

Guide for Benchmarking Residential Energy Efficiency Program Progress

REVIEW OPPORTUNITY

Home energy upgrade programs are being sought to review this draft Guide for Benchmarking Residential Energy Efficiency Program Progress. Your participation in this phase of the Guide's development will help lay the foundation for a future Better Buildings Residential Network Benchmarking initiative. You can help make program progress benchmarking more common among residential energy efficiency programs and gain new insights from the sharing of consistent information across programs.

The Guide will help residential program managers:

- Identify metrics that measure their goals
- Develop a program benchmarking plan to identify their program's strengths and weaknesses
- Measure progress for years to come by establishing a baseline of performance
- Gain insights from comparing to peers
- Communicate success with key stakeholders

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Table of Contents

Executive Summary	3
Introduction.....	4
Step 1. Use Program Goals to Guide Benchmark Planning	4
Step 2. Identify Potential Metrics that Measure Your Goals	6
Step 3. Determine How You Will Collect Information	8
Step 4. Assess the Level of Effort and Finalize Metrics.....	12
Step 5. Put the Process in Place and Get Started!.....	14
Step 6. Share Results Effectively.....	16
Step 7. Benchmarking Against Peer Programs	18
Additional Resources and References.....	21
Appendix A – Recommended Benchmarking Metrics	23
I. Table 1: Gross Program Outcome Metrics	27
II. Table 2: Normalized Program Progress Metrics.....	33
Appendix B – BBNP Peer Group Benchmarking Examples	39
Appendix C – Planning Worksheets	47

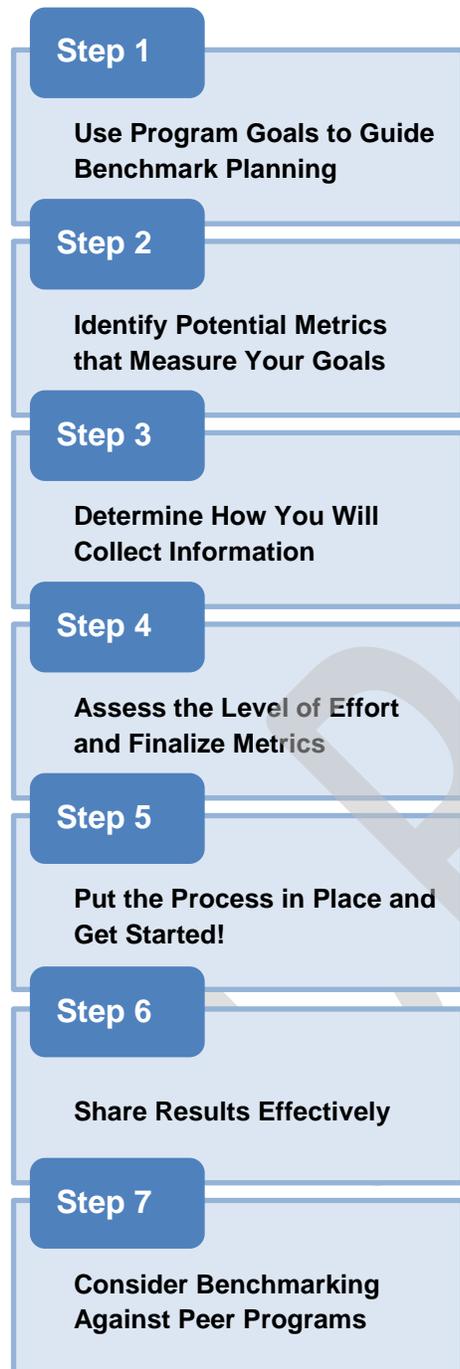
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Guide for Benchmarking Residential Energy Efficiency Program Progress

Executive Summary



In order to effectively engage customers and achieve savings, the most-successful Residential Energy Efficiency Programs continually assess their performance and enhance their programs. Program benchmarking provides valuable information that can lead to better program design and delivery decisions. This Guide provides an inventory of recommended Residential Program Progress Metrics, describes approaches for using them effectively, and gives examples of peer benchmarks from the Better Buildings Neighborhood Program for comparison. In addition, the Guide lays out a step-by-step action plan for developing an internal Benchmarking Plan for your residential program. Information is presented in the form of high-level, actionable guidance on key topics that need to be addressed.

The recommended benchmarking metrics described in this Guide include 26 indicators of total program impact. They provide information on participation, saving, and spending as well as other program and market performance. An additional 21 metrics, calculated from the program impact data, offer standardized information useful for comparing year-to-year or with other programs. These can also guide design improvements through a better understanding of program efficiency, energy savings, marketing and sales performance, and customer benefits.

In order to provide information that is clearly understood, consistent over time, and comparable to others, these recommended metrics are based on standard definitions. Guidance is also given on establishing internal consistency and tailoring the metrics to meet the characteristics of individual programs.

Depending on your current operations and level of experience, you may not need to implement all of these steps, but each should be considered when developing a benchmarking plan. New program managers will find that this Guide offers a clear pathway to effectively measuring your program's progress. While more-experienced managers are likely already measuring program performance, reviewing the metrics given here may help you identify additional useful information to add to your current plan.

Introduction

Program benchmarks are extremely important for effective energy efficiency upgrade programs to set realistic goals, measure progress over time, and identify areas for improvement. In recent years, hundreds of communities have worked to promote energy efficiency upgrades in homes through utility-sponsored programs, [Home Performance with ENERGY STAR](#), and the [Better Buildings Neighborhood Program \(BBNP\)](#). Their challenge – to address financial, educational, and service access barriers that stand in the way of making home improvements that save heating fuel and electricity and reduce homeowner energy costs. Delivering programs to address these challenges in a way that is effective and efficient provides the best chance for making a difference. But it may be hard from year to year to determine success when budgets, markets, and program delivery are evolving. The result of integrating benchmarking into your program design planning is better information that can lead to more-effective programs, higher impact, and a stronger basis to secure future funding.

Identifying good information to track requires thoughtful consideration of what you want to learn. Putting a system and process in place to gather that information and to use it wisely can be costly and time consuming. Like all such efforts, deliberate planning as you lay out your process will provide benefits down the road. Follow the step-by-step procedures laid out below to:

- identify metrics that will provide useful information to strengthen your programs;
- put an effective process in place to collect, track, and analyze data;
- develop benchmarks that reflect your program performance across time and in comparison to others; and
- report about your performance in effective ways.

Step 1. Use Program Goals to Guide Benchmark Planning

Re-visit your program objectives

Benchmarking is a powerful tool to help gather feedback about progress toward meeting your program objectives. Keeping those objectives front and center as you design a benchmarking strategy provides a focus for making decisions. Start the process by specifically *listing your program objectives*. Worksheet #1, provided in the Resources section, gives you a template to use for this.

As the manager of an energy efficiency program, you are often asking questions about the performance of your program. Am I succeeding or failing? How do I really know? Is my program becoming more effective compared to last quarter, or last year? Are my goals too low or too high compared to my peers? Ultimately, all program managers are accountable to funders and regulators (e.g., governor, city council, board, legislature, utility, public utility commission) and to other stakeholders (homeowners, community leaders, contractors, media, etc.), who all want to see progress toward program objectives in terms of measurable outputs: the results produced through your program activities.

ABOUT BENCHMARKING

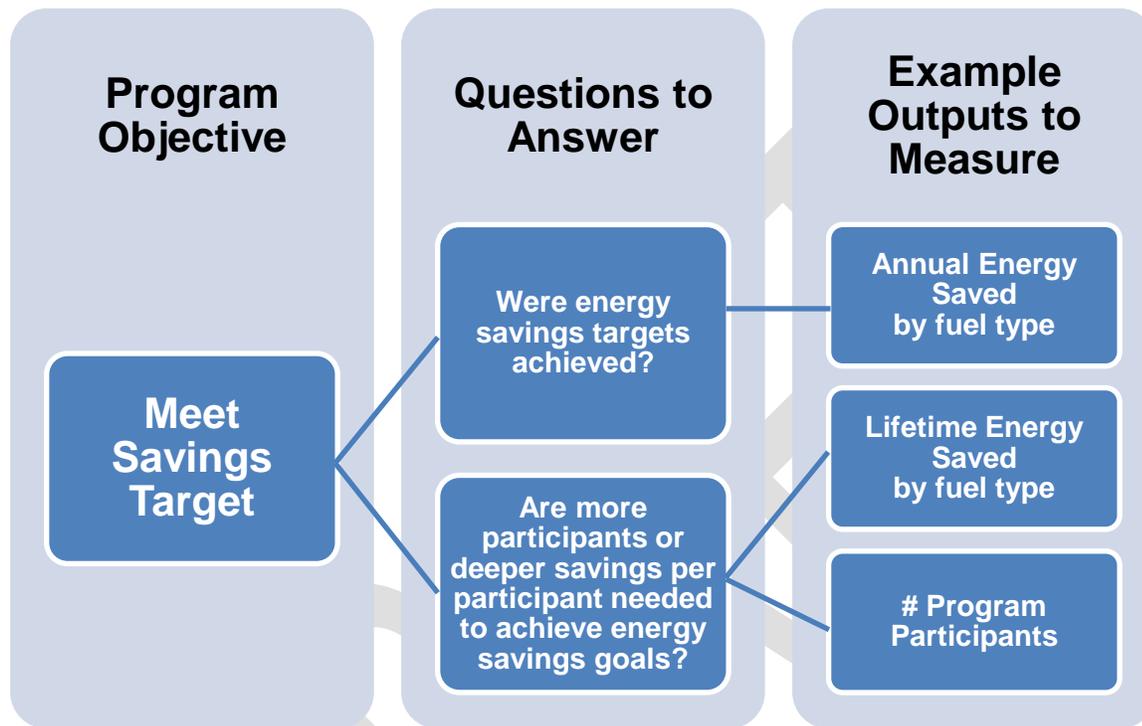
Benchmarking is the process of gathering, tracking, and assessing a program's current performance against past results in order to ***measure progress over time***, or to ***compare results to a peer group***.

Why benchmark? By making performance measurable and visible, program administrators can improve the design and delivery of their programs and enhance program successes. Benchmarking will:

- Help you set realistic goals and define success.
- Allow you to communicate progress.
- Assist with program management by:
 - ✓ Letting you assess where to adjust program design and delivery.
 - ✓ Establishing the cost necessary to achieve program outcomes.
 - ✓ Supporting and justifying continued investment in your program.

Prepare a list of questions relevant to those objectives

The figure below illustrates a useful way to go about moving from the high level of identifying program objectives to the detailed level of finding measurable outcome metrics to track. In this example, a program with an energy saving goal established by their state legislature might ask these two questions to determine how well they are meeting that goal. Thinking about the information that would be needed to answer these questions points to appropriate data to collect and analyze.



At this early stage in your planning, it is effective to *re-frame your program objectives as questions* to help make this leap to suitable metrics. Prepare a list of the questions that are relevant to your objectives – brainstorm about all the things that would be useful to know, without worrying at this point about how you answer them (more about useful ways to do that in Step 2). Think about which are most important, or perhaps which seem hardest to answer given your current understanding of how your program is doing. You might use a simple table like that in Worksheet 1 in Appendix C to help organize your thinking. An example of Worksheet 1 is filled out below with some common program objectives, and a few questions about each, and outcome metrics for illustration (these are just examples – see Step 2 for a more-complete discussion of metrics to consider).

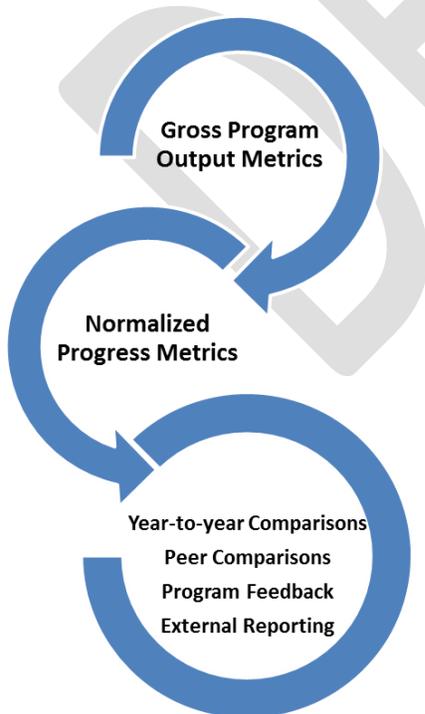
Program Objective	Questions to Answer	Example Outputs to Measure
Step 1		Step 2
Meet savings target	<ul style="list-style-type: none"> Were energy savings targets achieved? Are more participants or deeper savings per participant needed to achieve energy savings goals? 	Annual energy saved by fuel type
		Lifetime energy saved by fuel type

Program Objective	Questions to Answer	Example Outputs to Measure
Step 1		Step 2
Provide customer benefit	<ul style="list-style-type: none"> What was the average reduction in customer bills? How much energy was saved compared to the total energy used? Was it a significant change? 	Energy bill savings
		Percent energy saved
Increase market penetration	<ul style="list-style-type: none"> How effective are program marketing campaigns and contractors' sales efforts? What percentage of the market/available stock was improved? 	Conversion rates from leads to assessments to upgrade projects
		Number of buildings upgraded
Optimize program efficiency / cost-effectiveness	<ul style="list-style-type: none"> Did the total investment in building improvements exceed the amount invested to encourage those improvements? 	Program costs invoiced project cost
Support workforce development	<ul style="list-style-type: none"> Is the professional workforce growing? What is the supply of the active workforce? 	Number of individuals (assessors, raters, and contractors)

Step 2. Identify Potential Metrics that Measure Your Goals

Choose metrics to consider for your benchmarking plan

The next step is to develop a preliminary list of metrics to help track progress toward your goals. You may find it helpful to use the Worksheet you filled out in Step 1 as a tool for choosing potential metrics to assess. Review the questions you identified, and list all the metrics that could provide information to answer them. Do not worry about data availability, feasibility, or stakeholder feedback at this stage – you will address these issues later (Step 3). Just think about what information would be useful.



Before you start this task, we want to draw your attention to two tables in Appendix A. These were specifically developed to make it easy for you to complete Step 2 by presenting an extensive set of potential metrics to consider. The metrics tables are preceded by a set of standard definitions and include recommended calculations and data collection guidance.

Program output metrics

[Table 1](#) in Appendix A provides a list of gross program output metrics. You may already track or report many of these to funders or other stakeholders. As such, they are the basic descriptive information about your program and have value as indicators of total program size and impact. In addition, they represent the raw data necessary to calculate the progress metrics listed in Table 2 (see below). Table 1 lists these Gross Program Output Metrics,

the value of each toward measuring the success of your program, challenges you may face collecting data, and recommendations on standard approaches.

Metrics useful for progress comparisons

It is important to measure your program's gross output, but gross outputs have limited value in benchmarking your program progress over time, or compared to similar programs in another locations (peer programs). For example, an increase or decrease in the number of participants may be explained by differences in budget, market size, or program design. These differences in underlying context make direct comparisons difficult.

In order to facilitate comparisons, output metrics can be expressed in some relevant per-unit way, or *normalized*. [Table 2](#) in Appendix A lists Normalized Progress Metrics, designed to facilitate comparison across years and across programs. In order to help you select metrics for your plan, Table 2 also lists the potential value of each metric, and comments on data collection and analysis. It also gives the method for calculating the metric (calculations are based on the metrics found in Table 1).

CUSTOM METRIC DEVELOPMENT

While programs share many objectives in common, some programs have specialized objectives established by their funders or by the unique characteristics of the markets and constituents they serve – for example, a particular focus on economic development or a mission to address the needs of local low-income residents. In such cases, outcome metrics should be specially designed in order to assess progress toward these goals. Think about the types of things that are good proxies for the information you need, be sure that they are specific and measurable, and that the data needed are readily available. Here are two examples of custom program metrics:

A program that wants to increase the comprehensiveness of the upgrade projects it supports tracks:

- Average air leakage per project;
- Percent of projects with sq. feet of insulation added equal to at least 50% of a home's finished sq. feet of floor area; and
- Percent of projects with both shell measures and heating system measures installed.

A program that wants to support the development of a high-quality local workforce tracks:

- Training budget (in total, and average per participating contractor), and
- Number of workers that achieve professional certification.

Consider whether there are other metrics your program might track that are valuable internally for program management, even if they are difficult to aggregate across programs or use as a peer benchmark.

Step 3. Determine How You Will Collect Information

Now that you have identified what you would like to know about your program, you should establish how you will gather this information.

Review characteristics of effective data systems

Many different options exist to collect, track, and analyze data. To efficiently measure your progress, your data collection and analysis process should be:

- *Reliable* – so that you can have confidence in the quality of your data.
- *Easy* – to help increase buy-in from stakeholders and facilitate finding staff to perform the data collection.
- *Consistent* – to ensure that changes (for example, in staffing) do not affect the data collection effort or quality over time, and so that you can be confident that the data you will analyze is what you expect it to be.
- *Timely* – so that the data collected can be used to assess program performance without delay, and so that analyses can be available for any reporting requirements.
- *Transparent* – so that definitions of assumptions are clear and the information collected allows for comparisons over time and across peer programs, even if analyses and reporting requirements change.

Outline your data collection and analysis needs

The following steps provide some guidance for outlining your data collection and analysis effort.

1. The output metrics selected for benchmarking dictate the data required to calculate them, so the first step is to *identify all the data inputs required*.
2. *Determine the granularity and collection frequency* that your chosen metrics will require to be of greatest value. Make the level of detail appropriate for your needs. For example, should you track savings at the program level, contractor level, project level, or energy efficiency measure level? Should you assess how metrics evolve from year to year, quarterly, monthly, or weekly? Avoid collecting details that you will not subsequently use.
3. *Identify who owns the data and who will be providing it* – internal program staff; contractors; utilities; finance partners; etc. It is important to identify the datasets necessary for benchmarking. This could include internal program and budget information, energy project measures and timelines, project invoice and cost information, and energy consumption data. Collecting this information is aided by establishing clear roles and identifying avenues for data access. Delegating collection responsibilities may help create a more manageable process and can empower end users in the decision-making process.

TIP:

Want to maximize the chances that your data collection system works smoothly and is used by all stakeholders in the way you hoped? Interview data providers, vendors, and others as you design the process to assure that it is feasible and meets their needs as well. For example, ask:

Data owners (e.g., contractors, building owners, utility)	Is the information available/accessible? How is it being tracked and collected now? Are you willing to provide it? What is the burden/cost to provide it? Will you want to see the results?
Other program managers and third-party data solution vendors	What is available? What is being used? Will it reduce a burden? How? How soon? What will it cost? How flexible is it? Does it provide benefits for multiple program objectives?

A table like the one below can help you organize all this information (and provides a basis for later steps as well), as follows:

- Start by listing each metric that you are considering (from Step 2).
- For each, identify all the data needed to calculate it, along with specific definitions to clarify exactly what is required.
- Specify the level at which the data should be tracked – program, contractor, measure, etc.
- Identify the source or owner of each part of the information, and how often it should be reported.

We will revisit this table again in Step 4 to add information on feasibility and cost of collection, and to prioritize the metrics. Data needed to characterize average customer savings is shown as an example in the form below; a blank worksheet version of this table is available in Appendix C to help you consolidate this information (see Worksheet 2).

Metric	Data Needed to Calculate (Definition)	Data Collection Level	Data Owner	Collection Frequency
Step 2	Step 3			
EXAMPLE: Average customer monetary savings per upgrade across program	Estimated Annual Energy Bill Savings in Dollars	Per Home Upgrade Project	Home Assessor Contractor	Each Occurrence
	Unique Home Upgrade Project Identifier	Per Home Upgrade Project	Home Assessor Contractor	Each Occurrence
	Upgrade Completion Date (define this as the date of invoice)	Per home upgrade project	Contractor	Each Occurrence

Develop data collection procedures and identify tools

Procedures and tools for data collection, processing, and analysis can span a wide range of options from simple to elaborate, so think about what will meet your needs, and how much time and money you realistically want to devote to it. Tools can be as simple as a custom-made spreadsheet that allows you to keep all your data in one place, or a more-complex database designed to store data and produce custom reports. At the more-sophisticated end of the spectrum, you could also choose to purchase third-party software designed specifically to track home improvement program data, allowing you to collect a wide range of data at the customer, contractor, and program level. Programs like [Clean Energy Works](#) leverage investment in software that tracks project, customer, and lender data. This provides information for reporting to funders and lenders, feedback for program design, and operational efficiencies such as managing contractor timeliness in terms of responding to homeowners.

Investing time and resources to thoughtfully plan a data collection, transfer, and storage system will be worth the effort and is less costly than working out the process as it is developed and implemented. It is beyond the scope of this Guide to provide technical-level details on designing a data system. However, these are the key topics that should be addressed as you plan out your processes. Consider:

- *Data collection* – Data may come in through paper documentation, online forms, contractor surveys, software input tools, etc. As much as possible, use templates, checklists, or input forms and processes already in place to leverage efforts. Be sure to use data that is “stable” – at the point of the invoice or later – and that information is provided by reliable sources.

- *Data quality and completeness* – Final outcomes are only as good as the data that goes into the system. Consider adding data review and verification steps to the process.
- *Data transfer* – Be sure that formats are compatible and that security and confidentiality of any data transfers from one collection platform or process to final tracking and analysis tools is a priority.
- *Data aggregation and storage* – Inventory the type of tools that you will use as the data repository. Determine whether you will only need to aggregate data at the whole-program level, or whether you want to retain information aggregated by sub-categories (e.g., by contractor or by type of upgrade measure) for use in targeted metrics about performance of these groups.
- *Calculations, analysis, and data visualization* – consider what output you may want to generate, and the best tools to develop.

TIP:

Consider involving your external evaluators in your data system design process. They will be one of the principal reviewers of the results of your data collection and analysis, so they will have recommendations on useful ways to collect and track information. In addition, they have worked with many other programs, and can therefore help you identify more (and less!) effective systems and processes.

Some processes may appear low-cost and easy to use, but may prove to add to staff time or become cumbersome when implemented at the program scale. For example, paper- or spreadsheet-based information collection processes are often simple to develop and roll-out, but they may become cumbersome when aggregating and storing data from many sources. More-sophisticated software products can be expensive, whether developed internally or purchased, but they may be worth considering if they provide value in multiple ways, such as saving staff time, improving coordination, and professionalizing reporting. For example, some are designed to standardize data collection in the field, track and report on project timeline and performance for both contractors and customers, and capture and analyze a large array of important project information.

Data Collection in Action

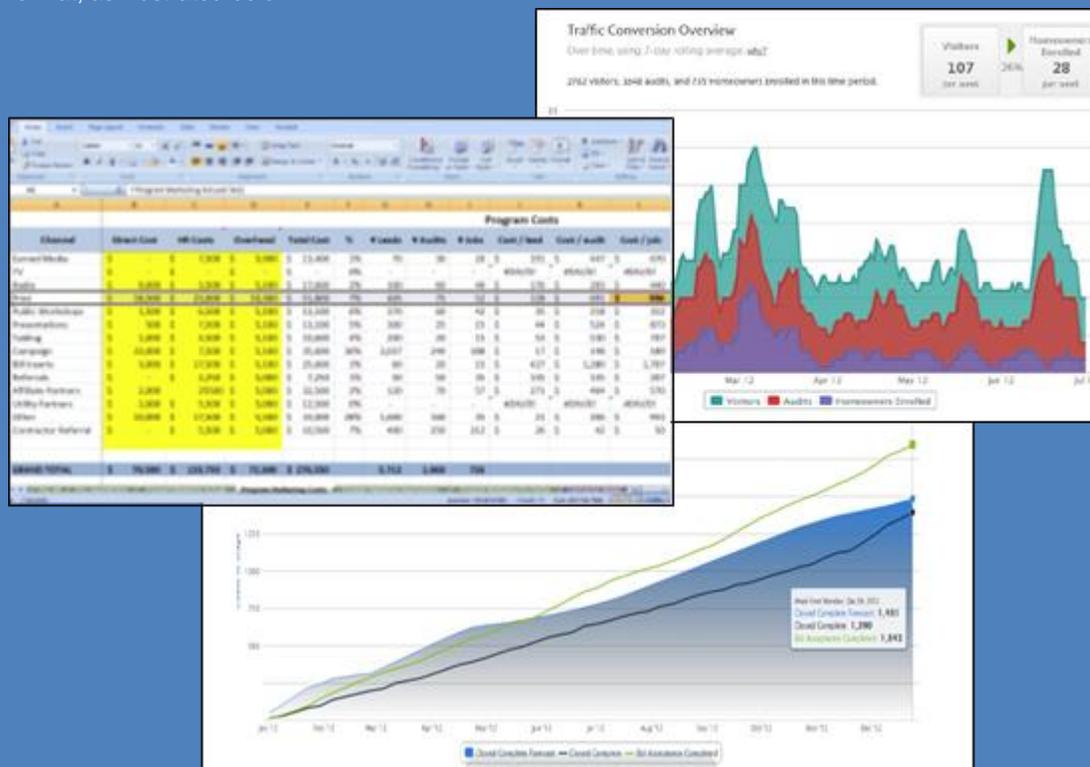
➤ The Local Energy Alliance Program (LEAP) is an organization doing Home Performance with ENERGY STAR efficiency upgrades in Virginia. They collected data on their program performance, marketing efforts, contractor performance, and their customers' experience using a variety of tools, including:

- Better Buildings Neighborhood Program reporting Excel sheets – for reporting to funders.
- Internally designed residential summary Excel spreadsheets – for monthly program summaries.
- Third-party software – for individual customer energy profiles, project management tools, and savings, costs, and measure data for upgrades.

Their performance data tracking system allows them to monitor many of the important metrics recommended in this guidebook. For example, they track program costs using an Excel tool. They also monitor assessment-to-enrolled customer conversion rates using third party software that lets them track results and manage program data:

➤ Clean Energy Works Oregon (CEWO) has grown since its inception and now handles over 1,500 simultaneous projects. Project, customer, and lender data are all integrated into third-party project data-tracking software that contractors, customers, program managers, and lenders can access.

The software used also allows them to track many metrics, including conversion rates, average time at each project stage, volume of applicants and project, program spending, economic impact of the program, and marketing campaign success data. The data platform also allows them to compare forecasted metrics and actual results, report performance to program partners (city, state, DOE), and identify needed tweaks to program design. Data collection and tracking can take a variety of forms and can involve a combination of several tools, providing a range of outputs in table or graphic format, as illustrated below



Step 4. Assess the Level of Effort and Finalize Metrics

There will be tradeoffs in cost and value for every metric you consider. Because the objective of benchmarking is not just to collect lots of data but rather to inform program decisions, you will want to select the most-effective approach, balancing the value and relevance of the data against the costs and burden of collection and analysis before you finalize your list of metrics.

Assess the feasibility, burden, and cost of data collection and analysis

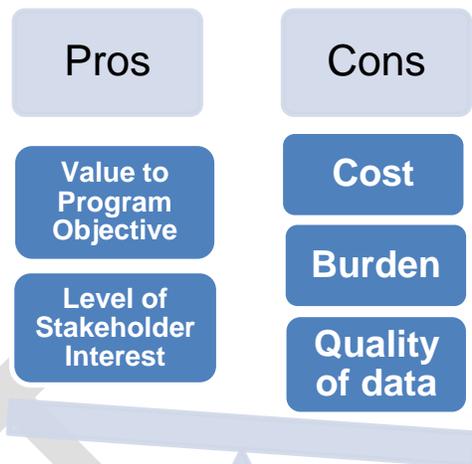
Collecting and aggregating all the data necessary to measure program outcomes can present operational and resource challenges. Be sure to consider the feasibility of each metric – that is, how available is it now, or how easy would it be to collect in the future – as well as any additional burden collecting and tracking it will place on the current process.

Estimate total costs of data collection and analyses, along with ability to collect good-quality data. Make sure you consider the following costs:

- Labor costs, including:
 - Labor costs that will be incurred by contractors or data aggregators who own or manage the data.
 - Training costs for staff to learn how to use new data management tools or processes.
 - Labor costs for your program staff to aggregate, compile, and analyze the data.
 - Labor costs associated with data quality verification.
- Tools and processes, including the cost to:
 - Develop any in-house tools and processes.
 - Purchase and maintain software licenses.
 - Contract to receive data from data owners.

In addition, be sure to consider opportunities provided by tools and processes that support multiple data needs. For example, a third-party project management and tracking tool may appear quite costly at first glance. However, providing a structured format for collecting reliable information about all the details of a project – cost, savings, measures installed, time line, contractor information – may justify its up-front investment, particularly if the data are made available in a format that integrates easily with other program processes.

Take another look at the Worksheet you began in Step 3 (Worksheet 2 in Appendix C). Capture information on feasibility, burden, and cost in the additional columns provided, as illustrated in the sample worksheet below (page 14). Determine the general level of cost, as well the level of burden added to your processes for each data row. These determinations do not need to be precise – a qualitative ranking, such as a low, medium, or high rating, should be sufficient to help identify your final priorities.



Consider the value and relevance of each metric

Because data collection and analysis is costly, you should plan to measure those metrics that will have the highest value for assessing your program objectives. At this point, highlight those metrics that provide the best guidance for your top-priority program objectives on the Worksheet.

Once you have filled out the matrix for all your proposed metrics, you should have the information needed to identify the most-effective ways to invest your benchmarking funds. Make several iterations if needed, and keep refining your metrics list until you are satisfied with your selection.

In addition, you have now gathered information in the Worksheet that will be useful as you put your plan in place and discuss the importance of this effort with others in your organization (see Step 5). This additional information for our example metric is shown in the table below.

BEDES and HPXML

The Building Energy Data Exchange Specification (BEDES, pronounced "beads" or /bi:ds) provides a common data format, definitions, and an exchange protocol for building characteristics, efficiency measures, and energy use to support analysis of measured energy performance of commercial, multifamily, and residential buildings. BEDES functions as a common data specification that a range of tools and platforms can either utilize or map.

The Building Performance Institute (BPI) Standard for Home Performance-Related Data Transfer, commonly known as HPXML, is a specific data specification developed by the home performance industry. It is one example of BEDES compliant standard that helps to increase interoperability among tools by mitigating the ambiguity and transaction costs associated with sharing and aggregating data.

You can find more information about BEDES on the DOE Office of Energy Efficiency and Renewable energy website: Buildings.Energy.Gov/BEDES

SEED Data Platform

The Standard Energy Efficiency Data (SEED) Platform is a web-enabled software application that helps organizations and state and local governments easily manage data on the energy performance of large groups of buildings. Users can combine data from multiple sources, clean and validate it, and share the information with others.

This software application provides an easy, flexible, and cost-effective method to improve the quality and availability of data to help demonstrate the economic and environmental benefits of energy efficiency, to implement programs, and to target investment activity.

You can find more information about SEED on the DOE Office of Energy Efficiency and Renewable Energy website: Buildings.Energy.Gov/SEED

Metric & Value	Data Needed to Calculate (Definition)	Data Collection Level	Data Owner	Collection Frequency	Feasibility	Burden	Cost
Step 2	Step 3			Step 4			
EXAMPLE: Average customer monetary savings per upgrade across program ●	Estimated Annual Energy Bill Savings in Dollars	Per Home Upgrade Project	Home Assessor Contractor	Each Occurrence	Need to specify a method to estimate savings	Need to train on estimating savings. May add to time to business process, but can also be presented to customer as a benefit. ●	●
	Unique Home Upgrade Project Identifier	Per Home Upgrade Project	Home Assessor Contractor	Each Occurrence	Need a process for assigning. Could be provided or assigned by program.	Low – add a project identifier field to records ●	●
	Upgrade Completion Date (define this as the date of invoice)	Per home upgrade project	Contractor	Each Occurrence	Available on paper or electric form of receipt.	Common business practice ●	●
For Assessing Value, Burden, and Cost: ● LOW ● MEDIUM ● HIGH							

Step 5. Put the Process in Place and Get Started!

Now that you have selected the data you want to collect and the metrics you want to track, put all your findings together into a Benchmarking Plan. This formal framework for your benchmarking effort will help map out the information and resources needed, communicate expectations to staff and stakeholders, and provide specific direction for all parties to use as the project is rolled out. Consider the following steps as you finalize your plan.

Secure buy-in from leadership, staff, and stakeholders

Present the results of your metric selection review and your recommendations for the process to your members or to leadership to make the case for support for your benchmarking effort. This support will provide legitimacy, resources, and recognition to the process. If needed, be prepared to justify your metric selection – for example, have multiple scenarios handy to explain why you made the selections that you made, and stress the value this effort will bring to meeting program objectives.

Formalize your Benchmarking Plan

You can maximize the chances of a successful implementation of your benchmarking plan by mapping out the steps that need to be taken ahead of time. The full technical details for implementing a data collection and analysis process are beyond the scope of this Guide. However, the following key steps

should be included to maximize your chances of a successful roll-out. In addition, the worksheet you developed in Steps 3 and 4 provides a good source of information for the implementation plan and may be useful in drafting a statement of work or data system requirements.

1. *Build a Benchmarking or Data and Reporting Team*, with clearly identified common goals and purpose, and well-defined roles and responsibilities. This should include internal staff as well as appropriate external parties – contractors, utility contacts, etc.

TIP:

Justifying extra, or different, work to staff and contractors may be easier if the processes and tools put in place make their lives easier or their customers happier – be sure to keep this in mind when designing!

2. *Map out an action plan for building and using the system.* Consider the following elements:
 - **Tools:** Develop, or purchase, the tools and software to facilitate data collection and management. Consider using templates, tracking processes, and benchmarking tool(s) if available (see additional resources highlighted at the end of this document). Develop new tools if you do not already have processes that meet your needs. Engage third-party vendors to assess their products.
 - **Process and procedures:** Identify the steps and processes needed to track data and complete analyses. Provide and enforce use of your chosen, standardized data collection tool and processes. This will limit data input errors and help assure complete and timely information. Write down data collection and analysis steps for consistency over time.
 - **Standards:** Be sure to provide clear definitions and standardization for data. For example, if a customer receives an assessment, and later completes a home upgrade, does this count as one or two “program participants”? When in the process is an upgrade considered “complete”? The more specific you are the cleaner and more comparable your data will be, even when collected by different individuals.
 - **Data quality:** Be sure to identify the places in the data collection, aggregation, and analysis steps where data quality and completeness can be assessed. Build steps to reconcile and review data into the process, and establish protocols to estimate or otherwise deal with missing data.
 - **Training:** Ensure staff members, contractors, and other members of the team are trained, which is one of the best ways to ensure quality reporting from the ground up.
3. *Establish timelines and data-transfer protocols* that identify who has the data, who needs to send and/or receive it, and exactly what information is required.
 - Identify appropriate formats for each type of data transfer and other communication (verbal, emails, formal memo, template, checklist, software upload, etc.).
 - Be sure that information is provided in the formats – fields, data type, etc. – that facilitate easy integration into the program’s data collection framework.
4. *Establish a plan for reporting results.* Consider who should know about the initial benchmarking plan and to whom the results will be reported. Map out the type of internal and external reporting and the information required for each (see Step 6 for more on Reporting).

Plan for feedback and change

Set a timeline to revisit the process at regular intervals. Compile the feedback received from the re-appraisal process. Plan to re-evaluate current capabilities and the need for additional training or staffing. Review other tools and processes that may enhance your benchmarking activities. Identify possible gaps, and update the plan.

- Build these questions into your review process:
 - Are the metrics being tracked still valuable?
 - Is the data quality adequate?

- Has the type of available data changed?
- Is data being received and tracked in a timely way so as to be useful for planning and project execution?
- Have the program delivery methods or objectives changed substantively?
- Has the information indeed been valuable in helping to meet program objectives?
- Who is responsible for approving any changes to the benchmarking plan, and does that need to be updated?
- Check-in periodically with contractors and other stakeholders.
 - Is the benchmarking process and information useful? That is, does it assist in informed decision making?
 - Is it accessible and usable for external communications with their customers (e.g., progress toward a goal) as well as their internal planning?

Launch your Benchmarking Effort

Once your plan is in place, test every part using realistic data. Once you are satisfied with the test results, you can begin data collection and analyses following the strategy you have established. Build a project timeline with milestones and check the milestones as you reach them to retain the momentum and to feel that you are making progress towards getting your program benchmarked!

Step 6. Share Results Effectively

Benchmarking involves synthesizing a large amount of data and presenting it in a way that is useful for making decisions. Therefore, the effort will be most beneficial if you effectively communicate to others not only your results but also the context of your progress in ways that are meaningful to them. Here are things to keep in mind as you design ways to present clear and useful results.

Present information in effective ways

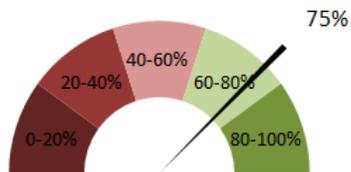
Present information in ways that will speak to your target audiences. You will need to interpret the information appropriately, and provide it through channels (for example, in-person meeting, report, webinar, posting on Web page, etc.) that best match the specific audience and intended purpose.

- Internal information can be more technical and detailed and will usually focus on progress and on results that inform the work going forward.
- Presenting aggregate results to your data owners (e.g. home assessor, participating contractors) can be valuable feedback and improve data quality when delivered early and often.
- Results to be shared with the public are often illustrated at a more-general level, and may be most effective in summary tables or graphics.
- Highlighting how reported data contributes to program results or policy changes can illustrate the value and may help improve data quality.

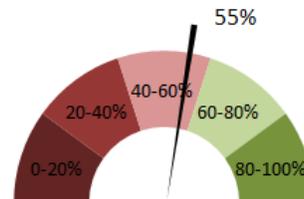
TIP – Consider developing and using a program dashboard – a regularly updated, easily accessed summary report of key metrics – to help monitor program progress toward your goals. Depending on goals and needs, a dashboard could include energy savings, program satisfaction, jobs created, and cost of service delivery. They can include detailed graphs with lots of information, or simple meters to quickly indicate progress, as in the examples below.

Dashboards can be particularly effective for internal feedback. Before designing external dashboards for any potential users (contractors, customers), understand their needs and level of interest in using them.

Percent of Savings Goal Achieved



Percent of Upgrades Goal Achieved



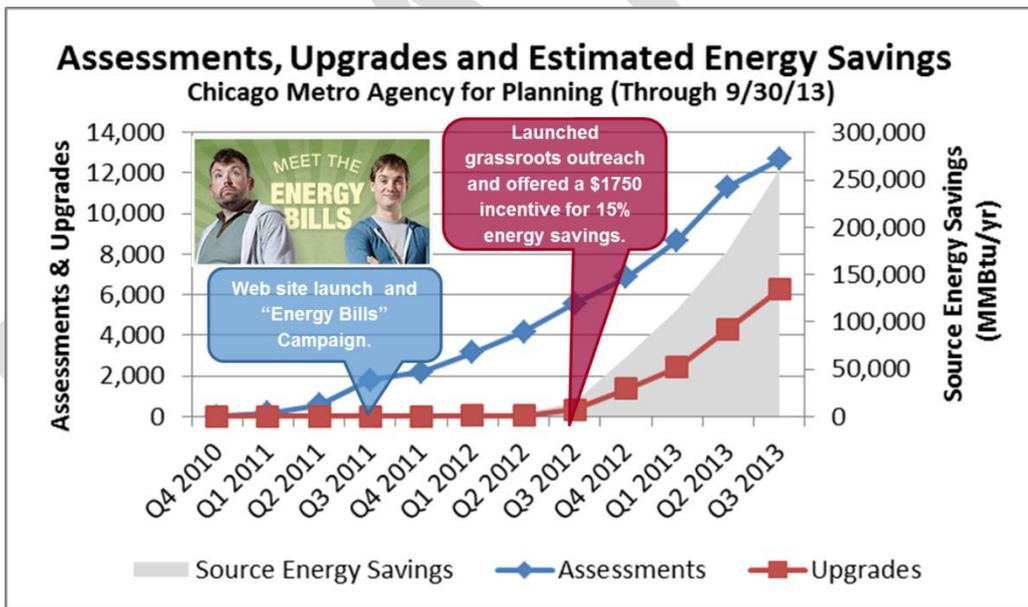
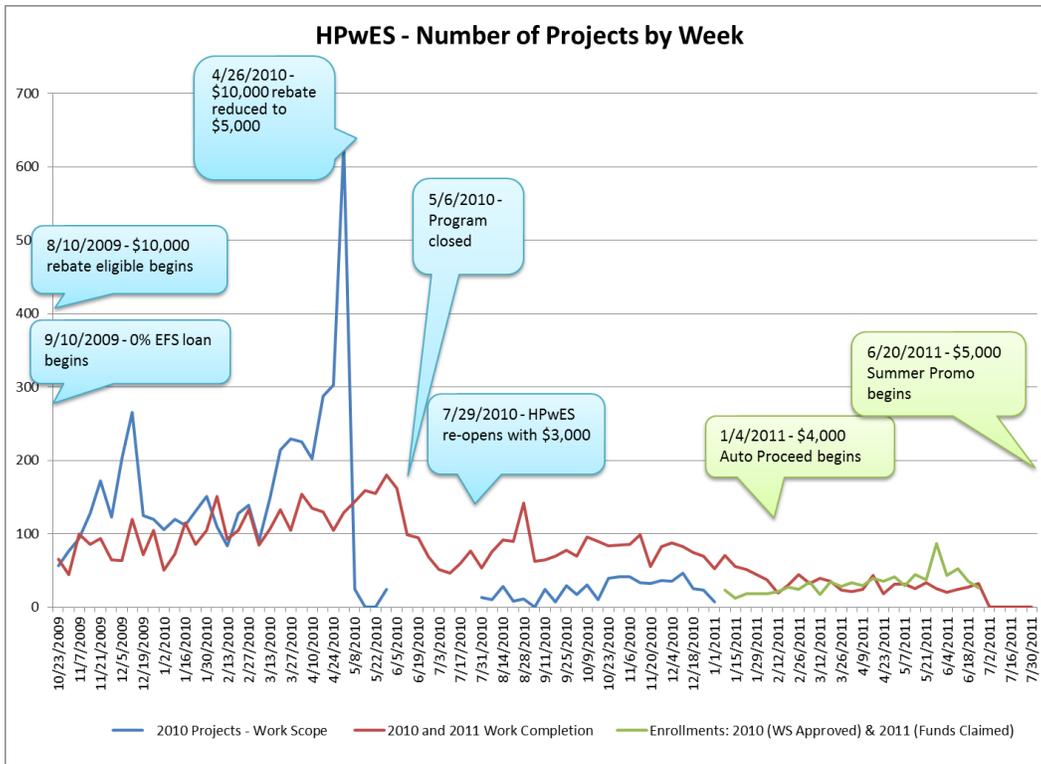
Use appropriate levels of detail in your communications

Details are important for explaining the full picture about the results, but should be used wisely. Define technical terms used in your communications to minimize the potential for misunderstanding. Be sure to provide information on units, calculations, assumptions, etc., or other factors that affect your performance, so that your audience interprets your data correctly. The standard definitions provided with the Recommended Metrics in Appendix A are a good starting point for common definitions and assumptions to use. This clarity is also important if you want others to be able to compare your results to theirs.

TIP – Make sure every table or graph includes units, clearly labeled data points, and a footnote with any other information needed to understand the data in context. The reader should be able to understand a stand-alone table or graph with its caption without referring to the report's text.

Provide context for your results

Determine how to present results in a way that will best illustrate the program's achievements to the reader, without glossing over important caveats. For example, the wider context can be incorporated by adding historical events or program highlights as milestones on a graph (see two examples of illustrations of program performance with milestones below), or by presenting region-wide or national averages side-by-side with data specific to your case. Determine and share whether circumstances or events unrelated to the program contributed to or limited its success. Be sure to describe your program thoroughly (LBNL's recent Policy Brief on EE Program Typology – see Additional Resources and References section below – gives detailed characterizations of common program types), and include and explain anything you would like to say about your program that your results do not tell. Finally, when preparing external reports of your performance, be sure to give all the program context information described in Step 7 below so that others will know whether your program is similar to theirs when considering benchmarking against your results.



Step 7. Benchmarking Against Peer Programs

Consider the benefits and challenges of comparing your performance to others

The tables in Appendix A are designed to help you identify possible metrics to use for benchmarking your own program's progress over time. You may also want to compare your program's results to those from other programs.

Peer comparisons, or peer benchmarking, can be challenging for two reasons. First, another program may have used calculations and analysis methodologies, assumptions, or even basic definitions that differ from yours. The only chance of having useful comparative results is to standardize these elements of determining values as much as possible.

In the last column of Table 2 in Appendix A, we have identified those metrics that are most likely to be suitable for comparisons across peer programs. In order to make such comparisons possible, we have also proposed standardized definitions and data collection methods for use when calculating these metrics. Using these standard definitions and methods will facilitate peer benchmarking. There are a number of other current regional and national efforts to develop standard glossaries and assumption sets – links to several of these are listed in the Additional Resources and References section of this Guide.

The second challenge to peer benchmarking comes from the identification of suitable peers. There are many reasonable explanations for differences in program performance that lie in the context and environment in which the programs are delivered. Here are several:

- The demand for and success of efficiency efforts is often more comparable within geographic regions because of a number of shared characteristics within regions:
 - Climate affects the types of measures demanded and the associated savings – air conditioning is more widespread in the warmer parts of the country; fuel oil and wood make up a large part of the heating fuel in the northeast.
 - Electric rates often depend on local electric generation type and are quite different in different parts of the country – customers may be more responsive to energy efficiency measures where energy costs are higher..
 - Housing stock age, quality, and type of construction are different across the country – upgrade projects will naturally have different characteristics.
- Regulatory requirements set by state legislation or public utility commissions may prescribe whether programs may address one or many fuel types, one or several building types (single family, multifamily of various definitions, or all), and low-income or not. They may also establish the percentage of budget expenditures on program implementation, evaluation, or incentives.
- Program size, age, and complexity – these factors can affect absolute levels of performance because of economies of scale, comprehensiveness of offerings, staffing decisions, and just plain experience.
- Market characteristics – efficiency potential, market penetration, and features of the labor pool and economic climate affect program performance.

The most informative peer comparisons will come from programs that share as many of these characteristics as possible with your program. However, it is rare to find a program that is an exact peer. Therefore, we recommend that you clearly communicate some basic program characteristics so that others can understand the degree to which your program may be a peer. Provide information about your climate, average electric and heating fuel rates, building sectors served, average energy consumption, and total budget when reporting your results. (Publically available resources to assist in determining this information are provided in the Additional Resources and References section of this Guide.) Look for or

Better Buildings Neighborhood Program Peer Benchmarking Examples

As an experiment in developing peer benchmarks, data reported from home energy upgrade programs in DOE's Better Buildings Neighborhood Program were used to create program benchmarks for 9 normalized progress metrics in Appendix A. Information from at least 30 programs was used to derive the metrics in Appendix B include:

- Average Invoiced Cost/Upgrade
- Average Loan Amount/Upgrade
- Average Estimated Energy Cost Savings/Upgrade
- Average Estimated Energy Savings/Upgrade

ask for this type of information if you use metrics from other programs that you want to use to benchmark to your program performance.

DRAFT

Additional Resources and References

Glossaries and definitions

- Home Performance with ENERGY STAR Sponsor Guide and Reference Manual – includes a section on Tracking and Reporting, and a Glossary of Common Terms:
http://www.energystar.gov/index.cfm?c=home_improvement.hpwes_sponsor_guide
- Lawrence Berkeley National Lab (LBNL) Policy Brief – Energy Efficiency Program Typology and Data Metrics: Enabling Multi-State Analyses Through the Use of Common Terminology:
<http://emp.lbl.gov/sites/all/files/lbnl-6370e.pdf>
- Northeast Energy Efficiency Partnerships (NEEP) EM&V Forum Glossary of Terms and Acronyms:
<http://www.neep.org/emv-forum/forum-products-and-guidelines/index#glossary>
- NEEP Regional Energy Efficiency Database (REED) Glossary: <http://neep-reed.org/Glossary.aspx>
- SEE Action Energy Efficiency Program Impact Evaluation Guide:
<https://www4.eere.energy.gov/seeaction/publication/energy-efficiency-program-impact-evaluation-guide>

DOE and other public resources to reduce cost and effort of data collection and analysis

Data collection tools and processes

- Building Energy Data Exchange Specification (BEDES): <http://energy.gov/eere/buildings/building-energy-data-exchange-specification-bedes>
- Standard for Home Performance –Related Data Transfer (HPXML) – Building Performance Institute 2100-S-2013: <http://hpxmlonline.com/>
- Standard Energy Efficiency Data Platform (SEED): <http://energy.gov/eere/buildings/standard-energy-efficiency-data-platform>
- Green Button, an effort to provide electricity customers with easy access to their energy usage data in a consumer-friendly and computer-friendly format via a "Green Button" on electric utilities' websites: <http://www.greenbuttondata.org/greenabout.html>
- Home Performance with ENERGY STAR Sponsor Guide and Reference Manual:
http://www.energystar.gov/index.cfm?c=home_improvement.hpwes_sponsor_guide

Savings calculations and analysis

- DOE Uniform Methods Project for Determining Energy Efficiency Program Savings:
<http://energy.gov/eere/about-us/initiatives-and-projects/uniform-methods-project-determining-energy-efficiency-program-savings>
- Lifetime and levelized savings calculations: LBNL – The Program Administrator Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs (pg. 14):
<http://emp.lbl.gov/publications>

Information for program context

- Population and demographic information: American Community Survey
 - <https://www.census.gov/acs/www/>
- Information on climate zones:
 - <http://energy.gov/eere/buildings/climate-zones>

- Information on average electric rates: Use Table 5.6.B of EIA's Electric Power Monthly Report to determine the average retail price of electricity for the state where your program operates.
 - <http://www.eia.gov/electricity/monthly/>
- Information on average natural gas rates: Use EIA Average Annual Residential Price by State (Dollars per thousand cubic feet, except where noted).
 - http://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PRS_DMcf_a.htm
- Information on average energy consumption: Use the Residential Energy Consumption Survey (RECS) "Per Household (million Btu) Site Energy Consumption" for your state or census division if state information is not available.
 - RECS Survey Data, Consumption and Expenditures: <http://www.eia.gov/consumption/residential/data/2009/index.cfm?view=consumption>
- Housing stock characteristics: American Community Survey
 - <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml###>

Comparative Program Performance Reports:

- American Council for an Energy-Efficient Economy (ACEEE) – The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs: <http://www.aceee.org/research-report/u1402>
- Consortium for Energy Efficiency (CEE) Annual Industry Reports: <http://www.cee1.org/annual-industry-reports>
- LBNL – The Program Administrator Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs: <http://emp.lbl.gov/publications>

Find related lessons, resources, and knowledge for residential energy efficiency programs at the Better Buildings Residential Program Solution Center:

- Home page: <http://energy.gov/rpsc> - Information and Handbooks on:
 - Market Position & Business Model
 - Program Design & Customer Experience
 - Evaluation and Data Collection

Appendix A – Recommended Benchmarking Metrics

The tables given in this Appendix are designed to provide standardized metrics that can be valuable benchmarks for your program performance. The tables themselves are preceded by a list of definitions used and guidelines on tailoring the metrics to meet the characteristics of your program.

Table 1: Gross Program Outcome Metrics – provides a listing of metrics that have value as indicators of total program impact and are likely reported to funders/stakeholders. These are also the primary data used to calculate the Normalized Program Progress Metrics provided in Table 2.

Table 2: Normalized Program Progress Metrics – useful for comparisons over time or to a peer group, which are calculated using the metrics provided in Table 1.

Common Terms and Definitions

In order to provide information that is clearly understood, consistent over time, and comparable to others, we recommend using the following standard definitions when collecting and calculating the metrics presented in the tables below. In addition, some metrics assume use of a consistent definition within your program reporting – for example, what constitutes the “completion” of an upgrade project? Decisions about these items should be made early in the data collection process design.

Standard Definitions

Annual energy savings (also called first-year savings) – A single year of gross annualized incremental savings (kWh or MMBtu) from program activities and installed measures.

Contractor – A business that provides specific services or installations to building or business owners that directly improve building performance.

Conversion rate – Percent of projects that move from one stage of an upgrade process to another (e.g., the percent of projects that progress from energy assessments to energy upgrades).

Customer-contracted work – A sales transaction between the contractor and the homeowner resulting in improvement measures paid for primarily by the homeowner. Customer-contracted work may be eligible for incentives but is distinguished from direct install work in that the homeowner typically has a choice of contractors and greater flexibility to customize the scope of work based on their own needs or wants.

Customer contribution – The portion of the total invoice amount, or total installed cost, of a project that is out-of-pocket for the customer. Generally determined by the invoiced cost minus any incentives or rebates made to the customer by the program or by other parties (utilities, etc.) if they are included on the invoice. This amount represents the participant contribution toward the cost of efficiency products and activities, in contrast to the contribution from programs. Making this determination requires information about all incentives received by the customer – those from your program as well as any from other sources.

Direct install measures – Improvement measures installed under an energy efficiency program design strategy involving the direct installation of measures in customer premises by a contractor sponsored by the program at no cost to the customer. Such programs generally involve one-for-one replacement of existing equipment with more efficient equipment. The installation typically occurs during a home energy assessment. Direct install measures are typically restricted to a specific set of pre-qualified eligible measures and/or may be subject to caps or other restrictions to meet the program’s cost-effectiveness guidelines or other criteria. This is in contrast to “customer contracted work” (see definition). Commonly includes products such as lighting and low-flow shower heads – may also include services such as air sealing.

Energy assessor (Home energy assessor, Home performance assessor) – A person who performs a series of tests in a building to identify opportunities for improved home performance and/or rate or score the homes energy performance.

Gross savings – The change in energy consumption resulting from program-related actions taken by program participants regardless of why they participated. Also means savings as measured at the end-use site (customer’s meter).

Invoiced cost – Total invoiced cost is the full cost of the installed home energy upgrade project, including homeowner contribution, incentives, and other rebates. Be sure to the value of any program incentives and/or incentives from other programs (such as utility rebates, etc.) included in invoice cost in order to also calculate Customer Contribution (see above).

Lifetime energy savings – The expected gross savings (kWh or MMBtu) over the lifetime of the measures installed under the program. Calculated by multiplying the savings from each measure by its measure life (see Additional Resources and References: *Savings calculations and analysis* section for calculation assistance).

Measure (or energy measure) - A specific action that a building owner can take to improve a building’s structure or performance.

Program costs (or spending) – Includes administrative, education, marketing and outreach costs; evaluation, measurement, and verification (EM&V) costs; and financial incentives paid to customers, contractors, and other upstream market allies (retailers, manufacturers, etc.). This does not include seed funding for loan programs, customer costs, or program administrator performance incentives earned for exceeding goals (or penalties assessed for shortfalls). For example, the following cost categories were used in the 2013 Annual Report for the Home Performance with ENERGY STAR program.

Program Administration
<input type="checkbox"/> Marketing, Outreach and Customer Acquisition
<input type="checkbox"/> Program Administration
<input type="checkbox"/> Quality Assurance
<input type="checkbox"/> Research & Evaluation
Total Program Administration
Consumer Incentives
<input type="checkbox"/> Costs of Direct Install
<input type="checkbox"/> Other Consumer Incentives & Rebates
<input type="checkbox"/> Consumer Financing Costs
Total Consumer Incentives
Contractors Incentives
<input type="checkbox"/> Contractor Training & Certification
<input type="checkbox"/> Contractor Production Incentives
Total Contractors Incentives

Definitions that require a program-specific decision – make a determination about these early in your process

Active contractor – You must have a definition for “active contractor” that makes sense in light of the market and the program delivery structure, such as active contractor companies are those approved by your program, but it may be more useful to define active contractors as those contractors that actually reported completing upgrades during the reporting period. When presenting your results, it is important to present how this has been defined. This definition for active contractors is not intended to define who may

participate in a program. It is only for the purpose of presenting the results of the program and therefore best relies on the actual number of contractors that contributed to those results.

- *Recommendation for peer comparison* – Define an active contractor as one that has completed at least one upgrade during the reporting period.

Energy assessment (Home energy assessment, Home performance assessment) – A series of tests in a home or building that reveals opportunities for improved energy efficiency, such as poor insulation and air leaks. Also known as “assessment”, “audit”, or “evaluation.” This definition includes assessments performed by a trained assessor and excludes on-line or do-it-yourself (DIY) assessments. An energy assessments performed by a trained assessors may vary based on the type of tests performed: air leakage test, duct leakage test, combustion safety test and infrared scan.

- *Recommendation for peer comparison* – Define an assessment as one completed by a trained assessor rather than by the customer.

Home energy upgrade (Energy upgrade, Home performance upgrade) – Individual measures or a group of measures installed for the customer to make a home or building more energy efficient, provide better comfort, and/or save money. Includes only customer-contracted upgrades and not direct install measures. Multiple upgrades may occur on the same house, but at different dates, over a period of time, and by different contractors. You will need to decide how these will be aggregated. Does each upgrade transaction (or invoiced project) count, or does a home count once regardless of the number of upgrade transactions? How this is addressed will affect each metric that is determined on a per-upgrade basis: ex., estimated energy savings. Projects that include only measures that are directly installed by the program do not fall into this category (see Direct install upgrades above).

- *Recommendation for peer comparison* – Define an upgrade as an invoiced project or transaction excluding measures directly installed by the program.

Lead – A potential customer of a program or contractor. Leads can come from direct program marketing, sales calls made by contractors, on-line referrals, or other methods of identifying interested customers. Tracking time from lead identification to actual upgrade work, or conversions from lead to assessments or upgrades, requires that the initial lead have an identifiable customer associated with it (in contrast with mass marketing activities).

- *Recommendation for peer comparison* – Track leads for outreach types that can identify the specific customer involved.

Savings for combined-fuel programs – Some programs promote activities designed to reduce consumption of more than one fuel type (electric and natural gas is the most common combination). Some measures provide savings for both fuels – appropriate methods should be used to allocate and track savings for each fuel type.

- *Recommendation for peer comparison* – Track electric, natural gas, and other fuel savings separately; calculate total savings by converting all to MMBtu and aggregating as well to provide a single value for the program.

Costs for combined-fuel programs – If the program promotes activities designed to reduce consumption of more than one fuel type, costs must be allocated across categories if metrics for each fuel savings are to be calculated separately. Cost data should be tracked separately for activities and measures that address only one fuel type. Allocations of cost can be made for activities that address measures that reduce consumption for more than one fuel type.

- *Recommendation for peer comparison* – Track costs that can be related to separate electric, natural gas, and other fuel saving activities separately. For costs not directly tied to specific measures (such as admin or marketing costs) or for multiple fuel measures, one commonly used

method is to allocate any costs that cannot be directly attributed to a specific fuel program in the same proportion as that fuel's share of the total savings.

Guidelines for using the Metrics Tables

Program components of interest

Many of the metrics included are represented in general format and may be calculated for any of a number of program components of interest by inserting the appropriate information as measured for that component – indicated by **RED text** in the metrics descriptions in the tables. Decisions about which components to track should be made as the metrics are chosen so that the necessary data is on hand for their calculation. The following components can have metrics to assess performance separately if the needs of the program warrant. If so, their data will need to be tracked separately, as well as aggregated at the program level.

- *Measures of interest* – direct install measures vs. upgrade projects as a whole vs. specific measure types included in upgrade projects
- *Customer groups of interest* – full program; low-income customers vs. non-low-income customers
- *Building types of interest* – single-family home vs. multifamily buildings
- *Fuels of interest* – electric, natural gas, other fuels, total fuels

Data collection / tracking level

Information on the performance (e.g. number of complete projects, success achieving savings, customer satisfaction, etc.) of participating contractors is often welcomed by prospective customers. When designing your data tracking system, decide whether to track and aggregate specific metrics by contractor as well as by total program.

A caveat to this level of contractor-specific information – providing multiple summary metrics helps give the full picture of contractor performance. For example, the average per project savings from a contractor who only does small jobs will differ from one specializing in large projects, so information on average project size along with average project savings would be beneficial.

Table 1: Gross Program Outcome Metrics

All of these have value as indicators of total program impact and are likely reported to funders/stakeholders. They are also the primary data used to calculate the Normalized Progress Metrics provided in Table 2. Metrics are grouped into the following categories:

- *Participation metrics* – provide basic information about the size of the program. Examples: number of energy assessments; number of home upgrades; number of specific measures installed.
- *Savings metrics* – provide information on the total savings achieved by the entire program. Examples: annual electricity savings; lifetime electricity savings; total energy saved from all fuels; total customer electric bill savings.
- *Spending metrics* – provide information on program and customer spending to accomplish energy efficiency activities for the year. Examples: total program spending; total spent on incentives to customers for upgrade projects; total invoiced costs to customers.
- *Other program performance and market metrics* – provide information on the way the program is delivering programs, and on the local market served. Examples: number of marketing leads and marketing budget; number of participating contractors and number of certified individuals they employ; number of eligible homes in the region; levels of customer satisfaction.

ID#	Gross Program Outcome Metric	Value	Challenges / Comments	Used to Calculate:
PARTICIPATION				
1	# energy assessments	<ul style="list-style-type: none"> • Inform program design to increase conversion-to-upgrade rate. • Communicate the impact to stakeholders. • Communicate the business opportunity to encourage more investment. 	<ul style="list-style-type: none"> • Assessors need to submit information on assessments in a timely manner. Under-reporting of the # of assessments will underestimate impact and could lead to overestimating the assessment-to-upgrade conversion rate. • It is helpful to provide information about the type of assessment. An online DIY assessment is not the same as an in-home Home Energy Score assessment. It is also helpful to know if direct install measures were included. • A recommendation for defining an assessment is given above; use it for peer comparison metrics. 	Metrics #36 and 37

ID#	Gross Program Outcome Metric	Value	Challenges / Comments	Used to Calculate:
2	# home energy upgrades (completed)	<ul style="list-style-type: none"> • Inform program decision to increase participation to achieve goals. • Communicate the impact to stakeholders. • Communicate the business opportunity to encourage more investment. 	<ul style="list-style-type: none"> • This metric does not account for upgrades in-process. It also requires that you have made a decision about what constitutes a completed upgrade – see Definitions above. • Contractors need to submit information on completed projects in a timely manner. Under-reporting of the # of upgrades will underestimate impact and could lead to underestimating the assessment-to-upgrade conversion rate. • A recommendation for defining a completed upgrade is given above; use it for peer comparison metrics. 	Metrics #27, 33, 34, 37-39, and 43-47
3	# assessments or upgrades that included direct-install (DI) measures	<ul style="list-style-type: none"> • Provides additional clarification about metric # 1 or #2 for programs that implement a direct install strategy. • Inform program decision about success of this strategy. 	<ul style="list-style-type: none"> • Requires complete and timely data on projects with DI installations. • Measures may or may not be installed at the time of an energy assessment. • It is useful to provide details about what measures were installed, and numbers of each. 	
4	# of [specific measure type] installed	<ul style="list-style-type: none"> • Inform program decision to increase participation to achieve goals. 	<ul style="list-style-type: none"> • Requires complete and timely data on measure installations. • It is useful to provide details about what measures were installed, and numbers of each, and if the list of measure types changed over the period of reporting. • If you are interested in progress feedback on specific measure categories, this metric requires that you track information on these measures separately – see Definitions above for guidance. 	
5	# home upgrade loans (approved)	<ul style="list-style-type: none"> • Show progress compared to program goals. • Inform program decision to increase participation to achieve goals. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Requires complete and timely information from lenders on loan approvals; does not account for loans in process. • If loan approval date and loan amount is reported, they can be compared with other data, like invoiced cost and upgrade completion data, as a check of data quality. 	Metric #41

ID#	Gross Program Outcome Metric	Value	Challenges / Comments	Used to Calculate:
SAVINGS				
6	<p>Annual energy savings [by fuel type] for total program (across all completed upgrades)</p> <p>Fuel types:</p> <ul style="list-style-type: none"> • For each individual fuel affected: <ul style="list-style-type: none"> ○ electric savings (kWh, kW) ○ natural gas savings (therms) ○ other fuel savings (MMBtu) • Total energy savings across all fuels addressed, in common units (MMBtu) 	<ul style="list-style-type: none"> • Show progress compared to energy savings goals. • Communicate savings potential to future participants. • Inform program decision to increase participation or deepen savings per participant to achieve energy savings goals. • Inform program methods for estimating savings. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Energy savings are typically reported as gross estimated annual savings. It is important to clarify to avoid confusion with lifetime savings or net verified savings. • The program should review and approve of the methodology used by contractors to estimate savings. • If the methodology only estimates savings of one fuel type (e.g., electricity), the total energy savings will be underestimated. Some methodologies are better able to estimate savings due to multiple measures. • This metric requires that you have made a decision about what constitutes a completed upgrade – see Definitions above for guidance. • Use a total energy metric for peer comparisons. 	Metrics #28 and 33
7	<p>Lifetime energy savings [by fuel type] for total program (across all completed upgrades)</p> <p>Fuel types:</p> <ul style="list-style-type: none"> • For each individual fuel affected: <ul style="list-style-type: none"> ○ electric savings (kWh, kW) ○ natural gas savings (therms) ○ other fuel savings (MMBtu) • Total energy savings across all fuels addressed, in common units (MMBtu) 	<ul style="list-style-type: none"> • Show progress compared to energy savings goals. • Show full impact of the program across the life of installed measures. • Communicate future savings potential to participants. • Inform program decision to increase participation or deepen savings per participant to achieve energy savings goals. • Inform program methods for estimating savings. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Lifetime energy savings are typically reported as gross annual savings times the life of the measures installed. • If the program covers multiple fuels, the metric will require allocation of savings to each fuel for measures that result in savings for more than one fuel type. If the method to determine savings addresses only one fuel type, the impact will be underestimated. • Deemed savings methods will likely overestimate the aggregated energy savings. • This metric requires that you have made a decision about what constitutes an upgrade – see Definitions above. • Use a total energy metric for peer comparisons 	Metric #29
8	<p>Annual CO2 or GHG reductions for total program (across all completed upgrades)</p>	<ul style="list-style-type: none"> • Show progress compared to reduction goals. • Communicate reduction potential to future participants. • Inform program decision to increase participation or deepen reduction per participant to achieve goals. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Use of different regional calculations for CO2 or GHG reductions may make this metric less valuable for peer comparisons. 	Metric # 34

ID#	Gross Program Outcome Metric	Value	Challenges / Comments	Used to Calculate:
9	Customer \$\$ savings for total program (across all completed upgrades)	<ul style="list-style-type: none"> Show progress compared to reduction goals. Inform program decision to increase participation or deepen reduction per participant to achieve goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> The program should review and approve of methodology used by contractors to determine customer \$\$ savings. This metric requires that you have made a decision about what constitutes an upgrade – see Definitions above. 	Metrics #44 and 45
SPENDING				
10	Total program spending [by fuel type if needed for multiple fuel programs] Fuel types: <ul style="list-style-type: none"> For each individual fuel affected, allocate in proportion to: <ul style="list-style-type: none"> electric savings (kWh, kW) natural gas savings (therms) other fuel savings (MMBtu) 	<ul style="list-style-type: none"> Show progress compared to budgets. Inform program decision to increase participation or deepen savings per budget \$\$ to achieve goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> If program spending is not aligned with program outcomes in organizational accounting systems, it may be difficult to allocate cost to specific categories. Programs will need to specify that costs be tracked based on cost subcategories (see Metrics #11 – 16) and other program components of interest (see Definitions above). Recommended allocation methodology for multiple fuel types is given above (see Definitions). 	Metrics #28-32
11	Total program incentives to customers for assessments	<ul style="list-style-type: none"> Show progress compared to budgets. Inform program decision to increase participation or deepen savings per budget \$\$ to achieve goals. 	<ul style="list-style-type: none"> All require timely incentive requisition and payment processes in order to reflect all incentives paid. Recommendations for defining assessments and upgrades are given above; use them for peer comparison metrics. 	Metric #32
12	Total program incentives to customers for upgrades			Metric #32
13	Total program incentives to contractors for assessments			Metric #32
14	Total program incentives to contractors for upgrades			Metric #32
15	Total program cost for direct-install measures	<ul style="list-style-type: none"> Inform program decision to adjust or revise methods for program delivery. 	<ul style="list-style-type: none"> Must decide whether to include DI installation labor costs along with measure costs, and explain which choice was made when presenting this cost information. A recommendation for defining direct-install measures is given above; use it for peer comparison metrics. 	Metric #32
16	Marketing (or lead generation) spending	<ul style="list-style-type: none"> Show progress compared to budgets. Inform program decision to increase marketing budgets to achieve goal. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> Requires information on costs of lead generation from contractors, and internal marketing costs. 	Metric #40

ID#	Gross Program Outcome Metric	Value	Challenges / Comments	Used to Calculate:
17	Total amount loaned for upgrades	<ul style="list-style-type: none"> Show progress compared to budgets. Inform program decision to increase participation or deepen savings per loan \$\$ to achieve goal. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> Requires complete and timely information from lenders on loan approvals; does not account for loans in process. Although rare, it is possible that an individual could receive more than one loan to pay for one upgrade; if so, a decision must be made on how to account for this. 	Metric #41
18	Total invoiced costs for upgrades	<ul style="list-style-type: none"> Communicate cost (and thus savings potential) to future participants. Communicate the economic impact to stakeholders. 	<ul style="list-style-type: none"> For completed projects only; requires complete and timely invoice information from contractors. When underreported, the total economic impact is underestimated. A recommended definition for invoiced cost is given above; use it for peer comparison metrics. 	Metrics #30 and 39
19	Total customer contribution for upgrades	<ul style="list-style-type: none"> Communicate cost (and thus savings potential) to future participants. Communicate the economic impact to stakeholders. 	<ul style="list-style-type: none"> For completed projects only; requires complete and timely invoice information from contractors. When underreported, the total economic impact is underestimated. Because this is useful when comparing customer investment to program costs, be sure to specify that customer contribution as tracked here should exclude any incentives to the customer from any source. A recommended definition for customer contribution to costs is given above; use it for peer comparison metrics. 	Metrics #30 and 42
OTHER				
20	Total # certified individuals within active contractor companies	<ul style="list-style-type: none"> Show progress compared to workforce development goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> Must define certification type of interest; requires timely information from contractors. This metric requires that you have made a decision about what constitutes an "active" contractor – see Definitions above. 	
21	Customer satisfaction - # complaints; feedback metrics from surveys	<ul style="list-style-type: none"> Show progress compared to customer satisfaction goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> Requires a standardized process for tracking customer feedback; any surveys done should be structured so that results can be quantified. The response rate should be provided when presenting survey results. 	Metric #47

ID#	Gross Program Outcome Metric	Value	Challenges / Comments	Used to Calculate:
22	Time from assessment-to-upgrade completion (days) for each home energy upgrade	<ul style="list-style-type: none"> Show progress compared to customer satisfaction goals. Inform program decision to decrease project time-to-completion to achieve goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> Requires complete and timely information from assessors and contractors about assessment start date, upgrade start date, and upgrade completion date. The time from assessment start date to upgrade start is relevant to understand how long between the first contact (assessment) to start of upgrade project work. The time from upgrade start date to upgrade completion helps you understand how long the projects take to complete. This metric requires that you have made a decision about what constitutes a completed upgrade – see Definitions above. A recommendation for defining completed upgrades is given above; use it for peer comparison metrics. 	Metrics #43 and 46
23	# marketing leads	<ul style="list-style-type: none"> Show progress compared to goal. Inform program decision to increase marketing activity to achieve goal. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> Requires a reliable and standardized process for gathering information from contractors and tracking leads from other sources. It is important to explain how this information was collected when presenting the results. A recommendation for defining a relevant lead is given above; use it for peer comparison metrics. 	Metric #36 and 40
24	# active participating contractors	<ul style="list-style-type: none"> Show progress compared to workforce development goal. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> This metric requires that you have made a decision about what constitutes an “active” contractor – see Definitions above. A recommendation for defining a participating contractor is given above; use it for peer comparison metrics. 	Metric #38
25	# eligible homes	<ul style="list-style-type: none"> Inform program design to increase activity to achieve goal. 	<ul style="list-style-type: none"> Requires a definition of what makes a home “eligible” for the program. 	Metric #27
26	Total building stock (# buildings in program region)	<ul style="list-style-type: none"> Inform program design to increase activity to achieve goal. 	<ul style="list-style-type: none"> Usually available from public information. Regional differences in market size may make this metric less valuable for peer comparisons. 	Metric #27

Table 2: Normalized Program Progress Metrics

Normalized Progress Metrics are useful for apples-to-apples comparisons across time or across peer group. All Normalized Metrics are calculated using the metrics from Table 1 as indicated. These metrics are grouped into categories that are roughly based on the program objective they help inform.

- *Program efficiency metrics* – provide insights into how effectively your program is achieving results compared to the cost and market penetration that may prove valuable in considering changes to program design and delivery. Examples: percent of eligible homes improved; annual cost of saved energy; lifetime cost of a direct-install program component; program administrative costs as a percent of total budget.
- *Energy savings metrics* – provide insights into effectiveness of projects to produce savings. Examples: average annual electric savings per upgrade; average percent of total customer energy savings across the program.
- *Marketing and sales performance metrics* – provide insights into how effective marketing and sales efforts have been. Examples: energy assessment-to-upgrade conversion rate; average number of upgrades per contractor; average loan amount for upgrades.
- *Customer benefit metrics* – provide information that may be of particular interest to potential customers as they make decisions about investing in the program’s activities and about contractors to engage. Examples: average customer dollar savings per upgrade; average time-to-complete for individual contractors; customer satisfaction levels by contractor.

ID#	Normalized Progress Metric	Value	Challenges / Comments	Calculation	X = Useful as a Peer Benchmark
PROGRAM EFFICIENCY					
27	% of building stock improved OR % of eligible homes improved	<ul style="list-style-type: none"> • Inform program design to increase conversion-to-upgrade rate. • Communicate the impact to stakeholders. • Communicate the business opportunity to encourage more investment. 	<ul style="list-style-type: none"> • Depending on the ratio of eligible homes to entire building stock, it may be more informative to the program to calculate % eligible homes improved. • Building stock will be variable across programs, making this metric not very useful as a peer benchmark. • Often effective to compare to past years’ progress by reporting as a cumulative % change over many years. 	# home energy upgrades completed / total building stock [Metric #2 / Metric #26] OR # home upgrades completed / # eligible homes [Metric #2 / Metric #25]	

ID#	Normalized Progress Metric	Value	Challenges / Comments	Calculation	X = Useful as a Peer Benchmark
28	<p>Cost of annual energy savings [by fuel type] – total program (across all completed upgrades)</p> <p>Fuel types:</p> <ul style="list-style-type: none"> • For each individual fuel affected: <ul style="list-style-type: none"> ○ electric savings (kWh, kW) ○ natural gas savings (therms) ○ other fuel savings (MMBtu) • Total energy savings across all fuels addressed, in common units (MMBtu) 	<ul style="list-style-type: none"> • Inform program decision to increase participation or deepen savings per budget \$\$ to achieve energy savings goals. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Total energy savings across all fuel types addressed, in terms of MMBtu, will be the most useful in peer comparisons. 	<p>Total program spending [by fuel type] / total program annual energy savings [by fuel type] [Metric #10 / Metric #6]</p> <p>Calculate for each fuel of interest</p>	X
29	<p>Cost of lifetime energy savings [by fuel type] – total program (across all completed upgrades)</p> <p>Fuel types:</p> <ul style="list-style-type: none"> • For each individual fuel affected: <ul style="list-style-type: none"> ○ electric savings (kWh, kW) ○ natural gas savings (therms) ○ other fuel savings (MMBtu) • Total energy savings across all fuels addressed, in common units (MMBtu) 	<ul style="list-style-type: none"> • Inform program decision to increase participation or deepen savings per budget \$\$ to achieve energy savings goals. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Measure-life assumptions may differ from other peer programs. 	<p>Total program spending / total program lifetime energy savings [by fuel type] [Metric #10 / Metric #7]</p> <p>Calculate for each fuel of interest</p>	X
30	<p>Upgrade cost to program leverage ratio (total upgrade invoiced costs/program cost)</p>	<ul style="list-style-type: none"> • Show effectiveness of program to stimulate private investment. 	<ul style="list-style-type: none"> • This metric is designed to reflect the total economic impact of the program by indicating the amount of private investment stimulated by the program investment. • Comparing total invoice cost to program spending gives a measure of the proportion of all project costs covered by the program. 	<p>Total invoiced costs for upgrades / total program spending [Metric #18 / Metric #10]</p>	X

ID#	Normalized Progress Metric	Value	Challenges / Comments	Calculation	X = Useful as a Peer Benchmark
31	Customer to Program Leverage ratio (total customer contribution/program cost)	<ul style="list-style-type: none"> Show effectiveness of program to stimulate private investment. 	<ul style="list-style-type: none"> Comparing customer contribution to program costs gives information on the amount of customer out-of-pocket \$\$ leveraged by program spending 	Total customer contribution for upgrades / total program spending [Metric #19 / Metric #10]	X
32	Program admin costs as % of total spending	<ul style="list-style-type: none"> Assess efficiency of program delivery to improve overall cost-effectiveness. 	<ul style="list-style-type: none"> Requires definition of admin costs; start with all costs except for incentives. 	Total program non-incentive costs / total program spending [(Metric #10 – SUM (Metrics #11-15)) / Metric #10]	X
ENERGY SAVINGS					
33	<p>Avg. total annual energy savings [by fuel type] per upgrade</p> <p>Fuel types:</p> <ul style="list-style-type: none"> For each individual fuel affected: <ul style="list-style-type: none"> electric savings (kWh, kW) natural gas savings (therms) other fuel savings (MMBtu) Total energy savings across all fuels addressed, in common units (MMBtu) 	<ul style="list-style-type: none"> Show depth of per-project savings. Communicate savings potential to future participants. Inform program decision to increase participation or deepen savings per participant to achieve energy savings goals. Inform program methods for estimating savings. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> If projects vary widely in size, a simple average across the program may not be very representative of the majority of the work done. Review data to assess whether to remove outliers, or consider reporting the range and the median instead. Total energy savings across all fuel types addressed, in terms of MMBtu, will be the most useful in peer comparisons. 	<p>Total program annual energy savings [by fuel type] / # home energy upgrades completed [Metric #6 / Metric #2]</p> <p>Calculate for each fuel of interest</p>	X
34	Avg. annual CO2 or GHG reductions per upgrade	<ul style="list-style-type: none"> Show depth of per-project reductions. Communicate reduction potential to future participants. Inform program decision to increase participation or deepen reductions per participant to achieve goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> If projects vary widely in size, a simple average across the program may not be very representative of the majority of the work done. Review data to assess whether to remove outliers, or consider reporting the range and the median instead. 	Total program CO2 or GHG reductions / # home energy upgrades completed [Metric #8 / Metric #2]	

ID#	Normalized Progress Metric	Value	Challenges / Comments	Calculation	X = Useful as a Peer Benchmark
35	Avg. % of total customer energy saved across program	<ul style="list-style-type: none"> • Show progress compared to savings goal. • Inform program decision to increase participation or deepen savings per participant to achieve goal. • Communicate potential saving to future participants. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Assumes that a % savings is provided for each customer. Program should review and approve of methodology used by contractors to determine customer % savings. Requires complete and timely information from contractor. Total energy usage may come from utility rather than customer/contractor. 	Average across the program: estimated percent customer energy saved	
MARKETING AND SALES PERFORMANCE					
36	Marketing lead-to-assessment conversion rate	<ul style="list-style-type: none"> • Assess effectiveness of marketing/ lead generation. • Inform program decision to increase marketing budgets to achieve goal. 	<ul style="list-style-type: none"> • Requires a reliable and standardized process for tracking and matching customers from marketing lead to assessment. 	# energy assessments / # marketing leads [Metric #1 / Metric #23]	X
37	Energy assessment-to-upgrade conversion rate for the total program	<ul style="list-style-type: none"> • Assess effectiveness of follow-through from assessment to completed upgrades. • Inform program decision to increase contractor outreach to achieve goal. • Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> • Requires a reliable and standardized process for tracking and matching customers from assessment to upgrade project, even if different contractors are involved. • The assessment completion date and upgrade start and upgrade completion dates can be helpful to determine the time lag in reporting of total assessments and upgrades, which would affect this metric. • Results will be misleading and have little comparative value if all upgrades are required to have an assessment or if all assessments are not reported. 	# home energy upgrades completed / # energy assessments [Metric #2 / Metric #1]	X

ID#	Normalized Progress Metric	Value	Challenges / Comments	Calculation	X = Useful as a Peer Benchmark
38	Avg. # upgrades per contractor (across program)	<ul style="list-style-type: none"> Inform program decision to increase contractor outreach to achieve goal. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> If contractor performance varies widely, a simple average across the program may not be very representative of the majority of the work done. Review data to assess whether to remove outliers, or consider reporting the range and the median instead. 	# home energy upgrades completed / # active participating contractors [Metric #2 / Metric #24]	
39	Average invoiced cost per upgrade	<ul style="list-style-type: none"> Communicate potential cost information to future participants (customers and contractors). 	<ul style="list-style-type: none"> Be sure to define invoiced cost as full installed cost. 	Total invoiced costs / # home energy upgrades completed [Metric #18 / Metric #2]	X
40	Marketing cost per lead	<ul style="list-style-type: none"> Assess effectiveness of marketing/ lead generation. Inform program decision to increase marketing budgets to achieve goal. 	<ul style="list-style-type: none"> Requires a reliable and standardized process for tracking leads. 	Marketing cost (\$)/lead [Metric #16 / Metric #23]	
41	Average loan amount for home upgrades	<ul style="list-style-type: none"> Inform program decision to increase participation or deepen savings per loan \$\$ to achieve goal. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> If loans vary widely in size, a simple average across the program may not be very representative of the majority of the work done. Review data to assess whether to remove outliers, or consider reporting the range and the median instead. 	Total amount loaned for upgrades / # home upgrade loans (approved) [Metric #17 / Metric #5]	X
42	Customer contribution as a % of total invoiced cost	<ul style="list-style-type: none"> Inform customers about the relative contribution of program support to project cost. Communicate the impact to contractors. 	<ul style="list-style-type: none"> Requires information on all incentives received by customer to calculate customer out-of-pocket contribution. Often used as a proxy for the benefit of the program – encourage a focus on customer \$\$ savings from energy reductions from project as a more-comprehensive metric. 	Total customer contribution for upgrades / total invoiced costs for upgrades [Metric #19 / Metric #18]	X

ID#	Normalized Progress Metric	Value	Challenges / Comments	Calculation	X = Useful as a Peer Benchmark
43	Average time-to-complete (time from assessment to upgrade completion) across the program	<ul style="list-style-type: none"> Communicate potential project completion information to future participants (customers and contractors). Inform program decisions with respect to potential number of upgrades per program year. 	<ul style="list-style-type: none"> Requires complete and timely information from contractor, and may require information from different parties for assessment and upgrade. 	Sum of (time to complete per upgrade) for all upgrades / # home energy upgrades completed [SUM (Metric #22 across all upgrades) / Metric #2]	X
CUSTOMER BENEFIT					
44	Average customer \$\$ savings per upgrade across program	<ul style="list-style-type: none"> Show depth of per-project customer savings. Communicate savings potential to future participants. Inform program decision to increase participation or deepen savings per participant to achieve energy savings goals. Communicate the impact to stakeholders. 	<ul style="list-style-type: none"> If projects vary widely in size, a simple average across the program may not be very representative of the majority of the work done. Review data to assess whether to remove outliers, or consider reporting the range and the median instead. 	Total customer \$\$ savings / # home energy upgrades completed [Metric #9 / Metric #2]	X
CUSTOMER BENEFIT – INFORMATION ON INDIVIDUAL CONTRACTOR PERFORMANCE					
45	Average Customer \$\$ savings per upgrade for each contractor	<ul style="list-style-type: none"> Assess effectiveness and depth of savings achieved for each contractor. 	<ul style="list-style-type: none"> Requires standard customer savings calculation protocols to make contractor information comparable. 	Total customer \$\$ savings for contractor X / # energy upgrades completed by contractor X [SUM (Metric #9) across upgrades for contractor X / Metric #2 for contractor X]	
46	Average of time-to-complete by contractor	<ul style="list-style-type: none"> Assess effectiveness of individual contractor in supporting project follow-through. Communicate potential project completion timeframe to future participants (customers and contractors). 	<ul style="list-style-type: none"> May not be comparable across projects of varied sizes, or across contractors who do not track project progress in the same way. 	Sum of (time to complete per upgrade) for contractor X / # upgrades completed by contractor X [SUM (Metric #22 across upgrades for contractor X) / Metric #2 for contractor X]	
47	Customer satisfaction - for specific contractors	<ul style="list-style-type: none"> Communicate customer satisfaction with contractors to future participants. 	<ul style="list-style-type: none"> Requires that contractor information be included in customer feedback. 	# complaints (or survey metrics) for contractor X / # upgrades completed by contractor X [SUM (Metric #21 across upgrades for contractor X) / Metric #2 for contractor X]	

Appendix B – BBNP Peer Group Benchmarking Examples

In 2010, the Better Buildings Neighborhood Program (BBNP) awarded \$508 million in federal assistance to 41 organizations to test innovative program approaches to overcoming barriers in delivering energy efficiency upgrades in homes and other buildings. Award recipients were challenged to test program approaches targeted all building sectors that reduced total energy use by 15%. Most award recipients focused on the residential market. From 2010 through 2013, BBNP partners reported progress metrics quarterly to DOE¹. Although the data collected are not a representative sample of all residential programs, they do provide a unique opportunity to create example peer group benchmarks for several of the metrics recommended in this guide.

To create these example benchmarks, DOE aggregated data from multiple programs to determine average values for each metric. The tables below list example benchmark metrics along with additional contextual information about the dataset (i.e., # of records, minimum value, maximum value, median value). The methodology used to derive these benchmarks is discussed at the end of this section.

The BBNP data include two types of information: project and program.

- **Project data** were reported for each building energy upgrade project. For example, invoiced cost or estimated energy cost savings was reported for each energy upgrade project. Data from thousands of projects across multiple programs can be aggregated to provide a national or regional average per project benchmark. The BBNP project data are useful for this purpose.
- The **program data** included aggregate results and spending for each BBNP partner. However, some partners targeted multiple sectors, and the data are difficult to disaggregate by sector. Eleven partners targeted the residential sector only, so DOE has grouped these to provide average per program benchmarks. Because the size of the group is small (11 out of 41 partners) and reflects programs with three years or less from startup, the BBNP data set is not ideal for this purpose, but we have included the results in this Appendix. Additional sources of program information include the *2013 Home Performance with ENERGY STAR 2013 Annual Report* and the LBNL report on “The Program Administrator Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs”: <http://emp.lbl.gov/publications>.

¹ *Better Buildings Neighborhood Program Summary of Report Data* is available at <http://energy.gov/eere/better-buildings-neighborhood-program/progress>.

Table 1 Invoiced Cost per Upgrade

Benchmark Metric	# of Partners ²	# of Records	% of Original Dataset	Min	Max	Mean	Median
Average Invoiced Cost Per Upgrade	37	63,363	85.3%	\$169	\$34,080	\$6,971	\$5,554
Observations:							
<ul style="list-style-type: none"> - Three partners comprise of 79.5% of projects with Invoiced Cost between \$100 and \$1,000. - Two partners comprise of 32.8% of projects with Invoiced Cost between \$1,000 and \$2,000. - Two partners comprise of 50% of projects with Invoiced Cost between \$2,000 and \$3,000. 							
Additional Population Segmentation: US Census Regions							
• Northeast	10	24,339	32.8%	\$355	\$34,065	\$7,988	\$6,700
• Midwest	8	17,495	23.6%	\$130	\$24,360	\$3,905	\$2,729
• South	9	8,514	11.5%	\$275	\$35,151	\$7,680	\$6,995
• West	10	12,988	17.5%	\$169	\$39,983	\$8,787	\$7,000

² The number of partners changes for each benchmark metric based on the availability of data. If a partner did not report the metric, the projects they reported would not be included in the records used to calculate the benchmark metric.

Table 2 Loan Amount per Upgrade

Benchmark Metric	# of Partners	# of Records	% of Original Dataset	Min	Max	Mean	Median
Average Loan Amount Per Upgrade	30	12,085	16.2%	\$1,464	\$29,960	\$10,112	\$9,019
Observations:							
<ul style="list-style-type: none"> - Four partners comprise of 75.4% of projects with Invoiced Cost between \$7,000 and \$8,000. - One partner comprises of 32.3% of projects with Invoiced Cost between \$14,000 and \$15,000. - One partner comprises of 32% of projects with Invoiced Cost between \$19,000 and \$20,000. 							
Additional Population Segmentation: US Census Regions							
• Northeast	9	6,387	8.6%	\$1,589	\$24,993	\$9,594	\$8,900
• Midwest	8	7,414	1.6%	\$1,136	\$19,991	\$7,931	\$7,414
• South	7	1,429	1.9%	\$2,319	\$28,254	\$8,722	\$7,770
• West	6	2,969	4.0%	\$1,700	\$36,560	\$12,530	\$11,385

Table 3 Estimated Annual Cost Savings per Upgrade

Benchmark Metric	# of Partners	# of Records	% of Original Dataset	Min	Max	Mean	Median
Average estimated customer annual cost savings per upgrade	36	61,751	83.1%	\$62	\$4,105	\$575	\$372
Observations:							
<ul style="list-style-type: none"> - Two partners comprise of 56.5% of projects with Cost Savings between \$250 and \$300. - One partner comprises of 31.8% of projects with Cost Savings between \$1,150 and \$1,200. 							
Additional Population Segmentation: US Census Regions							
• Northeast	9	27,714	37.3%	\$54	\$4,738	\$754	\$503
• Midwest	8	16,067	21.6%	\$39	\$2,126	\$340	\$287
• South	9	8,562	11.5%	\$47	\$2,763	\$433	\$344
• West	10	11,471	15.4%	\$29	\$3,448	\$491	\$322

Table 4 Estimated Annual Site Energy Savings

Benchmark Metric	# of Partners	# of Records	% of Original Dataset	Min	Max	Mean	Median
Average estimated annual electric site savings (kWh) per upgrade	36	37,873	51.0%	328	18,666	2,291	1,300
Average estimated annual natural gas site savings (therms) per upgrade	33	46,042	62.0%	21	1,723	287	220
Average estimated total annual site energy savings (MMBTU) per upgrade *	37	65,568	88.3%	3	192	30	22

* Total estimated annual energy savings (MMBTU) includes positive and negative savings due to instances of fuel switching to show cumulative impact.

Observations:

- 1,405 projects have Electricity Savings < 0 kWh.
- 720 projects have Natural Gas Savings < 0 therms.
- 125 projects have Total Estimated Annual Savings < 0 MMBTU.

All program cost benchmarks are a simple average by program (not weighted) and reflect what results to date by each partner included *not* cost or savings realized across all programs. Although most partners had residential programs, most also had programs that targeted other sectors and the program costs were not disaggregated. The program cost metrics in Table 6 are based on a relatively small subset of the total programs where program costs and outputs could be easily aligned. These do not adequately represent the results of all BBNP residential programs.

Table 5 Program Metrics

Benchmark Metric	# of Partners	# of Records	% of Original Dataset	Min	Max	Mean
Program Average days-to-complete (days from assessment completion to upgrade completion)	28	29,999	40%	25	269	116
Energy assessment-to-upgrade conversion rate	20	37,900	51%	14%	70%	42%

Notes for Dates-to-completion:

- Excluded negative and 0 days
- Excluded partners with Direct Install Projects Reported and Assessment to Upgrade Conversion > 100%

Notes for assessment-to-upgrade conversion rate:

- Upgrades completed after September 30, 2013 are not included although assessment completed until this date are included.

Table 6 Program Costs Metrics

Benchmark Metrics	# of Partners	Min	Max	Mean	Median
Program cost per upgrade ³	11	\$2,190	\$20,303	\$6,439	\$5,425
Program Marketing & Outreach costs as % of total spending ⁴	11	5%	58%	18%	14%
Program Administration costs as % of total spending ⁵	11	28%	95%	62%	65%

Methodology

Single-family home data from the BBNP dataset was used to calculate an average per project benchmark for five metrics: invoiced cost, loan amount, estimated annual energy savings (electricity, natural gas, and total), and estimated annual energy cost savings, and average time from assessment to upgrade completion. Only records with an upgrade completion date between July 1, 2010 and September 30, 2013 were included. Records with a value of 0 or blank were excluded. From this available dataset of records we performed further analysis to remove outliers. The following describes the steps taken for each metric.

- **Invoiced cost** – The 0.5th to 99.5th percentile of the dataset was retained after excluding records below a lower limit. A \$100 invoiced cost amount is set as the lower limit. Invoiced cost values below \$100 were assumed to be either misreported or representing low cost measures that are directly installed (e.g., CFLs, low flow faucets, pipe wrapping, etc.).
- **Loan amount** – The 0.5th to 99.5th percentile of the dataset was retained.

³ As a comparison, Home Performance with Energy Star programs in 2013 reported a weighted average program cost/upgrade of \$2,920.

⁴ Partners reported Marketing & Outreach costs defined as: outlays of BBNP award funds for communication activities designed to identify, reach and motivate potential customers to participate in a program and learn more (e.g. assessment or other informational activity) about energy efficiency or initiate an energy efficiency upgrade.

⁵ Partners reported Program Administration costs defined as: outlays of BBNP award funds not classified as labor & materials or marketing & outreach. These expenses are often associated with program overhead. Outlays are distinct from DOE's definition of expenditures, which is most relevant with financing programs (i.e., Funds drawn down and provided by the recipient to a third party, to capitalize a loan fund, are considered outlays. Funds drawn down by the recipient to capitalize a loan fund in-house are not considered outlays until the funds are loaned out.).

- **Estimated annual energy savings** – The 0.5th to 99.5th percentile of the dataset was retained after excluding records below a lower limit. A lower limit for annual energy savings was determined based on 2.5% of the average annual single-family home energy consumption from the U.S. Energy Information Agency’s 2009 Residential Energy Consumption Survey (RECS)⁶.
- **Estimated annual energy cost savings** – The 0.5th to 99.5th percentile of the dataset was retained after excluding records below a lower limit. A lower limit for annual energy cost savings was determined based on 2.5% of the average annual single-family home energy expenditure from the U.S. Energy Information Agency’s 2009 Residential Energy Consumption Survey (RECS)⁷.

The table below shows the number of records and the total from the original dataset and the Benchmark dataset after outliers were removed.

BBNP Dataset Used to Calculate Benchmarks

Project Data Element	BBNP Single-Family Home Original Dataset		BBNP Single-Family Home Benchmarking Dataset (with Outliers Removed)	
	Number of Records in Dataset with Data Element	Total	Number of Records in Dataset with Data Element	Total
Invoiced Cost	64,010	\$456,485,512	63,363	\$441,726,616
Loan Amount	12,209	\$124,527,781	12,085	\$122,200,363
Estimated Energy Cost Savings	67,049	\$37,340,636	61,751	\$35,484,301
Estimated Site Electricity Savings (kWh)	49,382	93,397,398	37,873	86,748,169
Estimated Site Natural Gas Savings (therms)	48,526	14,086,872	46,042	13,202,804
Estimated Site Energy Savings (MMBTU)	68,206	2,082,344	65,568	1,944,100

⁶ Lower Limit: 2.59 MMBTU (2.5% of average annual single family home energy consumption: 103.60 MMBTU).

⁷ Lower Limit: \$57.68 (2.5% of average annual single family home energy expenditure: \$2,307).

Appendix C – Planning Worksheets

Worksheet #1

Use this template to help identify the types of feedback information that would be useful for documenting success in meeting your program goals.

Common Residential Program Objectives	Questions to Answer	Outcomes to Measure
Step 1		Step 2
Meet Savings Targets	EXAMPLES: Were energy savings targets achieved?	EXAMPLES: Annual Energy Saved by energy type
	Are more participants or deeper savings per participant needed to achieve energy savings goals?	Lifetime Energy Saved by energy type # upgrade projects
Meet Savings Targets		
Provide Customer Benefit		
Increase Market Penetration		

Common Residential Program Objectives	Questions to Answer	Outcomes to Measure
Step 1		Step 2
Provide Customer Education		
Optimize Program Efficiency / Cost-effectiveness		
Leverage Program Funding		
Support Workforce Development		
Other		

Worksheet #2

Use this template to gather and organize information necessary for data collection, and to assess burden, cost, and value in order to prioritize metrics.

For Assessing Value, Burden, and Cost : ● LOW ● MEDIUM ● HIGH

Metric & Value	Data Needed to Calculate (Definition)	Data Collection Level	Data Owner	Collection Frequency	Feasibility	Burden	Cost
Step 2	Step 3			Step 4			
EXAMPLE: Average customer \$\$ savings per upgrade across program ●	Estimated Annual Energy Bill Savings in Dollars	Per Home Upgrade Project	Home Assessor Contractor	Each Occurrence	Need to specify a method to estimate savings	Need to train on estimating savings. May add to time to business process, but can also be presented to customer as a benefit. ●	●
	Unique Home Upgrade Project Identifier	Per Home Upgrade Project	Home Assessor Contractor	Each Occurrence	Need a process for assigning. Could be provided or assigned by program.	●	●
	Upgrade Completion Date (define as date of invoice)	Per home upgrade project	Contractor	Each Occurrence	Available on paper or electric form of receipt.	Common business practice ●	●