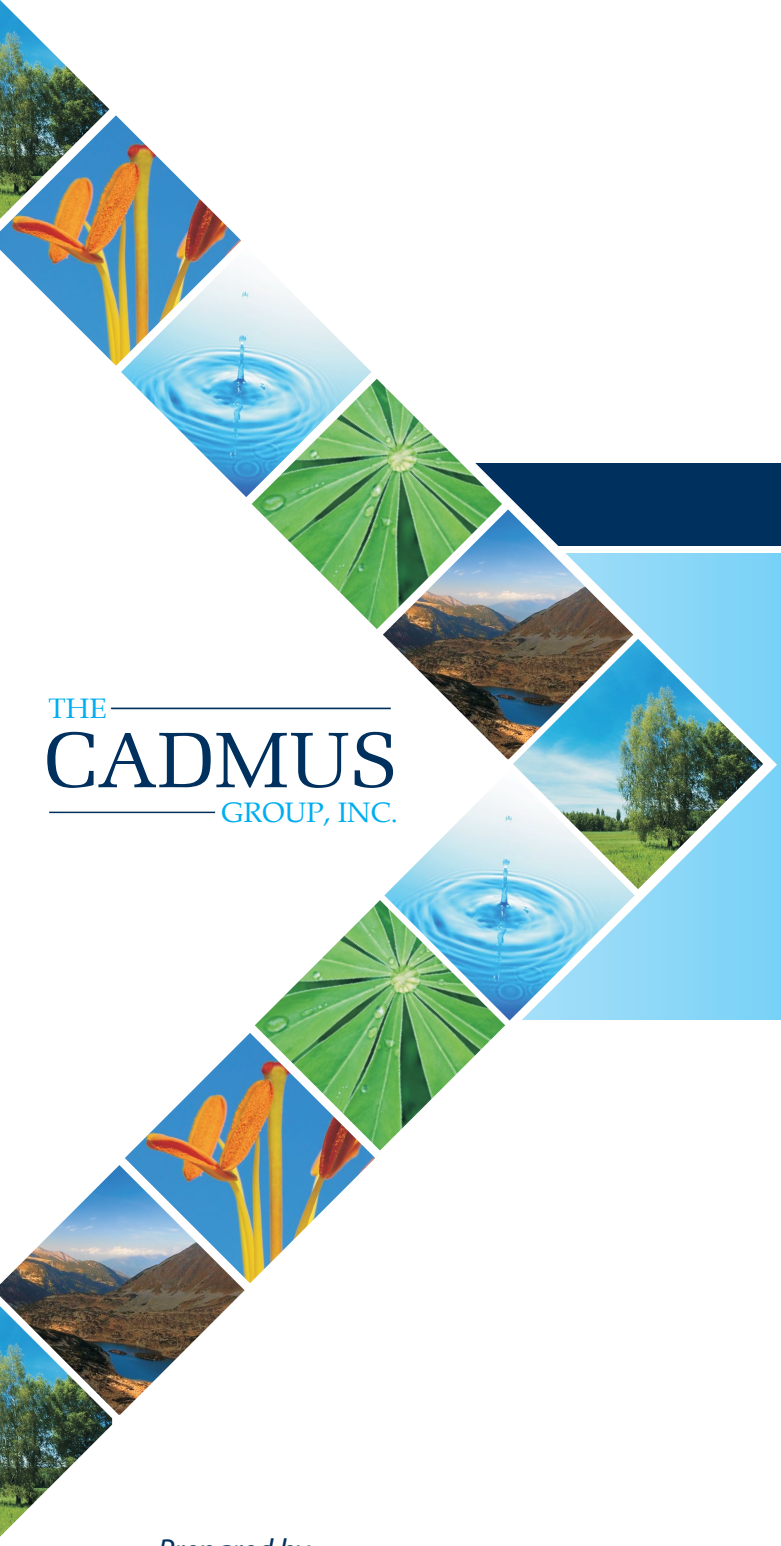

THE CADMUS GROUP, INC.

Final Report for Low Income Program

Massachusetts 2010 Residential Retrofit and Low Income Evaluation

June 2, 2011

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Acronym Glossary

Acronym	Full Name
ABCD	Action for Boston Community Development
AMP	Appliance Management Program
ARRA	American Recovery and Reinvestment Act of 2009
BCAC	Berkshire Community Action Council
BPI	Building Performance Institute
BTU	British Thermal Units
CA!	Community Action of the Franklin Hampshire & North Quabbin Regions
CAA	Community Action Agency
CAI	Community Action, Inc.
CAP	Community Action Program
CAPIC	Community Action Programs Inter-City
CET	Center for Ecological Technology
CFC	Citizens for Citizens
CFL	Compact Fluorescent Light Bulb
CFM	Cubic Feet per Minute
CSU	Community Services Unit
CTI	Community Teamwork, Inc.
DCS	Division of Community Services
DHCD	Department of Housing and Community Development
DHHS	Department of Health and Human Services
DOE	Department of Energy
DOER	Department of Energy Resources
DPU	Department of Public Utilities
DSM	Demand-Side Management
ECU	Energy Conservation Unit
EEAC	Energy Efficiency Advisory Council
GLCAC	Greater Lawrence Community Action Council
HAC	Housing Assistance Corporation
HEARTWAP	Heating Emergency Assistance Retrofit Task Weatherization Assistance Program
HVAC	Heating, Ventilating, and Air Conditioning
ISM	Instant Savings Measure
kWh	Kilowatt Hour
LEAN	Low income Energy Affordability Network
LEO	Lynn Economic Opportunity,
LI	Low Income
LIHEAP	Low Income Home Energy Assistance Program
MOC	Montachusett Opportunity Council
NEFWC	New England Farm Workers' Council
NGRID	National Grid
NSCAP	North Shore Community Action Programs
PA	Program Administrator
PACE	People Acting in Community Endeavors
QC	Quality Control
QCAP	Quincy Community Action Programs
RCS	Residential Conservation Services
RFP	Request for Proposals
RMC	Residential Management Committee
SHI	Self Help, Inc.

Acronym	Full Name
SIR	Savings-to-Investment Ratio
SMOC	South Middlesex Opportunity Council, Inc.
SPCA	Springfield Partners for Community Action
SSCAC	South Shore Community Action Council, Inc.
SSI	Supplemental Security Income
TAFDC	Transitional Aid to Families with Dependent Children
TRC	Total Resource Cost
TRICAP	Tri-City Community Action Programs, Inc.
TRM	Technical Review Manual
VOC	Valley Opportunity Council
WAP	Weatherization Assistance Program
WCAC	Worcester Community Action Council, Inc.
WMECO	Western Massachusetts Electric Company
Wx	Weatherization

1. Executive Summary

This report summarizes the process evaluation of the 2010 Low Income Program, conducted by The Cadmus Group Inc. (Cadmus), Opinion Dynamics, Navigant Consulting (Navigant), Itron, and Energy and Resource Solutions (ERS) and collectively referred to as The Cadmus Team. The evaluation findings, conclusions, and recommendations presented here have been drawn from an array of data collection activities, including interviews with Program Administrator (PA) staff and Community Action Program (CAP) agencies, surveys of participating customers, and a robust data review.

Evaluation Objectives and Activities

For the 2010 evaluation, the Cadmus Team focused on assessing program processes and identifying similarities and differences between the perspectives and assumptions of program staff, implementation staff, and customers regarding program goals, design, and implementation. As independent evaluators, our primary focus was to report the opinions and various perspectives gathered through interviews and surveys with program stakeholders. Cadmus then gleaned conclusions and recommendations based on these data collection activities.

We also reviewed the process by which program data are collected, managed, and reported. Additionally, we assessed the quality and consistency of the program data across the Commonwealth. A summary of 2010 evaluation tasks for Low Income is provided below.

Table 1. Summary of 2010 Evaluation Tasks

Evaluation Task	Details
PA Program Manager Interviews (n=7)	Provided insight into program design, areas for improvement, data concerns, ARRA impacts, and coordination between PAs and CAP agencies.
CAP Agency and Stakeholder Interviews (n=16)	Provided insight into program implementation, data collection and reporting process, regulatory structure, statewide program collaboration, and funding allocations.
Data Review (n=8)	Examined PA databases including appropriateness of forms, reports, and savings estimates.
Participant Surveys (n=400)	Provided insight into participant satisfaction and program delivery (in process).

Summary of Conclusions & Recommendations

The evaluation revealed a number of ways in which the program is succeeding and identified opportunities for improving processes and outcomes. Some of the notable findings discovered during the evaluation process are explained below.

Program Design and Administration

From this evaluation, it has become apparent that PAs have taken significant steps in 2010 towards statewide standardization. The evaluation also revealed—as expected—some program aspects have already become standardized, while other program aspects still vary between CAPs and PAs.

The Cadmus Team offers the following conclusions and recommendations regarding design and administration of the Low Income Program:

- **The Low Income Weatherization Program has a long-standing history of program delivery through the low income network.** The Low Income Program, funded by the eight Massachusetts gas and electric utilities, has been helping the low income population by providing weatherization services for over a decade. Since 1998, stakeholder coordination through LEAN and seasoned program implementers in the CAP agencies has resulted in delivery of weatherization services to many low income customers.

- **The funding from the eight PAs has been dispersed among a very complex network of over 20 CAP agency implementers.**

- **LEAN and the Best Practices Working Group has provided a framework for program collaboration and communication.** The low income network has a setting for collaboration through LEAN, which CAP agencies and LEAN staff we interviewed said worked well.

- **Many CAPs reported experiencing some challenges in managing spending of ARRA funds in addition to full allotment of PA funds.** ARRA funding is reportedly prioritized by CAP agencies we spoke with, mostly because funding will cease to exist or could be reallocated by the Federal Government to other sources if the funding is not used. However, CAP agencies not being able to spend PA funding at the same pace at which they may have been able to before ARRA has become a nationwide issue, not specific to Massachusetts.

- **PAs expressed concerned that increased funding expectations will fall to them when ARRA funding expires.** Several PAs expressed concerns that when ARRA funds expire, they will be expected to increase their funding; so CAP agencies can continue the same increased assistance level provided. CAPs in turn, are expecting this increase to happen.

    - **Recommendation:** To address any concerns related to funding and resource management, PAs and lead CAPs could increase communication during the goal-setting processes, and track spending throughout implementation.[1]

- **Little clarity or agreement exists as to the definitions of standardization and integration. Different stakeholders define it differently, sometimes at cross-purposes.**

    - **Recommendation:** The PAs should schedule a meeting or series of meetings in coordination with LEAN for the express purpose of clearly defining standardization and integration objectives for the program. Once the definition of standardization is communicated and agreed upon, strategies should be determined for meeting those objectives over a specified time period. This will ensure all stakeholders work toward commonly agreed upon objectives, and enhance progress toward meeting objectives to be measured.

[1] According to LEAN, this has been corrected by a PA-LEAN agreement that, starting in July 2011 for 2012 goal setting, PAs and LEAN will start discussions about budgets and savings goals in advance of the program year.

Program Implementation

- **CAPs we spoke with reported employing auditors directly rather than contracting auditors works well for them**, as it helps prevent quality issues, and streamlines the process of inspecting jobs in-progress and upon completion. CAPs said agency auditors understand program restrictions and requirements well, which enables them to appropriately identify the best solutions for customers using various funding sources.

- **Home Energy Assessment program residential customers could benefit from auditor and contractor training and expertise required through the Low Income Program.** CAPs have a long-standing network of installation contractors with whom they contract to make energy-efficiency upgrades to low income homes. Through interviews with contractors for the Home Energy Assessment program, we found several contractors implement both the Low Income and Home Energy Assessment programs. CAPs we spoke with reported both auditors and installation contractors are extremely well trained.

- **The in-progress quality control process CAPs implement works well according to several CAPs we spoke with.** CAPs reported in-progress quality checks work very well because they reduce the amount of post-installation visits by the contractor and auditor, and allow paperwork on a job to move forward without time lags or roadblocks. While it is important for the CAPs to have their own internal quality control process integrated into the project protocols, it is also important to conduct **independent** quality control checks, as required by some funding agencies.
- **Multiple quality control visits, which can occur at a home from various funding sources, can be cumbersome for CAP agency staff and, potentially, for participants.** CAPs reported each funding source is allowed (and sometimes required) to conduct a certain number of quality control visits in addition to in-progress or post-installation checks the CAP agency already implements. Due to multiple funding sources, this can become quite cumbersome for CAP agency staff, which typically has to accompany visiting quality control contractors to a site every time.

    - **Recommendation:** PAs should strongly consider all options for creating a streamlined, independent, third-party QA/QC process that serves the needs of the PA-funded program, while minimizing participant intrusion. Such a process could reduce existing inefficiencies including the potential number of visits to participants' homes, ensure CAPs do not perform quality control on their own projects, free up CAP auditors' time to reach more low income customers, and align this program's QA/QC process with that proposed for the Home Energy Assessment program. This does not necessarily have to be an additional QA/QC process, just a streamlined process that is collaborative in nature.[2]

- **Based on feedback from PA interviews, active program marketing is not a major focus of PAs.** Only one of the PAs we spoke with reported any active marketing for the Low income Program, such as targeted mail or event outreach. CAPs primarily market

[2] Based on our understanding of DHCD's existing QA/QC as explained by LEAN, which includes review of PA-funded measures, DHCD may be the best entity to act as an official statewide QA/QC officer, however it is not Cadmus' understanding that there is a formal agreement or process between PAs and DHCD as of yet.

the Low Income Weatherization Program to customers receiving fuel assistance. Cross program marketing, through the fuel assistance program, is typical of most low income programs. While subscription levels are not deficient, eligible customers may remain persistently unaware of the program if they do not participate in the fuel assistance program. These might include the newly unemployed or non-English speaking customers.[3]

- **According to PAs and CAPs, most CAPs experience a waitlist for program participation, while LEAN's stated opinion is that a waitlist does not exist, with the exception of one PA.** There is a difference in perspectives between LEAN and PAs concerning backlogs and waitlists. The evaluation team requested numbers from both parties, and the numbers provided by LEAN and the PAs differed. We were not able to reconcile these differences as part of the 2010 evaluation. The evaluation team will continue to work with the PAs and LEAN to understand the causes of these discrepancies and assess the implications. The 2011 planned benchmarking effort will compare the MA program with other programs in the U.S. to provide a more objective perspective of the waitlist.

Data Management and Content

Due to the current fragmented nature of the program data across PAs, the aggregate and analysis of the low income program more closely resembles eight individual PA evaluations than a single, statewide program. To address this, we offer two primary recommendations:

1. PAs should develop a standardized identification system to allow clear linkages between each PAs' tracking system, customer database, the Benefit Cost Ratio (BCR), and, finally, the technical review manual (TRM).
2. PAs should ensure collection and availability of a minimum set of critical fields for current evaluation work.

While we are recommend certain components be identical across PAs and CAPS, we are stop short of recommending all PAs and CAPS use the same end-to-end data tracking and reporting system. We recognize that some PAs have made significant investments over the last several years, and are very close to having an end-to-end system that meets all evaluation and reporting requirements while at the same time achieving low administrative costs through electronic modernization. For these PAs it may be more cost-effective to modify their existing systems and processes rather than adopt a single, statewide platform. Similarly, it may be more cost-effective for PAs without such systems to a lease a system from another PA.

All of the specific conclusions and recommendations offered below regarding data management and data content revolve around unifying Low Income program data across Massachusetts.

- **Organization and documentation of data (provided in response to data requests for supporting evaluation activities) have made data review and analysis extremely time**

[3] Cadmus was informed that a "hard to reach charette" has been formed to better understand hard to reach markets, and the evaluation team will engage with this group during 2011 to understand the hard to reach population.

consuming, often requiring significant clarification and communication with PAs via telephone and e-mail.

- **Recommendation:** The PAs should maintain a data dictionary for all critical program datasets that includes all field definitions, value definitions, and the sources of the data. The data dictionaries should be provided as part of all data requests thereby allowing evaluators (or any other third-party) to decode field names and data values efficiently. The data dictionaries would also ensure internal knowledge of the database is not lost in the event of critical personnel turnover. Once created, draft data dictionaries should be circulated among the low income working group to ensure that all PAs are collecting the same data and using the same naming conventions whenever possible. If such data dictionaries do not exist, the Data Management Working Group (DMWG) established as part of the 2011 Residential Retrofit and Low Income evaluation could assist with their creation.

- **The PAs' Low Income program data tracking systems may have some critical deficiencies.** Though minimally sufficient for operating programs, information collected is insufficient to support impact evaluation activities and provide import information for better program management. We use the phrase "may have some critical deficiencies" as our findings remain somewhat inconclusive, given information identified as missing may have actually been tracked, but may not have been provided in response to our initial data requests.

  - **Recommendation:** PAs should ensure the collection and availability of a minimum set of critical data fields for current and future evaluation work.[4]

- **Most audit data is never entered electronically or provided to the PAs.** This results in a tremendous amount of data "leakage," as data that could be leveraged to assist with evaluation studies, potential studies, and program planning efforts is lost or not usable in a cost-effective format.

  - **Recommendation:** We recommend that PAs consider mandating that a standard set of critical audit data fields be entered into an electronic format and maintained/archived for future internal and external use. The PAs should collaborate with the CAPs and the evaluators to identify valuable audit information not currently maintained electronically.

- **Some CAPs are currently using hard-copy audit data collection forms** and entering the data manually into disparate electronic tracking systems. Part of the reason for the data leakage described above is that many CAPs still use hard copy audit forms. Since these forms must be hand entered, CAPs enter only select fields in a digital format. Further, manual data entry leads to errors (due to transcription issues) and requires additional administrative time.

  - **Recommendation:** PAs should also explore the potential of having field technicians use electronic hardware (a PDA or laptop) to collect and enter onsite

[4] The DMWG is already actively working with the PAs to 1) identify the critical fields and 2) ensure they are maintained going forward.

data whenever possible. This approach would minimize manual data entry, reduce program administrative costs, and improve data quality through the institution of unique keys, foreign key constraints, lookup tables, and other database design best practices.

- **Unique identification fields (ID) are currently not being used to link different data sources and participation across programs.** As a result, it is difficult to align values listed in the PA low income program datasets with other program datasets or external reference documents (such as the TRM).
    - **Recommendation:** PAs should work collaboratively on integration of a common Measure ID system to allow tracking of each installed measure from the participant tracking database to the BCR input sheet and to the TRM. In addition, PAs should develop and maintain standardized ID fields (standardized internally, not across PAs) linking data across programs, customers, contractors, and billing data.
- **The lack of a standardized measure naming convention makes it difficult to aggregate and/or compare measure savings.** The measure naming conventions varies greatly across PAs, because different program stakeholders require different levels of specificity pertaining to measure data. For example, while the contractor installing the new refrigerator needs to know and record the exact make and model, the vendor may only care about the type of refrigerator (top freezer, side-by-side, etc.) and the PA may only care that a refrigerator was installed. Some stakeholders believe this should be included in the TRM efforts. However, this will require someone taking the initiative to engage the team working on the TRM to ensure this is included as part of the deliverable.
    - **Recommendation:** Through a collaborative process with the PAs and the TRM working group, continue to develop and employ a standardized measure naming convention for all PAs and CAPs. The TRM should be used as a basis to develop standard names and codes. A naming convention would allow for faster and more accurate statewide reporting, improve evaluability, and add transparency to the measure tracking process. The Cadmus Team specifically recommends consideration of a four-part measure naming convention that includes varying levels of detail for each program stakeholder: denoting the measure's end-use, group, type, and detail. Examples of several common program measures are provided in Table 2 below.

Table 2. Examples of Potential Standardized Measure Naming Convention

End Use	Measure Group	Measure Type	Measure Detail
Appliances	Refrigerator	Top Freezer Refrigerator	Frigidaire LGHT1837L*
HVAC	Insulation	Attic Insulation	R-30 Unrestricted - Settled Cellulose
Lighting	CFL	Screw-in CFL (20W)	GE 75412 20-Watt CFL Spiral Reveal Light Bulb, 75-Watt Equivalent
Water Heating	Water Heater	Condensing Water Heater (EF 0.82)	AO Smith GPHE-50 Vertex

2. Introduction

Overview of Program

The Massachusetts Residential Low Income Programs (the programs) offer free energy-efficiency measures to income-qualified residential customers of participating utilities. The program targets single-family and two to four unit multifamily residential customers whose household income is less than 60 percent of the state household median.

The programs center on energy-efficiency audits of participating homes. During the audits, technicians identify savings opportunities such as refrigerator replacement, air sealing, increased insulation, heating system repair and replacements, and installation of programmable thermostats, among others. Technicians also leverage their visits to participating home by installing a number of instant savings measures such as compact fluorescent lamps (CFLs), faucet aerators, and showerheads. Measures are provided through the programs free of charge.

Customers are contacted through numerous channels, depending on the Program Administrator (PA) strategy. Bill inserts, targeted mailing, Community Action Agency (CAA) referrals, and community outreach are all leveraged to solicit customers to participate in the program. Additionally, early in 2010, the PAs launched Mass Save® and www.masssave.com a state-wide initiative promoting all energy efficiency programs, including income eligible offerings.

The Massachusetts Green Communities Act of 2008 (G.L. c. 25, sec. 19 (c)) greatly affected activities of the Massachusetts Low Income Programs. The Act required that at least 10 percent of electric energy-efficiency program funds and at least 20 percent of the gas energy-efficiency program funds be spent on comprehensive low income residential demand-side management (DSM) and education programs. Additionally, the programs need to be:

- Cost-effective;
- Implemented through the low income weatherization and fuel assistance program network; and
- Coordinated with all electric and gas distribution companies in the state to standardize implementation.

To ensure consistent programs throughout the state, PAs coordinate their efforts through the Low Income Energy Affordability Network (LEAN). LEAN was established in 1998 by the member agencies of the low income weatherization and fuel assistance program network. Services provided by LEAN include:[5]

- Coordinating between electric utilities and gas utilities, with an objective of standardizing implementation.
- Coordinating within the low income weatherization and fuel assistance program network (including among lead vendors and between lead vendors and sub-vendors).
- Assisting development of comprehensive low income, residential, DSM and education programs, required by the state.

[5] Information provided by: www.democracyandregulation.com

- Assisting with monitoring and evaluation of existing programs to improve cost-effectiveness and to develop new program features. These include developing evaluation strategies, coordinating with evaluators, and synthesizing statewide lessons from program evaluations.
- Supporting the training of the low income weatherization and fuel assistance program network, the objectives of quality, cost-effectiveness, and consistency.

Numerous groups are involved in program delivery and coordination across the state:

- PAs manage program budgets and savings goals.
- Community Action Program (CAP) agencies implement and deliver the program.
- Contractors install measures.
- LEAN coordinates the process.

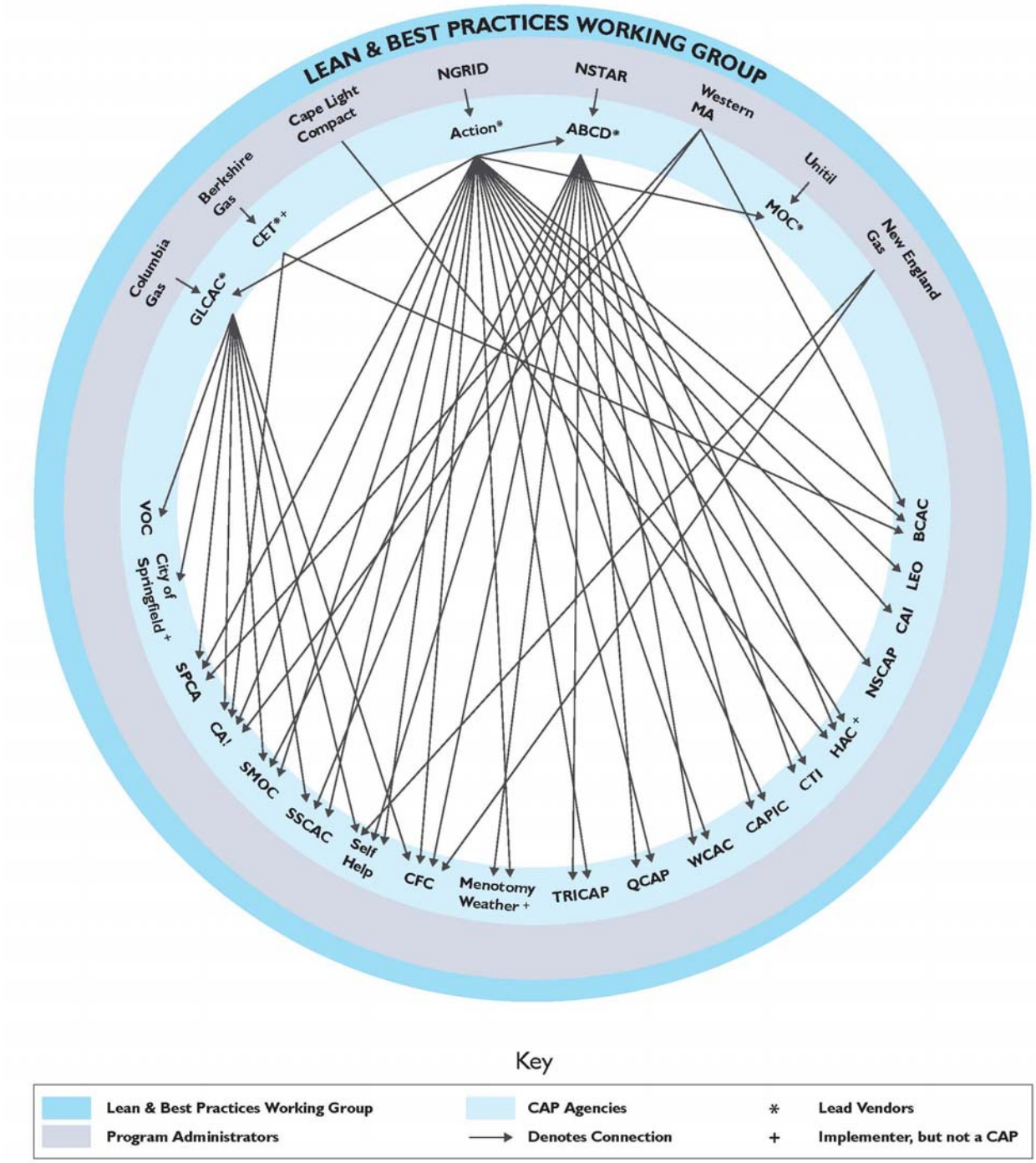
Additionally, five PAs use either a CAP or other agency to act as a lead vendor, reporting all necessary information back to their respective PAs; this streamlines communication between PAs and program implementers. Lead vendors contract with multiple local agencies to coordinate reporting, invoicing, budgets, and goals, in addition to implementing the program directly to clients. Low income program participants work directly with their local agencies for all implementation and delivery issues.

Currently, over 20 CAP agencies deliver the Massachusetts Low Income Programs. Serving an integral role in program implementation, these agencies determine eligibility, schedule and conduct audits, arrange for installation of energy-efficiency measures, and report progress to the PAs. However, given the number of these agencies—and the fact that the agencies primarily work independently of each other—processes and procedures employed by them vary widely.

Figure 1 on the following page illustrates the complex network of relationships between PAs, lead vendors, and local agencies, in addition to larger coordination through LEAN and the Best Practices working group. As shown, over 20 CAP agencies comprise the low income network, along with eight PAs, and additional program stakeholders involved with LEAN and the Best Practices Working Group. This graphic illustrates the complex environment in which the program functions through a network of multiple role players. Arrows delineate implementer relationships. Using NSTAR as an example, their lead vendor, ABCD, manages multiple "local agencies" and reports to NSTAR regarding program activities on behalf of these local agencies and themselves. Since ABCD also implements the program for some other PAs, they report to other lead vendors for those program activities.

Some PAs, such as Western MA, Cape Light Compact, and New England Gas, do not contract with a single lead vendor; instead, they work directly with local agencies. In these cases, the utilities take the role of lead vendor. Larger utilities, given their territory size, benefit from utilizing a lead vendor to streamline management of the implementing local agencies. We have not been able to identify whether additional local agencies worked with MOC on behalf of Unitil's program. Following the illustration on the next page, a list of CAP acronym definitions is shown in Table 3.

Figure 1. Network of Low income Program Stakeholders[6]



[6] Cadmus created Figure 1 based on feedback from the PA and CAP interviews completed in 2010. Modifications will likely be incorporated after review of the draft report and after speaking to additional stakeholders in 2011.

Table 3. CAP Acronym Definitions

Acronym	Full Name
ABCD*	Action for Boston Community Development
BCAC	Berkshire Community Action Council
CA!	Community Action of the Franklin Hampshire & North Quabbin Regions, Inc
CAI	Community Action, Inc.
CAPIC	Community Action Programs Inter-City
CET***	Center for Ecological Technology
CFC	Citizens for Citizens
CTI	Community Teamwork, Inc.
GLCAC*	Greater Lawrence Community Action Council
HAC**	Housing Assistance Corporation
LEO	Lynn Economic Opportunity,
MOC*	Montachusett Opportunity Council
NSCAP	North Shore Community Action Programs
QCAP	Quincy Community Action Programs
SMOC	South Middlesex Opportunity Council, Inc.
SPCA	Springfield Partners for Community Action
SSCAC	South Shore Community Action Council, Inc.
TRICAP	Tri-City Community Action Programs, Inc.
VOC	Valley Opportunity Council
WCAC	Worcester Community Action Council, Inc.

*Lead vendor.
**Is not a CAP agency, but implements the program on behalf of the PA(s).
***Is a lead vendor, but not a CAP agency.

Evaluation Activities and Objectives

The Cadmus Team's evaluation effort primarily focused on assessing various procedures employed by each PA and CAP in 2010. The key objectives for the 2010 process evaluation were these:

- Explore any identified statewide integration issues;
- Identify best practices employed by participating agencies;
- Document various data collection, data management, and reporting practices of each agency;
- Assess whether all data needed to inform future impact evaluation efforts are currently being gathered;
- Provide recommendations for improving data collection, data management, and reporting as well as ways to standardize or streamline processes between agencies/PAs; and
- Assess participant satisfaction.

After determining various procedures used by each CAP, the Cadmus Team identified best practices and opportunities to streamline, improve, and standardize these processes. Specifically, we coordinated the following:

- Interviewing PA and CAP agency energy staff, including lead CAPs;
- Reviewing data being collected by each CAP and PA;
- Reviewing monthly invoices at the detail level provided; and
- Identifying ways to improve program processes.

As independent evaluators, our primary focus was to report the opinions and various perspectives gathered through interviews and surveys with program stakeholders. Cadmus then gleaned conclusions and recommendations based on these data collection activities.

The following table summarizes evaluation tasks undertaken in 2010.

Table 4. Summary of 2010 Evaluation Tasks

Evaluation Task	Details
PA Program Manager Interviews (n=7)	Provided insight into program design, areas for improvement, data concerns, ARRA impacts, and coordination between PAs and CAP agencies.
CAP Agency and Stakeholder Interviews (n=16)	Provided insight into program implementation, data collection and reporting process, regulatory structure, statewide program collaboration, and funding allocations.
Data Review (n=8)	Examined PA databases including appropriateness of forms, reports, and savings estimates.
Participant Surveys (n=400)	Provided insight into participant satisfaction and program delivery (in process).

3. Methodology

The Low Income Program evaluation included PA program manager interviews, CAP agency staff interviews, PA data manager surveys, a data review, and participant interviews. Each effort is described in detail below.

Program Administrator Interviews

The Cadmus Team conducted in-depth interviews with PA program staff to address the following research areas:

- Program design, delivery, and administration;
- Quality control;
- Communication processes;
- Impact of ARRA funding;
- Status of standardization efforts; and
- Participation data.

In July 2010, this discussion began with introductory interviews with PA program managers, aimed at familiarizing the Cadmus Team with program, and continued with more focused process interviews in October 2010. The Cadmus Team attempted to speak to lead program managers from each PA as well as additional staff members relevant to the evaluation issues discussed. In all, nine interviews were completed with seven PAs. Appendix A contains the interview guide used.

CAP Agency Interviews

The Cadmus Team conducted in-depth interviews with CAP staff members who oversaw implementation to capture their viewpoint on topics discussed with the PA staff and the following additional research areas:

- Audit delivery;
- Participation process; and
- Data collection procedures.

During the PA staff interviews, contacts at lead agencies were provided to the team. Interviews were performed with (1) the five lead vendors who manage the reporting to PAs on behalf of their network of local CAPs and (2) a sample of nine local CAP agencies. Most local agencies we spoke with implement the program in more than one PA territory, resulting in nearly full coverage of the eight PA territories funding program. Table 5 includes a comprehensive list of agencies interviewed. Appendix B contains the interview guide used during interviews.

Table 5. Low income CAP Agency Interviews

	CAP Agencies Interviewed
Lead Vendors	Action for Boston Community Development
	Action, Inc.
	Greater Lawrence Community Action Council
	Center for Ecological Technology*
Local Agencies	Housing Assistance Corporation*
	Citizens for Citizens
	Berkshire Community Action Council
	Community Action
	Community Action Programs Inter-City
	Springfield Partners for Community Action
	Community Teamwork, Inc.
	Menotomy Weatherization
	Self Help, Inc.
	South Shore Community Action Council, Inc.

*Not a CAP agency, but is a vendor for PA

The team also conducted interviews with two program stakeholders active in LEAN, from Democracy and Regulation and Hancock Energy Software, resulting in 16 total interviews.

Participant Surveys

The participant survey objectives were to assess the following:

- The program's value;
- Program delivery;
- Experience with local agency staff and contractors;
- Satisfaction with the program; and
- Measure persistence.

In total, the Cadmus Team completed 400 surveys with low income program participants. Table 6 illustrates the distribution of completed surveys by each PA.

Table 6. Completed Participant Surveys by PA

PA	Completed	Percent of Total
Baystate Gas	65	16%
Berkshire Gas	33	8%
Cape Light Compact	32	8%
National Grid	125	31%
New England Gas	30	8%
NSTAR	107	27%
Unitil	3	1%
WMECO	5	1%
Total	400	100%

This report's evaluation findings sections include select participant survey findings, as appropriate. Appendix E provides the full participant survey.

Nonparticipant Survey

A separate, cross-program nonparticipant survey was conducted to inform current and future Residential Retrofit and Low income program evaluations. Because the nonparticipant survey was used for all programs, the survey covered a broad range of topics relevant to each program's evaluation, in addition to containing program-specific questions.

Our longitudinal approach to surveying program participants and nonparticipants enabled us to (1) identify customers participating in multiple programs over the three-year period; (2) follow new occupants in participating premises; and (3) obtain data required for tracking measure and education persistence.

The objectives for the nonparticipant survey were to assess the following:

- Program awareness;
- Sources of program information;
- Reasons for not participating;
- Awareness and interest in energy efficiency; and
- Demographic and household characteristics for use in future billing analysis.

Complete nonparticipant survey findings are reported in a separate deliverable. All findings germane to the program will be assessed and incorporated into subsequent drafts of this report in early 2011.

Data Review

After collecting 2010 program data from each PA, the Cadmus Team reviewed that data and interviewed each PA's data manager to understand the processes by which program data are gathered, managed, and reported. There were several objectives for this data review:

- Assessing the extent to which data collection, data management, and reporting practices are consistent across the commonwealth;

- Ensuring all necessary data will be available to inform future impact evaluation efforts;
- Identifying any gaps in current data collection practices, including:
  - Missing fields/variables
  - Inconsistencies within an individual PA's data
  - Inconsistencies across PAs
- Identifying potential opportunities to streamline, improve, and/or standardize the data collection processes.

The Cadmus Team approached the data review from two perspectives:

1. ***Data Management***: Focused on the processes by which program data are collected, managed, and reported.
2. ***Data Content***: Assessed the actual content of the participant tracking databases.

Data Management

To gather information on data management and reporting approaches, we sent a data review questionnaire to each PA and lead CAP. We also contacted local CAPs to complete the questionnaire, but few were able to return a completed form in time for this summary review. In all, 8 PAs, 6 lead CAPs, and 3 local CAPs returned the completed questionnaires and/or discussed the questionnaire over the telephone with the Cadmus Team.

The goals for the data management exercise were to identify best practices and offer recommendations when appropriate. The data questionnaire, included in Appendix C, addressed the following items:

- ***Form Content***. The physical forms that CAP staff use to collect data about low income participants and program measures.
- ***Data Collection***: The process by which data are entered from the physical forms or electronic-PDA audits into a central database.
- ***Reporting***: The creation and distribution of summaries for analysis or reporting.
- ***Savings Estimates***: Obtaining the source of all unit energy savings (kW, kWh, and/or therms) used to estimate program impacts.

Data Content

In addition to assessing the process by which data are collected, managed, and reported, the Cadmus Team sought to understand the comprehensiveness of the program data already collected. To initiate the data content review, the Cadmus Team issued a general data request in May 2010 for "*data by fuel, sector, program, building type, end use, participant, measure type, efficiency level…[at] the most granular level available across all residential and low income programs*," as well as requests for historical program data, each PA's residential customer information system (CIS), and energy consumption records. A copy of our original data request is provided in Appendix D this request was deliberatively open-ended for the following reasons:

- As the first year of a three-year evaluation, the Cadmus Team wanted to become familiar with the breadth of data currently gathered and not limit the scope of the data review by only requesting specific data fields.
- The Cadmus Team requested all data at the "most granular level" rather than specific data fields, in order to minimize the administrative burden of the request and prevent PAs from needing to write queries to extract specific data fields from the larger program database.

Once provided, we reviewed the contents of each PA's low income program data to assess what information was included. After data from all PAs were reviewed, the Cadmus Team compared and contrasted the provided data to identify commonalities and differences across PAs.

In our data content review, we also looked at the reported energy savings in the datasets. Where there were claimed savings, we grouped the measures together to determine whether deemed savings were used or if the measure was custom-based with variable savings estimates. For variable savings estimates, we examined an additional set of fields to identify whether the savings calculations could be replicated based on the provided tracking data. Finally, we checked the reported values for consistency across the PAs.

4. Findings

Evaluation results have been organized topically with responses from PAs and lead and local CAPs along with the findings of the data review reported together or in subsets, as appropriate. We include all perspectives, when appropriate, in the following sections:

- Program Design and Administration
- Program Implementation
- Data Management
- Data Content

Program Design and Administration

Program Design and History

The program's overall objective has been to increase energy savings and conservation opportunities for income-eligible customers. The program provides low income customers a home energy audit, energy education, and free energy-saving measures. Specific weatherization and/or appliance measures installed are based on recommendations from the audit process.

Based on interview feedback from the PAs, there are five CAP agencies and non-profits who work at an administrative level, referred to as the "lead vendors." [7] These lead vendors manage reporting for the PAs, contract local CAPs, and also act as CAPs to implement field work. Each local agency's staff conducts home audits and subcontracts measure installation work. Cadmus was not able to conduct an interview with SMOC; therefore, it could not be determined whether they operate differently. The majority of the PAs and CAP agency staff noted many of their PA/vendor teams have collaborated since the program's inception. These organizations provide services in an agreed-upon geographic area, generally defined by county. In most cases, CAPs serve multiple counties and lead vendors.

Based on information provided by PA and CAP agency staff, the PA program funding has been split into two energy savings categories: electric and natural gas. The natural gas program is called the Weatherization Program, and the electric program is called the Appliance Management Program (AMP). The Department of Public Utilities (DPU) issues energy savings requirements to each PA, and the Green Communities Act regulates how much money each PA invests in the low income sector.

Government Funding and Impacts of ARRA

In addition to utilizing PA funding for low income populations, the CAP agencies leverage funding from state and federal governments. The Weatherization Assistance Program (WAP), provided through the United States Department of Energy (DOE) since 1976, has long provided low income households with energy-efficiency and/or health and safety upgrades. In 1982, the Low Income Home Energy Assistance Program (LIHEAP), administered by the United States

[7] Some of lead vendors and local agencies implementing the program on behalf of PAs are not specifically CAP agencies, but nonprofit organizations with similar goals. For simplicity and clarity, the remainder of the report refers to all of the implementing firms as "the CAPs."

Department of Health and Human Services (DHHS), began providing additional dollars to states for use in concert with WAP funding to weatherize and provide health and safety related repairs and equipment upgrades to participant households.

Weatherization funding from both DOE and DHHS flows to individual states, then is dispersed among state CAPs, nonprofit organizations, and local governments. Generally, PA funding is spent in the same manner and for the same households as federal funds, with PA dollars generally stipulated to serve only their customers.

Due to the variety of resources utilized by the CAPs, PA low income participants are likely to receive energy-efficiency upgrades funded by the state or federal government. The State of Massachusetts funds LIHEAP and the Heating System Repair and Replacement Program (HEARTWAP). These programs are overseen by the Department of Housing and Community Development (DHCD) through their Community Services Division. Additionally, the American Recovery and Reinvestment Act of 2009 (ARRA) created funding offered by the federal government to support WAP.[8] ARRA dedicated over $125 million to increase energy-efficiency of low income family homes in Massachusetts—almost doubling the amount of federal funding CAPs were given before 2009. More specifically, ARRA increased the assistance level from DOE from $2,500 to $6,500 per home, expanded eligible homes to those weatherized prior to September 30, 1994, and increased eligible income levels.[9] The state and federal funded programs are all administered by CAP agencies, similarly to the PA funded programs.

The CAP weatherizing a home leverages dollars from multiple sources for each home to ensure installation of the best mix of measures. As such, more than two funding sources for each job are typical. According to CAP agency staff, the maximum PA budget allocated through the program to any one home is $4,500; therefore, a home could have insulation blown in the walls and ceiling with ARRA funding, window sealing with state funds, and a new refrigerator installed with PA funds. Every home is different, requiring a different mix of measures and tapping different funds for each measure. Collectively, homes can be more fully weatherized through combining the many available resources.

CAP staff are adept at determining how best to leverage various funding sources to meet the needs of an individual home. However, most PAs agree the large influx of ARRA funds to the weatherization network has impacted the program. The main impact reported was CAP production of PA weatherization projects has slowed considerably; so much so that some PAs are concerned they will fall short of their savings goals for 2010. Of federal funding awarded to WAP, roughly $65 million (52 percent) had been spent by the close of the 2010 calendar year.[10] PAs believe CAPs spend ARRA funds first because ARRA funds must be spent in a compacted timeframe (ARRA funds will remain available until September 30, 2013[11]); as opposed to PA funds, which have continued to be available since the program's inception. Interviews with CAPs confirmed PA concerns, as several CAP agencies reported it was challenging to manage spending the entire PA budget while simultaneously managing spending of ARRA funds. A few

[8] http://www.mass.gov/Eoca/docs/doer/pub_info/fa.pdf
[9] http://www1.eere.energy.gov/wip/pdfs/wx_recovery_fact_sheet.pdf
[10] http://arraprweb1.itd.state.ma.us/mapapp/money.html
[11] http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf

PAs expressed concern that when ARRA funds expire, PAs will be expected to increase their funding; so CAP agencies can continue to offer the same increased assistance level.

Eligibility Requirements and Program Offerings

The program targets income-eligible residential customers, which varies depending on numbers of individuals living in a participating home. Currently, a household is eligible when the household income is less than 60 percent of the state household median. CAP agencies primarily are responsible for income screening. If a customer contacts the PA about receiving weatherization, the PA verifies their income status, and connects all LI customers to the CAP for scheduling. For multifamily dwellings, two-thirds of building tenants must agree to participate and be eligible for fuel assistance. Table 7 shows the maximum combined household income levels customers can earn while qualifying for the program.

Table 7. Participant Income Eligible Levels in 2010[12]

Number of Household Members	Annual Income
1	$29,126
2	$38,087
3	$47,049
4	$56,011
5	$64,973
6	$73,935
7	$75,615
8	$77,295

Participating customers typically receive a customized report recommending efficiency upgrades that reduce natural gas and electricity usage. All measures recommended are offered fully subsidized and installed with the customer's permission. Current measures offered include:

- Attic insulation
- Wall insulation
- Pipe insulation
- Duct insulation
- Air sealing
- Domestic hot water measures
- CFLs /Low mercury CFLs
- Heating system repair and replacement
- Major weatherization repairs (e.g., electrical repairs, roofs, etc.)
- Refrigerators
- Freezers (PA-specific)
- Landlord heating system retirement initiative (PA-specific)
- Air conditioners
- "Smart" power strips
- Health and safety

[12] http://www.masssave.com/residential/income-eligible-programs/get%20details/

Communication and Coordination

Communication between PAs, CAPs, and LEAN consists of formal and informal channels, depending on relationships and involvement of particular agencies. For example, several PAs spoke of their contacts at local and lead agencies as friends, with weekly communications through lunches or phone calls. Other PAs have less direct involvement with their local agencies, and limit their communications to LEAN meetings or though a lead vendor. Communications with LEAN are usually more formal in nature, as the topics discussed affect a broad group of constituents. Additionally, PAs and CAPs meet quarterly with LEAN to discuss the program. In general, the relationship between parties was reported to be pleasant and constructive.

During one lead vendor interview, it was expressed they did not think there was sufficient communication between the lead agency and the PA during the goal-setting process. The concern was goals set by the PA were not always realistic or attainable. The respondent recommended the PA involve the lead agency early in the goal-setting process, and continue throughout; so the CAP (the agency closest to the low income environment) could add value to the goal-setting process, and the clients could receive the most benefits from PA funding. According to LEAN, this has been corrected by a PA-LEAN agreement that, starting in July 2011 for 2012 goal setting, PAs and LEAN will start discussions about budgets and savings goals in advance of the program year.

A potential disconnect lies with differing goals of contributing program agencies. Specifically, the CAPs stated its main goal is to improve the quality of life for its low income clients. The PA has a legislative mandate to increase the energy efficiency of low income constituents, and express pride in having been charged with this task.

Contractual Relationships

Most CAP agencies we spoke with were happy with their contracts with PAs, and reported no issues in their continual contractual relationships with their funding sources, the PAs.

However, a few CAP agencies mentioned challenges in renewing contracts with PAs. Specifically, these CAPs mentioned constantly being pushed from one short-term contract extension to the next—with one lead agency even mentioning they had more than 10 short-term extensions in a three-year period. CAPs explained the multitude of extensions seriously hindered their ability to conduct short- and long-term resource planning. For example, one CAP mentioned they could use some extra auditors on staff, but were unable to make this change because of uncertainty related to the continual 90-day contract extensions. At the lead vendor level, a significant ripple-effect occurs due to their not being guaranteed funding from the PA, meaning they cannot issue longer-term, multiyear contracts with the local CAPs or implementation contractors. As such, planning and resource management becomes increasingly difficult, for not just the lead vendor, but for all who implement the program on behalf of the PA.

LEAN

As noted, LEAN coordinates program activities as mandated by the Green Communities Act. LEAN works directly with the CAPs, PAs, and state agencies to make the program more efficient, standardize components across the state, and advocate for the low income community. Most recently LEAN successfully standardized measures and measure costs for all CAPs, PAs, and contractors associated with the program through the Best Practices Working Group.

PAs and CAPs provided mixed reviews of LEAN's involvement in the program. Opinions ranged from *"just another level of administration to deal with,"* to referring to LEAN as "*one of the best things that has happened to the program in a long time,"* although no clear patterns emerged.

CAP agencies provided praise and recognition for the positive collaborative environment LEAN has created for the program. All we spoke with who were directly involved with LEAN thought it provided a beneficial forum for program coordination.

The most frequent PA complaints about LEAN surrounded the measure cost-effectiveness analysis and LEAN's additional cost to the program. Some expressed concerns that the measure cost-effectiveness analysis performed by LEAN was difficult to defend at DPU regulatory proceedings. Some PAs expressed uncertainty as to how funding provided to LEAN was allocated among low income constituents they were trying to serve. However, all PAs agreed LEAN decreased their time required for administering the program.

Program Implementation

Auditors and Weatherization Contractors

Most CAPs reported employing their own energy auditors. Typically, agencies do not contract audit work outside of their organizations. This structure seems to work well for CAP agencies as it helps prevent quality issues, and streamlines the process of inspecting jobs in-progress and upon completion. This streamlined approach aids communication for participants; 86 percent of surveyed participants understood what was going to happen in their home before the auditor arrived for the first visit. Nearly all responding participants (92 percent) found the agency staff very courteous and respectful.

All CAPs we spoke with have a long-standing network of installation contractors they use to make the energy-efficiency upgrades to clients' homes once the audit processes have been completed. The Cadmus Team did not interview low income contractors specifically as part of this evaluation, but found, through interviews with contractors for the Home Energy Assessment program, that several contractors implement for both programs.

Through a separate Home Energy Assessment program evaluation, it was revealed that contractors participating in both programs are paid higher wages for their low income projects. This is likely due to the federal enforcement of the Davis-Bacon Act. (Since 1931, Congress has extended the Davis-Bacon prevailing wage requirements to some 60 "Related Acts," which provide federal assistance for construction, and ARRA is one of the Related Acts.) Any contractors performing under any ARRA-funded or assisted contracts must pay their laborers at least the prevailing wage rates and fringe benefits[13].

Home Energy Assessment laborers are not covered under this Act because they are not dealing with ARRA funding (although low income is); hence, the difference in wage rates. The Davis-Bacon Act actually held up the programs in the beginning while federal entities ensured the PAs' wage rates were compatible with the Act, which caused much frustration for the PAs. However,

[13] http://www.caplaw.org/StimulusPackage/ARRA_DBA.html

the Act protects the contractors and ensures higher wages, which the contractors view as a benefit of working for the program.

CAP staff we spoke with said all auditors and installation contractors are extremely well trained and constantly update certifications, attending workshops, seminars, trade shows, and more. Before participating, all auditors undergo BPI certification training, and are certified by the state after written and infield testing. Most CAP agencies felt their auditors were extremely knowledgeable. Several reported many auditors having worked at the agencies for 15 to 20 years.

Contractors must complete energy "boot camp" training to qualify for program participation. These "boot camps" are provided by the PAs and the state to cover insulation and air sealing education. Both auditors and contractors also undergo infield and classroom continuing education training. The extensive training and education required of contractors extends to their work: the vast majority of surveyed participants (85 percent) rated contractors' work as excellent or good. Further, 86 percent of participants noted their contractors were courteous and respectful towards them and their homes.

However, the 15 percent of participants who expressed dissatisfaction with their contractor's work noted program installations. Nearly half of disgruntled participants (49 percent) claimed their new measure was not installed correctly or the contractor caused some other type of damage to their home during the installation process.

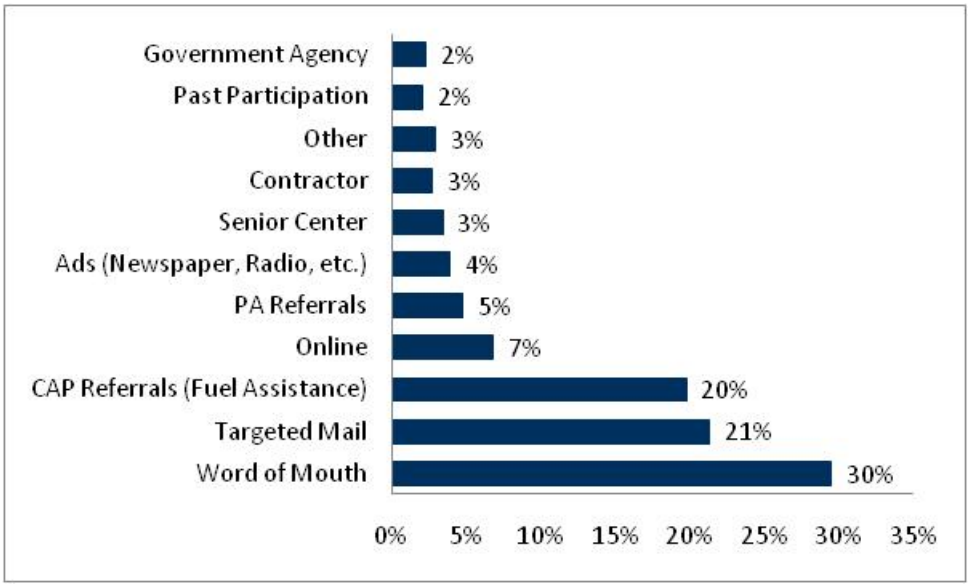
Outreach and Marketing

Because PAs market the program independently of each other, strategies employed vary widely between them. Approaches used to contact or target possible low income participants include:

- CAP referrals: when customers apply for and are accepted to the government fuel assistance program, they are referred to the weatherization program.
- Targeted mail: bill inserts or direct mail to customers regarding fuel assistance or PA discount rates.
- Event Outreach: booths or marketing campaigns at low income or elderly constituent events.
- Mass Save®: income-eligible program details and CAP information on the statewide Mass Save® website.
- PA referrals: when customers cannot pay their utility bills, PA call centers may refer them to their local CAP agency for additional assistance programs.

Only one of the seven PAs reported any active marketing for the program, such as targeted mail or event outreach. Notably, when participants were asked how they learned about the program, 21 percent of respondents reported hearing about it through a utility mailing. Figure 2 depicts the most common sources by which participants learned about the program, word of mouth being most common, as many interviewed PAs and CAPs expected.

Figure 2. How Participants Learned About the Program



Even though only 5 percent of participants heard about the program through PA referrals, 60 percent were aware the program was designed and operated by their PA. That correlation will be addressed during the program process.

Many PAs do not actively market the program due to challenges of serving the large number of customers already waiting for services. Several PAs and CAPs explained customers may wait more than one year after an initial application to receive program services.[14] However, LEAN reported that a backlog or waitlist does not exist, with the exception of one PA. There was a difference in opinions between the various parties interviews concerning whether or not a backlog exists; several PAs we spoke with did think a backlog exists.

The sometimes extensive waiting period is rooted in the priority system established for state and federal government weatherization programs. Government programs place a priority on serving certain low income customers:

- Elderly;
- Disabled;
- Children in the home, age six or younger;
- Native American Indian; and
- High-energy consumption.

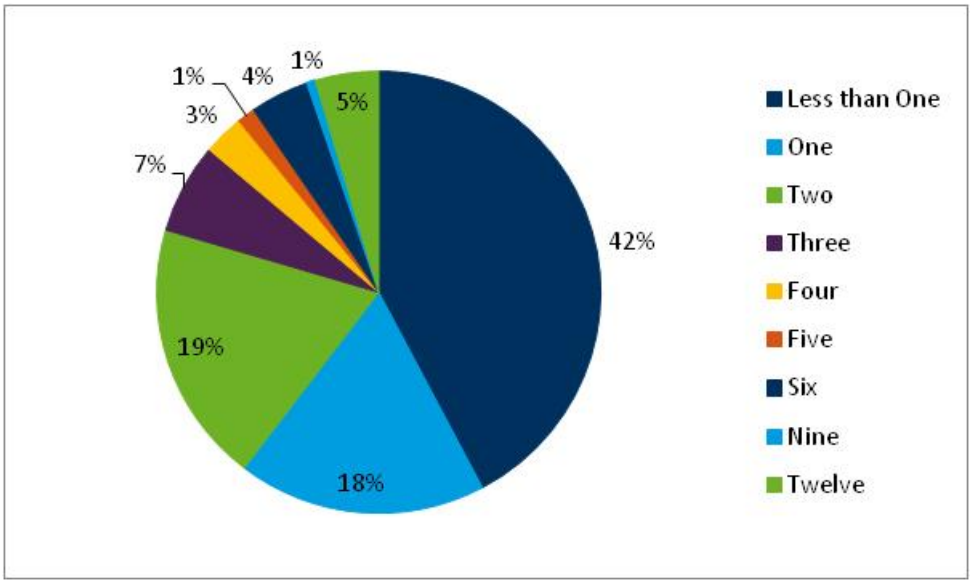
Priority points are given to customers matching any of the above demographics; those with more priority points are served first. A low income eligible home without any high-priority constituents may wait years to be serviced. As measure funding is divided *after* a home already receives services, CAP agencies prioritize all weatherization jobs based on government prioritization, regardless of whether or not that funding is used. In contrast, PAs do not have an

[14] For this report, we define the participant waitlist as the inventory of PA customers who have applied for low income weatherization services, but have not yet received them.

established priority system for services. The waitlist is specific to each CAP, not a statewide inventory. Homes may also be placed at the top of the priority system if they have an urgent situation, such as a broken window/door during freezing temperatures.

When participants were asked about the time they spent waiting for services, 79 percent reported satisfaction with the time spent on the waitlist (Figure 3).[15] Almost two-thirds of participants had their first visit scheduled within three months of signing up for the program. Only 5 percent of surveyed participants reported having to wait a year before having their first visit scheduled.

Figure 3. Number of Months Participants Spent Waiting for First Visit to be Scheduled



Program Delivery

Once a customer learns about the program, several steps are taken to deliver services to the participating client. To begin, the potential participant must identify and contact their local CAP agency. However, in most cases, CAP agencies reach out directly to eligible, high-priority, low income clients receiving fuel assistance, and inform them of the opportunity to sign up for the program. The application process has been well received by program participants, with 86 percent claiming it was easy to sign up for the program. Once the client has contacted the CAP, the agency walks them through potential available services, provides necessary application forms, and verifies income and eligibility. When an applicant is verified as eligible for the program, they are prioritized according to the federal priority system, and placed on a list with other customers waiting to receive services. The length of time to receive services depends on a home's priority.

Landlord Permission

If a participant rents their home, their landlord must permit work or audits to be performed on the premise. A release form must be signed, allowing one of two options: the landlord allows the audit, and all work covered by the program to be completed; or the landlord allows the audit to

[15] 79 percent of participants remembered being on a wait list and/or how long they waited.

be conducted, but requires the work order to be presented to him before any installations can occur. The latter option is followed up by another signature allowing measures to be installed. The tenant must also have the landlord sign a landlord/tenant agreement, which commits the landlord to maintain the tenant's current rent rate for at least one year after upgrades are made. The majority of renting participants (58 percent) reported having to complete this process without the assistance of CAP agency staff and most of them (70 percent) claimed the process was sufficiently easy to handle on their own. Another set of paperwork must be completed if the tenant lives in a multi-unit building which requires that 50 percent of the building's occupants must be eligible for the low income program and agree to have the audit and installations conducted.

Audit

Once a participant is chosen for services, and the landlord approves (if applicable), an audit is performed by CAP agency staff. The audit consists of a comprehensive evaluation of the home, including: blower door testing, appliance metering, and insulation measurement (as applicable). During this visit, the auditor determines which measures are eligible for replacement and installs instant savings measures, such as CFLs or faucet aerators. The CAP then assigns a work order to a qualified contractor, who schedules and performs requisite installation visit(s). If necessary, the contractor will apply for and receive a building permit for the work performed.

Quality Control

CAPs explained extensive quality control is conducted for all work performed for program. For at least 50 percent of projects, a CAP auditor is present at project completion to inspect work performed and suggest additional measures or improvements, if necessary. CAPs conveyed the in-progress quality visit is an effective quality assurance method as the participant does not have to have a supplementary appointment, and the installer does not have to spend additional resources on a revisit. In addition to the in-process quality control mentioned above, the following entities may perform post-installation quality control inspections, depending on funding sources used in the home:

- State Weatherization Auditor;
- Federal Weatherization Auditor;
- City/County inspectors (when a permit is pulled);
- PA Staff
- Lead Vendor Staff; or
- CAP Staff.

Should any measure not pass the post-installation inspection, the installation contractor is notified, the item repaired, and the home re-inspected. In total, CAP staff reported a home may have up to eight post-installation quality control visits during participation in the program. CAPs explained that, while this thorough inspection process ensures a high quality of work, it also may impose an increased burden on the participant.

Data Management

Due to the vastly different sizes of the low income programs offered, considerable differences in the current data management systems exist. The findings below are based on the data-focused questionnaires completed by PAs and CAPs, as well as supplementary conversations and E-mails with PA and CAP data managers.

CAP Data Management

The data collection process for the CAP agencies can be divided into two types: audit data and measure installation/invoicing data.

Audit Data

The breadth and depth of audit data collected by CAPs is generally consistent. Additionally, most audit forms were consistent across the CAPs, with only two CAPs indicating use of different forms. Participant and site-level detail was robust, and there did not appear to be gaps in the audit data collected.

What did differ was the medium used to collect the data: most of the contractors use hard copy forms, whereas two of the CAPs use laptop computers. One CAP uses both hard copy forms and laptops for the same PA, based on whether the customer uses gas or electric.

Once the audit has been performed, most of the audit data remains on the hard copy forms and are not shared with the PAs. Even if audit data are collected electronically, these data are retained by the CAP and not shared with the PAs. In general, the only data the CAPs share with the PAs are measure installation data for the purposes of invoicing and enabling the PAs to calculate and claim energy savings.

Measure Installation and Invoicing Data

Each CAP documents and stores every measure installed through the low income program. Most of the CAPs use some type of database to store this information. The type of data storage software used varies from CAP to CAP: some are using Microsoft Excel® spreadsheets (which are technically not databases) while others use more robust databases such as Microsoft Access® or an SQL server (one CAP is also actively migrating to SQL server). Some CAPs employ different data management processes for the same PA depending on whether the customer is gas or electric, or single family or multifamily.

The CAPs follow a fairly standard set of quality control (QC) systems before they transmit participant and invoice data to the PAs. QC is often conducted visually, where data are exported or examined in Excel. In addition to QC efforts, the CAPs will also export the data and summarize for program management and budget tracking. The following types of data are commonly summarized and reviewed:

- Per unit spending.
- Overall spending for a certain time period.
- Overall year-to-date spending.
- Spending as a percent of annual (and multiyear) budget.
- Total participation and measure-level participation.

As noted above, measure installation and invoicing details are the only data shared with the PAs. This information is transmitted several ways:

- With the exception of the CAPs that use electronic forms, hard copy invoices are mailed to the PA by the lead CAP. When the CAPs uses electronic forms, the invoice data are automatically delivered to the PA via the database system.
- Participant installation data is also sent; the medium for data transfer varies across the CAPs, ranging from an installation summary PDF (with no participant-level detail) to detailed information about each participant. The latter is most common when electronic forms are used and data transfers are automated.
- Installations associated with state and/or federal funds have to be reported differently and are input into WAP funds, a Web-based form. This reporting is transmitted to the state and federal entities associated with the funds, and not to the PAs.

The majority of the CAPs reported archiving their participant data goals, while several were unsure if this occurred. Most participant tracking data are shared/reported on a monthly basis, although data are also provided *ad hoc* at a PAs request.

PA Data Management

The data process for the PA agencies can be divided into three primary categories: measure installation/invoicing, reporting of summary installation/participation data, and savings estimation.

Measure Installation and Invoicing Data

Most of the PAs use an Oracle-based database to store the customer participation data they receive from the lead CAPs. Some of the smaller PAs use Excel, and one PA uses a custom, albeit older, database system. Half the PAs reported that QA/QC is conducted visually in Excel, while half have established database queries and procedures that allow them to QA/QC and summarize provided data.

While only two of the PAs automatically sync tracking data with their CIS, all of them include customer IDs and account numbers in the program data to enable this merge if necessary.

Reporting of Summary Installation and Participation Data

Reports summarize program data for administrative and financing tasks, as well as track the program's progress towards goals. Most reporting is conducted monthly, quarterly, or on an *ad hoc* basis. *Ad hoc* and monthly reports are most commonly generated for internal review and QC-related inquires, while the quarterly reporting is generated for state mandated filings or shareholder mandated disclosure. The majority of PAs stated that generating a summary report takes only minutes, but a few noted that reporting takes hours, describing the process as "*tedious work*." One PA commented: "*Reporting is an ongoing process and generally takes a day to summarize and is submitted monthly*."

According to the PAs, the most critical program metrics to track are total savings and budget expended to date. Collectively, these metrics help identify any gaps in actual program results versus established goals. A benefit-cost analysis is almost always performed outside of the database system—the summary data are exported into a spreadsheet where the calculations are

administered. Some PAs reported sending program summary data to a third party who calculates the benefits/costs for them.

Savings Estimation

According to the PAs, 2011 energy savings algorithms will be primarily based on the state-approved TRM values for both electric and gas measures. One PA used an older, out-of-date SMOCERS audit software system for custom (non-deemed) and deemed measures, and all PAs reported using only state-approved savings estimates for planning (though several PAs noted they were not confident in the source and acknowledge they could potentially be using outdated assumptions). A common response regarding the source of or rationale behind the per unit savings assumptions was "*Ask a representative with LEAN. I am really not sure.*"

Database Content

In addition to assessing the process by which low income data are collected, managed, and reported, the Cadmus Team reviewed the data in the provided program databases to verify completeness, clarity, and consistency. Although some PAs provided program data as far back as 2005, our data review focused exclusively on 2010. We will use the historic program data in future impact evaluation efforts when past participants need to be removed from nonparticipant samples.

The findings of the database content review were summarized in a quote offered by one PA data manager: "*The database …does not reflect good information on details of work completed—instead it reflects only when and where the work was done, and the final cost of the completed work.*"

Organization

While all PAs provided 2010 low income program data in Microsoft Excel, the nature of the files differed dramatically. In some cases the files contained only low income data, while in other instances low income participants were included in a larger dataset containing participants in all 2010 residential programs. In the latter case, the Cadmus Team commonly had to follow up with PA data managers to determine the appropriate program codes for identifying low income participants.

In two cases, the PA's low income program data was split into multiple datasets, such as one for appliance rebates and one for weatherization measures. This disaggregation prevented the Cadmus Team from assessing which participant received both types of program measures, as there was no unique identifier (i.e., account number) in both datasets. Unless this is resolved before future impact evaluations, it will be difficult for us to accurately estimate average participant savings and perform a thorough evaluation for these PAs.

In addition to the expected differences in field names, PAs had a variety of ways to track program data. For example, inconsistencies exist with how audits and weatherization are grouped together. Some PAs track individual measures, while some track multiple measures as a measure group (e.g., weatherization measure savings that include air sealing, duct insulation, pipe insulation, and attic insulation). As a result, some PA datasets report costs and savings by measure group, while others list the information for each individual measure. Further, some PAs record fees or audit procedures (e.g., Program Management Fee) as measures in the measure

field, while others track similar fees in a separate field unrelated to installed measures. Differences in measure naming conventions make it very difficult to compare the consistency of key measure assumptions, such as per-unit energy savings, incentives levels and effective useful life, across PAs.

Database Size

The PA program databases varied widely in size and scope. Specifically, participation mid-2010 ranged from 39 unique participants with 44 measure types in one database, to 2,037 unique participants installing 5,515 unique measures in another database. Some datasets were longer (having more records) and some were wider (having more columns or data fields). In general, more fields better facilitated the data review process since data could be filtered as necessary.

Data Dictionaries

Most PAs did not provide accompanying data dictionaries to assist in interpreting their low income program datasets. When the Cadmus Team reached out with questions regarding specific fields, PA data managers were often uncertain whether a data key existed and/or required time to locate the appropriate data key. In instances where data dictionaries and/or explanations of the data were provided, they were often not complete. However, even the incomplete data dictionaries greatly improved the data review process. This was especially true when multiple datasets from multiple sources needed to be merged.

Database Fields

As noted previously, the Cadmus Team did not request a specific set of data fields as part of our 2010 low income data request, but instead asked for low income program data at its most "*granular level*." The reasons for this approach are enumerated above. The Cadmus Team reviewed each provided PA dataset to determine whether the following general types of key data were being collected:

- Measure Data (e.g., useful life, measure name, quantity, savings).
- Customer Data (e.g., participant name, account number, telephone number).
- Household Data (e.g., square footage, heating fuel/system type).
- Project Data (e.g., project ID, contractor names, rebates/incentives).

Our assessment of each of these data types is provided below. When provided, we assessed the data's completeness and usefulness for informing future evaluations. The Cadmus Team also examined whether the values provided were accurate and consistent across measures and PAs.

Measure Data

All datasets list installed program measures (usually by name, sometimes by measure code) and the quantity of each. However, the naming conventions the PAs used differ dramatically. In some datasets, only a general measure name is provided (e.g., insulation), others specify the type of insulation (e.g., attic insulation), and some contain extremely detailed measure names (e.g., attic flat R22 open). While the detail associated with the latter example is helpful from an evaluation perspective, it was not always easy to determine which general measure group the specific measure belonged too.

While the measure quantity is reported in all datasets, the value and interpretation of the quantity field differs. For example, one dataset lists a measure quantity of "1" for all installation measures. Since measures such as insulation are usually quantified in terms square feet of a specific R-value added, a measure quantity of "1" provides little insight into the potential energy savings of the measure. Further, without listing the units installed (such as square feet), it is difficult to differentiate between a simple count of the number of measures installed and the actual amount of a measure (such as insulation). In a few places, negative quantities along with negative incentives appear. It is impossible to determine why this occurred without further information from the data manager.

Per-unit energy savings were found in approximately half of the provided datasets. Though 2010, claimed savings were not expected to completely synchronize with TRM values; matching observed per-unit savings with deemed measure savings listed in the TRM proved difficult and rarely matched. In some cases, the kWh values matched, but the corresponding kW values did not. In some cases, a TRM value was reported along with another value of unspecified origins.

Energy savings values that vary for every measure of the same type are most difficult to assess. The measures for a household appear to be exactly the same by name, housing type, etc., but each savings value is different. We assumed these are participant-specific modeled savings estimates, but often the household information needed to verify the savings estimate were not included.

In some cases, savings do not appear in the correct place. For example, insulation installed in a house with natural gas heating is receiving oil savings. Further, some datasets have rarely populated fields for water and other non-energy (NEB) savings. Only one dataset consistently had water and NEB values, despite methods for determining such savings being detailed in the TRM. Also, measure life is only present in a small number of datasets. The few datasets including this field were determined to align with the Massachusetts residential TRM.

Customer Data

Most datasets contain participant names, telephone numbers, addresses, and account numbers or another ID. In many cases, only telephone and account numbers were collected, with the remaining customer fields left blank. It is unclear if these data exists elsewhere and/or how they could be matched back to other tracking data.

Household Data

Five of the provided program datasets include information such as building type (single family, multifamily 2-4 units, etc.) and only one provides the square footage of the participating household. Less than a third of the datasets had heating system and fuel type, though this field was not always populated with complete data for the entire dataset.

Project Data

Most datasets include information about the contractor who performed the work. Contractor information is usually accompanied by a project ID, measure group ID, or location ID that indicates when multiple measures were installed at the same time. In most cases, if a separate visit or invoice was used for other measures installed later, the participant received an additional project identifier. Also, most datasets contain an invoice date or install date, but rarely both. An

invoice date gives a reasonable estimate of when the measure was installed, but an install or completion date is more accurate for the purposes of an impact evaluation. We assume these dates are collected, but just were not provided.

Incentives paid (or the rebate associated with each measure) was reported in most datasets. This typically included the amount of the incentive (per measure) and the date it was paid. In many cases, multiple incentive amounts are listed for the same measure within a single PA database. In some case, the differences appear to be the result of incentive levels changing during the 2010 program year (this became apparent when looking at the data in a chronological report).

Another type of data rarely in the data provided is the replaced measure. Nearly all datasets fail to include this. In some cases, this information is included in the measure name (which can make the measure name confusing) and in rare instances it is included anecdotally in a notes field.

Data Content Summary

Table 8 summarizes the findings above. For each PA, the Cadmus Team estimated the percent of participant records for which each of the aforementioned data elements are included and complete. We compiled a weighted average for all the datasets using the number of records in each dataset. Since the weighted average methodology causes larger program datasets to overshadow smaller datasets, the table also provides the number of PAs that provided adequate data (defined as greater than 50 percent of the values being present) for each field listed. Please note this table does not include an assessment of the integrity of the data (which is provided in the next table).

Table 8. Summary of Data Completeness

Data Category	Field Type	Average Percent Complete by Record	Count of PAs with Mostly Complete Fields
Measure Data	Completion Date	25%	4
	Measure Group	77%	4
	Measure Type	100%	8
	Measure Detail	<1%	0
	Quantity	100%	8
	Measure Life	30%	2
	Incentive/Cost	75%	6
	Electricity Savings	36%	3
	Oil/Gas Savings	42%	3
	Non-Energy Savings	<1%	0
	Original EE Value	<1%	2
Customer Data	Account Number	58%	4
	Name	99%	7
	Address	100%	8
	Contact Telephone	63%	6
Household Data	Single Family/Multifamily	86%	5
	Square Footage	8%	1
	Heating Fuel Type	30%	2
Contractor Data	Contractor	67%	4
	Project ID	78%	5
	Invoice Date	65%	3

Table 9 provides a summary of the consistency and inconsistency of these same data types across all PAs. This subjective ranking is based on the Cadmus Team's assessment regarding overall data consistency, which was comprised of three criteria: ease of understanding, consistency within the program, and consistency with TRM values. Data that ranks highly for these requirements are counted as Mostly Consistent while data that ranks poorly are counted as Mostly Inconsistent. We did not rate fields that are missing. As can be seen in the table, the majority of data elements were generally found to be inconsistent.

Table 9. Summary of Data Consistency

Field Type	Count of PAs with Mostly Consistent Values	Count of PAs with Mostly Inconsistent Values	Count of PAs Missing the Fields
Measure Names	4	4	0
Quantity	4	4	0
Measure Life	2	6	0
Incentive/Cost	2	5	1
Electricity Savings	3	0	5
Oil/Gas Savings	2	2	4
Non-energy Savings	0	1	7

Customer Satisfaction

Participants were very satisfied with the quality of information visiting auditors provided regarding ways to save energy. Nearly all (94 percent) of surveyed participants rated the information they received as excellent or good. Sixty-four percent of participants even recalled specific energy-saving tips they learned throughout the program's process. Common tips participants remembered included:

- Turn off the lights when you are not using them;
- Take shorter showers;
- Conserve while doing the laundry (use the cold water cycle, hang clothes to dry, etc.);
- Close windows and doors when the heat or air conditioning is running; and
- Unplug or turn off any devices not in use.

When asked about their behavioral changes since participating in the program process, more than half (57 percent) of respondents acknowledged they changed some of their habits to follow through with tips they discussed with auditors. Overall, the program has been well received by participants, with 93 percent rating the program experience, as a whole, as excellent or good.

5. Conclusions and Recommendations

After synthesizing findings presented in the preceding section, the Cadmus Team developed a set of conclusions. Some of these conclusions led to recommendations for change, while others did not, as the current approach appears to be working well.

Conclusions and recommendations presented have been organized in a manner similar to findings, under the following topics:

- Program Design and Administration
- Program Implementation
- Data Management and Content

Program Design and Administration

From this evaluation, it has become apparent that PAs have taken significant steps in 2010 towards statewide standardization. The evaluation also revealed—as expected—some program aspects have already become standardized, while other program aspects still vary between CAPs and PAs.

The Cadmus Team offers the following conclusions and recommendations regarding design and administration of the Low Income Program:

- **The Low Income Weatherization Program has a long-standing history of program delivery through the low income network.** The Low Income Program, funded by the eight Massachusetts gas and electric utilities, has been helping the low income population by providing weatherization services for over a decade. Since 1998, stakeholder coordination through LEAN and seasoned program implementers in the CAP agencies has resulted in delivery of weatherization services to many low income customers.

- **The funding from the eight PAs has been dispersed among a very complex network of over 20 CAP agency implementers.**

- **LEAN and the Best Practices Working Group has provided a framework for program collaboration and communication.** The low income network has a setting for collaboration through LEAN, which CAP agencies and LEAN staff we interviewed said worked well.

- **Many CAPs reported experiencing some challenges in managing spending of ARRA funds in addition to full allotment of PA funds.** ARRA funding is reportedly prioritized by CAP agencies we spoke with, mostly because funding will cease to exist or could be reallocated by the Federal Government to other sources if the funding is not used. However, CAP agencies not being able to spend PA funding at the same pace at which they may have been able to before ARRA has become a nationwide issue, not specific to Massachusetts.

- **PAs expressed concerned that increased funding expectations will fall to them when ARRA funding expires.** Several PAs expressed concerns that when ARRA funds expire,

they will be expected to increase their funding; so CAP agencies can continue the same increased assistance level provided. CAPs in turn, are expecting this increase to happen.

  - **Recommendation:** To address any concerns related to funding and resource management, PAs and lead CAPs could increase communication during the goal-setting processes, and track spending throughout implementation.[16]

- **Little clarity or agreement exists as to the definitions of standardization and integration. Different stakeholders define it differently, sometimes at cross-purposes.**

  - **Recommendation:** The PAs should schedule a meeting or series of meetings in coordination with LEAN for the express purpose of clearly defining standardization and integration objectives for the program. Once the definition of standardization is communicated and agreed upon, strategies should be determined for meeting those objectives over a specified time period. This will ensure all stakeholders work toward commonly agreed upon objectives, and enhance progress toward meeting objectives to be measured.

Program Implementation

- **CAPs we spoke with reported employing auditors directly rather than contracting auditors works well for them**, as it helps prevent quality issues, and streamlines the process of inspecting jobs in-progress and upon completion. CAPs said agency auditors understand program restrictions and requirements well, which enables them to appropriately identify the best solutions for customers using various funding sources.

- **Home Energy Assessment program residential customers could benefit from auditor and contractor training and expertise required through the Low Income Program.** CAPs have a long-standing network of installation contractors with whom they contract to make energy-efficiency upgrades to low income homes. Through interviews with contractors for the Home Energy Assessment program, we found several contractors implement both the Low Income and Home Energy Assessment programs. CAPs we spoke with reported both auditors and installation contractors are extremely well trained.

- **The in-progress quality control process CAPs implement works well according to several CAPs we spoke with.** CAPs reported in-progress quality checks work very well because they reduce the amount of post-installation visits by the contractor and auditor, and allow paperwork on a job to move forward without time lags or roadblocks. While it is important for the CAPs to have their own internal quality control process integrated into the project protocols, it is also important to conduct **independent** quality control checks, as required by some funding agencies.
- **Multiple quality control visits, which can occur at a home from various funding sources, can be cumbersome for CAP agency staff and, potentially, for participants.** CAPs reported each funding source is allowed (and sometimes required) to conduct a

[16] According to LEAN, this has been corrected by a PA-LEAN agreement that, starting in July 2011 for 2012 goal setting, PAs and LEAN will start discussions about budgets and savings goals in advance of the program year.

certain number of quality control visits in addition to in-progress or post-installation checks the CAP agency already implements. Due to multiple funding sources, this can become quite cumbersome for CAP agency staff, which typically has to accompany visiting quality control contractors to a site every time.

  - **Recommendation:** PAs should strongly consider all options for creating a streamlined, independent, third-party QA/QC process that serves the needs of the PA-funded program, while minimizing participant intrusion. Such a process could reduce existing inefficiencies including the potential number of visits to participants' homes, ensure CAPs do not perform quality control on their own projects, free up CAP auditors' time to reach more low income customers, and align this program's QA/QC process with that proposed for the Home Energy Assessment program. This does not necessarily have to be an additional QA/QC process, just a streamlined process that is collaborative in nature.[17]

- **Based on feedback from PA interviews, active program marketing is not a major focus of PAs.** Only one of the PAs we spoke with reported any active marketing for the Low income Program, such as targeted mail or event outreach. CAPs primarily market the Low Income Weatherization Program to customers receiving fuel assistance. Cross program marketing, through the fuel assistance program, is typical of most low income programs. While subscription levels are not deficient, eligible customers may remain persistently unaware of the program if they do not participate in the fuel assistance program. These might include the newly unemployed or non-English speaking customers.[18]

- **According to PAs and CAPs, most CAPs experience a waitlist for program participation, while LEAN's stated opinion is that a waitlist does not exist, with the exception of one PA.** There is a difference in perspectives between LEAN and PAs concerning backlogs and waitlists. The evaluation team requested numbers from both parties, and the numbers provided by LEAN and the PAs differed. We were not able to reconcile these differences as part of the 2010 evaluation. The evaluation team will continue to work with the PAs and LEAN to understand the causes of these discrepancies and assess the implications. The 2011 planned benchmarking effort will compare the MA program with other programs in the U.S. to provide a more objective perspective of the waitlist.

[17] Based on our understanding of DHCD's existing QA/QC as explained by LEAN, which includes review of PA-funded measures, DHCD may be the best entity to act as an official statewide QA/QC officer, however it is not Cadmus' understanding that there is a formal agreement or process between PAs and DHCD as of yet.

[18] Cadmus was informed that a "hard to reach charette" has been formed to better understand hard to reach markets, and the evaluation team will engage with this group during 2011 to understand the hard to reach population.

Data Management and Content

Due to the current fragmented nature of the program data across PAs, the aggregate and analysis of the low income program more closely resembles eight individual PA evaluations than a single, statewide program. To address this, we offer two primary recommendations:

1. PAs should develop a standardized identification system to allow clear linkages between each PAs' tracking system, customer database, the Benefit Cost Ratio (BCR), and, finally, the technical review manual (TRM).
2. PAs should ensure collection and availability of a minimum set of critical fields for current evaluation work.

While we are recommend certain components be identical across PAs and CAPS, we are stop short of recommending all PAs and CAPS use the same end-to-end data tracking and reporting system. We recognize that some PAs have made significant investments over the last several years, and are very close to having an end-to-end system that meets all evaluation and reporting requirements while at the same time achieving low administrative costs through electronic modernization. For these PAs it may be more cost-effective to modify their existing systems and processes rather than adopt a single, statewide platform. Similarly, it may be more cost-effective for PAs without such systems to a lease a system from another PA.

All of the specific conclusions and recommendations offered below regarding data management and data content revolve around unifying Low Income program data across Massachusetts.

- **Organization and documentation of data (provided in response to data requests for supporting evaluation activities) have made data review and analysis extremely time consuming,** often requiring significant clarification and communication with PAs via telephone and e-mail.
    - **Recommendation:** The PAs should maintain a data dictionary for all critical program datasets that includes all field definitions, value definitions, and the sources of the data. The data dictionaries should be provided as part of all data requests thereby allowing evaluators (or any other third-party) to decode field names and data values efficiently. The data dictionaries would also ensure internal knowledge of the database is not lost in the event of critical personnel turnover. Once created, draft data dictionaries should be circulated among the low income working group to ensure that all PAs are collecting the same data and using the same naming conventions whenever possible. If such data dictionaries do not exist, the Data Management Working Group (DMWG) established as part of the 2011 Residential Retrofit and Low Income evaluation could assist with their creation.
- **The PAs' Low Income program data tracking systems may have some critical deficiencies.** Though minimally sufficient for operating programs, information collected is insufficient to support impact evaluation activities and provide import information for better program management. We use the phrase "may have some critical deficiencies" as our findings remain somewhat inconclusive, given information identified as missing may have actually been tracked, but may not have been provided in response to our initial data requests.

  - **Recommendation:** PAs should ensure the collection and availability of a minimum set of critical data fields for current and future evaluation work.[19]

- **Most audit data is never entered electronically or provided to the PAs.** This results in a tremendous amount of data "leakage," as data that could be leveraged to assist with evaluation studies, potential studies, and program planning efforts is lost or not usable in a cost-effective format.
  - **Recommendation:** We recommend that PAs consider mandating that a standard set of critical audit data fields be entered into an electronic format and maintained/archived for future internal and external use. The PAs should collaborate with the CAPs and the evaluators to identify valuable audit information not currently maintained electronically.

- **Some CAPs are currently using hard-copy audit data collection forms** and entering the data manually into disparate electronic tracking systems. Part of the reason for the data leakage described above is that many CAPs still use hard copy audit forms. Since these forms must be hand entered, CAPs enter only select fields in a digital format. Further, manual data entry leads to errors (due to transcription issues) and requires additional administrative time.
  - **Recommendation:** PAs should also explore the potential of having field technicians use electronic hardware (a PDA or laptop) to collect and enter onsite data whenever possible. This approach would minimize manual data entry, reduce program administrative costs, and improve data quality through the institution of unique keys, foreign key constraints, lookup tables, and other database design best practices.

- **Unique identification fields (ID) are currently not being used to link different data sources and participation across programs.** As a result, it is difficult to align values listed in the PA low income program datasets with other program datasets or external reference documents (such as the TRM).
  - **Recommendation:** PAs should work collaboratively on integration of a common Measure ID system to allow tracking of each installed measure from the participant tracking database to the BCR input sheet and to the TRM. In addition, PAs should develop and maintain standardized ID fields (standardized internally, not across PAs) linking data across programs, customers, contractors, and billing data.

- **The lack of a standardized measure naming convention makes it difficult to aggregate and/or compare measure savings.** The measure naming conventions varies greatly across PAs, because different program stakeholders require different levels of specificity pertaining to measure data. For example, while the contractor installing the new refrigerator needs to know and record the exact make and model, the vendor may only care about the type of refrigerator (top freezer, side-by-side, etc.) and the PA may

[19] The DMWG is already actively working with the PAs to 1) identify the critical fields and 2) ensure they are maintained going forward.

only care that a refrigerator was installed. Some stakeholders believe this should be included in the TRM efforts. However, this will require someone taking the initiative to engage the team working on the TRM to ensure this is included as part of the deliverable.

- **Recommendation:** Through a collaborative process with the PAs and the TRM working group, continue to develop and employ a standardized measure naming convention for all PAs and CAPs. The TRM should be used as a basis to develop standard names and codes. A naming convention would allow for faster and more accurate statewide reporting, improve evaluability, and add transparency to the measure tracking process. The Cadmus Team specifically recommends consideration of a four-part measure naming convention that includes varying levels of detail for each program stakeholder: denoting the measure's end-use, group, type, and detail. Examples of several common program measures are provided in Table 2 below.

Table 10. Examples of Potential Standardized Measure Naming Convention

End Use	Measure Group	Measure Type	Measure Detail
Appliances	Refrigerator	Top Freezer Refrigerator	Frigidaire LGHT1837L*
HVAC	Insulation	Attic Insulation	R-30 Unrestricted - Settled Cellulose
Lighting	CFL	Screw-in CFL (20W)	GE 75412 20-Watt CFL Spiral Reveal Light Bulb, 75-Watt Equivalent
Water Heating	Water Heater	Condensing Water Heater (EF 0.82)	AO Smith GPHE-50 Vertex

Appendix A: Program Administrator Interview Guide

Massachusetts Residential Retrofit & Low Income Evaluation
Low Income Program Administrator Interview Guide

Name	
Program Administrator	
Title	
Interviewer Name/Firm	
Date of Interview	

Introduction:

The purpose of this interview is to understand your perspective of [PA]'s low income program as implemented in 2010. We are specifically interested in hearing your opinion regarding the relative strengths and weaknesses of the current program design, the consistency with which the low income program is implemented statewide, and whether any program design changes could increase the program's reach or depth of service. We will be conducting similar interviews with program managers at each program administrator, as well as with key stakeholders at agencies administering the program. All information gathered will be reported anonymously.

If at any time during this interview you think of someone else we should speak with as part of our research, please just me know.

Roles and Responsibilities

1. To begin, could you please describe your role in the program?
    a. How long have you held this position?

2. Have you held other positions in the program?
    a. If so, what were they?
    b. What about other positions with similar programs?

Program History

(For NSTAR & NGRID*: I understand you might have covered some of this information in the introductory interviews conducted a few months back, I appreciate your patience as we run through them again quickly.)*

1. Is your low income program implemented by CAP agencies?
    a. If yes, which ones?
    b. May I please get a list of your contacts at each CAP to interview?

2. Do you have a Lead CAP? If so, which agency?

3. Have CAPs always delivered the program on behalf of [program administrator]?
    a. If not, when did the current CAP(s) become the implementer(s)?

4. Other than the CAPs, is anyone else involved in the delivery of the program e.g., additional audit or other contractors who may work for the CAPs?
    a. [Probe as needed] staff involved with program coordination, marketing, QA/QC

Program Design

To help me get a sense of the program, I would like to ask a few questions regarding the program design.

1. What motivated the program originally? [Probe as needed]
    a. Legislation
    b. Utility filing
    c. Other

2. What role, if any, does Massachusetts State policy play in the Program? [Probe as needed]
    a. Funding
    b. Legislation
    c. Other

3. What are the Programs goals and objectives for 2010?
    a. Participation rates
    b. kWh/therm savings
    c. Other

4. Do you have deemed savings established for each measure? [Probe as needed]
    a. How were they created / Where did they come from?

5. Do you have any suggestions to improve the design of the program?

Program Delivery [Probe as needed]

Next, I would like to ask a few questions about program delivery.

1. How does the customer contact the program? For example: on-line, call into their utility, call in to a local CAP, etc.
    a. What are the most/least common methods?
    b. Does the PA refer customers to the program?
    c. What happens next…?

d. Where in the process, if at all, does the customer need to do something to keep the process moving forward (i.e. make a call to ensure the next step happens, or make an appointment with a contractor)?
e. Is there any sort of "follow-up" procedure when a customer ends up stuck on a step (for example, receives an audit but does not contact a contractor)?

2. In your opinion, what works particularly well about process?
    a. [Probe at each stage] marketing, pre-installation visit, installation, inspection, reporting
    b. In your opinion, is there anything that can be done to improve the process?

3. What type of marketing does the program do?
    a. Which have been particularly effective?
    b. Are there additional strategies you would like to see employed?
    c. Are there groups of potential participants that you feel are being overlooked or not marketed to?
    d. Does the PA create any list for the CAPs to recruit?

4. Is finding eligible and willing customers a challenge?
    a. Is there a waiting list to receive services?
    b. If so, how long is waiting list?

Quality Control

Now for a few questions about quality control, to your knowledge:

1. What quality control procedures are in place? (QC of CAP numbers or quality?)
    a. How were they devised?
    b. Who implements your quality control processes?
    c. How are they enforced?
    d. How effective is the quality control process at identifying potential issues?

2. How frequently are there quality issues?
    a. What types of issues are most common?

3. Are there particular agencies that have quality problems on a consistent basis?

4. How are persistent quality issues addressed?

Program Administration

To make sure I understand how the administration side of the program works, I'd like to ask a few questions.

1. Are you leveraging funds from other sources for participating homes? (i.e. Is funding divided?)
    a. If so, how is funding divided? Can a measure or home be funded by two sources? How are federal weatherization funds spent? How are ARRA funds spent?
    b. How are these funding sources coordinated?
    c. How does this leveraging of funds effect program activities?
    d. How does it affect program administration?

2. How is it decided the level at which the Program will be funded?

3. What are the benefits and drawbacks of the LEAN coordination?
    a. From your perspective, what are the benefits and drawbacks of the LEAN coordination?
    b. Are there elements of the current program that would benefit from increased coordination?
    c. Are there elements that would benefit from separate PA program strategies?
    d. Does the LEAN coordination increase or decrease your time spent administering the program?
    e. What, if anything, would you like to see changed in regards to LEAN involvement in the program?

4. What are the formal and informal communication procedures between CAPs and PAs?
    a. With whom?
    b. Frequency?
    c. From your perspective, what is the quality and tenor of the relationships between the CAPs and PAs?

5. What are the formal and informal communication procedures between LEAN and PAs?
    a. With whom?
    b. Frequency?
    c. From your perspective, what is the quality and tenure of the relationship between LEAN and the PAs?

6. What are the administrative costs associated with the Programs?

Participation Data

Now, I'd like to ask you a few questions concerning participation data, again please answer these questions based on your own knowledge of how the program works.

1. In what form do you receive participant data/reports? (hard copy, electronic software, etc)
    a. How often?
    b. Is there an internal QC process on the data? If so, what is it?
    c. Are there additional data you would like to see collected from the CAPs?
    d. Do you receive different data from various CAP agencies?

2. What internal processes exist to analyze the data?
    a. What types of analysis are conducted? E.g., Questions asked, Metrics, etc.
    b. Does the data collected provide the necessary information of impact analysis, cost/benefit analysis etc.?
    c. Are primary data merged with other data (e.g., billing) to expand the scope of analysis?
    d. Are relational databases used?
    e. Do they facilitate efficient storage and querying?
    f. Are the findings from data analysis used to modify Program implementation?
        i. If so, how? If not, why not?

Impact of ARRA

1. Has the American Recovery and Reinvestment Act of 2009 (ARRA) had any impact on the design or delivery of the Program?
    a. What specifically has changed?
    b. How has this impacted your program in 2010?

2. Has ARRA funding changed the types or depth of services now available to customers?

3. What are the long-term impacts of ARRA, if any, on the Program?

Other

1. As I mentioned before, we will also be interviewing CAP agencies as part of this evaluation. Is there anything we should be sure to ask them about?
2. Any other comments or areas we did not cover on which you would like to add your views?

3. Throughout the interview process has anyone else come to mind as someone who should be added to our list of contacts to be interviewed?

In addition to interviewing all program administrators, we will also be speaking with other low income stakeholders including those that developed marketing materials, conducted audits, installed program measures, and handled and reported program data.

Who is the best person at [program administrator] to provide the necessary database, forms, and reports needed?

Name	
Title	
Phone/Email	

Thank you for your time today. If you think of anything else you would like to discuss, please do not hesitate to give me a call or email.

Appendix B: CAP Agency Interview Guide

Massachusetts Residential Retrofit & Low Income Evaluation
Community Action Program Agencies Interview Guide

Name	
CAP staff member	
Title	
Interviewer Name/Firm	
Date of Interview	

Introduction:

The purpose of this interview is to understand your perspective of the low income program funded by [PA] as implemented in 2010. We are specifically interested in hearing your opinion regarding the relative strengths and weaknesses of the current program design, the consistency with which the low income program is implemented statewide, and whether any program design changes could increase the program's reach or depth of service. We will be conducting similar interviews with other program stakeholders, such as the program manager at each program administrator. All information gathered will be reported anonymously.

If at any time during this interview you think of someone else we should speak with as part of our research, please just me know.

Roles and Responsibilities

3. To begin, could you please describe your role in the [CAP] low income weatherization program?
    a. How long have you held this position?

4. Have you held other positions in the program?
    a. If so, what were they?
    b. What about other positions with similar programs?

Program History

1. Which PAs do you implement for?

2. When did [your agency] become an implementer for [PA]?

3. Other than [your agency staff] is anyone else involved in the delivery of the program e.g., additional audit or other contractors who may work for your CAP?

a. [Probe as needed] Additional staff for program coordination, marketing, QA/QC
b. May I please get a list of additional contractors that you work with and their contact information?

Program Design

To help me get a sense of the program, I would like to ask a few questions regarding the program design.

1. To your knowledge, what motivated the program originally? [Probe as needed]
    a. Legislation
    b. Utility filing
    c. Other
2. What role, if any, does Massachusetts State policy play in the Program? [Probe as needed]
    a. Funding
    b. Legislation
    c. Other
3. What are the Programs goals and objectives for [CAP] in 2010? [Probe as needed]
    a. Participation rates
    b. kWh/therm savings
    c. Other

Program Delivery

Next, I would like to ask a few questions about program delivery.

1. How does the customer contact the program? For example: on-line, call into their utility, call in to a local CAP, etc.
    a. What are the most/least common methods of contact?
    b. What happens next…?
    c. Where in the process, if at all, does the customer need to do something to keep the process moving forward (i.e. make a call to ensure the next step happens, or make an appointment with a contractor)?
    d. Is there any sort of "follow-up" procedure when a customer ends up stuck on a step (for example, receives an audit but does not contact a contractor)?
        e. How often is the client visited during the course of the implementation?
            i. By whom? E.g., auditor, installer, other
2. Does the audit include a blower door or other pressure testing? Does it improve the quality of weatherization work?

5. In your opinion, what works particularly well about process?

a. [Probe at each stage] marketing, pre-installation visit, installation, inspection, reporting
b. In your opinion, is there anything that can be done to improve the process?

6. Are there differences in program delivery between single and multi-family housing?
   a. Are there any challenges specific to administering the program to low income multifamily participants?

5. How are participants selected?

6. How does the program deal with landlord permission to make changes to the residence? What is done to facilitate the process?

7. Is there any recruitment or marketing for potential participants?
   a. How successful is this recruitment?
   b. Do the PAs refer customers to you?

8. What type of marketing does the program do?
   a. Which have been particularly effective?
   b. Are there additional strategies you would like to see employed?
   c. Are there groups of potential participants that you feel are being overlooked or not marketed to?

9. What is the current participant waitlist?
   a. Is this a typical quantity?
   b. How long does a participant wait, on average, for an audit?

10. Are most services being delivered by agency staff or contractors?
    a. Scheduling
    b. Audits
    c. Installation
    d. Other

11. To your knowledge,
    a. What training was provided/what training is still desired or required? (CAP staff and contractors)
    b. How are needed services and measures identified and recommended in the home?
       i. Who makes these decisions and when?

Quality Control

Now for a few questions about quality control, to your knowledge:

1. What quality control procedures are in place?
    a. How were they devised?
    b. Who implements your quality control processes?
    c. How are they enforced?

2. How frequently are there quality issues?
    a. What types of issues are most common?

3. How are persistent quality issues addressed? (e.g., contractors or staff)

Program Administration

To make sure I understand how the administration side of the program works, I'd like to ask a few questions…

1. Are you leveraging funds from other sources within participating homes? (i.e. Is funding divided?)
    a. If so, how is funding divided? Can a measure or home be funded by two sources? How are ARRA funds spent?
    b. How does this leveraging of funds effect program activities?
    c. How does it affect program administration?

2. Do you coordinate with LEAN, or is this done at the PA level?
    a. From your perspective, what are the benefits and drawbacks of the LEAN coordination?
    b. Are there elements of the current program that would benefit from increased coordination?
    c. Are there elements that would benefit from separate PA program strategies?
    d. Does the LEAN coordination increase or decrease your time spent administering the program?
    e. What, if anything, would you like to see changed in regards to LEAN involvement in the program?

3. Have you found implementation differences between the PAs?
    a. Services provided
    b. Funding levels
    c. Procedural requirements

4. Have you found differences in the data requirements between the PAs?

5. Is your agency paid by the PAs in a timely manner?

Participation Data

Now, I'd like to ask you a few questions concerning participation data.

1. How are audit data collected?
    a. Internet
    b. Electronic i.e., software
    c. Hard copy
2. What portions of the data are available electronically?
3. Who enters the data? How often?
4. Is there a QC process on the data? If so, what is it?
5. To your knowledge, is actual home energy consumption data entered into the software for calibration?
6. Does the software provide good recommendations?
7. What types of analysis are conducted? E.g., Questions asked, Metrics, etc.
    a. Does the data collected provide the necessary information of impact analysis, cost/benefit analysis etc.?
    b. Are relational databases used in your analysis?
        i. Do they facilitate efficient storage and querying?
    c. Are the findings from data analysis used to modify Program implementation?
        i. If so, how? If not, why not?
8. How are the audit and reporting data stored? For how long?
    a. Electronic (elaborate)
    b. Hard copy

Impact of ARRA

9. Has the American Recovery and Reinvestment Act of 2009 (ARRA) had any impact on the design or delivery of the Program?
    a. What specifically has changed?
    b. How has this impacted your program in 2010?
10. Has ARRA funding changed the types or depth of services now available to customers?
11. What are the long-term impacts of ARRA, if any, on the Program?

Other

12. We will also be interviewing other stakeholders as part of this evaluation. Is there anything we should be sure to ask them about?

13. Any other comments or areas we did not cover on which you would like to add your views?

14. Throughout the interview process has anyone else come to mind as someone who should be added to our list of contacts to be interviewed?

In addition to interviewing Community Action Program (CAP) agency staff, we will also be speaking with other low income stakeholders including program administrators, those that developed marketing materials, conducted audits, installed program measures, and handled and reported program data.

Who is the best person at [this CAP agency] to provide us with the database, forms, and reports needed for this evaluation?

Name	
Title	
Phone/Email	

Thank you for your time today. If you think of anything else you would like to discuss, please do not hesitate to give me a call or email.

Appendix C: Data Questionnaire

Part I: Form collection

This section pertains to the physical forms that lead CAPs are using to collect data about the low income participant and the measures being implemented. Please specify the PA if answers vary for different PAs you work with.

- Please provide all forms for collecting on-site data. If the data is captured electronically through PDAs (palm computer) please let us know what audit software program is being used, and provide the vendor's contact information.
- Do the forms or data collection approaches vary across other CAPs you work with?
- Are the forms distributed to the PAs or do the CAPs retain all forms?
- What data do you distribute to your PAs (i.e. which data fields) and how is it delivered/shared with them?
- What information is collected on the form but NOT shared?

Part II: Data collection

This section pertains to entering the data from the physical forms or electronic-PDA audits into a central database.

- Do you maintain a central database for collected form data, or if not, how is the onsite data compiled electronically?
- What type of database or software is used (Oracle, SQL Server, MS Access, db2, other)?
- Can you please explain the process for moving the form data into a central database?
    - What software is used?
    - Who does the data entry?
- Do the databases facilitate efficient data storage and querying? If not, please explain any inefficiencies in data storage and querying.

- Are older program data archived? If yes, how often?

Part III: Reporting

This section pertains to the data that has been aggregated to create summaries for analysis or reporting.

- How often are reports generated (for internal use and reporting to the PAs)?
- How much time does it take to generate reports or query data? Seconds, minutes, hours, days?
- What processes exist to analyze the data?
- What metrics are examined and considered important?
- Does the data collected provide the necessary information for the program impact analysis, such as a cost/benefit analysis?
- Are findings from data analysis used to modify the program implementation?
- Please provide examples of key monthly and annual reports.

Part IV: Savings Estimates

This section refers to unit energy savings (kW, kWh, and/or therms) that are used for assessing program impacts on energy demand.

- Please include all savings algorithms and assumptions used to calculate energy savings.
- Please provide sources for values used.

Appendix D: Data Request

The following data request was submitted by the Cadmus Team in May 2010.

Request Number	Data	Detail	Priority
Research and DSM Tracking Data			
1	Recent DSM Tracking Data - Energy Efficiency	Data by fuel, sector, program, building type, end use, participant, measure type, efficiency level. We are seeking the most granular level available across all residential and low income programs going back to 2005. Should include customer contact information. For participants, we are also looking for a "key" variable such as the electric and/or gas account number such that we can tie billing data to participant data. Overall, a relational database form would be ideal to allow us to do summarization independently of the utilities and implementers, although "flat files" (e.g., Excel) also work.	High
2	Previous market research studies (All sectors)	Any relevant studies regarding equipment saturation, penetration, and market share; customer attitudes/awareness towards energy efficiency; etc. Including previous evaluations of programs, going back up to five years.	High
Sampling and Future Billing Analyses			
3	Premise / Account billing data	Data dump of all residential customer bills (electric and gas) base of customers, rate class, monthly consumption, read dates. Having both the premise ID, and all account numbers associated with that idea over the (2-3) years of history available, is crucial to implementing our proposed evaluation approach. Need both single family and multifamily, so if multifamily are tracked as commercial also need these data.	High
4	Account information	Including name, address, phone, home type (if available), low income classification (if available)	High
Baseline and Forecast Data			
5	Base year (2009) aggregate sales and Customers	Weather-normalized actual sales and customers by building type, and income categorization, as available.	Medium
7	Sales Forecasts	Up to 20-years of weather-normalized retail electric and/or gas sales forecasts for the residential sectors. If forecasts by building type are available, that would be even better. Forecast needs to be what sales would be absent future DSM impacts to avoid double-counting in the DSM potential analyses.	Medium
8	Customer Forecasts	Up to 20-years of customer forecasts for the same dimensions as the sales forecasts.	Medium
9	System and Sector load profiles	Historic hourly system (for electric) or monthly system (for gas) and sector/segment load profiles for as many years as available	Medium
10	System Peak Forecasts	Projected system peak MW (or therms), by sector if available	Low

Economic Data			
12	Cost-effectiveness assumptions	Discount rates, line losses, inflation rates, etc.	Low
13	Avoided Costs	Hourly electric avoided costs or monthly gas avoided costs, as well as capacity benefits;	Low

Appendix E. Participant Survey

A. Introduction

Hello, my name is _____ and I am calling from Opinion Dynamics Corporation on behalf of <PA NAME> and <CAP NAME>/[IF CAP NAME=BLANK] your local community action agency about the energy-saving services they offer to households like yours. We are talking with people who recently received energy-saving services to get your opinion of the services you received, which could help improve the program so that people save money on their energy bills.

[READ MAX OF 3 MEASURE TYPES FOR A1]

You may have [had] [IF ANY INSULATION=1] insulation added to your home's walls or ceiling, [IF REFRIGERATOR=1] had a refrigerator replaced, [IF HEATINGSYSTEM=1] your heating system fixed or replaced, [IF WATERHEATING=1] your water heating system fixed or replaced, [IF THERMOSTAT=1] your thermostat replaced, [IF WINDOWS=1] your windows fixed or replaced, [IF FREEZER=1] your freezer replaced, [IF AIRDUCTSEALING=1] your air ducts sealed for air leaks, [IF AERATORSSHOWERHEADS=1] water saving devices put on your faucets or shower, [READ ALL] [or] received energy saving light bulbs. Do you remember receiving any of these services through a local community agency program during the past year or so?

The program may have been working with your landlord or maintenance staff to make these changes. Do you remember receiving these energy-saving services and having work done on your home/apartment through <PA NAME> [IF CAP<>BLANK, READ "or <CAP NAME>"] in the past year or so?

For quality control purposes this call may be monitored or recorded.

[IF NEEDED: Your responses will not be shared with anyone in any way that identifies you, we'd just like to ask some questions about your opinion of the services you received to help improve the program. The survey should take around 15 minutes and the information you provide will help the sponsors improve their programs and services.]

[CONTINUE WITH CORRECT CONTACT]

B. Program Awareness

First, I'm going to ask you about how you heard about the services provided by the program.

B1. How did you first learn about the program? [DO NOT PROBE]

1. (Fuel Assistance)
2. (CAP agency called them)
3. (They called their utility for another reason, and PA referred them to the program)
4. (Word of mouth – friend, family, neighbor, coworker, etc)
5. (Utility mailing or marketing materials)
6. (Government Agency)
7. (Religious institution)

00. (Other, [SPECIFY])
98. (Don't know)
99. (Refused)

[IF B1 = 1 or 2]
B1a. What was the name of the agency where you first heard about the program from? [OPEN END]

[IF B1=3]
B1b. What was the reason you first called <PA NAME>? [OPEN END]

B2. Did you know that the program is designed and operated by <PA NAME>?

1. (Yes)
2. (No)

98. (Don't know)
99. (Refused)

J. MASS SAVE Awareness

J1. Have you ever seen or heard the term "Mass Save"?

1. (Yes)
2. (No) [SKIP TO NEXT SECTION]

98. (Don't know) [SKIP TO NEXT SECTION]
99. (Refused) [SKIP TO NEXT SECTION]

J2. Could you tell me what "Mass Save" means to you? [OPEN END]

C. Audit Process

Now, I want to ask you a few questions about when the agency staff person came to your home and looked for ways to save energy and money.

[PROGRAMMER: REPEAT THIS PROMPT ON SCREENS C1-C3a AND C4-C6]
[INTERVIEWER NOTE: If at any point through this section the customer asks why they didn't receive any/all of the free products, read: "Please understand, that because everyone's home is different in age, layout and need, the agency staff person only installed products and offered suggestions specific to your home."]

C1. During the visit, did the agency staff person conduct a blower door test where they connected a large fan to one of your outside doors to test for air leaks?
1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[IF FUEL=GAS]
C2. During the visit, did the agency staff person seal air leaks throughout your home?
1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

C3. Did the agency staff person give you or install any compact fluorescent light bulbs or CFLs? [IF NEEDED: These are "energy saving" light bulbs that usually do not look like regular bulbs. The most common type of CFL is made with a glass tube bent into a spiral, resembling soft-serve ice cream, and it fits in a regular light bulb socket.]
1. (Yes)
2. (No) [SKIP TO C4]
98. (Don't know) [SKIP TO C4]
99. (Refused) [SKIP TO C4]

C3a. Did the agency staff install these new light bulbs directly into light fixtures or did they leave them with you? [DO NOT READ LIST – CHOOSE APPROPRIATE ANSWER BASED ON RESPONSE]:
1. The new light bulbs were installed by the agency staff directly in the light fixture
2. The agency staff left behind new lights for me to install
3. (The agency installed some CFLs and left me some more)
98. (Don't know)
99. (Refused)

[IF C3a=2 or 3]
C3aa. Did you install all, some, or none of the CFLs that were left by the agency staff?
1. (I installed all of them)
2. (I installed some of them)
3. (I installed none of them)
98. (Don't know)
99. (Refused)

C3b. How would you rate your new light bulbs? Would you say they are [READ LIST]:
1. Excellent
2. Good
3. Fair
4. Poor
98. (Don't know) [SKIP TO C3e]
99. (Refused) [SKIP TO C3e]

[IF C3b=1 or 2]

C3c. Why did you give the light bulbs a(n) <RESPONSE FROM C3b> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES. PROBE WITH "WHAT DO YOU LIKE ABOUT THE NEW LIGHTBULBS?"] [MULTIPLE RESP]

1. (They lower the electric bill/save money)
2. (They were free)
3. (They save energy/electricity)
4. (They last longer/I won't have to change the bulb as frequently)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[IF C3b=3 or 4]

C3d. Why did you give the light bulbs a <RESPONSE FROM C3b> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES. PROBE WITH "WHAT DO YOU DISLIKE ABOUT THE NEW LIGHTBULBS?"] [MULTIPLE RESP]

1 (They take too long to light up)
2 (The light is too bright)
3 (The light is too dim)
4 (They flicker)
5 (They don't look nice in my fixtures)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

C3e. Did the agency staff person take your old light bulbs or were you able to keep your old bulbs?

1. Agency staff person took old light bulbs
2. I was able to keep old light bulbs
3. (Agency staff person took some, and I kept some)
98. (Don't know)
99. (Refused)

[IF C3aa = 3 SKIP TO C4]

C3f. Are all of the CFLs you received from the agency staff still installed?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

C4. During the visit, did the agency staff person install any faucet aerators? [IF NEEDED: These screw onto your water faucets to reduce the amount of water that flows through. They may have replaced old ones in your kitchen or bathroom sinks. Did you receive any of these?]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

C5. During the visit, did the agency staff person install any low-flow showerheads? [IF NEEDED: These screw onto your showerhead to reduce the amount of water that flows through. They may have replaced your old showerhead in your bathroom. Did you receive any of these?]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[IF FUEL<>GAS, SKIP TO NEXT SECTION]

C6. During the visit, did the agency staff person install a programmable thermostat? [IF NEEDED: This type of electronic thermostat lets you set different temperature settings for different times of the day. Did you receive one of these?]

1. (Yes)
2. (No) [SKIP TO D1]
98. (Don't know) [SKIP TO D1]
99. (Refused) [SKIP TO D1]

C6a. Do you use the programmable thermostat to automatically lower temperatures at night or during the day when no one is home?

1. (Yes) [SKIP TO C6c]
2. (No)
98. (Don't know) [SKIP TO D1]
99. (Refused) [SKIP TO D1]

C6B. Why don't you use the programmable thermostat to automatically lower temperatures at night or during the day when no one is home? ***[OPEN END]***

[IF C6a<>1, SKIP]

C6c. Before receiving the programmable thermostat, were you making these temperature changes manually with your old thermostat?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

D. Weatherization Process

[IF AIR DUCT SEALING=1]

D1. Our records show that the agency staff person *SEALED THE HEATING AND COOLING DUCTS IN YOUR HOME, IS THAT CORRECT?*

1. (Yes) [GEN <V_DUCT>=1]
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF REFRIGERATOR=1]

D2. Our records show that you received a refrigerator through the program, is that correct?

1. (Yes) [GEN <V_REF>=1]
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF FREEZER=1]

D2aa. Our records show that you received a freezer through the program, is that correct?

1. (Yes) [GEN <V_FREEZE>=1]
2. (No)
98. (Don't know)
99. (Refused)

[IF <V_REF> <>1 AND <F_FREEZE> <>1, SKIP]

D2a. How would you rate the new <refrigerator> (and) <freezer> that was/were installed in your home? Would you say it was [READ LIST]:

1. Excellent
2. Good
3. Fair
4. Poor
98. (Don't know) [SKIP TO D3]
99. (Refused) [SKIP TO D3]

[IF D2a=1 or2]

D2b. Why did you give it a(n) <RESPONSE FROM D2a> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU LIKE ABOUT THE NEW APPLIANCE?"] [MULTIPLE RESP]

01. (It lowers the electric bill/saves money)
02. (It was free)
03. (It works)
04. (It saves energy/electricity)
05. (My old refrigerator stopped working/wasn't working well)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[IF D2a=3 or4]

D2c. Why did you give it a <RESPONSE FROM D2a> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU DISLIKE ABOUT THE NEW APPLIANCE?"] [MULTIPLE RESP]

01. (I don't like the way it looks)
02. (The refrigerator or freezer is too small)
03. (The refrigerator or freezer is too large)
04. (It doesn't keep the food at the right temperature)
05. (It stopped working)
00. (Other [SPECIFY])
98. (Don't know)
99. (Other)

[IF <ANY INSULATION>=1, IF NOT SKIP TO D4]

D3. Our records show that you had insulation installed in your <INSULATION LOCATION FROM SAMPLE>, is that correct? [IF NEEDED: Insulation is fluffy material put in your attic or walls to keep your home warmer in the winter and cooler in the summer.]

1. (Yes) [GEN <V_INSUL>=1]
2. (No) [SKIP TO D4]
3. (No, the insulation was installed in a different location [SPECIFY])
98. (Don't know) [SKIP TO D4]
99. (Refused) [SKIP TO D4]

D3a. How would you rate the new insulation that was installed in your home? Would you say it is [READ LIST]:

1. Excellent
2. Good
3. Fair
4. Poor
98. (Don't know) [SKIP TO D4]
99. (Refused) [SKIP TO D4]

D3b. Do you notice a difference in the way your home feels? If yes, how so? [OPEN END]

96. No/Nothing
98. (Don't know)
99. (Refused)

[IF <WINDOWS>=1, IF NOT SKIP TO D5]

D4. Our records show that you had work done on some of the windows in your home as a result of the program, is that correct?

1. (Yes) [GEN <V_WIND>=1]
2. (No) [SKIP TO D5]
98. (Don't know) [SKIP TO D5]
99. (Refused) [SKIP TO D5]

D4a. Can you tell me whether they replaced windows or repaired existing windows?

1. (Replaced)
2. (Repaired)
3. (Replaced some and repaired some)
98. (Don't know) [SKIP TO D5]
99. (Refused) [SKIP TO D5]

D4b. Was the glass broken or cracked in any of the windows they worked on?
1. (Yes, glass was broken)
2. (No, glass was intact)
98. (Don't know/don't remember)
99. (Refused)

D4c. How would you rate [IF D4a=1 "the new windows"; IF D4a=2 "the work that was done to repair your windows"]? Would you say it/they was/are [READ LIST]:
1. Excellent
2. Good
3. Fair
4. Poor
98 (Don't know) [SKIP TO D5]
99 (Refused) [SKIP TO D5]

[IF D4c=1 or 2]
D4d. Why did you give it a(n) <RESPONSE FROM D4c> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU LIKE ABOUT THE NEW WINDOWS/WINDOW REPAIR?"] [MULTIPLE RESP]

1. (They lower the electric bill/save money)
2. (They were free)
3. (They save energy/electricity)
4. (I like the way they look)
5. (The house is more comfortable)
6. (The house is more secure/safer)
7. (The contractor did a nice job)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[IF D4c=3 or4]
D4e. Why did you give it a <RESPONSE FROM D4c> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU DISLIKE ABOUT THE NEW WINDOWS/WINDOW REPAIR?"] [MULTIPLE RESP]

1. (I don't like the way the new window/repaired window looks)
2. (I don't like the way the new window works (opens/does not open, etc.))
3. (I didn't need new windows or repairs)
4. (It doesn't help keep the house more comfortable)
5. (The contractor didn't finish)
6. (The contractor left a mess)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[IF HEATING SYSTEM=1, IF NOT SKIP TO D6]

D5. Our records show that you had work done on the heating system in your home, is that correct?
1. (Yes) [GEN <V_HVAC>=1]
2. (No) [SKIP TO D6]
98. (Don't know) [SKIP TO D6]
99. (Refused) [SKIP TO D6]

D5a. Can you tell me whether they replaced the heating system or repaired the existing heating system?
1. (Replaced)
2. (Repaired)
98. (Don't know) [SKIP TO D6]
99. (Refused) [SKIP TO D6]

D5b. How would you rate [IF D5a=1 "the new heating system"; IF D5a=2 "the work that was done to repair your heating system"]? Would you say it was/is [READ LIST]:
1. Excellent
2. Good
3. Fair
4. Poor
98 (Don't know) [SKIP TO D6]
99 (Refused) [SKIP TO D6]

[IF D5b=1 or 2]
D5c. Why did you give it a(n) <RESPONSE FROM D5b> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU LIKE ABOUT THE NEW HEATING SYSTEM/HEATING SYSTEM REPAIR?"] [MULTIPLE RESP]

1. (It lowers the heating fuel bill/saves money)
2. (It was free)
3. (It saves energy/electricity/oil/gas)
4. (The house is more comfortable)
5. (The contractor did a nice job)
6. (It keeps the house warmer)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[IF D5b=3 or4]
D5d. Why did you give it a <RESPONSE FROM D5b> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU DISLIKE ABOUT THE NEW HEATING SYSTEM/HEATING SYSTEM REPAIR?"] [MULTIPLE RESP]

1. (I liked my old heating system better)
2. (I don't like the way the new heating system works)
3. (I didn't need a new heating system or repairs)
4. (It doesn't help keep the house more comfortable)
5. (The contractor didn't finish)
6. (The contractor left a mess)
00. (Other [SPECIFY])

98. (Don't know)
99. (Refused)

[IF WATER HEATING=1, IF NOT SKIP TO D7]

D6. Our records show that you had work done on the water heater in your home, is that correct?
1. (Yes) [GEN <V_H2O>=1]
2. (No) [SKIP TO D7]
98. (Don't know) [SKIP TO D7]
99. (Refused) [SKIP TO D7]

D6a. Can you tell me whether they replaced the water heater or repaired the existing water heater?
1. (Replaced)
2. (Repaired)
98. (Don't know/don't remember) [SKIP TO D7]
99. (Refused) [SKIP TO D7]

D6b. How would you rate [IF D6a=1 "the new water heater"; IF D6a=2 "the work that was done to repair your water heater"]? Would you say it was/is [READ LIST]:
1. Excellent
2. Good
3. Fair
4. Poor
98 (Don't know) [SKIP TO D7]
99 (Refused) [SKIP TO D7]

[IF D6b=1 or 2]

D6c. Why did you give it a(n) <RESPONSE FROM D6b> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU LIKE ABOUT THE NEW WATER HEATER/WATER HEATER REPAIR?"] [MULTIPLE RESP]

1. (It saves energy/electricity/gas/oil)
2. (It lowers the electric/oil/gas bill)
3. (It was free)
4. (The house is more comfortable)
5. (The contractor did a nice job)
6. (I needed a new water heater or water heater repairs anyway)
7. (It keeps the water warmer)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[IF D6b=3 or 4]

D6c. Why did you give it a <RESPONSE FROM D6b> rating? [DO NOT READ, RECORD FIRST THREE RESPONSES, PROBE WITH "WHAT DO YOU DISLIKE ABOUT THE NEW WATER HEATER/WATER HEATER REPAIR?"] [MULTIPLE RESP]

1. (I liked my old water heater better)
2. (I don't like the way the new water heater works)

3. (I didn't need a new water heater or repairs)
4. (It doesn't help keep the water warmer)
5. (The contractor didn't finish)
6. (The contractor left a mess)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

D7. Did you receive any additional products through the program that I have not already mentioned? [PROBE IF NEEDED]

01. (Insulation)
02. (Duct Sealing)
03. (Refrigerator)
04. (Windows)
05. (Heating System)
06. (Water Heater)
00. (Other [Specify])
96. No/Nothing
98. (Don't know)
99. (Refused)

[IF D7=1]

D7a. Do you remember where the insulation was installed? [MULTIPLE RESP] (PROBE IF NEEDED)

1. (Attic)
2. (Basement)
3. (Duct)
4. (Wall)
00. (Other [Specify])
98. (Don't know)
99. (Refused)

EB. Education & Behavior Change

EB1. When the agency staff person was at your house, did you walk around with them when they were taking measurements or ask about what tests they were conducting?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

EB2. When the agency staff person was at your house, did they review any materials or information with you about changes you could make to save energy in your home?

1. (Yes)
2. (No) [SKIP TO EB6]
98. (Don't know) [SKIP TO EB6]
99. (Refused) [SKIP TO EB6]

EB3. Do you remember any tips for ways to save energy? If yes, what are they? [OPEN END]
96. No/Nothing
98. (Don't know)
99. (Refused)

EB4. Have you changed any habits in an effort to follow through on any of the tips that you discussed with the agency staff person? If so, what have you changed? [OPEN END]
96. No/Nothing
98. (Don't know)
99. (Refused)

EB5. How would you rate the quality of the information provided to you about how to save energy? Would you say it was [READ LIST]:
1. Excellent
2. Good
3. Fair
4. Poor
98. (Don't Know)
99. (Refused)

[IF EB5= 3 OR 4]

EB5A. ***CAN YOU EXPLAIN*** why you are not completely satisfied with the quality of the information provided to you about how to save energy? ***[OPEN END]***
98. (Don't know)
99. (Refused)

EB6. Have you shared what you may have learned or have you recommended the program to anyone such as a family member, friend or neighbor?
1. (Yes)
2. (No)
96. (Not applicable, did not learn anything)
98. (Don't know)
99. (Refused)

F. Program Satisfaction

Now I want to talk to you about your satisfaction with the program.

F1. How easy did you find the process of signing up for the program? Was it…[READ LIST]

1. Very easy
2. Somewhat easy
3. Not very easy
4. Not at all easy
6 . (Not applicable, did not take care of signing up)
98. (Don't Know)
99. (Refused)

[IF F1= 3 OR 4]

F1a. Can YOU EXPLAIN why you felt the program was <F1 RESPONSE> to sign up for? [OPEN END]

98. (Don't know)
99. (Refused)

F2. Approximately how many months did you wait from when you first signed up, to when the agency staff person scheduled the visit to your home? [ENTER MONTHS]

_____

0. (Less than one month)
96. (Was not on a waitlist)
98. (Don't know)
99. (Refused)

[SKIP IF F2= 0, 96, 98, 99]

F2a. How satisfied were you with the amount of time you spent waiting for services? Were you… [READ LIST]

1. Very satisfied
2. Somewhat satisfied
3. Not very satisfied
4. Not at all satisfied
96. (Not applicable)
98. (Don't know)
99. (Refused) [SKIP TO F3]

[IF F2A= 3 OR 4]

F2B. CAN YOU EXPLAIN why you are dissatisfied with the amount of time you spent waiting? [OPEN END]

F3. Do you own or rent your home?

1. Own [SKIP TO F5]
2. Rent
00. (Other [Specify]) [SKIP TO F5]
98. (Don't know) [SKIP TO F5]
99. (Refused) [SKIP TO F5]

F4c. Did the agency staff get approval from your landlord for you or did you take care of it?

1. Agency got approval for me
2. I took care of it
96. (Not applicable)
98. (Don't know/don't remember)
99. (Refused)

[IF F4c=1 OR 96, SKIP TO F5]

F4. How easy was it for you to get approval from the property-owner or landlord to make home improvements recommended by the agency staff person? Would you say it was [READ LIST]:

1. Very easy [SKIP TO F5]
2. Somewhat easy [SKIP TO F5]
3. Not very easy
4. Not at all easy

96. (Not applicable) [SKIP TO F5]
98. (Don't Know) [SKIP TO F5]
99. (Refused) [SKIP TO F5]

[IF F4=3 OR 4]

F4A. WHAT PROBLEMS DID YOU EXPERIENCE GETTING LANDLORD APPROVAL TO MAKE THE home improvements recommended by agency staff person? [OPEN END]

[IF F4=3 OR 4]

F4b. What would have made it easier for you to get landlord permission? [OPEN END]

F5. When working with the agency staff, how courteous and respectful were they towards you? Would you say they were [READ LIST]:

1. Very courteous
2. Somewhat courteous
3. Not very courteous
4. Not at all courteous
98. (Don't know/don't remember)
99. (Refused)

F6. Before the agency staff came to your home to perform work, did you understand what they were going to do in your home?

1. (Yes)
2. (No)

98 (Don't know)
99 (Refused)

[ASK F7-F7B IF ANY <V_INSUL>=1, <V_DUCT>=1, <V_HVAC>=1, <V_REF>=1, <V_FREEZE>=1, <V_H2O>=1, <V_WIND>=1, OR (D7=1-6)]

Now, please think about the contractor who came to your home after the first visit by the agency staff person and worked on the energy-efficient improvements in your home.

F7. When working with the contractor, how courteous and respectful were they towards you and your home? Would you say they were [READ LIST. PROBE IF NEEDED: "For example, did they clean up after themselves?"]:

1. Very courteous
2. Somewhat courteous
3. Not very courteous
4. Not at all courteous
98. (Don't know/don't remember)
99. (Refused)

F7a. How would you rate the work that was done by the contractor? Would you say their work was [READ LIST]: [PROBE WITH "DID YOU FEEL THE WORK WAS COMPLETE? DID YOU FEEL THE WORK WAS HIGH QUALITY?"]

1. Excellent
2. Good
3. Fair
4. Poor
98. (Don't Know)
99. (Refused)

[ASK IF F7A=3 OR 4]
F7B. WHAT PROBLEMS DID YOU EXPERIENCE WITH THE contractor? [OPEN END]

F11. Did having these changes that the contractor made to your home create any problems for you?

00	(Yes [SPECIFY])
96	(No) [SKIP TO F12]
98	(Don't know) [SKIP TO F12]
99	(Refused) [SKIP TO F12]

F11a. Was/were the problem(s) resolved to your satisfaction?

1	(Yes)
2	(No)
98	(Don't know)
99	(Refused)

[IF F11a=2]
F11b. How would you have liked them to resolve this problem? [OPEN END]

F12. In thinking of the program overall—setting up the appointments, the actual visits of the energy agency staff and the contractors, how would you rate the program as a whole experience? Would you say it was [READ LIST]:

1. Excellent
2. Good
3. Fair
4. Poor
98. (Don't Know)
99. (Refused)

[ASK IF F12=3 OR 4]
F12A. CAN YOU EXPLAIN *why you are not completely satisfied with your experience with the program?* [OPEN END]

F13. Do you have any suggestions for ways the program could be improved? [OPEN END]

96. No/Nothing
98. (Don't know)
99. (Refused)

NE: Non-Energy Benefits

Since receiving these services, you may have noticed additional changes in your home.

NE1. Since all of the work in your home was completed, would you say that your home is [READ LIST]:
1 More comfortable to live in
2 Just about as comfortable to live in as it was before the energy efficiency improvements, or
3 Less comfortable to live in
98 (Don't know)
99 (Refused)

NE2. Since all of the work was completed, would you say that your heating fuel bills have been [READ LIST]:
1 More affordable
2 About the same, or
3 Less affordable
96. (Not applicable/ energy bills are included in rent/ does not pay the energy bills themselves)
98. (Don't know)
99. (Refused)

NE3. What were the biggest benefits you got from having the work done on your home? [DO NOT READ LIST, MARK ALL THAT APPLY UP TO 3]
1 (fewer drafts; home feels more comfortable)
2 (quieter, less noise from outside)
3 (quieter, less noise from appliances or heating and cooling equipment)
4 (improved health, general)
5 (improved health, asthma or other chronic health conditions)
6 (improved health, fewer colds and flus)
7 (improved safety of the home)
8 (improved reliability of heating and cooling equipment or appliances)
9 (more affordable energy bills)
96 (No benefits)
98 (Don't know/don't remember)
99 (Refused)

[ASK NE4, IF <V_WIND> OR <V_INSUL> = 1 OR (D7= 1 OR 4)]

NE4. Since having the work done, do you hear less noise, more noise, or no change in the amount of noise from outside your home??
1. (Less noise [Positive change])
2. (More noise [Negative Change])

3. (No Change)
98. (Don't know)
99. (Refused)

[ASK NE5-7, IF ANY <V_WIND>, <V_INSUL>, <V_HVAC>, OR <V_DUCT>= 1 OR (D7=1, 2, 4 OR 5)]

NE5. Since having the work done, Is your health better, worse, or the same?

1. (Health is better [Positive change])
2. (Health is worse [Negative change])
3. (No Change)
98. (Don't know)
99. (Refused)

NE6. Since having the work done, has the frequency or intensity of chronic health conditions such as asthma gotten better or worse?

1. (Have felt better [Positive change])
2. (Have felt worse [Negative change])
3. (No Change)
96. (Not applicable, don't have chronic problems)
98. (Don't know)
99. (Refused)

NE7. Since having the work done, have you noticed any changes in the frequency or intensity of other illnesses such as colds or flus? Is it is a positive change or a negative change?

1. Yes, Positive change
2. (Other illnesses are less frequent/less intense [Positive change])
3. (Other illnesses are more frequent/more intense [Negative change])
4. (No Change)
96. (Not applicable, don't have chronic problems)
98. (Don't know)
99. (Refused)

[ASK NE8 IF [<V_HVAC>, <V_REF>, <V_H20>, <V_WIND>, <V_INSUL>=1, OR (D7=1, 3, 4, 5 OR 6)] AND F3=1]

NE8. Do you think the work that was done on your home has increased, decreased or had no change on the value of your home?

1. (Value has increased [Positive change])
2. (Value has decreased [Negative Change])

3. (No Change)
98. (Don't know)
99. (Refused)

[ASK NE9, IF ANY <V_HVAC>, <V_REF>, V_FREEZE>, <V_H20>, <V_WIND>, <V_INSUL>, D1 = 1, OR (D7=1, 3, 4, 5 OR 6)]

NE9. Since having the work done, have you noticed any other changes that I have not already mentioned?

1. (quieter, less noise from appliances or heating and cooling equipment)
2. (improved health, fewer colds and flus)
3. (improved safety of the home)
4. (improved reliability of heating and cooling equipment or appliances)
5. (fewer bill related calls to the utility)
96. No/Nothing
98. (Don't know)
99. (Refused)

H. DEMOGRAPHICS

Lastly I have just a few questions about you and your home. Your responses will not be shared with anyone in any way that identifies you.

H1. How long have you lived at your current residence? [ENTER NUMBER OF YEARS] _____

0. (Less than a year)
98. (Don't know)
99. (Refused)

H2. In what year were you born? [NUMERIC OPEN END; 1890-1991] _____

99. (Refused)

H3. How many people currently live in your house all year? [ENTER NUMBER OF PEOPLE] _____

98. (Don't know) [SKIP TO H5]
99. (Refused) [SKIP TO H5]

H4. Of the <H3 RESPONSE> people who live in your house, how many are under 18 years of age? [ENTER NUMBER OF PEOPLE] _____

98. (Don't know)
99. (Refused)

H5. What is the highest level of education you have completed? [PROBE IF NEEDED]

1. (Less than high school)
2. (High school graduate or equivalent (e.g., GED))
3. (Attended some college (includes junior/community college))

4. (Bachelors degree)
5. (Advanced degree)
00. (Other, [Specify])
98. (Don't know)
99. (Refused)

H6. Do you consider yourself to be…?
1. White
2. Black or African American
3. American Indian, Native Hawaiian, Pacific Islander or Alaska Native
4. Asian
5. Hispanic or Latino
6. Mixed Race or
00. Other [Specify]
98. (Don't know)
99. (Refused)

H7. [RECORD GENDER. DO NOT ASK]
1. (Male)
2. (Female)

I. HOUSEHOLD CHARACTERISTICS

[INTERVIEWER NOTE: If a respondent cannot answer a question, do not spend a lot of time probing for answers. Keep moving forward.]

I1. Which of the following best describes your home? [READ RESPONSE CATEGORIES]
1. Single family home
2. Two-family duplex or flat
3. Triple decker
4. Low-rise (3 stories or less) multi-family building or attached row or townhouse
5. Hi-rise multi-family building
6. Mobile home
7. Cottage or cabin
00. (Other, [Specify])
98. (Don't know)
99. (Refused)

I2. When was your home originally built? Would you say it was..?
1. Before 1930
2. between 1930 and 1939
3. between 1940 and 1949
4. between 1950 and 1959
5. between 1960 and 1969
6. between 1970 and 1979
7. between 1980 and 1989
8. between 1990 and 1999
9. between 2000 and 2005
10. or between 2006 and 2010
98. (Don't know)
99. (Refused)

[ASK IF I1=3, 4, OR 5]

I3. And approximately how many units are in your building? [PROMPT RESPONSE CATEGORIES IF NECESSARY]
1. (2-4 units)
2. (5 or more units)
98. (Don't know)
99. (Refused)

I4. Approximately, how many square feet is your home? Would you say..?
1. Less than 1,400
2. 1,400 to less than 2,000
3. 2,000 to less than 2,500
4. 2,500 to less than 3,500
5. 3,500 to less than 4,000
6. 4,000 to less than 5,000
7. 5,000 or more
98. (Don't know)
99. (Refused)

I6. How is your home heated? [READ LIST]
1. Natural gas
2. Oil
3. Electricity
00. Other [SPECIFY] _____
98. (Don't Know)
99. (Refused)

[SKIP IF I1= 1, 6, OR 7]

I7. Does the main heating system serve only this residence or does it serve more than one residence?
1. (Only this residence)
2. (More than one residence)
98. (Don't know)
99. (Refused)

I10. How is your water heated? [READ LIST]
1. Natural gas
2. Oil
3. Electricity
00. Other [SPECIFY] _____
98. (Don't Know)
99. (Refused)

[SKIP IF I1= 1, 6, OR 7]

I11. Does your water heater, or the source of your hot water, serve only this residence or does it serve more than one residence?
1. (Only this residence)
2. (More than one residence)
3. (This residence has no hot water)
98. (Don't know)
99. (Refused)

Thank you very much again for your time. Have a good day.

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