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OAK RIDGE
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SUGGESTED RECORD-KEEPING PROCEDURES FOR DDOE ENERGY PROGRAMS

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EXECUTIVE SUMMARY

BACKGROUND

Sixteen different programs designed to increase energy efficiency and reduce the energy cost burden for District of Columbia residents, businesses, and non-profit organizations are currently provided by the District Department of the Environment's (DDOE's) Energy Office. In the spring of 2008, DDOE asked Oak Ridge National Laboratory (ORNL) to provide assistance in its ongoing efforts to track the progress of those programs. Effective record-keeping can provide information to help managers improve their programs, be very useful in preparing quarterly reports documenting program achievements, and facilitate the performance of periodic evaluations that measure how well the various programs are achieving their objectives.

Each of DDOE's 16 energy programs has an identification number by which it is commonly referred. The 16 programs can be grouped into three broad categories: (1) Demonstration and Promotion Programs; (2) Energy Efficiency Improvement Programs; and (3) Low-Income Programs.

Four programs are classified as Demonstration and Promotion. They are:

- B-4. Renewable Energy Demonstration Program;
- B-5. Distributed Generation and Net Metering;
- C-5. Home Energy Rating System Program; and
- G-5 Energy Awareness Campaign

The two Energy Efficiency Improvement Programs are:

- C-3. Non-Profit Energy Efficiency Program; and
- C-13. Small Business Energy Efficiency Program

The majority of DDOE's energy programs target the Low Income sector. The 10 programs that fall into this category are:

- D-1. LIHEAP Extension and Education Program;
- D-2. Residential Aid Discount (RAD) Expansion Program;
- D-3. Residential Aid Discount (RAD) Arrearages Retirement and Education Program;
- D-4. Weatherization Plus Program;
- D-5. Low-Income Appliances Program;
- D-6. Weatherization Rehabilitation Program;
- E-1. Affordable Housing Energy Efficiency Rebate Program;
- E-2. Weatherization Rehabilitation and Asset Preservation (WRAP) Program;
- G-1. Residential Essential Service (RES) Expansion and Awareness Campaign; and
- G-2. Heating System Repair, Replacement and Tune-up

METHODS

The first major task in this study was to review existing documents describing DDOE's energy programs, to become familiar with the purpose and procedures of each one. The relevant documents included existing program evaluation plans, recent evaluations of DDOE's energy programs, relevant Public Service Commission orders, local regulatory filings, filings by other interested parties, and evaluation-related documents from other states.

The next step was to conduct in-depth interviews with all DDOE energy program managers to obtain detailed information on each program's information needs, existing record-keeping procedures, and data collection capabilities. Those interviews were followed by discussions with DDOE evaluation staff to identify their key information requirements.

Based on program goals and activities, evaluation and reporting needs, and other relevant factors revealed through the document review and in-depth interviews, we identified key items for each program on which the record-keeping effort should focus. The frequency of data collection was determined by the needs of program managers and evaluators as well as by reporting requirements. Appropriate analytical approaches to use with the data collected for each program were identified based on the evaluation-related documents reviewed and the experience of ORNL evaluators. Ideas on data entry and storage procedures were provided by interviews with information technology experts and a past ORNL examination of U.S. Department of Energy record-keeping practices.

FINDINGS AND RECOMMENDATIONS

For each program, the data to be used for management purposes and in quarterly reports should be kept in one database while data earmarked for program evaluations should be kept separately. The evaluation database would tend to contain substantial amounts of detailed information which would be collected only when needed for a specific evaluation and would primarily be used by professional evaluators. In contrast, the management/quarterly report database would have data entered into it on a regular basis by program staff and would probably be accessed often by managers and staff members.

We suggest that Microsoft Excel be employed for the management/quarterly report databases because it is easy to use and the program managers and staff who would be working with it are generally familiar with the software. Because the evaluation databases would primarily be used by evaluation professionals, there are more options from which to choose (e.g., Excel, Access, SAS) and the preferred format should be determined by the evaluators themselves on a case-by-case basis.

The management/quarterly report databases should be designed and set up by managers or staff members involved with the individual energy programs or by DDOE's Information Technology (IT) staff, while evaluation professionals would perform those functions for the evaluation databases. In both instances, the appropriate information to collect for each program is shown in the tables contained in the body of this report.

The management/quarterly report databases could be kept in a network share (a subdirectory or folder on a computer where users can download or upload files) or at a share point/portal (which allows the sharing of files but also has the capability to perform a variety of additional functions.) Access could be restricted to the appropriate people and different users could be given different privileges (e.g., read only, read and write). Evaluation data are likely to be kept on the evaluation contractor's computer, but it is possible that some of those data could also be kept in the same place as the management/quarterly report databases and made available to other users.

Program managers or staff with access to the network share or share point could enter management/quarterly report data online. Under such an arrangement, the data set could be updated each time new data are entered. The appropriate data entry method for each evaluation database should be determined by the evaluation contractor but it is more likely that data would be entered directly into the computer in which they are stored.

Program expenditures should be disaggregated by broad program activities and categories of administrative function. This report suggests appropriate expenditure categories to track, but the final decision on what data to collect should be made by the individual program managers. In addition to DDOE expenditures, private investment can be a critical element of certain programs and the extent of that investment should also be recorded. And all program records should include the name, address, and ward of those individuals and organizations receiving services so that their geographic distribution can be monitored.

To quantify energy production or savings, we suggest the collection of data that would allow generation and savings *estimates* as well as data that would allow more rigorous calculation (i.e., through billing analysis or metering). The approach chosen will depend on available resources and the need for rigor, with metering or billing analysis being more rigorous but also more expensive.

When savings are estimated based on the measures installed and some measures are self-financed, attribution to the program can be determined by asking participants to report the extent to which their self-financed measures were due to the program services received. Of course, assuming that none of the *program*-financed measures would have been installed by service recipients in the absence of the program can overstate savings to some extent, which is why the use of a treatment/control group design provides more rigor than savings estimates based on a count of measures installed.

Any surveys used to collect information from program participants, or other relevant parties, would be designed by DDOE staff or, more likely, by the professional evaluators hired to study the program in question.

Where billing data are used, 12-15 months of pre- and post-treatment bills are typically needed for those entities receiving program services and 24-30 months of bills are needed for control group members to correspond to the pre-and post-treatment periods. Advance requests for billing data can reduce the delays that often occur when such requests are not made until a program evaluation is initiated. If possible, control group members should be selected from those who participated in the program in the year following the one under examination or who were on the waiting list for program services, to ensure that the two groups (treatment and control) have similar characteristics.

When a treatment/control group design is used, any savings achieved by control group members are subtracted from those realized by service recipients (the treatment group) to reveal the magnitude of savings attributable to program participation. The only exception to this is for the Renewable Energy Demonstration Program (B-4), where the program funds only a portion of the renewable energy installations that are made; in that case, the program portion of savings is represented by the fraction of total installation costs provided by the program.

It is important to note that the recommended frequencies for the collection of evaluation-related data given in the body of this report are ideals that may not be achievable given the resource constraints that often apply to real-world programs. While it would be very helpful to program managers, regulators, and clients to have key outcomes measured annually, it may be necessary to allocate evaluation resources to a subset of programs each year so that any given program might be measured using rigorous evaluation techniques every second or third year.

1. INTRODUCTION

1.1. BACKGROUND

The District Department of the Environment's (DDOE's) Energy Office operates 16 different programs designed to increase energy efficiency and reduce the energy cost burden for District of Columbia residents, businesses, and non-profit organizations. Eleven of those programs have been in existence since mid 2005, while the remaining five began operation in late 2007 or early 2008. A recent evaluation of the 11 older programs (DOXA, Inc. 2008) organized them into three broad categories: (1) Demonstration and Promotion Programs; (2) Energy Efficiency Improvement Programs; and (3) Low-Income Programs. Those designations are still appropriate and the new programs can be easily fit into that framework, so this report will use those categories to describe DDOE's energy efforts. The following table lists the 16 current programs and the numbers that are commonly used to identify them

Table 1.1. List of DDOE Energy Programs (as of March 2008)

DEMONSTRATION AND PROMOTION PROGRAMS

B-4. Renewable Energy Demonstration Program
B-5. Distributed Generation and Net Metering
C-5. Home Energy Rating System Program
G-5 Energy Awareness Campaign

ENERGY EFFICIENCY IMPROVEMENT PROGRAMS

C-3. Non-Profit Energy Efficiency Program
C-13. Small Business Energy Efficiency Program

LOW-INCOME PROGRAMS

D-1. LIHEAP Extension and Education Program
D-2. Residential Aid Discount (RAD) Expansion Program
D-3. Residential Aid Discount (RAD) Arrearages Retirement and Education Program
D-4. Weatherization Plus Program
D-5. Low-Income Appliances Program
D-6. Weatherization Rehabilitation Program
E-1. Affordable Housing Energy Efficiency Rebate Program
E-2. Weatherization Rehabilitation and Asset Preservation (WRAP) Program
G-1. Residential Essential Service (RES) Expansion and Awareness Campaign
G-2. Heating System Repair, Replacement and Tune-up

In the spring of 2008, DDOE asked Oak Ridge National Laboratory (ORNL) to provide assistance in its ongoing efforts to track the progress of the above-named programs. Having good records of program activities and accomplishments is important to DDOE for management purposes (i.e., identifying areas for possible improvement or refinement), preparing quarterly reports for the Public Service Commission listing program achievements, and facilitating periodic program evaluations that examine how well the various DDOE efforts are achieving their objectives. Specifically, DDOE was interested in knowing what data would be most helpful to collect for each program, the sources of those data, the frequency with which the relevant information should be collected, and how it would be applied.

1.2. SCOPE OF REPORT

This report documents the study that ORNL performed for DDOE and the major findings from that undertaking. **Chapter 2** discusses the research methods employed, which were relatively simple and straightforward. **Chapter 3** suggests a record-keeping approach for DDOE's renewable energy demonstration programs. After a general discussion of the suggested approach for this broad type of effort, detailed information is provided on key data to collect, data sources, frequency of data collection, and data applications for each individual program. **Chapter 4** provides the same kind of information for energy efficiency programs while **Chapter 5** addresses the same topics for DDOE's low-income efforts. **Chapter 6** summarizes our major findings and makes recommendations concerning the types of data bases to establish, who should design and implement them, and related data management issues. Finally, **Chapter 7** lists the key documents reviewed during the course of this study.

2. METHODS

The methods employed in this study were relatively simple. We began by reviewing existing documents describing DDOE's energy programs, to become familiar with the purpose and procedures of each one. The relevant documents included: existing program evaluation plans (District of Columbia Energy Office 2005; Mathur 2007); recent evaluations of DDOE's energy programs (District Department of Environment 2006; DOXA, Inc. 2008); relevant PSC orders (Public Service Commission of the District of Columbia 2007 and 2008); local regulatory filings (District of Columbia Office of the Attorney General 2008); filings by other interested parties (Office of the People's Counsel 2008), and evaluation-related documents from other states (New York State Energy Research and Development Authority 2007).

Following the document review, we conducted in-depth interviews with all DDOE energy program managers. Through this process, we obtained detailed information on each program's information needs, existing record-keeping procedures, and data collection capabilities. These interviews were followed by discussions with DDOE evaluation staff to identify their key information requirements.

Based on program goals and activities, evaluation and reporting needs, and other relevant factors revealed through the document review and in-depth interviews, we identified key items for each program on which the record-keeping effort should focus. We were careful to include sufficient information to allow attribution of program effects during subsequent evaluations.

The frequency of data collection was determined by the needs of program managers and evaluators as well as by reporting requirements. Appropriate analytical approaches to use with the data collected for each program were identified based on the evaluation-related documents reviewed and the experience of ORNL evaluators. Ideas on data entry and storage procedures were provided by interviews with information technology experts and a past ORNL examination of record-keeping practices by selected U.S. Department of Energy programs.

3. DEMONSTRATION AND PROMOTION PROGRAMS

Four DDOE energy programs can be classified as Demonstration and Promotion efforts. They are: the Renewable Energy Demonstration Program (B-4); the Distributed Generation and Net Metering Program (B-5); the Home Energy Rating System Program (C-5); and the Energy Awareness Campaign (G-5). A separate table is provided below for each of these programs, showing key data to collect, the source of those data, the suggested frequency of data collection, and how the data will be used. The tabular information is largely self-explanatory but we will elaborate on it in the text, if needed. For ease of application, we suggest that the data to be used in Quarterly Reports and for program management should be kept in one database and that data for program evaluations should be kept separately. The evaluation database will tend to contain substantial amounts of detailed information which will only be collected when needed for a specific evaluation effort, while the management/report database will be added to on a regular basis and used frequently. The reader should note that the suggested frequencies for collection of evaluation-related data are ideals that may not be possible to achieve within the limitations of real-world budgets.

In the "Key Data to Collect" category, we have suggested disaggregating program expenditures by broad program activities and we identify the specific activities that should be tracked *if* the data are available. However, program managers know their own programs best and should decide if it would serve their interests to further disaggregate some broad activities or add other activities that are not listed here.

We also suggest disaggregating expenditures by broad categories of "administrative function." For that subject, we've suggested major classes of expenditures with the understanding that not all apply to every program. Each program manager will have to identify which administrative items are relevant for them and whether any others (e.g., vehicle lease, contracted services) may also apply. Recent comments by the DC Office of the People's Counsel (OPC) suggest that comparing expenditures for administrative functions with the amount spent on key program activities (e.g., the installation of renewable energy systems or energy efficiency measures) provides a good measure of a program's cost-effectiveness.

In addition, we consider it worthwhile to keep records on the name, address, and ward of those individuals and organizations receiving DDOE program services. While this information will not be reported verbatim, it can be used to identify the geographic distribution of service recipients which can be important for periodic reports, evaluations, and program management purposes.

In addition to DDOE expenditures, private investment can be a critical element of these programs and knowing the extent of that investment can be important in determining program success. Two of the programs covered in this chapter (B-4 and C-5) involve private investment, and the amount of that contribution is elicited in the appropriate tables.

Several different kinds of baseline information will be useful for gauging program potential and/or putting the measured outcomes in perspective. These baseline items include annual energy consumption, the amount of solar insolation, and wind speed.

Where energy production or savings are quantified, we suggest the collection of data that would allow generation and savings *estimates* as well as data that would allow more rigorous calculation (i.e., through billing analysis or metering). Attribution of effects to the program can be determined by interviews with service recipients or by the use of a control group. The approach chosen will depend on available resources and the need for rigor, with metering or billing analysis and the use of a treatment/control group design being more rigorous but also more expensive.

Where billing data are used, agencies can request pre-treatment bills at the time an individual or organization signs up for the program and can also make advance arrangements with local utility companies to provide pre- and post-treatments bills as soon as they become available. Normally, 12-15 months of pre-treatment bills and 12-15 months of post-treatment bills are needed for those entities receiving program services.

When a control group is used, we recommend that it be selected from those who participated in the program in the year following the one under examination or who were on the waiting list for program services. This is done to ensure that both groups are similar in terms of program eligibility and other key factors (e.g., awareness, interest in energy issues) while differing on the critical factor of having received services during the study period. For the control group, 24-30 months of bills are needed to correspond to the pre-and post-treatment periods. If a member of the control group eventually receives treatment, as often happens, *all* of the usable billing data must come from the period before program services are received.

"Frequency of Data Collection" refers to the intervals at which the responsible individual in each program office assembles the necessary information and enters it into the appropriate data set. Some information is gathered by the program office on a continuous basis (e.g., number of renewable energy systems installed for program B4) and will be available to the manager more frequently than the intervals indicated in the tables.

3.1. RENEWABLE ENERGY DEMONSTRATION PROGRAM

The Renewable Energy Demonstration Program (B-4) engages in a number of activities designed to provide information about the opportunities for on-site generation of electricity from renewable sources in the District of Columbia and also provides grants to interested parties to help fund renewable energy installations. The principal outcomes from these efforts are the generation of electricity from renewable sources (primarily solar) and associated reductions in CO2 emissions. Table 3.1 shows the specific information to be collected regarding expenditures and program activities, as well as other data considered necessary for the quantification of outcomes.

Table 3.1. Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., make personal contacts, make contacts via electronic media, hold public meetings, run newspaper advertisements); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.

Table 3.1. (Continued) Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of personal contacts with local elected officials and community organizations regarding program services and opportunities	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of personal contacts made with local elected officials and community organizations	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of personal contacts with local elected officials and community organizations and the date(s)on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of personal contacts with local elected officials and community organizations were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of personal contacts with local elected officials and community organizations, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of contacts with interested parties via electronic media (e.g., website, list serves, web logs) regarding program services and opportunities	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of contacts made with interested parties via electronic media	Program manager, from counts of web "hits" and other program records	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of contacts with interested parties via electronic media, showing when they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of contacts with interested parties via electronic media were reached	Program manager	Quarterly	List in Quarterly Report

Table 3.1. (Continued) Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of contacts with interested parties via electronic media, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goals for number of public meetings to inform potential participants about program services and opportunities and for the number of people attending them	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of public meetings held and when; number of people attending each meeting; and each attendee's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of meetings and meeting attendance and the date(s)on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s)that Key Milestone(s) for number of meetings and meeting attendance were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of meetings and meeting attendance, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of paid advertisements to run in local newspapers	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of newspaper advertisements run	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Date(s) that Key Milestone(s) for number of newspaper advertisements were reached	Program manager	Quarterly	List in Quarterly Report

Table 3.1. (Continued) Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of newspaper advertisements, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Public awareness of renewable energy options and perception that renewable energy systems are viable for DC	Survey of samples from target groups (residential, institutional, and small business)	Annually , if possible	Report changes over time in evaluation reports
Number of trade allies signed on as program partners	Program manager	Annually	Report changes over time in evaluation reports
Annual numerical goal for number of renewable energy demonstration grants to award and the cumulative dollar amount of those grants.	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of renewable energy demonstration grants awarded. For each one get: recipient's name, street address, and ward; type of structure (residential, institutional, or small business); project type (photovoltaic or wind); award amount; rated capacity; initial cost estimate; date that installation began; date of completion; total installation cost (award plus owner's contribution); and date of connection to grid.	Program manager for first six items; Contractors/ installers and/or award recipients for last four items	Quarterly for first five items; Annually for last four items	Use in Quarterly Report and evaluation reports. Date of completion, date of connection to grid, and actual KW output (see below) can be used to estimate electricity savings. Award amount as a proportion of total installation cost can be used to represent the fraction of total kWh generated that is due to the program's contribution. Total cost data can be used to calculate Benefit/Cost ratio and determine System Viability (cost of produced electricity compared to standard energy sources).

Table 3.1. (Continued) Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Key Milestone(s) for number of renewable energy demonstration grants and their cumulative dollar amount, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of renewable energy demonstration grants and their cumulative dollar amount were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of renewable energy demonstration grants and their cumulative dollar amount, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Participant satisfaction with program services and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for number of kWh generated, by project type and type of structure	Program manager	Annually	List in Quarterly Report and evaluation reports
Actual KW output for each system installed with program funding	Site inspection	Annually, if possible	List in evaluation reports and use to estimate amount of electricity generated
The percentage of time that the system is operating functionally (system reliability)	Award recipient (through survey or interviews)	Quarterly	List in evaluation reports and use to estimate amount of electricity generated

Table 3.1. (Continued) Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Metered data on electricity production (in kWh)	Meters installed on renewable energy systems funded by program	At least every two months	Use in evaluation to calculate amount of electricity generated by installation. This can also be used to calculate Performance Realization Factor (the ratio of achieved performance to design expectation).
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for award recipients; 24-30 months of pre-installation bills for a control group of those who received awards or were placed on a waiting list during the *following* program year **-- Only for installations for which metered data are not available**	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use in evaluation to calculate amount of electricity generated by installation, by comparing difference between pre- and post-installation weather-normalized electricity use for treatment and control groups.
Local data on solar insolation, wind speed, and temperature	Secondary sources	Annually	Can use in evaluation to estimate amount of electricity generation based on rated capacity; can also use in conjunction with metered data or billing data to calculate amount of electricity generation; and can use to gauge potential for electricity generation from renewable energy sources in DC
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to compare program-achieved generation from renewable sources with total District-wide consumption
Energy efficiency improvements made to structure during same general time period that renewable energy system was installed	Award recipients (through survey or interviews)	At time Award is made	Can be used in regression model in evaluation to estimate electricity savings due to renewable energy system

Table 3.1. (Continued) Suggested record-keeping approach for renewable energy demonstration program (B-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local cost of electricity for relevant customer classes	Local utility company or monthly bills used in prior calculations	Annually	Use, in conjunction with electricity generation calculations, to calculate dollar value of electricity generated for evaluation
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use, in conjunction with electricity generation calculations, to calculate amount of CO2 emissions avoided by generating electricity from renewable sources for evaluation

3.2. DISTRIBUTED GENERATION AND NET METERING PROGRAM

The Distributed Generation and Net Metering Program (B-5) provides educational materials and holds workshops designed to help parties with electricity-generating renewable energy installations make connections to the electric utility grid and implement net metering arrangements with the local utility. The principal outcome from these efforts is the connection of renewable energy installations to the grid and the implementation of net metering. Table 3.2 shows what information should be collected regarding expenditures and program activities as well as what data are needed for the measurement of outcomes.

Table 3.2. Suggested record-keeping approach for distributed generation and net metering program (B-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., provide educational materials, hold workshops); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual numerical goal for number of people reached with educational materials regarding distributed generation and net metering	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of people receiving educational materials	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for providing educational materials and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for providing educational materials were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for providing educational materials, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goals for number of workshops on distributed generation and net metering and the number of people attending them	Program manager	Annually	List in Quarterly Report and evaluation reports

Table 3.2. (Continued) Suggested record-keeping approach for distributed generation and net metering program (B-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Number of workshops held and when; number of people attending each workshop; and each attendee's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of workshops and workshop attendance and the date(s)on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s)that Key Milestone(s) for number of workshops and workshop attendance were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key workshop-related milestone(s), and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of interconnections to the electric grid and implementation of net metering	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of grid connections and implementation of net metering made by program participants; the dates of those events; and each system owner's name, street address, and ward	Participants (through reports to program manager and follow-up contacts, as needed)	Quarterly	Use in Quarterly Report and evaluation reports.
Influence of program on participants' decision to connect to grid and implement net metering and on the timing of those events	Program participants (through survey or interviews)	Annually, if possible	Attribute actions to program for evaluation reports

Table 3.2. (Continued) Suggested record-keeping approach for distributed generation and net metering program (B-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Participant satisfaction with program services and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Key milestone(s) for number of grid connections and implementation of net metering and the date(s) on which the milestone(s) should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s)that Key Milestone(s) for grid connections and implementation of net metering were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for grid connections and implementation of net metering, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Local data on solar insolation, wind speed, and temperature	Secondary sources	Annually	Can use to gauge potential for electricity generation from renewable energy sources in DC
Number and location of grid connections by alternative energy installations city-wide (regardless of program participation)	Local electric utility	Quarterly	Useful to program manager to understand grid operations and anticipate potential problems

3.3. HOME ENERGY RATING SYSTEM PROGRAM

The Home Energy Rating System Program (C-5) focuses on performing energy-efficiency audits for DC residences. The major quantifiable outcomes from this program are the installation of energy-efficiency measures in response to the audits and the energy and cost savings achieved by those measures. Table 3.3 shows the specific information to be collected regarding expenditures, key activities, and program outcomes.

Even though this program is supported by electric utility funds, the audits that it performs can identify a broad range of energy efficiency measures, including those that result in gas savings. Any effort to measure savings from billing data should only address electricity savings because collecting and analyzing natural gas bills involves too much time and expense for a program whose primary focus is on electrical systems. However, natural gas savings can be estimated from survey responses regarding the measures installed and the program's influence on those installations. We suggest that such natural gas savings estimates be added to measured electricity savings to present a comprehensive picture of program effects.

Table 3.3. Suggested record-keeping approach for home energy rating system program (C-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., secure certified auditors, perform audits); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Description of DC housing stock [e.g., type of dwelling (single family, multi family); ownership status (rental, owner-occupied); primary heating fuel; type of air conditioning (window, central, none)]	Secondary sources or survey of city-wide sample	Annually	Useful to program manager to understand needs of potential clients

Table 3.3. (Continued) Suggested record-keeping approach for home energy rating system program (C-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Key Milestone(s) for number of ResNet certified auditors (in-house or on contract) available to perform audits on DC dwellings, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of ResNet certified auditors was reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of ResNet certified auditors, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Public awareness of audit program and actions taken by sellers to improve ratings	Survey of sample from target group	Annually, if possible	Report changes over time in evaluation reports
Annual numerical goal for number of audits to perform	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed; and each recipient's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of audits, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of audits, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 3.3. (Continued) Suggested record-keeping approach for home energy rating system program (C-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Number and type of measures installed following audits; per-measure savings estimates from audits; date of installation; and installation costs	Program participants for most items (through survey or interviews) and program manager for per-measure savings estimates	Annually, if possible	List everything in evaluation reports. Number and type of measures installed can be used in conjunction with per-measure savings estimates from energy audits (or typical per-measure savings numbers from other sources) and "influence" question (see below) to estimate energy savings attributable to program participation. Cost data can be used with energy savings to calculate Benefit/Cost ratio
Influence of program on participants' decision to install measures and on the number, type and timing of the measures installed	Program participants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute installed measures to program and adjust savings estimates that are based on number and type of measures installed.
Participant satisfaction with program services and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for audit recipients who installed measures; 24-30 months of pre-installation bills for a control group of those who received audits, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning *at least* 15 months after completion of first program year.	Can use to calculate amount of energy savings attributable to audits, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.

Table 3.3. (Continued) Suggested record-keeping approach for home energy rating system program (C-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption
Local cost of electricity for relevant customer classes	Local utility company or monthly bills used in prior calculations	Annually	Use in conjunction with energy savings calculations, to calculate dollar value of energy saved for evaluation
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use, in conjunction with electricity generation calculations, to calculate the CO2 emissions reduction for evaluation

3.4. ENERGY AWARENESS CAMPAIGN

The Energy Awareness Campaign (G-5) engages in several different activities designed to encourage DC residents to participate in two other DDOE programs for low-income natural gas customers and to promote energy efficiency in general. Table 3.1 recommends information to be collected regarding program expenditures, key activities, and public awareness and attitudes regarding energy efficiency.

Table 3.4. Suggested record-keeping approach for energy awareness campaign (G-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., place advertisements, distribute literature, distribute promotional materials, produce video, update website); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual numerical goal for number of paid advertisements to run on local TV and radio stations and in newspapers	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of TV, radio, and newspaper advertisements run	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of TV, radio, and newspaper advertisements, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of TV, radio, and newspaper advertisements were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of TV, radio, and newspaper advertisements, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of pieces of literature (brochures, flyers, posters) to distribute	Program manager	Annually	List in Quarterly Report and evaluation reports

Table 3.4. (Continued) Suggested record-keeping approach for energy awareness campaign (G-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Number of pieces of literature distributed	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of pieces of literature distributed, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of pieces of literature distributed were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of pieces of literature distributed, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of promotional materials (pens, pencils, stickers, etc.) to distribute	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of promotional materials distributed	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of promotional materials distributed, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of promotional materials distributed were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of promotional materials distributed, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 3.4. (Continued) Suggested record-keeping approach for energy awareness campaign (G-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Key Milestone(s) for production of video, showing when they should be reached	Program manager	Quarterly	List in Quarterly Report
Date that Key Milestone(s) for production of video were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for production of video, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Key Milestone(s) for update of website, showing when they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for update of website were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for update of website, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Number of "hits" on Natural Gas Trust Fund website and individual program pages	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Annual numerical goal for number of people signing up for Residential Essential Service (RES) program	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of people signing up for RES program; and each registrant's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports
Influence of this awareness campaign on registrants' decision to sign up for RES program	RES program participants (through survey or interviews)	Annually, if possible	Attribute RES sign-ups to awareness campaign for evaluation reports
Key Milestone(s) for number of people signing up for RES program, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report

Table 3.4. (Continued) Suggested record-keeping approach for energy awareness campaign (G-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Date(s) that Key Milestone(s) for number of people signing up for RES program were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of people signing up for RES program, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of people signing up for Heating System Repair, Replacement and Tune-up program	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of people signing up for Heating System Repair, Replacement and Tune-up program; each registrant's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Influence of this awareness campaign on registrants' decision to sign up for Heating System Repair, Replacement and Tune-up program	Heating System Repair, Replacement and Tune-up program participants (through survey or interviews)	Annually, if possible	Attribute Heating System Repair, Replacement and Tune-up program sign-ups to awareness campaign for evaluation reports
Key Milestone(s) for number of people signing up for Heating System Repair, Replacement and Tune-up program, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of people signing up for Heating System Repair, Replacement and Tune-up program were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of people signing up for Heating System Repair, Replacement and Tune-up program, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 3.4. (Continued) Suggested record-keeping approach for energy awareness campaign (G-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Participant satisfaction with awareness campaign and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Public awareness of, and attitudes toward, energy efficiency	Survey of sample from target group	Annually, if possible	Report changes over time in evaluation reports
Influence of this program on public awareness of, and attitudes toward, energy efficiency	Survey of sample from target group	Annually, if possible	Attribute energy-efficiency awareness and attitudes to this program for evaluation reports

4. ENERGY EFFICIENCY IMPROVEMENT PROGRAMS

Two DDOE energy programs can be classified as Energy Efficiency Improvement efforts. They are: the Non-Profit Energy Efficiency Program (C-3) and the Small Business Energy Efficiency Program (C-13). Each of these programs is addressed below by its own table and a brief discussion. As in the previous chapter, each table shows the key data to collect, the sources of those data, the suggested frequency of data collection, and how the data will be used. Once again, we suggest that the data to be used in Quarterly Reports and for program management should be kept in one database and that data for program evaluations should be kept separately. Unlike the management/report database, which is likely to be added to and accessed frequently, the information for the evaluation database will only be collected when needed for a specific evaluation effort. As noted previously, the suggested frequencies for collection of evaluation-related data are ideals, and real-world conditions might dictate that data are actually gathered at greater intervals.

As in the tables contained in Chapter 3, we suggest major activities to be tracked, but we recommend that program managers decide if they want to further disaggregate some broad activities or add others. Similarly, those who know the programs best should decide the major classes of administrative function for which expenditure data should be collected. We recommend that the name, address, and ward of those individuals and organizations receiving DDOE program services be recorded to allow the geographic distribution of service recipients to be tracked.

As noted previously, private investment can be a critical element of these programs and knowing the extent of that investment can be important in determining program success. Both programs covered in this chapter involve private investment, and the amount of that contribution is elicited in the appropriate tables. For both of these programs, baseline information on energy consumption will also be collected to allow program potential to be gauged and help put the measured outcomes in perspective.

Once again, we suggest the collection of data that would allow energy savings *estimates* as well as data that would allow more rigorous calculation. Attribution of effects to the program can be determined by interviews with service recipients or by the use of a control group with the appropriate approach chosen based on available resources and the need for rigor.

Where program activities include referring clients to other DDOE programs, as in the Non-Profit Energy Efficiency Program (C-3), we do *not* call for the collection of data that could be used to quantify savings resulting from participation in those other programs. This approach is based on the understanding that any such savings would be captured by the independent evaluation of the programs to which clients are referred and that attempting to measure those savings here could result in a double-counting of outcomes. Because a summation of the savings and generation resulting from all programs combined is likely to be useful, it is considered important to allow such a summary to occur without the risk of over-counting results.

4.1. NON-PROFIT ENERGY EFFICIENCY PROGRAM

The Non-Profit Energy Efficiency Program (C-3) provides non-profit organizations with information about available energy saving opportunities, refers them to other DDOE programs, conducts energy efficiency audits, and awards small grants for the purpose of implementing audit-identified measures. The principal outcomes from these efforts are the installation of energy-efficiency measures and the energy and cost savings achieved by those measures. Table 4.1 shows the specific information to be

collected regarding expenditures and program activities as well as other data to be used in the quantification of outcomes.

If audits and small implementation grants are permanently discontinued, which might happen, data will no longer be needed on this program element for program management purposes and Quarterly Reports. However, evaluation-related data would still be valuable if DDOE and its regulators are interested in the retrospective outcomes of these programs.

Although this program is supported by electric utility funds, the audits that it performs can identify energy efficiency measures that, if taken, would result in savings of natural gas. While program funds cannot be used to take such actions, service recipients can employ their own resources to install audit-identified gas-saving measures. Natural gas savings can be estimated from program records on the measures taken and from survey responses regarding the program's influence on recipients' actions. However, any effort to measure savings from billing data should only address electricity savings because collecting and analyzing natural gas bills involves too much time and expense for a program whose primary focus is on electrical systems and which funds only electricity-saving measures. As noted in the previous discussion of the Home Energy Rating System Program (C-5) we suggest adding *estimates* of savings from natural gas measures to measured electricity savings to present a comprehensive picture of program effects.

Table 4.1. Suggested record-keeping approach for non-profit energy efficiency program (C-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., distribute guides, provide training, refer non-profits to other programs, perform audits, make implementation grants); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.

Table 4.1. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of energy efficiency guides to distribute to non-profit organizations	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of energy efficiency guides distributed to non-profit organizations; and each recipient organization's name, street address, and ward – if possible	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of energy efficiency guides to distribute to non-profit organizations, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of energy efficiency guides to distribute to non-profit organizations were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of energy efficiency guides to distribute, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of non-profit organizations to receive training on energy efficiency	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of non-profit organizations receiving energy-efficiency training; and each participating organization's name, street address, and ward – if possible	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of non-profit organizations to receive energy-efficiency training, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of non-profit organizations receiving energy-efficiency training were reached	Program manager	Quarterly	List in Quarterly Report

Table 4.1. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of non-profit organizations to receive energy-efficiency training, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Whether or not energy saving actions were taken after guides and training were received; the amount of private funds invested; and the estimated savings achieved	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Influence of guides and training on participants' decision to take action and on the magnitude and timing of those actions	Program participants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute estimated savings to program
Annual numerical goal for number of non-profits referred to other DDOE programs	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of non-profits referred to other DDOE programs	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of non-profits referred to other DDOE programs, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of non-profits referred to other DDOE programs were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of non-profits referred to other DDOE programs, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 4.1. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of audits to perform and small implementation grants to award to non-profit organizations	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed and small implementation grants awarded to non-profit organizations; and each recipient organization's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of audits and implementation grants for non-profits, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits and implementation grants for non-profits were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of audits and implementation grants for non-profits, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Number of non-profit organizations' buildings in which audit-identified energy-saving measures are installed with program funds. For each building get: number and type of measures installed; per-measure savings estimates from audits; date of installation; and installation costs.	Program manager	Quarterly	List in Quarterly Report and evaluation reports. Number and type of measures installed with program funds can be used, in conjunction with per-measure savings estimates from energy audits (or typical per-measure savings numbers from other sources) to estimate energy savings attributable to measures funded by program. Cost data can be used with energy savings to calculate Benefit/Cost ratio

Table 4.1. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Number of non-profit organizations' buildings in which additional audit-identified energy-saving measures are installed at the organization's own expense. For each building get: number and type of measures installed; per-measure savings estimates from audits; date of installation; and installation costs.	Program participants (through survey or interviews)	Annually, if possible	Describe everything in evaluation reports. Number and type of measures installed at the organization's expense can be used -- in conjunction with number of program-installed measures, per-measure savings estimates from energy audits (or typical per-measure savings numbers from other sources), and "influence" question (see below) -- to estimate energy savings attributable to program participation.
Influence of audits on the number, type and timing of measures installed by the non-profit organization at its own expense.	Program participants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute organization-funded measures to program and adjust savings estimates that are based on number and type of measures installed.
Participant satisfaction with all program services and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for audit recipients who installed measures; 24-30 months of pre-installation bills for a control group of non-profit organizations that received audits, or were placed on a waiting list, during the *following* year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to audits, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.

Table 4.1. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation.
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption
Local cost of electricity for relevant customer classes	Local utility company or monthly bills used in prior calculations	Annually	Use, in conjunction with energy savings calculations, to calculate dollar value of energy saved for evaluation
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use, in conjunction with electricity generation calculations, to calculate the CO2 emissions reduction for evaluation

4.2. SMALL BUSINESS ENERGY EFFICIENCY PROGRAM

The Small Business Energy Efficiency Program (C-13) is similar to the non-profit energy efficiency program discussed above, but it focuses on a different client group. This program provides small businesses with information about available energy saving opportunities, conducts energy efficiency audits, and installs audit-identified measures. The principal outcomes are the installation of energy-efficiency measures and the resulting energy and cost savings. Table 4.2 shows the specific information to be collected regarding expenditures and program activities as well as the data to be used to quantify outcomes.

As noted above, the audits performed by this program can identify a broad range of energy efficiency measures, including those that result in gas savings, and service recipients can use their own resources to install audit-identified gas-saving measures. While any analysis of billing data should focus only on electricity savings because of the substantial effort involved, we suggest adding *estimates* of natural gas savings (from program records on the measures taken and survey responses regarding program influence) to measured electricity savings to present a comprehensive picture of program effects.

Table 4.2. Suggested record-keeping approach for small business energy efficiency program (C-13)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., distribute materials, visit businesses, perform audits, install measures); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual funding allotted to each Community Based Organization (CBO) to install energy saving measures	Program manager	Annually	List in Quarterly Report
Amount of funding awarded to each CBO monthly to install energy saving measures	Program manager	Monthly	Useful to program manager for tracking each CBO's awards against its annual allocation

Table 4.2. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-13)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of brochures, small business testimonials, and similar materials to distribute to small businesses	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of brochures, small business testimonials, and similar materials distributed to non-profit organizations; and each recipient organization's name, street address, and ward – if possible	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of brochures, small business testimonials, and similar materials to distribute to non-profit organizations, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of brochures, small business testimonials, and similar materials to distribute to non-profit organizations were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of brochures, small business testimonials, and similar materials to distribute, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of door-to-door visits to small businesses by program staff	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of door-to-door visits to small businesses by program staff; and each recipient organization's name, street address, and ward – if possible	Program manager	Quarterly	Use in Quarterly Report and evaluation reports.
Key Milestone(s) for number of door-to-door visits to small businesses by program staff, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report

Table 4.2. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-13)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Date(s) that Key Milestone(s) for number of door-to-door visits to small businesses by program staff were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of door-to-door visits to small businesses by program staff, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Whether or not energy saving actions were taken after educational materials and visits were received; the amount of private funds invested; and the estimated savings achieved	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Influence of educational materials and visits on participants' decision to take action and on the magnitude and timing of those actions	Program participants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute estimated savings to program
Annual numerical goal for number of audits to perform for small businesses	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed for small businesses; and each recipient organization's name, street address, and ward	Program manager	Quarterly	Use in Quarterly Report and evaluation reports
Key Milestone(s) for number of audits to perform for small businesses and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits performed for small businesses were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of audits to perform for small businesses, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 4.2. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-13)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of small businesses in which audit-identified energy-saving measures are installed by Community Based Organizations with program funds	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of small businesses in which audit-identified energy saving measures are installed with program funds. For each building get: number and type of measures installed; per-measure savings estimates from audits; date of installation; and installation costs.	Program manager	Quarterly	List everything in Quarterly Report and evaluation reports. Number and type of audit-identified measures installed with program funds can be used, in conjunction with per-measure savings estimates from audits (or typical per-measure savings numbers from other sources), to estimate energy savings attributable to measures installed by program. Cost data can be used with energy savings to calculate Benefit/Cost ratio.
Key Milestone(s) for number of small businesses receiving program-funded energy-saving measures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of small businesses receiving program-funded energy-saving measures were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting Key Milestone(s) for number of small businesses receiving program-funded energy-saving measures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 4.2. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-13)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Number of small businesses in which additional audit-identified energy saving measures are installed at the expense of the business. For each building get: number and type of measures installed; per-measure savings estimates from audits; date of installation; and installation costs.	Program participants (through survey or interviews)	Annually, if possible	Describe everything in evaluation reports. Number and type of measures installed at the expense of the business can be used -- in conjunction with number of program-installed measures, per-measure savings numbers from audit (or typical per-measure savings numbers from other sources), and "influence" question (see below) -- to estimate energy savings attributable to program participation.
Influence of audits on the number, type, and timing of measures installed by small businesses at their own expense	Program participants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute self-funded measures to program and adjust savings estimates that are based on number and type of measures installed.
Participant satisfaction with program services and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for small businesses who received audits through this program; 24-30 months of pre-installation bills for a control group of small businesses that received audits, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to audits, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.

Table 4.2. (Continued) Suggested record-keeping approach for non-profit energy efficiency program (C-13)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation.
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption
Local cost of electricity for relevant customer classes	Local utility company or monthly bills used in prior calculations	Annually	Use, in conjunction with energy savings calculations, to calculate dollar value of energy saved for evaluation
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use, in conjunction with electricity generation calculations, to calculate the CO2 emissions reduction for evaluation
Number of local residents employed to install energy efficiency measures in small businesses	Survey of Community Based Organizations performing installations	Annually, if possible	List in evaluation reports

5. LOW INCOME PROGRAMS

Ten DDOE energy programs – the largest part of the 16 program portfolio – can be classified as Low Income Programs. They are: the LIHEAP Extension and Education Program (D-1); Residential Aid Discount (RAD) Expansion Program (D-2); Residential Aid Discount (RAD) Arrearages Retirement and Education Program (D-3); Weatherization Plus Program (D-4); Low-Income Appliances Program (D-5); Weatherization Rehabilitation Program (D-6); Affordable Housing Energy Efficiency Rebate Program (E-1); Weatherization Rehabilitation and Asset Preservation (WRAP) Program (E-2); Residential Essential Service (RES) Expansion and Awareness Campaign (G-1); and Heating System Repair, Replacement and Tune-up (G-2). A brief discussion and table on each of these programs is presented below. As in Chapters 3 and 4, each table shows the key data to collect, the sources of those data, the suggested frequency of data collection, and how the data will be used. As before, we suggest that the data to be used in Quarterly Reports and for program management be kept separately from the data intended for program evaluation purposes. As noted previously, the suggested frequencies for collection of evaluation-related data are ideals and we acknowledge that it might not be practical to gather the specified information as frequently as we would like.

As in the tables contained in Chapters 3 and 4, we suggest major activities to be tracked but we recommend that program managers decide if they want to add others. Also, those same individuals should decide the major classes of administrative function for which expenditure data should be collected. We recommend that the name, address, and ward of those individuals and organizations receiving DDOE program services be recorded so that the geographic distribution of service recipients can be tracked.

As previously observed, private investment is an important element of some programs so measuring it can be important. Two of the programs covered in this chapter (E-1 and E-2) involve private investment, and the amount of that contribution is elicited in the appropriate tables.

Once more, we suggest the collection of data that would allow energy savings *estimates* as well as data that would allow more rigorous calculation. As explained in previous chapters, attribution of effects to the program can be determined by interviews with service recipients or by the use of a control group with the appropriate approach determined by available resources and the need for rigor.

Several different kinds of baseline information will be useful for gauging program potential and/or putting the measured outcomes in perspective. These baseline items include annual energy consumption, the number of low-income households, and the number of households receiving bill-paying assistance or discount rates.

Where program activities include referring clients to other DDOE programs, as in the Non-Profit Energy Efficiency Program (E-2), we do *not* call for the collection of data that could be used to quantify savings resulting from participation in those other programs to avoid double-counting when the effects of all programs are summed.

The *Reliable Energy Trust Fund Program Evaluation Plan* (DC Energy Office 2005) called for an examination of how the District of Columbia's low-income energy programs affect participants' energy burden, which is energy expenditures divided by household income. However, calculating energy burden would require the collection of pre- and post-treatment electric *and* gas billing data for program participants, which requires substantial time and effort. As an alternative, we suggest surveying program

participants and asking directly about how the services they received impacted their ability to pay energy bills (including the need for bill-paying assistance and discount rates) and affected their health and quality of life. In addition, we suggest using a new indicator of program effects, called "Income Returned to Household," which is calculated by dividing program payments to participants or energy cost savings by household income. This approach requires substantially less data collection than an analysis of energy burden and provides a clear picture of the additional funds that the program makes available to households for improving occupant comfort or obtaining other important goods and services. Ideally, the data on income used in the calculation of Income Returned to Household should be for the same time period in which program services are provided.

5.1. LIHEAP EXTENSION AND EDUCATION PROGRAM

The LIHEAP Extension and Education Program (D-1) provides energy bill-paying assistance to low-income families. The principal outcome is an increased ability by program participants to pay their electric bills. Table 5.1 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

Table 5.1. Suggested record-keeping approach for LIHEAP extension and education program (D-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Major program activity (i.e., provide energy assistance); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual numerical goal for number of households served with LIHEAP-like energy assistance and the cumulative amount of assistance	Program manager	Annually	List in Quarterly Report and evaluation reports

Table 5.1. Suggested record-keeping approach for LIHEAP extension and education program (D-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Number of households served with LIHEAP-like energy assistance. Get dollar amount of assistance provided to each household; each recipient's name street address, and ward; and cumulative amount of assistance for all households combined.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Dollar amount of assistance will be used to calculate "income returned to household": the proportion of each household's income represented by program payments.
Key Milestone(s) for number of households served and cumulative amount of assistance, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of households served and cumulative amount of assistance were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of households served and cumulative amount of assistance, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Number of DC households receiving LIHEAP assistance and cumulative amount of assistance	DC LIHEAP Director	Annually	Can use to calculate magnitude of this DDOE program relative to LIHEAP
Recipients' reports of how assistance has impacted their ability to pay energy bills and affected their health and quality of life (e.g., changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.

Table 5.1. (Continued) Suggested record-keeping approach for LIHEAP extension and education program (D-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Recipients' satisfaction with assistance and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income)[a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-assistance electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-assistance household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of income returned to household and household energy burden for evaluation
Local temperature data [a]	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.2. RESIDENTIAL AID DISCOUNT (RAD) EXPANSION PROGRAM

The Residential Aid Discount (RAD) Expansion Program (D-2) provides discount electric rates to low-income families. As in the previous program, the principal outcome is an increased ability by program participants to pay their electric bills. Table 5.1 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

Table 5.2. Suggested record-keeping approach for residential aid discount (RAD) program (D-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Major program activity (i.e., provide discount rate); (2) Administrative functions – divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual numerical goal for additional number of households served by Residential Aid Discount (RAD) extension and the cumulative amount of funds expended	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of households served by Residential Aid Discount (RAD) extension. Get dollar amount of discount provided to each household; each recipient's name street address, and ward; and cumulative amount of funds expended for all households combined.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Dollar amount of discount will be used to calculate "income returned to household": the proportion of each household's income represented by program payments.
Key Milestone(s) for number of households served and cumulative expenditures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report

Table 5.2. (Continued) Suggested record-keeping approach for residential aid discount (RAD) program (D-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Date(s) that Key Milestone(s) for number of households served and cumulative expenditures were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of households served and cumulative expenditures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Number of DC households receiving RAD prior to this extension and the cumulative amount of that discount	PEPCO	Annually	Can use to calculate magnitude of this DDOE program relative to previous RAD
Recipients' reports of how receiving discount rate has impacted their ability to pay energy bills and affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Recipients' satisfaction with discount rate and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report

Table 5.2. (Continued) Suggested record-keeping approach for residential aid discount (RAD) program (D-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Twelve months of pre- and post-discount electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-discount household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of income returned to household and household energy burden for evaluation
Local temperature data [a]	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.3. RESIDENTIAL AID DISCOUNT (RAD) ARREARAGES RETIREMENT AND EDUCATION PROGRAM

The Residential Aid Discount (RAD) Arrearages Retirement and Education Program (D-3) eliminates or reduces arrearages owed by low-income families with overdue electric bills. As in the previous two programs, the principal outcome is an increased ability by program participants to afford their electric service. Table 5.3 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

Table 5.3. Suggested record-keeping approach for residential aid discount (RAD) arrearages retirement and education program (D-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Major program activity (i.e., provide arrearage reductions); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual numerical goal for number of households receiving arrearage reductions and the cumulative amount by which arrearages are reduced	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of households receiving arrearage reductions; each recipient's name street address, and ward; and the dollar amount for each household	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Dollar amount of arrearage reduction will be used to calculate "income returned to household": the proportion of each household's income represented by program payments.
Key Milestone(s) for number of households receiving arrearage reduction and cumulative expenditures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of households receiving arrearage reductions and cumulative expenditures were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of households receiving arrearage reductions and cumulative expenditures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 5.3. (Continued) Suggested record-keeping approach for residential aid discount (RAD) arrearages retirement and education program (D-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Recipients' reports of how receiving arrearage reduction has impacted their ability to pay energy bills and affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Recipients' satisfaction with arrearage reduction program and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-arrearage reduction electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-arrearage reduction household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of income returned to household and household energy burden for evaluation

Table 5.3. (Continued) Suggested record-keeping approach for residential aid discount (RAD) arrearages retirement and education program (D-3)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local temperature data [a]	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.4. WEATHERIZATION PLUS PROGRAM

The Weatherization Plus Program (D-4) performs energy efficiency audits and installs audit-identified measures in low-income dwelling units. The principal outcomes from these efforts are the installation of energy-efficiency measures, the energy and cost savings achieved by those measures, and an increased ability by program participants to pay their electric bills. Table 5.4 shows the specific information to be collected regarding expenditures and program activities as well as other data to be used in the quantification of outcomes.

Table 5.4. Suggested record-keeping approach for weatherization plus program (D-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., perform audits, install measures); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.

Table 5.4. (Continued) Suggested record-keeping approach for weatherization plus program (D-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual funding allotted to each Community Based Organization (CBO) to provide program services	Program manager	Annually	List in Quarterly Report
Amount of funding awarded to each CBO monthly to provide program services	Program manager	Monthly	Useful to program manager for tracking each CBO's awards against its annual allocation
Annual numerical goal for number of audits to perform	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed	Program manager	Quarterly	List in Quarterly Report and evaluation reports
Key Milestone(s) for number of audits, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of audits, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of dwelling units in which to install electric energy-saving measures	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of dwelling units in which electric energy-saving measures are installed by contractors for CBOs. For each one get: recipient's name, street address, and ward; type of dwelling unit (single family or multi-family); whether or not dwelling is electrically heated; number and type of measures installed; per-measure savings estimates from pre-installation audit; date of installation; installation costs; and CBO responsible for installation.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Number and type of measures installed can be used in conjunction with estimates from energy audits (or typical per-measure savings numbers from other sources) to estimate energy savings attributable to measures installed by program. Cost data can be used with energy savings to calculate Benefit/Cost ratio.

Table 5.4. (Continued) Suggested record-keeping approach for weatherization plus program (D-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Customer satisfaction with measures installed	Program manager (from standard evaluation form)	Quarterly	Useful to program manager for quality control purposes
Key Milestone(s) for number of dwellings in which to install electric energy-saving measures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of dwellings in which to install electric energy-saving measures were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of dwellings in which to install electric energy-saving measures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for households that received measures; 24-30 months of pre-installation bills for a control group of households that received audits, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to program, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations.

Table 5.4. (Continued) Suggested record-keeping approach for weatherization plus program (D-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption
Local cost of electricity for relevant customer class	Local utility company or monthly bills used in prior calculations	Annually	Use in evaluation, in conjunction with energy savings calculations, to calculate dollar value of electricity saved. Those monetary savings will be used to calculate "income returned to household": the proportion of each household's income represented by energy cost savings.
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use in evaluation, in conjunction with electricity savings calculations, to calculate the CO2 emissions reduction
Recipients' reports of how receiving electric energy-saving measures has impacted their ability to pay energy bills (including need for bill-paying assistance and discount rate) and affected their health and quality of life (e.g., changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Recipients' satisfaction with any aspects of program not covered by standard evaluation form, and suggestions for program improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate

Table 5.4. (Continued) Suggested record-keeping approach for weatherization plus program (D-4)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-installation electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-installation household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of "income returned to household" and household energy burden for evaluation
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.5. LOW-INCOME APPLIANCES PROGRAM

The Low-Income Appliances Program (D-5) performs audits and installs high-efficiency electric appliances to replace older models in low-income dwelling units. The principal outcomes from these efforts are the installation of high-efficiency appliances, the energy and cost savings achieved thereby, and an increased ability by program participants to pay their electric bills. Table 5.5 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

Table 5.5. Suggested record-keeping approach for low-income appliances program (D-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., perform audits, install appliances); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual funding allotted to each Community Based Organization (CBO) to provide program services	Program manager	Annually	List in Quarterly Report
Amount of funding awarded to each CBO monthly to provide program services	Program manager	Monthly	Useful to program manager for tracking each CBO's awards against its annual allocation
Annual numerical goal for number of audits to perform	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed	Program manager	Quarterly	List in Quarterly Report and evaluation reports.
Key Milestone(s) for number of audits, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits were reached	Program manager	Quarterly	List in Quarterly Report

Table 5.5. (Continued) Suggested record-keeping approach for low-income appliances program (D-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of audits, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goals for number of dwelling units in which to install high-efficiency electric appliances to replace older models and for number of appliances replaced	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of dwelling units in which high-efficiency electric appliances are installed to replace older models and number of appliances replaced. For each participant get: name, street address, and ward; type of dwelling unit (single family or multi-family); number and type of appliances installed; per-appliance savings estimates from pre-installation audit (net difference in electricity consumption between old unit and its replacement); date of installation; installation costs; and CBO responsible for installation.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Number and type of high-efficiency electric appliances installed can be used in conjunction with estimates from pre-installation audits (or typical per-appliance savings numbers from other sources) to estimate energy savings attributable to appliances installed by program. Cost data can be used with energy savings to calculate Benefit/Cost ratio.
Customer satisfaction with appliances installed	Program manager (from standard evaluation form)	Quarterly	Useful to program manager for quality control purposes
Key Milestone(s) for number of dwellings receiving high-efficiency replacement appliances and number of appliances replaced, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of dwellings receiving high-efficiency replacement appliances and number of appliances replaced were reached	Program manager	Quarterly	List in Quarterly Report

Table 5.5. (Continued) Suggested record-keeping approach for low-income appliances program (D-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of dwellings receiving high-efficiency replacement appliances and number of appliances replaced, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for households that received high-efficiency electric appliances to replace older models; 24-30 months of pre-installation bills for a control group of households that received audits, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to program, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations.
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption

Table 5.5. (Continued) Suggested record-keeping approach for low-income appliances program (D-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local cost of electricity for relevant customer class	Local utility company or monthly bills used in prior calculations	Annually	Use in evaluation, in conjunction with energy savings calculations, to calculate dollar value of electricity saved. Those monetary savings will be used to calculate "income returned to household": the proportion of each household's income represented by energy cost savings.
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use in evaluation, in conjunction with electricity savings calculations, to calculate the CO2 emissions reduction
Recipients' reports of how receiving energy-saving replacement appliances has impacted their ability to pay energy bills (including need for bill-paying assistance and discount rate) and affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports
Recipients' satisfaction with any aspects of program not covered by standard evaluation form, and suggestions for program improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report

Table 5.5. (Continued) Suggested record-keeping approach for low-income appliances program (D-5)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Twelve months of pre- and post-installation electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-installation household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of "income returned to household" and household energy burden for evaluation
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.6. WEATHERIZATION REHABILITATION PROGRAM

The Weatherization Rehabilitation Program (D-6) performs audits and installs energy-saving measures and high-efficiency electric appliances in rehabilitated low-income housing units. The principal outcomes from these efforts are the installation of energy-saving measures and appliances, the energy and cost savings achieved by those installations and an increased ability by occupants of the rehabilitation units to pay their electric bills. Table 5.6 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

Measuring energy savings or other benefits to low-income households would not be possible for dwelling units that had not existed in the current form prior to rehabilitation (e.g., tear-down and new construction or radical reconfiguration of existing structures). Even if the size and nature of units are similar before and after rehabilitation, it would be hard to get accurate results on how energy use and affordability changed if there were different occupants (with different incomes, household size, and energy use patterns) during the pre and post periods. If all rehabilitation units served in a given year are multifamily, keeping records on the type of dwelling would not be necessary.

Table 5.6. Suggested record-keeping approach for weatherization rehabilitation program (D-6)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., perform audits, install measures and appliances); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual funding allotted to each Community Based Organization (CBO) to provide program services	Program manager	Annually	List in Quarterly Report
Amount of funding awarded to each CBO monthly to provide program services	Program manager	Monthly	Useful to program manager for tracking each CBO's awards against its annual allocation
Annual numerical goal for number of audits to perform	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed	Program manager	Quarterly	List in Quarterly Report and evaluation reports
Key Milestone(s) for number of audits, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits were reached	Program manager	Quarterly	List in Quarterly Report

Table 5.6. (Continued) Suggested record-keeping approach for weatherization rehabilitation program (D-6)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of audits, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goals for number of low-income housing units undergoing rehabilitation to receive electric energy-saving measures and high-efficiency appliances and for number of appliances installed	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of rehabilitation units in which electric energy-saving measures and high-efficiency appliances are installed and number of appliances replaced. For each unit get: recipient's name, street address, and ward; type of dwelling (single family or multi-family); whether or not dwelling is electrically heated; number and type of energy-saving measures and electric appliances installed; savings estimates from pre-installation audit for each measure and appliance installed; date of installation; installation costs; and CBO responsible for installation.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Number and type of energy-saving measures and high-efficiency electric appliances installed can be used in conjunction with estimates from pre-installation audits (or typical per-measure and per-appliance savings numbers from other sources) to estimate energy savings attributable to measures and appliances installed by program. Cost data can be used with energy savings to calculate Benefit/Cost ratio.
Customer satisfaction with measures and appliances installed	Program manager (from standard evaluation form)	Quarterly	Useful to program manager for quality control purposes
Key Milestone(s) for number of rehabilitation units receiving electric energy-saving measures and high-efficiency appliances and for number of appliances replaced, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report

Table 5.6. (Continued) Suggested record-keeping approach for weatherization rehabilitation program (D-6)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Date(s) that Key Milestone(s) for number of rehabilitation units receiving electric energy-saving measures and high-efficiency appliances and for number of appliances replaced were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of rehabilitation units receiving electric energy-saving measures and high-efficiency appliances and for number of appliances replaced, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for rehabilitation units that received electric energy-saving measures and high-efficiency appliances; 24-30 months of pre-installation bills for a control group of households that received audits, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to program, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation

Table 5.6. (Continued) Suggested record-keeping approach for weatherization rehabilitation program (D-6)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption
Local cost of electricity for relevant customer class	Local utility company or monthly bills used in prior calculations	Annually	Use in evaluation, in conjunction with energy savings calculations, to calculate dollar value of electricity saved. Those monetary savings will be used to calculate "income returned to household": the proportion of each household's income represented by energy cost savings.
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use in evaluation, in conjunction with electricity savings calculations, to calculate the CO2 emissions reduction
Recipients' reports of how receiving energy-saving measures and appliances has impacted their ability to pay energy bills (including need for bill-paying assistance and discount rate) and affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness), *if the same people resided there pre- and post- rehabilitation*	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.

Table 5.6. (Continued) Suggested record-keeping approach for weatherization rehabilitation program (D-6)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Recipients' satisfaction with any aspects of program not covered by standard evaluation form, and suggestions for program improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-installation electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-installation household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of "income returned to household" and household energy burden for evaluation
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.7. AFFORDABLE HOUSING ENERGY EFFICIENCY REBATE PROGRAM

The Affordable Housing Energy Efficiency Rebate Program (E-1) provides rebates for the installation of energy-efficiency measures in affordable housing projects in the District of Columbia. The principal outcomes from these efforts are the installation of energy-efficiency measures, the energy and cost savings achieved by those measures, and an increased ability by occupants of the dwellings in question to pay their energy bills. Table 5.7 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

As noted previously for several other programs, the audits performed for the Affordable Housing Energy Efficiency Rebate Program can identify a range of energy efficiency measures, including those that result in gas savings. Developers or building occupants are then free to use their own resources to install audit-identified gas-saving measures. Because of the substantial effort involved in performing a billing analysis, it is suggested that it should focus only on electricity savings. However, we believe that *estimates* of natural gas savings (from program records on the measures taken and survey responses regarding program influence) should be added to measured electricity savings to present a comprehensive picture of program effects.

It is important to point out that a billing analysis for this relatively new program cannot be performed until 12-15 months of post-installation electricity bills are available for all affordable housing units that received rebates during the first full year of program operation.

As mentioned in the discussion of the Weatherization Rehabilitation Program (D-6), measuring energy savings or other household benefits would not be possible for dwelling units that had not previously existed in the current form. Also, if there were different occupants before and after the installation of energy-saving measures, it would be difficult to accurately measure changes in energy use and affordability.

Table 5.7. Suggested record-keeping approach for affordable housing energy efficiency rebate program (E-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Major program activity (i.e., provide rebates); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.

Table 5.7. (Continued) Suggested record-keeping approach for affordable housing energy efficiency rebate program (E-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Amount of funding awarded to each participating non-profit housing developer monthly to install energy-saving measures at affordable housing sites	Program manager	Monthly	Useful to program manager for tracking each non-profit housing developers' awards
Annual numerical goal for number of affordable housing units in which rebate-financed energy-efficiency measures are installed with program funds	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of affordable housing units in which rebate-financed energy-efficiency measures are installed with program funds. For each dwelling get: recipient's name, street address, and ward; number and type of energy-efficiency measures installed; date of installation; and amount of rebate paid for each installed measure.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Number and type of rebate-financed energy-efficiency measures installed with program funds can be used, in conjunction with typical per-measure savings numbers from other sources, to estimate energy savings attributable to measures installed by program. Rebate amount and other program costs can be used, together with energy savings and electricity cost data, to calculate Benefit/Cost ratio.
Key Milestone(s) for number of affordable housing units receiving program-installed energy-efficiency measures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of affordable housing units receiving program-installed energy-efficiency measures were reached	Program manager	Quarterly	List in Quarterly Report

Table 5.7. (Continued) Suggested record-keeping approach for affordable housing energy efficiency rebate program (E-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Challenges encountered in meeting key milestone(s) for number of affordable housing units receiving program-installed energy-efficiency measures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Number of affordable housing units receiving rebates in which additional energy-efficiency measures are installed at the developer's or occupant's expense. For each dwelling get: type of dwelling (single family or multi-family); number and type of energy-efficiency measures installed; amount and source of funding; and date of installation.	Non-profit housing developers and occupants (through survey or interviews)	Annually, if possible	List in evaluation reports. Number and type of measures installed at the expense of developer or occupant can be used -- in conjunction with number of rebate-financed measures, typical per-measure savings numbers from other sources, and "influence" question (see below) -- to estimate energy savings attributable to program participation.
Influence of program on the number, type, and timing of measures installed by developer or occupant at their own expense.	Non-profit housing developers and occupants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute developer- or occupant-installed measures to program and adjust savings estimates that are based on number and type of measures installed.
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report

Table 5.7. (Continued) Suggested record-keeping approach for affordable housing energy efficiency rebate program (E-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for affordable housing units that received rebates; 24-30 months of pre-installation bills for a control group of comparable units that received rebates during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to program participation, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption
Local cost of electricity for relevant customer class	Local utility company or monthly bills used in prior calculations	Annually	Use in evaluation, in conjunction with energy savings calculations, to calculate dollar value of electricity saved. Those monetary savings will be used to calculate "income returned to household": the proportion of each household's income represented by energy cost savings.

Table 5.7. (Continued) Suggested record-keeping approach for affordable housing energy efficiency rebate program (E-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use in evaluation, in conjunction with electricity savings calculations, to calculate the CO2 emissions reduction
Occupants' reports of how receiving program services has impacted their ability to pay energy bills (including need for bill-paying assistance and discount rate) and how the program has affected their health and quality of life (e.g., changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness).	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Occupants' satisfaction with services received and suggestions for program improvements	Housing occupants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-installation electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-installation household energy burden for evaluation

Table 5.7. (Continued) Suggested record-keeping approach for affordable housing energy efficiency rebate program (E-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual household income and number of occupants for each participating household	Program records for pre-installation period, and participant survey for post-installation period	Quarterly for pre-installation period and annually, if possible, for post-installation period	Use to calculate poverty level and in calculations of "income returned to household" and household energy burden for evaluation
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-installation periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.8. WEATHERIZATION REHABILITATION AND ASSET PRESERVATION (WRAP) PROGRAM

The Weatherization Rehabilitation and Asset Preservation (WRAP) Program (E-2) performs audits and installs energy-saving measures in the dwellings of low- to moderate-income families and also refers those households to other programs for which they might be eligible. The principal outcomes from these efforts are the installation of energy-saving measures, the energy and cost savings achieved by those installations, and an increased ability by occupants of the serviced units to pay their energy bills. Table 5.8 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

While the Weatherization Rehabilitation and Asset Preservation Program only funds the installation of electricity-saving measures, EPC or the building occupant can install audit-identified gas-saving measures at their own expense. While the effort required to perform a billing analysis seems justified only for measures designed to save electricity, we suggest that *estimates* of natural gas savings should be added to measured electricity savings to present a complete picture of program effects.

A billing analysis for this relatively new program cannot be performed until 12-15 months of post-installation electricity bills are available for all low-income dwellings that received audit-identified energy-savings measures during the first full year of program operation.

Table 5.8. Suggested record-keeping approach for weatherization rehabilitation and asset preservation (WRAP) program (E-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., refer households to other programs, perform audits, install measures); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Amount of funding given to the EPC monthly to provide program services	Program manager	Monthly	Useful to program manager for tracking program outlays
Annual numerical goal for number of households referred to other programs	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of households referred to other programs	Program manager	Quarterly	List in Quarterly Report and evaluation reports
Key Milestone(s) for number of households referred to other programs, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of households referred to other programs were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of households referred to other programs, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 5.8. (Continued) Suggested record-keeping approach for weatherization rehabilitation and asset preservation (WRAP) program (E-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of audits to perform on low- to moderate-income dwellings	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed on low- to moderate-income dwellings	Program manager	Quarterly	List in Quarterly Report and evaluation reports
Key Milestone(s) for number of audits to perform on low- to moderate-income dwellings and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits performed on low- to moderate-income dwellings were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of audits to perform on low- to moderate-income dwellings, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Annual numerical goal for number of low- to moderate-income dwellings in which audit-identified energy-saving measures are installed with program funds	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of low- to moderate-income dwellings in which audit-identified energy-saving measures are installed with program funds. For each dwelling get: recipient's name, street address, and ward; type of dwelling (single family or multi-family); number and type of energy-saving measures installed; savings estimates from pre-installation audit for each measure installed; date of installation; and costs of audit, measure installation, and EPC administration.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Number and type of audit-identified energy-saving measures installed with program funds can be used, in conjunction with per-measure savings estimates from pre-installation audits (or typical per-measure savings numbers from other sources) to estimate energy savings attributable to measures installed by program. Cost data can be used with energy savings to calculate Benefit/Cost ratio.

Table 5.8. (Continued) Suggested record-keeping approach for weatherization rehabilitation and asset preservation (WRAP) program (E-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Key Milestone(s) for number of low- to moderate-income dwellings receiving program-installed energy-saving measures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of low- to moderate-income dwellings receiving program-installed energy-saving measures were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of low- to moderate-income dwellings receiving program-installed energy-saving measures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Customer satisfaction with measures installed by program	Program manager (from standard evaluation form)	Quarterly	Useful to program manager for quality control purposes
Number of low- to moderate-income dwellings in which additional audit-identified energy-saving measures are installed at the expense of EPC or occupant. For each dwelling get: type of dwelling (single family or multi-family); number and type of energy-saving measures installed; savings estimates from pre-installation audit for each measure installed; costs of measure installation; and date of installation.	EPC and occupants (through survey or interviews)	Annually, if possible	List in Quarterly Report and evaluation reports. Number and type of measures installed at the expense of EPC or occupant can be used -- in conjunction with number of program-installed measures, per-measure savings numbers from audit (or typical per-measure savings numbers from other sources), and "influence" question (see below) -- to estimate energy savings attributable to program participation.

Table 5.8. (Continued) Suggested record-keeping approach for weatherization rehabilitation and asset preservation (WRAP) program (E-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Influence of audits on the number, type, and timing of measures installed by EPC or occupant at their own expense.	EPC and occupants (through survey or interviews)	Annually, if possible	Use in evaluation to attribute EPC- or occupant-installed measures to program and adjust savings estimates that are based on number and type of measures installed.
Total number of low- to moderate-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of electric utility bills for the pre- and post-installation periods for low- to moderate-income dwellings that received program services; 24-30 months of pre-installation bills for a control group of dwellings that received audits, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to program services, by comparing difference between pre- and post-installation weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation
Total annual electricity consumption in DC	Secondary sources	Annually	Can use to gauge potential for electricity savings and to compare program-achieved savings with total District-wide consumption

Table 5.8. (Continued) Suggested record-keeping approach for weatherization rehabilitation and asset preservation (WRAP) program (E-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local cost of electricity for relevant customer class	Local utility company or monthly bills used in prior calculations	Annually	Use in evaluation, in conjunction with energy savings calculations, to calculate dollar value of electricity saved. Those monetary savings will be used to calculate "income returned to household": the proportion of each household's income represented by energy cost savings.
Amount of CO2 emissions per kWh or million source BTUs of electricity for local utility (or utilities using a similar mix of fuels in their generating plants)	Local utility or secondary sources	Annually	Use in evaluation, in conjunction with electricity savings calculations, to calculate the CO2 emissions reduction
Recipients' reports of how receiving program services has impacted their ability to pay energy bills (including need for bill-paying assistance and discount rate) and their ability to remain in their dwelling and how the program has affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness).	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Recipients' satisfaction with any aspects of program not covered by standard evaluation form, and suggestions for program improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report

Table 5.8. (Continued) Suggested record-keeping approach for weatherization rehabilitation and asset preservation (WRAP) program (E-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Twelve months of pre- and post-installation electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-installation household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-service period, and participant survey for post-service period	Quarterly for pre-service period and annually, if possible, for post-service period	Use to calculate poverty level and in calculations of "income returned to household" and household energy burden for evaluation
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-service periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.9. RESIDENTIAL ESSENTIAL SERVICE (RES) EXPANSION AND AWARENESS CAMPAIGN

The Residential Essential Service (RES) Expansion and Awareness Program (G-1) provides discount natural gas rates to low-income families. The principal outcome is an increased ability by program participants to pay their natural gas bills. Table 5.9 shows the specific information to be collected regarding program expenditures, activities, and outcomes.

Table 5.9. Suggested record-keeping approach for residential essential service (RES) expansion and awareness campaign (G-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Major program activity (i.e., provide discount rate); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual numerical goal for additional number of households served by Residential Essential Service (RES) expansion and the cumulative amount of funds expended	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of households served by Residential Essential Service (RES) expansion. Get dollar amount of discount provided to each household; recipient's name, street address, and ward; and cumulative amount of funds expended for all households combined.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Dollar amount of discount will be used to calculate "income returned to household": the proportion of each household's income represented by program payments.
Key Milestone(s) for number of households served and cumulative expenditures, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date that Key Milestone(s) for number of households served and cumulative expenditures were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of households served and cumulative expenditures, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 5.9. (Continued) Suggested record-keeping approach for residential essential service (RES) expansion and awareness campaign (G-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential
Number of DC households receiving RES prior to this expansion and the cumulative amount of that discount	Washington Gas	Annually	Can use to calculate magnitude of this DDOE program relative to previous RES
Recipients' reports of how receiving discount rate has impacted their ability to pay energy bills and affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports
Recipients' satisfaction with discount rate and suggestions for improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-assistance electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-assistance household energy burden for evaluation

Table 5.9. (Continued) Suggested record-keeping approach for residential essential service (RES) expansion and awareness campaign (G-1)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of income returned to household and household energy burden for evaluation
Local temperature data [a]	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

5.10. HEATING SYSTEM REPAIR, REPLACEMENT AND TUNE-UP

The Heating System Repair, Replacement and Tune-up Program (G-2) conducts audits and performs gas heating system tune-ups, repairs, and replacements in low-income dwelling units. The principal outcomes from these efforts are more efficient gas heating systems in the serviced dwellings, the energy and cost savings achieved by those more efficient systems, and an increased ability by service recipients to pay their natural gas bills. Table 5.10 shows the specific information to be collected regarding expenditures and program activities as well as other data to be used in the quantification of outcomes.

A billing analysis for this program cannot be performed until 12-15 months of post-installation natural gas bills are available for all dwelling units in which gas heating system tune-ups, repairs, and replacements were performed during the first full year of program operation.

Table 5.10. Suggested record-keeping approach for heating system repair, replacement and tune-up (G-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Program budget	Program manager	Annually (by Program Year)	List in Quarterly Report
Expenditures for three major categories: (1) Program activities -- disaggregated by major activity, if possible (e.g., perform audits, service gas heating systems); (2) Administrative functions -- divided into relevant classes, if possible (e.g., salaries, fringe benefits, supplies, and equipment); and (3) Program evaluation.	Program manager	Quarterly	List in Quarterly Report. Comparison of expenditures in different categories can provide insights on program cost-effectiveness for evaluation reports.
Annual funding allotted to each Community Based Organization (CBO) to provide program services	Program manager	Annually	List in Quarterly Report
Amount of funding awarded to each CBO monthly to provide program services	Program manager	Monthly	Useful to program manager for tracking each CBO's awards against its annual allocation
Annual numerical goal for number of audits to perform on low-income gas-heated dwelling units	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of audits performed on low-income gas-heated dwelling units	Program manager	Quarterly	List in Quarterly Report and evaluation reports
Key Milestone(s) for number of audits to perform on low-income gas-heated dwelling units and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of audits to perform on low-income gas-heated dwelling units were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of audits to perform on low-income gas-heated dwelling units, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report

Table 5.10. (Continued) Suggested record-keeping approach for heating system repair, replacement and tune-up (G-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for number of low-income dwelling units in which to perform gas heating system tune-ups, repairs, or replacements	Program manager	Annually	List in Quarterly Report and evaluation reports
Number of dwelling units in which gas heating system tune-ups, repairs, or replacements are performed. For each one get: recipient's name, street address, and ward; type of dwelling unit (single family or multi-family); type of service performed (tune-up or repair/replacement); savings estimate from pre-service audit; date of service; service costs; and CBO responsible for service.	Program manager	Quarterly	Use in Quarterly Report and evaluation reports. Estimated program savings can be taken from energy audit or estimated independently based on type of service performed and typical savings numbers for that type of service taken from other sources. Cost data can be used with energy savings to calculate Benefit/Cost ratio.
Customer satisfaction with services performed	Program manager (from standard evaluation form)	Quarterly	Useful to program manager for quality control purposes
Key Milestone(s) for number of dwellings in which to perform gas heating system tune-ups, repairs, or replacements, showing numerical goal(s) and the date(s) on which they should be reached	Program manager	Quarterly	List in Quarterly Report
Date(s) that Key Milestone(s) for number of dwellings in which to perform gas heating system tune-ups, repairs, or replacements were reached	Program manager	Quarterly	List in Quarterly Report
Challenges encountered in meeting key milestone(s) for number of dwellings in which to perform gas heating system tune-ups, repairs, or replacements, and remedial actions taken	Program manager	Quarterly	List in Quarterly Report
Total number of low-income households in DC	Secondary sources	Annually	Can use to gauge program potential

Table 5.10. (Continued) Suggested record-keeping approach for heating system repair, replacement and tune-up (G-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Annual numerical goal for amount of energy saved	Program manager	Annually	List in Quarterly Report
Twelve to fifteen months of gas utility bills for the pre- and post-service periods for households that received heating system tune-ups, repairs, or replacements; 24-30 months of pre-installation bills for a control group of households that received services, or were placed on a waiting list, during the *following* program year	Local utility	Annually, if possible, beginning 15 months after completion of first program year	Can use to calculate amount of energy savings attributable to services performed, by comparing difference between pre- and post-service weather-normalized energy use for treatment and control groups. Give this information in evaluation reports.
Local temperature data	Secondary sources	Annually	Use to normalize energy consumption data to account for year-to-year variations in weather in energy savings calculations for evaluation
Total annual natural gas consumption in DC	Secondary sources	Annually	Can use to gauge potential for natural gas savings and to compare program-achieved savings with total District-wide consumption
Local cost of gas for relevant customer class	Local utility company or monthly bills used in prior calculations	Annually	Use in evaluation, in conjunction with energy savings calculations, to calculate dollar value of gas saved. Those monetary savings will be used to calculate "income returned to household": the proportion of each household's income represented by energy cost savings.

Table 5.10. (Continued) Suggested record-keeping approach for heating system repair, replacement and tune-up (G-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Amount of CO2 emissions per ccf or million source BTUs of natural gas	Secondary sources	Annually	Use in evaluation, in conjunction with gas savings calculations, to calculate the CO2 emissions reduction
Recipients' reports of how receiving heating system services has impacted their ability to pay energy bills (including need for bill-paying assistance and discount rate) and affected their health and quality of life (e.g, changes in perceived indoor comfort, need to forego food or medicine to pay utility bill, number of days of work missed due to illness)	Program participants (through survey or interviews)	Annually, if possible	Describe in evaluation reports.
Recipients' satisfaction with any aspects of program not covered by standard evaluation form, and suggestions for program improvements	Program participants (through survey or interviews)	Annually, if possible	Use to refine program design, as appropriate
Annual numerical goal for reduction in average household energy burden (energy expenditures divided by household income) [a]	Program manager	Annually	List in Quarterly Report
Twelve months of pre- and post-installation electric and gas utility billing records showing energy consumption and payments for each participating household [a]	Local electric and gas utility companies	Annually, if possible, beginning 12 months after completion of first program year	Use in calculations of pre- and post-installation household energy burden for evaluation
Annual household income and number of occupants for each participating household	Program records for pre-assistance period, and participant survey for post-assistance period	Quarterly for pre-assistance period and annually, if possible, for post-assistance period	Use to calculate poverty level and in calculations of "income returned to household" and household energy burden for evaluation

Table 5.10. (Continued) Suggested record-keeping approach for heating system repair, replacement and tune-up (G-2)

Key Data to Collect	Data Source	Frequency of Data Collection	Data Application
Local temperature data	Secondary sources	Annually	Use in evaluation to normalize energy burden by accounting for year-to-year variations in weather
Monthly electricity and gas rates during the pre- and post-assistance periods [a]	Local electric and gas utility companies	Annually	Use in evaluation, along with data on monthly energy consumption, to interpret calculated changes in energy burden

[a] These data should only be collected *if* DDOE and its regulators choose to examine changes in household energy burden.

6. SUMMARY AND RECOMMENDATIONS

As noted previously, the data gathered on DDOE's energy programs have three major applications: to provide information to help managers improve their programs; to allow the preparation of quarterly reports documenting program achievements; and to facilitate the performance of periodic evaluations that measure how well the various programs are achieving their objectives. Each program should have its own data bases, which could be shared with others as needed.

For each program, the data to be used for management purposes and in quarterly reports should be kept in one database while data earmarked for program evaluations should be kept separately. The evaluation database would tend to contain substantial amounts of detailed information which would be collected only when needed for a specific evaluation. Much of the data collection effort is likely to be done by professional evaluators rather than by program staff, and evaluators would be the principal users of those data. In contrast, the management/quarterly report database would have data entered into it on a regular basis by program staff, would contain information that is relatively easy to understand, is likely to be accessed often by managers and staff members, and could easily be shared with a variety of audiences.

We suggest that Microsoft Excel be used for the management/quarterly report databases because it is easy to use and the program managers and staff who would be working with it are generally familiar with the software. Because the evaluation databases would primarily be used by evaluation professionals, there are more options from which to choose (e.g., Excel, Access, SAS). The preferred format should be established on an individual basis, with the choice determined by the types of data involved and the analyses to be performed.

The management/quarterly report databases should be designed and set up by managers or staff members involved with the individual energy programs or by DDOE's Information Technology (IT) staff, while evaluation professionals would perform those functions for the evaluation databases. In both instances, the appropriate information for each program is shown in the tables contained in the previous chapters but designing the specific layout would require additional work.

The management/quarterly report databases could be kept in a network share (a subdirectory or folder on a computer where users can download or upload files) or at a share point/portal (which allows the sharing of files but also has the capability to perform a variety of additional functions.) The network share or share point could be set up by DDOE's IT staff or by the DC Office of the Chief Technology Officer. Access could be restricted to the appropriate people and different users could be given different privileges (e.g., read only, read and write). Storage of Excel data on a network share or share point would allow authorized users to download spreadsheets to their personal computers at any time. Evaluation data are likely to be kept on the evaluation contractor's computer, but it is possible that some of those data could also be kept in the same place as the management/quarterly report databases and made available to other users.

Program managers or staff with access to the network share or share point could enter management/quarterly report data online (as opposed to having to physically sit at the computer where the data are stored). Under such an arrangement, the data set could be updated each time new data are entered. The appropriate data entry method for each evaluation database should be determined by the evaluation contractor but it is more likely that data would be entered directly into the computer in which they are stored.

The frequency of data collection for evaluation purposes suggested in the previous chapters are ideals that may not be achievable given the resource constraints that often apply to real-world programs. While it

would be very helpful to program managers, regulators, and clients to have important outcomes measured annually, as suggested here, it may be necessary to allocate evaluation resources to a subset of programs each year so that any given program might be measured using rigorous evaluation techniques every second or third year.

When savings are *estimated* based on the measures installed and some measures are self-financed, attribution to the program can be determined (though less rigorously than with a control group) by asking participants to report the extent to which their self-financed measures were due to the program services received. Of course, assuming that none of the *program*-financed measures would have been installed by service recipients in the absence of the program can overstate savings to some extent, which is why the use of a treatment/control group design provides more rigor than savings estimates based on a count of measures installed.

Any surveys used to collect information from program participants, or other relevant parties, would be designed by DDOE staff or, more likely, by the professional evaluators hired to study the program in question.

Where billing data are used, 12-15 months of pre- and post-treatment bills are typically needed for those entities receiving program services and 24-30 months of bills are needed for control group members to correspond to the pre-and post-treatment periods. Advance requests for billing data can reduce the delays that often occur when such requests are not made until a program evaluation is initiated. If possible, control group members should be selected from subsequent program participants or from those on the waiting list to ensure that the two groups (treatment and control) have similar characteristics.

In nearly all cases where savings are quantified, the comparison of savings by treatment and control groups shows the amount of savings due to program services. This is accomplished by subtracting the change in energy use that would have occurred in the absence of the program (represented by the control group's change in consumption) from the change experienced by the group receiving program services. The one exception to this is for the Renewable Energy Demonstration Program (B-4), where the program funds only a portion of the renewable energy installations that are made so the savings revealed by the comparison of treatment and control groups is not all attributable to the program. In that case, the program portion of savings is represented by the fraction of total installation costs provided by the program.

To repeat a point made earlier, having good records of program activities and accomplishments is important for program management purposes, preparing quarterly reports, and facilitating periodic program evaluations. The record-keeping procedures suggested in this report should be useful to DDOE for all those purposes.

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