BEC provides education to Baltimore City residents on energy saving practices and behaviors through a grassroots effort in neighborhoods and schools as well as through in-home consultations and a service that provides free energy-saving materials to tenants and homeowners (see Attachment A for flyer that explains BEC services). Much of the program's outreach is developed from the marketing strategy outlined in *Fostering Sustainable Behavior: An Introduction to Community Based Social Marketing* (McKenzie-Mohr, 2011). This has provided a strong framework for BEC to attain its goals of spreading awareness of energy efficiency benefits and committing residents to lowering their energy consumption.

Baltimore Energy Challenge consists of two main programs, the energy efficiency program (EEP) and the community engagement program (CEP). Each is charged with the goal of helping lower Baltimore's energy usage through education and social interaction as well as actual installation of energy saving products in homes. The two teams work together to achieve this goal by meeting frequently to strategize how to increase the impact and number of residents served by the program.

The BEC Community Engagement Program (CEP) is comprised of four major outreach efforts: neighborhood-based energy captain recruitment, citywide events, business and non-profit outreach, and school engagement. The goals of CEP are to facilitate education about energy-saving behavioral habits as well as to provide a community-based point-of-entry into the larger Baltimore Energy Initiative.

There are two major components of the CEP that are designed to deepen and broaden the reach of the Baltimore Energy Initiative, 1) pledges that community members make in public, and 2) kits that contain free energy saving material. Having community members sign public pledges and giving away small household items has been shown in numerous studies to contribute to energy saving behaviors[1,2]. All residents engaged by CEP teams are encouraged to take the pledge, where they commit to reducing their energy use at home (see Attachment B for the CEP public pledge). They are also given the

[1] Strohm, S. (2011). Community-level energy efficiency programs: A literature review of best practices for promotion and recruitment. The Research Shop. Retrieved from www.theresearchshop.ca/resources.
[2] Drakos, J., Khawaja, M. S., & West, A. (2007). Impact of Flipping the Switch: Evaluating the Effectiveness of Low-Income Residential Energy Education Programs. Energy Program Evaluation Conference, Chicago.

opportunity to become energy captains within their communities to help motivate others in their communities. The kits given to community residents include energy saving products and other safety items such as: CFL light bulbs, draft stoppers, toilet tank bank, LED night light, programmable thermostats, personal first aid kit, emergency storm radio and informational materials.

The CEP team consists of AmeriCorps volunteers who use various methods of engaging the community. These methods include, presentations in community associations and faith based organizations, teaching curriculum in schools, recruiting and training energy captains. For their training, AmeriCorps members and staff are tasked with learning the theory and methods of social marketing on which the larger Baltimore Energy Initiative is based to develop an approach that yields increasing commitments among Baltimore City residents and organizations to reduce energy consumption.

The team of AmeriCorps volunteers work together to achieve this goal by meeting frequently to strategize how to increase the impact and number of residents served by the program. They then go out into the community using the strategies to provide the community with information about how to save energy and increase commitments among city residents to lower their energy consumption. This "feedback loop" has enable the BEC CEP team to continually refine the system and approaches to more effectively reach the program's goals.

In line with the overall structure of the Baltimore Energy Initiative, the CEP is integrated with other programs to multiply the impact and people reached. The two main programs with which the CEP is connected are the BEC Energy Efficiency Program (EEP) and the city's Community Action Centers (CACs). Residents engaged by CEP team members are encouraged to utilize the EEP which provides free in-home weatherization services that help augment the education and social marketing aspects of the CEP. The CEP also partnered with the CACs to take advantage of the role CACs play as an important point of interface for low-income households who are seeking energy assistance. For instance, members of the CEP team trained CAC staff on energy-efficiency education so they could then provide the same education to clients during the in-take process. The CEP also supplies energy education material such as videos for clients to watch during the wait period, as well as public pledges and free kits so that CAC staff can further engage clients to foster energy saving awareness. This integrated structure provides both resources and consistent messaging of energy saving that have been shown in previous studies to significantly reduce energy consumption[3][4].

2. Program during FY2015 (Year 2) of CIF funding

The BEC CEP program is composed of four main elements; neighborhood-based energy captains, city wide efforts, business/non-profit outreach, and school hub outreach. Each of these programs is described below.

Neighborhood Energy Captains

[3] Brown, M., & M. Power (1993). The reach of low-income weatherization assistance. *Home Energy*, 21–25.
[4] McKenzie-Mohr, D. (2011). Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing. New Society Publishers: British Columbia.

A key component in community outreach is the engagement and recruitment of neighborhood leaders to serve as volunteer energy captains for their community[5]. Their roles are to educate, engage, and shape the energy behaviors of their communities. They are equipped with materials and training to communicate with their family and neighbors regarding energy saving habits and available energy-reduction resources. They use multiple approaches to engage their own community such as, community walks, door-to-door canvassing, hosting in-home energy parties, and organizing block party events which are all focused on raising awareness about energy conservation (see Attachment C for Energy Captain Recruitment flyer).

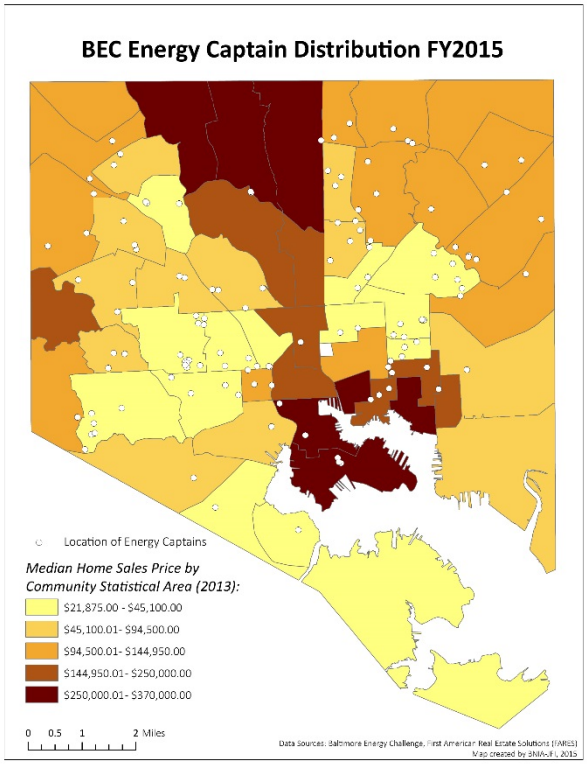


Figure 6: Distribution of BEC Energy Captains

An energy party hosted by an energy captain is an important social forum bringing other residents together to both educate and discuss issues such as the relationship between energy-efficiency and positive change they would like to see in their larger neighborhood. These social interactions provide an extra benefit beyond the goal of increasing energy awareness; they also foster conversation and community-building which can result in many other positive community dynamics.

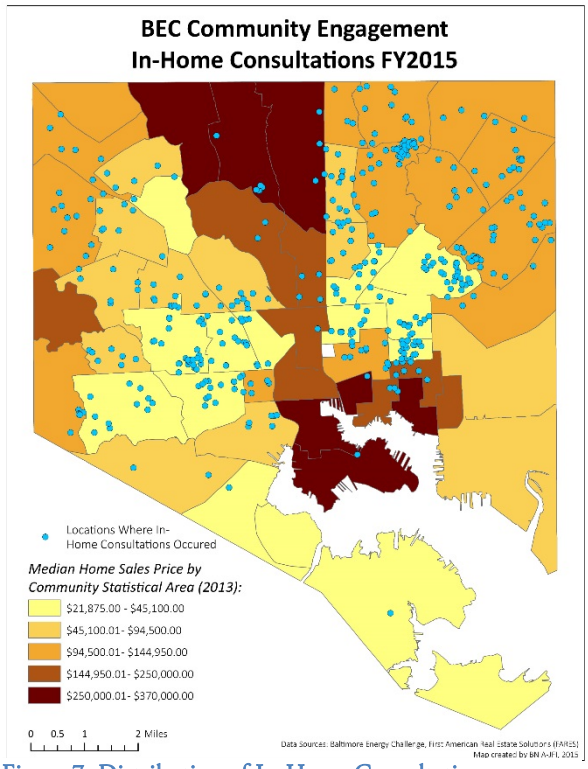


Figure 7: Distribution of In-Home Consultations

Energy Captains who desire to go beyond just their own efforts can coordinate with other energy captains in their area to start a team to increase the impact. Team formation provides access to up to $1000 for funds to organize a community block party or event. These block parties can then used as an opportunity to expand the reach of energy education by having energy educators engage the crowd and share materials. Block parties consisted of food, music and entertainment that drew large crowds of people from surrounding neighborhoods for a fun, positive event on energy conservation.

[5] Costanzo, M., Archer, D., Aronson, E., & Pettigrew, T. (1986). Energy conservation behavior: The difficult path from information to action. *American Psychologist*, *41*(5), 521–528.

The teams of energy educators held raffles, gave prizes, played quiz games, and shared BEC's top ten resources with the participants and encouraged everyone to sign the pledge. The energy captains played a key role in motivating their neighbors to participate, and supporting the BEC CEP team in collecting pledges.

As can be seen in Table 1 below, the CEP team in FY2015 recruited 183 energy captains. As can be seen in Figure 7, these energy captains were distributed in primarily in low- to moderate- income neighborhoods. The energy captains held a total of 94 in-home consultations that engaged 777 other people. From these events, 641 people were referred to EEP services; 50 people stated interest in becoming energy captains themselves; and 570 public pledges were signed.

City-Wide Efforts

In order to effectively reach a broader portion of Baltimore City residents, the CEP organizes and attends public events throughout the city. As with other elements of the CEP, the goals are to provide energy education, obtain public pledges to reduce energy consumption, recruit energy captains, and to spread awareness of the multiple energy services provided through the larger BEI program. The two main types of city-wide efforts are tabling events and community presentations.
Events and presentations allow the team to leverage these strategies with other elements such as the energy captain trainings, thereby increasing the city-wide effort to reduce energy.

The CEP frequently participates in events that provide tabling opportunities such as health fairs, community festivals, and senior expos. This is a proactive approach that enables the CEP team to meet and interact with many residents who often have not heard about the BEI or the resources available to them for lowering their energy bills. In addition, this is a primary way that public pledges are collected and community connections are made. They typically involve quick interactions where an educator will converse with attendees giving background on the program, sharing tips that they personally use and engaging in other friendly discussion, followed by the signing of a pledge. Any Baltimore City resident that signs a pledge at an event receives a starter kit. The kit consists of the same items as in the kit discussed above that contain free energy conservation items.

The second main platform in CEP's city-wide efforts are in the form of public presentations. This is another proactive approach that broadens community outreach. Presentations consist of an introduction to the program, education on how to save energy in a resident's home, and opportunity at the end to sign the pledge and sign up for the free installation service that BEC EEP provides. Presentations generally take place in community centers and association meetings, as well as churches and other faith based organizations. Rather than the quicker interactions during tabling events, presentations allow for longer interactions.

Due to these longer interactions, the presentations are an integral part of the larger BEI program in that it allows the CEP team to take more time to go in-depth about energy-reduction issues and services. Presentations go beyond the simple sharing of facts in that it also involves meaningful personal contact with residents and creative ways of displaying and demonstrating the desired behavior changes for energy

reductions. This diversity of approaches is suggested by the most-current literature on behavioral change[6][7].

During FY2015, the BEC EEP team delivered over 400 city-wide presentations. This number also includes school presentations given to school students on a weekly basis. Major events attended by the community engagement team included the Youth Opportunity (YO!) Baltimore's Health Fair, where the YO! group hosted a variety of tabling stations for the community to find out more about resources available to young people in the area. BEC CEP team members shared information of energy conservation and promoted the free installation services that the BEC EEP program offers. Another presentation occurred at the Northwest Healthy Neighborhoods Community Festival, which is a large event where hundreds of people came out for food, fun, and fitness activities. Other events included the City Tax Payers Night, Baltimore City Town Hall, and GreenScape. At each of these presentations BEC CEP team members provided energy education, spread awareness about the BEI program and resources, and secured public pledge commitments from participants. At some events such as the Baltimore City Town Hall, BEC CEP team members also engaged in innovative ways to engage the public like pairing their presentation with a light bulb and battery recycling challenge. Another highlight came when in April 2015 the Sustainability Tools for Assessing and Rating (S.T.A.R.) Communities program awarded Baltimore City 5 stars, the highest rating possible for sustainability programs, for its sustainability efforts. The award event was an opportunity for the AmeriCorps members of BEC CEP team and Energy Captains to both educate and be credited as some of the many reasons for the city's success.

Business and Non-Profit Outreach

The Baltimore Business Energy Challenge (BBEC) component of the community engagement program focuses on extending energy-efficiency education and resources to small businesses and nonprofits in Baltimore City. The BBEC program mirrors the community engagement portion in that a primary tool for engagement is a public pledge that businesses sign to commit to lowering their energy use. In signing a pledge, businesses are also offered the opportunity to receive an energy assessment of their business. A BEC staff supervisor and AmeriCorps volunteer conducts this assessment which provides customized recommendations on the ways that the business can conserve more energy. The business owner is also offered other opportunities to participate in the BEI such as hosting an energy efficiency party or information session for customers, posting information about the BBEC program visibly in the business location, and talking to fellow business owners about energy conservation.

The BBEC program also serves to connect small business owners and non-profits organizations to higher-level energy conservation resources such as the Baltimore Energy Initiative Loan Program and the BGE's Small Business Energy Solutions. The Baltimore Energy Initiative Loan Program provides low-interest loans to Baltimore non-profit organizations and small businesses for upgrading their facilities with energy conservation measures. The BGE's Small Business Energy Solutions allows the business

---

[6] McKenzie-Mohr, D. (2011). Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing. New Society Publishers: British Columbia.

[7] Hoffman, S. M., & High-Pippert, A. (2010). From private lives to collective action: Recruitment and participation incentives for a community energy program. *Energy Policy*, *38*(12), 7567–7574.

owner to save up to 80% on energy efficiency upgrades, as well as improving the lighting for the work environment. The BBEC team encourages business owners to take advantage of these products to help in lowering their energy use and benefitting their business in other economic and social ways.

The business installation consists of all of the same products used in the home install, but more suited to the needs of the business. The AmeriCorps BEC CEP team members assess the business for ways that they may be more efficient and determine what items will best suit the business owner's needs. Powerstrips are popular items installed in businesses, since businesses generally use more machinery in their day-to-functions than a household. However, less light bulbs are used in business installs than in home installs because many businesses use long fluorescent light fixtures. All businesses using lighting fixtures that BEC CEP team members are unable to service are referred to BGE's Smart Energy Savers Retrofit Lighting program. This program supports businesses with contracting energy upgrades for more the more costly lighting ventures.

This program is undertaken primarily by a staff supervisor and two AmeriCorps during the spring and fall, and then an additional 4 AmeriCorps during the summer months. The BBEC AmeriCorps volunteers spend about two thirds of their time canvassing businesses to sign the public pledge. The other third of that time is spent formulating strategy, mapping out the next approach, and data keeping.

In addition to canvassing, BBEC is positioned to partner with local institutions to provide concentrated service as part of larger community development efforts. For instance, Morgan State University reached out to the BBEC partner to help in promoting energy-efficiency to local businesses focused in the Morgan Mile, which is an area that comprises a one-mile radius around the Morgan State University Campus where the university has programs focused on energy-efficiency and sustainability. During the 2014 summer months, an extra two AmeriCorps were hired to focus outreach on businesses in the Morgan Mile. During that period, the team was able to get over 30 businesses to sign the pledge, eight of which took advantage of the free energy assessment and install.

Non-profits and churches
A large majority of the entities with whom BBEC partnered were churches and non-profit organizations. Institutions like these were already predisposed to take the time to listen to the energy educators while they were out in the field and more likely to sign the pledge. There were several relatively large churches that received the service as well as small ones. Many of the other non-profits that took advantage of the BBEC program were community associations with buildings that they used for meetings. These contacts were generally made either through canvassing or through connections already made with individuals encountered by the school hubs and city-wide energy educators.

For-profit businesses
Small business owners of for-profit establishments were slightly more difficult to connect with. They tended to be less receptive and more difficult to get in touch with due to the time constraints when running a business. Energy educators found that they had to have more organic approaches, shifting and shaping their communication from person to person. Once a small business owner agreed to listen they were able to pitch the idea of signing the pledge and take the next step in some cases by offering a free assessment. In FY2015, 8 businesses received the assessment followed by the kit install.

School Hub Efforts

Another important aspect of CEP's outreach campaign occurs in partner schools called School Hubs and is a critical element of generating change in the communities CEP serves. The goal of this approach is to use the school as a hub to expand outreach efforts to students, their families, and surrounding community associations and faith based organizations. This integrated approach helps amplify the energy education that students receive by having them be ambassadors to their own families and communities. Students are recruited and trained as "Junior Energy Captains". These student captains are given instruction on public speaking, business etiquette, and energy conservation measures. They then go to community events to share what they are learning in school. This further spreads the CEP's reach, as well as diversity of approaches, in that students are engaging the adults in their community engaged in the process as well.

For FY2015, there were 10 school hubs selected. Each school within the 10 hubs receives a $1000 grant to be used toward an energy project or initiative within the school. There were a variety of ways schools used these grants to engage students in energy consumption issues. For instance, one school used the money for an in-depth class project that allowed them to substantially delve into the multiple subjects that comprise energy efficiency science. These initiatives helped increase students' awareness and interest in these issues. For instance, one class was so intrigued by the lesson on wind power that they worked together to create model wind turbines that could generate power enough to light up an LED. Once they had these windmills powered they were able to put them on display school-wide for other students to observe.

This program highlights the amplifying efforts of an integrated strategy to yielding substantive behavior change. When community residents hear about energy efficiency from students and see their efforts to create change, in addition to the outreach by BEC team members, they are more likely to follow through with their pledge commitment to reduce energy use[8]. Another way that this program is leveraged is that outreach efforts by AmeriCorps volunteers then are focused in the hubs, with all of the above mentioned outreach efforts (trainings, presentations, etc.) in the area surrounding this hub school.

Other examples of how CEP's efforts in schools generated spreading outcomes can be seen in their efforts in Roland Park where a class prepared a town hall presentation on energy efficiency presented to the entire school. During this town hall event students delivered a presentation on how to save energy with a call-to-action for all of the students. Through this, the class of 16 students expanded CEP's reach to over 250 kids by sharing what they learned in our curriculum with their entire school.

In addition, the BEC CEP took advantage of tabling opportunities at Back-To-School nights and Parent/Teacher meeting nights. These allowed an opportunity for parents to find out more about what their children were learning in class as well as more about how they can conserve energy. Parents were prompted at these events to sign the pledge if they had not already done so. In schools where there was a Green Team, we partnered with their events and set up a table with resources and pledges as well. These

[8] Drakos, J., Khawaja, M. S., & West, A. (2007). Impact of Flipping the Switch: Evaluating the Effectiveness of Low-Income Residential Energy Education Programs. Energy Program Evaluation Conference, Chicago.

events were often difficult to coordinate as communication with school leaders was not always fluid. The BEC CEP team plans to use lessons learned from these initial efforts to develop a more systematic outreach plan that takes into consideration of Green Team staff schedules, as well as their challenges, in order to better support Green Team staff in facilitating these energy related events. Also, BEC CEP staff has developed a plan for more parent involved activities, such as showcases where parents come to view their child's project and receive a presentation on energy saving by the energy educators. This includes leverage other aspects of the BEC CEP program such as encouraging parents to share our information with their community groups and partners as well.

Below is a brief description from many of those schools for the 2014-2015 school year and how they used the grant to impact their respective schools. While working in these schools, energy educators engaged with 256 students on a weekly basis providing lesson planning and seeing projects through to completion.

Baltimore International Academy
5 participating students
Baltimore International Academy used their grant to conduct an energy audit and energy upgrade to the school building. They purchased power strips and smart strips and educated students, faculty, and staff about the proper use in order to achieve the goal of overall energy reduction in the school. They also bought T-shirts that read, "Save Energy," in all 5 of the BIA languages taught at BIA as a promotional piece and to increase awareness.

Roland Park Elementary/Middle Schools
60 participating students
The focus of the energy grant was on a Town Hall meeting developed and performed by the students of this group. The Town Hall meeting focused on behavior change that the rest of the classes could adopt. It gave them an opportunity to share what the students had been learning. The students also worked on a booklet they presented at the Town Hall meeting. The event ended with the students demonstrating how to conduct energy audits by conducting a full audit of the gym used for the Town Hall. The students designed T-shirts using a computer program and distributed them for increased awareness.

Hamilton Elementary/Middle Schools
30 participating students
The students were involved in collecting qualitative and quantitative surveys on how energy is used in the school. They will found creative and personal ways to instruct and inform younger students and the community about the effects of energy on the environment and on climate change. This included a classroom play presented to students in lower grades, as well as classroom lesson plans modeled for the younger students' grade levels.

Hilton Elementary/Middle Schools
66 participating students
Students were given energy meters to measure the amount of energy each classroom was using. With these, they conducted energy audits of the entire school. They also gave recommendations for how the teachers could save more energy in their classes. They then purchased power strips and smart strips for

about 20 classrooms, several more for the computer room and also for the administration office in order to lower energy in the school.

Augusta Fells High School
18 participating students
Students conducted an energy audit and did outreach throughout Augusta Fells Institute of Visual Arts on energy awareness. To begin, a survey of the school population's current energy conservation knowledge was conducted. The outreach included morning announcements, posters, artwork, an informational booklet, and a presentation during the school's ArtScape celebration. A final survey was conducted to evaluate the impact of the energy outreach campaign. In addition to this effort, they also took a field trip to Chesapeake Bay Foundation's LEED-Certified Green Building.

Waverly Elementary School
10 participating students
The students used the energy grant to publish a booklet that focused on energy conservation and behavior change. The students focused on how energy can be saved in four different methods: residential, commercial, industrial and transportation. The energy project also involved presenting this information to entire the school in the form of an assembly. Another idea to spread the knowledge to other students in the school was to create posters aired on the morning announcements, which reinforced the education shared in the assembly.

Federal Hill Elementary School
20 participating students
The Federal Hill green team created a video educating people on how to save energy. The video was a showcase of the green team and their journey in learning about energy saving, calling the video, "Fed Hill Goes Green!" The video had many educational components to it. The students discussed and demonstrated energy saving tips.

Lakeland Elementary School
About 20 participating students
The "Lakeland Energy Agents," as they termed themselves, participated in a nationwide competition through a program called 'Windwise'. The students learned about wind energy and then used the knowledge they gained to build two windmills. They then tracked the amount of energy produced by these windmills and entered it in the competition.

BEC Weatherization Assistance Program
The Weatherization Assistance Program (WAP) of the Baltimore Energy Challenge provides a follow-up service to Baltimore City residents who have received Baltimore City's Energy Efficiency Plus (EEP) weatherization services. This program is one more way in which the BEI is integrated and works to leverage different programs to have a more significant cumulative impact than any one stand-alone program. This program was initialized in November 2014, and in FY2016 this program will be expanded.

For this service, the BEC weatherization team brings LED lightbulbs to replace any that may not have been completed by the EEP program. In addition, clients are provided BEC's signature purple bag kit bag filled with power down devices, light switch gaskets, toilet tank banks, disaster preparedness items (flashlight and crank radio), and nightlights. They also provide the resident with thorough education about ways they can take energy saving actions in their home. This follow-up to the City's weatherization services allows BEC to ensure the resident receives all the education needed to remain efficient and to reinforce the importance of behavioral change along with the physical improvements made to their home.

The WAP team visits six homes per day, and which is scheduled by a member of the BEC administration team. These residences are pulled from a database used by the City. The administration team member confirms that they have received full weatherization then reaches out with a phone call to schedule an energy efficiency visit. The weatherization team, which consists of a staff member and two AmeriCorps volunteers will then go out to conduct the in-home consultation and installation.

While in the home, the WAP team will audit for any issues that may have come up from the work that was done on the home and any other repairs that may be needed. The staff person in charge of the team will then report back to a representative in the City Weatherization office to ensure that follow up is done and the issues handled.

For FY2015, the BEC WAP team has been able to work with and educate 321 Baltimore City residents who received EEP services. The team has grown from one team leader and one AmeriCorps to one team leader and two AmeriCorps. For FY2016, BEC's WAP team will consist of one team leader and 3 AmeriCorps.
While the WAP team has had a hard time reaching residents due to inaccurate telephone numbers or those no longer in service, the team has been successful in working directly with landlords to reach wider groups of residents.

Partnerships
In order for the BEC CEP program to have the fullest extent and reach, BEC staff have engaged in multiple partnerships throughout Baltimore City. Two of the more significant partnerships are described below.

Retrofit Baltimore
Retrofit Baltimore is a project of Civic Works that provides Baltimore City homeowners with information and services for energy retrofit upgrades. Retrofit Baltimore recently began working with Baltimore City residents interested in solar retrofitting. This includes helping homeowners navigate the solar retrofit process as well as bringing interested residents together to take advantage of community leverage. One outcome of this community approach is that it facilitates bulk purchases of solar equipment that allow significant price reductions for consumers. The partnership with Retrofit Baltimore allows for two-way sharing of program information, where BEC CEP is able to provide information about BEI services and Retrofit Baltimore can extend its reach as well. For instance, BEC CEP energy educators have been able to share information about Retrofit Baltimore's services at city-wide events and

collect names of interested residents that can then be passed on to Retrofit Baltimore. This partnership began in the latter part of FY2015, so is still in its early stages.

Maryland Solar United Neighborhoods (MD Sun)
Maryland Solar United Neighborhoods works to improve Marylanders' access to solar energy. They work to develop cooperatives among groups of residents who desire solar for their homes or neighborhoods. Staff at MD SUN then guides the participants of the co-op through the process of obtaining solar, connecting them with a contractor, and seeing installation through to completion. In addition, MD Sun helps enable a significant discount due to the combined purchasing power.
MD SUN has partnered with the Baltimore Energy Challenge specifically by using Energy Captains as co-operative ambassadors in the Waverly area of Baltimore City. This partnership works by gathering all of the Energy Captains in the Waverly area to share information regarding starting a solar co-op. This process is designed to guide residents so that they themselves can either join, start, or encourage someone to participate in a solar co-operative.

3. Accomplishments Using CIF Funds

Community Empowerment Metrics - Baltimore Energy Challenge			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
Number of energy captains recruited	-	183	-
Number of public pledges signed	-	14,217	-
Number of kits distributed	-	3,916	195 (5.0%)
Number of kit installations	-	4,715	-
Number of in-home energy consultations	-	94	-
Number of city-wide training events	-	420	-
% of energy savings per school, neighborhood, business	-	-	-

Table 1: Community Empowerment Metrics

During FY2015, the BEC CEP program was able to significantly improve its performance over the previous year for some of the metrics in Table 1 above. For instance, the number of energy captains recruited improved from 60 in FY2014 to 183 in FY2015. The number of public pledges signed rose from 5,915 to 14,217. Furthermore, the distribution of public pledges was mostly in distressed or lower-income neighborhoods, in line with the overall purpose of the BEI in engaging these communities. However, the number of kits distributed decreased from 4,194 to 3,916, partly due to bad weather during the winter and a certain amount of saturation of people from the previous year already receiving kits. The number of in-home consultations dropped from 302 to 94, however the number of city-wide training events rose significantly from 58 to 420. In regards to the number of kit installations, this is actually a metric that tracks the BEC EEP program, and so will be discussed in the section of the report covering that program.

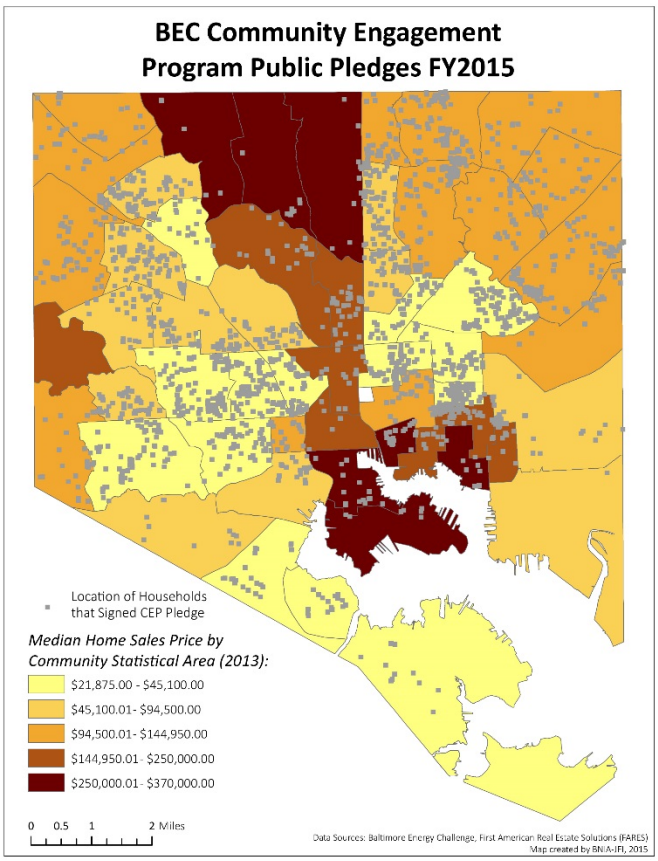


Figure 8: Distribution of CEP Public Pledges

4. Issues and challenges

There were many successes for the CEP program in FY2015, and there are also challenges that staff and team members encountered. Some of the challenges came with a transition in leadership of the program director, as well as a heavy winter that inhibited events and mobility during storms and cold weather.

For the BBEC program, team members spent a large amount of canvassing, often with redundancies in outreach. To overcome this, BEC CEP staff developed a more systematic data keeping system. The School Hub efforts was another program that had challenges. In this, the CEP team had difficulties managing both the hub school impacts and city-wide efforts. The team members, while making significant progress in each arenas, had difficulty recording data on the efforts due to the business of the schedule - which included spending the day at schools providing lesson planning and following project progress, followed by spending the evenings seeking out opportunities for presentations or training, and then weekends with community outreach at events - left the AmeriCorps members with little time to keep record. This challenge is being addressed by bringing on two more AmeriCorps in the upcoming term to offer support in data collection and benchmarking. This support will also allow for a more strategic approach to target efforts in hub neighborhoods. Data support persons will be able to tell which events and efforts are city-wide and which are within the hub areas. From there, they will be able to suggest more systematic approaches to making contacts and scheduling events. Another adjustment that will be made is a more systematic approach to scheduling. AmeriCorps will have blocked out time for all

outreach types so that the team is able to be more efficient with time and preparation for each event. This model has already allowed for a greater impact in the community so that more people found out about the program and more opportunities for pledges were accepted, despite the little focus on organization.

5. Lessons Learned for Year 3 Implementation

In order to address the primary challenges around data management, the BEC CEP team has set up more comprehensive reporting templates to ensure proper tracking from inventory to community contacts. They are also in the process of completing the contract with ClientTrack, who we have been working with to create a database strictly for tracking client records. The team at ClientTrack has worked to get a very detailed understanding of the BEC program so that a platform is created to assist the BEC CEP staff in keeping record of every interaction we make with community partners and residents. It will also allow the staff to streamline reporting, inventory and all community relations into one location. This will allow provide a better picture of the program's reach and keep it organized in one place due to being able to see what events, visits, presentations and school activities have occurred through simple report creations. With leadership now stable, staff will be able to better motivate the CEP teams by reminding them of the goals and milestones that have been met and the importance of recording data. Staff will also make the metrics of the program more explicit and familiar to them so that while out in the field they know exactly what the goal is and can keep that at the forefront of their minds while serving and engaging the community.

Retrofits and Upgrades - Community Energy Savers Grants and Loans

1. Program Description

The Retrofits and Upgrades portion of the Baltimore Energy Initiative is coordinated by the Department of General Services - Energy Office, which moved to the Department of Public Works in November 2014 and became the Office of Sustainable Energy (OSE). Using Baltimore Energy Initiative funds from the Public Service Commission, OSE is running three programs; 1) a grant program for nonprofits for energy upgrades to facilities, 2) a low interest loan program overseen by Healthy Neighborhoods, Inc. (HNI) and The Reinvestment Fund (TRF) as loan partners, and 3) energy upgrades to city facilities.

2. Program during FY2015 (Year 2) of CIF funding

Grant Program

The grant program with nonprofits began early FY2014 when OSE partnered with Healthy Neighborhoods, Inc. to write a proposal under the Maryland Energy Administration's (MEA) EmPOWER Clean Energy Communities Low-to-Moderate Income Competitive Grant. The grant proposed providing energy efficiency measures in 27 facilities owned and operated by 11 nonprofit organizations who serve the City's most vulnerable populations: persons who are homeless; persons with mental, physical or developmental disabilities; persons with substance use disorders; persons diagnosed with HIV and AIDS; and persons with other special needs. All of the beneficiaries of the programs have incomes at or below 60% of Area Median Income and the vast majority are very low income at or below 30% of Area Median Income. The $998,789 award from MEA leveraged $254,104.45 in funding from OSE's Baltimore Energy Initiative, $109,024 from 2 of the nonprofits and $157,472.33 in utility rebates from the Baltimore Gas and Electric Smart Energy Savers Program for a total investment in energy efficiency of $1,519,389.78.

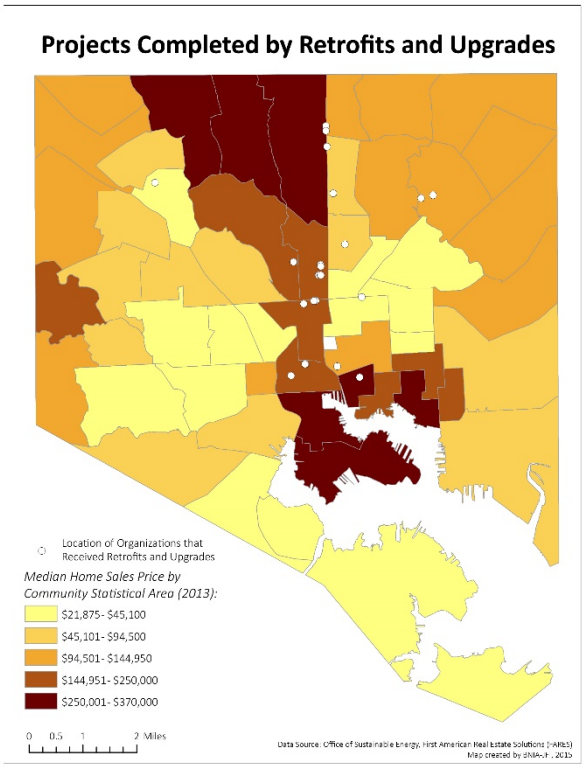


Figure 9: Distribution of Retrofits and Upgrades Projects

The selected nonprofit organizations to receive energy improvements were: Associated Catholic Charities, Inc.; At Jacob's Well, Inc.; Gaudenzia Foundation, Inc.; Govans Ecumenical Development Corporation (GEDCO); House of Ruth Maryland, Inc.; Marian House, Inc.; Maryland Center for Veterans Education & Training, Inc., (MCVET); Project PLASE, Inc.; United Ministries, Inc.; University of Maryland Medical Center Safe Haven Shelter; and Volunteers of America Chesapeake, Inc.

The 27 facilities occupied by these organizations operate with limited resources for capital improvement and often have the highest need. The MEA/BEI funds provided energy efficiency improvements that would have been difficult for the recipient organizations to procure on their own. For instance, two of the funded sites had outdated knob and tube wiring in their attics that required electrical repairs before insulation. In addition, at one site where lighting was upgraded and appliances were replaced, special PTAC upgrades occurred as well as a conversion from oil burners to natural gas and replacement of aging split DX systems. Another organization had three aging central gas heat and AC systems upgraded, as well as having a significant thermal defect in the rear wall corrected. Organizations were able to reduce operating costs through energy savings and therefore direct the resources into their missions.

The OSE team worked closely with Baltimore Gas & Electric and their Baltimore City subcontractor, ICFI, Inc., to coordinate custom and appliance rebates. We used a comprehensive Energy Retrofit Process to (ERP) implement cost-effective energy retrofits, which is more

comprehensive audit than the conventional Energy Audit Report. The ERP includes initial walk-throughs inspections, utility analyses, site inventories and testing. The ERP team developed scopes of work for each project based on initial assessments, solicited and selected contractors, oversaw execution and budget management, and completed final inspections. At the conclusion of each project, energy service measures were updated to reflect final costs and test-out results to determine actual savings and payback at each site.

In addition, OSE was able to provide technical assistance and energy education to directors, facility managers, and maintenance staff of these buildings as upgrades were implemented. This resulted in energy and building experts discovering health and safety issues while conducting initial energy assessments which may have been otherwise overlooked. A snapshot of the impact of the grant is as follows:

- 22 Energy Assessments
- 94 Energy Conservation Measures Implemented
- $313,000 in Annual savings
- 2,770 Low to Moderate Income Beneficiaries
- 53 Contracts Awarded to 30 Contractors
- 10.7 Years Average Payback

The Maryland Energy Administration (MEA) is using OSE's public/private partnership – between HNI, OSE and 11 nonprofits - as a model for other counties in the State in the hopes they will follow our prototype. They created a video describing the nonprofit energy upgrades which included some innovative practices and procedures and highlighted the positive impacts on the nonprofits and their low income clients. The video was posted to the MEA website and can be viewed at https://www.youtube.com/user/MEACommunications. Already the grant program has yielded leveraged outcomes. When the time came to write a second round MEA grant, HNI again in partnership with OSE, was awarded $984,000 in June 2015. This time OSE partnered with 17 nonprofits who serve low income residents to upgrade 29 of their facilities. OSE matched $500K in BEI funds for FY2016. OSE is currently finishing up audits, collecting bids and starting to award work.

Low-Interest Loan Program

During FY2015, the Office of Sustainable Energy engaged in creating awareness about the low interest program for nonprofits as well as initiating the program with the loan partners, The Reinvestment Fund and Healthy Neighborhoods, Inc. Once the partner agreements were signed, each organization was issued $1,000,000 to start their program. The loan program has a 3-4% interest rate with a maximum 15 year pay back. The loan program was processed through two different partnerships, as given below.

The Reinvestment Fund (TRF) -The first loan was originated by TRF in November 2014. A one million dollar loan at 4% was signed by the Green Street Academy, a charter school on Baltimore's west side. Green Street Academy is a public middle-high school that embraces the green movement and the new

career paths it will generate. It opened in September of 2010. Green Street Academy is renovating 145,000 square feet of space at the former Gwynns Falls Junior High School at 125 North Hilton Street. This loan was part of $5M in energy upgrades which had a total project cost of $23M. The new building is opening this August for the 2015-2016 school year. A second loan was approved in FY2015 for Eager Street Housing/Station East. The borrower, Historic East Baltimore Community Action Coalition (HEBCAC), plans to acquire and rehab four row homes in a New Markets Tax Credit (NMTC) area. The funds for rehabbing the 4 buildings total $1.147M. The BEI energy loan of $150,000 will be used for the rehabilitation. Additionally, TRF is in the process of underwriting two strong applicants with energy upgrades of almost $2M and has more applicants in the pipeline.

Healthy Neighborhoods, Inc. (HNI) - On May 18, 2015, HNI's loan committee approved the first two loans in its pipeline. Funds were committed to renovate a building at 2911 Pulaski Highway ($127,336) on the east side of Baltimore that will house Banner Neighborhoods, a community based non-profit dedicated to supporting residents in their efforts to enhance the quality of life throughout 10 southeast Baltimore communities. Funds from the second loan will be used to upgrade lighting at the Markets of Highlandtown ($49,900), which is a small business based in East Baltimore. In addition to the two approved loans, there are 18 applicants in the HNI pipeline who are in varying stages of the loan process. Seven are small businesses and all are located in New Market Tax Credit areas and some are located in a Baltimore Main Street District. Additionally, there are eight churches, a charter school and two nonprofits including a local community development corporation and a graduate fraternity that sponsors programs which foster achievement, scholarship and community. Although off to a slow start, they are getting applicants lined up and working closely with them to move through the process.

Attached are the loan pipelines from HNI (Attachment D) and TRF (Attachment E) and the Banner Neighborhood Energy Analysis Report (Attachment F), and the Banner Final Energy Spreadsheet (Attachment G) as well as the Markets of Highlandtown Lighting Audit conducted by OSE (Attachment H) (the audit has a larger scope than the loan). Also attached is the breakdown of energy costs (Attachment I) and LED Building Energy Simulation Report (Attachment J) for Green Street Academy, and, for the Eager Street Project: the development budget (Attachment K), the Existing (Attachment L) and Post-Rehab House HERS Reports (Attachment M) and the list of energy measures (Attachment N).

City Facility Program

In FY 2015, OSE spent $48,995 to upgrade four city facilities: a homeless shelter, police station, library and a building used by multiple city agencies and nonprofits. Details are on the attached spreadsheet (Attachment O). OSE is in the process of working on multiple city facilities in Year 3.

Outreach

In addition to the three primary programs described above, OSE engaged in an extensive outreach and information campaign about the grant and loan process, as described below.

Web

Webpages were set up on the TRF website at http://www.trfund.com/BEILoans/. The initial financing request form that triggers the loan is attached (Attachment P). Once it is completed, the loan application

process begins by conducting an energy model or audit. In addition, the Department of Public Works website promotes the program: http://publicworks.baltimorecity.gov/Bureaus/OfficeofSustainableEnergy/LowInterestLoans.aspx, as does a local contractor, A.J. Michael's. They included our BEI information in one of their marketing pieces and on their website http://www.ajmichaels.com/

Meetings
In partnership with HNI, OSE kicked off 2015 by hosting an information session for faith based organizations attended by 38 persons from 17 organizations. A number of them followed up and applied for loans (see attached overview (Attachment Q), invitation (Attachment R) and attendee list (Attachment S). HNI attended a lunchtime meeting of Baptist Churches and have had some follow up. HNI also has charged each of its participating neighborhood leaders (17 of them) to bring in at least one loan to HNI program.

Staff from OSE hosted a lunch and learn event at the Baltimore Development Corporation (BDC) and received a number of inquiries and loan applications from small businesses as a result. This involved meeting with a group of independent groceries in Baltimore. The first grocer loan was approved by the loan committee in May (Markets of Highlandtown), and a second grocery has applied for a loan. Staff from OSE attended a BDC Main Streets meeting and shared information about the loan program with all the Main Street Managers. These referrals have resulted in a number of loan applicants. Along with the BDC, OSE met with the Small Business Administration who is now promoting the grant and loan program and has introduced OSE staff to a few minority-owned lighting contractors. Recently, OSE staff met with BDC with a focus on raising funds to help small businesses get back up on their feet. OSE offered our energy loan as a way to help small businesses fund energy retrofits. HNI has attended numerous meetings which are listed in the attached document (Attachment T).

OSE staff also met with contractors working with faith based, nonprofits and small businesses to promote our program. OSE has also coordinated with Baltimore Energy Challenge to share information grasp of the grant and loan program so they can assist in promoting it within their program.

For FY2015, OSE has successfully established the loan program, which can be seen in the projects that have already been completed as well as the project pipeline given in Attachment D.

3. Accomplishments Using CIF Funds

Community Empowerment Metrics - Retrofits & Upgrades			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
# of facilities upgrades	-	31	5 (16%)
# of clients served	-	2,024 + (4 city bldgs.)	-
projected electricity savings (kWh)	-	809,404	-
projected energy savings (MMBtu)	-	4,385	-

actual costs	-	$1,303,099.00	-
projected cost savings	-	$112,943.00	-
energy savings and energy cost savings	-	2,094,559.8 kWh / $196,302.13	-
cost effectiveness/savings to investment ratio	-	11.5	-

Table 2: Retrofits and Upgrades Metrics

Almost immediately upon receiving the funds, TRF loaned $1,000,000 to its first applicant, Green Street Academy for energy upgrades. OSE also assisted in the MEA grant with Healthy Neighborhoods to upgrade the 26 buildings used by the homeless. Having the $254,104 in BEI funds to leverage the State's $998,789, the nonprofit matches of $109,024 and BGE's $157,472.33 in utility rebates for a total of $1,519,389.78 produced tremendous savings. Best of all, the savings can be used for program enhancements to raise up the lives of those who are most in need in Baltimore City.

4. Issues and challenges

OSE spent the first few months of FY2015 writing and reviewing the agreements between the City and HNI and TRF. Agreements were signed in August and September 2014. OSE also had challenges getting the attention of the smaller loan applicants – faith based organizations, small businesses and nonprofits. Outreach to these communities has proven to take considerable time, as well as the technical assistance OSE needs to provide to coach organizations through the loan process. One aspect of the outreach program was to meet every other week with Healthy Neighborhoods. These meetings helped facilitate outreach and streamline the process for energy audits and applications. One of the challenges included the time commitment necessary for working through the shared review process with HNI, but which was a critical component of establishing a productive partnership.

OSE was the only agency recipient of the CIF funds who created a new program. The others used the funds to supplement and expand existing programs. Because of this, it took careful thought and time to put together a strong platform for lending energy funds. And, as a result, OSE got off to a slow start and is short of our forecasted goals. Additionally, unlike the other city agencies, OSE will have a revolving fund of dollars with the opportunity to relend to more customers.

5. Lessons Learned for Year 3 Implementation

OSE recently began streamlining the audit process for HNI's applicants. Once an applicant completes the initial paperwork, OSE staff no longer relies on the applicant to choose and order an audit, instead it will automatically be done for them. Once the audit is complete, OSE reviews it and HNI will meet with the applicant to go over in detail the priorities and the paybacks. OSE and HNI are now meeting every week to keep updated on the loan applicants and process. OSE also added a new information sheet in order to get more detailed information from Religious Organizations. The new sheet asks about membership numbers, financial committee members, ownership of properties etc. A copy is attached (Attachment U).

In addition, OSE has been implementing technical assistance program to guide the targeting organizations through the energy renovation process, which allows the organizations to focus on their

primary missions. The applicants have time constraints, are moving into unknown territory and often do not really understand the payback process. Because of this, OSE must spend a substantial amount of time educating them.

In regards to outreach, OSE has been building a more effective and efficient system for both outreach and application processing. For instance, a brochure was designed for marketing and HNI is currently retooling it to create a marketing piece to distribute to potential loan applicants.

Educating contractors on BGE rebates is important to do before work commences on a contract. OSE now includes a requirement in the bid documents that contractors must apply for rebate incentives when applicable. OSE also plans to make sure the rebate process starts earlier to account for technical review and other potential setbacks, especially for customized incentives. That said, when coordinating utility rebates for large-scale programs, it is critically important to have a strong partnership and communication on with the utility company. One of OSE's priorities has been establishing a strong partnership with BGE. An example of this is that OSE was highlighted in the current BGE Smart Energy Savers Program (Attachment V).

Cogeneration - Combined Heat and Power

1. Program Description

The Office of Sustainable Energy is developing combined heat and power with the goals of ensuring stable and efficient energy supply and reducing Baltimore City's reliance on the larger electrical grid. In FY2015, four separate projects for cogeneration have been initiated and are at varying stages in the conversion process: 1) Back River Waste Water Treatment Plant, 2) Patapsco Waste Water Treatment Plant, 3) Ashburton Water Filtration Plant, and 4) Baltimore City Police Headquarters and the adjourning Central District. To complete these projects, OSE will leverage the CIF funds with EmPOWER incentives from Baltimore Gas & Electric and financing from Baltimore City.

2. Program during FY2015 (Year 2) of CIF funding

Although no physical construction has taken place at the four project sites, in FY2015 OSE made significant headway in the planning and procurement process that is necessary for cogeneration conversions to occur. This planning and procurement process is complex and time consuming, and involves technical and financial feasibility studies for each of the sites. For instance, contracts must be developed with companies to conduct the evaluation, interconnection agreements to hook into the power grid must be established with BGE, and technical studies such as heat load projections must be performed. From there, the projects go into construction. Each of the four project sites will be discussed below in order to highlight the work that has been done and to show where each project is in the cogeneration process. In addition to these four sites, OSE evaluated the use of small CHP units at three Baltimore City schools with swimming pools but determined the projects would not meet the BGE efficiency requirements.

Back River Waste Water Treatment Plant (BRWWTP)

The BRWWTP treats wastewater from approximately 1.3 million residents in Baltimore City and County. The 466-acre site currently receives up to 180 million gallons of wastewater per day, and has been in operation since 1911. The City supplements grid power with 3MW of CHP. The plan is to add another 2MW natural gas reciprocating engine generator with heat recovery, WCR and CO Catalyst. The heat recovery system will consist of a HRSG to supplement the steam supply to the existing boiler plant. An engine jacket water heat recovery system will be installed to preheat sludge entering the digester process. The system will include a double pipe heat exchanger to transfer heat, subject to a demonstration during winter and summer seasons (2016) to prove its efficacy to BGE and Back River.

The BRWWTP cogeneration process has cleared some of the initial hurdles for work to begin, with construction slated to initiate during the summer of 2016. Technical and financial feasibility studies have been conducted, with BGE giving pre-approval to the BRWWTP cogeneration plan in June 2015. Currently, an Energy Service Company contract (ESCO) is being established with Johnson Controls, Inc. to design, build, and operate both the Back River and Ashburton CHP plants. A BGE Combined Heat and Power (CHP) incentive that provides per-megawatt subsidies based on the efficiency of CHP generation hour has been approved, although this was a complex process that entailed three revisions of the original proposal. This was finally approved on June 15, 2015. In addition, the Maryland Energy Administration approved a grant of $464,700 in May of 2015 in support of this project. Baltimore City will enter into a Phase 1 energy service contract with Johnson Controls by early November for the development of the CHP and the heat load demonstration. Work will begin in December with the proof of concept demonstration lasting through August. The design work on the CHP units can begin in December and be conducted in parallel to the heat exchanger demonstration. Assuming the demonstration shows the expected positive results, an interconnection agreement will be submitted and a Phase 2 contract will be executed in the fall of 2016 and construction begin about November.

Ashburton Water Filtration Plant (AWFP)

The AWFP is one of three water supply plants for Baltimore City. It was placed into service in 1956 and filters approximately 165 million gallons of water per day. OSE will be installing a 674 kW cogeneration plant that will service the operations centers. Although the City is also planning on installing a 1MW emergency backup diesel generator, the CHP will be developed with black start capability to operate even during power outages.

Of all the City's potential CHP projects, Ashburton is furthest along. In June 2013, BGE gave preliminary approval of the project for the EmPOWER incentive and for the interconnection. OSE worked with a consultant to conduct the project technical and financial feasibility studies. This process was a complex one that took 15 months to receive approval from BGE.

At the same time, OSE is coordinating with the DPW's Water Division project evaluating emergency backup generation for Ashburton to ensure there is no conflict in the electrical hookup. Preliminary meetings have been held with the generator subcontractor and an OSE consultant to outline basic plans and identify areas of potential conflict and compatibility. The City is planning on executing an energy performance contract with Johnson Controls, Inc. for the design, construction, and operation of the

CHP. Approval is expected by November 2015 and active planning will begin at that point November. That design will probably be completed by March or April 2016 and a Phase 2 contract approved by June 2016. Construction can begin upon contract approval.

Patapsco Waste Water Treatment Plant (PWWTP)

The PWWTP is a secondary treatment facility with enhanced nutrient removal (ENR), chlorination and de-chlorination, situated on 69 acres on the Patapsco River at Wagner's Point. First built in 1940, the plant treats 63 million gallons of waste water per day. It serves an area of approximately 184 square miles spanning Baltimore City and Baltimore, Howard, and Anne Arundel counties for an estimated population of approximately 450,000.

An OSE consultant conducted a technical and financial analysis to determine if a CHP project was feasible. The objective was to reach the 65% efficiency level required by BGE in order to receive the CHP incentive. The first analysis failed to reach that efficiency level. Another consulting firm analyzed with a different configuration and heat load but only reached 59%.

OSE has continued to try different CHP designs because of the importance of keeping this facility operating and the level of electricity usage. Separate from CHP planning the City is now evaluating the HVAC system at Patapsco and OSE is working with that firm to determine if a combined approach could efficiently (65%+) use a CHP. A determination is expected by the end of 2015 whether a CHP project is feasible. If it is, then OSE will begin the procurement process to bring a firm under contract to design, build, and operate the CHP plant.

Baltimore City Police Headquarters and Central District

The Baltimore City Police Headquarters (BCPH) was opened in 1972 to serve as a central command location for the city's police force. The Central District Headquarters is adjacent to the BCPH and serves one of nine major police districts in Baltimore City. In addition, there is an Annex to the HQ. Police Headquarters uses electricity and natural gas supplied by Baltimore Gas & Electric. In addition, steam and chilled water are provided by Veolia, a company focused on energy efficiency and environmental sustainability. Electricity and natural gas are purchased through BRPAC. The Headquarters building and Annex have a 1437KW peak demand and use approximately 9,330,300kwh/year. Its 24 hour use was the reason OSE worked with a consultant to analyze the technical and financial feasibility of installing CHP.

The first option considered was a CAT CG132-12 or equivalent natural gas fired reciprocating engine with both exhaust and jacket water heat recovery systems. The CG132-12 is a highly efficient 600KW, 1800rpm unit with electrical efficiency in the 41.1% range and thermal efficiency in the 46.6% range. The exhaust heat would be used to make steam which will be supplied into the existing mechanical plant steam header and will offset the amount of steam that is purchased from Veolia. The jacket water heat will be used to produce the domestic hot water used by the plant along with supplying multiple hot water loops that are used for reheat, dehumidification and heating parts of the building. The estimated annual CHP efficiency (HHV Basis) is 75%.

In responding to ICF questions and concerns, it became clear that the combination of different utilities and the way they were metered made the project too complex to organize and document savings. So ICF and OSE agreed to drop the BCPH and Central District project from consideration.

3. Accomplishments Using CIF Funds

Community Empowerment Metrics - Co-Generation			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
# of facilities upgrades	-	4 (in process)	-
# of clients served	-	-	-
projected energy savings	-	-	-
actual costs	-	-	-
projected cost savings	-	-	-
energy savings and energy cost savings	-	-	-
cost effectiveness/savings to investment ratio	-	-	-

Table 3: Co-Generation Metrics

Two CHP projects have received pre-approval from BGE for the EmPOWER incentive during FY2015 for Back River Waste Water Treatment Plant (2MW) and Ashburton Water Treatment/Pumping Station (674KW). In addition, the Interconnection Agreement was signed for Ashburton.

In the first two years of the CIF program, a little less than $200,000 in labor, indirect, and consulting costs have been expended in conducting intensive evaluation of the four City sites and cursory review of the three schools. OSE is planning on expending the remainder of the labor and consulting budget and the entire construction budget in the upcoming fiscal year.

4. Issues and challenges

CHP applications entail a complex review with BGE and its contractor, ICF. This has lengthened the application process due to substantial questions or clarifications concerning our applications.

Although the CHP interconnection process is focused on electricity, the electric division of BGE requires the applicant to request that the natural gas division document the availability and pressure of the natural gas supply. Obtaining the certification and meeting the other requirements for interconnection has been a relatively long process.

For Back River specifically, ICF wanted assurances that the new 2 MW CHP will be coordinated with the currently operating CHP, requiring a great deal of proposal revisions.

5. Planned Enhancements or Program Alterations

Baltimore City's approach in developing CHP is to first tap into the State EmPOWER incentive for CHP ($1,000/KW incentive) to leverage the CIF funds. As a practical matter, the City must obtain an

interconnection agreement with BGE, which will use the same contractor, ICF, to review the project. The intended net result is to substantially enhance the CIF CHP program by increasing the total KW generated.

6. Lessons Learned for Year 3 Implementation

OSE was moved from General Services to Public Works in the fall of 2014. Substantial time was required for new decision makers to learn about new processes and projects. But there are opportunities for new energy saving measures in DPW since that department is the single biggest user of electricity in City government.

One opportunity stems from an environmental consent decree to improve the operations of the Back River Waste Water Treatment Plant. Improvements are well into the planning and design phase with the result of substantially increasing the City electric usage at that site. OSE is trying to inject coordinated energy generation into the plan, including the proposed 2MW CHP. Energy needs are now part of the City's capital improvements planning process and review, extending this consideration far beyond Public Works.

The Derecho several years ago caused a temporary stoppage of some public works facilities. Energy assurance in the face of loss of grid power has prompted a renewed focus by the City on emergency backup generation. The current CHP plant at Back River does not operate during power outage. All CHP projects will be designed to have black start capability to ensure continuation of essential services as well as contribute to curtailment efforts.

Urban Heat Island Mitigation

Cool Roofs

1. Program Description

Cool roofs use solar-reflective surface treatment to reduce the amount of energy absorbed by the roof which helps lower a building's temperature and cuts energy costs. The Baltimore Energy Challenge Cool Roof program motivates residents and businesses to adopt cool roofing technology for their homes and businesses. The Cool Roof Program utilizes a combination of education and outreach to encourage adoption, installation and completion of cool roofs in Baltimore, with a particular focus on target neighborhoods and blocks with increased urban heat island effects. The program also leverages tree plantings being completed in order to provide a comprehensive approach block by block. The goal of the program is not only to install cool roofs, but to advance awareness of the benefits of cool roofs, as well as to increase the number of jobs associated with the cool roofing sector.

2. Program during FY2015 (Year 2) of CIF funding

During FY2015 (Year 2) of CIF funding, the full implementation of Cool Roof program began by building off of initial planning during FY2014 and focusing installation to overlap with the TreeBaltimore program. The primary focus of the Cool Roof program during FY2015 was to identify target blocks within one specific neighborhood where outreach would start, promote the program to

non-profits to install cool roofing systems, and to administer the cool roof portion of the combined pilot project with GRID Alternatives.

During FY2015, the Office of Sustainability leveraged the CIF Cool Roof funding to implement a pilot study that advances solar installations on income-restricted residences. The Office of Sustainability, partnering with the national organization GRID Alternatives, secured funding from the Abell Foundation to develop a financing model for low-income families to install cool roofs and deploy solar on ten residences as well as on a critical non-profit community facility. The eligible homes that were chosen for this pilot received full services under the CREATES program and had their homes energy consumption further reduced through Weatherization services or Energy Efficiency installations. Since the cool roof installations, the homes also received solar PV system installations, so that the homes will realize additional savings and benefits from onsite energy generation.

Cool Roofs selected ten residences within a neighborhood known as the Door Community to provide with cool roofs in partnership with GRID Alternatives. Cool Roofs also installed a cool roof system on the roof of the Door Community Center. This was a $50,000 project that provided a major relief to a facility that is seen as a haven for the community. Not only does the Door Community Center provide recreation services to the community, but it also extends leadership development and service to residents to the community. It is a designated disaster relief location. Provision of this energy reduction service to the Door facility will be a benefit to the population surrounding the building, who rely on it for it for these reasons.

In addition to identifying target outreach areas, the program was able to convene roofing contractors to share information on their successes or barriers to increased adoption of cool roofing systems.

3. Accomplishments Using CIF Funds

Community Empowerment Metrics - Urban Heat Island Mitigation - Cool Roofs			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
Number of cool roof volunteers recruited	0	0	-
Number of roofs painted residential	7	3	-
Number of cool roof painted commercial/industrial/institutional	1	1	-

Table 4: CoolRoofs Metrics

During FY2015, one commercial building had a cool roof painted on it, and three residential households received a cool roof. In addition, a total of 550 Baltimore City residents received outreach about the CoolRoof program. Another main accomplishment for the CoolRoof Program using CIF funds was the addition of a full-time staff member to complete initial planning, do on-site roof assessments of buildings, and coordinate estimates from a number of contractors. The staff member also fostered key relationships with the main supplier of solar-reflective material as well as roofing installation industry

professionals. The staff member also was able to present at community meetings in targeted neighborhoods, conduct door-to-door canvassing and one-on-one education sessions with potential residences and businesses interested in cool roofs.

4. Issues and challenges

The major issue for the FY2015 program was staffing, and the loss of our trained paid staff member within several months after they were hired. Cool Roof installations are restricted by the weather since no installations can occur during the winter months. During those months, the program concentrated on outreach and education to prepare for spring, summer and fall installations.

Another challenge is trying to leverage the funds with other available funding streams, or to try and leverage private client funding. Most residential clients in low-income communities have limited funds to put toward the installation of a cool roof so the program sought out additional loan or grant programs to leverage CIF funds.

5. Planned Enhancements or Program Alterations

The Cool Roof program is partnering with the Maryland Institute College of Art and the Johns Hopkins University and Hospital to complete a heat sensor program. This will enhance reporting for CIF funds, as well as provide critical block specific heat data. Temperature sensors have been deployed in neighborhoods on the City's eastside in coordination with the tree-planting schedule and will work to gather data for the next reporting cycle. This will provide data about the impact of the tree plantings and cool roofs within the heat island.

6. Lessons Learned for FY16 Implementation

Since beginning stages of implementation for this program started in FY2015, we will be able to build upon the program for FY2016. The program will continue to provide more information during outreach activities to advance education about the benefits of cool roofs. Dedicated staff will also look at increased overlaps between cool roof installations and renewable energy installations across the city in all of our heat island areas for both residential and commercial properties.

A majority of our city's heat islands are in lower income neighborhoods, so how we explain the benefits and costs are extremely important. Cool Roofs are inherently more expensive than a black tar or silver coat roof. Being able to show residents the long-term return on investment over the life of the roof needs to be better addressed and communicated. Also, we will increase the opportunities to recruit volunteers for installations on non-profit buildings, as well as some low-income residential properties.

During FY2016, we will continue to leverage opportunities to provide cool roof installations by way of grants or volunteers, combined with solar installations in our heat island communities. Building off of the successful pilot with GRID Alternatives, we will look for opportunities to provide cool roof technology and solar technology to our income-restricted residences.

We will also leverage our FY2016 funding with a grant from the Town Creek Foundation to install cool roofs on critical community facilities with onsite renewable energy systems. These facilities will act as emergency centers for residents during natural hazard events. Installation of cool roofs not only will

lower the facilities energy bills and help the heat island effect in the community, but also will provide a longer-term roofing solution to limit leaks and damage during wet weather events.

TreeBaltimore

1. Program Description

TreeBaltimore is a mayoral initiative led by the Baltimore City Department of Recreation and Parks that serves as the coordinating functions for all City agencies and private organizations in their collective efforts to increase the tree canopy of Baltimore to 40% by 2037. TreeBaltimore strives to increase the urban tree canopy through the establishment of new trees, management of growing trees and preservation of mature trees. TreeBaltimore partners with individual homeowners as well as communities, schools, and businesses to ensure increases and stewardship on both public as well as private property throughout Baltimore City.

Tree planting is a key aspect of the program to increase canopy and decrease the urban heat island effect. Studies suggest that households experience between 15 to 35 percent utility bill savings when tree canopy coverage is 25 to 40 percent of the surrounding site coverage[9]. Decreasing the amount of impervious surface and increasing the amount of tree canopy can dramatically affect core temperatures of "high priority" neighborhoods[10]. In preparation for planting trees, TreeBaltimore team members are involved with creating new pits to plant trees, enlarging existing tree pits, and removing tree stumps from existing pits that will be replanted.

2. Program during FY2015 (Year 2) of CIF funding

In FY2014, the first fiscal year of CIF funding, the primary objectives for TreeBaltimore was to secure contracts with partners to plant trees and to engage in community outreach. The two major partners for this project are non-profit organizations, Parks & People Foundation and Blue Water Baltimore. Contracts with these partners became effective in late-winter-to-early-spring of the first year of implementation. The second major initiative in FY2014 was to provide outreach to foster community buy-in of the TreeBaltimore program particularly for planting on private land through community meetings, environmental education, door-to-door education, and literature.

During FY2015, the previous year's preparatory work began to yield results and so TreeBaltimore was able to significantly increase its tree-planting program (see Table 5 and discussion below). In addition, the program was still able to maintain its community engagement program to explain the program and solidify support.

3. Accomplishments Using CIF Funds

---

[9] Akbari, H., D. Kurn, S. Bretz, and J. Hanford. 1997. Peak power and cooling energy savings of shade trees. Energy and Buildings. 25:139-148.

[10] Rosenfeld, Arthur H., et al. "Cool communities: strategies for heat island mitigation and smog reduction." Energy and Buildings 28.1 (1998): 51-62.

Zhanga, X. et al. (2010) Relationship between vegetation greenness and urban heat island effect in Beijing City of China, Procedia Environmental Sciences, 2(5), p.438–1450.

Community Empowerment Metrics - Urban Heat Island Mitigation - TreeBaltimore			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
Number of trees planted	-	541	305 (56.3%)
Measurable tree canopy coverage utilizing LIDAR satellite data	-	-	-
Reduction in urban heat island temperatures using satellite data	-	-	-

Table 5: TreeBaltimore Metrics

For FY2015, TreeBaltimore planted 541 trees in seven concentrated loci throughout the city, compared to 159 trees planted the previous year. As part of this, 405 new tree pits were created, a process that consists of using power tools to break the existing concrete in sidewalk areas. In addition, 134 existing pits were expanded to accommodate new plantings, which involves cutting through sidewalk concrete with a concrete cutting tool. Overall 19,480 square feet of concrete was removed during FY2015. A total of 68 stumps were removed as well in preparation for new tree plantings.

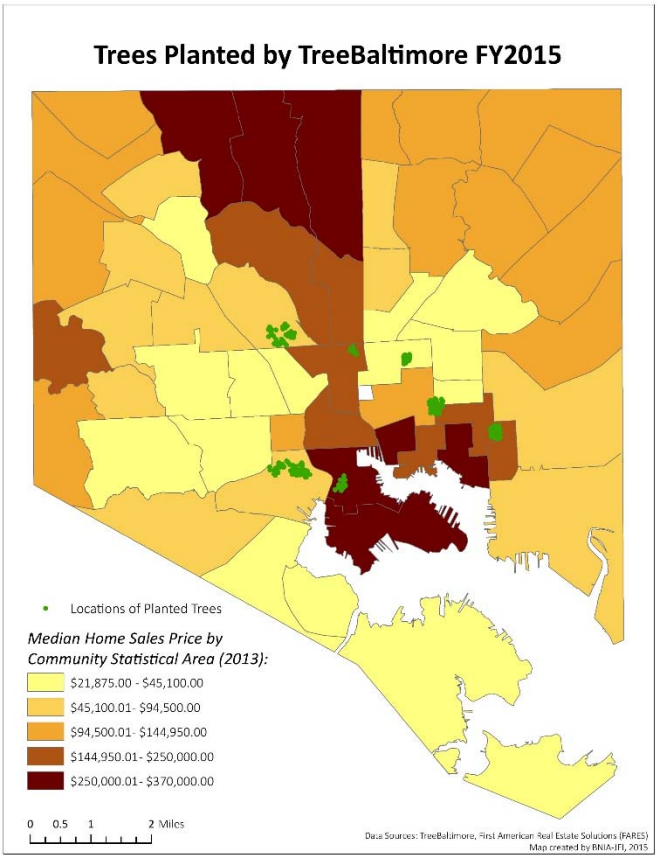


Figure 10: Distribution of tree plantings for FY2015

Blue Water Baltimore, while working in the Greenmount West, Oliver, Reservoir Hill, Highlandtown and Sharp Leadenhall neighborhoods planted 289 trees and created13,448 square feet of pervious surface through the creation and/or expansion of pits. Parks & People, while working in the C.A.R.E. (Caring Active Restoring Effects) and Pigtown neighborhoods planted 252 trees and removed 6,032 square feet of impervious surface through the creation and/or expansion of pits.

As can be seen in the Figure 10 above, TreeBaltimore significantly expanded its tree planting operations for the second year of program implementation. The impact of the program was not able to be measured through satellite data such as LIDAR due to the schedule for the LIDAR satellite to gather data is not due until (late-2015), and even with this data it may be difficult to successfully recognize patterns of longitudinal change due to incomplete temporal coverage.

4. Issues and challenges

The major issue with the designated "high priority" planting neighborhoods is the lack of planting opportunities. A lot of the preliminary work that was required included identifying potential sites through

pedestrian surveys, informing of citizens and then the creation of street tree pits. The TreeBaltimore team concluded that more funding needs to be spent on continual creation of "planting opportunities" than originally budgeted. The original budget, called for 50 pits to be opened by each partner, per year. This roughly equates to 9,600 sq. ft. for FY2014 and FY2015. To date, almost 20,000 sq. ft. has been removed. This concrete removal is a required task to complete tree plantings.

5. Lessons Learned for Year 3 Implementation

TreeBaltimore is currently re-allocating funds for plantings by BCRP's Urban Forestry to our partners who are working to increase "planting opportunities" for the end goal of decreasing Heat Island effect in Baltimore. Now that the contracting organizations have begun implementation, plantings will continue to expand out from the high priority neighborhoods.

II: Energy Assistance & Case Management

The Energy Assistance and Case Management programs are primarily managed by the Mayor's Office of Human Services (MOHS) Community Action Partnership (CAP). This combined program enables MOHS to pair assistance for energy bills to low-income households with case management services. CAP staff provide energy education to clients, direct them to additional services and track their progress in becoming energy secure. The Energy Assistance and Case Management programs are described in detail below.

Tactic	PSC Priority Addressed
Benefits coordination and self-sufficiency counseling to decrease dependence on public energy assistance	Low-Income Energy Assistance
Coordination of energy assistance clients with energy efficiency and weatherization services	Low-Income Energy Efficiency
Leveraging of loan financing programs to address energy, health and safety needs	Financing for Residential Conservation Projects
Streamlining wrap-around services to address critical health and safety barriers that prevent weatherization in a home	Removing Barriers to Adoption of Technologies and Behaviors Related to Energy Use

Energy Assistance

1. Program Description

The City of Baltimore, through the Mayor's Office of Human Services (MOHS) Community Action Partnership (CAP) administers services and delivery systems that promote self-sufficiency for low-income households. CAP operates the Office of Home Energy Programs and five Community Action Centers that are geographically dispersed throughout Baltimore City in the communities of Govans (Northern), Park Heights (Northwest) Cherry Hill (Southern), Patterson Park (Southeast) and Oliver (Eastern). Onsite staff assist with the completion of approximately 17,000 to 20,000 Maryland Energy Assistance Program applications for city residents each year.

The basic premise of the Energy Assistance (EA) program is that energy assistance must be combined with other social services in order to help low-income households reach energy security. While energy assistance grants are necessary to ensure housing stability, they currently do little to reduce dependency on public energy assistance programs or to improve overall self-sufficiency of residents. Instead, energy assistance often serves as an emergency program to avoid turnoffs and pay arrearages rather than a tool to improve the long term economic stability of households. This model is unsustainable in the face of declining funds and growing demand. CIF funding has significantly helped the CAP program to break down the silos between energy assistance, conservation, and education. Using energy assistance as an intake point, resources from these programs are targeted to ensure efficiency and impact.

This framework allows the CAP program to transform energy assistance from a single social service to a larger portal that directs customers into the optimal level of education, energy efficiency and case management requisite to their unique needs. Through the CIF model, CAP has been able to incentivize behavior change, promote energy conservation, and reduce household dependency on public assistance. This has been achieved through energy education, a case management approach, and technology reform.

2. Program during FY2015 (Year 2) of CIF funding

During FY2015, there were three main areas of focus for the Energy Assistance program; increased staff training, extending the community outreach aspect, and expanding marketing efforts. These three areas of concentration has helped CAP staff to better respond to clients' needs, connect them with available services, and to extend the reach of the EA program.

Increased Training

Continued training for MOHS staff was a primary focus in order to better serve clients who come to the centers and experience crowded waiting areas. Customers come to one of CAP's five community action centers to inquire and apply for a variety of services. Services include food referrals, water assistance for renters and homeowners, GED classes, employment training, legal assistance, energy assistance and clothing referrals. The Community Action CIF energy assistance process begins with the sign-in process. A member of the CIF staff collects the customers BGE account number at sign-in, in an effort to record the customers' kilowatt (kWh) usage. After the kWh is recorded, the CIF staff member then identifies customers that are eligible for weatherization services. During this time, another CIF staff member provides energy education using the Baltimore Energy Challenge (BEC) curriculum which demonstrates low to no cost ways for saving energy. The CIF staff asks everyone to sign a pledge committing to reduce their energy use through behavioral change and for that, customers are thanked with a kit of energy saving products. At this time the customer is encourage to contact BEC and schedule a home visit for the Energy Efficiency Program and, if necessary, an home visit to install a programmable thermostat.

Free Energy Savers kits are distributed to help supplement their energy saving behaviors. The kit includes:

- Outdoor CFL light
- Draft Stopper Gaskets for light switches and outlets
- Toilet Tank Bank
- Light Switch Decals

- First Aid Kit
- Energy Savers Guide

Upon receiving education, customers are triaged to Community Action programs based upon kWh usages and arrearage level to more comprehensive CIF interventions. For customers with less than 10,000 kWh they received the BGE Quick Home Energy Check-Up; 10,000 – 15,000 kWh customers receive Baltimore Energy Challenge Energy Efficiency Program (EEP) home visit and benefits coordination; and customers with greater than 10,000 kWh are referred to weatherization for housing/LIGHT coordination, benefit coordination, and self-sufficiency case management, with an emphasis on families with over 15,000 kWh per year[11].

Extending Community Outreach Efforts

Providing community outreach to increase the visibility of Customer Investment Fund (CIF) is a critical element to informing and educating the public on energy conservation and weatherization services. Because our program targets low to moderate-income households, partnering with organizations that service CIF's target population is essential to the continued success of the CIF program. The community organizations below are frequented by CIF client population and are target locations for outreach initiatives:

- Faith-based organizations,
- Baltimore city public school system
- City government agencies
- Non-profit organizations

Baltimore Community Action Partnership's Public Information Officer increased the community engagement outreach by leading a comprehensive communication and engagement strategy, both internally and externally. Community engagement has been incorporated within the board meetings, monthly Community Roundtables at each center, community outreach events, neighborhood meetings, social media and partnering with agencies within Baltimore City. The Public Information Officer role has served as a liaison among staff, media and community members in order to keep all parties informed about CIF and deliver resources and tools. With this strategy in place, over 200 hours of community outreach have immensely increased the visibility and community awareness of CIF within the Baltimore City.

[11] This program has been significantly leveraged by federal funding for high consuming energy assistance families. Through the REACH grant, the Maryland Department of Human Resources (Office of Home Energy Programs), in partnership with the Baltimore Community Action Partnership (CAP) and the Baltimore City Department of Housing & Community Development (HCD), provides a "one stop" approach to promote family self-sufficiency and home health & safety for Baltimore City residents that are LIHEAP eligible with high energy usage, defined as ≥ 15,000 annual kilowatt hours (kWh). The innovative program is a coordinated effort to address the full range of housing, health, energy and financial needs of qualified low-income families with energy education, benefits coordination, case management (family/social services & home-related services), and housing retrofits. The goal of the project is to (1) minimize health and safety risks, (2) to reduce home energy vulnerability and prevent homelessness, and (3) to increase energy efficiency.

The enhancement of the community outreach opened lines of communication with employees, families, communities, non-profits, schools and faith based organizations. Community Action Partnership has developed methods to effectively leverage technology to improve communications: each Community Action Partnership Center has a video displayed in the waiting area which highlight programs offered through CIF, the Community Action Partnership and other service providers. In addition, after viewing the Baltimore Energy Challenge energy conservation video clients can immediately schedule an appointment to receive a home visit to participate in their Energy Efficiency Program.

CAP staff also extended community outreach through social media such as Facebook and Twitter. This provides CAP staff with additional means to communicate with and involve Baltimore City residents while providing up-to-date information about our services and events. The Community Action Partnership aims to make effective community outreach decisions that reflect the needs of CAP catchment areas. The use of social media in terms of community engagement goes beyond the provision of information. The social media strategy places emphasis on the Community Action Partnership team's active role in the community and demonstrates the direct engagement with residents. With the use of the new layer of community engagement, the CAP program will continue to expand and continue to explore all opportunities.

Community engagement is one of the key means for consumer feedback, which is used to help understand the needs, views and expectations of local residents, and other stakeholders. However, good engagement is not only about providing insight, but also about empowering individuals and communities to play their full role in society through participating in decision making and shaping service delivery. Community engagement is the lynchpin of the way local Community Action Partnership operates. Through Community Action Partnership's consistent quality engagement, there is collaborative development that involves listening and responding to community needs. In addition, the Public Information Officer has structured and extended CAP's community outreach in each center's catchment area and strengthen the Customer Investment Funds' impact.

Marketing Efforts

A strategic marketing effort is one of the key means through which access to and application of knowledge and information are facilitated. The marketing and awareness effort for Energy Assistance and Case Management is a combination of information, education, behavior change and mobilization that helps lead clients to self-sufficiency. Community Action Partnership's services are greatly dependent on and play a critical role in promoting other key services. These additional services include, Energy Conservation Education, Credit Improvement Program, Income Tax Preparation, Renters/Homeowners Tax application assistance, Weatherization Program, Educational Opportunities/GED Preparation and Employment Assistance.

The central role of the Energy Assistance and Case Management marketing and awareness efforts are to:

- Empower families and individuals with the ability to become self-sufficient
- Promote an information sharing culture within and among communities as a learning hub
- Demonstrate to communities the power of awareness and information sharing

- Promote and extend the voices of the poor for participation in public dialogue and demand for greater and better service within their own communities
- Facilitate two-way education and learning about Community Action Partnership's programs
- Facilitate community access to program information, access and values; provide community members with useful knowledge and information.
- Institute new communication channels within and across the Baltimore city community that could be leveraged beyond the current operations.
- Facilitate realistic, relevant, culturally sensitive and effective outreach to community groups regarding their roles, responsibilities and benefits.

3. Accomplishments Using CIF Funds

Energy Assistance Metrics			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
Number of energy assistance applications	-	1,029	-
Number of applicants who attend energy education (BEC)	-	17,255	-
Number of applications who sign energy pledge	-	4,262	-
Number of referrals to higher tier education programs	-	1,559	-
Number of referrals to LIGHT program	-	810	-

Table 6: Energy Assistance Metrics

Overall, the Customer Investment Fund has significantly assisted Community Acton's ability to provide wide-ranging services to our customers. The additional CIF staff have been able to significantly increase the number of people we are able to help with energy assistance needs at the centers. Because of this, CAP staff are able to provide and refer to more services such as energy education and BGE Quick Home Energy Check-Up and weatherization referrals and projects have significantly increased which assist customers with reducing their overall energy bill and hopefully decreasing the need for assistance in the following year.

The number of energy applications continues to increase through CIF funding as the additional staff have enhanced CAP's ability to service customers. Staff completed a total number of 4,307 energy assistance application this reporting period. The number for the energy applications metric is for the ones that received assistance, not the number that applied. All customers receive energy conservation education in the morning at each center even if they are there for other services. After receiving the education, customers are encouraged to sign the energy pledge, which is forwarded to Baltimore Energy Challenge for referral to the Quick Home Energy Check-Up and the installation of programmable

thermostats which helps the customers lessen their energy usage to make their home more energy and thereby, decreasing their energy bill. By accessing the customers' kilowatt usage, Community Action is able to identify which intervention level is appropriate for the client based upon their annual kilowatt usage as follows:

< 10,000 – BGE Quick Home Energy Check-up
10, 000 – BEC Energy Efficiency Home Visit, Benefits Coordination
>15,000 – Weatherization, Housing Coordination, Benefits Coordination, Self-Sufficiency Case Management.

Staff refer all customers to LIGHT through our CIF liaison located in the Weatherization Unit and customers that sign the pledge are referred to Baltimore Energy Challenge Energy Efficiency Program.

The Results Oriented Management Accountability (ROMA) scales (See Case Management section for more detail) are completed to provide a more comprehensive picture of the client's overall household needs and connect the client to appropriate case management.

CAP staff along with the CIF liaison continue to educate clients that are in need of energy assistance with simple strategies and behavior modifications to reduce energy consumption. In addition, clients are referred to additional Baltimore Energy Challenge services. Baltimore Energy Challenge provides quick home energy checkups and the installation of programmable thermostats. This service addresses the immediate internal and functional usage of energy in the home. Clients that have usage of 15,000 kilowatts and higher may also receive higher tiered services that focus more on heating system replacements and the structural condition of the home, as it relates to energy consumption.

As a result of the educational information that CIF provides, clients in turn adapt energy saving practices within their individual households and they are asked to share that information with friends, family and neighbors. By practicing energy conservation methods, clients are able to see the monthly cost of their utilities decline and plan their usage throughout the year, which in turn reduces the amount of money that is paid out towards energy cost. The energy conservation education has assist customers in reducing their use of their arrearage fund through Maryland Energy Assistance Program (MEAP) by explain to customers the importance of conserving their energy use and planning their usage throughout the year. Arrearage is an additional benefit the customers can receive if they have been paying their bill in a timely manner and the regular MEAP grants do not cover the utility bill. Many customers use this benefit at the beginning of the program year and return again because they have a turn off notice. With the implementation CIF, customers are able manage their bill and apply ways to reduce cost lessening their dependence on grant money and not having to return for energy assistance the following fiscal year.

Energy conservation has become foundation of our operation as staff have incorporated energy saving practices in their homes. At our Southeast Community Action Partnership Center all staff have participated in the Energy Efficiency Program.

4. Issues and challenges

Given the volume of clients and the number of programs each can be referred to, we are currently unable to capture the real-time number of customers that attend an energy education presentation, number that

signed a pledge, number referred to higher tier education programs and number referrals to LIGHT program through the software.

An issue that may also cause some clients to be referred to an incorrect program is that the annual kilowatt is an estimate based upon the customer's previous three months of usage; therefore, the "annual usage" depends on the month the customer completes the application. Hence we are not capturing all customers that may qualify for CIF if we had the actual kilowatt number.

5. Lessons Learned for Year 3 Implementation

The next planned enhancement for Year 3 is to ensure that ClientTrack software is able to capture all client information in real time. This will allow CAP staff to better provide wrap-around energy-efficiency services.

6. Lessons Learned for FY2015 (Year 2) Implementation

As this was the second year of implementation, our numbers reflect the growth of our intake process, forms, and procedures in capturing customers and data. Community Action spent the second year refining the data entry process with the utilization of ClientTrack to ensure the accuracy of reporting. In addition, we have refined our strategic marketing effort to ensure we are connecting with as many residents in need to ensure those that qualify for CIF are aware of the program.

Energy Assistance and Case Management are the core focus within Community Action Partnership; they provide significant added value to the program. For example, we are able to demonstrate EarnBenefits screening and provide energy conservation education presentations in the community during most outreach efforts.

Case Management

1. Program Description

The MOHS Community Action Partnership (CAP) case management model under the Customer Investment Fund centers on a targeted approach to energy assistance customers with excess usage and arrearage problems that meet the needs of both the family and the house in which they reside. Through case management, customers are monitored over time to track improvement in key indicators of energy security using the Home Energy Insecurity Scale, used by Low-Income Home Energy Assistance Program (LIHEAP). Supplementing this is the Results Oriented Management and Accountability (ROMA) system which tracks incremental improvement for customers in the areas of self-sufficiency, household budgeting, debt and emergency assistance. CAP staff screen clients for 23 different government benefits through its case management services. In addition to the government benefits, customers are also informed of local community resources such as food pantries, farmer's markets, ESL classes and first time homeowner classes. The Community Action Partnership's case management ensures the client accesses the full range of eligible local, state and federal benefits.

Low income customers with complex energy needs require case management to navigate the confusing web of applications, eligibility requirements, constant funding changes and various agencies. With CIF support, CAP provides more direct access to the services necessary to stabilize households and avoid future energy crises. The case management portion under CIF has also contributed to increase awareness

of other home safety resources such as installation of fire alarms, carbon monoxide detectors and eliminating lead poisoning.

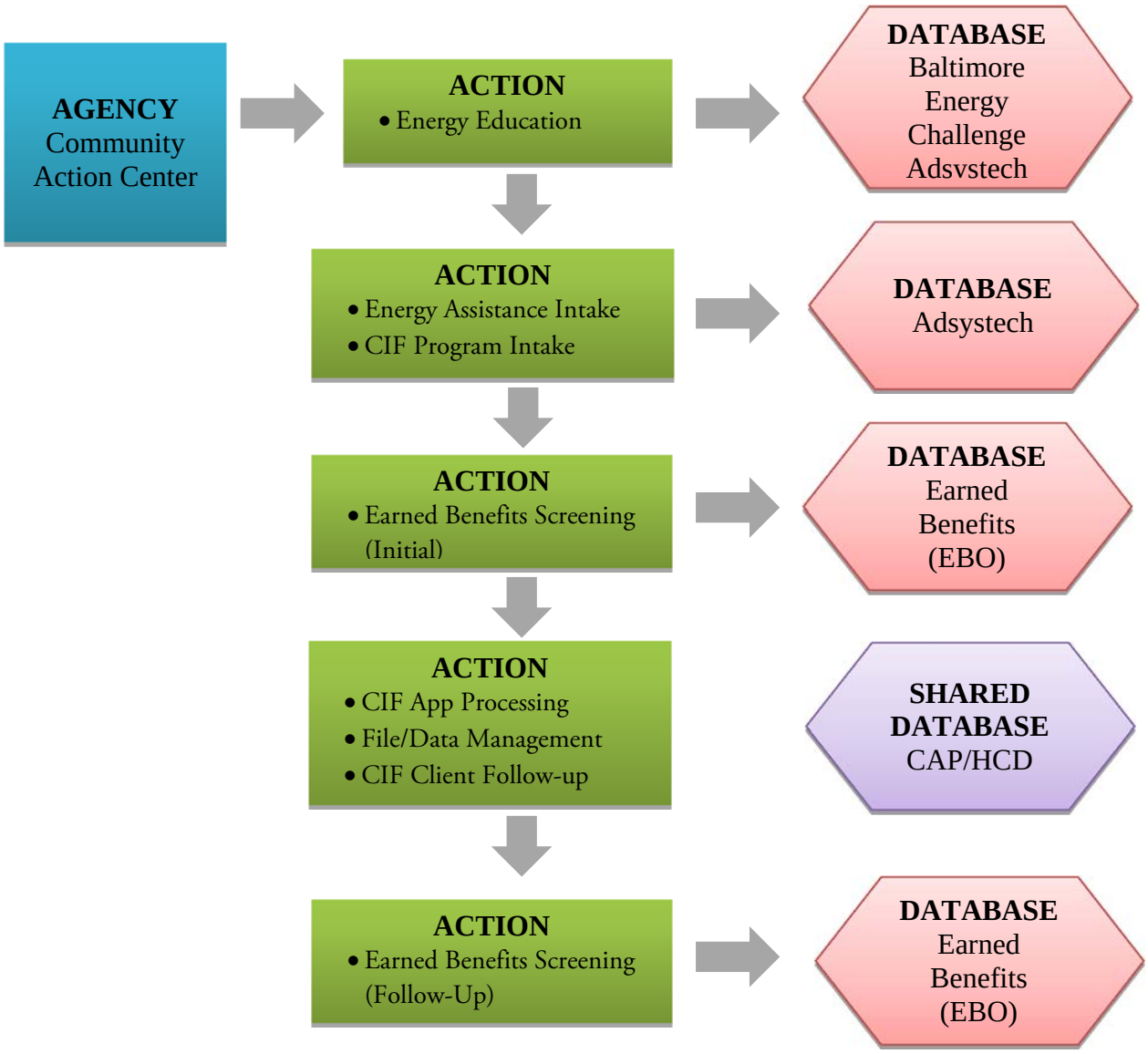


Figure 11: Case Management Flow Chart

2. Program during FY2015 (Year 2) of CIF funding

Increased staff training was a primary focus for FY2015 as well as the implementation of new technology such as the ClientTrack database. All CAP staff hired using CIF funds received ClientTrack training and refresher Baltimore Energy Challenge Education course. The Office of Home Energy Programs' staff were trained in ClientTrack, Baltimore Energy Challenge Education, Case Management, ROMA, EBO, and Family Development. In addition, meetings were held with ClientTrack representatives to develop and configure CAP technology needs for CIF implementation.

Training of Staff:

- ClientTrack: The purpose of the ClientTrack training was to equip the staff with the necessary skills to enter in customers' data and enable administrators to generate necessary CIF reports.

- Baltimore Energy Challenge Education: The purpose the refresher training was to update CIF staff on new energy conservation information.

- Case Management: The purpose of the case management training was to equip the CIF staff with the necessary tools to identify potential CIF clients in need of services that may aid them toward self-sufficiency.

- ROMA: The purpose of ROMA training was to assist CIF staff in asking qualifying and/or probing questions that identify the current status of clients as it relates to self-sufficiency. The ROMA scales assist in pinpointing whether or not the client is thriving or in crisis. The ROMA scales also measures the need for services such as housing, health care, childcare, education, energy assistance, food and nutrition and transportation. After the client has been assessed, the CIF worker and the customer can then begin to establish an action plan that will direct the customer towards self-sufficiency.

- EBO: The CIF staff was trained on EarnBenefits Online (EBO) to identify current government services the customer may be eligible for. This is determined by screening the customer and including information for household members during the intake process.

- Family Development: This training provided CIF staff the tools and framework to identify strengths and customer involvement in the case management process.

Case Management

After customers have signed in at a CAP center, the CIF leader pulls their kilowatt usage from the BGE portal, then determines if they qualify for the Customer Investment Fund program. Once they qualify for CIF, the Maryland Energy Assistance Program application is completed. At the beginning of the second year, CIF staff utilized the Adsystech core assessment to determine a snapshot for potential case management services that include education, employment, housing, food and utilities. The form was printed and reviewed with the Community Action Checklist by the customer and CIF worker. Currently, the CIF workers are utilizing ClientTrack and complete the ROMA Case Management Primary Assessment Self-Sufficiency Scales and Matrix instead of the Adsystech core assessment. The CIF worker then has the customer agree on barriers that need to be addressed. In addition to short and long term goals, the customer is then given a task to complete that moves them one step closer to overcoming each identified barrier. Usually, the customer has approximately two weeks to complete the first task. Afterwards, the customer meets with the CIF worker at least two times per month. The CIF worker follows up with the customer weekly to ensure motivation.

The Result Oriented Management Accountability (ROMA) scales will be completed as they provide a more refined picture of the customer's household needs. ROMA is a management and accountability system that integrates outcomes and results into our case management for clients. Surveys include the In-

home Energy Inspection Baseline and Self-Assessment, which affords the client a perspective of how energy efficient their home is and identifies areas of potential energy savings. The Practice of House and Personal Energy Conservation Measure determines what behavioral energy conservation methods clients currently utilize. The Case Management Primary Assessment Self-Sufficiency Scales and Matrix assess the unmet and met needs of the client regarding childcare, emergency assistance, education, employment, energy, food/nutrition, health insurance, budgeting, housing, primary health care and transportation. At the completion of each survey, there is a scale that benchmarks their status which can range from Thriving, Safe, Stable, Vulnerable and Crisis. The customer leads in the development of a case management action plan with the CIF staff.

In addition, if staff identifies there is a need for government benefits, an EarnBenefits screening is completed. CIF staff will ask a series of guided questions and the program will populate the benefits for which the clients qualify. Staff then provides applications and benefits information print outs to either mail in or present when they visit the appropriate benefit provider. The CIF staff follows-up with the customer to verify if the benefit is received and the actual value or if they need additional assistance. This sometimes presents a problem because some clients are not inclined to respond once they've received a benefit. We are working with the State DHR to confirm if clients are receiving their benefits in Year 3.

Prior to the initiation of case management, the client is provided an overview of its benefits, their responsibilities, and CIF worker's role. The client receives an acceptance letter. The customer completes and signs an Individual Self-Sufficiency Case Plan and each barrier is addressed from their perspective. Once the barriers are outlined, then the goals are developed for their movement toward self-sufficiency through the action plan, which includes referral to appropriate service and programs.

Customers are engaged face-to-face or over the phone regularly to their monitor progress, facilitate additional referrals, and ascertain if there are additional barriers to address and provide supportive counseling to ensure motivation. Each meeting is goal and outcome focused. At each meeting, the client's progress is reviewed and tracked to make certain there is movement toward self-sufficiency.

3. Accomplishments Using CIF Funds

Case Management Metrics			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
Number of leveraged benefits (EBO)	-	2,706	-
Dollar value of leveraged benefits (EBO)	-	$8,412,394	-
Improvements in energy security	-	-	-
ROMA household budgeting scale	-	-	-
ROMA self-sufficiency scale	-	-	-
ROMA energy scale	-	-	-

Number of leveraged housing + health + human services coordinated (LIGHT)	-	-	-
Dollar value of leveraged housing + health + human services (LIGHT)	-	-	-
Repeat energy assistance usage	-	-	-
On-time bill payment frequency	-	-	-
Arrearages reductions	-	-	-
Survey data of HH financial, health, energy, and general satisfaction	-	-	-

Table 7: Case Management Metrics

With the ability to provide EarnBenefits screening, CAP staff increased the number of leveraged benefits customers receive and track the actual dollar value. The ROMA scales were purchased late in the first year of CIF and are fully implemented in the second year. The scales provide the CIF workers with a clear picture of the customers' needs and condition of their home. This affords better goal setting and outcomes attained during case management. Due to the length of the ROMA questionnaire, several clients choose not to complete them. CAP is developing a survey to collect household financial, health, energy and general satisfaction to use in the third year of funding. The frequency of on-time payments will have to be addressed in the third funding year with the assistance of BGE. For FY2015, data on the number of arrearage reductions was not kept, but with the recent assimilation of Office of Home Energy Programs; Community Action will track arrearage reductions moving forward.

4. Issues and challenges

There were a number of issues and challenges during FY2015. A major issue has been the incomplete implementation of ClientTrack by the software provider. This has created a significant hurdles. ClientTrack does not yet allow data entry for the ROMA surveys and we are unable to track leveraged benefits, repeat energy assistance usage, on time bill payment frequency, and arrearage reduction. CAP staff continue to use the paper surveys and that causes them to manually enter the data into a spreadsheet, which is a highly time consuming process. The EarnBenefits Online screening and the ROMA survey may take 60 minutes each to complete. The length of time is an impediment to staff as customers do not want to wait or participate in the extensive process.

CAP continues to have a CIF worker assigned to OHEP who serves as the link between CIF and weatherization. She screens weatherization applications for completeness, accuracy, and program eligibility. In addition, she reaches out to eligible clients to not only gather more information and categorize priority, but also serves as the human connection between weatherization clients and potential weatherization services. Her role is to also update CIF workers and clients alike with the status of applications. This also offers the client outstanding customer service as the continued tensions associated with not knowing placement within the weatherization process, is greatly reduced by keeping the client and other CIF workers informed. Furthermore, OHEP transitioning to the Community Action

Partnership affords us the ability to reach over 15,000 more clients, through the training of CIF staff at that location.

5. Lessons Learned for Year 3 Implementation

CAP transferred client data into ClientTrack; however, there are still configuration issues such as ROMA survey integration and the inability to automatically exit customers from the program. We have created temporary ROMA databases to obtain data through Excel spreadsheets. The reassignment of Office of Home Energy Programs (OHEP) under Community Action Partnership has enhanced our ability to provide energy assistance to a broader pool of City residents that meet CIF requirements. The OHEP team has over 15,000 clients apply for energy assistance on an annual basis. These clients were not included in the initial grant and therefore were not receiving the benefits of the educational and case management components of CIF. We have trained CIF staff assigned to OHEP to provide the same services customers would receive at the Community Action Centers. Additionally, we refer customers to our centers for case management. Adding OHEP under CAP ensures that all residents applying for energy assistance will receive the same education, energy assistance and case management.

6. Lessons Learned for FY2015 (Year 2) Implementation

Staff are sharing "best practices" for engaging more customers in the case management process. In addition, the ROMA scales were streamlined to remove the redundancy of the questions and lessen completion time. To better assist staff, a community resource book was placed on the shared drive for easy access by staff.

III: Energy Efficiency

Tactic	PSC Priority Addressed
Energy Education	Removing Barriers to Adoption of Behaviors Related to Energy Use
Low – Tier Energy Efficiency Retrofits	Low-Income Energy Efficiency; Removing Barriers to Adoption of Behaviors Related to Energy Use
Referral to State and utility programs for loan programs	Financing for Residential Conservation Projects

1. Program Description

The Baltimore Energy Challenge (BEC) is a program led by the Baltimore City Office of Sustainability in partnership with Civic Works, Inc. and the Baltimore Community Foundation. BEC seeks to educate Baltimore City residents on energy saving behaviors through a grassroots effort in neighborhoods and schools as well as through in-home consultations and a service that provides free energy-saving materials to tenants and homeowners. Much of the program's outreach is based on research that shows how community-based marketing can help change every day actions and eventually lead to new social norms among neighborhood peers (*Fostering Sustainable Behavior: An Introduction to Community Based Social Marketing*, McKenzie-Mohr, 2011). BEC attributes much of its success in spreading awareness and committing residents to lowering their energy to the knowledge provided by this approach.

Baltimore Energy Challenge consists of two main programs, the energy efficiency program (EEP) and the community engagement program (CEP). Each is charged with the overall goal of helping lower Baltimore's energy usage through education and social interaction as well as the physical installation of energy saving products in homes. The two teams work together to achieve this goal by meeting frequently to strategize how to increase the impact and number of residents served by the program.

The primary service that BEC EEP provides are accessed during scheduled visits to the homes of Baltimore City residents who sign up for the program. Points of entry for obtaining BEC EEP services are available throughout Baltimore in strategic locations such as the Community Actions Centers, the BEC Community Engagement Program, referrals from partner organizations and city agencies, and from neighborhood canvassing that BEC EEP itself conducts.

Upon visiting a household, the BEC EEP team engages in three main activities. The first is to install light weatherization materials to help conserve energy. The second is to provide a personalized energy education. The third is to gain a commitment from the resident to reduce energy in the form of signing a public pledge. Upon signing the pledge, the resident is given an energy conservation kit similar to the ones that the CEP distributes. The combination of *in situ* energy education, light weatherization services, and free energy conservation materials magnifies the impact of each of these three elements in promoting energy efficient habits.

The teams that conduct these visits are comprised of staff from Civic Works along with AmeriCorps participants that serve as Energy Educators. In addition, a management and administrative team work in the BEC office to coordinate the program, schedule appointments, and record data from the program.

2. Program during FY2015 (Year 2) of CIF funding

As stated above, the primary element of the BEC EEP are the visits to households across Baltimore. Because barriers such as homeownership, income, or electric usage do not limit who can receive BEC EEP services, the program has been able to reach a broad range of Baltimore City residents (see Figure 12 below). This low-barrier-to-entry advantage, combined with the personalized and friendly in-home visits, contributes to the significant breadth and depth in reach of the program, making it a valuable component of the larger Baltimore Energy Initiative.

To describe the home visits in detail, a resident can be referred to the BEC program through a variety of ways as discussed above. A team in the BEC office will call the resident in order to assess their energy needs and to finalize the scheduling of the appointment. From there, a BEC EEP team, working in pairs of two, will visit the household during the scheduled appointment time in order to provide the household with BEC EEP services. Before any work is completed in the home, the resident signs a liability waiver documenting their consent to the performance of these upgrades.

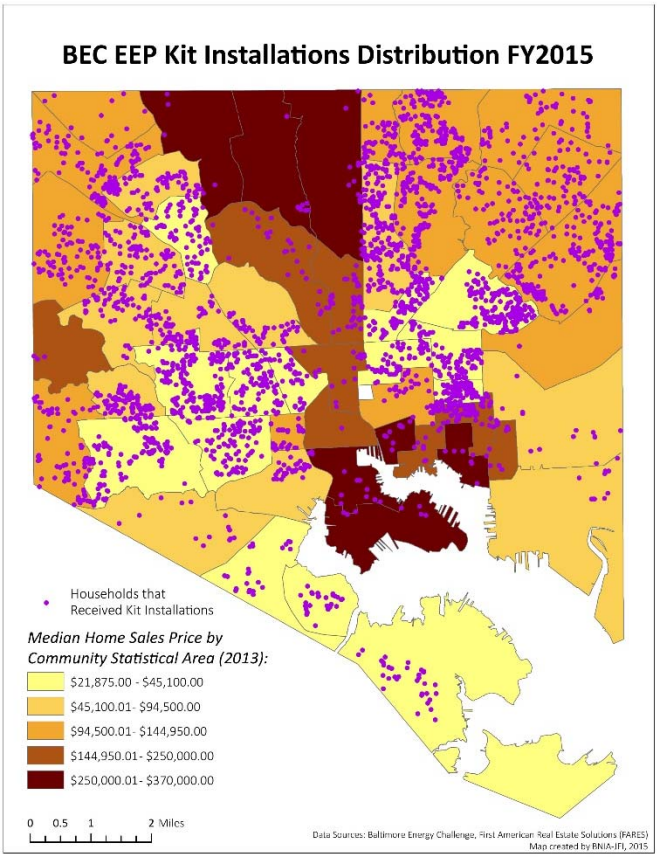


Figure 12: Distribution of BEC EEP Kit Installations

The core of the BEC EEP services is a checklist assessment of the household's energy needs and the installation of light weatherization and energy efficiency items. The teams will discuss with the resident the needs of the home and the resources that are available to help the household increase energy efficiency. This work occurs simultaneously with the installation of the light weatherization and energy efficiency items.

The most common items installed during these appointments are CFL and LED lights, which use a fraction of the energy of incandescent bulbs. The lights can use as little as five watts of energy per year but still maintain comparable brightness. They can even surpass the brightness of what residents had in place prior in addition to having a longer lifespan. Over the second half of the year there was a spike in the amount of LED bulbs installed as residents were finding them highly desirable with regard to reduction in energy as well as in brightness. The cost of these bulbs are greater than that of the CFL bulbs, however the benefit of lowered utility costs over time and lowered energy usage in the home is significant both to the resident and the BEC EEP team.

In conjunction with reducing the kilowatts spent lighting the home, teams might also install traditional surge-protected power strips and specialty "smart strips" or energy-conservation timer devices. This emphasizes the importance and ease of powering off electronics in the home while they are not in use. This new technology tends to further motivate residents about being at the forefront of household conservation methods.

Lessening the demand of water use is also part of the EEP teams' service plans, and so they include the installation of low-flow, pressure compensating showerheads and faucet aerators to reduce the amount of gallons per minute which these areas of the home use. Installation for hot water heaters and hot water pipes insulation is utilized in coordination with these water saving tools in order to minimize the loss of heat as water travels in the home and eliminate the need to burn excess energy reheating water during idle times.

All residents that are encountered by the BEC team are encouraged to take the pledge for committing to reduce their energy usage at home. Once the residents sign the pledge, they are presented a free gift bag containing an LED flashlight, a carbon monoxide/smoke detector, first-aid kit, hand-crank operated radio, LED photosensitive night-light, water displacing Toilet Tank Bank, outlet/light-switch insulation

gaskets and a door-stopper to eliminate exterior drafts, and reminder magnets with encouraging tips on how to best use power in the home.

Aside from the product incentives included in the service, the residents also receive education about how smart usage of energy, which is designed to increase their understanding of how the technology given to them is best used to save energy. Through this direct, in-depth consultation teams can point out areas in the home where adjustments can be made to become more energy efficient, such as the installation of programmable thermostats to automatically counteract excess space heating, which is a large and costly source of unnecessary energy use in the home. These programmable thermostats can be installed by BEC through a sub-contracted service at no cost to the resident. During installation, the sub-contracted team will also engage the resident in discussion of what best suits their needs for space heating and counter-balance that with informed opinions of what usages best conserve energy without sacrificing comfort.

The EEP team rounds out the consultation aspect of their service by making referrals to the resident for other Civic Works and non-profit programs and general resources within the city that may provide additional assistance outside of what BEC offers. These programs include the Green and Healthy Homes Initiative, TreeBaltimore, Cities for All Ages, Retrofit Baltimore, the LIGHT Program, and general city department hotline numbers.

These visits are documented through In-Home Assessment forms. This assessment records all data for each home such as the energy savings from switching incandescent light bulbs to CFLs, temperatures of appliances and home thermostats, HVAC setups, and referrals made to specific external programs for further home consultation and repairs. Their progress in maintaining energy conservation practices is monitored by BEC with the consent of the residents who sign a form releasing pre- and post-install historical data of their energy usage as recorded by BGE.

Partnerships

CAC

Partnerships are formed between BEC and other community organizations and programs in an effort to expand outreach. One of the major partnerships during FY2015 was with the Baltimore City Community Action Centers (CACs). There are five CACs in the city, and these centers are designed to support families that are in need of financial and social assistance.

Staff from each CAC undergo a thorough training on the BEC program and energy saving education. They are then tasked with introducing this program to every client they make contact with. Those clients each receive an Energy Savers kit on the spot and also receive a call from the administration team to have the install completed at their home. CACs receive a stock of kits bi-annually and replenish throughout the year as needed. They then report back to BEC the number of completed pledges and education sessions they led. A renewal training takes place yearly for all new CAC case workers. This partnership allows BEC to provide assistance to families through education on how to be more efficient as well as access to BEC's free service through the energy efficiency program.

BEC also provides a video produced by New Lens Video that runs in a replay loop at the five CACs for clients to watch as they are waiting for services. This video describes energy saving measures that can be

adopted by residents in the home to assist in lowering energy consumption. In the past, Constellation Foundation also funded the creation of two other videos, one of them being an energy rap song written by a young Baltimore City Schools student. Both are included in the loop to be seen in the CAC waiting areas. All three videos provide constant reinforcement about actions anyone can take to change how they use energy in their home.

Representatives from the BEC administrative team offer secondary support by also going to each Community Action Center (CAC) once a week to speak with their clients, asking them to sign the pledge and sign up for the free energy install. Due these efforts and this partnership, BEC has been able to significantly increase in the amount of people it is able to reach and pledges it collects.

3. Accomplishments Using CIF Funds

Energy Efficiency Metrics			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
clients served	5,000	4,715	90 (1.9%)
energy savings and cost savings of participants (kW)	-	2,307.9 kW / $445,091.30	-
cost of interventions (per household)	$471	$382	-
cost effectiveness: savings/cost over life of measures	-	1.84	-

Table 8: Energy Efficiency Metrics

In FY2015, the BEC EEP program was able to expand the breadth and depth of its services. During this period, EEP team members conducted 4,715 visits to households to install energy saving material and provide energy efficiency education. During these visits the BEC EEP teams installed 80,710 lightbulbs, 3,986 low-flow showerheads, 7,093 faucet aerators, 7,574 ft. of hot water heater pipe wraps, 2,193 hot water heater insulation wraps, 2,249 power smart-strips, and 2,968 regular power strips.

4. Issues and challenges

Despite the significant increase in outreach from the year prior, the difference in the forecasted (5000) and actual number (4715) of houses completed was in large part due to a period of transition in leadership and other contributing factors such as snow delays and closures. With leadership now strong and proper planning in place the difference should be resolved for FY2016. The BEC program is now looking to reach numbers beyond monthly goals in the summer to make up for the winter deficit.

In addition, during the previous year, the BEC EEP faced challenges with upkeep of administrative duties such as scheduling and record keeping for the program. One of the new developments of the program during this year was the addition of an administrative team. The members of the administrative team are employees of Civic Works that have been hired to conduct administrative tasks that keep the program in order. They are tasked with scheduling home visits for the AmeriCorps and staff so that they go out and complete the install. The administrative team also fields customers' inquiries about the

program by referring them to other private, non-profit, and city services to resolve issues they may have in their home. In addition, this administrative team offers customer service solutions for BEC EEP installed products including programmable thermostats. They also offer data entry support through recording all of the information for the light weatherization installation, which is central for keeping track of CIF-required data metrics.

Many other office related tasks are handled by this team, such as tracking inventory, offering order support and doing off-site scheduling at events. This reorganization has resulted in the energy efficiency team being able to concentrate on their primary task of conducting the energy upgrades and consultations.

5. Lessons Learned for Year 3 Implementation

As the BEC EEP program evolves and expands, management and staff are ensuring a proactive and thoughtful approach to future services. Presently a large portion of BEC EEP's clients are renters and owners who are settled into homes they have resided in for a significant amount of time. Looking forward, BEC EEP is implementing plans to more directly address the needs of city residents who are still in transition or who live in Baltimore City Public Housing units. Currently BEC EEP is in the process of servicing several of these multi-household residential complexes by coordinating large-scale retrofitting installations on select days, where the full management and EEP teams are mobilized to concentrate on one particular complex. The education that is provided through the on-site consultation, as well as the resources provided, build a strong foundation for the residents for when they eventually transition into alternative living spaces. Furthermore, the physical installation of light weatherization materials in the buildings' units bring the overall energy consumption down long-term, thereby supporting Baltimore's initiative for reduced energy utilization. For these reasons, evolving the EEP program to include these multi-household residential complexes provides a cost effective way to reach a portion of Baltimore City residents that were previously overlooked.

In addition to the above innovation, the BEC EEP team has added an additional staff member to serve as a quality assurance specialist. With this role, BEC EEP now has a dedicated individual focused on ensuring that every resident has a quality experience with their BEC home visits. The Quality Assurance Specialist (QAS) assists with the development and implementation of the program through planning, training, inventory control, and standard operating procedures. They are also proactive in helping coordinate the teams to perform effectively and efficiently in the field, as well as auditing teams' performance by contacting residents after the initial BEC EEP team has concluded their installations. The QAS also provides corrective procedures when necessary, providing ongoing training to installation teams to address recurring issues and maintaining record of these occurrences.

IV: Energy Efficiency Plus

Tactic	PSC Priority Addressed
Energy Education/Weatherization	Removing Barriers to Adoption of Behaviors Related to Energy Use
Heating System Replacements	Low-Income Energy Efficiency
Energy Efficient Roofing	Low-Income Energy Efficiency; Financing for Residential Conservation Projects
Weatherization Enhancements	Low-Income Energy Efficiency
Health & Safety	Removing Barriers to Adoption of Technologies Related to Energy Use
Energy Efficient Rehab	Low-Income Energy Efficiency; Financing for Residential Conservation Projects
Whole Neighborhood Stabilization	Removing Barriers to Adoption of Technologies Related to Energy Use

1. Program Description

The HCD Energy Efficiency Plus and Case Management components of the Customer Investment Fund (CIF), which is budgeted approximately $20 million over three years, are well described in the CREATES proposal. For a summary, HCD's CIF program goal is to serve more low-income families more completely with green, healthy and sustainable home improvements integrating public and non-profit agency services. CIF funded elements overcome obstacles that historically have been barriers for low-income families to receive energy conservation services. These obstacles are especially evident and problematic in Baltimore City's aging and distressed housing stock, and so the HCD CIF element is especially important in providing services to households most in need of weatherization services.

2. Program during FY2015 (Year 2) of CIF funding

The CIF elements that enable HCD to reach low-income households during FY2015 include:

- Heating system repairs and replacements, including an emphasis on converting homes from oil to natural gas heating. Traditional federal weatherization and Empower MD programs are limited in their approvals and abilities to address heating system problems. Neither traditional energy program allowed low-income households to convert from oil to natural gas, which we estimated will save the average low-income families $974 per year. Neither program was designed to address the winter-time "no heat" emergencies of families with dangerous or dysfunction heating systems. A complicated patchwork of various grants were sought and used for this purpose in the past. CIF funding allows for both conversions and emergency responses that allow HCD to serve low-income households not eligible for weatherization through previous frameworks.

- Roof repairs and replacements – Similarly, roofing problems in the past with DOE funded weatherization and Empower MD were reasons for deferral and denial of families most in need

of our services. With CIF funding HCD has been able to provide the roofing services that prevent energy from literally going "through the roof." Due to roofing issues being a primary barrier in past programs, with CIF funding HCD has been significantly expand its reach to able to aid families with poor housing conditions most in need of our services.

- Weatherization Enhancements – This CIF component allows HCD to replace knob and tube wiring, test new lighting strategies, timers, and make electrical improvements related to energy efficiency but not funded by other sources. It also facilitates creative solutions to meet energy needs. Traditional weatherization and Empower MD are strictly tied to certain established sets of energy measures determined by savings-to-investment ratios. For instance, the previous funding sources did not allow for knob and tube wiring unless it fell within the $500 health and safety cap. This item alone runs between $900-1700, however according to the National Electrical and International Building Code, insulation cannot come into direct contact with knob and tube wiring as it has the tendency to overheat and poses a fire risk. Previous to CIF funding the presence of knob and tube wiring was a cause for deferral under prior funding rules. If insulation was not conducted due to knob and tube wiring, the expected energy savings for the household receiving weatherization would be drastically reduced.

- Health and Safety – This HCD component of the CIF program is critically important to provide support for coordinated green and healthy home services. It enables HCD to make healthy home repairs beyond the narrow limits of energy conservation programs. Although healthy home repairs that do not have a savings-to-investment ration, they may prevent housing-related childhood health problems and fall/injury, especially for seniors, while also providing for a safe work environment for HCD employees and contractors. Before CIF funding, health and safety issues for residents, HCD staff, and contractors a barrier for low-income households to receive weatherization services. Because CIF funding allows for health and safety repairs, this has allowed HCD to better serve low-income residents.

- Energy Savings Loan Program – ARRA weatherization allowed families up to 60% of area median income to be served, but current DOE and Empower MD policy restricts this service to households with a much lower standard of 200% of poverty. With the ability to provide zero percent deferred loans to families between 200% of poverty and 80% of AMI, this CIF component supports energy conservation and Energy Efficiency Plus services to low-to-moderate income families that were excluded from DOE and Empower MD weatherization programs.

- Section 8, Energy Assistance and HCD Case Management – CIF funding allowed this HCD Division and the Office of Home Energy Programs (Energy Assistance) to expand staffing for intake and case management, functions that are not adequately supported by DOE weatherization and Empower MD. Qualifying families for an array of services (the LIGHT Program) takes time, effort, and professional support. The LIGHT Program is the single point of intake and case coordination for three programs in the Division of Green, Healthy, and Sustainable Homes: Energy Conservation Services, Structural Rehabilitation, and Lead Hazard Reduction. LIGHT Program case coordinators conduct assessments and screen clients for these services as well as for fall/injury prevention, asthma reduction, and other healthy home

improvements. Additionally in partnership with CAP we screen for tax credits, employment assistance, health care access, financial benefits and more; then match clients' needs and eligibility with available services. Services are provided by Baltimore City agencies as well as outside organizations. LIGHT's individualized case coordination maximizes the green and healthy homes benefit potential in each household and provides an efficient and customer-friendly experience for applicants. Our LIGHT team approach is best exemplified in the Whole House Assessment Triage (WHAT) Committee described below. OHEP staff qualify and refer more families to HCD for assistance through their CIF-expanded staff. Additionally, HCD has been implementing the focus described in our CIF proposal to the PSC where the energy conservation economies of scale and the support for affordable rental housing are achieved by weatherizing Section 8 projects and properties.

- *Weatherization Assistance Program (WAP) (DHCD)*
  BEC purchased inventory, a vehicle and dedicated phone, and hired staff in order to begin meeting with WAP clients in April 2014. In April of 2014, HCD received a list of WAP clients from July 2013 through March 2014 for us to see the magnitude of the work we will be doing. There were 406 clients, which will be scheduled in a month's time.

  Once this joint program is fully implemented, two BEC AmeriCorps will be assigned to meet with WAP clients to conduct the energy efficiency education and provide additional energy conservation products not installed during the weatherization. They will schedule their own appointments with WAP clients and work primarily out of the BEC offices where their vehicle and inventory are located. At least once a week, they will work out of the WAP offices, checking files on clients, verifying what products were installed so that they can also educate the client on those items and why they are important and if applicable how to use those items. As described in the Community Engagement program narrative on page 20, the BEC CEP team was able to provide education on energy conservation habits to 321 residents who received HCD weatherization services.

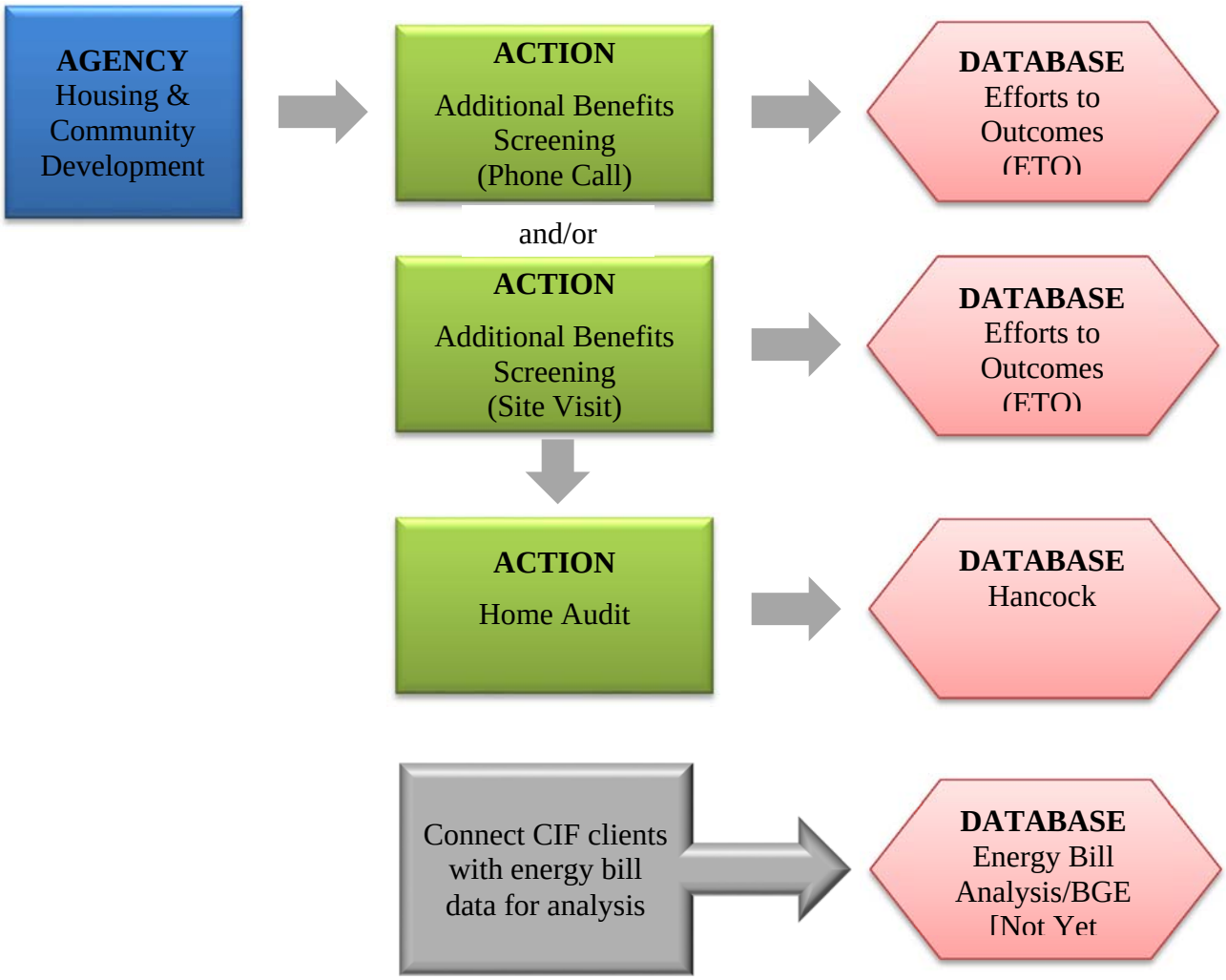


Figure 13: HCD Case Management Flow Chart

3. Accomplishments Using CIF Funds

Energy Efficiency Plus Metrics			
Metric	**Forecasted**	**Reported**	**Verified (Audited)**
Energy Savings and energy cost savings	0	1,992,961 (kWh) / $186,780.30	-
Clients served	500	1071	-
Cost of efficiency measures	$6,272,690.00	$5,777,155.49	-
# and Dollars leveraged housing interventions	$750,000.00	$5,348,332.00	-
# of Customers Served Who Were Otherwise Ineligible	100	536	-

Cumulative neighborhood energy savings in geographically targeted areas	To be calculated by JFI-BNIA in Year 3
Health & Quality of Living	
Change in property values at next assessment	
Occupancy rate of property and neighboring properties	

Table 9: Energy Efficiency Plus Metric

In regards to accomplishments for FY2015, the EEP program accomplished many of the goals set forward in the initial proposal for the CIF grant. For instance, heating system replacements served 521 homes in the second year of CIF FY2015 (Year 2) but were projected to reach 400 households; 121 ahead of projection and HCD expects that trend to continue in the third year (see Appendix D, page 91). Roofing repairs/replacements were provided to 384 households, more than twice as many as the CIF proposal projected (Appendix D). The broad need for roofing assistance as an essential component of weatherization in older urban housing was even greater than HCD projected. Due to CIF funding, HCD was able to meet this higher demand. Health and safety improvements served 400 households in direct CIF support, and with complementary health and safety improvements through non-profit partners such as the HCD Lead Hazard Reduction Program added 110 houses served in this category, HCD was able to approach the CIF proposal goal for 550 homes served (Appendix D).

Weatherization enhancements served 384 homes with a variety of measures. Enhanced lighting was the broadest service and opportunity in this category. Experiments with lighting automation were on track meeting the projected 25 units and applied to group homes that received weatherization services. But the projected need in 140 homes for special adaptations for knob and tube wiring was not realized at that level, and HCD was able to service 90 houses with knob and tube wiring which had been a previous barrier to weatherization. In addition, the Energy Savings Loan Program settled 61 loans during the second year of CIF, which is somewhat below the projected service number of 75. However, many loan applications are in the pipeline for consideration and emergency needs have been receiving top priority attention.

In regards to Table 9 above, the Energy Savings metric above will best be discussed at the end of CIF year three when WegoWise, the expert Baltimore Energy Initiative contractor employed for this purpose, will independently report on results from actual utility bill analyses. HCD expects that energy savings will exceed the "reported" projection which was based upon calculated formulas from Hancock. This is partly due to the positive impacts of heating system and roof replacements not being factored into standard formulas.

The large number of clients served over the proposal forecast, as seen in Table 9, reflects the ability for HCD through CIF funding to weatherize homes that State and federal resources would not have permitted due to strictures on those funding streams. For that same reason, we included the full cost of energy conservation or weatherization investments in the houses served by CIF. However, a truer metric of the impact of CIF investments in "energy efficiency plus" is the number of houses that would have

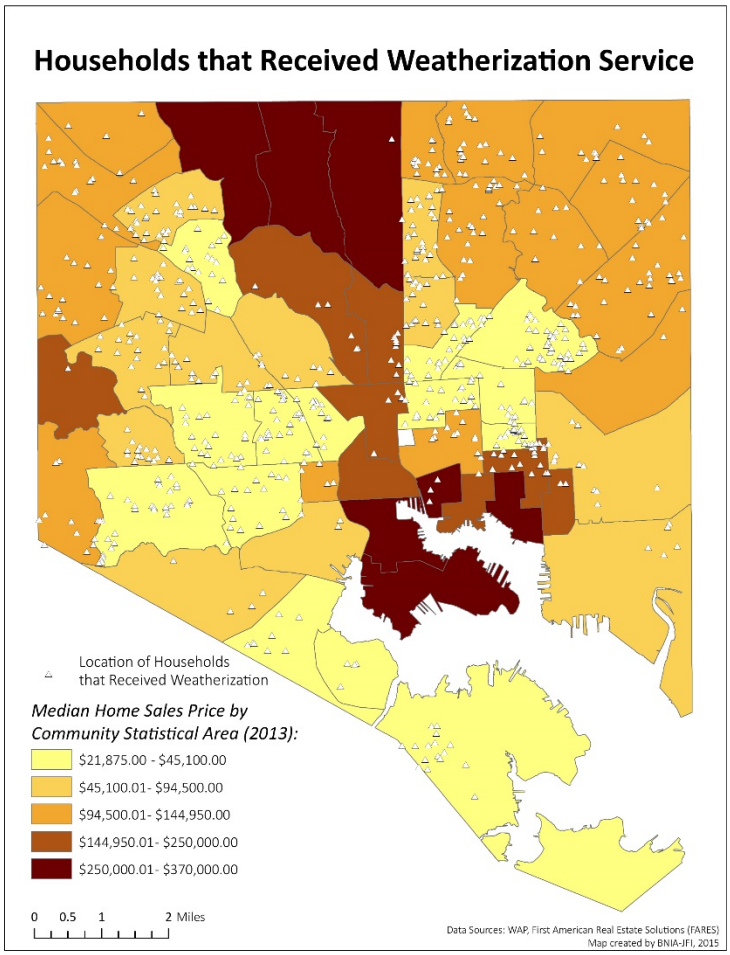


Figure 14: Distribution of HCD's Weatherization Services

been rejected from traditional state and federal weatherization programs, which is 50 % more than five times the forecasted number.

In addition to these accomplishments, HCD has fulfilled its goal of focusing on low-income households and communities. As can be seen in Figure 14 below, the vast majority of households that were serviced by HCD were in communities with significant or at least moderate signs of distress. Servicing low-income homes entails significant challenges such as the need for structural repairs, health and safety work, pest control, lead abatement, and roofing. As mentioned above, CIF funding has enabled HCD to reach these households that would have been ineligible to receive weatherization under previous funding restrictions. In FY2016, HCD will continue to use the expertise it has developed in servicing low-income households to ensure that the goal of providing weatherization to those most in need is met.

Weatherization: During FY2015, the second year of CIF, HCD weatherized 1,071 homes of families at or below 200% of poverty in the city of Baltimore. Of that total, 698 families were served through the EmPOWER MD program and 373 were served by the federal Weatherization Assistance Program. A majority of the families served by HCD in FY2015 would have been deferred or rejected in the past due to roofing, heating system, or structural problems. CIF made it possible for HCD to families most in need of services to make their homes green, healthy and sustainable

Heating Systems: With the assistance of CIF in FY2015 (Year 2), HCD was able to replace dangerous, dysfunctional or grossly inefficient heating systems in 521 homes of low-income families. This level of heating system support enabled HCD to help more families with heating system emergencies during the winter of 2014/2015; 218 households were reported through the 311 system or through referrals from the Mayor's Office of Human Services as having a "no heat' emergency and receiving prompt heating system repairs and/or replacements by HCD.

Oil-to-gas conversions in FY2015 (Year 2) of CIF numbered 113 and represented one of the most significant utility cost savings for the low-income families HCD served, many of whom were senior

citizens on fixed incomes. HCD projects that the average low-income family saves $974 a year as a result of the oil-to-gas conversions. Collectively, the estimated heat cost savings for these families are $110,062 per year, more than a million dollars over ten years.

In FY2015, the program started to install combination hot water boilers with domestic hot water heating capabilities. The units are direct vent, sealed combustion and mount to the wall. The combo units provide space heating and hot water for domestic use. Not only are the units rated at minimum AFUE 90, they save on hot water fuel that is traditionally wasted by jacket loss of a conventional tank. The on demand hot water heat portion is much easier to read, understand and control. The integrated/combo units are also easier to maintain and repair in the event of a failure (most boilers are plagued with the tendency to crack over time and when the boiler cracks, a new unit is usually the best fix. Further by installing these combo units, HCD eliminates the orphaning of the traditional water heater and the need for a chimney liner, which saves an average $1,300.00 per unit (the liners are needed to prevent condensation in the chimney and prevents back drafting).

In addition to the energy savings, the heating system program has had significant impacts for the everyday lives of the recipients. For instance, a community leader in Johnston Square sent HCD a videotape of an older man who, thanks to CIF, had heat in his home for the first time in two years.

Roofing Repairs and Replacements: During the second year of CIF, HCD replaced roofing for 384 households that were also weatherized. Without CIF support, those families would have been ineligible for state and federal weatherization. 75% of the roofs replaced were energy star rated. The other 25% were either gable (shingle or slate) or were completed in winter months when it was not feasible to install a "cool" roof.

The roofing work completed by HCD protects the weatherization investments in the homes served but weatherization also extends the lifetime of the roof. Air sealing and insulation of the top levels of homes preventing ice damming, moisture and premature roof system failure.

Of special note, 33 homes in Southwest Baltimore received cool white roofing from Civic Works, one of HCD's weatherization contractors and the one with the most experienced in cool roofing. Not only were there economies of scale in this approach but there are also synergistic benefits from whole row house blocks reflecting sunlight.

Weatherization Enhancements were provided to 384 homes during the second year of CIF, those enhancements included LED lighting, specialized roofing, plumbing repairs, and lighting automation.

Health and Safety home improvements were provided to 400 homes during the second year of CIF and those improvements included CO abatement, mold remediation, fall and injury prevention (handrails, stair treads, grab bars), chimney work (including liners), and knob and tube wiring mitigation.

HCD staff in weatherization, housing rehabilitation, and lead hazard reduction programs attended a two day training program on HUD's Healthy Homes Rating System. 33 City staff and non-profit partners attended the training provided by the National Center for Healthy Homes and held in May 2015.

HUD's Healthy Homes rating System will inform the work of this division especially when healthy home needs cut across the services of all three division programs. For example, the home of a veteran at risk of homelessness following a fire was used as a model for the training program and a full scope of work was outlined to make the home green and healthy. That work supported by weatherization and housing rehabilitation is also supported by CIF.

Weatherization and CIF funds supported the completion of ten homes in the past year that were subsequently served by the Lead Hazard Reduction Program. Roofing, heating and healthy home needs were addressed in houses that would otherwise have been rejected by the lead program. Good roofing, in particular, is a prerequisite for lead hazard reduction since roof leaks will undermine lead paint safety measures. The HCD met its goal establish by HUD for the Lead Hazard Reduction Program by the end of June 2015; and weatherization and CIF contributed to that achievement.

One of HCD's weatherization contractors, Civic Works, was funded by a foundation to aid seniors with fall and injury prevention home improvements and a number of complementary human and health services. Over one hundred senior citizens received these leveraged services from Civic Works, often working in conjunction the CAPABLE Program of the Johns Hopkins School of Nursing.

Energy Savings Loan Program (ESLP): For families over the income threshold for weatherization grants and associated CIF assistance with heating, roofing, weatherization enhancements and health/safety home improvements described above, the Energy Savings Loan Program was designed. The program provides zero percent deferred loans to meet the energy and associated needs of households with incomes ranging from 200% of poverty to 80% of Area Median Income.

In the second year of CIF, 61 cases were settled with ESLP funds totaling $542,531 in commitments at an average cost of $9,042.18/case. The three top needs addressed through the program were heating system replacements (including some "no heat" emergencies in winter), roof replacements, and energy star windows.

ESLP funds are often leveraged with Community Development Block Grant and other city and state loan programs when the needs of the household are more than one program can meet. Families over the income threshold for ESLP are referred to community-based loan programs such as Neighborhood Housing Services of Baltimore.

Special Events: HCD celebrated National Weatherization at the end of October 2014 by the completion of weatherization, with CIF support, of the Susannah Wesley House, a shelter for women escaping abuse and/or homelessness for themselves and their children. Sustaining this vital non-profit, and reducing its utility bills was a great way to celebrate.

On Rebuilding Together Day in April 2015, volunteers from both HCD and weatherization contractors joined in the efforts to help rehabilitate and preserve the homes of a few dozen senior citizens in the Mid-Govans neighborhood of North Baltimore. LIGHT staff, supported in part by CIF, were on duty supplying neighborhood residents with an array of service information relevant to green, healthy and sustainable housing. Rebuilding Together Baltimore is one of HCD's non-profit partners funded by

foundations to help older adults and people with disabilities who need more help than HCD can provide.

4. Issues and challenges

Section 8 and Rental Property Weatherization: During much of the past fiscal year, the State had issued a moratorium on the weatherization of rental properties without very significant investment of matching funds from the property owners. This also extended to rental properties that were subsidized and owned by non-profit organizations. This reduced HCD's ability to employ economies of scales in rental projects. The City and State are looking at projects pre-approved for income eligibility by federal DOE and HUD, properties that are managed Housing Authority of Baltimore City. HCD is approaching Section 8 landlords to discuss their willingness to invest 50% of the cost of the capital improvements and appliances beyond traditional weatherization measures. HCD aims to make the most of this opportunity area included in our CIF proposal during the third year of CIF.

Staff turn-over in the LIGHT Program: As cited in the first year report, HCD experienced a significant loss of staff in the LIGHT program, five staff left for a variety of reasons at the beginning of year two. This seriously impacted our intake and case management capabilities and a backlog of applications resulted. In addition to hiring new staff, HCD implemented some efficiencies in the application process, and the backlog was reduced to a manageable level.

Price Caps Issued by State for EmPOWER MD and federal Weatherization Assistance Program: During the second year of CIF, the State of Maryland issued requests for proposals to Local Weatherization Agencies (LWAs) including HCD to determine if those agencies should continue in their LWA roles. Along with those RFPs, the state issued price caps for energy conservation measures that could not be exceeded. HCD had existing agreements with weatherization contractors based upon lowest bidding prior to the issuance of price caps. Contractor prices varied widely, most were inconsistent with the new price caps. HCD worked closely with the City's Bureau of Purchases and obtained "best and final prices" to comply with State caps. The State has agreed that HCD will continue to be the LWA for the federal Weatherization Assistance Program. However, a decision has not yet been issued regarding EmPOWER MD.

5. Planned Enhancements and Program Alterations

The HUBS (Housing Upgrades Benefiting Seniors) Program: The Stulman and Hoffberger Foundations awarded $1.2 million to a consortium of non-profit partners working closely with HCD. Five social workers will be funded for three years to assist senior citizens in accessing housing and human service benefits, with an emphasis in the first year (the third year of CIF), on helping seniors make optimal use of the program benefits of HCD, EmPOWER MD, federal weatherization, amplified by CIF. The social workers will be especially helpful in visiting the homes of adults who cannot easily get out to make applications and access services.

Asthma Trigger Reduction in Coordination with the Green & Healthy Homes Initiative (GHHI): HCD has pledged $200,000 in CIF Health and Safety funds to coordinate energy conservation with healthy home improvements specific to asthma trigger reduction. Research has proven that certain

healthy home improvements can reduce hospital visits for children with severe asthma. One of HCD's weatherization contractors, GHHI, is a recognized leaders in this field nationally, and will be efficiently coordinating weatherizing while reducing the negative (sometimes life-threatening) impacts of severe asthma.

Revisiting HCD Weatherization Clients to Reinforce Energy Conservation and Home Health Safety: HCD will be employing several graduates of the Civic Works training program and assigning them the task of re-visiting weatherization clients aided by HCD in the past. Checking on the maintenance of furnaces HCD and CIF provided; checking on the whether smoke alarms and CO detectors have active batteries will be among a list of for check-up and immediate assistance. These visits will be made in concert with the Baltimore Energy Challenge providing energy conservation education and materials. Senior citizens will be a priority for these follow-up visits, education and service. Referrals will be made to partnering agencies such as Meals on Wheels if adequate nutrition is lacking; and clients in need of more complex or longer term case management will be referred to the HUBS program.

Tax Sale Foreclosure Prevention and Water Service Protection: HCD is working closing with other City agencies and an array of non-profit organizations to help prevent tax sale foreclosure and help prevent water service termination when households, especially senior households are behind on City bills. Helping these families access comprehensive benefits is a function of the Mayor's Office of Human Services, which is supported by CIF. HCD can play a helpful role in coordinating weatherization, housing rehabilitation, and home improvements that address water system problems or lower utility bills. The City is funding a Tax Sale Service Coordinator to be stationed at HCD and work to connect the dots and help more families avoid tax sale and avoid having their water shut off. CIF funding in the third year of the program, strengthens HCD's ability to sustain homeowners, especially seniors.

Solar Installations: HCD is working with the U.S. Department of Energy and Morgan State University to explore the potential of solar installations for low-income families in Northeast Baltimore. Weatherization and CIF support can play a significant role in pursuing the potential of that project.

V: Data Integration

1. Program Description

The City of Baltimore has begun the process of measuring progress towards achieving CIF program goals through data-driven metrics that drive program reform for low-income energy services. The specific metrics to be measured, both energy and non-energy related, have been included in the preceding program sections. Program data will be aligned with PSC requirements as well as with BGE, State and Federal protocols.

For FY2015, the City of Baltimore continued the process of engaging independent services from the Baltimore Neighborhood Indicators Alliance-Jacob France Institute (BNIA-JFI) at the University of Baltimore to conduct evaluation, measurement and verification (EMV) in conjunction with every aspect of its Customer Investment Fund proposal.

2. Program during FY2015 (Year 2) of CIF funding

The overarching goal of CIF is to integrate services within Baltimore to achieve benefits of interagency coordination for both better delivery of City services as well as community outcomes. In order to measure the benefits of interagency coordination, protocols for data integration across agencies and standardization of methodologies for calculating energy reduction was required.

Among the five program areas, there are multiple databases that can be integrated to monitor, track, and analyze activities. *Community Empowerment* consists of 4 address-based databases that allow for either mapping through Geographic Information Systems software programs or matching through database system software programs: the Baltimore Energy Challenge Community Engagement Program (CEP), the Urban Heat Island Mitigation program, Department of General Services Cogeneration Combined Heat and Power program, and the Retrofits and Upgrades Community Energy Savers program.

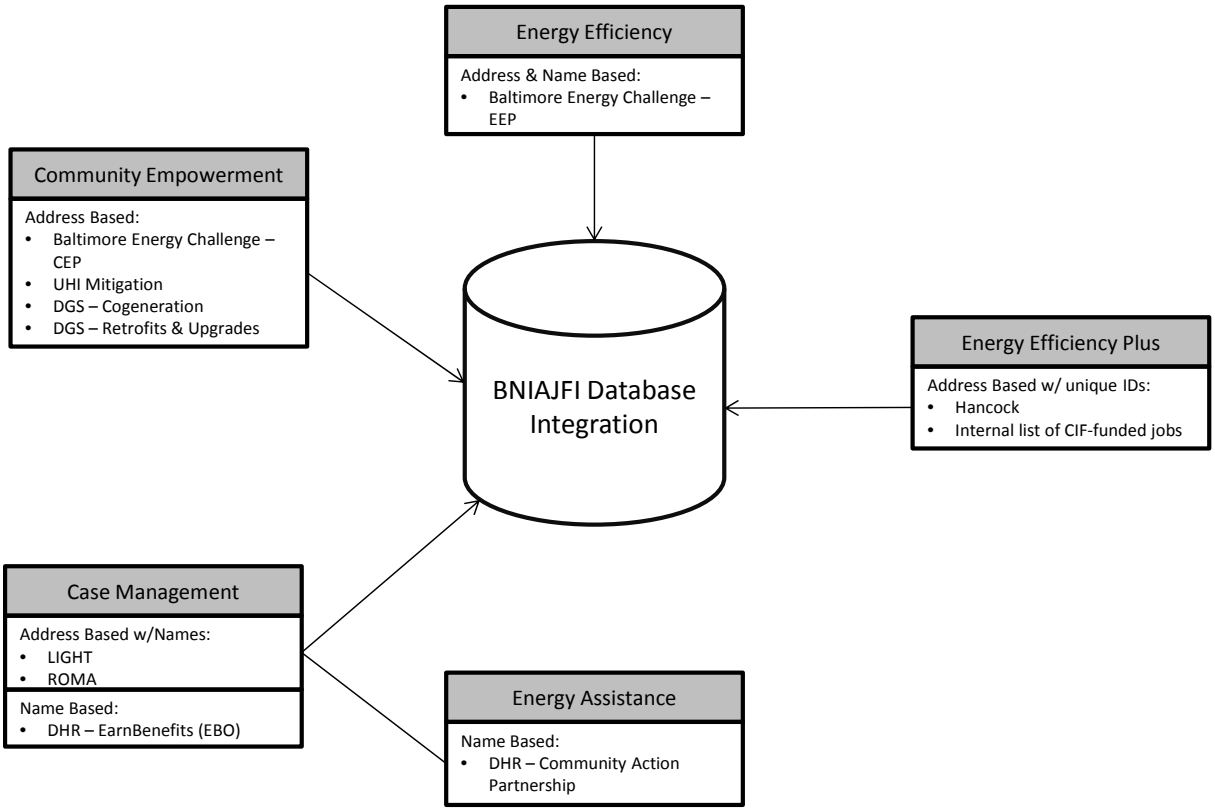


Figure 15: Data Integration Model

3. Accomplishments Using CIF Funds

During FY2015, BNIA-JFI hired a full-time staff member to coordinate the data management, data analysis, field verification, and report writing processes. This has allowed a more systematic framework for integrating and analyzing data from BEI programs. This position will continue into Year 3 of CIF funding, which will provide continuity for the data integration process. For FY2015, BNIA-JFI made

significant progress on a main aspects of data integration and analysis, which is the mapping of program data.

CIF programs with data that contains addresses have been mapped with ArcGIS software. Maps that were made have been included in the sections for each program: BEC Community Empowerment Program (BEC Energy Captain Distribution, BEC Community Engagement In-Home Consultations, and BEC Community Engagement Program Public Pledges FY2015), Retrofits and Upgrades (Distribution of Organizations Receiving Loans, TreeBaltimore (Trees Planted by TreeBaltimore FY2015), BEC EEP (Kit Installations Distribution FY2015), and Energy Efficiency Plus (Households that Received Weatherization Services).

Each of these maps contain a data layer showing the Median Home Sales Price by Community Statistical Area (CSA) in Baltimore. The Median Home Sales Price indicator provides insight into both the economic and housing conditions of the CSAs. Use of this indicator can highlight whether programs are effectively engaging distressed or low-income communities, which is a core goal of the overall BEI program. Once three years of data has been received, the BNIA-JFI team will be able to discern the CSAs which had had the most focus from BEI programs. From this, in FY2016 BNIAJFI will analyze the impacts at a community level by using longitudinal data for the Median Home Sales Price indicator. This analysis will help to understand the cumulative effects of the energy conservation services provided by the multiple BEI programs.

4. Issue and challenges

During FY2015, ClientTrack, a third-party database that handles all BEI program data, was supposed to have been implemented. However, this did not happen, and so BEI programs still maintained their own data recording methods. This presents multiple problems for data integration, such tracking clients who may have been participants in multiple programs. BNIA-JFI has attempted to work around this lack of a central database by using the matching procedures discussed in the previous section above.

5. Lessons Learned for Year 3 Implementation

For FY2016, BNIAJFI will be focusing on matching the clients between Energy Assistance, BEC CEP, BEC EEP, and Energy Efficiency Plus. This will provide information about client flow through for each of these programs, in other words it will tell which clients received multiple services. This will help understand the degree of integration between the different programs. The data bases that can be matched are, 1) BEC CEP, BEC EEP, and Energy Efficiency Plus (as these all have addresses), and 2) BEC EEP and Energy Assistance (BEC EEP has both addresses and BGE numbers; Energy Assistance only has BGE numbers and names).

Appendices

Appendix A: Annual Program Overview

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Baltimore Energy Challenge - Community Empowerment		
Awardee	Office of Sustainability		
Main Contact name	Alice Kennedy		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	14,217	1.4%
Average Investment per Household	-	$52.07	-
Electric Savings			
Annualized Energy Savings (kWh)	-	102,654.80	-
Coincident Peak Demand Savings (kW)	-	9.97	-
Lifecycle Energy Savings (kWh)	-	597,031.59	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	14,217	-
Participants referred to EmPOWER Maryland Programs	-	-	-
Program Costs			
Total Funds Spent During Reporting Period	$1,000,650.00	$740,297.20	-
Total Administrative Funds Spent During Reporting Period	$90,968.00	$177,732.60	-
Percentage of Total Awarded Funds Expended	-	22.1%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 11-24		
Successes	see program narrative pages 11-24		

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Retrofits & Upgrades Community Energy Savers		
Awardee	Baltimore City Office of Sustainable Energy (OSE)		
Main Contact name	Ted Atwood		
Contact Information	theodore.atwood@baltimorecity.gov		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	31	5 (16%)
Average Investment per Household	-	$145,479.68	-
Electric Savings			
Annualized Energy Savings (kWh)	-	809,404	-
Coincident Peak Demand Savings (kW)	-	185	-
Lifecycle Energy Savings (kWh)	-	-	-
Other Energy Savings			
Annualized Therm Savings	-	15,970	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	26 organizations	-
Participants referred to EmPOWER Maryland Programs	-	26 organizations	-
Program Costs			
Total Funds Spent During Reporting Period	$7,750,000.00	$4,509,870.00	-
Total Administrative Funds Spent During Reporting Period	$648,000.00	$189,136.00	-
Percentage of Total Awarded Funds Expended	-	43.4%	-
Highlight of Lessons Learned			
Challenges	see program narrative page 24-28		
Successes	see program narrative pages 24-28		

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Cogeneration - Combined Heat & Power		
Awardee	Baltimore City Office of Sustainable Energy (OSE)		
Main Contact name	Ted Atwood		
Contact Information	theodore.atwood@baltimorecity.gov		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Contract Procurement		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	4 (in progress)	-
Average Investment per Household	-	$47,687.25	-
Electric Savings			
Annualized Energy Savings (kWh)	-	-	-
Coincident Peak Demand Savings (kW)	-	-	-
Lifecycle Energy Savings (kWh)	-	-	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	-	-
Participants referred to EmPOWER Maryland Programs	-	-	-
Program Costs			
Total Funds Spent During Reporting Period	$4,000,000	$190,749.00	-
Total Administrative Funds Spent During Reporting Period	$499,000	$188,620.00	-
Percentage of Total Awarded Funds Expended	19.30%	3.7%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 29-32		
Successes	see program narrative pages 29-32		

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Urban Heat Island Mitigation - TreeBaltimore		
Awardee	Office of Sustainability		
Main Contact name	Alice Kennedy		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	541	56%
Average Investment per Household	-	$458.51	-
Electric Savings			
Annualized Energy Savings (kWh)	-	-	-
Coincident Peak Demand Savings (kW)	-	-	-
Lifecycle Energy Savings (kWh)	-	-	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	-	-
Participants referred to EmPOWER Maryland Programs	-	-	-
Program Costs			
Total Funds Spent During Reporting Period	$335,211	$248,053.95	-
Total Administrative Funds Spent During Reporting Period	$1,432.78	$0.00	-
Percentage of Total Awarded Funds Expended	-	14.5%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 32-35		
Successes	see program narrative pages 32-35		
*Total Funds and Administrative Funds are for TreeBaltimore and CoolRoofs combined.			

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Urban Heat Island Mitigation - CoolRoofs		
Awardee	Office of Sustainability		
Main Contact name	Alice Kennedy		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	4	-
Average Investment per Household	-	$21,789.33	-
Electric Savings			
Annualized Energy Savings (kWh)	-	-	-
Coincident Peak Demand Savings (kW)	-	-	-
Lifecycle Energy Savings (kWh)	-	-	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	-	-
Participants referred to EmPOWER Maryland Programs	-	-	-
Program Costs			
Total Funds Spent During Reporting Period	$335,211.26	$87,157.31	-
Total Administrative Funds Spent During Reporting Period	$1,432.78	$1,432.78	-
Percentage of Total Awarded Funds Expended	-	2.2%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 32-35		
Successes	see program narrative pages 32-35		
*Total Funds and Administrative Funds are for TreeBaltimore and CoolRoofs combined.			

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Energy Assistance		
Awardee	Mayor's Office of Human Services		
Main Contact name	Lori Cunningham		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	1,029	-
Average Investment per Household	-	$231.09	-
Electric Savings			
Annualized Energy Savings (kWh)	-	-	-
Coincident Peak Demand Savings (kW)	-	-	-
Lifecycle Energy Savings (kWh)	-	-	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	17,255	-
Participants referred to EmPOWER Maryland Programs	-	1,559	-
Program Costs			
Total Funds Spent During Reporting Period	$490,121.00	$237,796.44	-
Total Administrative Funds Spent During Reporting Period	$261,378.00	$230,004.66	-
Percentage of Total Awarded Funds Expended	-	12.6%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 39-44		
Successes	see program narrative pages 39-44		

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Case Management		
Awardee	Housing and Community Development		
Main Contact name	Ken Strong		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	-	1380	413 (29.9%)
Average Investment per Household	-	$679.06	-
Electric Savings			
Annualized Energy Savings (kWh)	-	-	-
Coincident Peak Demand Savings (kW)	-	-	-
Lifecycle Energy Savings (kWh)	-	-	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	-	-
Participants referred to EmPOWER Maryland Programs	-	-	-
Program Costs			
Total Funds Spent During Reporting Period	$609,510.31	$937,105.69	-
Total Administrative Funds Spent During Reporting Period	$574,009.31	$908,945.53	-
Percentage of Total Awarded Funds Expended	-	28.3%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 45-49		
Successes	see program narrative pages 45-49		

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Energy Efficiency		
Awardee	Office of Sustainability		
Main Contact name	Alice Kennedy		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	5,000	4,715	90 (1.9%)
Average Investment per Household	$471	$381.79	-
Electric Savings			
Annualized Energy Savings (kWh)	-	4,749,160.27	-
Coincident Peak Demand Savings (kW)	-	771.47	-
Lifecycle Energy Savings (kWh)	-	35,275,044.78	-
Other Energy Savings			
Annualized Therm Savings	-	-	-
Annualized BTU Savings	-	-	-
Participants Receiving Consumer Education	-	4,715	-
Participants referred to EmPOWER Maryland Programs	-	1,431	-
Program Costs			
Total Funds Spent During Reporting Period	$2,378,413.00	$1,800,151.44	-
Total Administrative Funds Spent During Reporting Period	$107,128.00	$242,190.76	-
Percentage of Total Awarded Funds Expended	-	24.3%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 50-55		
Successes	see program narrative pages 50-55		

Exelon Customer Investment Fund - Annual Program Overview - FY2015 (Year 2)			
Project Name	Energy Efficiency Plus		
Awardee	Housing and Community Development		
Main Contact name	Ken Strong		
Contact Information			
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Project Status	Program fully operational		
	Forecasted	Reported	Verified
Program Progress			
Number of Households/Businesses	1,500	1,071	36 (3.4%)
Average Investment per Household	-	$5,432.43	-
Electric Savings			
Annualized Energy Savings (kWh)	-	1,992,961.06	-
Coincident Peak Demand Savings (kW)	-	-	-
Lifecycle Energy Savings (kWh)	-	28,077,415.74	-
Other Energy Savings			
Annualized Therm Savings	-	472,001.67	-
Annualized BTU Savings	-	127,819.94	-
Participants Receiving Consumer Education	-	321	-
Participants referred to EmPOWER Maryland Programs	-	-	-
Program Costs			
Total Funds Spent During Reporting Period	$7,613,418.00	$6,885,814.57	-
Total Administrative Funds Spent During Reporting Period	$1,340,728.00	$1,108,659.08	-
Percentage of Total Awarded Funds Expended	-	34.90%	-
Highlight of Lessons Learned			
Challenges	see program narrative pages 56-64		
Successes	see program narrative pages 56-64		

Appendix B: Verified Annual Program Overview

VERIFICATION FIELD AUDITS

Verification of work completed was conducted by the BNIAJFI team during the summer of FY2015. The verification process entailed identifying a key component of each program and sampling 5% of that component. Some program verification, such as that performed for BEC EEP, was conducted as the work was being undertaken. Details are provided below.

Baltimore Energy Challenged Community Engagement Program (BEC CEP)

For the BEC CEP, the process for verification entailed retroactive phone calls to participants who signed public pledges. For FY2015, there were 3,916 public pledges signed though the BEC CEP program. To achieve a five percent sample, 194 phone verifications were conducted (for 5.0% sample). However, for Appendix A for BEC CEP, the total number of public pledges is 14,217. This number is the total public pledges administered through BEC CEP, BEC EEP, and the Energy Assistance program. These other two programs administer public pledge through a partnership with the BEC CEP. With the 14,217 total, the sampling percentage drops to 1.4%.

The key metrics for verification involved specific interactions at the time of the signing public pledges. During the phone survey, four questions were asked:

1) When you signed the Baltimore Energy Challenge pledge, did you receive the energy efficiency kits that came in the purple bag?
2) Were you presented with the opportunity to become an energy captain?
3) Were you presented with the opportunity to receive the BEC free in-home energy efficiency kit installation?
4) Were you directed to any other Energy Efficiency programs?

CEP Pledge Verification						
	Yes		No		Does Not Remember	
Verification Question	#	%	#	%	#	%
1) Received Kits	137	70.6%	44	22.7%	13	6.7%
2) Energy Captain	59	30.4%	122	62.9%	13	6.7%
3) In Home Kit Install	99	51.0%	87	44.8%	8	4.1%
4) Other Programs	67	34.5%	116	59.8%	11	5.7%

Table 10: CEP Pledge Verification

As can be seen in Table X above, clients who signed the pledge were most likely to state that they did receive the kit bag with free items (70.6%), while for the last three questions a significant amount of respondents stated they did not receive an opportunity to become an energy captain, learn about the BEC kit installation, or were directed to other Energy Efficiency programs. The kit bag, which is a purple bag, is the most memorable aspect of the pledge process, so participants' recall of receiving the kit bag may be naturally higher. For the other three elements, the BEC team may want to place greater

emphasis during the public pledge process so that participants retain knowledge of these aspects of the interaction.

TreeBaltimore

For the verification process for TreeBaltimore, the BNIAJFI team travelled to the location of work completed and visually verified that trees were planted and pits were expanded or created. A five percent sampling strategy was created, however, due to the clustering of the tree plantings, the BNIAJFI team was able to verify a much larger sample than the one originally developed (see Table 11 below).

Tree Baltimore Verification			
	Work Conducted	Verified	Percent Verified
Trees Planted	541	305	56%
Pits new or expanded	407	291	71%

Table 11: TreeBaltimore Verification

CoolRoofs

During FY2015, there was only one CoolRoof completed at the Green Street Academy. Due to the difficulty in obtaining access to the roof of the building, verification was not performed.

Retrofits and Upgrades

Verification of the Retrofits and Upgrades program was completed through visitation and inspection of 5 of the 26 locations that received loans through the program for a 19% sample. The inspected locations were the following:

- Paca House (116 N. Paca Street)
- Marian House (949 Gorsuch Avenue)
- Harford House (1517 E. North Avenue)
- Micah House (5207 York Road)
- CARES Food Pantry (5502 York Road)

For each of these locations, BNIAJFI team members performed a checklist survey of work completed to ensure that the physical improvements were visually verified.

In addition to verifying completed work, questions were asked about the impact of the improvements on the organizations operations. All locations part of the verification process reported that they already noticed substantial decreases in energy bills and improved workplace conditions. For the locations that served homeless populations, staff reported a significant increase in quality of life for their residents by providing better indoor living conditions.

An example of these improvements can be shown in the Harford House program. This is an organization that provides transitional housing and social services to formerly homeless males in an attempt to place them in permanent housing and work. The organization used the loans to upgrade lighting, replace the heating system, and install energy efficient appliances. The new lighting not only helped the organization conserve energy, but also dramatically improved the conditions in both the community meeting space and the individual rooms. The replacement of the heating system has allowed for better control of the temperature in the multi-floor building, whereas before the heating system upgrade, the different floors

would have highly variable heat with some floors being cold while others were too hot. With the new system, energy is being conserved and temperature is better regulated for a more comfortable environment for all the floors of the building. In addition, energy efficient refrigerators were installed in the rooms. These appliances are much more energy efficient and quieter, providing both energy conservation and better quality of life.

Cogeneration

Because no physical work has been initiated yet for this program, verification could not take place in FY2015.

Energy Assistance and Case Management

For verification of the Energy Assistance (EA) program, in-person visits to the Community Action Centers (CAC) were conducted. These visits entailed two parts; direct observation of the client intake process and spot observations of the overall workings of the EA program at the CACs. For the first type, a day was spent at a CAC where a BNIAJFI team member paired with a CAC staff member to observe the interactions and processes of the client intake. This type of observation only occurred once, and the day it occurred there were only two clients that were seeking EA. While these types of visits are beneficial in verifying the details of the interaction between CAC staff and clients, it is an intrusive method in that it interjects an outside observer into a sensitive situation of a low-income client seeking aid. However, a more robust month-long during June of FY2015 verification process was conducted where BNIAJFI team members observed the overall functioning of the CACs. This was a much less intrusive method of verification that also allowed a broader view of the EA process. The CACs deal with extremely high volumes of clients seeking energy assistance, with lines literally stretching out the door and around corners. Waiting rooms were full, and the caseload for CAC staff was heavy. Even with this high volume, CAC staff maintained a professional and respectful attitude with clients where they provided energy education, screening for other social programs, and case management.

In regards to verifying case management, BNIAJFI team members paired the verification process with data entry for the ROMA surveys conducted by CAC staff during the client intake process. For the verification/data entry process, 413 of an estimated 1,800 ROMA forms were examined and recorded for a 23% sample. During the verification process, the BNIAJFI team noticed significant challenges that CAC staff had in administering the ROMA survey. The first is that the database contractor, ClientTrack, had not yet developed the program for entering the ROMA surveys digitally. Therefore, CAC workers were required to administer the survey through a hardcopy form, which required the additional data entry step by BNIAJFI staff to transcribe the data into a digital form. In addition, the survey, consisting of three different sections totaling 32 pages is highly time consuming especially with substantial wait rooms and lines. In regards to the design of the survey, many of the questions are difficult to understand, resulting in answers that may not reflect the actual situation of the client. One of the surveys, the Practice of Household and Personal Energy Conservation Measures, does not have an outcomes table to provide the most important part of the survey that describes the condition of the survey respondent. Currently, the ROMA portion of the case management process is on hold to work out these problems. Recommendations are to substantially reduce the amount of questions, simplify the questions on the

surveys, maintain standardized survey procedures at all five CACs, and ensure that ClientTrack is able to process the surveys to reduce the reliance on the paper surveys.

Baltimore Energy Challenge Energy Efficiency Program

For the verification process, BNIAJFI team members accompanied BEC EEP teams into homes and apartments to observe the work they did. During a typical kit installation, there were nine key tasks that teams were expected, if possible, to complete. These were

- to replace old incandescent light bulbs with CFL or LED bulbs,
- to wrap the hot water heater tank,
- to install low flow aerators and showerheads,
- to offer the resident the chance to receive a programmable thermostat,
- to including a carbon monoxide and smoke detector,
- to provide the household with a gift bag of additional energy efficiency items,
- to ask if the resident wants to become an energy captain,
- to discuss energy tips and resources located in the city,
- to and having the resident sign a pledge to use less energy.

There were a few additional tasks that teams did during the installations, which included checking the temperature of the refrigerator, freezer, and water in the residence. However, the above nine tasks were the ones that the verification team audited. Eighty-five in-home kit installations were verified out of a total of 4,715 for a 1.8% sample. As can be seen in Table 12 below, the BEC EEP teams were relatively consistent in the services, except in their offering of the opportunity to become an energy captain.

BEC EEP Program Verification			
Item	Received %	Declined/Ineligible %	Not Offered %
CFL	94.1%	5.9%	0.0%
HWH Wrap	81.2%	18.8%	0.0%
LFS and Aerators	94.1%	5.9%	0.0%
Prog. Thermostat	34.1%	65.8%	0.1%
CO/Smoke Detector	85.9%	11.7%	2.4%
Kit Bag	100.0%	0.0%	0.0%
Energy Captain	31.7%	27.2%	41.1%
Energy Education	93.0%	0.0%	7.0%
Public Pledge	93.0%	3.5%	3.5%

Table 12: BEC EEP Program Verification

Energy Efficiency Plus

BNIAJFI team members conducted the verification of the Energy Efficiency Plus program by accompanying an EEP Inspector to sites that had received weatherization and visually inspecting work that had been completed. These visits were part of the EEP program's own quality control inspection process. For the EEP program, there were 783 individual households that received services in FY2015, and the BNIAJFI verified 36 homes for a sample of 4.6%. The sample was smaller than our target of 5% due to the time intensive nature of this verification process, staff turnover, and injuries that occurred for both BNIAJFI and EEP staff during the period of verification.

BNIAJFI observations were that the staff of the EEP program was highly professional and knowledgeable about building science especially as it relates to weatherization. Most have extensive experience in construction or home building, and so are able to quickly and efficiently inspect the work done by weatherization contractors. The EEP inspectors were thorough and ready to identify aspects of weatherization that did not meet their standards or that were not completed. When sub-standard or un-completed work was identified, EEP inspectors would call the contractors back to the site without reservation. In addition to their roles as inspectors, EEP staff serve as a type of customer service representative to ensure that beyond the physical work completed that the client was happy with the work completed and the overall EEP process.

Appendix C: BGE Incremental Savings Table

Exelon Customer Investment Fund- BGE Incremental Savings			
Project Name	Energy Efficiency		
Awardee	Office of Sustainability		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	BGE EmPOWER Program	Incremental Savings	Total
Number of Households/Businesses	-	4,715	4,715
Annualized Energy Savings (kWh)	-	4,749,160.27	4,749,160.27
Coincident Peak Demand Savings (kW)	-	771.47	771.47
Annualized Therm Savings	-	-	-

Exelon Customer Investment Fund- BGE Incremental Savings			
Project Name	Energy Efficiency Plus		
Awardee	Housing and Community Development		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	BGE EmPOWER Program	Incremental Savings	Total
Number of Households/Businesses	-	1,071	1,071
Annualized Energy Savings (kWh)	-	1,992,961.06	1,992,961.06
Coincident Peak Demand Savings (kW)	-	-	-
Annualized Therm Savings	-	472,001.67	472,001.67

Appendix D: Measure Breakdown

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Baltimore Energy Challenge - Community Engagement		
Awardee	Mayor's Office of Human Services		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Measures Provided			
Public Pledges Signed	14,217	14,217	100%
Energy Captains Recruited	183	183	100%
Kit Distributed	8,631	8,631	100%
In-Home Energy Consultations	94	94	100%
City-Wide Training Events	420	420	100%
Business Outreach	108	108	100%
School Hub Outreach	10	10	100%
WAP Consumer Education	321	321	100%

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Retrofits & Upgrades Community Energy Savers		
Awardee	Baltimore City Office of Sustainable Energy (OSE)		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Measures Installed	35	35	100%
HVAC	9	9	100%
Envelope	10	10	100%
Water	6	6	100%
Lighting	8	8	100%
Health and Safety Measures	2	2	100%
Loan Details			
Total Loans	$303,099.00	$303,099.00	100%
Average Loan Amount	$22,022.00	$22,022	100%
Defaults	0$	$0	0%

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Cogeneration - Combined Heat & Power		
Awardee	Baltimore City Office of Sustainable Energy (OSE)		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Feasibility Studies Completed	-	4	-
Projects in Planning Phase	-	2	-
Projects in Construction Phase	-	0	-
Projects Completed	-	0	-
Grant and Incentive Details			
Total Grants Administered	-	-	-
Total Incentives Administered	-	-	-
Total Funds Leveraged	-	-	-

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Urban Heat Island Mitigation		
Awardee	Office of Sustainability		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
TreeBaltimore			
Measures Provided			
Trees Planted	541	541	100%
Stumps Removed	68	68	100%
New Pits	405	405	100%
Expanded Pits	134	134	100%
Sq. Ft. Concrete Removed	19480	19,480	100%
CoolRoofs			
CoolRoofs Installed	4	4	100.00%
Outreach and Education	550	550	100.00%

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Energy Assistance		
Awardee	Mayor's Office of Human Services		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Number of energy assistance grants given	1,029	1,029	100%
Number of energy assistance applications	4,307	4,307	100%
Number of applicants who attend energy education (BEC)	17,255	17,255	100%
Number of applications who sign energy pledge	4,262	4,262	100%
Number of referrals to higher tier education programs	1,559	1,559	100%
Number of referrals to LIGHT program	810	810	100%
Household Details			
Households Receiving EUSP Assistance	-	-	-
Households in Arrears	-	-	-
Grant Details			
Total Grants	-	1,029	-
Average Grant Amount	-	-	-

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Case Management		
Awardee	Housing and Community Development		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Clients served by Community Action Partnership	244	244	100.00%
Clients served by HCD (LIGHT)	1,136	1,136	100.00%
Total Clients Served	1380	1380	100.00%

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Energy Efficiency		
Awardee	Office of Sustainability		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Measures Installed			
13W CLF installed	26,161	26,161	100%
18W CFL installed	24,443	24,443	100%
LED installed	15,046	15,046	100%
DTD installed	576	576	100%
3-way installed	2,560	2,560	100%
Dimmable installed	1,629	1,629	100%
Candelabra installed	10,295	10,295	100%
Kitchen Aerators	3,394	3,394	100%
Bathroom Aerators	3,699	3,699	100%
Regular Showerheads	2,296	2,296	100%
Handheld Showerheads	1,690	1,690	100%
1/2" pipe insulation added (ft.)	4,088	4,088	100%
3/4" pipe insulation added (ft.)	3,485	3,485	100%
CO/Smoke Detector	4,358	4,358	100%
Draft Stoppers	4,567	4,567	100%
Flashlight	4,490	4,490	100%
Eton Radio	4,682	4,682	100%
Nightlight	9,227	9,227	100%
Toilet Tank Bank	8,994	8,994	100%
Water Heater Wrap	2,193	2,193	100%
Door Snake	904	904	100%
Conserve Socket	2,846	2,846	100%
Timer	1,223	1,223	100%
Powerstrip	2,968	2,968	100%
Smart Strip	2,249	2,249	100%

Exelon Customer Investment Fund - Measure Breakdown			
Project Name	Energy Efficiency Plus		
Awardee	Housing and Community Development		
Date	Sept. 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
Program Details			
	Total Measures Offered	Total Measures Received/Installed	Percentage of Households/Businesses Accepting Measures
Measures Installed			
Heating System Replacement	521	521	100%
Roofing	384	384	100%
Enhancements	384	384	100%
Health and Safety Measures	400	400	100%
Furnace Conversions	113	113	100%
Loan Details			
Total Loans	-	$542,531	-
Average Loan Amount	-	$9,042.18	-
Defaults	-	$0	-

Appendix E: Program Costs

Community Empowerment Programs

Project Name	Baltimore Energy Challenge		
Awardee	Office of Sustainability		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$90,968.00	$177,732.56	-
Indirect Costs	$282,000.00	$58,957.13	-
Marketing	$120,000.00	$85,785.99	-
Evaluation	-	$12,762.67	-
Customer Benefit	$507,682.00	$405,058.88	-
Subtotal	$1,000,650.00	$740,297.23	-
Leveraged Outside Funds	$50,000.00	$0.00	-
Total Spending	$1,050,650.00	$740,297.23	-

Exelon Customer Investment Fund- Costs			
Project Name	Retrofits & Upgrades Community Energy Savers		
Awardee	DGS Energy Division		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$648,000.00	$189,136.00	-
Indirect Costs	$433,500.00	$273,284.00	-
Marketing	$0.00	$0.00	-
Evaluation	$225,000.00	$0.00	-
Customer Benefit	$6,443,500.00	$4,047,450.00	-
Subtotal	$7,750,000.00	$4,509,870.00	-
Leveraged Outside Funds	$0.00	$0.00	-
Total Spending	$7,750,000.00	$4,509,870.00	-

Exelon Customer Investment Fund- Costs			
Project Name	Cogeneration - Combined Heat & Power		
Awardee	DGS Energy Division		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$499,000.00	$188,620.00	-
Indirect Costs	$211,464.00	$2,129.00	-
Marketing	$0.00	$0.00	-
Evaluation	$87,536.00	$0.00	-
Customer Benefit	$3,202,000.00	$0.00	-
Subtotal	$4,000,000.00	$190,749.00	-
Leveraged Outside Funds	$0.00	$0.00	-
Total Spending	$4,000,000.00	$190,749.00	-

Exelon Customer Investment Fund- Costs			
Project Name	Urban Heat Island Mitigation		
Awardee	Office of Sustainability		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$ 10,000.00	$1,432.78	-
Indirect Costs	$ 5,000.00	$1,814.03	-
Marketing	$ 5,000.00	$0.00	-
Evaluation	Pool w/other agencies	$0.00	-
Customer Benefit	$ 80,000.00	$331,964.45	-
Subtotal	$ 100,000.00	$335,211.26	-
Leveraged Outside Funds	$ 10,000.00	$0.00	-
Total Spending	$ 110,000.00	$335,211.26	-
*Combined CoolRoofs and TreeBaltimore			
CoolRoofs - Administrative = $1432.78; Indirect = $1,814.03; Customer Benefit = $83,910.50; Subtotal = $87,157.31			
TreeBalt. - Customer Benefit = $248,053.95; Subtotal = $248,053.95			

Energy Assistance Program

Exelon Customer Investment Fund- Costs			
Project Name	Energy Assistance		
Awardee	Mayor's Office of Human Services		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$261,378.00	$230,004.66	-
Indirect Costs	$27,743.00	$0.00	-
Marketing	$201,000.00	$7,791.78	-
Evaluation	$0.00	$0.00	-
Customer Benefit	$0.00	$0.00	-
Subtotal	$490,121.00	$237,796.44	-
Leveraged Outside Funds	$5,430,886.00	$4,624,795.00	-
Total Spending	$5,921,007.00	$4,862,591.44	-

Case Management

Exelon Customer Investment Fund- Costs			
Project Name	Case Management		
Awardee	Housing and Community Development		
Date	August 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$574,009.31	$908,945.53	-
Indirect Costs	$34,501.00	$0.00	-
Marketing	$1,000.00	$28,160.16	-
Evaluation	$0.00	$0.00	-
Customer Benefit	$0.00	$0.00	-
Subtotal	$609,510.31	$937,105.69	-
Leveraged Outside Funds	$5,430,886.00	$4,624,795.00	-
Total Spending	$6,040,396.31	$5,561,900.69	-
*Combined Community Action and Energy Efficiency Plus Case Management			
Community Action - Administrative = $408,569.66; Subtotal = $436,729.82			
EEP - Administrative = $500,375.87; Subtotal = $500,375.87			

Energy Efficiency

Exelon Customer Investment Fund- Costs			
Project Name	Energy Efficiency		
Awardee	Office of Sustainability		
Date	August 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$107,128.00	$242,190.76	-
Indirect Costs	$231,000.00	$162,892.61	-
Marketing	$20,400.00	$28,576.48	-
Evaluation		$1,666.67	-
Customer Benefit	$2,019,885.00	$1,364,824.92	-
Subtotal	$2,378,413.00	$1,800,151.44	-
Leveraged Outside Funds	$75,000.00	$0.00	-
Total Spending	$2,453,413.00	$1,800,151.44	-

Energy Efficiency Plus

Exelon Customer Investment Fund- Costs			
Project Name	Energy Efficiency Plus		
Awardee	Housing and Community Development		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$1,340,728.00	$1,108,659.08	-
Indirect Costs	$0.00	$0.00	-
Marketing	$0.00	$0.00	-
Evaluation	$0.00	$0.00	-
Customer Benefit	$6,272,690.00	$5,777,155.49	-
Subtotal	$7,613,418.00	$6,885,814.57	-
Leveraged Outside Funds	$3,426,038.10	$4,137,296.94	-
Total Spending	$11,039,456.10	$11,023,111.51	-

Pooled Evaluation, Measurement, and Verification

Exelon Customer Investment Fund- Costs			
Project Name	Pooled EMV		
Awardee	City of Baltimore		
Date	September 29, 2015		
Reporting Period	July 1, 2014 - June 30, 2015		
	Forecasted	Reported	Verified
Administrative	$0.00	$0.00	-
Indirect Costs	$0.00	$0.00	-
Marketing	$0.00	$0.00	-
Evaluation	$0.00	$134,022.75	-
Customer Benefit	$0.00	$0.00	-
Subtotal	$204,578.17	$134,022.75	-
Leveraged Outside Funds	$0.00	$0.00	-
Total Spending	$204,578.17	$134,022.75	-

Appendix F: Additional Tables

None

Appendix G: Notes and Assumptions

Participants and Measures

Appendix G: Notes and Assumptions

Participants and Measures

Community Empowerment Program

Participants:
Number of Households/Businesses – the number of Baltimore City residents that signed a public pledge and received energy education.

Measure Definitions:
Public Pledges Signed - the number of public pledges signed through BEC CEP, BEC EEP, and from the EA process at the CACs.
Energy Captains Recruited – the number of Baltimore City residents recruited as Energy Captains.
Kits Distributed – the number of energy saver kits distributed through both BEC CEP and BEC EEP.
In-Home Energy Consultations – the number of energy education events hosted or planned by Energy Captains.
City-Wide Training Events – the number of public events planned or attended by the BEC CEP team.
Business Outreach – the number of businesses provided energy education and information about BEI services.
School Hub Outreach – the number of schools engaged in the BEC CEP outreach program.
WAP Consumer Education – the number of clients who received energy education after receiving Energy Efficiency Plus weatherization services.

Retrofits and Upgrades

Participants:
Number of Households/Business – the number of non-profit organizations and city agencies that received retrofit and upgrade loans or grants.

Measure Definitions:
HVAC – the number of heating, ventilation, and air conditioning replacements or services.
Envelope – the number of service provided for air sealing/tightening/ weatherization services to prevent inflow and outflow of air into the building.
Water – the number of services provided for low-flow plumbing fixtures and/or efficient hot water heaters.
Lighting – the number of lighting upgrades and/or retrofits.
Health and Safety Measures – the number of retrofits or upgrades related to health and safety improvements.

Cogeneration

Participants:

Number of Households/Business – The number of facilities in the co-generation pipeline. As described in the narrative, these are at varying stages in the planning process.

Measure Definitions:
Feasibility Studies Completed – all projects must be evaluated to assure energy supply and that it will reduce the electric load from the grid. This is one of the more major hurdles in the pre-planning process.
Projects in Planning Phase – this phase includes securing contracts and developing construction plans.
Projects in Construction Phase – physical work is being conducted at the facility to implement co-generation capabilities.
Projects Complete – construction is finished and co-generation capabilities have been completely installed.

Urban Heat Island Mitigation

TreeBaltimore

Participants: not applicable

Measure Definitions:
Trees Planted – number of new trees planted.
Stumps Removed – number of stumps removed from old pits in order to plant new trees.
New Pits – the number of new pits opened for tree plantings.
Expanded Pits – the number of pits that were expanded to accommodate new tree plantings.
Sq. Ft. Concrete Removed – total square feet of concrete removed during new pit opening and pit expansions.

CoolRoofs

Participants:
Number of Households/Businesses – number of clients who received Cool Roof Installations

Measure Definitions:
Cool Roofs Installed – number of cool roofs installed on residential, business or commercial buildings
Outreach and Education – number of residents and businesses educated about advantages of cool roofs at community meetings, events, and one-on-one consultations

Energy Assistance and Case Management

Energy Assistance

Participants: Number of Households/Businesses – the number of clients who received Energy Assistance to pay the utility bills.

Measure Definitions:
Number or energy assistance grants given - this is the number of applications that were accepted, not total number of applications.
Number of energy assistance applications – total number of applications for energy assistance, not all were granted.

Number of applicants who attend energy education – this number captures the total number of people who came to the Community Actions Centers and received energy education. These people may have been at the CACs for non-energy related issues.
Number of applicants who attend sign energy pledge – Clients who during the EA application process signed a public pledge to reduce energy consumption.
Number of referrals to higher tier education programs – This is the number of clients who: 1) had under 10,000 kWh annual energy consumption and so were referred to the BGE Quick Energy Home Check-up, and 2) had between 10,000-15,000 kWh annual energy use and so were referred to BEC for a kit installation.
Number of referrals to LIGHT program – the number of clients who had over 15,000 kWh annual energy use and so were referred HCD weatherization services.

Case Management

Participants: Number of Households/Businesses – the number of clients who had a ROMA survey administered to them at a Community Action Center, combined with the number of clients who have case management through the HCD LIGHT program.

Measure Definitions:
Clients served by Community Action Partnership – Number of clients who completed ROMA scales for case management.
Clients served by HCD (LIGHT) – Number of clients who received case management through the HCD LIGHT program. 734 cases were certified for Energy Conservation Services and received information, referral, and case coordination. 402 cases were processed for the Office of Rehabilitation Services, including candidates for the Energy Savings Loan Program, and more complex case management involving inter-agency services or public/non-profit agency collaborations
Total Clients Served – Combined number of clients who received case management through CAP and LIGHT.

Energy Efficiency

Participants:
Clients served – the number of Baltimore City residents who received light weatherization services offered by BEC EEP.

Measure Definitions:
This is a self-explanatory list of items installed or provided by BEC EEP.

Energy Efficiency Plus

Participants:
Clients served – the number of Baltimore City residents who received weatherization services offered by the Energy Efficiency Plus program.

Measure Definitions:
Heating System Replacement – CIF funding allows the replacement of dangerous, dysfunctional, or grossly efficient heating systems.

Roofing – this is the number of roofs that were replaced, which pre-CIF funding was a major impediment to weatherization.
Enhancements – this number includes LED lighting, specialized roofing, plumbing repairs, and lighting automation.
Health and Safety Measures – this is the number of homes provided improvements to improve the health and safety of residents, HCD staff, and contractors. These include CO abatement, mold remediation, fall and injury prevention (handrails, stair treads, grab bars), chimney work (including liners), and knob and tube wiring mitigation.
Furnace Conversions – this measures the number of oil-to-gas furnace conversions, which is one of the most significant utility cost savings.

Energy Savings and Demand Reduction Calculations

Community Engagement Program

The calculations for this were based on the 11W CFL lightbulb that is included in the kits given out by the CEP staff after a resident signs the public pledge, which total 3,196. Annual Energy Savings, Summer Coincident Peak Savings, and Lifecycle Savings were calculated using the formulas taken from the Mid-Atlantic Technical Reference Manual, and which are given below in the Energy Efficiency section.

Annual Energy Saving Formula	
11W CFL	ΔkWh = ((CFLwatts*DeltaMultiplier)/1000)*ISR*HOURS
11W CFL	ΔkWh = ((13*1.83)/1000)*0.88*1,150
Coincident Peak Demand Savings Formulas	
11W CFL	ΔkW=((CFLwatts*DeltaMultipier)/1000)*ISR*WHFd*CF
11W CFL	ΔkW=((11*1.83)/1000)*0.88*1.18*0.09
Lifecycle Energy Savings	
11W CFL	ΔkWh = AnnualEnergySavings*MeasureLife
11W CFL	ΔkWh = 20.37*5.5

Table 13: CEP Kit Annual Energy Saving Formula

Annual Energy Savings (kWh)			
	# Installed	Annual Energy Savings (kWh) per item	Annual ES (kWh) for all items
11W CFL	3196	20.37	65102.52

Table 14: CEP Kit Annual Energy Savings Calculations

Coincident Peak Savings (kW)			
Item	# Installed	Summer Coin. Peak Savings per item	Total Summer Coin. Peak Savings kW
11W CFL	3196	0.0018812	6.01

Table 15: CEP Kit Coincident Peak Savings Calculations

Lifecycle Energy Savings

	# Installed	Annual Energy Savings (kWh) per item	Measure Life (years)	Lifecycle Energy Savings (kWh) per item	Lifecycle Energy Savings (kWh) for all items
11W CFL	3196	20.37	5.5	112.035	358063.86

Table 16: CEP Kit Lifecycle Energy Savings Calculations

The next step was to calculate the savings for the CEP Business and Non-Profit section of the CEP program, where kit installations were performed in a similar way to the BEC EEP home installations. The calculations are the exact same as those in the BEC EEP section below. These calculations are:

Annual Energy Savings (kWh)			
	# Installed	Annual Energy Savings (kWh) per item	Annual ES (kWh) for all items
13WCFL	238	24.08	5,730
18W CFL	181	33.34	6,034
9W/11W LED	252	30.40	7,661
14W DTD	3	66.59	200
12/23/30W 3-way CFL	1	52.69	53
23W Dimmable	53	52.69	2,793
5W/9W Candelabra	12	18.24	219
Electric LFS	4	168.16	673
Electric Aerator	134	28.73	3,850
HWH Wrap	31	234.43	7,267
Elec. 1/2" Pipe Wrap	134	17.21	2,307
Smartstrip	32	24.00	768
TOTAL			**37,552**

Table 17: Business Outreach Annual Energy Savings Calculations

Coincident Peak Savings (kW)			
Item	# Installed	Summer Coin. Peak Savings per item	Total Summer Coin. Peak Savings kW
13WCFL	238	0.0022	0.53
18W CFL	181	0.0030	0.55
9W/11W LED	252	0.0028	0.71
14W DTD	3	0.0009	0.00
12/23/30W 3-way CFL	1	0.0049	0.00
23W Dimmable	53	0.0049	0.26

5W/9W Candelabra	12	0.0017	0.02
Electric LFS	4	0.0516	0.21
Electric Aerator	134	0.0034	0.46
HWH Wrap	31	0.0268	0.83
Elec. 1/2" Pipe Wrap	134	0.0030	0.40
Smartstrip	32	0.0000	0.00
TOTAL			**3.96**

Table 18: Business Outreach Annual Energy Savings Calculations

Lifecycle Energy Savings					
	# Installed	Annual Energy Savings (kWh) per item	Measure Life (years)	Lifecycle Energy Savings (kWh) per item	Lifecycle Energy Savings (kWh) for all items
13WCFL	238	24.08	5.5	132.42	31,515
18W CFL	181	33.34	5.5	183.34	33,185
9W/11W LED	252	30.40	6.8	206.71	52,091
14W DTD	3	66.59	6.8	452.84	1,359
12/23/30W 3-way CFL	1	52.69	6.8	358.30	358
23W Dimmable	53	52.69	6.8	358.30	18,990
5W/9W Candelabra	12	18.24	6.8	124.03	1,488
Electric LFS	4	168.16	10	1,681.57	6,726
Electric Aerator	134	28.73	5	143.64	19,248
HWH Wrap	31	234.43	5	1,172.14	36,336
Elec. 1/2" Pipe Wrap	134	17.21	15	258.19	34,598
Smartstrip	32	24.00	4	96.00	3,072
TOTAL					**238,968**

Table 19: Business Outreach Lifecycle Energy Savings

These were then totaled together with the savings from the 11W CFL, and then entered into the table for Appendix A on page 76:

Retrofits and Upgrades

For Retrofits and Upgrades, the energy savings were calculated by OSE. The annualized energy savings (kWh) are based on specific project estimates and are calculated on an individual basis. These estimates were created during the project design using engineering calculations and equipment specifications and the operational characteristics of the site. Auditors and consultants calculated the energy savings for each project and with different people doing different projects. For lighting and appliances, the estimates were based on equipment specifications. The Green Street Academy estimates were based on the engineering model from the contractor for this specific space.

Annual Energy Savings Calculations

The formulas for calculating annual energy savings all were taken from the Mid-Atlantic Technical Reference Manual Version 3.0 March 2013 (MATRM). All inputs for formulas were taken directly from MATRM. The formulas and any assumption or variable used outside MATRM is provided in Table 20 below.

Formulas	
13W CFL	ΔkWh = ((CFLwatts*DeltaMultiplier)/1000)*ISR*HOURS
18W CFL	ΔkWh = ((CFLwatts*DeltaMultiplier)/1000)*ISR*HOURS
9W/11W LED*	ΔkWh = ((WattsBase-WattsEE)/1000)*ISR*Hours*WHFecool*WHFeheat
14W DTD	ΔkWh = ((WattsBase-WattsEE)/1000)*ISR*Hours*WHFecool*WHFeheat
12/23/30W 3-way CFL**	ΔkWh = ((WattsBase-WattsEE)/1000)*ISR*Hours*WHFecool*WHFeheat
23W Dimmable	ΔkWh = ((WattsBase-WattsEE)/1000)*ISR*Hours*WHFecool*WHFeheat
5W/9W Candelabra	ΔkWh = ((WattsBase-WattsEE)/1000)*ISR*Hours*WHFecool*WHFeheat
LFS Gas Algorithm	ΔMMBtu = (((GPMbase-GPMlow)/GPMbase)*#people*gals per day*days per year)SHhome*8.3*(TEMPsh-TEMPin/1,000,000/Gas DHW Recovery Efficiency
LFS Electric Algorithm	ΔkWh = (((GPMbase-GPMlow)/GPMbase)*#people*gals per day*days per year)SHhome*8.3*(TEMPsh-TEMPin/1,000,000/DHW Recovery efficiency/0.003412
Aerator Gas Algorithm	ΔMMBtu = (((GPMbase-GPMlow)/GPMbase)*#people*gals per day*days per year*DR)/(Fhome))*8.3*(TEMPft-TEMPin)/1,000,000)/DHW Recovery Efficiency
Aerator Elec. Algorithm	ΔkWh = (((GPMbase-GPMlow)/GPMbase)*#people*gals per day*days per year*DR)/(Fhome))*8.3*(TEMPft-TEMPin)/1,000,000)/DHW Recovery Efficiency/0.003412
HWH Wrap	ΔkWh = ((Abase/Rbase-Ainsul/Rinsul)*ΔT*Hours)/(3412*nDHW)
Gas Pipe Wrap Algorithm	ΔMMBtu = ((1/Rexist-1/Rnew)*(L*C)*DT*8,760/nDHW/1,000,000
Elec. Pipe Wrap Algorithm	ΔkWh = ((1/Rexist-1/Rnew)*(L*C)*ΔT*8,760/nDHW/3413
Smartstrip	ΔkWh =24kWh
*For 9W/11W, the value of 10W was used for WattsEE as this is the average between 9W and 11W	

** For 12W/23W/30W, the value of 23W was used for WattsEE as this is the average between 12W/23W/30W

Table 20: Energy Efficiency Formulas

The following Tables 21 shows the annual energy savings calculations for each type of item installed by BEC EEP.

Formulas with Values	
13W CFL	ΔkWh = ((13*1.83)/1000)*0.88*1,150
18W CFL	ΔkWh = ((18*1.83)/1000)*0.88*1,150
9W/11W LED*	ΔkWh = ((40-10)/1000)*0.88*1,150*1.12*0.89
14W DTD	ΔkWh = ((60-14)/1000)*0.88*1,643*1.12*0.89
12/23/30W 3-way CFL**	ΔkWh = ((23-14)/1000)*0.88*1,150*1.12*0.89
23W Dimmable	ΔkWh = ((23-14)/1000)*0.88*1,150*1.12*0.89
5W/9W Candelabra	ΔkWh = ((25-7)/1000)*0.88*1,150*1.12*0.89
LFS Gas Algorithm	ΔMMBtu = (((2.5-2)/2.5)*2.56*11.6*365)*1.6*8.3*(105-55/1,000,000/0.75
LFS Electric Algorithm	ΔkWh = (((2.5-2)/2.5)*2.56*11.6*365)*1.6*8.3*(105-55/1,000,000/0.98/0.003412
Aerator Gas Algorithm	ΔMMBtu = (((2.2-1.5)/2.2)*1.6*10.9*365*0.5)/(3.5))*8.3*(80-55)/1,000,000)/0.75
Aerator Elec. Algorithm	ΔkWh = (((2.2-1.5)/2.2)*1.6*10.9*365*0.5)/(3.5))*8.3*(80-55)/1,000,000)/0.98/0.003412
HWH Wrap	ΔkWh = ((23.18/8-25.31/18)*60*8760)/(3412*0.98)
Gas Pipe Wrap Algorithm***	ΔMMBtu = ((1/1-1/4.5)*(1*0.13)*65*8,760/0.98/1,000,000
Elec. Pipe Wrap Algorithm***	ΔkWh = ((1/1-1/4.5)*(1*0.13)*65*8,760/0.98/3413
Smartstrip	ΔkWh =24kWh
*For 9W/11W, the value of 10W was used for WattsEE as this is the average between 9W and 11W	
** For 12W/23W/30W, the value of 23W was used for WattsEE as this is the average between 12W/23W/30W	
***For pipe wrapping, the value is dependent on pipe circumference; for 1/2" wrappings the value was 0.13, for 3/4" the value was 0.196	

Table 21: Energy Efficiency Formulas with Values

The next step in calculating annual energy savings in kWh was to convert gas-based items from MMBtu to kWh. This conversion was conducted from the equation 1MMBtu=293.08kWh. Converted items and the kWh results are given in Table 22 below.

MMBtu to kWh Conversion Table

Conversion from MMBtu to kWh		MMBtu per item	kWh conv.	kWh per item
Gas LFS	1MMBtu=293.08kWh	0.7497	293.08	219.7222
Gas Aerator	1MMBtu=293.08kWh	0.12808	293.08	37.5387

Table 22: Energy Efficiency MMBtu to kWh Conversion Table

Electric LFS	kW = (kWh/h)	168.16	8,760	0.0192
Gas Aerator	kW = (kWh/h)	37.54	8,760	0.0043
Electric Aerator	kW = (kWh/h)	28.73	8,760	0.0033
HWH Wrap	kW = (kWh/h)	234.43	8,760	0.0268
Gas 1/2" Pipe Wrap	kW = (kWh/h)	17.22	8,760	0.0020
Gas 3/4" Pipe Wrap	kW = (kWh/h)	25.96	8,760	0.0030

Table 23: Energy Efficiency kWh to kW Conversion Table

From these two steps, the following results were calculated for annual energy savings in kWh, shown in Table 24 below.

Annual Energy Savings (kWh)			
	# Installed	Annual Energy Savings (kWh) per item	Annual ES (kWh) for all items
13WCFL	26161	24.08	629,839
18W CFL	24443	33.34	814,814
9W/11W LED	15046	30.40	457,381
14W DTD	576	66.59	38,358
12/23/30W 3-way CFL	2560	52.69	134,890
23W Dimmable	1629	52.69	85,834
5W/9W Candelabra	10295	18.24	187,774
Gas LFS*	6442	219.72	1,415,450
Electric LFS	651	168.16	109,470
Gas Aerator*	3620	37.54	135,890
Electric Aerator	366	28.73	10,515
HWH Wrap	2193	234.43	514,103
Gas 1/2" Pipe Wrap*	3714	17.22	63,947
Gas 3/4" Pipe Wrap*	3165	25.96	82,160
Elec. 1/2" Pipe Wrap	375	17.21	6,455
Elec. 3/4" Pipe Wrap	320	25.95	8,305
Smartstrip	2249	24.00	53,976
TOTAL			**4,749,160**

Table 24: Energy Efficiency Annual Energy Savings

Summer Coincident Peak Demand savings

For calculating for coincident peak demand savings, formulas were taken from MATRM, given below in Table 25.

Coincident Peak Demand Savings Formulas	
13W CFL	ΔkW=((CFLwatts*DeltaMultipier)/1000)*ISR*WHFd*CF
18W CFL	ΔkW=((CFLwatts*DeltaMultipier)/1000)*ISR*WHFd*CF
9W/11W LED*	ΔkW=((WattsBase-WattsEE)/1000)*ISR*WHFd*CF
14W DTD	ΔkW=((WattsBase-WattsEE)/1000)*ISR*WHFd*CF
12/23/30W 3-way CFL**	ΔkW=((WattsBase-WattsEE)/1000)*ISR*WHFd*CF
23W Dimmable	ΔkW=((WattsBase-WattsEE)/1000)*ISR*WHFd*CF
5W/9W Candelabra	ΔkW=((WattsBase-WattsEE)/1000)*ISR*WHFd*CF
LFS Gas Algorithm	ΔkW= ΔkWh/hours*CF
LFS Electric Algorithm	ΔkW= ΔkWh/hours*CF
Aerator Gas Algorithm	ΔkW= ΔkWh/hours*CF
Aerator Elec. Algorithm	ΔkW= ΔkWh/hours*CF
HWH Wrap	ΔkW= ΔkWh/8760
Gas Pipe Wrap Algorithm	ΔkW= ΔkWh/8760
Elec. Pipe Wrap Algorithm	ΔkW= ΔkWh/8760
Smartstrip	ΔkW= 0kW

Table 25: Energy Efficiency Coincident Peak Demand Savings Formulas

The variables input into these formulas were also taken from MATRM, given below in Table 26.

Coincident Peak Demand Savings Formulas	
13W CFL	ΔkW=((13*1.83)/1000)*0.88*1.18*0.09
18W CFL	ΔkW=((18*1.79)/1000)*0.88*1.18*0.09
9W/11W LED*	ΔkW=((40-10)/1000)*0.88*1.18*0.09
14W DTD	ΔkW=((60-14)/1000)*0.88*1.18*0.018
12/23/30W 3-way CFL**	ΔkW=((75-23)/1000)*0.88*1.18*0.09
23W Dimmable	ΔkW=((75-23)/1000)*0.88*1.18*0.09
5W/9W Candelabra	ΔkW=((25-7)/1000)*0.88*1.18*0.09
LFS Gas Algorithm	ΔkW= 219.72/45*0.0138
LFS Electric Algorithm	ΔkW= 168.16/45*0.0138
Aerator Gas Algorithm	ΔkW= 37.54/45*0.0026
Aerator Elec. Algorithm	ΔkW= 28.73/45*0.0026
HWH Wrap	ΔkW= 234.43/8760
Gas Pipe Wrap Algorithm	ΔkW= 17.22/8760
Elec. Pipe Wrap Algorithm	ΔkW= 25.96/8760
Smartstrip	ΔkW= 0kW

Table 26: Coincident Peak Demand Savings Formulas

The results of these calculations are given in Table 27 below, with the coincidental peak savings given both per item and the sum of the savings for the total number of each item.

Coincident Peak Savings (kW)			
Item	# Installed	Summer Coin. Peak Savings per item	Total Summer Coin. Peak Savings kW
13WCFL	26161	0.0022	58.16
18W CFL	24443	0.0030	73.60
9W/11W LED	15046	0.0028	42.18
14W DTD	576	0.0009	0.50
12/23/30W 3-way CFL	2560	0.0049	12.44
23W Dimmable	1629	0.0049	7.92
5W/9W Candelabra	10295	0.0017	17.32
Gas LFS	6442	0.0674	434.07
Electric LFS	651	0.0516	33.57
Gas Aerator	3620	0.0045	16.18
Electric Aerator	366	0.0034	1.25
HWH Wrap	2193	0.0268	58.69
Gas 1/2" Pipe Wrap	3714	0.0020	7.30
Gas 3/4" Pipe Wrap	3165	0.0020	6.22
Elec. 1/2" Pipe Wrap	375	0.0030	1.11
Elec. 3/4" Pipe Wrap	320	0.0030	0.95
Smartstrip	2249	0.0000	0.00
TOTAL			**771.47**

Table 27: Energy Efficiency Peak Demand Savings Calculations

Lifecycle Savings

For calculating Lifecycle Energy Savings, the MATRM was once again used for values (ΔkWh*Measure Life). The primary value for these calculations are the measure life, which are given in Table 28 below.

Lifecycle Energy Savings					
	# Installed	Annual Energy Savings (kWh) per item	Measure Life (years)	Lifecycle Energy Savings (kWh) per item	Lifecycle Energy Savings (kWh) for all items
13WCFL	26161	24.08	5.5	132.42	3,464,112
18W CFL	24443	33.34	5.5	183.34	4,481,478

9W/11W LED	15046	30.40	6.8	206.71	3,110,193
14W DTD	576	66.59	6.8	452.84	260,834
12/23/30W 3-way CFL	2560	52.69	6.8	358.30	917,251
23W Dimmable	1629	52.69	6.8	358.30	583,673
5W/9W Candelabra	10295	18.24	6.8	124.03	1,276,862
Gas LFS	6442	219.72	10	2,197.22	14,154,501
Electric LFS	651	168.16	10	1,681.57	1,094,699
Gas Aerator	3620	37.54	5	187.69	679,451
Electric Aerator	366	28.73	5	143.64	52,574
HWH Wrap	2193	234.43	5	1,172.14	2,570,513
Gas 1/2" Pipe Wrap	3714	17.22	15	258.27	959,201
Gas 3/4" Pipe Wrap	3165	25.96	15	389.39	1,232,407
Elec. 1/2" Pipe Wrap	375	17.21	15	258.19	96,823
Elec. 3/4" Pipe Wrap	320	25.95	15	389.28	124,568
Smartstrip	2249	24.00	4	96.00	215,904
TOTAL					**35,275,045**

Table 28: Energy Efficiency Lifecycle Energy Savings Calculations

The final values for Total Annual Energy Savings, Total Coincidental Peak Savings, and Lifecycle Energy Savings are given in Table 29 below, and match the values given in Appendix A on page 76 of the BEC EEP program narrative section.

TOTALS	
Total Annual Energy Savings (kWh) for all items installed	4749160.27
Total Summer Coin. Peak Savings (kW) for all items installed	771.47
Lifecycle Energy Savings (kWh) for all items installed	35275044.78

Table 29: Energy Efficiency Calculation Totals

Other Assumptions and Calculations

For BEC EEP, the narrative metrics include the following measures: Energy Savings and Cost Saving of Participants, Cost of Interventions, and Cost Effectiveness (see Table 8 on page 42). The calculation of each of these is given below.

Energy Savings and Cost Saving of Participants

For this measure, the energy savings are in kW, which means a conversion is necessary from the annual energy savings per item given in kWh above. The conversion was calculated from the following formula: kW=kWh/hours. For the hours variable, these were taken from MATRM. For the lightbulbs, the variables for hour were used from the values given in the annual energy savings algorithms. For the power

strip and water-based items such as aerators, the hour values were taken from the summer coincident peak algorithms. However, for the low-flow shower heads and aerators the hour values were substantially lower than all other measures, which in turn gave a significantly higher output for kW. For instance, the formula for electric aerators was (28.73/22=1.31kW), versus for a hot water heater wrap being (234.43/8,760=0.0268kW). Therefore for the low-flow showerheads and aerators, the value of 8,760 was substituted for those given in the MATRM summer coincident peak algorithms. This resulted in the following value in Table 30 below.

Conversion from kWh to kW				
		kWh per item	Annual Hours	kW per item
13WCFL	kW = (kWh/h)	24.08	1,150	0.0209
18W CFL	kW = (kWh/h)	33.34	1,150	0.0290
9W/11W LED	kW = (kWh/h)	30.40	1,150	0.0264
14W DTD	kW = (kWh/h)	66.59	1,643	0.0405
12/23/30W 3-way CFL	kW = (kWh/h)	52.69	1,150	0.0458
23W Dimmable	kW = (kWh/h)	52.69	1,150	0.0458
5W/9W Candelabra	kW = (kWh/h)	18.24	1,150	0.0159
Gas LFS	kW = (kWh/h)	219.72	8,760	0.0251
Electric LFS	kW = (kWh/h)	168.16	8,760	0.0192
Gas Aerator	kW = (kWh/h)	37.54	8,760	0.0043
Electric Aerator	kW = (kWh/h)	28.73	8,760	0.0033
HWH Wrap	kW = (kWh/h)	234.43	8,760	0.0268
Gas 1/2" Pipe Wrap	kW = (kWh/h)	17.22	8,760	0.0020
Gas 3/4" Pipe Wrap	kW = (kWh/h)	25.96	8,760	0.0030
Elec. 1/2" Pipe Wrap	kW = (kWh/h)	17.21	8,760	0.0020
Elec. 3/4" Pipe Wrap	kW = (kWh/h)	25.95	8,760	0.0030
Smartstrip	kW = (kWh/h)	24.00	7,149	0.0034

Table 30: Energy Efficiency Cost Savings Calculations

The next step is to multiple the annual savings per item by the number of items installed, given in Table 31 below. The total annual energy savings amounted to 2,307.9 kW for FY2015.

Total Annual Energy Savings kW			
	# Installed	Annual Energy Savings kW per item	Annual Energy Savings kW for all items
13WCFL	26,161	0.0209	547.69
18W CFL	24,443	0.0290	708.53
9W/11W LED	15,046	0.0264	397.72
14W DTD	576	0.0405	23.35

12/23/30W 3-way CFL	2,560	0.0458	117.30
23W Dimmable	1,629	0.0458	74.64
5W/9W Candelabra	10,295	0.0159	163.28
Gas LFS	6,442	0.0251	161.58
Electric LFS	651	0.0192	12.50
Gas Aerator	3,620	0.0043	15.51
Electric Aerator	366	0.0033	1.20
HWH Wrap	2,193	0.0268	58.69
Gas 1/2" Pipe Wrap	3,714	0.0020	7.30
Gas 3/4" Pipe Wrap	3,165	0.0030	9.38
Elec. 1/2" Pipe Wrap	375	0.0020	0.74
Elec. 3/4" Pipe Wrap	320	0.0030	0.95
Smartstrip	2,249	0.0034	7.55
TOTAL			**2,307.90**

Table 31: Energy Efficiency Total Annual Savings kW

For cost savings, this number was calculated in kWh, as the rate BGE customers pay is calculated in kWh. The calculation for this measure was (total annual energy savings kWh * BGErate) = annual cost savings. The value for BGErate was taken from the Standard Offer Services (SOS) Rates/Miscellaneous Charges table from the BGE website[12]. The Weighted Average Supply Price June 1, 2015 – May 31, 2016 for Schedule R was used, which is $0.09372 per kWh. Because rates will increase at least yearly, this value provides a baseline measure that should be seen as a conservative estimate. The results are found in Table 32 below.

Average Annual Cost Savings $			
	Annual ES (kWh) for all items	BGErate $/kWh	Average Annual Cost Savings $ for all items
13WCFL	629,838.63	0.09372	$59,028.48
18W CFL	814,814.25	0.09372	$76,364.39
9W/11W LED	457,381.26	0.09372	$42,865.77
14W DTD	38,358.01	0.09372	$3,594.91
12/23/30W 3-way CFL	134,889.88	0.09372	$12,641.88
23W Dimmable	85,834.22	0.09372	$8,044.38
5W/9W Candelabra	187,773.76	0.09372	$17,598.16
Gas LFS	1,415,450.12	0.09372	$132,655.98
Electric LFS	109,469.92	0.09372	$10,259.52
Gas Aerator	135,890.23	0.09372	$12,735.63

[12] https://www.bge.com/myaccount/billsrates/ratestariffs/electricservice/Electric%20Rates%20Information%20Documents/POLR_Rates_PTC_MiscCharges.pdf

Electric Aerator	10,514.79	0.09372	$985.45
HWH Wrap	514,102.59	0.09372	$48,181.69
Gas 1/2" Pipe Wrap	63,946.73	0.09372	$5,993.09
Gas 3/4" Pipe Wrap	82,160.46	0.09372	$7,700.08
Elec. 1/2" Pipe Wrap	6,454.84	0.09372	$604.95
Elec. 3/4" Pipe Wrap	8,304.56	0.09372	$778.30
Smartstrip	53,976.00	0.09372	$5,058.63
TOTAL	**4,749,160.27**	**0.09372**	**$445,091.30**

Table 32: Energy Efficiency Average Annual Cost Savings

Cost of Interventions

The cost of interventions calculations was derived from using the Total Funds Spent During Reporting Period (Appendix A) and the Number of Households/Businesses (Appendix A). The variables for this were **$1,800,151.44/4,715=$381.79**.

Cost Effectiveness: Savings/Cost over Life of Measures

The formula for this is (per household lifecycle cost savings/ cost over the life of measures).

For the first variable, this measure is calculated by dividing the total lifecycle cost savings for all items by the cost over life of measures. For the total lifecycle savings for all items, the value of $3,305,977.20 was derived, as can be seen in Table 33 below.

Total Lifecycle Cost Savings			
	Lifecycle Energy Savings (kWh) for all items	BGErate $/kWh	Average Lifecycle Cost Savings $ for all items
13WCFL	3,464,112.48	0.09372	$324,656.62
18W CFL	4,481,478.37	0.09372	$420,004.15
9W/11W LED	3,110,192.57	0.09372	$291,487.25
14W DTD	260,834.48	0.09372	$24,445.41
12/23/30W 3-way CFL	917,251.17	0.09372	$85,964.78
23W Dimmable	583,672.72	0.09372	$54,701.81
5W/9W Candelabra	1,276,861.59	0.09372	$119,667.47
Gas LFS	14,154,501.17	0.09372	$1,326,559.85
Electric LFS	1,094,699.25	0.09372	$102,595.21
Gas Aerator	679,451.16	0.09372	$63,678.16
Electric Aerator	52,573.97	0.09372	$4,927.23
HWH Wrap	2,570,512.96	0.09372	$240,908.47

Gas 1/2" Pipe Wrap	959,200.97	0.09372	$89,896.32
Gas 3/4" Pipe Wrap	1,232,406.97	0.09372	$115,501.18
Elec. 1/2" Pipe Wrap	96,822.55	0.09372	$9,074.21
Elec. 3/4" Pipe Wrap	124,568.41	0.09372	$11,674.55
Smartstrip	215,904.00	0.09372	$20,234.52
TOTAL	**35,275,044.78**	**0.09372**	**$3,305,977.20**

Table 33: Energy Efficiency Total Lifecycle Cost Savings

This Total Lifecycle Cost Savings of $3,305,977.20 then needed to be divided by the number of households that received services, or 4,715. This produced a result of lifecycle cost savings of **$702.65** per household.

Next, the total cost over life of measure was taken from cost of interventions (per household) from the program narrative metrics Table 8 on page 42, which is a value of **$381.79 per household**.

The final formula was therefore: **$702.65/$381.79=1.84**, which is the same as a lifecycle savings to investment ratio.

Energy Efficiency Plus

Annual Energy Savings Calculations

Energy Efficiency Plus utilized energy savings data in the Hancock software system. For each individual measure within a household, specific energy savings are provided. The aggregate of those equals the values listed in Appendix A of this report.

Summer Coincident Peak savings

Not calculated for FY2015 as Hancock does not calculate this number.

Lifecycle Savings Calculations

Where lifecycle savings calculations were reported for Energy Efficiency Plus, figures were derived from the Hancock software system. Lifecycle savings were reported in kilowatt hours and were reported as an aggregate of all households that received specified weatherization measures.

Glossary

Baltimore Community Action Partnership (CAP)
Baltimore Energy Challenge (BEC)
Baltimore Energy Initiative (BEI)
Baltimore Gas and Electric (BGE)
Community Assistance Centers (CAC)
Community Engagement Program (CEP)
Customer Investment Fund (CIF)
Department of General Services (DGS)
Department of Housing and Community Development (DHCD)
Energy Efficiency Program (EEP)
Leading Innovation for a Green and Healthy Tomorrow (LIGHT)
Maryland Energy Administration (MEA)
Mayor's Office of Human Services (MOHS)
Office of Home Energy Program (OHEP)
Public Service Commission (PSC)
Leading Innovation for a Green and Healthy Tomorrow (LIGHT)
Residential Energy Assistance Challenge Program (REACH)
Coordinating Resources to Effectively Align and Transform Energy Services (CREATES)

Appendix H: List of Attachments

Attachment A: Baltimore Energy Challenge Flyer Sample

Attachment B: Community Engagement Public Pledge

Attachment C: Community Engagement Energy Captain Recruitment Flyer

Attachment D: Retrofits and Upgrades Healthy Neighborhoods Initiative Project Pipeline

Attachment E: Retrofits and Upgrades The Reinvestment Fund Project Pipeline

Attachment F: Retrofits and Upgrades Banner Neighborhoods Energy Analysis Report

Attachment G: Retrofits and Upgrades Banner Neighborhoods Energy Spreadsheet and Specifications

Attachment H: Retrofits and Upgrades Markets at Highlandtown Lighting Proposal

Attachment I: Retrofits and Upgrades Green Street Academy Energy Costs

Attachment J: Retrofits and Upgrades Green Street Academy LEED Report

Attachment K: Retrofits and Upgrades Eager Street Development Budget

Attachment L: Retrofits and Upgrades Eager Street Existing House HERS Report

Attachment M: Retrofits and Upgrades Eager Street Post-rehab House HERS Report

Attachment N: Retrofits and Upgrades Eager Street List of Energy Measures Spreadsheet

Attachment O: Retrofits and Upgrades City Facility Project Spreadsheet

Attachment P: Retrofits and Upgrades Initial Loan Application

Attachment Q: Retrofits and Upgrades BEI Loan Program Brochure

Attachment R: Retrofits and Upgrades BEI Loan Invitation Flyer

Attachment S: Retrofits and Upgrades Faith-Based Meeting Attendee List

Attachment T: Retrofits and Upgrades Outreach and Meetings List

Attachment U: Retrofits and Upgrades Religious Organization Information Sheet

Attachment V: Retrofits and Upgrades Smart Energy Savers Brochure

Attachment W: Baltimore Energy Challenge School Lessons

Attachment X: Baltimore Energy Challenge Sustainability Grant Activities

Attachment Y: School Hub Pokemon Cards

Attachment Z: BEC CEP and EEP Flyer

Attachment AA: BEC EEP Top 10 Energy Saving Actions Handout

Attachment BB: BEC EEP Pledge Card

Attachment CC: BEC CEP Energy Captain Teams Flyer

Attachment DD: BEC EEP Advertisements

Attachment EE: BEC EEP Brochure 1 2015

Attachment FF: BEC EEP Brochure 2 2015

Attachment GG: BEC EEP Lawn Sign