research/into/action inc

Final Report

Preliminary Process and Market Evaluation: Better Buildings Neighborhood Program

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This document presents the preliminary process and market evaluation of the U.S. Department of Energy's (DOE) Better Buildings Neighborhood Program (BBNP). The document was prepared in partial fulfillment of a contract with the Lawrence Berkeley National Laboratory to conduct a comprehensive program assessment of BBNP. This research project was initiated and directed by Jeff Dowd of DOE's Office of Energy Efficiency & Renewable Energy (EERE). Technical oversight of the project was provided by Ed Vine, Staff Scientist, of Lawrence Berkeley National Laboratory.

Our team would like to thank Jeff and Ed for their support and guidance on this project. We would also like to thank Danielle Byrnett, her staff, and her contractors for their openness and willingness to talk with us and answer numerous email questions whenever we asked.

All 41 grantees have many people wanting them to explain their activities and their accomplishments; although we were one of the many, they were overwhelmingly friendly and cooperative, usually talking with us for several hours to explain what they were doing and what their experiences had been. We anticipate that many future discussions will continue to illuminate the varied activities and accomplishments of the Better Buildings Neighborhood Program and we look forward to those.

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ES EXECUTIVE SUMMARY

This document presents the preliminary process and market evaluation of the U.S. Department of Energy's (DOE) Better Buildings Neighborhood Program (BBNP). The document was prepared in partial fulfillment of a contract with the Lawrence Berkeley National Laboratory to conduct a comprehensive program assessment of BBNP.

BBNP is one of many programs funded through the American Recovery and Reinvestment Act of 2009. The funding initially targeted city and state governments, local neighborhood associations, nonprofits, colleges and universities, utilities, and financial institutions through the competitive Energy Efficiency and Conservation Block Grant program Retrofit Ramp-Up Solicitation. Initially DOE made 25 awards to local governmental or nonprofit organizations in amounts ranging from $1.2 to $40 million. Nine similar grantees from the Formula Energy Efficiency and Conservation Block Grant program and seven from the State Energy Program solicitation resulted in 41 Better Building grantees, with award allocations of $508,302,786 in funding for Better Buildings projects.

The three BBNP objectives are:

1. Initiate building energy upgrade programs that promote projects estimated to achieve energy savings in more than 40 communities.
2. Demonstrate more than one sustainable business model for providing energy upgrades to a large percentage of the residential and/or commercial buildings in a specific community.
3. Identify and spread the most effective approaches to completing building energy upgrades that support the development of a robust retrofit industry in the United States.

BBNP seeks to increase the overall energy efficiency of residential and nonresidential facilities through home and building assessments, a trained workforce, and through financing and incentives that lead to energy efficiency upgrades. The 41grantees each proposed, and is implementing, its own program design to deliver energy efficiency upgrades within its designated jurisdiction.

METHODS

The preliminary process and market evaluation includes data from multiple sources: program databases, United States Census data, grantee websites, the Better Buildings Program Google website, and in-depth interviews with 35 grantees, 11 DOE staff, four DOE support contractor staff, 6 non-governmental stakeholders, and 26 market informants. We also conducted surveys

with 189 participating and 151 nonparticipating contractors, as well as 164 equipment suppliers serving home and commercial buildings owners across 22 of the grantee locations.

For this preliminary process evaluation, we interviewed 35 grantees, selected after discussions with Account Managers. We sampled disproportionately fewer SEPs, focusing primarily on the other grantees, of which we sampled 31 of 34. To aid in our selection, Account Managers identified those grantees that, as of late Spring 2012, had programs fully up and running, and whom had not undergone recent changes in management or program design. In addition, we considered number of audits or upgrades accomplished, workers trained or certified, and outlays as a percentage of total budget. By using multiple criteria, we hoped to avoid excluding grantees that may not appear to have made much progress on one criterion (such as, number of upgrades), but may have been active in laying the groundwork for later accomplishments.

To identify factors contributing to grantee success, we needed to discern which of the grantees were most successful to date (we grouped grantees into high, medium, and low success-to-date groups comprising about 10 to 12 grantees). We developed a composite metric of success to date based on progress toward goal, rate of conversion of audits to upgrades, average cost per upgrade completed, and average cost per unit of energy saved. We used this metric for the Energy Efficiency and Conservation Block Grant grants only, since State Energy Program grantee awards occurred later. We identified the grantees with the ten highest success-to-date metric values and categorized them as high success grantees. Although we will be exploring in the final process evaluation alternative formulations of the success metric, our findings strongly suggest that our conclusions are not sensitive to the precise definition of success.

FINDINGS

The differences among grantees and among their programs are multiple, including differences in organizational types and prior efficiency experience, in climate and building types served, in services and measures offered (assessments, qualifying measures, rebates, grants, financing), in role of private sector firms in delivering program services, and in marketing methods. We identified the factors most strongly correlated with the ten most successful grantees' performance: *partnerships with financing organizations*, *partnerships with nonprofit organizations*, and *having energy efficiency experience*, either broadly in the community or through collaborating or hiring of staff.

Partnerships with financing organizations are important, as they facilitate grantees being able to provide effective and available financing solutions. Nonprofits are effective because they are flexible and nimble, and thus able to adjust programs as needed; collaborating with them seems to enable organizations to capture that nimbleness. Finally, while the statistical association was not clear with respect to the energy efficiency experience metric, the interview data support a conclusion that having strong energy efficiency experience in the community leads to community interest in upgrades, and having organizational experience provides the knowledge and capacity to develop an integrated and effective program.

Providing further support of the findings from grantee interviews, we found preliminary evidence that market effects are emerging for grantee programs based on the surveys of participating and nonparticipating contractors and energy efficient equipment suppliers. Both participating and nonparticipating contractors agreed that the BBNP grantee programs were having a positive effect on their businesses and the marketplace in general. The surveys also found that contractors believe there to be increased availability of trained contractors and increased marketing of energy efficiency by contractors, and suppliers believe there to be increased sales and availability of high-efficiency equipment and products. In general, these growth rates are more pronounced in the most successful grantee areas. However, it appears spillover (upgrade activity among customers not participating in grantee programs) may be somewhat higher in the least successful grantee areas, which typically had less prior energy efficiency experience.

CONCLUSION

DOE promoted for BBNP a framework of four pillars as the necessary ingredients for an effective energy upgrade program. These are *marketing*, *financing*, *workforce*, and *data and reporting*. Our research confirms that these pillars are necessary components to an effective upgrade program. More importantly, our research confirms that these components must work together for an energy upgrade program to be effective and successful, and that one pillar alone is not enough. Further, we found that there is no best way to implement each pillar and that each pillar needs to have multiple supporting elements to create an integrated whole. Finally, *data and reporting*, is critical to understanding and evaluating program success and is a key component to gaining long-term funding.

We conclude that although the grantees and their programs vary widely, success is *not* associated with specific organizational types (although it is associated with partnerships with financing and nonprofit organizations and having energy efficiency experience), with climate or building types served, with the specific services and measures offered (assessments, qualifying measures, rebates, grants, financing), with the role of private sector firms in delivering program services, or with marketing methods. There is no "silver bullet" of activities that likely lead to success. We identify activities that have yielded good results, yet both successful and unsuccessful grantees engage in these activities and both successful and unsuccessful grantees engage in activities we do not identify as most promising. We conclude that program success is most closely associated with program activities that are complementary, that effectively address market barriers, and that coherently drive customers and trade allies to comprehensive building upgrades. We also conclude that the grantees with prior efficiency experience and strong partnerships are more likely than other grantees to have such complementary, effective, and coherent program activities.

BBNP is not a scientific experiment; however, as is clear in the three objectives, it was designed to encourage innovative ideas and to assess, through the evaluation process, a variety of approaches to implementing energy efficiency upgrade programs. This research confirms that

BBNP is meeting these objectives. The program generated a wealth of experience in alternative, and sometimes very innovative, approaches to developing the demand and supply markets for whole house and building upgrades. At the close of the second year of the three-year grant period, nearly a quarter of the grantees have developed business models successful in attaining efficiency upgrades, and several models show promise of being sustainable beyond the funding period.

Overall, DOE enabled and facilitated an exchange of grantee experiences that grantees describe as highly valuable to the grantees and as contributing to their success to date.

RECOMMENDATIONS

Our findings reinforce the notion that the four pillars offer a sound framework for developing an integrated energy efficiency program. Demand (marketing) and supply (workforce and financing) strategies, and the program processes that support them (including data and reporting), must work together – have the same objectives, complement each other, and reinforce each other – in order to attain any degree of market success. For each of the aspects of the demand and supply side that we investigated, successful grantees vary in their approaches, a finding that indicates there are no "must have" features. Further, less successful grantees may have used one or more aspects of the demand and supply side approaches used by the successful grantees, a finding that indicates no single feature guarantees success.

We believe the following key factors will increase BBNP success, regardless of the variation among grantees and their programs. We believe DOE should, in this final program year:

- Encourage grantees to clearly identify who has or should have the role of selling the upgrade, and then to provide sales training to those individuals.
- Encourage grantees to include messaging that emphasizes comfort and solutions to building problems, as such messages appear to be influential.
- Encourage grantees in their continued efforts to simplify assessments and connect the assessment to the upgrade sales process; this looks very important, but the best solutions are evolving.
- Encourage grantees to sponsor meetings that give contractors opportunities to share their experience and insights with each other and with the grantees' program teams.
- Encourage grantees to have a program with components that logically and coherently drive demand and stimulate supply; this is a multi-component program process and there are no silver bullets.
- Promulgate these findings to market informants who lack an empirical evidence of the reasons for program success and failure, and are generally unaware of the BBNP efforts; this should increase understanding and opportunities for these important market actors to better support the programs.

1 INTRODUCTION AND METHODOLOGY

The following is a preliminary process and market evaluation of the U.S. Department of Energy's (DOE's) Better Buildings Neighborhood Program (BBNP). The document was prepared in partial fulfillment of a contract with the Lawrence Berkeley National Laboratory (LBNL) to conduct a comprehensive program assessment of BBNP. This is the first of four deliverables for the assessment; they include:

- A preliminary process evaluation focusing on the early program period (this report)
- A preliminary impact evaluation focusing on early grantee projects and including a limited market effects analysis[1]
- A final process evaluation covering the entire program period
- A final impact evaluation focusing on all grantee projects, including a limited market effects analysis

This document includes both process and market evaluation findings, but does not have a market effects assessment.

BBNP PROGRAM DESCRIPTION AND EVALUATION SCOPE

BBNP is one of many programs funded through the American Recovery and Reinvestment Act of 2009 (ARRA).[2] The funding initially targeted city and state governments, local neighborhood associations, nonprofits, colleges and universities, utilities, and financial institutions through the competitive Energy Efficiency and Conservation Block Grant Program (EECBG) Retrofit Ramp-Up Solicitation.[3, 4] Initially, DOE made 25 awards to local governmental or nonprofit

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1 Market effects are changes in the "structure of a market or behavior of participants in a market that is reflective of an increase in the adoption of energy-efficiency products, services, or practices and is causally related to market interventions." (Eto, J, R. Prahl, and J. Schlegel. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*. Prepared for The California Demand-Side Measurement Advisory Committee, Project 2091T. LBNL-39058, UC-1322. Berkeley, Calif.: Lawrence Berkeley National Laboratory.)

2 ARRA distributes its funding in three ways: tax benefits; contracts, grants and loans; and entitlements. The Better Building Neighborhood Program is one of the many grants funded by ARRA.

3 U.S. Dept. of Energy. 2009. *Competitive Solicitation: Retrofit Ramp-up and General Innovation Fund Programs, Funding Opportunity Announcement Number: DE-FOA-0000148*, Announcement Type: Initial CFDA Number: 81.128 Energy Efficiency and Conservation Block Grant Program (EECBG). Cincinnati, OH: Consolidated Business Center.

4 In April 2010, when the first grants were awarded, the program was termed the *Retrofit Ramp-Up* program. By September 2010, the program had been re-titled as the *Better Buildings Neighborhood Program*.

organizations as subgrants to local governments with awards ranging from $1.2 to $40 million. Nine similar grantees from DOE's Formula EECBG program[5] and seven from DOE's State Energy Program (SEP) solicitation[6] (four of whom are part of a NASEO multistate collaborative) were included in BBNP, for a total of 41 grantees, with award allocations of $508,302,786 in funding for BBNP projects.

The three primary objectives for BBNP are:

1. Initiate building energy upgrade programs[7] that promote projects estimated to achieve energy savings in more than 40 communities.
2. Demonstrate more than one sustainable business model for providing energy upgrades to a large percentage of the residential and/or commercial buildings in a specific community.
3. Identify and spread the most effective approaches to completing building energy upgrades that support the development of a robust retrofit industry in the United States.[8]

BBNP seeks to increase the overall energy efficiency of residential and nonresidential facilities through home assessments that lead to energy improvements and, in some cases, through loans and rebates to drive demand for energy efficiency upgrades. The 41grantees include state and local governments and nonprofits, as well as multiple subgrantees operating across the United States and its territories (see Figure 1).

Each grantee proposed, and is implementing its own program design to deliver energy efficiency within its designated jurisdiction. Thus, more than 41 programs are in operation, all of which have BBNP funding.

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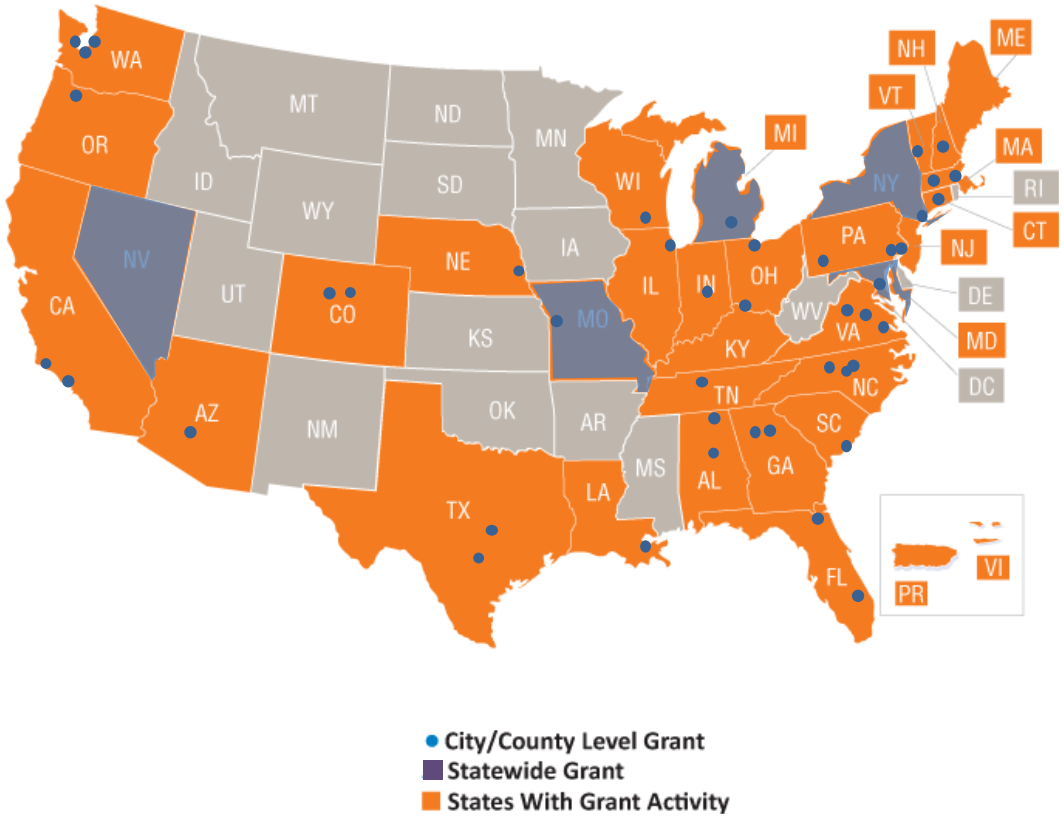
5 American Recovery and Reinvestment Act – Energy Efficiency and Conservation Block Grants. *Formula Grants Funding Opportunity.* Number : DE-FOA-0000012, Announcement Type Amendment 000003, CFDA Number: 81.128 Energy Efficiency and Conservation Block Grant Program (EECBG).

6 Miltenberger, S. 2010. *State Energy Program (SEP) Strengthening Building Retrofit Markets and Stimulating Energy Efficiency Action DE-FOA-0000251*, Announcement Type: Initial CFDA Number: 81.041. U.S. Department of Energy.

7 Documentation for the BBNP program uses varying language to refer to grantee activities. The *Better Buildings Neighborhood Program Grant Recipient Management Handbook (Version 2.0)*, for example, refers to each grantee's set of activities as a *project*, while other sources refer to grantee *programs*. In the energy efficiency community, *program* usually refers to a collection of activities that an administrator carries out to induce uptake of energy efficiency measures, and *project* usually refers to a specific equipment replacement or facility upgrade meant to improve energy efficiency for a specific end-user. As this appears to be the usage currently preferred by DOE, we will use it in this report.

8 The term *retrofit* refers to changing equipment out to improve its energy utilization prior to its natural need for replacement. The Better Buildings team shifted their terminology to use *energy upgrade* rather than *retrofit* as a more commonly understood and positive term that referred to improving a building, not just early replacement of equipment.

Figure 1: Grantees by Location



The differences among the grantee programs are multiple:

- Climate served
- Sector and building types served (single family residential, multifamily residential, commercial, agricultural, and industrial)
- How and at what depth does a program offer assessments
- Whether or not a program offers rebates, grants, or financing, and at what levels (such as to whom, for what, how much)
- The energy upgrade measures that are allowed and/or encouraged
- The role of private sector firms in delivering program services, the nature of the implementer's relationship with the assessment and energy upgrade contractors
- The qualifications of the contractors
- The type and frequency of quality assurance
- How grantees market their program

- When program recruitment began, and time spent laying the groundwork through more extensive marketing and partnership building, or developing auditor capability
- The grantee's organizational structure (government, nonprofit, utility, other) and culture (such as flexible, entrepreneurial)
- The grantee's previous experience with energy efficiency
- The program manager's experience and characteristics (such as flexible, entrepreneurial)
- Other energy efficiency programs that previously or currently serve the grantee's jurisdiction
- The types, experience levels, and roles of various grantee partners; quality of the relationships with those partners

This evaluation addresses the national program, with a goal of identifying what grantee program elements are most successful at bringing about market changes that will result in sustainable savings. To do this, we have collected detailed data on program activities and performance metrics from all 41 grantees, using grantee as the *unit of analysis*. This information provides the raw data needed to identify success factors and explain why those factors are meaningful. This, however, is not an evaluation of the individual grantees, which would require a much greater level of data and effort. As a result, the reader will not find it possible in this document to know what specifically happened at each grantee program.[9]

In addition, this is a preliminary assessment focused on what is known approximately two years after the grants were awarded.[10] Through this preliminary assessment, we hope to provide some insights to the BBNP team (DOE staff and its program contractors) and to the grantees to strengthen their last year in the program, and we intend to use this preliminary assessment to inform the research plan for the final process and market evaluation report.

METHODOLOGY

Limits of This "Real Time" Evaluation

DOE sought this preliminary BBNP process and market evaluation to provide feedback mid-way through the grant period, in order that DOE and grantee team members might obtain insights useful to their remaining BBNP activities. This "real time" evaluation contrasts with the final

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9 DOE's BBNP website provides a wealth of information, including information related to DOE's and grantee's programs and to energy efficiency upgrades. By clicking on the map on the site's home page, the user has access to links to information on each grantee's program and (as available) the grantee's program website. *http://www1.eere.energy.gov/buildings/betterbuildings/neighborhoods/*

10 The first contracts were signed in May 2010 and the last of the 41 were signed in September 2010. Grants terminate three years after contract signing.

BBNP retrospective process and market evaluation that the team will prepare after the grant period.

The timing and resource constraints of the preliminary process evaluation in comparison with the final evaluation have a number of implications. Perhaps foremost among the implications is this: Although our primary task is to identify factors contributing to grantee success, it was not until mid-August 2012 that we (or indeed, anyone involved in BBNP) had data on grantee achievements that the DOE team considered to be reasonably complete and accurate. At this time, DOE issued cleaned and vetted data for grantee accomplishments through Quarter 2 (June) 2012.[11]

The achievement data, while generally of good quality, themselves have limitations. For example, shortly after issuing the dataset, DOE retracted the information for one grantee, stating the data reflected inaccuracies that the grantee was working to correct. In response to this news, we excluded this grantee from our identification of successful grantees; thus, our list of the ten most successful grantees based on achievement (quantitative) data therefore does not take into account this grantee, which our interview (qualitative) data suggests is among the most successful.

Perhaps more significantly than our analytical treatment of a single grantee, the achievement data did not distinguish between residential and nonresidential achievements; thus, all distinctions we make in this report between the sectors are based on interview (qualitative) data. Nor did the achievement data include some elements of interest in a study seeking to characterize and understand grantee success, such as number of assessment inquiries, which might serve as a denominator to assessments conducted and thus indicate rate of conversion from interest to assessment.

DOE staff also caution that some data elements – such as total numbers of assessments and retrofits – are more reliable than other data elements – such as costs for different activities and energy savings (reported in MMBTUs). Reported energy savings are those the grantees have tracked for each upgrade, most often based on deemed values.[12] The savings estimates have yet to be validated by an impact evaluation. Our final BBNP evaluation will use MMBTU estimates informed by our impact evaluation, to the extent these are available in time for our analysis.[13, 14]

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11 This clean dataset represents a significant investment in time and effort by the DOE and grantee team members, which explains why the data were unavailable until mid-August.

12 The term “deemed values” describes savings estimates that have been derived from a source external to the program – typically savings estimated through engineering and other evaluation studies – and assigned to the program upgrade activities. The savings are also known as stipulated savings or *ex ante* savings, in that they are established prior to any upgrade work.

13 Some of the grantees are also conducting impact evaluations to validate their upgrade savings. Impact evaluations generate an *ex post* or after-the-upgrade assessment of savings for the specific upgrades undertaken by the program.

In addition to the limitations of the achievement data, its arrival in mid-August also has implications for the current research. The reporting schedule necessitated that we conduct much of our analysis prior to the availability of achievement data. For that work, we relied on the assessments of the DOE and grantee teams (qualitative data) to identify successful outcomes and, for those outcomes, sought success factors.

On another note, only a few grantees had initiated evaluations of their own programs at the time of this preliminary evaluation, and none of these evaluations had yet yielded data in a form the grantees were willing to share. The final evaluation will review and seek to draw findings and conclusions from all evaluations the grantees share with us.

As a final consideration in this discussion of the limits of our methods: We had a wealth of information available to us – from over two hundred hours of interviews, grantee websites and links, and the substantial information DOE has compiled and made available through BBIS, *Salesforce*, a BBNP dashboard, a BBNP Google website, webinars, conferences, and so on.[15] Grantees' program websites quickly become out-of-date. Formally reported data have inaccuracies and, similarly, are quickly outdated. Interview and narrative data have generalities and opinions.

At each point of the analysis, we endeavored to use the available data we judged to be most reliable. We triangulated across the multiple sources, looking for the preponderance of evidence. When sources did not converge, we typically chose the most recent data; but in all cases, we also considered how the data had been collected or reported and the context of its gathering.

Throughout this report, we note topics for which the preliminary data are insufficient to drawn firm conclusions – topics we will pursue further in the final evaluation.

Overview of Data Sources and Sampling

Table 1 provides our sampling plan for this preliminary evaluation. We developed each sampling plan within the available resources, constrained by data limitations – what data were available and the time that data became available. Within those constraints, our research objectives guided our decisions. The table identifies the samples by research objective, indicates data source, whether the data are quantitative or qualitative, and the chapters that analyze these data. We subsequently describe the sampling plans in more detail and the methods we used with these samples. Appendix A provides all data collection instruments. We collected the data in summer 2012.

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14 The impact evaluation lags the process and market evaluation, due to differing data needs and analytical requirements.

15 We describe subsequently these DOE sources of BBNP information.

The table refers to these chapters:

- 2: *Better Buildings Neighborhood Program*
- 3: *Overview of Grantee Characteristics*
- 4: *DOE Program Management and Support*
- 5: *Driving Demand*
- 6: *Stimulating Supply*
- 7: *Market Assessment: Market Informants*
- 8: *Market Assessment: Contractors and Vendors*

Table 1: Data Sources and Sampling Plan

Data Source/ Sample Group	Population	Sample	How Sample Selected	Type of Data Collected	Chapters
Secondary Data					
Grantees' Secondary Data	41	41	Census	Quantitative and Qualitative	2, 3, 5, 6
BBNP Program Secondary Data	NA	NA	All sources accessed	Quantitative and Qualitative	2, 4
Implementation Contacts					
DOE BBNP Account Managers and Program Managers	8	8	Census	Qualitative: In-depth Phone Interview	2, 4
Additional BBNP-Related DOE Staff and Contractors	13	7	DOE provided contacts; evaluators selected subjects	Qualitative: In-depth Phone Interview	2, 4
Non-governmental Stakeholders	6	4	DOE provided contacts; evaluators selected subjects	Qualitative: In-depth Phone Interview	2, 4
Grantee Analyses					
Grantee Success Metric	41	39	Census of those with complete metric-related data Quarter 2 2012	Quantitative	3*
Grantee Activities and Experiences	41	35	Account Managers identified grantees fully up and running, no recent major change in approach or organization as of late Spring 2012	Qualitative: In-depth In-Person and Phone Interview	4, 5, 6
Market Effects Analyses					
Market Informants	32	26	Targeted sample of national and regional experts in energy efficiency upgrades, programs, and products	Qualitative: In-depth Phone Interview	7

Continued

Data Source/ Sample Group	Population	Sample	How Sample Selected	Type of Data Collected	Chapters
Market Effects Analyses (Continued)					
Grantees' for Market Effects Surveys	41	22	Account Managers identified as most active (most likely to have generated market effects)	NA – selected to drive vendor and contractor surveys	NA
Participating Contractors	1,159**	189	Lists provided by grantees	Quantitative and Qualitative: Survey	8
Nonparticipating Contractors	7,281**	151	Purchased list	Quantitative and Qualitative: Survey	8
Vendors	585**	164			

* We used the resulting success metric as an explanatory variable in Chapter 6 and 8 analyses; had the data been available earlier, we would have similarly used the metric in Chapters 4 and 5.
** Populations estimated subsequent to data collection, as described below.

The final evaluation will include the perspectives of participants, nonparticipants, and participating financial institutions.

Overview of Analytical Methods

For this preliminary evaluation, we used qualitative analysis software (*NVivo 10)* to aid in our analysis of all interview data. We entered the grantee, stakeholder and DOE staff, and support contractor interviews into a common *NVivo 10* database for coding and analysis. We analyzed the market informants independently for the preliminary process evaluation in their own *NVivo 10* database. We used the outline of the report as the basis for our coding scheme, expanding on that as the coding proceeded. Staff involved in conducting the interviews coded the interviews. The senior staff responsible for drafting the report reviewed and further expanded coding as necessary.

We analyzed survey data using *IBM SPSS Statistics*. We generated frequencies and cross-tabs and used the Chi-squared test to assess the statistical significance of differences between groups.

Secondary Data

The preliminary process evaluation used secondary data from BBNP's documentation and databases, as well as census data for the geographic areas included in the programs.

BBNP Data Bases

We developed a data set that includes data from *Salesforce* and BBIS, as well as collecting data from each of the grantee websites.[16] These data are discussed in more detail in Chapter 3. For instance, grantees provide quarterly updates of their upgrade accomplishments. DOE and its contractors vet the quarterly data, and then enter them into a "dashboard" of program accomplishments in *Salesforce*. We used this dashboard as the source for much of the accomplishments data.

DOE has several contractors who are developing datasets to support DOE and its primary contractor, the National Renewable Energy Laboratory (NREL), for reporting purposes. When we could not find information in a readily available database, we asked DOE staff if they had the information, and they often were able to provide us with additional data.

We also used *Salesforce* and the BBNP's Google group website to illuminate our understanding of DOE engagement with the grantees. These databases are repositories for nearly all the materials generated by the program, and *Salesforce* provides documentation of interactions with the grantees since mid-2011.

Census Data

We compiled the demographic characteristics of the geographic areas targeted by each grantee, using data from the U.S. Census Bureau.[17] We primarily used the 2006-2010 American Community Survey's five-year estimates of population, housing, and economic characteristics of the grantee communities. As discussed below regarding contractor and equipment vendor sampling, we were careful to define the area to be geographically reasonable relative to the grantee – neither too large nor too small to be meaningful. Appendix D describes the geographical definitions we used for each grantee to support a match with census data.

Implementation Contacts

DOE Staff and Contractors

We identified 11 DOE and 10 support contractor staff members from five companies engaged in working with Better Buildings. During the development of the preliminary process evaluation

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16 *Salesforce is a commercially available relationship management software. Although the software is commonly used by organizations engaged in sales, the BBNP team uses the software to gather, analyze, and report on a wide variety of data relating to grantees and their programs. DOE staff and contractors use SalesForce to track their activities and communications with grantees; the software includes dashboards that record the progress of the BBNP activities based on the data uploaded into the BBIS.*

17 U.S. Census Bureau. 2010. *American Community Survey 2006-2010. http://www.census.gov/acs/www/*. Washington, D.C.: U.S. Department of Commerce.

work plan, we clarified the roles of these contacts. We selected those who were *actively* involved in planning and executing Better Buildings support activities. This resulted in 11 DOE staff and four support contractor staff interviews, each representing a specific contractor's work area.[18]

We conducted telephone interviews with each contact lasting between 45 minutes to two hours. We audio recorded and wrote down their responses to each question during the interview.

The interviews with DOE staff and support contractors covered the following topics, aligning the depth of the questions to their role and responsibilities:

- Roles and responsibilities in BBNP;
- Their assessment of the program objectives, program experience, and technical assistance (questions modified based on their role);
- Drivers and barriers to program success and program sustainability;
- Issues with complying with various DOE and federal grant requirements and overall data management;
- Experiences with nongovernmental stakeholders; and
- Knowledge of grantee evaluation efforts.

Non-Governmental Stakeholders

We conducted telephone interviews with a sample of four of six identified nongovernmental stakeholders.[19] The interviews lasted between 30 minutes and one hour. We audio recorded and wrote down their responses to each question during the interview. The interviews with stakeholders covered the following topics, aligning the depth of the questions to their roles:

- Stakeholder involvement in BBNP
- Their assessment of the program effects on the market
- Drivers and barriers to program success and program sustainability
- Issues with Davis-Bacon Act and data management[20]
- Experiences with technical assistance

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18 The one support contractor firm not interviewed primarily had the role of facilitating workshops and conferences and was not involved in program support functions.

19 Our work plan called for interviews with 14 contacts among program staff, support contractors, and stakeholders. We interviewed 19.

20 The Davis-Bacon Act of 1931 is a federal law requiring that wages on projects with federal financial assistance must be paid at prevailing wage rates for the community.

Grantee Analyses

Grantee Success Metric

We calculated a metric of grantee success from the BBNP achievement data reported through Quarter 2 2012. We discuss the derivation of this metric in Chapter 3, *Overview of Grantee Characteristics,* under *Grantee Progress,* and present correlates of grantee progress that we identified through a statistical correlation analysis of quantitative grantee characteristics with grantee metric values.[21] The metric is a composite of grantees' rankings on four indices of success: progress toward goal (number of completed upgrades as a percentage of targets), rate of conversion of audits to upgrades, average cost per upgrade completed, and average cost per unit energy saved. We discuss the selection of these four indices in Chapter 3. In addition, as explained in detail in Chapter 3, we did not calculate a composite metric for two grantees (both SEP grantees) for whom we had insufficient data to calculate two of the component indices. After calculating the composite index, we decided to exclude all seven SEP grantees from the analyses of correlates of grantee progress, as the award and program launch dates were much later for those grantees than for the other grantees and so they had not been in the field long enough to permit a fair test of the factors that we examined. We also eliminated one other grantee from the analyses, as we discovered that the progress data for that grantee were not accurate. Thus, the analyses of the correlates of grantee progress were based on a final sample of 33 grantees.

We identified the grantees with the ten highest metric values and categorized them as high success grantees. We divided the remaining grantees based on a natural break point in the metric value distribution into medium and low success categories. We use the high/medium/low categorization in the analyses presented in Chapter 6, *Stimulating Supply* and Chapter 8, *Market Assessment.*[22]

Grantee Activities and Experiences

For this preliminary evaluation, we conducted 10 on-site and 25 telephone interviews with the 35 sampled grantees. The interviews ranged in depth and complexity from a two-hour interview with a single grantee representative to more than five interview hours with multiple representatives and multiple sessions.

We selected the 35 grantees, shown in Table 2, after discussions with Account Managers. We sampled disproportionately fewer SEPs (4 of 7), focusing primarily on the other grantees, of which we sampled 31 of 34. To aid in our selection, Account Managers identified those grantees

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21 Metric values range from 25 to 159, as it was the sum of four components that each ranged from 1 to 41.

22 Due to the mid-August availability of achievement data, we were not able to consider a grantee's success category as we conducted the other analyses described in this report. Those analyses relied on qualitative assessments of successful grantees and successful activities.

that, as of late spring 2012, had programs fully up and running, and whom had not undergone recent changes in management or program design. Account Managers suggested the "recent changes" criterion as a means of obtaining clear interview data (obviating the need to distinguish between current and past practices) consistent with reported (thus, historical) accomplishments. In addition, we considered number of audits or upgrades accomplished, workers trained or certified, and outlays as a percentage of total budget.[23] By using multiple criteria, we hoped to avoid excluding grantees that may not appear to have made much progress on one criterion (such as, number of upgrades), but may have been active in laying the groundwork for later accomplishments.

Table 2: Grantees Interviewed for Preliminary Process Evaluation

- Alabama SEP
- Austin, TX
- Bainbridge Island, WA
- Bedford, NY
- Boulder County, CO
- Camden, NJ
- Chicago, IL
- Cincinnati (GCEA)
- Connecticut
- Eagle County, CO
- Fayette County, PA
- Greensboro, NC
- Indianapolis, IN
- Kansas City, MO
- LA County, CA
- Lowell, MA
- Maine
- Maine SEP
- Maryland
- Massachusetts SEP
- Michigan
- New Hampshire
- NYSERDA
- Philadelphia, PA
- Phoenix, AZ
- Portland, OR
- Rutland County, VT
- San Antonio, TX
- Seattle, WA
- SEEA
- St. Lucie County, FL
- Toledo-Lucas Co. Port Authority (OH)
- University Park, MD
- Virginia SEP
- Wisconsin

We prepared for the grantee interviews by interviewing the account managers and by combining the available grantee information from *Salesforce*, BBIS, grantee websites, and BBNP webinars and conferences. We designed an open-ended interview guide focusing on the grantee's experiences, interpretations, and lessons learned. Our interviewers probed to obtain additional details throughout the interviews.

[23] We obtained these data from the BBIS quarterly report for the fourth quarter of 2011.

Market Effects Analyses

Market Informants

We conducted in-depth interviews with 26 market informants. We sought to interview individuals who would provide a variety of viewpoints of the energy efficiency market. Organizations represented include trade associations, regional energy efficiency organizations , and energy efficiency stakeholders. Table 3 provides a more detailed characterization of each type of organization. We selected respondents for this study based on interviews conducted as part of the BBNP process evaluation, entities identified by other market informants, and our industry knowledge.

Table 3: Types of Market Informants

TYPE OF ORGANIZATION	NUMBER INTERVIEWED (*n* = 26)	DESCRIPTION
Trade association	9	Trade associations whose members retrofit and upgrade homes or existing buildings
Regional energy efficiency organization	5	Organizations generally working on behalf of energy efficiency program administrators in a supportive capacity within various regions of the U.S., including the Southeast, Southwest, Midwest, and Northeast
Stakeholder organization	12	Organizations directly involved with the energy efficiency industry, serving a research, program implementation, lending, or supportive function

Interview questions primarily addressed the following topics:

- The key market actors in the residential upgrade market, main barriers, and critical drivers to affecting greater efficiency in the residential upgrade market;
- The extent to which the program addresses the key barriers and drivers that bring about greater efficiency in the residential upgrade market;
- The timing of BBNP grantee programs, other programs, and market changes in relation to these evolving dynamics; and
- Changes in observed market activity and estimates of jobs created or retained that key market actors attribute to the program versus other programs and outside influences, and the particular aspects of the program (e.g., marketing, incentives, and training) to which they attribute the most influence.

We identified several interviewees as having experiences that pertain to both the process and market assessment evaluations. In an attempt to limit the burden placed on these individuals, we asked them a subset of market effects questions during the process evaluation interviews.

Contractors and Equipment Vendors

We conducted surveys with participating and nonparticipating contractors, and with energy efficiency equipment vendors in communities with the most active BBNP grantees at the time of the preliminary evaluation.

We iterated to develop the sample frame of participating and nonparticipating contractors and energy efficiency equipment vendors. We began with a target of 170 completed surveys for each population and a target of three to five members of each population from each grantee. We worked with DOE Account Managers to identify the most active grantees and selected from those identified 22 grantees (Table 4) to comprise the preliminary market effects survey sample. (Note that these grantees are a subset of the 36 grantees with whom we conducted in-depth interviews to gather grantee activity and experience data.)

Table 4: Grantees Included in the Preliminary Market Effects Survey

- Austin, TX
- Bainbridge Island, WA
- Boulder County, CO[a]
- Connecticut[b]
- Eagle County, CO[c]
- Fayette County, PA
- Greensboro, NC
- Kansas City, MO
- Lowell, MA
- Maine
- Michigan[d]
- New Hampshire[e]
- NYSERDA[f]
- Philadelphia, PA
- Phoenix, AZ
- Portland, OR
- Rutland County, VT
- San Antonio, TX
- Seattle, WA
- St. Lucie County, FL
- Toledo-Lucas Co. Port Authority (OH)
- University Park, MD

[a] Boulder County comprises the counties of Boulder, Garfield, and Denver.
[b] Connecticut comprises the cities in the southwest portion of the state of Westport, Ridgefield, Wilton, and Weston, where over 50% of the residential retrofits had occurred at the time of the study.
[c] Eagle County comprises the counties of Eagle, Pitkin, and Gunnison.
[d] Michigan comprises Wayne County and the city of Grand Rapids.
[e] New Hampshire comprises the towns of Berlin, Nashua, and Plymouth.
[f] NYSERDA comprises the cities of Syracuse, Rochester, and Buffalo, where over 60% of the 2011 NYSERDA HPwES residential retrofits had occurred.

We compiled lists of participating local contractors obtained from data requests we placed to the 22 grantees and from the grantees' websites. The number of participating contractors varied dramatically among the grantees, ranging from 4 (Connecticut) to 365 (Maine). We identified a geographic region for each grantee from which we drew our sample of nonparticipating contractors and energy equipment vendors. Our sought to systematically identify grantee geographic regions that captured an adequate population of contractors and vendors working in the grantee locations without defining a region that was so large that we would be unable to detect potential market effects.

Grantees are located in a range of locations, including major metropolitan regions, small cities or towns within major metropolitan regions, medium sized cities, rural counties, and small towns.

We categorized grantees locations according to the Center for Disease Control's National Center for Health Statistics (NCHS) – 2006 Urban-Rural Classification Scheme for Counties.[24] The NCHS report classifies counties into one of six categories, four urban and two rural, as shown in Table 5.

Table 5: NCHS – 2006 Urban-Rural Classification Scheme for Counties

NCHS URBAN-RURAL COUNTY CODE	DEFINITION
Large metro, central	Counties in a Metropolitan Statistical Area (MSA) of 1 million or more population that: 1) contain the entire population of the largest principal city of the MSA; or 2) are completely contained within the largest principal city of the MSA; or 3) contain at least 250,000 residents of any principal city in the MSA
Large fringe metro	Counties in a MSA of 1 million or more population that do not qualify as large central
Medium metro	Counties in a MSA of 250,000 to 999,999 population
Small metro	Counties in a MSA of 50,000 to 249,999 population
Nonmetro, micropolitan	Counties in a micropolitan statistical area
Nonmetro, noncore	Counties not in a micropolitan statistical area

Next, we distinguished between grantees working in a specific city, town, or neighborhood within the county or MSA, and grantees working in an entire county or entire metro region. Based on this distinction, we defined the geographic region from which we drew our sample of nonparticipating contractors and vendors of energy-efficient equipment according to the rules described in Table 6.[25] Appendix D provides more detail on the grantee classification, as well as maps of the grantee program areas.

Table 6: Geographic Area for Sampling Nonparticipating Contractors and Vendors

NCHS URBAN-RURAL COUNTY CODE	LOCATION WITHIN COUNTY	SAMPLING REGION
Large metro (central or fringe)	Primary city or entire county	County
Large metro (central or fringe)	Neighborhood, town, or city, but not the primary city	Geographic region encompassing 10 mile radius from the edge of grantee location
Medium or small metro	Entire county	County
Medium or small metro	City or town within the county	Geographic region encompassing 10 mile radius from the edge of grantee location
Nonmetro (micropolitan or noncore)	County, city, or town	County

[24] See: *http://www.cdc.gov/nchs/data_access/urban_rural.htm*.

[25] The Maine grantee program is offered statewide, so contractors and vendors were sampled from the entire state of Maine.

For each grantee we developed an initial population of nonparticipating contractors and vendors with data from a purchased list (InfoUSA[26]).[27] We classified grantees as offering either a residential or a commercial program, and identified contractors by Standard Industrial Classification (SIC) codes.[28] Appendix C provides the SIC codes we used.

InfoUSA provided a random sample of up to 258 contractor and vendors records for each population. We reviewed each list and removed duplicate entries, contractors included in the participating contractor lists, and – based on the description of their primary SIC code – contractors and vendors who did not work construction trades and activities that are commonly associated with energy upgrades.[29]

We then derive grantee-specific targets by allocating the target of 170 total completed contractor and vendor surveys among the grantees. Under the simplifying assumption that one would hope to find market effects proportionate to the BBNP grant received (that is, a finding that larger grants generated greater total market effects), we applied the percentage of the total BBNP grant value constituted by a given grantee to the target of 170 total completed surveys to derive grantee-specific targets.[30]

For example, Austin's grant of $10,000,000 represents 3% of the total grant funds received by the 22 grantees, which resulted in a minimum goal of 5 completed surveys. We considered the size of the sample frame (number of contractors and vendors) for each grantee and reduced some minimum goals because of small sample frames, while setting a minimum goal of at least two completed surveys for each population for each grantee.

As a last step, we estimated during the data analysis phase the population of nonparticipating contractors and vendors based on the survey dispositions (call records) and the original population estimates from InfoUSA.

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26 infoUSA, a product of the Infogroup, provides business and consumer data, including contact information, for marketing and research purposes. See: *http://www.infousa.com/*.

27 The original sample of nonparticipating contractors and vendors included firms that we excluded from the final population estimates. We excluded firms based on several criteria: disconnected phone numbers, wrong numbers or otherwise unusable phone numbers, the firm did not perform or sell energy-efficiency upgrade services or products, or the firm did not serve the sector (residential or commercial) of interest for the respective grantee.

28 The following grantees were classified as commercial programs: Lowell, MA; Phoenix, AZ; Boulder County, CO; and Toledo-Lucas Co. Port Authority (OH).

29 For example, contractors with the following SIC code descriptions were removed: convenience stores, janitor service, and printers.

30 We considered an allocation reflecting the grantee's share of total BBNP upgrades for this preliminary evaluation in recognition that the grantee programs are at different stages of maturity. However, because we are establishing with this evaluation methods to be used in the final evaluation, and are obtaining interim results that we will compare with final results, an allocation by share of total BBNP grant funding – which will remain stable across the two evaluations – seemed preferable.

Table 7 reports the population of participating and nonparticipating contractors and vendors for each grantee.[31] Appendix D provides the original sample frame and survey goals. Based on the population estimates and sample sizes from Table 7, we estimate a sampling error at 90% confidence level of 7.3% for participating contractors, 8.6% for nonparticipating contractors, and 6.1% for vendors. We estimated the associated error margins assuming a 50/50 proportion of responses. We note that our sampling strategy represents all sampled grantees, *but does not provide statistical precision at the grantee level*, nor do we draw any grantee-specific conclusions or inferences.

Table 7: Estimated Population (*N*) and Number of Completed Surveys (*n*) of Participating and Nonparticipating Contractors and Vendors, by Grantee

Grantee	Grant Value	Participant Contractors		Nonparticipant Contractors		Vendors	
		N	*N*	*N*	*n*	*N*	*n*
Austin, TX	$10,000,000	28	2	351	6	21	8
Bainbridge Island, WA	$4,884,614	17	8	524	7	36	9
Boulder County, CO*	$25,000,000	59	4	140	8	21	7
Connecticut	$4,171,214	4	1	233	5	8	3
Eagle County, CO	$4,916,126	35	9	102	6	15	5
Fayette County, PA	$4,100,018	14	5	52	6	3	0
Greensboro, NC	$5,000,000	11	3	361	7	19	7
Kansas City, MO	$20,000,000	43	16	123	5	39	15
Lowell, MA*	$5,000,000	12	2	55	3	12	3
Maine EECBG	$34,538,571	369	28	929	17	41	13
Michigan	$30,000,000	53	5	588	12	72	14
New Hampshire	$10,000,000	55	7	204	6	14	4
NYSERDA	$40,000,000	62	18	647	6	47	10
Philadelphia, PA	$25,000,000	117	20	702	8	58	12
Phoenix, AZ *	$25,000,000	31	3	438	10	43	10
Portland, OR	$20,000,000	50	22	337	8	30	11

Continued

[31] Although the population of participating contractors in total is 1,159, there were only 1,147 unique contacts included in the sample frame because 12 contractors participated with more than one grantee. We randomly assigned these 12 contractors to one grantee. In addition, because some grantees had very small populations of participating contractors, we reduced the number of completed surveys for some grantees and expanded the number of surveys for other grantees that had larger numbers of participating contractors.

Grantee	Grant Value	Participant Contractors		Nonparticipant Contractors		Vendors	
		N	*N*	*N*	*n*	*N*	*n*
Rutland County, VT	$4,487,588	8	4	48	4	6	3
San Antonio, TX	$10,000,000	48	9	489	3	10	3
Seattle, WA	$20,000,000	15	8	587	7	46	13
St. Lucie County, FL	$2,941,500	56	6	73	5	7	2
Toledo-Lucas Co. Port Authority (OH)*	$15,000,000	7	2	53	6	26	8
University Park, MD	$1,425,000	65	7	245	6	11	4
Total	**$321,464,631**	**1,159**	**189**	**7,281**	**151**	**585**	**164**

* Designates a grantee classified as a commercial program for the preliminary evaluation.

The surveys collected data on the potential market effects of the BBNP grantees, including:

- Number of homes/buildings with energy upgrades before and during program implementation
- How contractors have changed their marketing in response to program changes
- Whether and how the contractor's marketing changes have made a difference in the observed level of program activity
- Training and availability of qualified contractors
- Jobs created and retained
- Changes in practices and changes in the energy efficiency upgrade market
- Vendor assessment of the stock of current building materials and changes compared to pre-program stocks
- Barriers to energy efficiency upgrades
- Knowledge of and participation in other programs
- What changes in the number of upgrades respondents attribute to BBNP versus other programs and outside influences, and to which particular aspects of BBNP (e.g., marketing, incentives, and training) they attribute the most influence
- Descriptive information about the contractors themselves, such as the range of services they provide and their organizational structure, and whether these things have changed as a result of program involvement

2 THE BETTER BUILDINGS NEIGHBORHOOD PROGRAM

In this chapter, we discuss the BBNP program theory and logic, and the steps that grantees pursue in the program.

The following describes the program logic and market models based on our review of program materials, interviews with the DOE program account managers, and our preliminary evaluation findings.

Pursuing the three BBNP objectives, the 41 BBNP grantees are each engaged in efforts to stimulate and facilitate building energy upgrades through the programs they run within their communities using BBNP funding. The energy upgrades provide energy savings and jobs, and the programmatic efforts of the grantees provide evidence of effective business models for energy upgrades that are sustainable and support the development of a robust energy upgrade industry in the United States.

The DOE BBNP team defined four pillars of success for an integrated residential energy efficiency program: *driving demand*, *financing*, *workforce development and contractor capacity*, and *data, reporting, and evaluation*. These four pillars create the framework for the activities the BBNP team (DOE staff and its contractors) and grantees pursue. The four pillars should not be confused with the program theory and logic, as programs may use different activities and outputs to drive demand for energy upgrades, finance energy upgrades or support a contractor market for energy upgrades.

1. Driving Demand – This pillar is concerned with creating the demand for energy upgrades.
2. Financing – this pillar ensures that financial mechanisms are available so that home and business owners can make the energy upgrade.
3. Workforce Development and Contractor Capacity – this pillar is to ensure that assessment and energy upgrade contractors are trained and have sufficient staff to meet the demand for energy upgrades.
4. Data, Reporting, and Evaluation – this pillar establishes the principal of collecting and reporting data to document the program and evaluate how well the program has met it goals.

As the evaluation is focused on that national program, not each grantee, we have developed two program logic models that depict the program from two perspectives, DOE and grantees. It is important to note that the grantee model is not intended to suggest that all grantee programs operate the same way or include the same activities: it is a general logic model that includes key grantee-level activities, outputs, and outcomes that may be observed across the grantees.

The logic models illustrate the key program activities, outputs, and anticipated outcomes, but imply neither priority of importance of various activities nor any particular process flow across the activities. They illustrate how program activities ultimately influence the market and the interrelationships among model elements, but do not show when activities occur.

PROGRAM THEORY AND LOGIC – DOE PERSPECTIVE

The program theory and logic from the DOE perspective is that through the support and funding of the DOE BBNP, the grantees will be able to develop sustainable program models that stimulate energy upgrades, provide energy savings, and create jobs. Figure 2 provides the graphic depiction of the program logic for DOE's BBNP activities as identified by the preliminary evaluation research activities and findings.

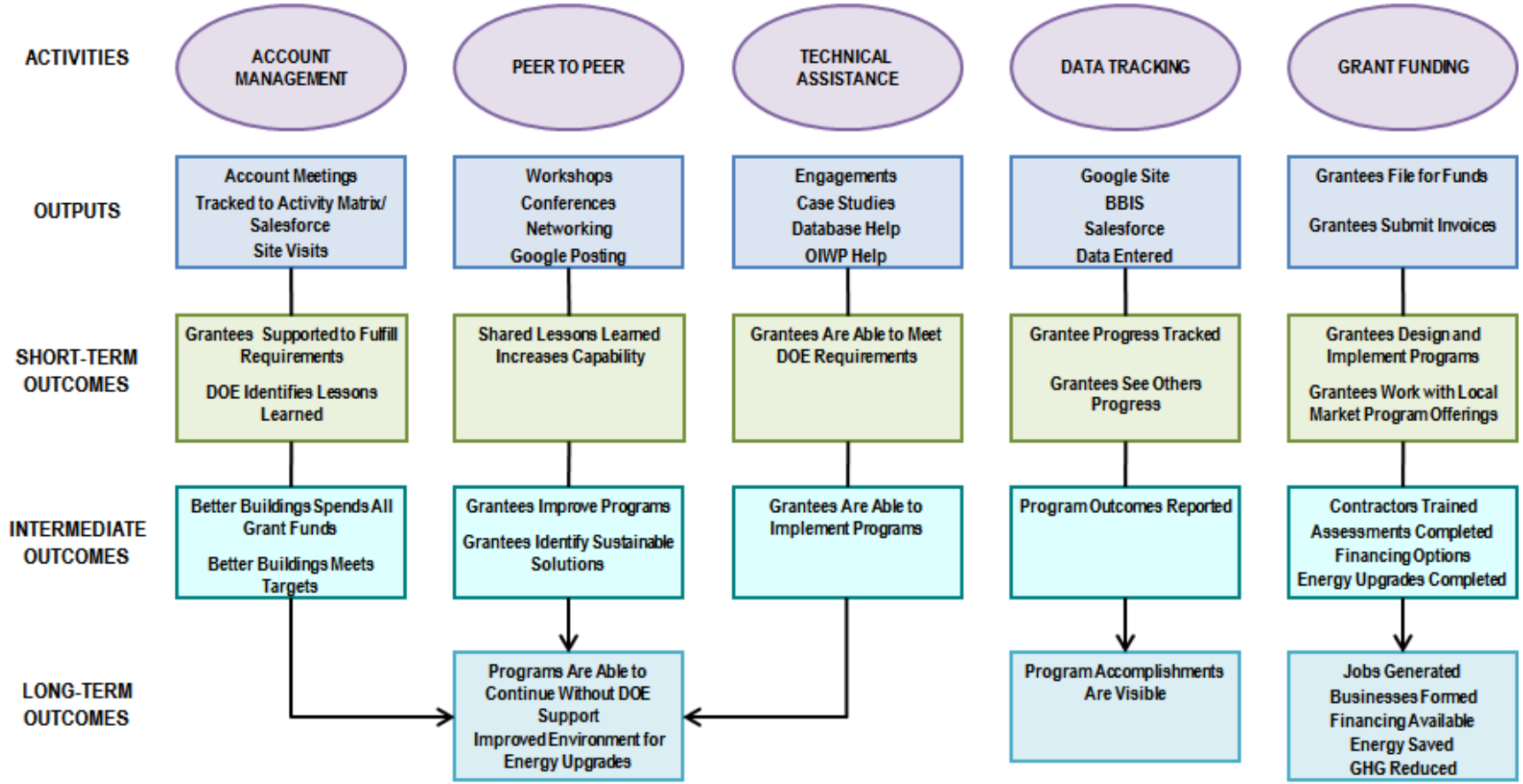
DOE developed a support system of activities to provide the grantees with a variety of services to aid their process. One of these services is the grant funding itself, which the grantees can use to pay staff and contractors to design and implement the programs. Grantees use the funds to provide financial support for energy upgrades, either through rebates, direct installation of equipment, or through the establishment of financing mechanisms available to support building owners' implementation of the upgrades.

The first three activities: *Account Management*, *Peer to Peer*, and *Technical Assistance* focus on providing support to the grantees in each of the four pillars.

Account Management Activities

- DOE provides an account manager for each grantee. The account managers work with the grantees identifying their needs for support to design, develop, and implement their programs and then helping the grantees find that support. Account managers also monitor the progress of grantees and collect lessons learned. The account managers track the output data for their activities. Initially this was in an Activity Matrix spreadsheet, and later in a program specific Salesforce database. The short-term outcome of account manager activities is that grantees are supported to fulfill the requirements of their grants and DOE is close enough to the grantees to identify lessons learned.
- In the intermediate term, through the account management support enables grantees to spend their BBNP funds and meet targets and permits monitoring of these activities. In the long term, this support will have supported grantees so they are able to continue without support and the environment for energy upgrades is improved.

Figure 2: Better Buildings Neighborhood Program – DOE Perspective



Peer-to-Peer Activities

- DOE provides peer-to-peer resources in the form of peer-sharing calls, workshops, a Google website and a Google group, and newsletters. These peer-to-peer resources provide grantees the opportunity to learn from each other and build their capabilities on their own. The account managers and DOE support contractors facilitate these peer-to-peer resources, with the expectation is that the networks will become self-sustaining. Participation in conferences, workshops, networking and use of the Google site, are outputs of these activities. The short-term outcome is that grantees will share lessons learned about energy upgrade programs and increase their individual and collective capability to operated energy upgrade programs.
- In the intermediate term, as a result of peer-to-peer activities, and shared lessons learned, grantees will improve and refine their programs and identify models of sustainable energy upgrade programs. In the long term, this will enable the programs to continue without DOE support and the environment for energy upgrades is improved.

Technical Assistance Activities

- DOE provides technical assistance through the Office of Weatherization and Intergovernmental Programs (WIP). The WIP coordinated a Technical Assistance Program (TAP) for EECBG and SEP grantees for Better Buildings and other DOE ARRA-funded efforts. The funding was available from the time of the grant awards until Fall 2011. Technical assistance focused on the four pillars of success for energy efficiency programs. The technical assistance activities made expertise from the energy efficiency community available to the grantees. The engagements with technical assistance services, the case studies developed, the databases created and maintained are the outputs of these activities. In the short term, the outcome of the technical assistance activities is that grantees are able to meet DOE requirements for their grants.
- In the intermediate term, as a result of the technical assistance activities, grantees are better able to implement effective energy upgrade programs; and in the long term, their programs continue without DOE support, and the environment for energy upgrades is improved.

The last two program activities in the DOE perspective program logic model are *Data Tracking* and *Grant Funding*.

Data Tracking Activities

- Data Tracking is part of the fourth pillar (data, reporting, and evaluation) and part of DOE's responsibility for overseeing the program. The BBNP team developed several databases – one of which is the Better Buildings Information System (BBIS) – into which grantees upload data on their project activities. Another is the Salesforce database that the account managers and DOE staff and contractors use to track their activities and communications with grantees. Within Salesforce, there are dashboards that record the

progress of the BBNP activities based on the data uploaded into the BBIS. The BBNP team publishes these dashboards on the Google group website so that grantees can see the overall progress. The outputs for data tracking activities is the active and accurate uploading of data to these databases by grantees and DOE staff and the short term outcome is that DOE can track and monitor grantee progress and that grantees can observe the progress of each other's programs.

- The intermediate term outcome of data tracking activities is that program outcomes are reported and in the long-term that the BBNP accomplishments are visible.

Grant Funding Activities

- Grant Funding is the final activity noted in the DOE perspective logic model. DOE is responsible for overseeing the use of the $508.3 million in grant funds. The grantees use the funds to design, develop, and implement their programs. They use the funds to train contractors, pay for assessments and upgrades, provide incentives and financing loan pools, and pay for the human resources needed to support these activities (i.e., staff and contractors). The outputs for these activities are evident as grantees apply for funds and submit invoices, and the short-term outcomes are the grantee activities to design and implement program and work in their local markets to offer energy upgrade programs that follow the four pillars.
- The intermediate outcomes of this funding are a trained contractor work force, completed assessments, and completed energy upgrades in each grantee area. These factors result in long-term outcomes of energy-upgrade businesses formed, jobs generated, upgrade financing available, energy saved, and greenhouse gases reduced.

At the DOE program level, key program performance metrics include, but are not limited to:

1. Number and frequency of meetings between account managers and grantees;
2. Level of detail of grantee activity data tracked in BBIS and Salesforce;
3. Number and quality of grantee workshops, peer sharing calls, and other networking events held;
4. Attendance at and satisfaction with events;
5. Use of the Google site, BBIS, and the public website by grantees;
6. Amount of technical assistance provided;
7. Grantee ratings of the quality of technical assistance; and
8. Amount and percentage of grant funds spent, which are an indication of the program's overall progress. Development and improvement of the programs
9. Completion of energy upgrades,

10. Continuation of successful programs; creating new businesses to do more energy upgrades – and thus more creating jobs and more energy savings resulting in reduced greenhouse gas emissions.

We discussed these in the preliminary evaluation report; the final report will update these metrics.

PROGRAM THEORY AND LOGIC – GRANTEE PERSPECTIVE

Figure 3 shows the program logic model from the grantee perspective as modified by the preliminary evaluation research activities and findings. (For brevity, the model uses the term "consumers" for the programs' target markets which may be residential, nonresidential, or both.) Recall that logic models are not intended to illustrate when activities occur, but rather the consequences of activities.

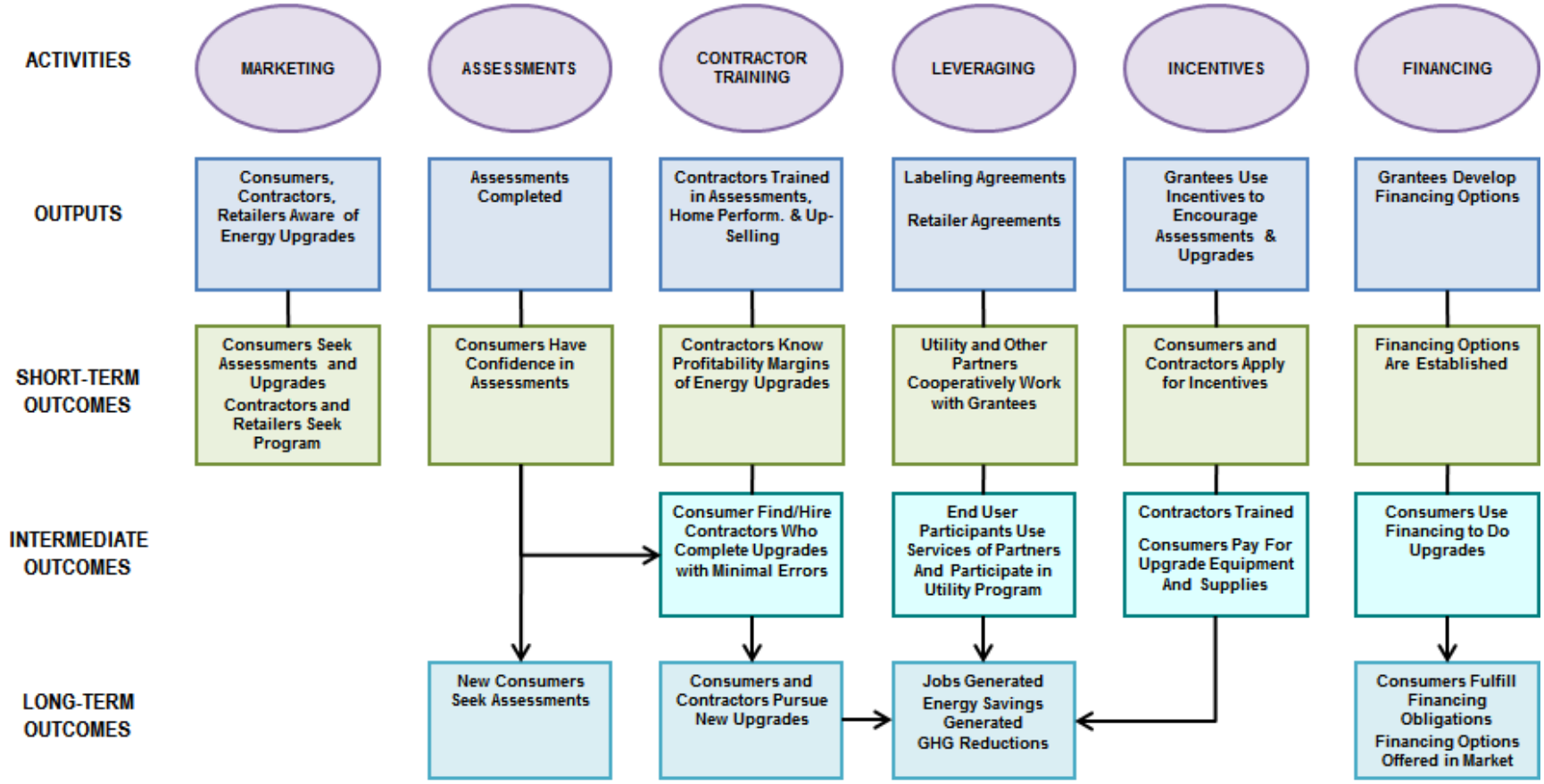
Three of the four pillars are clearly visible in the activities. The data and evaluation activity is not, though the data and evaluation pillar is fulfilled by documentation of the program activities.

The four pillars are common across most of the grantee programs, yet the details and tactics used by the 41 grantees vary considerably. The logic model shows the general theory and logic of how the grantees apply the framework to the programs they operate. The following describes each of the activities and the theory of how they lead to program outcomes as well as their relationship to the four pillars.

Marketing Activities – are part of *driving demand* and *workforce development and contractor capacity.*

- Grantees implement these activities in many different ways including meetings, door hangers, direct mail, events, competition, etc. The outputs of their marketing activities are that consumers and contractors are aware of energy upgrades and in the short term, as outcomes consumers seek assessments and upgrades, and contractors seek to be engaged in the program.
- In the intermediate term, following increased awareness and seeking participation, consumers promote energy upgrades and the program to others though referrals and testimonials, which in the long term results in new energy upgrades, energy saved, greenhouse gases reduced, and jobs generated.

Figure 3: Better Buildings Neighborhood – Grantee Perspective



Assessment Activities – are part of *driving demand* and *workforce development and contractor capacity*.

- Assessments are conducted by grantee staff, by assessment contractors participating in the program or by contractors who are aware of the program and offer these services to consumers. The output of these activities is that assessments are completed and the short-term outcomes are that consumers have confidence in the assessments and thus undertake upgrades and save energy in their homes and businesses.
- In the intermediate term, because of the short-term outcomes, more consumers seek upgrade services so that in the long-term new energy upgrades occur, more energy is saved, greenhouse gases reduced, and jobs are generated

Contractor Recruitment Activities – are part of *workforce development and contractor capacity*.

- Grantees may engage contractors, train contractors, provide leads to contractors or pursue other activities so that the outputs of the activities are that contractors understand the program requirements and are trained in upgrade services. In the short term, outcomes from contractor recruitment include contractors participating in the program, and being able to provide quality services and see the potential for business revenue from energy upgrade businesses.
- In the intermediate term, contractors' skills improve, they do test-ins and test-outs, and their revenue increases leading to the long-term outcomes of more energy upgrades, energy saved, greenhouse gases reduced, and jobs generated.

Leveraging Activities – are part of *driving demand.*

- These activities include setting up partnerships and agreements with utilities, financial institutions and others – the outputs are that they agreements and relationships exist and the short term outcomes are that they partners work cooperatively with the grantees.
- The intermediate outcomes are that the consumers also use partner services and participate in utility programs, with the long-term result that there are new energy upgrades, energy saved, greenhouse gases reduced, and jobs generated.

Incentive Activities – are part of *driving demand* and *financing*.

- Grantees offer incentives of various types these may be for assessments, completed test in/test out reports, upgrades, or for contractor training. The documentation of the uptake of these services by consumers demonstrates the short-term outcomes.
- In the intermediate term as a result of the incentives permitting contractors to gain training and consumers to pursue assessments and upgrades, consumers and contractors value energy upgrades, this leads to the long term outcome of new energy upgrades, energy saved, greenhouse gases reduced, and jobs generated.

Financing Activities – are part of *financing* and *driving demand*.

- ➡ Grantees offer financing in a variety of forms and it is a key pillar for an effective and successful energy upgrade program. The presence of financing options is the output and the short-term outcome is that consumers apply for financing through the program offerings.
- ➡ The intermediate term outcome is that consumers can repay their loans and the longer term outcomes is that financing for energy upgrades continues to be offered after the DOE BBNP support concludes.

At the BBNP grantee level, key program performance metrics include, but are not limited to:

1. Consumer and contractor awareness of energy upgrades
2. Contractor understanding of BBNP grantee programs
3. Contractor training in energy upgrade services
4. Assessments completed
5. Incentives and financing offered
6. Partnership with utilities, financial institutions and other to support energy upgrades in grantee communities
7. Participation in grantee programs by consumers and contractors
8. Confidence in energy assessments by contractors and consumers
9. Confidence in energy upgrades by contractors and consumers
10. Number of "test ins", "test outs", and upgrades reported
11. Use of incentives and financing
12. Support of programs and energy upgrades by partners
13. Consumers and contractors support of energy upgrades referral of others to grantee programs
14. Increased energy assessment and upgrade skills by contractors
15. Perception by contractors that energy assessments and upgrades provide business revenue
16. Consumers and contractors place value on energy upgrades
17. Consumers and contractors use program partner services and programs
18. Consumers repay loans

19. Continuation of successful programs and financing mechanisms; creating new businesses to do more energy upgrades – and thus more creating jobs and more energy savings resulting in reduced greenhouse gas emissions

MARKET MODEL

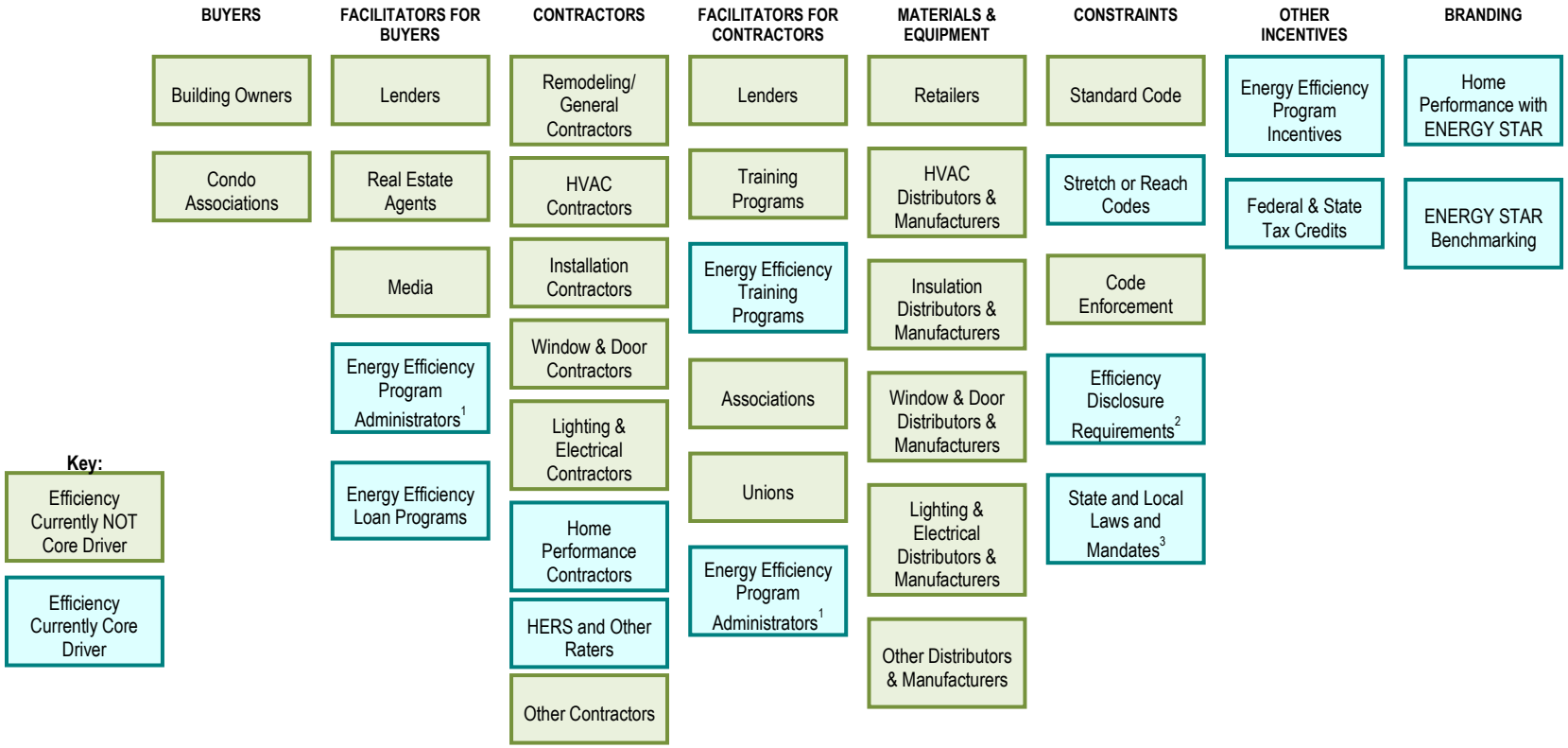
Figure 4 illustrates the key market actors, programs, policies and factors in the energy upgrade market, while Figure 5 illustrates the links between key BBNP program elements, expected outcomes, and the indicators of BBNP induced market effects.

A market effect is "a change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficient products, services, or practices and is causally related to market intervention(s)."[32] For BBNP, the expected market effects are not changes in technology, but more likely changes in the delivery channels and institutional supports for implementation of the technology. Therefore, the primary market metrics will be evidence of such changes.

The energy efficiency upgrade market (Figure 4) includes a number of market actors, programs, policies and factors. Energy efficiency serves as a core driver for some actors and factors, such as energy efficiency program administrators, energy efficiency loan programs, and home performance contractors, as well branding and marketing, such as Home Performance with ENERGY STAR. The BBNP program activities primarily work through these market actors and factors to affect the market for energy efficiency upgrades. Energy efficiency does not serve as a core driver for many other actors and factors, such as lenders, building owners, large numbers of contractors, and large segments of the materials and equipment market. The BBNP program activities can influence these other actors to raise the importance of energy efficiency. For example, marketing and outreach can raise building owner awareness of the value and benefits of energy efficiency upgrades, increasing demand.

32 Eto, Prahl, and Schlegel, *Scoping Study*.

Figure 4: Renovation/Remodeling Energy Efficiency Market Model



[1] Examples include utilities and public benefit corporations or trusts, such as the New York State Energy Research and Development Authority (NYSERDA) or Efficiency Maine.

[2] Example: Austin's Energy Conservation Audit and Disclosure (ECAD) ordinance, Austin City Code, Chapter 6-7, which requires Austin homes and buildings 10 years old or older that receive electricity from Austin Energy to have an energy audit and disclose the information to buyers before they are sold.

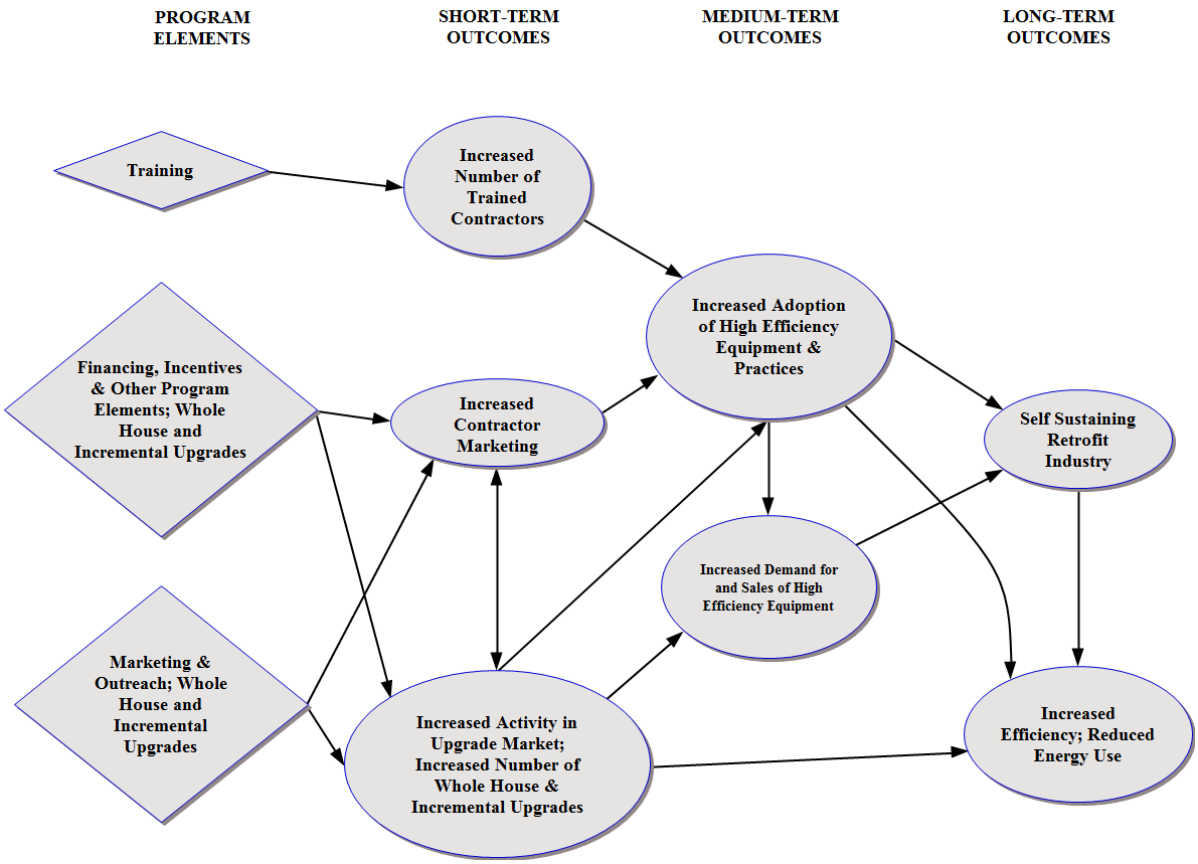
[3] Example: Connecticut's Public Act 11-80, An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future, which requires that by 2030, 80% of residences in Connecticut be weatherized.

Key elements of the BBNP programs activities in the market include training and workforce development, financing and other incentives, and marketing and outreach. The BBNP program activities may result in several key outcomes in the energy-efficiency upgrade market that will be examined in the market assessment, largely through self-reports from market actors:

- Increased activity in the energy-efficiency upgrade market
- Program elements such as marketing and outreach, financing and incentives, and training are expected to result in increased activity in the energy-efficiency upgrade market. Grantees that have adopted a whole-house approach can result in more highly trained contractors who take a whole-house approach to upgrades, resulting in both whole-house upgrades that encompass a wider range of measures and higher savings, as well as incremental upgrades. Grantees that have adopted an incremental approach may result in upgrades that focus on single measure installations that may build over time into more comprehensive upgrades.
- Increased availability of trained contractors
- Through training program elements, BBNP grantees can increase the supply of technically capable contractors, resulting in increased activity in the upgrade market, increased adoption of high-efficiency equipment and practices and ultimately energy savings.
- Increased marketing of energy efficiency
- Program and contractor marketing and outreach can help increase consumer demand for energy-efficiency upgrades, with marketing that emphasizes whole-house marketing leading to higher levels of whole-house upgrades.
- Increased adoption of energy-efficient building practices by contractors
- Because of increased demand and increased supply of trained contractors, an expected market effect is increased installation of energy-efficient technologies and practices such as high-efficiency HVAC equipment, insulation, and air sealing. The BBNP may not only affect the number of energy-efficiency upgrades but also the energy savings realized by non-program upgrades through whole-house upgrades.
- Increased sales and availability of high efficiency equipment and products
- If the BBNP results in increased demand for energy-efficiency upgrades and adoption of energy-efficient building practices, an expected market effect is increased sales of high-efficiency equipment as reported by vendors and distributors.

These outcomes contribute to the ultimate long-term goals of increased energy efficiency, reduced energy use and a self-sustaining upgrade industry.

Figure 5: Expected Outcomes and Links to BBNP Program Elements



REPORT CHAPTERS

The next chapter of the report provides an overview of grantee characteristics, along with a preliminary analysis of success factors. Chapter 4 presents an assessment of the DOE program management and support. Chapters 5 and 6 discuss the experience of grantees in driving demand (Chapter 5) and stimulating supply and sustainability (Chapter 6). The report then provides some market assessment data: the findings from market informants (Chapter 7) and from contractors and equipment vendors (Chapter 8). Finally, Chapter 9 provides conclusions and recommendations for this preliminary process and market assessment report, and Chapter 10 provides a bibliography.

3 OVERVIEW OF GRANTEE CHARACTERISTICS

In this chapter, we review the grantee characteristics and discuss the relationship between those characteristics and their accomplishments to the second quarter (Q2) of 2012.

To facilitate this analysis, we developed a quantitative database of grantee and program characteristics from the following sources:

- BBNP documents from *Salesforce* – e.g., statements of program objectives, BBNP quarterly reports (using data also uploaded to BBIS), account manager notes, and so forth
- DOE's BBNP website
- Individual grantees' websites
- Data collected on behalf of DOE by one of the technical assistance contractors in support of DOE's internal evaluation of grantee progress
- Data provided by DOE staff in response to direct requests from the evaluation team

The resulting grantee characteristics database included information on a wide range of grantee and program characteristics, covering:

- Location and demographic characteristics – e.g., population, ACEEE score[33]
- Grantee organization, structure, and staffing
- Segments targeted
- Marketing and outreach activities
- Program services – e.g., training and financing
- Date of program rollout and implementation progress

The data collection process is ongoing, and not all data are available for all grantees. For this preliminary process evaluation, we provide a summary of some key grantee characteristics for which we were able to obtain data for most or all grantees. We also discuss indicators of grantee progress to date and present results of analyses examining possible correlates of grantee progress.

[33] Sciortino, M. et al. *2011State Energy Efficiency Scorecard*. American Council for an Energy-Efficient Economy. According to ACEEE website, the scorecard "rank[s] states on their policy and program efforts, document[s] best practices, and provide[s] recommendations for ways in which states can improve their energy efficiency performances. The State Scorecard serves as a benchmark for state efforts on energy efficiency policies and programs each year."

GRANTEE CHARACTERISTICS

The following summarizes key characteristics of the grantees and their programs.

Organization Type and Structure

The grantees differed widely in the type of entity that administered the grant and in the grantee program's organizational structure, including the role of subcontractors and the types of partnerships established. As seen in Table 8, some three-quarters of grantees were government entities, but those were divided among cities, states, counties, and regional entities. The remaining quarter were nonprofit entities and government-established entities, such as public benefits agencies (agencies funded through the system benefit charge included in electricity rates; for example, NYSERDA – the New York State Energy Research and Development Authority, and Efficiency Maine).

Table 8: Grantee Entity Type

ENTITY TYPE	COUNT (*n* = 41)	PERCENT
Government	**30**	**73%**
City	*11*	*27%*
State	*8*	*20%*
County	*4*	*10%*
Regional (multi-county/multi-city)	*7*	*17%*
Nonprofit	**6**	**15%**
Government-established corporations*	**4**	**10%**
Utility	**1**	**2%**

* Includes public benefits agencies, development agencies, and similar organizations.

Eight of the grantees were organizations that served multicity or multicounty regions, but existed outside a state government; in seven of those cases, the grantees were multicounty or multicity collaborations, while the other was a nonprofit organization that served a multistate region. Of the eight regional grantees, three (Omaha/Lincoln, Boulder, and Eagle) were created specifically to administer ARRA or BBNP grants. The other five (SEEA, Chicago, Toledo, Wisconsin, and Philadelphia) represented ongoing regional environmental or energy-related collaborations.

Grantees worked with and through a variety of other organizations to implement their programs. Most grantees (34 or 83%) reported they used subcontractors to carry out some or most aspects of program implementation (Table 9). Eight grantees had subgrantees that implemented their own program designs with assistance from the primary grantee. Among those eight grantees were four states or state-run agencies (Wisconsin, New York/NYSERDA, Alabama SEP, and Virginia SEP), three counties (LA County, Boulder County, and Eagle County), and one multistate organization (SEEA).

Table 9: Subcontractors and Subgrantees (multiple responses)

TYPE OF SUBCONTRACTOR OR SUBGRANTEE	COUNT	PERCENT (*n* = 41)
Any subgrantee or subcontractor	34	83%
Program implementation subcontractor (managing upgrade activities)	*17*	*42%*
Marketing subcontractor	*21*	*51%*
Data management subcontractor	*21*	*51%*
Subgrantee	*5*	*12%*

All grantees have at least two partners, many have five to six partners, and one grantee has eighteen partners. Most grantees reported partnerships with utilities, and about one-third to one-half reported partnerships of some sort with government agencies or authorities and institutes of higher education (Table 10).

Table 10: Grantee Partnerships (multiple responses)

PARTNER TYPE	COUNT	PERCENT (*n* = 41)
Utility	25	61%
Government	20	49%
Financial authority	19	46%
Higher education	15	37%
Housing authority	15	37%
Labor union	12	29%
Quasi-governmental	11	27%
State weatherization program	8	20%
Energy/environmental nonprofit	8	20%
Other nonprofits	5	12%

Experience

For 22 of the 41 grantees, we were able to determine whether the grantee had individual or organizational experience in managing energy efficiency programs. Of those 22 grantees, 15 reported prior experience. Among those grantees who reported prior experience, the amount of experience ranged from one-to-two years to over 30.

Those grantee organizations that did not themselves have prior experience with energy efficiency likely compensated by hiring program implementation contractors that had experience. Of all 41 grantees, 34 (83%) either had prior experience or hired an implementation contractor.

Target Markets

Forty of the 41 grantees targeted the residential market, and residential upgrades constituted 96% of all upgrades achieved through Q2 2012. Beyond that, we were able to determine that between two-thirds and three-quarters of grantees targeted the low-income segment, middle-income residences, and the multifamily segment. Table 11 suggests the proportion of grantees targeting each market as of summer 2012; the grantees frequently refine or expand their target markets.

Table 11: Target Markets

TARGET MARKET	COUNT	PERCENT (*n* = 41)
Residential	40	98%
Residential single-family	38	93%
Residential multifamily	31	76%
Residential middle income	32	78%
Residential low income	27	66%
Commercial & Institutional	30	73%
Industrial	8	20%
Agricultural	1	2%

Although about two-thirds of grantees indicated they targeted the commercial market, that market made up only 4% of all upgrades through Q2 2012. However, the percentage of all upgrades that were in the commercial sector was skewed – for three grantees, commercial upgrades accounted for more than one-quarter of all upgrades.

Training and Certifying Workers

Twenty grantees reported that they trained workers (i.e., auditors, installers, etc.), of which 15 reported certifying workers. Among those grantees that trained or certified workers, the numbers trained and certified varied widely – from 6 to 598 trained, and from 2 to 508 workers certified.

Marketing

Grantees used a variety of marketing approaches (Table 12). Traditional advertising (through radio, television, and newspaper) was most commonly reported, but nearly as many grantees used a form of social media to market their program.

Table 12: Marketing Approaches

MARKETING APPROACH	COUNT	PERCENT (*n* = 41)
Traditional advertising	36	88%
Social media (examples: *Facebook, Twitter*)	35	85%
One-stop shops*	34	83%
Door-to-door	30	73%
Online advertising	30	73%
Direct mail	33	73%
Contests	25	61%
CBOs/NGOs	24	58%
Webinars	19	46%
Residential associations	16	39%
Business organizations	14	34%

* Indicates the program seeks to provide participants with all the services they need to identify efficiency opportunities, make upgrades, and receive incentives in one place.

Table 13 presents marketing activity of grantees; discussion follows the table. This topic is treated more fully in Chapter 5, *Driving Demand.*

Table 13: Marketing Activity

MARKETING ACTIVITY	MINIMUM	MAXIMUM	MEDIAN
Radio advertisements*	2	9,132	237
Newspaper advertisements*	1	1,909	16-17
Television advertisements*	1	9,298	65
Online advertisements*	1	4.9M	19
Direct mail slips	95	437,201	20,000
Door-to-door visits	12	113,259	880
Social media clicks	12	50,020	663
Contests	1	20	3-4
Contest participants	11	12,544	294
Webinars	1	180	3
Webinar participants	2	883	44
One-stop shop visitors	23	3,777	177

* Grantees provided the counts for these activities. It appears some data describe individuals reached while others describe advertisements placed. We will attempt to clarify these counts in the final process evaluation.

For two grantees – both SEP grantees in the early stages of program implementation – we did not identify which marketing approaches were used. (We will collect additional information on

grantees for the final evaluation.) For the other 39 grantees, the number of the above marketing approaches ranged from 2 to all 11 of them, with a median of 8. Three grantees reported using multilingual messaging in one or more of their marketing approaches. Among those grantees that reported carrying out any specific marketing activity, the level of activity varied widely based on the reported actions (Table 13, previous page).

Financing

A large majority of the grantees (35, 85%) offer some sort of financing. Thirty-three of those grantees provided details about loan amounts, characteristics, and terms.

Twenty-four grantees provided a total of 4,406 residential loans, totaling nearly $45.7 million (an average value of about $10,000 each). By contrast, eight grantees provided 23 commercial loans totaling about $3.7 million (an average value of about $160,000).

Seventeen grantees reported interest rates that ranged from 0% to 6.99%. Of those 17, nine reported a single interest rate, while the other eight reported multiple rates or ranges. Ten grantees reported that they offer interest rate buy-downs.

Nineteen reported maximum loan amounts, which ranged from $3,000 to $50,000; of those 19 grantees, 12 reported minimum loan amounts ranging from $500 to $6,500. These data did not distinguish between residential and commercial loans. When we looked only at those grantees that provided residential loans, but not commercial loans, the maximum loan amount still ranged to $50,000.

Grantees also varied in the loan mechanisms employed; some grantees used different mechanisms for different programs. Nineteen grantees established a loan loss reserve fund and 13 grantees established a revolving loan fund; a total of 23 grantees have these mechanisms, reflecting the fact that nine grantees use both approaches.[34] The type of mechanism established was not related to either the number of loans made or the mean loan amount.

GRANTEE PROGRESS

The following describes our analyses of various objective metrics of grantee success to date, summarizes progress to date, and presents the results of our efforts to identify factors related to level of success.

[34] A loan loss reserve fund is a credit-enhancement mechanism to reduce lender risk by covering potential losses resulting from defaults and nonpayment of loans, increasing the attractiveness of the loan portfolio to the lender. A revolving loan fund is a source of money from which loans are made for multiple and successive business development projects; the central fund is replenished as individual projects pay back their loans, creating the opportunity to issue other loans to new projects.

Metrics of Success

A goal of our evaluation is to identify grantee and program characteristics associated with program success. Therefore, it was necessary to identify one or more meaningful metrics of success to date. Neither the total number of upgrades completed nor the total savings achieved is an appropriate metric, as grantees varied considerably in terms of the size of the grant, the size of the area population, and other factors that would affect the number of upgrades completed or savings achieved. Instead, we examined several ratios as potential success metrics:

- Progress toward goal (number of upgrades completed as a percentage of upgrade target)
- Rate of conversion of audits to upgrades
- Average cost per upgrade completed
- Average cost per unit energy saved

In the following subsections, we discuss the strengths and limitations of each of these ratios as a success metric and why we selected the above metrics and not others. We describe our use of a composite success metric based on a combination of the four ratios to improve reliability. We also discuss how we will address limitations of the component metrics to further improve measurement of success for the final process evaluation.

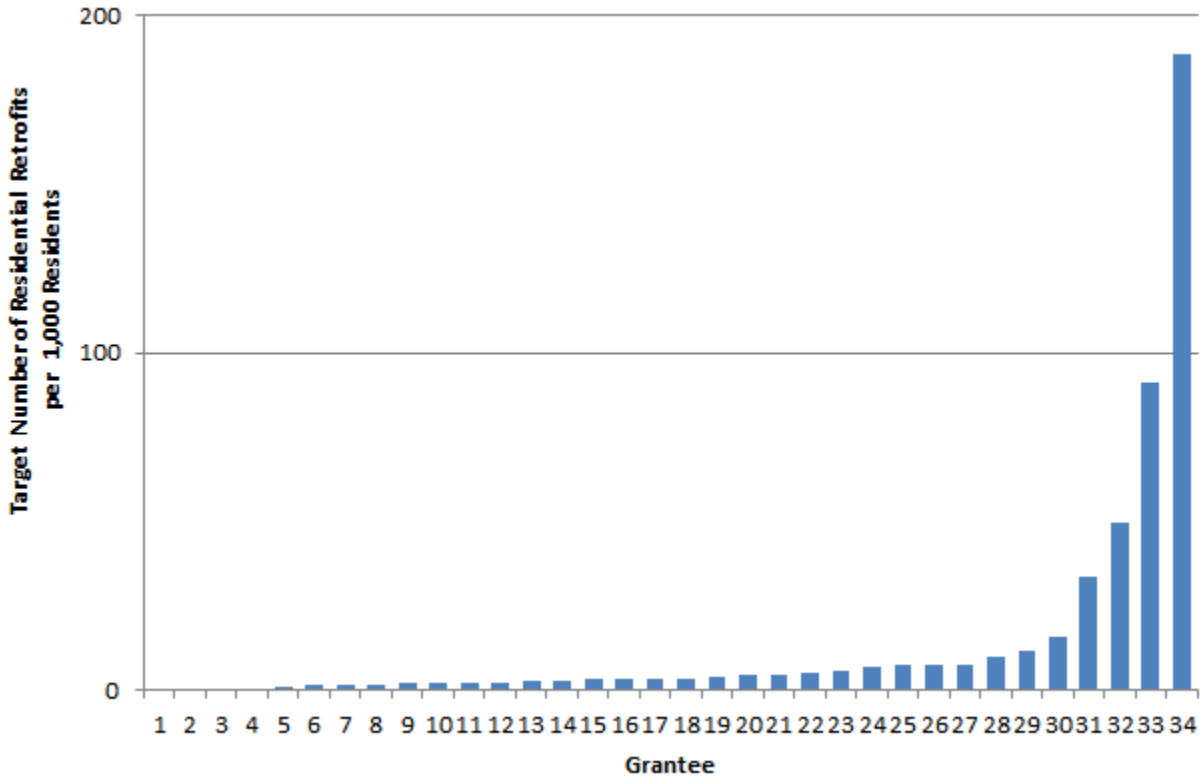
Progress Toward Goal

Grantee progress toward goals offers a reasonable metric of success to date if the goals were established in a consistent manner across grantees. To assess whether the goals were a relatively consistent function of the size of the potential participant pool, we examined the correlation coefficients of target number of upgrades with population size and total number of households in each grantee area, data obtained from the U.S. Census. We found the target number of upgrades across grantees correlated significantly with population and number of households (r = .78 and .76, respectively, $p < .001$). Therefore, population and number of households accounted for about 60% of the variance in target number of upgrades, suggesting reasonable consistency of goals across grantees. [35]

Moreover, we found no correlation between progress toward goal and size of goal (r = -.01), indicating that grantees with large goals were generally as successful by this metric as those with modest goals. Nevertheless, if population and number of households accounted for 60% of the variance in the target number of upgrades, other factors accounted for the remaining 40% of the variance. As Figure 6 shows, for example, the upgrade targets for a few grantees were much higher relative to the local population than for most others.

[35] Population size and number of households were essentially collinear (r = .998), and so together they do not account for more variance in target number of upgrades than either does alone.

Figure 6: Variation in Residential Upgrade Targets Relative to Population*



* The target retrofit counts we had for the seven SEP grantees did not distinguish between residential and other retrofits. Therefore, those seven grantees are not included in the graphic.

This finding does not rule out the possibility that goals were, indeed, relatively consistent across grantees: the potential participant pool may not always be the same fraction of the local population, as some grantees may target different subgroups than others. Program staff reported, however, that grantees were not entirely consistent, with some establishing more conservative goals than other. With the available data, we could not determine how much of that 40% variance is explainable by program-specific targets and how much reflects an inconsistency in goal setting.

Apart from whether or not all grantees' goals are appropriate, progress toward a goal may not be an entirely satisfactory metric. Our interviews found that grantees differed in how they plan to achieve their goals, with some possibly spending more time than others laying the groundwork through more extensive marketing and partnership building, or developing auditor capability, before starting efforts to recruit participants.

Based on all of these considerations, progress toward goal is a reasonable, yet not ideal, success metric. We anticipate it accurately reflects one measure of comparative success (comparative across the grantees) for most grantees, yet recognize that some grantees that informed observers

might reasonably consider to be comparatively successful may, nonetheless, not perform well on this metric.

Because DOE holds as a goal that all grantees will attain their targets, this metric appears promising for the final evaluation. That evaluation will include an investigation of the extent to which the goal expressed in terms of implied saturation of the population has a systematic effect on goal attainment.

Audit Conversion Rate

Grantee programs carry out audits to identify savings opportunities. Grantees that are more successful at converting audits to upgrades may, in the end, achieve more upgrades, all other things being equal. Indeed, at this preliminary juncture in BBNP, some grantees have been very effective in driving demand for audits, yet not nearly as effective in driving demand for upgrades. Therefore, the number of upgrades completed per audit (conversion rate) appears to be a reasonable metric of success to date.

However, grantee programs differ in the role played by the audit. Most programs require audits prior to upgrades, but this is not a universal requirement; some grantees reported only those audits that result in an upgrade, and a few reported more upgrades than audits. Most programs tally audits and upgrades (and thus audit participants and upgrade participants) separately, yet some programs count as participants only those people who have received loans or incentives and, because these participants must have audits, the resulting conversion rate is 100%. No doubt there are other program variants that make conversion rate an inappropriate measure for those programs.

Apart from the role of the audit in relationship to upgrades, variability in conversion rate could occur if grantees differ in how quickly they move participants from audits to upgrades, or if some grantees recently completed a large number of audits that were still in the pipeline for upgrades at the time of our data collection.

Based on all of these considerations, audit conversion rate may be a reasonable overall indication of program success, but by itself it is not ideal. We anticipate it accurately reflects one measure of comparative success for most grantees, yet recognize that some grantees that informed observers might reasonably consider to be comparatively successful may, nonetheless, not perform well on this metric, while for still other grantees the metric may suggest greater success than one might otherwise judge.

In our final evaluation, we will have systematic data on the role of audits relative to upgrades so that our analysis can accommodate differences in program design that affects this success metric.

Average Cost

Grantees that carry out upgrades at a lower cost should be able to accomplish more upgrades for a given amount of funds, suggesting a metric of **average cost per upgrade**, with lower costs

associated with greater success. However, grantees vary in the extensiveness of their typical upgrades; some grantees may be saving more energy per average upgrade than other grantees and may be attaining these savings at a commensurately higher cost. Thus, it is possible that higher average upgrade costs are associated with greater success.

Apart from the extensiveness of the typical upgrade, variability in average cost per upgrade will also result from variations in local labor rates and supply costs and from the artifact of this mid-cycle evaluation. Some programs may have invested more program funds than others in establishing infrastructure, the rewards of which they expect to reap in the latter half of the program.

In light of these possible relationships, we considered **average cost per MMBTU saved**. This metric, however, may be subject to the objection that the cost per MMBTU saved may reasonably vary by region. Controlling by average heating and cooling degree-days may overcome that objection, a possibility we plan to explore in the final evaluation. Similar to the average cost per upgrade, average cost per MMBTU saved is subject to differing strategies of funding program infrastructure that affects this mid-term calculation of the metric.

For this preliminary evaluation, we considered both average cost per upgrade and average cost per MMBTU saved, as discussed next. We defined average cost per upgrade as program expenditures to date divided by upgrades to date, with pools of set-aside moneys such as loan loss reserve funds excluded from the calculation of expenditures to date. We defined average cost per MMBTU saved as program expenditures to date (exclusive of set-aside moneys) divided by program-reported MMBTU savings. Note that MMBTU savings have not been validated by impact evaluations; validated MMBTU savings data were not available for the preliminary evaluation.

We think these two average cost measures constitute reasonable, yet not ideal, success metrics. We anticipate it accurately reflects one measure of comparative success for most grantees. Some grantees, such as those that install, on average, more measures and achieve more savings, will not look as successful on the average cost per upgrade than one might otherwise judge. And some grantees, such as those that have overestimated their MMBTU savings, will look more successful on the average cost per MMBTU saved than one might otherwise judge.

In our final evaluation, the calculation of these metrics will benefit from complete program expenditure data. We will have systematic data on the extent of the upgrades, so that our analysis can accommodate differences in program design that affects this success metric. We will investigate the extent to which weather (heating and cooling degree days) has a systematic effect on average MMBTU saved by the grantees. And we will use MMBTU estimates informed by the impact evaluation, to the extent these are available in time for our analysis.[36]

[36] The impact evaluation lags the process and market evaluation, due to differing data needs and analytical requirements.

Other Metrics Considered

We considered other metrics as potential indicators of success, such as number of audits completed relative to number requested and number of upgrades by type of program expenditure (such as marketing or labor). However, we found that the reported data were incomplete or appeared to lack consistent definitions (such as for the cost categories) and thus unable to support the calculation of meaningful metrics.

Composite Success Metric

We thus have four metrics that each provide reasonable indicators of success, but none of which by itself is completely reliable. In such cases, if the various metrics are intercorrelated, combining them into a composite metric provides improved measurement.[37] We examined the intercorrelations of the four metrics. All intercorrelations were statistically significant ($p < .05$[38]) and showed a consistent pattern: 1) progress toward goals and conversion rate were positively correlated (grantees that had shown greater progress toward goals also had higher conversion rates, and vice versa); 2) likewise, average cost per upgrade and per MMBTU saved were positively correlated (grantees with higher average upgrade costs also tended to achieve greater savings per dollar spent); and 3) the first two were inversely correlated with the latter two (those grantees with greater conversion rates and progress toward their goals had lower costs per upgrade and per MMBTU saved.)

We therefore constructed a composite success metric from all four metrics rather than relying on any single one.

So that each element of the composite had equal weight, we converted raw values for each of the four metrics to ranks before combining them. For two of the metrics (cost per upgrade and cost per MMBTU saved), a higher rank (lower number) means a greater cost per upgrade or amount saved – an indication of less success to date. For the other two metrics (progress toward goal and conversion rate), a higher rank means greater success to date. Consequently, we reversed the rank-orders for the cost metrics prior to combining them with the others.[39] The result was an index that ranged in value from 25 to 159. The lower the score, the greater the grantee's success to date.

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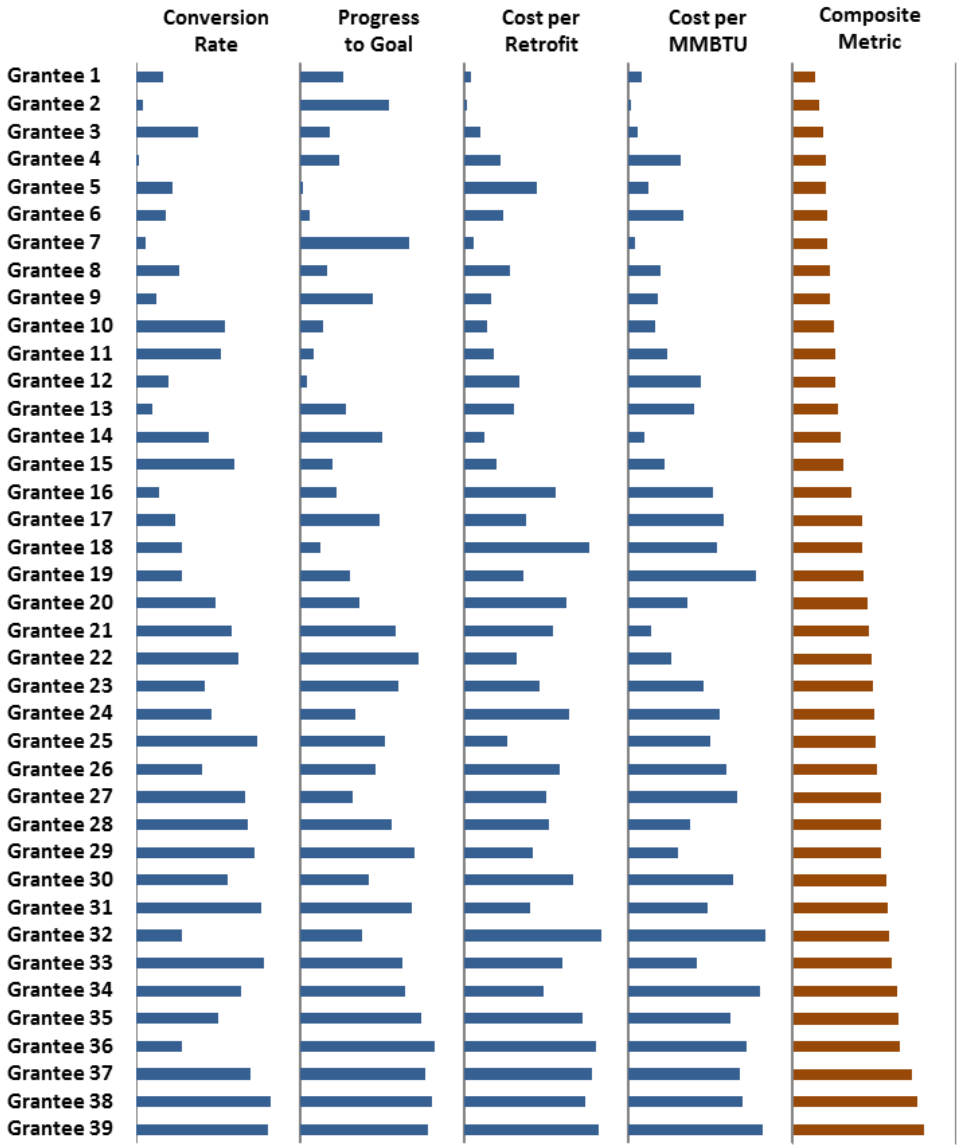
37 Allen, M.J., and W. M. Yen. 2002. *Introduction to Measurement Theory*. Long Grove, IL: Waveland Press.

38 Three of the four success metrics had distributions that were far from normal, with skewness ranging from 2.0 to 5.8 ($p < 0.05$ in all cases). Therefore, we used the nonparametric Spearman correlation coefficient.

39 We subtracted each grantee's original rank from 41, the total number of grantees. For example, if a grantee was ranked 25th on cost per upgrade, that grantee had the 25th highest cost per upgrade (i.e., 24 other grantees had higher costs per upgrade). The "reversed" rank for that grantee became 41 – 25 = 16, meaning that the grantee had the 16th best (lowest) cost per upgrade.

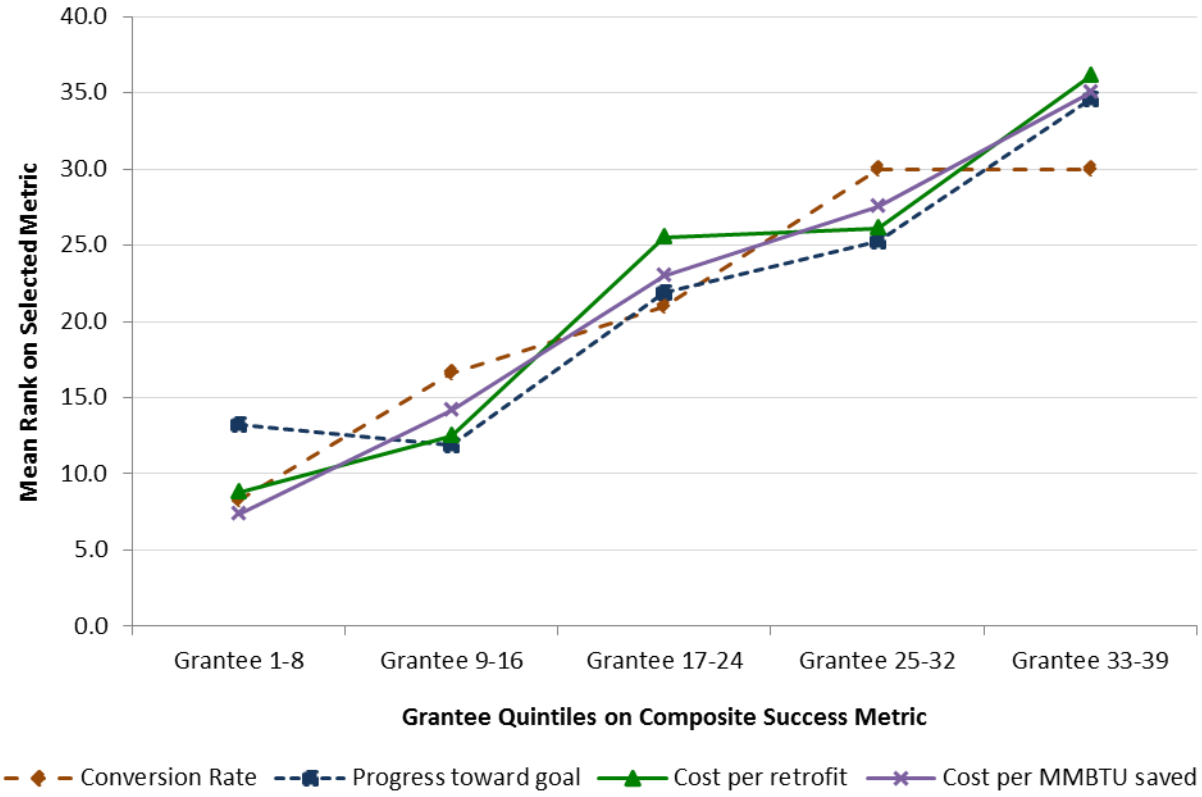
Figure 7 illustrates each grantee's relative position on each of the four component metrics and on the combined metric. As the graphic illustrates, the component metrics generally agree in aggregate. This is seen even more clearly in Figure 8, which shows, for each of the four component metrics, the mean rank of those grantees within each quintile of the composite score.

Figure 7: Comparison of Component Success Metrics



For the four component metrics, bar length indicates grantee rank
For the composite metric, bar length indicates relative value of the summed ranks

Figure 8: Comparison of Component Success Metrics



As discussed in Chapter 1, *Limits of This "Real-Time" Analysis,* at the time of this preliminary evaluation few commercial upgrades had occurred, and most of these had been conducted by a small number of grantees. Thus, the data could not support the development of separate metrics for residential and commercial upgrades.

As noted above, commercial upgrades made up only 4% of total upgrades, though they likely made up a larger percentage of overall savings and cost. Such factors may mean that a metric based partly on cost per unit energy saved may not be as reliable as ones constructed solely for the residential or commercial segments. For the purpose of this preliminary process evaluation, however, we opted to use a more general metric; the alternative would be to exclude the few grantees that did a significant proportion of commercial upgrades. As discussed below, we decided to exclude SEP grantees from our analyses of success factors, and excluding additional ones would have reduced the sample size even further. For the final process evaluation, we will consider alternative analytic approaches.

We used this composite index to examine whether any of the grantee or program characteristics we were able to quantify were related to success to date. In addition to performing quantitative analyses with the composite index, we classified each grantee as having high, medium, or low success to date based on the combination of metrics. We used that three-level categorical

variable as a grantee attribute in our qualitative analyses of grantee interview data, described elsewhere.

We conclude this discussion of success metric by returning to a point we first introduced in discussion of the average cost component. The intra-component correlations we found between higher conversion rates and higher progress towards goals on the one hand, with lower cost per retrofit and lower cost per unit of energy saved on the other. Two hypotheses are consistent with these findings. One hypothesis is that successful programs have efficiently gotten more customers to undertake deep retrofits. The alternative is that high conversion rates and progress towards goals and lower costs of retrofits and unit energy savings can occur when programs accept retrofits that stick to the quick-return measures, rather than requiring a more comprehensive and costly package that includes higher-cost, lower rate-of-return retrofit measures that would provide deeper total savings. The data we obtained for our preliminary evaluation does not enable us to distinguish between these mutually exclusive hypotheses. In our final evaluation, we will seek to better understand grantees' approaches to their markets.

We note here, however, the grantees identified by our metric as among the most successful include many of the grantees that DOE team members identified as most successful.

Overall Progress to Date

Figure 9 shows overall grantee progress, in terms of number of upgrades achieved, through Q2 2012. Progress is shown separately for all grantees combined, as well as the grantees categorized as high, medium, and low success on our composite success to date metric. The rate of increase in number of upgrades over time does not appear to differ appreciably between high-success and medium-success groups.

Figure 9: Upgrades Achieved through Q2 2012 by Level of Success to Date

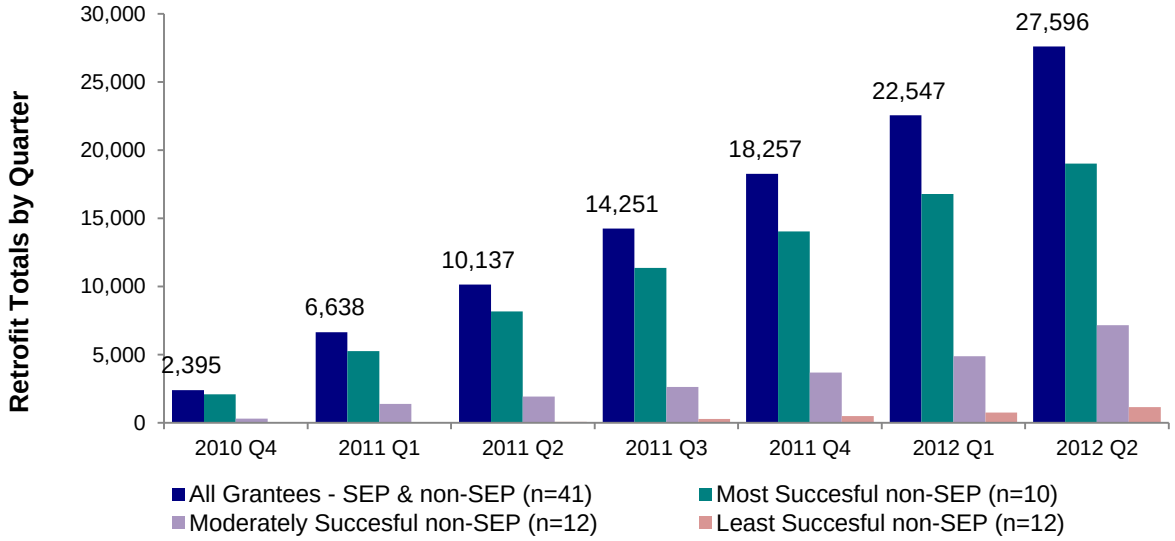
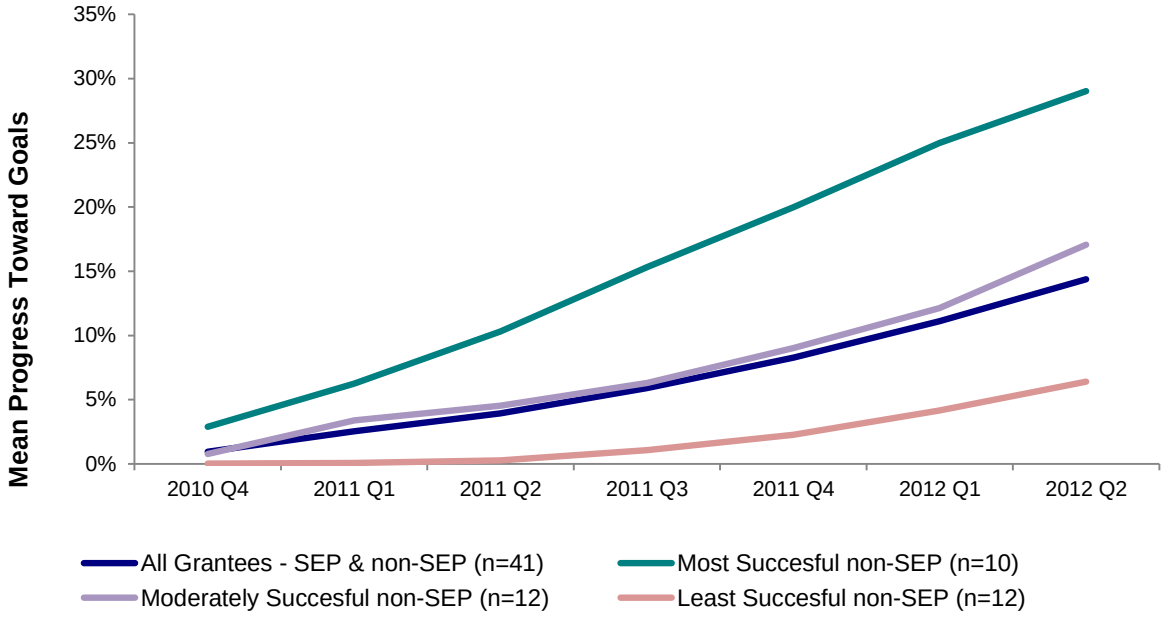


Figure 10 shows the mean progress toward goals (number of upgrades completed as a percentage of target) over time for the high-, medium-, and low-success groups.[40]

We do not show graphics for the other two success metrics – audit-upgrade conversion rate and cost per upgrade – there is no particular reason to expect meaningful time trends for those metrics. While we might expect cost per upgrade to decrease over time as grantees become more effective at selling upgrades, the presence or absence of such a trend would not necessarily be an indicator of program success. The same is true for audit conversion rate. Moreover, we might expect to see an initial increase in audit conversion rate as early audits are converted to upgrades, and then a dip in the rate in the last months of data capture, as additional audits have been performed that will be converted to upgrades later. Neither of those short-term trends, if they occurred, would provide any indication of program success, but both might mask any indication of increased program effectiveness.

Figure 10: Grantee Progress toward Goals by Level of Success to Date



[40] We selected a line graph for this figure to better illustrate the continuum of progress. Also, while the column chart format captures the fact that the figure for "all grantees" is a sum of all other figures, the line graph for percentage of goals achieved better captures the fact that for this metric, the progress for the most successful grantees is above that for "all grantees."

Correlates of Progress

We examined the relationships between many of the grantee and the program characteristics described above and the success to date metric we developed.[41] Specifically, we looked at whether the grantee's rank on the success metric was related to:

- The type of organization administering the grant (government, nonprofit, etc.)
- Uses of subcontractors and types of partnerships established
- Prior experience doing energy efficiency
- The grantee state's ACEEE energy efficiency ranking (ACEEE scorecard)
- Aspects of program marketing, including the use of marketing professionals and the timing, breadth, and extent of marketing activities
- The types of residential segments targeted
- Whether or not the grantee provides training or certification to contractors
- Whether or not the grantee provides financing and the type of financing mechanisms established

The award and program launch dates were much later for SEP grantees than for the other grantees: on average, they launched their programs nine months later than the other grantees. Therefore, we eliminated them from these analyses, as they may not have been in the field long enough to permit a fair test of the factors that we examined. In addition, we discovered that one grantee had been sending progress data incorrectly since Q4 2011, with the result that DOE had not recorded any the data for that grantee until shortly before this report was prepared. Therefore, the available progress data for that grantee were not accurate, and we eliminated that grantee from the analyses as well.

Even among the non-SEP grantees, launch dates varied. Not surprisingly, we found that the amount of time elapsed since program launch was related to the score on our composite metric (Kendall's $T = .328$, $p = .009$) (i.e., the shorter the amount of time since program launch, the lower the score). Therefore, we used linear regression to create an adjusted success metric that takes time since program launch into account.[42] We then examined the relationship between the various grantee and program characteristics and score on the adjusted metric.

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41 As part of the final process evaluation, we will assess the influence of additional grantee and program characteristics.

42 We first created a "time since launch" variable by subtracting the date of launch from the date of the end of Q2 2012. That variable was represented in the SPSS dataset as a number of seconds. With that as the independent variable and the initial success metric as the dependent variable, the regression analysis produced a beta of -.00000247 and a constant of 203.859. This produced the regression equation, y = (-.00000247 * time since launch) + 203.859, where y = the adjusted success metric score.

The value of examining the adjusted success metric is illustrated with the following example. We examined whether grantee success to date was related to whether the grantee was a government entity or some other type of organization. When using the unadjusted success metric, grantees that were not government entities did better than government entities (59.5 vs. 95.8; z = -2.68, p = .007). [43,44] However, grantees that were government entities launched their programs about one month later than other grantees did, so they appeared to lag behind the other grantees on the *unadjusted* success metric. When we analyzed the relationship using the success metric adjusted for time since program launch, the relationship was no longer statistically significant (79.0 vs. 87.3, z = -1.20, p = .23).

The only other factors that we found related to grantee success to date related to the types of partnerships that grantees had formed. Those grantees that partnered with financing authorities did better on the success metric than did other grantees (79.1 vs. 91.6, z = -2.12, p = .03). On the other hand, those that partnered with local community-based low-income weatherization programs *did not do as well* on the success metric as other grantees did (95.2 vs. 81.8, z = -2.32, p = .02). This finding may reflect challenges serving the target market rather than any issues with the partner, a hypothesis we will explore in the final evaluation.

In addition to the above, one relationship was marginally significant and may warrant further investigation. Those grantees that partnered with nonprofit organizations other than energy organization did better on the success metric than other grantees (83.5 vs. 85.1, z = 1.89, p = .06).

Grantee success to date, as measured by our composite metric, was not related to prior experience with energy efficiency, ACEEE energy efficiency ranking, segments targeted, contractor training or certification, financing, the use of program implementation or marketing contractors, or the type or even amount of marketing they carried out.

Although our statistical analysis did not indicate that success to date was related to grantees' prior energy efficiency experience, we believe this finding is an artifact of our difficulty quantifying grantee prior experience. Our qualitative findings strongly suggest that success to date is related to prior grantee energy efficiency experience. Our quantitative indicator of grantee experience is imprecise, as some grantees without much prior experience worked with program implementation contractors that had experience. Our research in support of the final process evaluation will collect more systematic data on the overall level and type of experience brought by the entire program team and will examine through quantitative statistics the relationship between experience and program success.

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[43] Note that a low score indicates better success, as it represents higher ranks on progress toward goals, conversion rate, low cost per upgrade, and low cost per MMBTU saved.

[44] Because the sample sizes were small and the adjusted success metric was not normally distributed, we used the nonparametric Mann-Whitney test for differences between means. The test statistic for Mann-Whitney is z, which follows the t distribution.

On a further note, several of the variables included in these preliminary analyses are defined relatively broadly and may not capture some nuances of program implementation. The fact that subgrantees implemented their own program designs while the success metric is at the main grantee level makes analyzing the effectiveness of specific design elements a challenge. We also lack clear information on the comprehensiveness of the typical upgrade conducted by each grantee, yet we have indications that comprehensiveness differs across grantees and program designs.

The qualitative analysis described in subsequent chapters addresses to a greater extent than our quantitative analysis the influence of program design and implementation differences and nuances on grantee success. For the final evaluation, we will work to quantify and collect as much systematic data as possible on the factors identified in the qualitative analyses.

4 DOE PROGRAM MANAGEMENT AND SUPPORT

INTRODUCTION

In this chapter, we discuss the role DOE management and support played in BBNP implementation, and lessons learned that could improve other DOE programs in the future.

BETTER BUILDINGS DOE STRUCTURE

The BBNP DOE staff includes the program manager, a project officer, six account managers (not all of whom are dedicated to Better Buildings full time), a lead for data and evaluation, and a variety of contractors who provide support to DOE staff and the grantees. This equals a full-time equivalent (FTE) of six DOE staff. The program manager believes one more FTE would be helpful and, based on the amount of need, probably a ratio of one staff to six grantees (1:6) would be best; the current ratio with six FTE and 41 grantees is 1:6.8 (which is nearly 1:7).

The following make up the management support structure:

- **Program Manager** – has weekly staff meetings with DOE staff and appropriate contractors.
- **Account Managers** – work directly with the grantees at the direction of the program manager.
- **Project Officer** – has a team of contractors that provides grant management support, making sure the grantees operate within the grant guidelines. The project officer also conducts regular monitoring site visits with the team to assess the progress and activity of the grantees and ensure that they are effectively using the grant.
- **Data and Evaluation Lead** – manages the data contracts, ensures that data quality is meeting DOE needs, and holds biweekly meetings with the contractors engaged in data activities so that each has a sense of what the others are doing.

The support contractors provide a variety of specialized services, including: database development and management, managing webinars and conferences, providing technical assistance, managing *Salesforce* and the Google group and website, and developing tools and services for BBNP.

ROLE OF ACCOUNT MANAGERS

At the time of the preliminary evaluation, DOE had six account managers, five of whom had five to eight grantees with whom they maintain contact and provide support.[45] Typically, an account manager has regular biweekly phone meetings with the grantee contacts, email is often daily, and account managers have all visited grantees as part of monitoring visits or when asked or needed (i.e., to help solve a problem or discuss the award with a city council or local utility company). Account managers accompany the project officer's team during monitoring site visits. Generally, account managers respond to questions grantees have and help grantees connect to other grantees with similar challenges and successes. Given the fact that many of the grantees are novices in energy efficiency program design and implementation, the need to respond to questions is a constant activity that has not slowed down since the program began.

The grantees mostly report positive experiences with the account managers, with many commenting on how much they appreciate the support, expertise, and access to the account managers and the project monitor staff. Challenges came primarily during the early months of the program, when the first answer to questions was not always the final answer and conditions changed after the first answer was already implemented.

> "…the responses and answers to our questions were not always the right answers. We have always had availability and quick responses. Seventy-five percent of the time, they were right. But there was a chunk of time when they were not right, and that was hard." (Grantee)

The account managers, of course, are individuals and thus do not operate identically – similarly, the grantees have varied levels of need. Account managers varied in the amount of time they took to get responses or to answer questions; some were highly effective in connecting grantees to other grantees with similar programs or suggesting a technical assistance opportunity that would be effective for the grantee. Nearly all of the grantees report that their account manager was highly engaged, though a few grantees report they would have liked more engagement.

In only one or two cases did a grantee indicate that they received less support than they wanted from an account manager. In these cases, it appears that prioritization by the account manager led them to work most closely with grantees that were proactively seeking guidance and support, or seemed to need it more, and less closely with the grantees who made fewer requests on their time or who seemed to need less support. Grantees that indicated they wanted more support than they received reported turning to other DOE staff, specifically the project officer, or moving on without asking for support.

In general, the account managers are on the front line and available for the grantees when they are needed. Given what grantees told us, the functions that seem to be most important to grantees were answering questions when needed, especially regarding technical issues.

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[45] One account manager had two grantees, due to other DOE program responsibilities outside of Better Buildings.

> "I would say the technical issues, with regulations and things. They've been very prompt in their responses. Whenever we have a question or an issue, within a day or two we have an answer. At least, the conversation continues. It's not hard to get a hold of them." (Grantee)

In addition, grantees often praised the effort account managers made to connect them to other grantees, particularly those with similar projects that needed help or those that could share ideas.

> "She was so helpful in discussing the organization and how we were going to put the program together; her ideas on marketing were very important to us. She addressed other grantees and what they were doing. There was a lot of correspondence back and forth. Her recommendations on how to solicit contractors or auditing firms – *This is what they're doing in Vermont*, *This is what they're doing in Connecticut*, and *This might work for you*." (Grantee)

One grantee described the role of the account manager as "coach" and said this was a "brilliant" approach. Usually this grantee would be worried about talking to a funder; yet, because the account manager acts as a coach, this grantee was able to talk about the challenges in implementing the program and voice complaints she had about the program, after which the account manager would help her with suggestions and support. She knew that the account manager was going to help with new ideas and suggestions, not "come back at them." In particular, the account managers knew about the "use of contractors and the DOE requirements and what others (grantees) were doing."

Of the many comments provided by grantees, most confirm that the help provided was readily available. Further, it is clear that account managers drew upon their experience and provided guidance to grantees so they could make their programs as effective as possible.

> "Whenever we need additional support, we ask for it and we have gotten it without fail." (Grantee)

> "Two examples: They are looking at our waste plan application form. They told us that it could be enhanced and then followed up with other programs that were stronger than ours. We wanted to do a pilot with some handheld tablets to do onsite reports and we were told that 'these (other) two programs were using them and we can give you their information.' They always take the time to resource a request." (Grantee)

> "More so than us reaching out…they've been reaching out to us…. Early on, we were struggling to get the ball rolling. She provided us with some insight on some marketing strategies, which were very successful in getting business owners into our program. They attracted them in, and once they got in we've been rolling with them." (Grantee)

SHARING GRANTEE EXPERIENCES

One of the key activities for the account managers was facilitating the exchange of information between and among the grantees.

> "The account managers really upped the bar on the networking, the webinars, and not only having themselves as a resource for us, and making sure to let us know what others are doing so we can talk to them, but also setting up these peer exchange webinars and the Google groups." (Grantee)

BBNP built a set of tools and processes to facilitate sharing information, so that the grantees could learn from each other and build a community of practice in the design and implementation

of energy efficiency programs. As one of the DOE contacts explained when asked about the success of the BBNP grantee programs:

> "The biggest [success] in my mind has been that we've created an open community among the grantees so they are comfortable asking questions of each other – created a safe space. They see each other as resources, not competition." (BBNP team contact)

Grantees also see this effect, one noting:

> "I think DOE has done a lot of good things in establishing a network of states and organizations. We're becoming a very large peer group." (Grantee)

The specific tools and process established for the program include a program-specific Google website with access for grantees, peer exchange calls, webinars, a grantee-focused newsletter (*Insider Blast*), and grantee-focused conferences and workshops. As we heard from more than one grantee, this network is very important. As one grantee put it, it is the core of their initial market research.

> "One of the things I said to all my staff is the importance of using that network. In other words, any time we're about to endeavor into a new project or a new potential initiative here, one of the first things we should do is market research; and the core element of that research is to understand what, if any, other organizations in the Better Buildings community has already done something or is already thinking about doing something. I will not do anything of significance in this organization without first understanding the degree of precedent among the Better Buildings community." (Grantee)

Google Site and Google Group

The BBNP team established a Google group in 2010 and provided access to each grantee; in March 2011, the Google website was launched and grantees were provided instructions on login and the resources that would be available on the site. The numbers of licenses were limited by Google and not all grantee staff could have ready access to the site. Further, the license had a unique *betterbuildingsnetwork* email address, which required each user to log in with an assigned email address. For some users who had their own Google account, this restriction created difficulties, as they could not have both addresses active at the same time.[46] Going forward, the plan is for the material on the Google site be placed on the public Better Buildings website so that anyone engaged in energy efficiency programs can access the information created through Better Buildings and the peer-to-peer exchanges can continue and expand.

> "The website that was set up for the different grantees to use and access all the different guidance tools – calendar, posts, etc. – was very useful; we have gone back to it many times throughout the grant design, implementation, and reporting." (BBNP team contact)

Despite the awkwardness of access for those who had their own Google account, all but a handful of the grantees report using the Google website "sometimes" or "often." The website

[46] A feature that is being dropped from Google in fall 2012.

provides guidance on grant administration and access to all the resources created by and for BBNP, as well as access to a Google Group discussion function for easy peer discussions. Many grantees use this discussion function to enhance their connections to other grantees.

> "In the Google group [other grantees] are quick to talk about groups who are doing similar things or showing best practices." (BBNP team contact)

This is probably the highest intended benefit of the Google site: that the grantees can facilitate their own interactions without depending on the account managers.

> "A lot of these [grantee] communities are becoming more interactive with each other as the years go by. Years ago, that never used to be. So, with Better Buildings, the Google community is where we're all able to go there and communicate, and share best ideas and any challenges that we were having." (Grantee)

Peer Exchange Calls

The BBNP team hosts regular peer exchange calls that provide grantees the opportunity to share and discuss their experiences, successes, and challenges. Each call is organized with a specific theme. As noted earlier, Better Buildings identifies four pillars of success for energy efficiency programs: *marketing and outreach*, *financing*, *workforce development and contractor capacity*, and *data, reporting, and evaluation*. With over 60 peer exchange calls having been offered as of August 2012, these calls have covered all four pillars, and addressed specialized topics such as multifamily and low income, the commercial sector, and working with utilities.

> "Overall, the peer-to-peer interactions have been positive for [us]. Otherwise, we'd just feel like we're spinning around out here, or feel like we're inventing new things when it's all been done before." (Grantee)

Throughout the grant period, the Better Building support team has solicited suggestions from grantees about topics that they would like to see covered in the peer-to-peer calls. One such example is the *Promising Approaches Poll* found on the Google site that asks people what topic they would like more information on in a peer sharing opportunity. This approach ensures that the peer exchange calls meet the needs of the grantees.

> "They really tailor the peer exchange calls to stuff that we want to know about and care about. And it's the same thing with webinars, even the webinars are a good mix." (Grantee)

> "For me, it's been confirmation that other folks are going through the same difficulties we are…. Since we are all at the same place at the same time, you don't know what is truly successful. You know what has an indication of being successful, so you don't want to change your program immediately based on this, but it affirmed that others are seeing the same results." (Grantee)

Peer-to-peer interactions are stimulated from the exchange calls, the Google site, and conferences. This has led many grantees to seek out others in the network to share their knowledge and experience. One commented that he really hoped for ongoing one-on-one consulting among other grantees. The degree to which this sharing continues into the third year and beyond the BBNP program period will be the real test of whether the peer-to-peer networks

have made a difference for communities that are newest to the energy efficiency program experience.

Webinars

The webinars available to grantees are publicized through the Google site, email invitations, and the *Insider Blast*. Included in these offers are Better Building targeted webinars, as well webinars offered through DOE's Technical Assistance program, DOE's Buildings America program, the National Renewable Energy Laboratory (NREL), and ENERGY STAR®. There were 26 webinars in 2010, 75 in 2011, and more than 30 by early August 2012. Given the number and diversity of topics, it is not surprising that many of the grantees noted that they monitor the webinars and attend when one seems important, but cannot attend them all.

> "They have been the most useful mechanism, although we haven't participated in all of them. Having access to those webinars, where you can talk to people from around the country on specific topics has been helpful." (Grantee)

With so many topics and the frequency of the webinars, it is not surprising that the grantees give them a more varied rating than the peer network calls and the Better Buildings targeted workshops and conferences. For instance, some grantees commented that they do not always feel they get sufficient advance notification of the webinars and that because the webinars are usually presentations with *PowerPoint* and expert presenters, there is less interaction and thus less sense of connection to the presenters.

Workshops, Conferences, and Meetings

The Better Buildings team has held eight workshops and conferences since July 2010, when BBNP kick-off occurred in Washington, DC. In addition, as part of the DOE network, grantees were offered an opportunity to attend one of 30 PRO EXPOs associated with local contractor meetings across the United States, and to attend the *Better Buildings Partner Summit*, which focused on long-term strategies for state and local communities. The conferences and workshops occurred as noted below.

- **Conferences:** October 2010, February 2011, May 2011, and July 2012
- **Workshops:** July 2010, September 2010, February 2011, and October 2011

For the first two conferences, the Better Buildings budget only permitted two or three people per grantee to attend. After the second conference in Los Angeles in February 2011, in response to the request for more open access, the conferences have been open to anyone.

> "The biggest support DOE provided – well, we place so much value in the conferences. It's the richest chance to get to know other programs on a personal and a professional level. Relationships have been forged. They enable relationships to move beyond the grant period." (Grantee)

The conferences are structured to facilitate interaction through networking periods, discussions during question and answer periods, and brainstorming on specific topics. Professional facilitators support these sessions so that ideas are encouraged and captured using sticky notes, white boards, and flip charts. Grantees learn about each other, learn from other grantee project experiences, learn from experts in energy efficiency, and generally leave with more contacts and an increased understanding of how to do energy efficiency upgrade programs.

> "I know a lot of the grant managers by name. So, 'Hey (xx) from Chicago!' It is nice to have that. They have paved the way for those relationships to happen." (Grantee)

The conferences received many positive comments. Some grantees view the conferences as among the most valuable services offered through BBNP. People get to meet each other face-to-face and will follow up on conversations occurring in the Google Group discussion and peer exchanges. Some of the account managers used the conferences as a time to have all their grantees together in a room to share ideas and discuss their activities, which grantees described as a very effective way to meet and get to know more about each other. A couple of grantees also noted that the account manager groupings were not based on grantee similarity, so that it was not unusual to have to go outside of the account manager group to find grantees who were working in the target groups or neighborhoods that were similar.

> "There are other places [outside of our account manager group] that were doing things like we were trying to do. That is what we found most helpful…real examples." (Grantee)

As discussed in Chapter 2, DOE awarded the EECBG Better Building grants in three stages and they end three years later, between May 2013 and September 2013. DOE awarded the SEP grants along with the later EECBG awards, with an end date of September 2013. As noted in the review of grantee characteristics and in subsequent chapters, not all grantees were able to launch their programs close to the time of the award. Thus, while the second conference in Los Angeles in February 2011 was good for some grantees in their startup phase, others had launched in summer 2010; some did not fully launch until the end of 2011.

The different waves of funding and grant awards, and the differences in program development, created some challenges for providing the most appropriate content to all grantees at the same time through conferences and webinars. One grantee commented: "The first conference in Los Angeles was very helpful for startup." while another commented that "the conference was fantastic" but it occurred at the "wrong time" and would have been more helpful if it had occurred at the appropriate growth point for his program.

Many of the grantees said that the conferences and workshops were valuable and, as one noted, if anything could be improved, it would be to have more.

> "Conferences are very valuable. They should be a little more frequent. They should be on a four-month cycle instead of six months, because they're very effective and permit a lot of sharing." (Grantee)

Newsletters

In July 2010, the Better Buildings team started a weekly electronic newsletter called *Insider Blast*. In September 2011, the newsletter shifted to a biweekly newsletter. The *Insider Blast* is focused on what the grantees need to know and how they should report to DOE. There are sections on administration (including upcoming dates to remember and reporting guidance), information about programs' successes and program management, and specific sections addressing one or more of the four pillars: work force, financing, driving demand, or data reporting.

> "*Insider Blast* – I definitely like this. It is very useful. It's a very good way to get information out. And it's good to have as a reference. It is much easier to access than going online to get the regulations and requirements." (Grantee)

In addition to the *Insider Blast*, which is available only to grantees and affiliated organizations, the Better Buildings team prepares a monthly newsletter for the public on Better Buildings activities. This newsletter, *The Better Buildings Neighborhood View* – began as a quarterly publication in Spring 2011, shifting to monthly in January 2012 – provides similar insight about Better Buildings program activities, as well as a calendar, but lacks the grant administration and reporting focus.[47]

Grantees certainly value the newsletter, but some, especially those who are dealing with the Better Building grant as one of many activities in their job, and thus have lots of email, sometimes did not know what was happening in the larger BBNP program. One noted that he always paid attention to an email from the program manager, or a letter, but he did not really see the newsletter as the way to know what is going on:

> "Better Buildings newsletter comes out and has, I guess, become the way that they communicate with grantees, but I'm more familiar with getting – well, if there's something important, you get a letter, as opposed to a newsletter…." (Grantee)

While there were many comments on use of the newsletter, one suggestion surfaced to facilitate further peer-to-peer communication. That suggestion was to circulate a list with details about the projects, their audiences, and contact names so there is a way to maintain contact going forward.

TECHNICAL ASSISTANCE

With substantial ARRA funds assigned to DOE, DOE allocated those funds to a variety of programs for energy efficiency and established technical assistance resources that the different programs could use. The Office of Weatherization and Intergovernmental Programs (WIP) coordinated the Technical Assistance Program (TAP) for the EECBG and SEP grantees.

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[47] U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy. 2012. *Better Buildings Neighborhood View.* April 2011 – October 2012. *http://www1.eere.energy.gov/buildings/betterbuildings/neighborhoods/newsletter.html*.

Through this network, the Better Buildings grantees could access technical assistance up to a pre-set budget for assistance managed by the BBNP program manager.

According to DOE staff, many of the grantees used technical assistance at the outset of the funding period. Overtime, fewer requests for technical assistance were made to the account managers, and thus by the time the allocated technical assistance funds had been used, there were few requests that had to be turned down. Further, the availability of TAP was extended for nearly a year beyond its initial time period – the end of 2010.

From the perspective of DOE staff, technical assistance was available and used when needed, and by the time it was no longer available, there appeared to be very little remaining need. The perspective of grantees was that the TAP generally was a very useful resource, and when the funding stopped in fall 2011, some could have used more. Several discussed how they subsequently continued with the same TAP support providers, having to use their own budgets for the support.

> "Early on there were funds for all of us to tap into technical assistance, but then that got cut about nine months ago. It would have been nice to continue to have that resource there. We were able to hire them on, we did that with SWEEP, but we had to pay for that through our budget versus tapping into this pool." (Grantee)

> "Providing guidance on energy evaluations, loans, energy savings, etc. has helped us to shape our program, and *continues* to be very helpful. We had heard the consultant contracts were ending mid-grant; that was threatening to be a problem for us, but we managed." (Grantee)

Others had no problem with the reduction in available TAP funds; they shifted to using the TAP providers with their own funds.

> "The technical assistance – that was fantastic! We used it for a lot of financing work, marketing, workforce development work, and program design. We retained relationships with those vendors, and pay them now." (Grantee)

However, the technical assistance providers did not always solve the problems.

> "In financing, we used the TAP quite a bit early on. We even hired him directly after his BBNP funds were used up. We also used another financing advisor [TAP]. Basically, we ended up with no program. At that point, some of the TAP funds had dried up. We went back to a revolving loan fund structure and hired [the first TA] directly, as a consultant, to help with that." (Grantee)

In addition, one grantee discussed how by the time they had their program up and running and realized that they were having health and safety issues with some of the completed upgrades, the TAP funds had expired and DOE could not provide support for them to sort out the problems. Then they had to spend their own funds to resolve the issues, though they could charge this to the grant; their experience led them to feel the TAP was not helpful when they most needed it.

Some of the grantees thought it was difficult to sort out what type of technical assistance would really serve their need, and specific needs surfaced that were difficult for the TAP to address. The residential focus of the TAP was a good resource for many of the grantees. However, those

dealing with commercial sector equipment and buildings, and specialty needs, found it less useful.

> "There wasn't a lot of information out there on [commercial equipment we wanted]. At the beginning, a lot of the information from Better Buildings was targeted toward single-family homes. They've gotten more up-to-speed with information about commercial and multifamily now. In the beginning, commercial and multifamily programs had to be translated into residential terms, and that translation was difficult." (Grantee)

> "Determining projected energy savings on a gut rehab or vacant property was also difficult to sort out in the beginning. NREL sent us a house-modeling guide that was 80 pages [Building America House Simulation Protocols; difficult without an engineering background]. There was not a lot of information out there to determine a baseline for those gut remodels." (Grantee)

The peer networks also helped sort out of their information needs for developing their programs. As we discuss in the next sections, some grantees were successful in developing financing efforts and reported success with the TAP financing experts.

> "I think the financing is the most singular kind of accomplishment of the Better Buildings award, and yeah, I think we have been sharing information on that through a variety of webinars that DOE helped put together." (Grantee)

However, several grantees found financing support inadequate to their needs. This largely seemed to occur because the approach that many wanted to pursue at the outset, Property Assessed Clean Energy (PACE), could not be pursued after the Federal Housing Finance Agency (FHFA) advised member banks in July 2010 not to purchase mortgages with a PACE assessment.[48] This FHFA recommendation occurred after most grantees had prepared their proposals and many awards had been made. It forced the grantees to rethink their approach, some came up with solutions, and others did not.

> "DOE has fallen very short on their financial/technical support. It was not nearly as supportive as we needed for the PACE financial support." (Grantee)

The change in the ability to use PACE affected DOE as much as the grantees, since DOE had anticipated PACE funding would be widely used. Without PACE, it was difficult for many grantees to address the program pillar of financing unless the grantee already had another model under consideration.

In addition to the financing assistance not always meeting grantee needs, grantees also commented on their need for other tools that were not available through TAP or within DOE – in particular, database needs and savings determinants.

> "And I think that nationwide there are some commonalities around that. We were left to try to figure out how we would do that on our own, you know, as programs sort of manage that with a vendor. It seems that a centralized set of tools or standards around technology and around a

[48] Wiegman, Leo. *State and Local Energy Report*, Volume 5.3 - Summer 2012, pp. 14-24.

> couple of other things would have been really helpful where programs wouldn't have to fend for themselves." (Grantee)

One DOE team member noted that those using the technical assistance typically were the ones that most needed it; the grantees staff considered as most successful needed less technical assistance. Two comments specifically pointed out that grantee needs for technical support were for very practical resources:

> "To be more effective, DOE needs to focus less on technical support with a policy emphasis, and more on technical support with a practical and deliverable emphasis. It would be helpful to have a repository for technical practical resources." (Grantee)

> "In terms of program design, there was plenty of information and workshops about it, but there was less on product sharing in relation to the different design elements, such as sharing marketing materials, contract materials, templates, RFPs, press releases, council motions. This has more to do with implementation than program design." (Grantee)

Those resources are now developed, and the Better Buildings team recently identified a need for a repository of all the lessons learned from BBNP including:

> "….other program templates, resources program infrastructure, stories, case studies – on what worked and what did not and why – to give people the context for how to think about an issue. A knowledge base – like the decision tool (for website) or names of the people with expertise and ability (technical assistance). A go-to resource for residential programs getting started or ongoing with problems for programs that are stumped." (BBNP team contact)

The challenge will be to find funds to support developing and maintaining such a knowledge base, and to maintain it so that it remains useful to new and experienced program designers and implementers.

TOOLS

As DOE staff and grantees noted in the interviews, as the program enters its last year, there are now tools available that would have been useful at the outset of the grant period.

> "I wish there could have been software we could have had early on instead of trying this or trying that. Something like this would also be useful across the whole project – how we gather data at the individual project level and turn that into data we can use to make product design decisions and program effectiveness decisions." (Grantee)

> "Every program has created [its] own data collection and analysis system. It is a very cost ineffective way, considering they're all recording the same things. There should be centralized route taken by DOE for data collection. They can't reconcile our data [because we are all different]." (Grantee)

> "We've made the point to our account manager that software development is an area that would really help." (Grantee)

The BBNP team also sees this problem and sees that their solutions today would be different than they were when they selected *Excel* as the tool for recording data and uploading, they can also use XML (Extensible Markup Language) for uploading their data.

> "If we were to do it again, we would consider doing everything in [a program grantees are using on their own] *Salesforce.* That would make it easier to transfer directly from grantees [many are using *Salesforce*] to DOE. *Salesforce* is built on Oracle, so hypothetically, should be able to handle that use." (BBNP team contact)

Tools that grantees would have liked early on include audit software that is easy to use and can be easily transferred to a database that is also easy to use and contains all the building performance information that grantees were expected to collect. Also valuable are: a means to access utility billing data; and more details on writing and managing RFPs (and examples); and agreements with contractors and auditors, homeowners and businesses. Many grantees told the interviewers that DOE should have been able to provide these types of tools and that this would have helped their projects go more smoothly.

Some of these solutions are in development or now available. DOE has developed an open source database structure with a standard taxonomy for building data called *Standard Energy Efficiency Data Platform* (SEED Platform). This database will make it easy to enter data and configure to specific needs.

In addition, grantees would have liked tools for how to estimate savings and collect data in the field. Still in development is an XML standard for home performance audits that is being developed by the Building Home Performance Institute's HPXML group. This standard will mean that data for audits and output from audit programs will be standardized such that both can be easily downloaded for analysis.

Another tool stimulated during this period is the Green Button project, which, with appropriate applications software, will permit a homeowner or building owner to access their own utility billing history data for analysis. It will also enable the end-user to provide the data to a third party, such as a contractor or program manager who is providing the end user with audit or energy information services.

DOE staff concur with the grantees that it would have been valuable to have these tools at the outset of BBNP. The lack of these tools clearly slowed most grantees down.

DOE REQUIREMENTS

It is likely a truism that no one likes program requirements, and federal government program requirements can seem particularly burdensome to comply with and difficult to understand. This is true for Better Buildings, though with additional challenges. These challenges are threefold:

1. **The program launched quickly** – by all accounts too quickly – affecting goal setting and the ability to clarify questions about program requirements.
2. **The program sought to estimate energy effects**, and thus needed energy data and building performance data to be tracked and stored so that it could be used to assess program effects. This is a complicated set of data to gather.

3. **Many of the grantees had no experience with energy program data** and were unprepared for the data requirements that the program imposed in terms of staff skills, allocation of funding to data management, and what was required to capture the data. Even DOE was unprepared, in part because DOE had little recent experience with local programs.

Contracting

Many grantees reported experiencing a rushed contracting process. After an award had been made, a team from DOE (called a *strike team*) would come to the grantee site and within 48 hours to several days there would be a final agreement (the SOPO) in place with goals and a revised budget. Grantees reported such changes in the final award as often less than half of what had been requested: a $50 million proposal became a $20 million award; a $75 million proposal became a $25 million award; in other cases, much closer amounts, but still less – a $25 million proposal became a $22 million award, and so on.

A few grantees discussed difficulties because their program idea was different from what the BBNP team wanted and had to be modified somewhat, or because the funding change was so great that they had to rethink their program. Yet most grantees indicated that the contracting process was smooth and efficient.

The contracting process typically was fine, but other challenges came later. Specific programmatic requirements and questions about how to address them, and final agreement on goals and targets, all presented problems after the contracts were in place and the grantee had to implement.

> "And we were working hard to get money out the door, and learning all the requirements and the strings that were attached to these dollars at the same time. I understand that the genesis of the stimulus package was to get the money on the street, to get people employed quickly. But I think that in coupling that with all the hoops you had to jump through, all the T's and I's you had to dot and cross, to get all that going at the same time and then get it out the door, it's difficult." (Grantee)

Program requirements, as noted previously, included meeting legislative requirements for: wages as per the Davis-Bacon Act; historic preservation; and reporting requirements that DOE generally developed after the contracts were in place. Because the DOE team had not been supporting local community energy efficiency projects in the recent past, there was no body of answers to questions about how to meet the requirements at the local level. DOE and the grantees were developing this as they rolled the programs out.

> "Everything from Davis-Bacon, historic preservation, the things we were all trying to figure out at the same time, they were trying to figure out. What does the law say? Our attorney became expert at all of the elements that were in our contract. He would find the answer before them almost. I'm not going to get into specifics, but…even loan loss reserve and what does that mean, how do these funds get spent. All of it was just the (result) of a huge amount of funding going to DOE and a young staff, and everybody trying to answer these questions at the same time. So no one's at fault, it just was frustrating and we got annoyed; we talk about how they had to deal with

> thousands of people asking these questions and figuring it out in real time. So they have done a great job given that." (Grantee)

For the grantees, the lack of ready answers to these questions was frustrating, and because many of the grantees had funds from different DOE programs – some from their state energy office running DOE programs, some from other DOE grants – it turned out that answers were sometimes inconsistent across the DOE contacts answering on behalf of the different funding streams.

> "It seemed like they were siloed. You can get a completely different answer from A funds than from C funds. You can tell that they are siloed just by how our questions are answered." (Grantee)

> "It would be great if this decision-making was just there with our project officers and they could make that call on the spot, I'm sure they would have loved to. They would make a call and then they would maybe rethink, was that the right answer, lets run it up the chain." (Grantee)

Further frustration occurred because some of the requirements were not new with the ARRA funds, such as Davis-Bacon, which had been on the books for many years. Yet because the DOE team dealing with Better Buildings did not have experience with Davis-Bacon, the answers were not readily available.

> "But Davis-Bacon is nothing new. That's the part I found frustrating. That's not something that was new with the Recovery Act. Buy American – that was new for the Recovery Act. When you come back with something from Davis-Bacon, you should know by now." (Grantee)

As grantees worked through their program development after the SOPO, some grantees needed to modify their approach from that approved in the SOPO. Those revised plans took time, once approved by DOE; city or county grantees often required further approval from their governing bodies. DOE expected all EECBG Better Buildings program activities to launch by February 28, 2011, yet some grantees sought changes in their plan and got final approval later than February.

> "There is lots of pressure to spend the money – *'Why haven't we spent more?*' Yet we needed clarification as to what to spend it on. We had a proposal, but it had changed. So many changes, both on our side and DOE. Our final plan was approved May 2011. We're implementing that now." (Grantee)

Neither the grantees nor DOE fully anticipated the time required to develop a well-functioning program. As we conducted interviews in spring and summer 2012, a few of the grantees discussed their efforts to revise and re-launch their programs because of lessons learned in 2010 and 2011; with only a year left to implement, they continue to hope for increased success.

Reporting Requirements

The reporting requirements were not very difficult for those grantees familiar with the requirements of energy program reporting;, for everyone else, the detailed requirements for building performance and energy use were often quite unexpected, and thus more difficult and complex than expected.

DOE did not have any systems in place at the outset and did not specify the tracking and reporting requirements until the program was underway. Grantees report that the requirements for payment changed at least once, the templates for reporting changed two or three times, and reviews of data sometimes required multiple resubmissions. Grantees also pointed out that there are multiple forms that they must use to report, some with the same data content, yet each has to be created and submitted, duplicating effort. This evaluation is also creating a challenge as the evaluation contractors ask grantees to provide items that are voluntary in the DOE reporting template, but are critical for the evaluation.

Even those familiar with energy program reporting had difficulties as DOE worked through iterations of the specific reporting requirements and templates. Two grantees told us that they realized they needed to track data internally and found themselves working together to develop a spreadsheet for tracking. This became the template for data tracking for the entire program in mid-2010.

> "In 2010, DOE had no reporting requirements. So we [two grantees] put together a quantitative spreadsheet for data collection …. We invited the DOE folks to review it. They saw our spreadsheet, decided to amend it and send to the other grantees. Great, but shows DOE was unprepared. They did not have systems in place; they were figuring it out as they went." (Grantee)

The XML data specification for data uploads to DOE database was available in summer 2011. Even through 2012, some grantees were still having difficulties translating data into that format or uploading data in that format to the DOE database.

> "Our data person probably lost five years of his life trying to upload them correctly. He keeps getting error messages, even for small inconsequential information, like congressional districts. It sucks up a ton of time; there is not a good error correction system." (Grantee)

For grantees with energy reporting systems already in place, challenges sometimes occurred because the DOE forms and templates did not easily accept the organization's data, or the data were in multiple locations and had to be assembled to meet DOE data requirements. At the same time, a couple of the grantees with preexisting experience in energy programs commented that the DOE requirements took their evaluation measurement and verification (EM&V) efforts to a higher level.

> "This has challenged the people who do measurement and verification around here. It has raised the bar, has had a positive impact." (Grantee)

These challenges and the fact that reporting was typically much more demanding than most grantees were expecting slowed the grantees considerably. As one grantee that was able to move quickly points out:

> "We planned to be in the market for two years, then year three for evaluation, but we had major delays due to the data issue. We got grant in mid-August 2010. We had the core program in place by October and did training. In November 2010, we did a soft launch. In fourth-quarter 2010, we had first upgrade. In March 2011, we had a launch with entire community." (Grantee)

Moreover, even as some grantees moved forward with their programs, their reported accomplishments are limited by gaps in data collected.

> "There are upgrades that are happening and because we can't get every little bit of data DOE is asking for, those retrofits aren't being counted." (Grantee)

Our DOE interviews confirmed these challenges; there was no preexisting database and no information technology (IT) infrastructure to begin with. As discussed in the *Tools* section above, such an IT infrastructure has been developed and is in beta testing at the time of this writing. The costs to the grantee of developing an XML system are often high and it can be difficult for the IT programmer to fully understand how to translate the DOE requirements to work with the data the grantee has. DOE provided an Excel template that small grantees could use to track information.

Another challenge has been when to report results. Projects can take a long time – from audit, to upgrade, to financing. DOE wants to know what upgrades have occurred and whether the financing is in place, yet waiting for all the pieces to be completed takes time. Grantees initially were reporting their projects in process, so that they could demonstrate they were accomplishing something and meeting their targets. However, this led to duplicate reporting, so DOE asked the grantees to resubmit just-completed projects. Some grantees thought DOE would just take their data and convert it, but that was not possible.

While many of the grantees have spent the funds needed to develop the data reporting systems, a few have not. A few of the grantees expressed their view that they do not understand the data requirements. They see the detail and requirements as excessive or as not needed for their program implementation. A program wants to know who did the audit, but this is not what DOE needs to know. Grantees want to focus on results; DOE needs the details of the projects so they can generate savings estimates, understand the loan structures, and the job generated. Grantees often see their program as primarily a service to their community, not as an energy savings or job creation program.

Grantees also report having a difficult time collecting some of the data: utility companies frequently will not provide data, even with signed release forms, or will only provide data in PDF form, not electronic datasets. In addition, some communities rely on fuel oil and solid fuel use (wood and pellets), for which there is no way to obtain detailed usage data. In general, however, it appears that grantees are slowly resolving these problems. The second quarter results for 2012 had just been submitted at the time of this writing. DOE staff reported very few errors, mostly complete data from nearly all grantees, and a smooth process.

Davis-Bacon and Historic Preservation Requirements

Davis-Bacon

DOE staff noted that these funds were the first time DOE had project funding that was subject to the Davis-Bacon requirements to ensure that work was paid at the prevailing wage rate. The

requirement applies to all buildings, but DOE issued a waiver for residential owner-occupied homes. Thus, for BBNP, the requirements applied to commercial construction and to grantees that were going to be choosing and managing the contractors doing residential projects. A solution for the residential programs was for the homeowners to choose which contractor to use and sign an agreement that the grantee will pay the contractor once the program inspector conducts a quality assurance inspection that accepts the work.

For projects with commercial upgrades, Davis-Bacon did apply and grantees needed their contractors to complete the paperwork required by the Act. One grantee reported that an original signature was required on the submitted form, which meant contractors could not fax or scan the form and return it. For contractors, the increased labor costs, plus the paperwork and the frequency of filing, create a hurdle to them embracing the program opportunity.

A few grantees reported some frustration because the Davis-Bacon requirements will continue to apply to any loans made with the loan pool, so at least one grantee is moving to set up a separate loan pool for commercial projects that will not be using DOE funds and will, therefore, not be subject to Davis-Bacon in the post-grant period. Other grantees reported that the requirements caused their commercial sector opportunities to mostly disappear because of increased project costs. In particular, one grantee noted that none of their commercial customers were interested in the loan offer because of the Davis-Bacon requirements.

Historic Preservation

Historic preservation requirements also applied to the Better Buildings grantees. Each state has different requirements, so each grantee had to find out their local regulations. Some grantees worked with their city or county historic preservation staff, and at least one grantee had an architect available to do historic preservation reviews for them. Another grantee is specifically targeting historic buildings and sees this as a great opportunity for energy efficiency.

> "Years ago [some people thought of] historic preservation as an economic development tool. Prior to that, there was a real sense that those two didn't mix well. Now we're hearing the same thing about sustainability, energy efficiency. Can't we prove that wrong too while we're at it? That kind of led to why we thought this was a great opportunity." (Grantee)

At least one project limited participants to those not on the historic registry, in order to minimize the burden of compliance, while several others targeted historic buildings, one developing a training program for how to retrofit historic buildings. For those who accept historic buildings into the program, the review process can delay a project.

> "Historic preservation can delay a process a few weeks to a month easily…. We probably lose people because, they think: 'I've been waiting six weeks on this thing.' It's not quick and easy." (Grantee)

Historic preservation requirements by-and-large have been less of an issue for grantees than Davis-Bacon requirements have, though in both cases the challenges of these requirements affected a limited number of grantees. In most cases, the challenges have been addressed. Several grantees noted that they received a great deal of assistance from DOE on these issues,

though in a few cases – especially regarding Davis-Bacon – some concerns remain. However, in general, we found that these requirements were understood and able to be followed.

> "From my perspective, we've gotten the help we needed on the financial technical assistance and the Davis-Bacon and state's historic preservation requirements." (Grantee)

Savings Requirements

The January 2011 version of the *Better Buildings Program Grant Recipient Management Handbook*[49] states that energy savings for each upgrade should be from 15% to 30%; the April 2011 handbook[50] and January 2012 handbook[51] both include a table clearly noting the savings target per upgrade as a minimum of 15% for EECBG grantees and 20% for SEP grantees.

When DOE and the grantees signed letter agreements to govern their grants, these agreements included a footnoted definition of retrofit as indicating a minimum of 15% savings. However, many grant recipients reported to the evaluation interviewers that DOE first notified them that they needed to achieve 15% savings on each project after the programs were well underway and through a newsletter.[52] They saw the 15% requirement as news and, in some cases, this change led to revisions to reporting, revisions to program outreach, and desires to change the goals – because achieving the 15% target at the project basis could result in fewer upgrades for some grantees. The concern was that either there would be higher project costs to achieve the target number of retrofits or fewer opportunities to complete qualified retrofits, or both. Other grantees already had targets of 25% or 20% per upgrade from a state or utility program; for them, this requirement was not a problem, though several commented that it was a surprise.

> "I feel like that 15% was a late hit. It was not a big determination in our view of whether the program was successful or not. If we were designed for that 15% requirement, we would have worked with a lot fewer businesses. We could not have taken our program and leveraged it to hit that kind of savings. Our municipal partners had other goals – they wanted to reach all the businesses in town." (Grantee)

One contact noted that the 15% had been a target, but never a requirement. Another noted that they did not see the 15% in their contracts and feel that it should be treated as a contract amendment, not just an announcement.

> "Yet something like '*you must achieve 15% savings to count the project*' should not be in an *Insider Blast*, but should be a contract amendment that gets signed off on by our director. It's a game-changer. You told us to get going, and now you say we can't count it? We would have designed a different program." (Grantee)

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49 U.S. Department of Energy. January 2011.*Grant Recipient Handbook*, v1.0, page 2.

50 U.S. Department of Energy. April 2011.*Grant Recipient Handbook*, v1.1, page 2.

51 U.S. Department of Energy. January 2011. *Grant Recipient Handbook*, v2.0, page 2.

52 The *Insider Blast* for March 11, 2011, March 18, 2011, March 25, 2011, and April 19, 2011 – each offer guidance addressing questions about the 15%.

Our review of the documents in the account management database and on the Google site suggest that DOE was developing guidance for the grantees at the same time the grantees were designing their programs. DOE published the first handbook in January 2011, yet grantees report having been under pressure to develop their programs, draw down funds, and report retrofits since the agreements were signed, beginning in May 2010. Though prominently displayed in the handbook, if a grantee did not review the handbook in January 2011, likely the first time they noticed the requirement would have been in the *Insider Blast* in March 2011.

In addition to comments that the requirement created a serious risk of not being able to make the original goals, grantees noted that their average housing stock or energy loads could not easily meet the 15% requirements, particularly in areas with mild climates where lighting, water heating, appliances, and electronics and other plug loads comprise the majority of energy use, not the heating/cooling use which shell and mechanical improvements reduce. Another concern was that ease with which a standard retrofit could achieve 15% would vary by household, as some are large energy users and some are small users. Other grantees noted that they had heard some grantees would not meet the 15% and would report fewer savings; they wondered whether that was okay and if it was okay for some, maybe it was okay for them as well.

> "We told DOE that we would do a combo between commercial and residential retrofits (for our goal). They changed the bar to 15%, but then they wouldn't let us change our retrofit numbers." (Grantee)

In March 2012, DOE provided guidance that the 15% could be treated as a portfolio goal, not an individual upgrade goal. Thus, many grantees should be able to count projects that miss the 15% target at an individual upgrade, but are offset by those that exceed the target. While this should have alleviated some of the concerns by grantees, those who were uncomfortable with the 15% target continued to be troubled by the requirement and fear having to change their reporting once more.

In addition to the savings targets, there are goals for the number of upgrades that were established when contracts were developed and signed. DOE and grantee contacts reported that targets were not determined systematically. Our review of the aggregate goals relative to population found a 0.78 correlation. This is a good correlation, indicating that most grantees' goals did align with their populations; however, for a handful of grantees, the goals were comparatively high in relation to their populations and likely those are the grantees that are having difficulty. Nearly all contacts agree that too little time was spent at the contracting stage to make sure the budget changes, the program designs, and the targets were aligned. Yet, the targets are public, and DOE is continuing to press grantees to pursue their targets. As one DOE support staff said:

> "And we've been developing the program as we go. When I first started, I put together retrofit targets. In addition, I was involved in the cost savings estimates. As the program developed, we realized maybe we shouldn't have put the numbers out there publically." (BBNP team contact)

In efforts to align the savings target of 15% with the upgrade targets, NREL has worked with many grantees to help them identify a package of measures that typically can achieve the 15% or greater savings target for their climate and housing stock.

> "I also every once in a while call in NREL to review data. We engaged them through DOE to come up and approve our deemed savings values. Every time we have needed help, it has been there and DOE has been very responsive." (Grantee)

While many grantees use modeled savings, others are using these packages, and some are shifting to these packages as a way to assess the likelihood of meeting the target. One grantee, who always screened for a minimum of 15% savings in project recruitment, sees no problem with the target. Nonetheless, most other interviewees recognize that hitting the upgrade targets will be challenging.

Grants are, unlike contracts, based on best effort. Thus, as long as the grantees demonstrate consistent and intentional progress toward their targets, they believe they are doing what they agreed to do. While the savings target is present for every grantee, some state that their proposals were focused on such things as "piloting different types of marketing strategies," or working with low-income populations that were underserved, or developing innovative ways to integrate with multiple existing programs, etc. These innovations may lead to fewer upgrades, but could provide new solutions as to how to get energy upgrades in the residential, commercial, and agricultural areas.

Balancing Different Goals

BBNP challenges the DOE staff engaged in its implementation and challenges the grantees trying to make sense of the requirements, make their programs work for their communities, and comply with grant requirements.

Grantee perspective:

> "DOE has multiple goals that exist in tension – destructive tension – with each other: goal of saving energy, driving energy efficiency; job creation goal; regulatory goal – compliance with existing federal regulations; market transformation goal – to create and grow markets where they didn't exist; experimental goal. Not clear to me what they want most." (Grantee)

DOE team member perspective:

> "Having a sustainable program is intended to be a key goal, not likely attainable from a one-time investment. The notion is that the BBNP program would become the foundation for an ongoing retrofit program – either run by utility, or nonprofit, or some other entity. The goal is for the BBNP program to initiate an ongoing program that could be replicated by others. On a pragmatic level, the BBNP goals are to reach retrofit targets and spend ARRA funds, followed by workforce development, marketing and increased awareness, and financing mechanisms." (BBNP team contact)

The multiple competing objectives for Better Buildings are in tension with one another, not necessarily in a destructive tension as the grantee quoted above described, but perhaps also in constructive tension.

From the interviews, we learned that some grantees have taken all the requirements and structured their program within the confines of the requirements. Other grantees found the requirements conflicted with their own plans, either because they wanted to innovate and experiment more than the requirements (especially the savings requirements) allowed, or because they wanted to focus on a community service approach that did not always fit within the requirements.

In the past few months, several grantees have learned of restrictions on when they can collect fees. As they seek a sustainable model, they cannot accept fees for services or products until they fully expend their grant funds. While a logical requirement, such restrictions come as a surprise. As one grantee put it: "Some of the federal stipulations get in the way of this being simple."

The most fundamentally difficult goal to balance is the speed at which the funds must be spent in contrast to what the grantees and DOE have come to understand as the time it takes to develop programs that meet the financing and workforce development goals.

> "The main challenge has been the need to have the immediate results – jobs, retrofits – through doing the energy efficiency projects, versus the long-term transformational pieces of sustainable financing and workforce standards." (Grantee)

> "There was a lot of money coming in, and folks pressured us to get money out door. It will take five to ten years to get transformative change."(Grantee)

DOE moved quickly to get the award agreements signed. Nearly everyone has commented that the initial period was rushed. Would more time upfront have helped get the projects out the door sooner? Most believe it would have helped to set goals and make sure the program ideas would work within the context of the various goals.

> "What has made the project challenging is the long-term goals, yet with ARRA funds that must be spent in a time frame. I wish we had taken a little more time up front to ensure things were really thought out. I think some grantees spun their wheels for a year or so." (BBNP team contact)

Clearly, the program is operating much as it was designed. As we discuss in subsequent sections, much has been accomplished and many lessons about energy upgrades have been learned.

OVERALL MANAGEMENT

Although BBNP builds on prior DOE energy efficiency activities, it is a new program with new objectives, requirements, and processes. Thus, the BBNP team and the grantees worked in parallel to develop the national and local programs. Grantees had different experiences of these parallel processes; for some, the BBNP team was not able to act fast enough, at best being "just one step ahead of the grantees" and at worst being a step behind, with negative consequences for the grantee.

> "We started out assuming that the banks would make information available, or the utilities would be a great partner and provide account data – which we are struggling to get. So once the programs are underway, DOE is issuing guidance, yet the grantees have already invested in particular programs. To remain in compliance, we have to disinvest, turn on a dime, or be in conflict with DOE. DOE is behind us, making requirements after the fact." (Grantee)

Yet for other grantees, this parallel process had an advantage. These grantees appreciated that the BBNP did not have elaborate procedures developed over the course of years. They view the BBNP approach as working as well or better than some other federal or state programs.

> "I think one of the strengths is that they aren't overly regulating how we were getting the money out and what we were doing. I mean, they keep an eye on us, but we have flexibility." (Grantee)

> "They've been really flexible. There are obviously a lot of regulations we have to deal with, but also that DOE has to deal with as it pertains to all the federal guidelines for how grants are utilized. Those regulations can seem pretty onerous, but [the project officer] has been helpful with getting us through those different hurdles." (Grantee)

Views of DOE's overall management can be extreme – ranging from believing everything was onerous and challenging to noting that the DOE program staff have been supportive and flexible. While some grantees spoke of being challenged by the monitoring visits, others appreciated them, as reflected in this comment, "I like the monitoring visits. It was reassuring to know we are doing things correctly, no major concerns."

Some grantees spoke about how they get feedback directly from the program manager or the project officer without having to go through channels and that these responses were usually "helpful, accurate, and quick."

> "In the beginning, I think we talked to too many people. If you are grantee, you are worried that you are doing what the funder wants you to be doing. We talked to a lot of consultants available for help. Sometimes we got conflicting answers regarding how we should do our work. DOE eliminated a lot of the red tape and rules that would normally hold them back, so they wanted to make sure they were following the rules and getting the right answers. That was right at the beginning. [Our account manager] did a great job getting us the answers that we needed. We treated her as the end-all-be-all." (Grantee)

By most accounts, DOE staff provided what grantees needed, but at the outset perhaps with some stumbles; as one said, the guidance was sometimes late in coming, effectively causing the grantees to make changes in midstream – this was very difficult for everyone. However, as this grantee put it:

> "In summary, federal regulations are a pain in the neck, but DOE's been pretty good in trying to help us work through those different issues and understand them. They've been pretty patient with us." (Grantee)

The use of account managers and the online and web-based resources have made it easier for the grantees. A few with other grants from DOE through the ARRA funding noted that these are unique to Better Buildings and much appreciated. Overall, the DOE support has likely made it possible for more grantees to be successful than would have been without the support.

5 DRIVING DEMAND

In this chapter, we discuss strategies grantees used to create market demand. The chapter is organized into four sections:

- *Marketing* – discusses marketing messages and methods
- *Sales* – discusses messages for making the sale (securing the upgrade)
- *Financial Incentives and Free Services* – explores the strategy of reducing first cost barriers in marketing and sales
- *Financing* – discusses financing as a tool to stimulate demand for retrofits

This chapter and the subsequent chapter, *Stimulating Supply*, tackle different aspects of what needs to be an integrated, internally consistent approach to energy efficiency upgrades. The need for coordination between demand and supply-side strategies is an important consideration when examining lessons learned from the experience of BBNP grantees.

The chapters discuss *perceptions* of effective approaches. Our final evaluation will conduct statistical analyses to identify approaches statistically associated with objective measures of success.

We also note that although the grantees and their programs vary widely, success is *not* associated with specific organizational types (although it is associated with partnerships with financing and nonprofit organizations and having energy efficiency experience), with climate or building types served, with the specific services and measures offered (assessments, qualifying measures, rebates, grants, financing), or with marketing methods.

MARKETING

Energy efficiency upgrades constitute a new product. As many of the grantees and other interviewed contacts stated or implied, most end users have limited awareness of energy efficiency in general, and what awareness they have is typically limited to ENERGY STAR® products (which speaks to the effectiveness of the EPA activity). For a new, unfamiliar product to be adopted by end users, they need to have assurance that the product can deliver its touted benefits (is not "hype"), is appropriate for their specific circumstances (buildings), and can be obtained from someone they feel reasonably confident can deliver (that is, is trustworthy). Financial incentives function both to reduce first-cost barriers and to convey assurance to end users that the program staff believe that the promised benefits will be realized.

Often, the stated benefits of energy efficiency upgrades focus on reducing energy use. However, there is evidence end users do not recognize that the specific characteristics of their buildings contribute significantly to their energy consumption.[53] As one grantee put it:

> "A lot of people pay their electricity and gas bills and have no idea where the amount comes from, and how it is so high. Quite honestly, I think they really have no interest in it." (Grantee)

This language of energy savings often fails to tap into the primary benefits both residential and nonresidential end users obtain from their buildings – comfort, utility, health, and safety.

These ideas are the key levers that grantees are recognizing and attempting to use, to varying degrees, in their programs, and form the foundation of the findings in this chapter.

What is Promoted?

Marketing success must be gauged, ultimately, by the level of upgrade activity. Successful marketing *must drive the desired end user action*, and to accomplish that, program designs must be clear as to how end user engagement with the program generates upgrades.

"Identifying the end goal is a major piece of the puzzle," said a BBNP program contact. As we mentioned in the prior section *Underlying Principles*, all program activities – from marketing focus to incentive design and contractor engagement – need to consistently drive the end user to and through a sequence of activities that culminate in upgrades. Many grantee programs and their outreach activities – at least initially, and to a lesser extent continuing – did not drive directly to upgrades. Instead, they drove assessments, under the assumption that assessments drive upgrades, or …

- They drove education as an outcome or precursor to the assessment
- They drove rebates or loans
- They drove end users to a website and assumed end users would "take it from there"
- They drove the measures that they directly installed

But many programs did not from the outset explicitly drive upgrades. A home performance or comprehensive assessment report itself is unlikely sufficient to motivate large numbers of end users to do upgrades. Evidence of this can be seen in BBNP's accomplishments as of second quarter 2012, where assessments exceeded retrofits threefold (roughly 27,000 upgrades to

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[53] Brounen and his colleagues have documented that the "energy literacy" of households is low (Brounen, B., N. Kok, and J. M. Quigley. 2011. "Residential Energy Literacy and Conservation," Paper presented at the *47th Annual AREUEA Conference.*) In the commercial sector, consider that large commercial real estate firms seek to minimize their costs and maximize profits, however, an August 2, 2012, article in *The New York Times* reported, "The first comprehensive study of energy use by New York City's largest buildings shows some to be power hogs, using up to five times as much electricity, natural gas, heating oil and steam as others of comparable size or purpose." (Navarro, M. 2012).

103,000 assessments, for a ratio of 27%). All types of grantees, including those with the most success to date, expressed this conclusion in the interviews. Further, this experience is consistent with that of efficiency program administrators (utilities and public benefits agencies) nationally.

Before continuing, it is worth further examining the approach of installing measures during the assessment, which is a subset of the broader concept of *incrementalism* – encouraging end users to embark on upgrades one step at a time.

Comprehensive Upgrades versus Incrementalism

Everyone involved in Better Buildings would like to see widespread adoption of deep retrofits, with a correspondingly large percentage of energy savings per building (greater than 30% energy savings). Nevertheless, the question remains as to the best way to move toward this long-term goal when the nation is at the starting line of introducing a new product – efficiency upgrades – to end users and potential suppliers.

Better Buildings has building savings goals of 15% (variously specified as per-building and portfolio average). However, some of the grantees suggested during interviews that their programs recognize that multiple smaller projects over time can lead to comprehensive upgrades. Some of these grantees directly install measures during assessments, either hoping to make assessments more attractive to potential employees, or to begin reaping smaller savings from participants as they contemplate additional actions. Other grantees spoke of the differing needs of customers, contrasting, for example, those that just need financing for better appliances with those who "understand the full value of energy efficiency and want other measures." Grantees working in the commercial sector were more likely than grantees exclusively serving the residential sector to discuss the need to start with whatever project interests the customer most – typically lighting, and work with that customer over time to achieve deeper savings.

A prior section of this report (*Metrics of Success)* discussed this issue with respect to the development and interpretation of success metrics. As noted, higher conversion rates and progress toward goals, and lower costs per retrofit and unit of energy savings, are consistent with opposing interpretations: greater grantee efficiency in getting comprehensive savings, or greater grantee activity with less-than-comprehensive projects.

This preliminary evaluation is unable to distinguish between these alternatives; the final evaluation will investigate this important issue.

Marketing Messages

We make a distinction between marketing messages, discussed in this section, and sales messages, discussed subsequently. Successful marketing messages lead the end user to consider the product (the efficiency upgrade) and are directed at a large group of potential customers (the market). Successful sales messages are *end-user specific*, promoting the benefits that the specific end user will attain, and countering his or her specific concerns (barriers to the sale).

Comfort, Health, and Safety are Principal Motivators

Many grantees reported that end users undertake upgrades to improve their comfort, health, and safety within their home and business. Successful grantees (success to date as characterized per our metric, see Chapter 3) were nearly twice as likely as the other grantees to mention that they use messages of comfort, health, and safety.

In addition to reducing the energy required to maintain living spaces at a comfortable temperature, energy upgrades can make temperatures more consistent throughout a home or business and make it possible to maintain a comfortable temperature in areas where it had been impossible or impractical to do so previously. Only one Better Buildings locale – San Diego and Los Angeles (but to a lesser extent), both of which have exceptionally mild climates – did not respond to the comfort message, according to the grantee. Energy assessments and upgrades also address health and safety issues (i.e., mold and moisture), gas leaks, and structural problems (i.e., ice dams).

> "I think it's surprising the number of assessments we do where there is some sort of gas leak or carbon monoxide back-drafting. We also offer free radon testing as part of the assessment. The safety piece is not insignificant, part of our family marketing." (Grantee)

Some grantees encourage end users to consider efficiency upgrades at the time they are replacing failed equipment. This approach is an expansion of the *comfort, health, and safety* theme, as those are the needs that the existing equipment serves.

> "We really do a large amount of HVAC swap outs. It's an emergency situation for the homeowner and they don't really have a choice, they are going to do it immediately. Because of the relationship we have with our HVAC contractors, we are able to get to these guys right at the point of purchase. I would say that is one of our biggest successes." (Grantee)

Utility bill savings appears to be a secondary consideration. Although the same proportion of grantees mentioned bill savings as mentioned comfort/health/safety as motivators, the successful grantees were twice as likely to mention comfort/health/safety than they were to mention bill savings. As one grantee put it, "Saving money is so far down the line."[54]

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[54] Although the grantee interview data only weakly support a contention that utility bill savings are considerably less effective than messages of comfort, health, and safety, other sources strongly suggest bill savings are a secondary motivator, while yet another source suggests both are important: (1) Three successful home performance business owners that conduct both program and non-program home upgrades agreed, in a webinar, the primary motivators are comfort, health, and safety (Efficiency First. August 7, 2012. "With or Without You: Home Performance Success in a Non-Incentive World".) (2) A recent market research study of the four-state Pacific Northwest conducted by the Northwest Energy Efficiency Alliance (NEEA) determined the messages of comfort, health, safety, reduce waste, and benefit your community are strongest (Benenson Strategy Group. October 24, 2011. "Messaging Survey Study." Available from NEEA). (3) In a study that Portland State University and Research Into Action conducted (under contract to LBNL through Earth Advantage Institute) on an audit program implemented by the City of Seattle, the benefits that participants expected prior to the assessment (their motivations) differed from those that they experienced from the upgrades they made. Prior to the assessment, contacts largely reported that they were able to keep their homes comfortable, though the cost of doing so was higher than they would like. Participants cited cost

continued…

Themes of energy savings (as distinct from bill savings) and environmental benefits motivate small portions of most markets and may alienate other segments that interpret these themes through a political lens. Boulder, Colorado, is known for its environmental ethic; however, the grantee serving Boulder concluded that the environmental message was not a strong driver for its upgrades.

> "We are coming from a place of Climate Smart programs and the message of do it for the environment. We are shifting the market to a message of comfort." (Grantee)

Only two grantees thought environmental benefit was a motivator, with one of these two saying it was only influential in one of the several communities it serves. One grantee successfully changed its marketing strategy from emphasizing the energy savings and environmental benefits to addressing end user needs; they reported that the number of inquiries received in the fourth quarter of 2011, following this change, was 57% greater than in all three previous quarters combined.

Incentives play a role in the final decision – *the sale* – by reducing a barrier, but they do not drive the end users' decision to get an upgrade. Experienced sales staff know that when the salesperson addresses all of the customer's non-price objections, price seldom precludes the sale. The availability of financing also plays a role in the final decision, but similarly does not convince the end user that an upgrade is worth pursuing. Explained one grantee:

> "It's not really about the [incentive] money; it's really more about the comfort. They're uncomfortable, something's not right. The rebates are nice and great and wonderful, but at the end of the day, when all this is said and done, and they're extremely comfortable and they don't have any more problems, that's what has sold them. And that's what sold their friends when they go say, 'Yeah, it was great, I got some money, but now I don't have to wear two pairs of socks to bed.'" (Grantee)

The theme of avoiding waste (loss aversion) was mentioned by only one grantee, despite substantial evidence from social science research and some energy efficiency agencies that this is a powerful motivator.[55]

While three grantees mentioned increasing the home value as an upgrade benefit, a greater proportion of grantees described the current depression in the home real estate market as undermining that proposition.[56]

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savings as their primary motive for seeking the audit and making upgrades. After the upgrade, comfort was the main benefit that people cited, above cost savings (Ingle, A. et al. July 2012. *Behavioral Perspectives on Home Energy Audits: The Role of Auditors, Labels, Reports, and Audit Tools on Homeowner Decision-Making*. LBNL-5715E. Berkeley, Calif.: Lawrence Berkeley National Laboratory).

55 Benenson Strategy Group. 2011. *Messaging Survey Study*. Conducted for, and available from, the Northwest Energy Efficiency Alliance (NEEA). The study identified waste reduction as a strong motivator for energy efficiency.

56 One research agenda of the energy efficiency community is to verify that energy-efficient homes and buildings sell and lease at higher values and/or more rapidly. A recent study claims to be "the first study to

continued…

> "Investing in home improvements in these market conditions gives you limited return." (Grantee)

In fact, some grantees explicitly identified the communities in their grant area with high proportions of under-water mortgages (mortgages higher than the home value) and minimized outreach activities in those areas.

Community Benefits

Most of the grantee programs are clearly serving well defined communities – cities, counties, corridors within a city, and so on. Program names and materials make clear the program intends to improve the communities' building stocks and generate jobs. In addition, several of the grantees mentioned the community benefit of addressing climate action goals. However, it is not yet clear to grantees (or to the wider energy efficiency community), however, whether climate action goals align with people's concepts of community benefits. And whatever the community benefits, it can be difficult to motivate end users in the task of "what you can do for your community," rather than that of "what your community can do for you," to paraphrase President Kennedy.

Community benefits are clearly evident for one grantee that serves an island; the city negotiated an agreement with the local utility that gives the island three years to achieve a set reduction in electricity demand in order to avoid construction of a new substation on the island. The program motivated participation by emphasizing the benefits to the community as a whole and leveraging public resistance to substation construction.[57]

Another grantee initially pursued a competition among communities, but received negative feedback that the competition was divisive and so to engage in a competition would not benefit the community.

> "We worked with community leaders to restructure that and make it into a community energy party. Rather than a competitive thing, it will be a collaborative effort. We can make commitments as a community to make energy savings goals and have some rewards for seeing those goals met. It will be a Tupperware party model, where people can come over and see somebody's

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provide statistical evidence that, holding other factors constant, a green label on a single-family home in California provides a market premium compared to a comparable home without the label." *The Value of Green Labels in the California Housing Market,"* by Nils Kok and Matthew E. Kahn, July 2012.

Perhaps the earliest work in the nation on the topic of a premium for high efficiency homes (not labeled homes) was a study conducted in the 1980s for the Bonneville Power Administration. It found (based on a small sample) a price premium for homes meeting Bonneville's Model Conservation Standards (Horowitz, M. J. and H.M. Haeri. 1990. "Economic Efficiency versus Energy Efficiency: Do Residential Model Conservation Standards Make Good Sense." Energy Economics, 12 (2): 122–131.

[57] The program has a real-time dashboard of energy use in each of three island communities. The dashboard reports current usage as a percent of capacity, and illustrates the relationship between usage and capacity with an odometer-type dial color coded into six sections from green (less than 20%) to dark red (over 95%). See *http://www.positiveenergybi.org/dashboard.*

> upgrades, hear what it's like. We are just starting to pilot this right now, so we don't have a lot of feedback. So far people have been more receptive to that than the contest." (Grantee)

These examples are consistent with conclusions from the previously footnoted recent market research study that identified community benefits, as well as waste reduction, as a strong motivator for energy efficiency.[58]

Sense of Urgency

Many of the grantees are in agreement on the importance of creating a sense of urgency to act now. (More than twice as many successful grantees as other grantees mentioned that they created a sense of urgency.) For example, one grantee, a city with a municipal utility, had a three-month *Best Offer Ever* promotion that led to more than ten times the utility's typical participation rate. The community benefits messaging used by the island grantee previously discussed was further leveraged by the urgency of a three-year window to offset the need for a new substation.

While end users do need to be motivated to act, which means *now*, grantees also report negative consequences to this approach. According to one grantee:

> "We were trying to create a sense of urgency, get it done before the rebates expire. We heard from contractors, 'Keep the program steady and quit yanking us and the public around.' So some degree of urgency in the message works, but do too much of it and you get into diminishing returns." (Grantee)

A time-limited offer may succeed in stimulating demand during that period, but if the standard offer and messaging are not also successful in driving demand, then retrofits are likely to fall off dramatically after the offer ends. This is what occurred in at least one jurisdiction.

If a program seeks to plant the seeds of end user demand and contractor supply that will continue to grow in the future, steady activity throughout the program period is better at supporting sustainable growth among trade allies and avoiding delays caused by long queues of interested end users. One successful grantee and several successful utility program administrators do this by "sweetening the pot" in different ways at different times. For one promotion, the assessment incentive might be increased. For a subsequent promotion, the incentive on certain measures might be increased. And subsequent to that, the loan terms might be made more advantageous. Or, rather than repeat enhanced financial incentives, a program might offer recognition and publicity to a contractor or end user participating during the period.

Creating a sense of urgency can be effective when the program develops multiple creative time-limited promotions (financial or otherwise) that are successively offered to the market.

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[58] Benenson Strategy Group, *Messaging Survey Study*.

Make It Easy

Potential participating end users and contractors want simple program participation steps, and simple things they can do to save energy. Successful grantees were more than twice as likely as other grantees to comment on the need for simplicity.

> "We have targeted the comfort and savings, and I think more than anything it is the simplicity." (Grantee)

> "We try to convey that you don't have to put out time and energy to participate." (Grantee)

One grantee determined that the need to maintain simple participation processes limited the amount of data that they could require participants to provide prior to entering the program. According to this grantee:

> "We found that if we ask the customer too many questions up front, we would lose them. Our job is to get a foot in the door…not intimidate them at the beginning." (Grantee)

Another grantee noted similar challenges, but stated that using an energy advisor model to support participants allowed them to collect information while reducing the burden on the participant.

Indeed, some grantee program models seek to increase participation in existing utility programs by, in the words of one grantee, "sweetening and streamlining" the process. Similarly, another grantee elaborated that they seek to streamline the utility program participation process by serving as a resource for information about incentives available from different utilities. According to this grantee:

> "I know that's one thing our contractors and customers have appreciated, being able to talk to one person about incentives and different utilities, and demystifying that." (Grantee)

Branding and Building Scores and Labeling

A few grantees and program contacts mentioned program branding or labeling as useful in driving awareness – but not uptake.

A number of the successful grantees include program branding in their strategies and devoted resources to creating a strong brand. Some of these grantees have created a new brand with their program, and other grantees are building on brands from existing energy efficiency efforts in their territories (from utility or public benefits activities). Conversely, one grantee with a very low assessment-to-upgrade conversion rate linked itself with an existing brand that it has come to believe is weak; this grantee feels hampered by its brand.

Several grantees are pursuing some type of home score as a method of conveying to the market the value of the upgrade. One grantee said, "We are toying with the idea of a tag line, *Tell me your blower door score*." Four of the State Energy Program grantees seek to encourage homeowners, home improvement professionals, and real estate agents to use the Energy Performance Score (EPS) rating system developed by the Earth Advantage Institute. A few of

the grantee programs are linked to Home Performance with ENERGY STAR (HPwES), either by offering HPwES upgrades or soliciting contractors with HPwES experience, and others use the Home Energy Rating System (HERS) developed by the Residential Energy Services Network (RESNET). The grantee programs offering HPwES or HERS typically are affiliated with utility programs that offer these products. A few grantees serving the commercial sector are using the U.S. Environmental Protection Agency's (EPA) Portfolio Manager energy performance rating system; buildings rating 75 or better may qualify for the ENERGY STAR label.

As mentioned in a footnote in our discussion of comfort and other marketing messages, a recent study found that a green label on a single-family home in California provides a market premium of just under 9%, compared to a comparable home without the label.[59] The study investigated homes with and without three labels: *ENERGY STAR* (EPA), *LEED for Homes* (U.S. Green Building Council), and *GreenPoint Rated* (Build It Green).

The early results on use of branding, building scores, and building labeling are promising, yet additional program activity and investigation of results is needed before we draw conclusions.

Marketing Methods

NOT Traditional Advertising

Most grantees report they have seen little evidence that traditional mass media advertising drives program interest or upgrade activity. It does provide information about program availability, which has some limited value, but it does not seem to induce participation. One of the grantees among the top handful in terms of number of upgrades has billboards around its city, but reports that they appear to have little effectiveness.

As one grantee expressed it:

> "On the marketing side, we are now focused on community-based marketing and outreach, as opposed to spending money on advertising. Yes, that is a big lesson learned. Don't spend money on traditional advertising; it doesn't give you very much. It gives you brand recognition, but it doesn't bring people in the door." (Grantee)

Recall our premise that grantee programs enter a marketplace where energy efficiency upgrades are a new product with a name that does not speak to the needs and wants of end users. Potential customers need assurance that an upgrade can deliver the claimed benefits for their specific home or building, and can be obtained from someone who they feel reasonably confident can deliver.

[59] Kok, N. and M. Kahn. July 2012. *The Value of Green Labels in the California Housing Market.* Funded by the San Francisco Department of the Environment and StopWaste.Org – both of whom received Better Buildings funding as a subgrantee to LA County and used this funding, in part, for this study.

The marketing methods discussed in this section are responsive to these characteristics of the upgrade product and of potential customers.

Endorsements to Create Assurance of Performance

Friends, Families, Neighbors

Many grantees report that referrals from people that have already participated in the program are among the greatest sources of leads that convert into upgrades. At least one grantee facilitates this natural process by offering a *friends and family* incentive. Said another:

> "Our program is built around trust – trusted sources. From the mouths of their neighbors, from people who have actually gone through and had the work done and can tell them, 'My home is less drafty, I'm using less oil, I'm saving money, my house feels more comfortable.'" (Grantee)

Many grantees place yard signs with participants. While some grantees attributed the effectiveness of yard signs to a homeowner's motivation to "keep up with the Joneses," because completed upgrades are seldom evident to passers-by, yard signs may also be effective because they provide assurance that this homeowner thought the cost of the upgrade was worth its value, or that upgrades are "normal." The yard signs also invite conversations in which interested end users can talk about the upgrade, the benefits, the contractor, and so on with a neutral, knowledgeable person – the neighbor.

Community Leaders, Community Benefits

Grantees reported that community leaders can be effective in promoting the program. Community leaders are individuals prominently involved in organizations and activities serving the community, either as a whole or a discernible group within it. Occasionally, early upgrade participants have been recruited to be a show-case for upgrades and have taken on a spokesperson role. Multiple grantees have taken steps to integrate these engaged participants into their outreach efforts, organizing open-houses at the homes of willing participants to illustrate completed upgrades. One grantee provided huge discounts to homeowners willing to act as ambassadors and host open houses.

Community leaders are not limited to individuals, but include organizations that either lead or have influence in the community. Preeminent among leadership organizations are local governments. Many of the grantees are local governments, and some of them effectively used the local government's leadership role to promote the program. Among the benefits local governments offer as grant administrators are: the personal connections staff have with community members of all types, both commercial and residential; their authority as the elected government; the ability to reach out to all members of the community; and the information that they possess on the local building stock.

One grantee working at the state level elaborated on the value of involving local governments:

> "We've signed up more than 50 municipalities to include our brochures in their tax bills when they go out. That's like 250,000 pieces of mail that are going out in a format that nobody is going to

> throw away, everybody's going to take seriously. We don't pay any postage on it. It's a magnificent channel for marketing and communication in something that nobody else uses. It turns out that the relationship with municipalities has as much to do with legitimizing our programs and brand recognition as does being a state entity for helping people." (Grantee)

This grantee recognized that staff do not yet know whether the mechanism of piggybacking onto the tax bill will be effective, but through this process they have engaged municipalities and established relationships that can be leveraged for other campaigns.

Another state grantee reported conducting outreach to every town and city that its grant serves:

> "We got letters of support from all but one of the communities. We engaged them all in advance and explained how the program would bring additional resources to their community." (Grantee)

Another grantee serving a city had the support of an individual city council member and attributed program success in part to that support and to a community celebration held for the program launch.

Community leadership is broader than elected officials and advocacy organizations. Some businesses hold leadership positions in their community, due to their size, prominence, or contributions to civic activities. Businesses that serve the public, rather than other businesses, also provide an avenue for outreach. One grantee has had success with businesses both in providing access to residential end users and as a leader among other businesses.

> "We have done a lot of outreach through businesses, where we will do a lunch-and-learn type of thing, or set up a table at the cafeteria at the community hospital; just finding places where people are going to be and talking to them face-to-face. That has been extremely successful. … [A specific business] is one of the biggest property owners, with one hundred properties and one million square feet. We knew at the outset it was important to get a couple of the larger property managers into the program. The city had a property owner/manager design charrette. [The company] said 'alright;' they are the most progressive in town. It snowballed from there." (Grantee)

Some grantees relying on outreach to and among a defined community encountered a glitch: the communities originally identified did not generate the anticipated number of upgrades. They needed to expand their geographic or community reach. Other grantees, especially those servicing large areas, found that they needed their community engagement strategy to define communities not by geographic or neighborhood boundaries, but rather by cultural, ethnic, or other considerations.

Because the efficiency upgrade product is largely unknown, community groups *may* offer needed assurance and foster trust that efficiency upgrades deliver on their promise of increased comfort, health, and safety for the occupants, and reduced energy bills and consumption. The use of community groups has worked well for grantees serving a region that already had an energy efficiency mission and activities. And community leaders may be uniquely qualified to articulate and deliver credible information about potential community benefits from individual actions.

However, nothing about the upgrade program model can be taken for granted. Some grantees have learned that people do not turn to their PTAs (school parent-teacher associations) or

churches for advice on whole-house upgrades, while at least one successful grantee believes its engagement of civic groups (like Rotary and Lions clubs) has contributed to its success.

The problems associated with outreach based on a community designation likely stem from the newness of the upgrade product. The market remains in the *early adopter* phase – a very small proportion of the population will upgrade its buildings.

There are methods other than community leadership that provide assurance and build trust; we discuss these methods after our discussion of community sweeps.

Community Sweeps

Many grantees implemented, at least initially, a strategy of saturating a community defined by geography with targeted outreach efforts. They commonly refer to these campaigns as *community sweeps*. These grantees sent teams to contact each residence and/or business within a designated area, such as by hanging flyers on doorknobs.

While this approach was often quite effective in generating large numbers of completed assessments, especially when the assessments were free or heavily subsidized, it seldom led to much upgrade activity. The approach creates awareness, but does not provide assurance that upgrades deliver on their promise, will deliver for the specific home or building owner, and will deliver through the efforts of whatever contractor they might select.

One grantee's experience suggests community sweeps can be useful when supported by all other elements of the program to drive upgrades. The neighborhood sweeps conducted as part of one grantee's initial program design resulted in a high degree of interest; staff believed the conversion rates during this period were driven by high incentives. While neighborhood sweeps remain a part of this grantee's redesigned program, more effective coordination of other program elements has resulted in respectable conversion rates at lower incentive levels. This lesson is equally pertinent to virtually any single piece of program design: *a specific activity that typically does not provide good results can be part of a successful program when the remaining elements of the design coherently drive retrofits*.

Showcasing Upgrades

Showcasing upgrades through open-houses, yard signs, case studies, and articles in newspapers and other media are another way to provide end users with assurance that upgrades deliver on the promise *at least some of the time.* If the end user has a building similar to that which is showcased, or learns of a contractor that worked on a similar building, they also have some assurance that an upgrade will work for them. In the new technology adoption literature, this process is termed *demonstration*; customers need to try out the new technology, including from learning from others who have tried it out.

Some approaches to showcasing, such as case studies and articles, simply demonstrate that "someone" is happy. Approaches in which the home or business owner is available to talk with

interested end users enables those end users to better assess whether the upgrade will work for them and to gain some confidence in the upgrade contractors. This *Tupperware party* model creates a relaxed, welcoming opportunity "where people can come over and see somebody's upgrades, and hear what it's like."

Several grantees have augmented this testimonial approach with impact evaluation research to substantiate the upgrade savings claims. As one grantee said:

> "We've seen…that the savings are real, and the savings are dramatic. By simply being able to stand up in front of people and say, 'Do this loan, it's cash-positive. There's absolutely nothing you can do with your money that's going to be a better investment.' Most of these projects, we're talking about somewhere between a fifteen to twenty percent return on investment. If you get a five percent loan over fifteen years, you're essentially making fifteen percent on your investment for fifteen years with no up-front cost, and then it's all cake from there on out. It's a very appealing financial message." (Grantee)

Targeting

A number of the grantees identified what they assumed to be promising submarkets within their grant service territory. We did not find evidence that targeting demographic groups for outreach contributed to program success. For example, one interviewed program contact described a grantee's experience as follows:

> "They did research on the year the house was built, the income level, and two other criteria. These households fell mostly into four zip codes. Yet those people were not interested in the upgrade." (BBNP program contact)

Another grantee with few completed upgrades reported targeting "a cross-section of the mortgage program of customers who were current with their bills and who had purchased their homes between about 10 and 15 years ago – older houses, financial security; they would benefit from efficiency upgrades."

Thus, there is little evidence that pre-deployment targeting based on available secondary data has been effective.

As noted above, grantees have found that targeting potential customers too narrowly can limit a program's ability to reach early adopters of efficiency retrofits and inhibit the ability of the program to expand through the networks in which these early adopters operate.

One grantee discussed building on this success to developed nuanced targeting going forward.

> "We would love to get funding to better understand the psychographic and demographic profile of the consumer [in the grant service territory] generally, but also compared to the current participants. I see a great opportunity to drive cost-effectiveness through better targeted marketing, which really means you need to understand demographic and psychographic profiles of your consumers." (Grantee)

Marketing Contractor

Several of the grantees commented on their use of a contractor for marketing and the difficulties they have had aligning the marketing contractor's activities with their needs. Although the data from this preliminary evaluation are suggestive and not conclusive, it appears that the grantees recognized a need for marketing expertise and execution, but often did not understand what kind of marketing or market consulting works for comprehensive efficiency upgrades. It appears that some grantees assumed mass marketing would be effective, while others assumed that any "good" marketing consultant would be able to recommend appropriate methods for the unusual, specialized type of service that upgrades constitute.

> "We have a marketing contractor and they've been involved in some market analysis, development of different TV commercials and radio campaigns, and that sort of thing. It's been very interesting, because we did a four-month TV campaign. It was our biggest marketing expenditure, and there was no perceptible change in the inflection of the curve on either applications or closings. The marketing firm was like, 'Hey, ready for another round?' We said, 'Hey, not so much.'" (Grantee)

This experience reflects the nature of efficiency upgrades as a new product still firmly in the early adopter stage, and a purchase decision not yet proven to be influenced by mass market advertising.

SALES

Marketing aims to create end user interest; the sales process "closes the deal" and gains commitment to a building upgrade.

For the sales process to be effective, there are two critical considerations: Who makes the sale, and what is the message. As stated, we make a distinction between marketing messages, discussed previously, and sales messages. While marketing messages are directed at a large group of potential customers, successful sales messages are *end-user specific*, promoting the benefits that the specific end user will attain and countering his or her specific concerns (barriers to the sale).

Who – or What – Makes the Sale?

Grantee programs differ widely in their assumptions (implicit or explicit) as to who or what makes the sale, and underlying these assumptions are different views on how to provide the potential participant with assurance that the upgrade will deliver the value claimed. The various approaches and their (sometimes implicit) rationales can be characterized as follows:

- **The assessment sells the upgrade:** The assessment reflects high quality building science and constitutes assurance that the energy savings will be there. Energy savings assurance sells the upgrade.

- **The independent auditor "sells" the upgrade:** The auditor is an independent building science professional. His or her independence from the upgrade contractor's sale provides assurance that the savings potential will be realized.
- **The upgrade contractor sells the upgrade:** The contractor, who may also conduct the audit, sells the upgrade based on one or more benefits and sells his or her firm as capable of doing quality work.
- **The program staff sells the upgrade:** Some member of the program team sells the upgrade based on the assessment.
- **Financial incentives and/or financing sell the upgrade:** The assessment report sells the desirability of the upgrade and financial incentives and/or financing remove the primary barrier of first cost.

The following sections examine each of these sales approaches in detail.

The Assessment Sells the Upgrade

This proposition holds that the assessment – the investigation of the home or building and the report on the improvements needed and anticipated energy savings – sells the upgrade.[60] This view is the minority opinion. One grantee clearly expressed the view that the assessment itself persuades a majority of participants, and other grantees likely share this opinion. Indeed, some grantees appear to have not carefully considered the question of *What sells the upgrade?* and by default are relying on the assessment to persuade. The grantee explicitly holding the view that the assessment is key serves a small, homogeneous market. This grantee is in the bottom quartile in terms of assessments reported, although its conversion rate is close to the median for all grantees. The second quarter 2012 Better Building data indicate that program-wide, four times as many assessments as upgrade have occurred. This outcome suggests that assessments – while a necessary component – do not on their own sell upgrades; for success, assessments need to be part of a comprehensive strategy.

The Independent Auditor "Sells" the Upgrade

A common program design assumes the auditor sells the upgrade; this design assumes the contractor is called in to provide the products and services the owner has decided to pursue. Support for this design assumption comes from the notion that the independent auditor does not stand to gain financially from the building owner's decision; consequently, the owner trusts the recommendations received and decides to proceed. Said a grantee whose uses this model, and whose program conversion rate is comparable to the national average:

[60] This view describes the influence of the assessment, not the auditor, whose influence we discuss next.

> "I think the key thing about our program is that the energy auditors are not the people that put in the equipment. We have the model that you're getting independent, unbiased energy assessment; the person who is recommending things is not the person that's selling anything." (Grantee)

The Upgrade Contractor Sells the Upgrade

This view appears to be on the ascendance. Many grantees have noted that too many of their assessments languish without the end users taking action; they view the typical auditor as having high technical skills, but lacking interest in or capability to engage in a strategic conversation that aims to close the sale. Grantees are also noticing that many of the participating contractors lack the skills needed to sell the new product of efficiency upgrades. One of these grantees led the way and engaged a sales training consulting firm to design a sales training program for its participating contractors, focused on selling efficiency upgrades. Other grantees have since used this or other sales training and still others are considering conducting training. As one grantee expressed it:

> "Contractors need to be able to explain why the building owner should do the upgrade – explain its benefits and address the customer's barriers. Without helpful contractors, it's difficult. For success, you need a base of contractors committed to selling upgrades, and that doesn't exist in this region." (Grantee)

Sales skills are just one component of the skills that contractors need; many contacts recognize that some contractors do "shoddy work;" lack of consumer trust in contractors is another barrier to upgrades. Recognition of this lack of trust likely has led grantees to adopt the other models regarding who sells. Yet poor contractor workmanship will sabotage the nascent efficiency upgrade market regardless of the program model; successful programs will need to both have quality assurance activities for contractor work *and* have an effective sales model.

While contractors' direct financial motivation makes them a natural choice to sell energy upgrades, that same financial motivation may limit contractors' credibility in the eyes of potential program participants. The increased credibility of involving someone without a direct financial motivation in the sales process was a primary reason grantees cited for taking an approach other than one in which the contractor sells the upgrade.

The Program Staff Sells the Upgrade

In this model, the program staff or implementation contractors hired to serve as energy advisors or coaches (especially programs run by local governments) support the building owner throughout the process or at the delivery of the assessment report, explaining the benefits, addressing end users' concerns (barriers), and helping them to move forward with incentives, financing, and selecting a contractor. According to grantee contacts:

> "The energy coach is key to helping customers understand the value and follow through. Incentives are helpful, but not number one." (Grantee)

> "I think another part of our success is our ability to create personal relationships with these property owners and provide them information and education. …That's the role that we've taken as the city managing this grant." (Grantee)

The loan officer in one grantee's financing program takes on this role of an energy advisor, meeting with the end user to discuss the assessment recommendations and the benefits of the upgrade, to calculate for them the financing terms, and to address any concerns. The loan officer has received building efficiency training to increase his effectiveness in selling the upgrade. This model of having program staff sell the upgrade can be effective, but requires staffing levels sufficient to keep up with the assessments.

Financial Incentives and/or Financing Sell the Upgrade

This model assumes that most end users expressing an interest in their building's energy use (such as by attending an efficiency event or requesting an assessment) will want to undertake an upgrade to attain the energy savings, but the cost of the upgrade (or assessment) is a key barrier. These programs offer financial incentives and/or financing to sell the upgrade. In practice, this strategy is used in tandem with each of the other strategies; it is included here to round out the discussion of how programs organize to make the sale. Said grantees:

> "In some cases, our financial incentives have already caused the multifamily property owner to call us." (Grantee)

> "While the utility program had seen little uptake, we generated interest among commercial property owners with rebates in the fifty to seventy percent of project cost range. The utility has now increased its commercial rebates….What we've been able to demonstrate is the price point. We found what it took to get property owners in a bad economy into this market." (Grantee)

We further discuss financial incentives and financing in subsequent sections in this chapter.

What Is Effective?

The grantee programs reflect these different premises regarding who/what makes the sale. Many of the interviewed grantee contacts expressed the belief that their approach is effective. Some of the grantees described how their initial program experiences led them to change their views on what is effective. Of course, these five characterizations are stylized; reality is complex and each proposition can play a role in successful programs. The different models, however, have different implications for program activities and costs, trade ally recruitment, training and oversight (quality control), and sustainability.

Sales Messaging

Effective sales messages both address the benefits of the upgrade and allay concerns *specific to the prospective participant*. Effective marketing messages focus on the primary benefits that appeal to the widest audience, which most grantees indicated are comfort, health, and safety. Effective sales messaging emphasizes the benefits most aligned with the end user's wants and

needs. These messages draw on, as appropriate to the specific end user, both the primary benefits promoted through marketing and the secondary benefits that have more limited appeal. In order to develop this tailored approach, the person intending to close the sale must engage the end user in a conversation to understand his or her wants and needs. The conversation also needs to elicit the end user's concerns, which are barriers to the sale. Said one grantee:

> "Owner's concerns are specific. Assessors [who in this program make the sale] need a basic message for everyone, but also need to be able to tailor the message to a specific problem or concern. The point-of-sale takes place when communicating about specific needs." (Grantee)

As mentioned, end users commonly cite costs as a barrier, and the grantees provide various incentives and loan offerings to lower first costs. Grantees differ in the extent to which they customize their presentation of incentives and loan offerings to the prospective participant. Some grantees simply provide participants with the incentive and financing information, while other grantees have staff discuss with each prospective participant the incentives, the resulting cost to the end user, possibly the payback or return on investment, and the incentive or loan application processes. Some grantees assume the auditor or contractor will present the incentive and loan information to the prospective participant in whatever degree of customization the auditor or contractor feels is appropriate. To facilitate this, grantees are increasingly choosing to offer sales training to their auditors/contractors that emphasizes an individualized approach.

However, there are barriers beyond first costs, the most common of which is a lack of trust. This lack of trust requires the program's sales process to prove that: 1) the upgrade will deliver the promised benefits for the participant's specific building, including but not limited to the estimated energy savings; and 2) the upgrade contractor will perform quality work.

> "We emphasize health, comfort, and energy efficiency. It is up to the auditor to find out what the homeowner's concerns and issues are and to show how the whole house approach addresses them."(Grantee)

> "We can encourage as much as we can, but if the customer's experience with the contractor isn't great, and the scope the contractor presents isn't what resonates with the customer, then we are not going to get any upgrades." (Grantee)

Another grantee emphasizes these issues.

> "The key drivers of upgrades seem to be energy savings, comfort of the home, community engagement – if they feel they are participating in a community goal; connecting our message to community core goals seems to be important. As for the main barriers: lack of financing, lack of good tools to explain the savings/benefits to homeowner, shoddy performance at the contractor level in terms of their basic business and selling skills. Trust is an issue also in terms of people believing that the savings will be realized – trusting the actual models that say you're going to save so much." (Grantee)

As part of building trust that the prospective participant will realize the promised benefits, one grantee noted, "End users also want to understand how the upgrades function to provide those benefits." Another elaborated that this understanding is not conveyed through a detailed, lengthy assessment report heavy with building science. The information needs to be easily understood by the specific end user.

Many programs also use auditors (sometimes certified) and established software as a means of assuring the estimated savings, as discussed in Chapter 6. One grantee administering a statewide grant is hoping to establish a web-based source of information to contribute to the need for assurance; homeowners would use the site to find out about best practices in weatherization.

One grantee offered insights about the sales process within contractor firms:

> "We realized the installers knew about our program, but the sales staff didn't always know. We've been conducting targeted outreach to sales teams at contractor firms, helping them to see the benefits for them. Getting sales teams on board has been very successful, and we have seen a big spike in contractor referrals after starting that outreach." (Grantee)

FINANCIAL INCENTIVES AND FREE SERVICES

The financial incentives offered to assessment or upgrade participants of the grantees' programs can be considered as one of four broad levels: *none*, *moderate*, *substantial*, or *full* (free to the end user). These categories describe the total incentive for which the end user is eligible, as it is the total incentive that motivates action, not the portion of an incentive coming from a single organization. A few programs do not directly provide incentives and instead are designed to increase participation in utility incentive programs. For a number of programs, the Better Building incentive augments a utility or other (such as tax) incentive, which the participant either applies for separately or, in the case where the grantees are themselves utilities or include utilities as partners, applies for simultaneously.

Some grantees' incentives have varied over time: they offered increased incentives as part of a limited time offer; they began with lower incentives and moved to higher ones to increase ongoing participation; or, at least in one case, they discontinued incentives when their incentive funds ran out for one of several programs they were running.

A few grantees fully incentivized – that is, offered for free – services in the following situations: free assessments and upgrades for low-income end users; direct installation of measures during assessments; and free assessments (but not free upgrades) to interested (in some cases pre-screened) end users.

The experiences of programs that have provided free assessments illustrate the need to coordinate all program elements around the program's ultimate goal – generating retrofits. Grantees' experiences suggest that fully subsidized audits constitute an effective program strategy only when combined with the other program elements that strongly drive upgrades. Otherwise, the program generates – and bears the full cost of – many more assessments than upgrades.

Several grantees expressed the view that free assessments undermine the larger Better Buildings goal of creating demand for building efficiency upgrades because it suggests that assessments do not offer any value that the end user would be willing to pay for.

> "With free audits, people don't associate any value with them." (Grantee)

> "I think the major lesson learned on the incentives is that when you offer free energy audits, a lot of the customers don't move to implementation. I think that with no skin in the game, the conversion rate will be hurt unless your energy auditors market only to customers who are very serious about implementation [as indicated by screening or targeting]." (Grantee)

Some grantees make payment of the assessment cost contingent on the upgrade; they pay the full cost when the upgrade is completed. Some of these programs require the end user to contract with the assessor, paying the full assessment cost, while other programs provide an assessment incentive. Either way, the end user receives at the end of the upgrade reimbursement of whatever he or she paid for the assessment. These approaches motivate end users to participate while eliminating or reducing program costs for assessments that do not lead to upgrades.

Free assessments, not tied to completion of the upgrade, appear to work best for the low-income sector, where the assessments are coupled with free upgrades or upgrades that have higher incentive levels than those offered to non-income-qualified end users.

A handful of grantees directly installed conservation measures when in the home or business for the assessment; this type of direct installation is another approach to providing services for free. One of these grantees installs a variety of low-cost measures during the assessment: compact fluorescent light bulbs, low-flow showerheads and faucet aerators, and smart strips. Subsequent to the assessment, the participant can schedule to receive up to $1,500 (residential) or $2,000 (small business) in air sealing and attic insulation incentives. The assessment report identifies additional upgrade opportunities that the end user can pursue with or without the program's financing.

While the low-cost measures that most programs install in conjunction with an assessment are unlikely to significantly contribute to reaching the 15% energy savings threshold, one grantee described these direct install efforts as a first step in building an incremental relationship with program participants that will motivate additional retrofits over time. Direct installations may also improve program cost effectiveness by obtaining some instant savings from each high-touch, in-home audit.

Another grantee initially launched with a program heavily focused on direct installation of measures. When the initial design was not successful for a variety of factors, the grantee redesigned the program. Both the initial and redesigned programs promoted direct installation, rebates, and low interest loans, yet the redesign shifted funding away from direct installation to rebates and loans. While many program elements changed from the initial approach (not just the direct install effort), the redesigned program is considerably more successful than the initial program. (This is the same program discussed earlier as initially relying heavily on neighborhood sweeps, with sweeps continuing, but in a lesser role, in the redesign.)

Programs with free services – assessments, upgrades, direct install – produce the valuable outcomes of immediate energy savings and increasing the experience and skills of the contractors conducting this work. However, they do not promote a sustainable market approach to building upgrades, which requires some direct economic exchange between end users and suppliers, even if that exchange is subsidized.

As mentioned previously, some grantees' incentives have varied over time. In the markets with existing utility programs that now have additional ARRA-funding from the grantees, increased incentives became available. These changes in incentives constitute an experiment, with the outcome that, in most cases, larger incentives got greater numbers of participants. Not surprisingly, the grantees with this experience strongly endorse the view that incentives drive upgrades.

> "We've learned that they key is money – make it fast and easy." (Grantee)

Another grantee spoke of having discovered the price point for commercial customers to act.

> "We had three rounds of rebates, the first for just lighting, then the next two included HVAC and other measures. We didn't initially hit the price point on HVAC and got hardly any projects in the second round. In the third round, we increased the HVAC rebates and now have property owners – large property owners – lining up. Before, we couldn't get the large property owners to give us the time of day. Now we probably have eight of the ten top property owners in the county coming in for rebates and wanting more." (Grantee)

The price point that the grantee found was 50% to 70% of the project costs, plus the services of an energy advisor. The program that found the price point, which is just one of several programs the grantee runs, is an example of offering a substantial rebate. The substantial incentives were highly effective, yet the grantee subsequently had to notify the commercial market that its funds were gone. The grantee recognizes this unfortunate outcome, but explains:

> "These are thirty- to forty-year investments the businesses are making. Do fewer projects with greater incentives and you'll get a lot more savings than you will with lower rebates and little interest from business. ...And we definitely got the attention of the business community. It will listen to our messages going forward." (Grantee)

This grantee initially offered substantial rebates for upgrades and revised its approach to offer no rebates; the program still offers assessments and energy advisory services, and will market the utility's rebates, which increased during the grant period.

Incentive structures vary widely across the grantees, from low/moderate to substantial/free. While grantees' experiences show that substantial incentives and free services are effective in stimulating interest, experiences with low to moderate incentives do not show a clear, positive relationship between incentive amount (proportion of cost) and upgrade uptake. Within the low/moderate range, it appears that any rebate motivates end users, but relatively higher rebates do not guarantee correspondingly higher uptake.

One grantee decided that performance rebates were "more of a pain then a help," so the program changed to prescriptive rebates.

> "We've just eliminated the modeling part. So if you are doing attic insulation, window replacement, a boiler or furnace replacement, or a crawlspace retrofit, you are eligible, point blank. Then, if somebody wants to do modeling on a number of things themselves, they can still go after it that way. We just simplified the target and said, 'If you just do one of these four things, you are eligible.' If we don't get 10% or 20% out of them, it's unlikely not to model out north of 15%, we are still going to be in better shape than having the barrier to participation [that modeling constituted]." (Grantee)

An advocate for low incentives expressed this view:

> "I think one of the best things about our program is we have a low cost of living and so we don't offer a lot of rebates. A $750 rebate is all we have, and I've seen some other places that do $3,000 and $5,000. As a homeowner, I think that's great, I'm all for it. But it eats up all your program money. So we've been able to do a whole lot with a whole lot less because we have done what we feel is the minimum amount of rebate possible to get people to start shelling out money out of their own pockets, and no more."(Grantee)

Another grantee speculated:

> "If we offer aggressive rebates and low-interest financing, will that result in contractors charging more?" (Grantee)

A third grantee acknowledged that some contractors participating in its program had used the incentive as an opportunity to increase prices, but noted that these contractors were less successful in selling upgrades than those who had not done so.

Grantees' collective experiences speak to the need for rebates, to get end user attention and to meet their desires for good deals; however, it is not yet clear how large the rebate needs to be for the general market. One grantee expressed the take-away message:

> "You have to ensure your incentives are aligned with your program goals." (Grantee)

As we have said elsewhere, success likely reflects the degree of alignment of all program facets with the goals, rather than resting on a single program element assumed to be most influential.

As an illustration of this point, consider the lesson learned by one grantee.

> "Contractor feedback has been very valuable. What we heard is that our rebate was more of a pain than it was a help to them…. We changed the rebate to be no longer based on the amount of insulation they are putting in, but simply if they do an attic insulation improvement, they are eligible for fifty percent of the cost up to $500. Granted, there might be a couple of projects where that doesn't model out [that is, is not cost-effective], but in most cases it will, especially when we include in the project a couple of other quick-fix items." (Grantee)

Most grantee programs offer, or sought to be able to offer, financing to participants. Financing constitutes a type of incentive, yet warrants its own discussion, which we turn to next.

FINANCING AS A TOOL TO STIMULATE DEMAND

Similar to the differing opinions among grantees as to whether incentives play the critical role in driving upgrades, grantees expressed differing opinions about the relative benefits of loans and rebates. Some believe that "no one wants loans" and rebates are more effective than loans.

> "Our biggest surprise was that the availability of financing isn't what drives demand. We wish we had a better understanding of this when we designed the program. Knowing that rebates drive demand helped us change course." (Grantee)

Other grantees are firm believers that loans are more attractive to participants than rebates, that financing is key, and lack of financing is a significant market barrier.

Almost all of the grantees are offering – or are in negotiations or exploring – financing. Few of these offer the financing themselves; most of them offer financing through an existing financial institution. Commonly, the grantees with financing in place have conducted only a handful of upgrades to date that received financing. However, there are a few grantees with a large number of upgrades that received loans.

We previously contended that marketing messages are most effective when they emphasize the benefits appealing to the widest audience. Because many end users are unfamiliar with the upgrade product, marketing messages that primarily emphasize the benefits of upgrades will be more effective than messages primarily based on rebates and financing. The availability of rebates can play a supporting role in marketing messages because customers like to think they are getting a good deal and may need motivation to act now, but many customers will first need to be convinced of the value of an upgrade project.

In contrast to marketing messages, sales messages are most effective when they emphasize the benefits most relevant to the prospective buyer and when they address the barriers that buyer faces. Financing can be an effective sales tool to address first cost barriers that might prevent customers who are already interested in making energy upgrades from moving forward.

Integration of Financing with Other Program Offerings

Grantees described three areas in which integrating loan offerings with other efforts to drive demand for efficiency had generated successful outcomes. First, grantees called attention to the importance of marketing their financing products. According to one, "Financing isn't an issue until people are out there looking for financing and can't find it." Second, grantees described efforts to integrate their financing offerings into their assessment and/or energy advising processes. These grantees noted that doing so can help the program ensure that participants meet both the lender's requirements and requirements associated with federal grants, like the need to meet historical preservation requirements. Some grantees also view integration of assessments or energy advising with lending as a way to reduce the risk of loans, since these services can help ensure that participants are fully informed about their retrofits and that they pursue the most cost-effective measures. The administrative fees associated with loans can also defray other program costs, such as that of the assessment.

The third area in which grantees described efforts to integrate financing with other efforts to drive demand is related to incentives. Grantees indicated that participants find incentives more appealing than loans and described a variety of ways in which they had combined loans and incentives to make projects more appealing. For example, one grantee credited a performance-based incentive that increases the ratio of project costs eligible for incentive funding, as opposed to loan funding, as participants achieve greater energy savings as a way to motivate participants to pursue more comprehensive projects.

Other grantees noted that loans and incentives may be complementary because one funding mechanism can cover measures that the others do not. As well as broadening the range of

efficiency measures available, in some cases, grantees allow participants to finance home repairs, radon mitigation, and other measures that do not directly provide energy savings in order to make efficiency projects more appealing. According to one grantee:

> "We learned that customers want to do all kinds of other things when a contractor is around. The customer might walk away from a project if they can't get these things done, and this is job creation money, so we want to create those opportunities." (Grantee)

Financing Program Target Audiences

Several grantees either explicitly target specific audiences with their financing offerings or reported that those offerings are most appealing to certain subsets of participants. While some grantees have set income qualification requirements targeting low-income participants, others have found that their financing offerings are most compelling to middle-income participants. These grantees noted that low-income participants may not be able to qualify for a loan and are typically served by weatherization programs that heavily subsidize projects. Meanwhile, high-income participants may be able to finance upgrades through a home equity loan that offers a lower interest rate than that available through the efficiency program. Outside the residential sector, one grantee noted that its loan offering was most appealing to mid-size businesses: the smallest businesses may not be stable enough to take on any type of financing, while the largest typically have existing sources of financing.

Elements of the financing offering, like interest rates and requirements to qualify for a loan, determine which participants will find the loan offering most compelling. Some grantees have found it necessary to adapt their financing offerings in order to better serve their target audience, in some cases taking steps to relax qualification requirements in order to make loan offerings more inclusive. Perhaps the best example of going beyond a strict interpretation of a credit worthiness score is the use of utility bill payment history as an additional criterion. Strong utility bill payment speaks favorably about an otherwise marginal project. In the words of one grantee:

> "We're trying to hit a different segment with the loan program, but there's still probably 50% of the population that can't afford a loan…. So we'd have to change the underwriting standards and have some backstop for potential losses, but slowly work our way into those different fields." (Grantee)

The next chapter, *Stimulating Supply*, addresses financing as a component of the supply-side of the market for upgrades.

6 STIMULATING SUPPLY

This chapter discusses strategies to stimulate the supply market in support of whole house and whole building energy efficiency upgrades. The chapter contains five broad sections:

- *Stimulating the Contractor Market*
- *Stimulating the Supply of Energy Efficiency Financing*
- *Benefits and Challenges of Utility/Program Administrator Relationships*
- *Viability of Program Efforts*
- *Selected Findings from Contractor Survey*

Our findings on strategies for stimulating supply reinforce our findings for driving demand. Demand and supply strategies, and the program processes that support them, must work together – have the same objectives, complement each other, reinforce each other – in order to attain any degree of market success. For each of the aspects of the supply side that we investigated, successful grantees varied in their approaches, a finding that indicates that there are no "must have" features. Further, less successful grantees may address one or more aspect of the supply side using approaches used by the successful grantees, a finding that indicates that no single feature guarantees success.

As with our findings on driving demand, supply-side success is neither associated with grantee characteristics nor with the role of private sector firms in delivering program services, as we will subsequently discuss.

STIMULATING THE CONTRACTOR MARKET

Supply Model

The grantees take different approaches with respect to who plays what role in making the sale (see Chapter 5), and these approaches are associated with differences in who plays what role in supporting the development of a robust supply of building upgrade services. These different approaches have resulted from the interplay between grantees' assumptions about end users' barriers to upgrades and grantees' experiences with the existing contractor pool, including the number of contractors qualified to do various parts of the whole building upgrade puzzle.

The basic roles and their variants can be characterized as follows. The programs differ in which of these roles they employ:

- **Facilitation:** The program staff facilitate the participation process for end users.
- **Assessment:** The program conducts or assigns the assessments *or* the end user selects the (program-approved) assessor.

➡ **Upgrades:** The program conducts or assigns the upgrades *or* the end user selects the upgrade contractor.

The following sections examine each of these roles and approaches in detail. We report the number of grantees that use each approach (although some interviews did not address all facets of this analysis and thus the counts may not sum to the number of grantees interviewed).

Each of these basic approaches are employed by one or more of the successful grantees (per our success metric; see Chapter 3).

Facilitation

In this model, program representatives serve as liaisons between the end user and the program throughout the end user's program involvement. These staff are variously called energy advisors, coaches, advocates, and H.E.R.O.s (home energy response officer). As noted above, we identified at least six programs using this approach, four of which are among the ten grantees that we judged successful. A seventh program uses pre-qualified independent contractors, yet refers to them as *advisors*.

Grantees carry out this program liaison role for one or more of three reasons. First, they believe it is necessary to create trust with the end user, who is unfamiliar with energy efficiency retrofits – a new product. This approach promotes trust when the advisor comes from a trusted organization like a local government or utility, and because the advisor does not have a financial stake in the end user's decision to upgrade.

> "These are just guys that own commercial buildings, like restaurant owners. They need somebody that isn't trying to sell them a modulating boiler to tell them, 'This is what a modulating boiler does, and this is how it saves you money.' That's the role that we've taken as the city managing this grant." (Grantee)

Second, grantees perceive that the complexity of the process could be a barrier to the completion of upgrades by end users. In their liaison role, grantees guide end users through the process of receiving an assessment, comparing proposals to complete the recommended work, coordinating measure installations by different firms, completing applications, testing homes or buildings, performing quality assurance activities, and so on. Finally, grantees use program liaison staff when their supply market is inexperienced with energy efficiency in general and whole building upgrades specifically (a situation shared by most grantees).

The responsibilities of the liaison staff differ among the programs. For all programs, the objective of the advisor position is to minimize the proportion of assessments that do not lead to upgrades. The advisors help the end users complete the paperwork and fulfill other requirements (such as providing utility billing data), and they help resolve problems that arise. One grantee serving a market with little energy efficiency experience explained:

> "Our program relies more on the energy coach than the contractors. …There can be too much reliance on contractors and auditors for moving customers from audit to retrofit." (Grantee)

One program uses the advisor to conduct the assessment, which is a ninety-minute, non-diagnostic check-up. Two of the programs use the advisor to conduct a quality review inspection.

Some programs also involve advisors in outreach to begin creating trust while the end user considers an assessment. One of these programs initially used a contractor to conduct assessments (and install CFLs during the assessment), but abandoned this approach when the contractor underperformed. The program now uses one advisor exclusively to conduct outreach and assessments, and uses other advisors to follow-up with end users interested in conducting retrofits.

A successful grantee that uses advisors to serve both the residential and commercial sectors reported that both advisors and contractors can play a role in outreach efforts. This grantee noted that contractors have existing relationships with end users that program staff lack, particularly in the commercial sector.

> "When your firm's mechanical contractor, who has been working on your equipment for years [recommends more efficient equipment], it carries more weight. We knew that from the start, and that's why we got the contractors involved in spreading the message instead of just us." (Grantee)

The finding that four of the six grantees that use facilitation are successful suggests facilitation provides value. However, it is costly to the program to use program staff in an advisor role. Thus, it is a model that will evolve as the supply market matures and contractors develop the technical and sales skills to drive quality upgrades. Until that ideal is reached, at least one of the grantees using facilitation is exploring ways to reduce the advisor's role in the average project. One grantee tried to create a "light" advising path for end users who were clear on what they wanted; however, the grantee found it difficult to make this distinction among end users, as their expressed wants and needs often change during the project.

Assessment

The Program Conducts or Assigns the Assessments

In this model, either staff in the grantee organization conduct the assessments or the grantee assigns assessments to firms working with the program. Eleven of the interviewed grantees take this approach, five of whom are successful.[61] Grantees that assign assessments to specific firms, rather than using their own staff, take multiple approaches:

- Several grantees contract with one or a few firms to conduct all the program assessments. (In efficiency program terminology, firms under contracts to programs to perform a specific function are often termed *program support contractors*).

[61] We include in the list of *Program Conducts Assessment* a grantee that offers only an on-line assessment and a grantee that offers a walk-through, 90-minute, non-diagnostic assessment.

- One grantee intended to have the end user select the assessment contractor from a qualified list, yet initially qualified only one firm and only recently added a second firm to the list.
- One grantee (working in the commercial sector) asks assessors (engineering firms) to bid on the assessment work (which includes project design); the grantee then selects the best bid and contracts for the work.
- One grantee assigns a home performance contractor to the participant for both assessment and upgrade work, yet the participant contracts with the home performance firm directly when agreeing to move forward (reducing or eliminating the grantee's potential liability).

In some cases, grantees opt to conduct or assign assessments directly because they use a simplified audit or, more commonly, because the supplier market included few firms – perhaps a single firm – with the necessary assessment qualifications. Quality assurance appears to be the primary motivation of the grantee that obtains bids for commercial assessments and the grantee that assigns the contractor that conducts the entire job (assessment through upgrade), but has the homeowner contract with that firm.

Independent Contractors Conduct Assessments

Sixteen of the interviewed grantees provide end users with a list of contractors qualified to conduct program assessments, including five of the ten successful grantees. This approach represents the end goal of a sustainable home and building performance market, where programs do not need to step in to provide the supply side of the market.

This approach requires a supply of multiple qualified assessors active in the market. Slightly fewer than half of the grantees taking this approach operate in markets that already had firms with these capabilities, either as a result of prior efficiency programs (including DOE's Weatherization Assistance Program) or from recent workforce development activities conducted by community colleges and other groups seeking to stimulate the "green jobs" market. The remainder of the grantees taking this approach conducted trainings to build supplier capabilities. Included among this latter group are several grantees that acknowledged that their supply markets were weak in home and building performance skills.

One grantee that now uses independent contractors to conduct assessments launched their program with in-house staff initially conducting the assessments (which were free).

> "That didn't sit well with the contractors. Contractors saw it as competition with them. Now, homeowners pay $100 for the audit and the program pays the contractor $300." (Grantee)

The grantee continued by saying that the $100 cost to the homeowner conveys to the owner that the audit has value, a theme discussed in the previous chapter.

Some grantees discussed the need to assure the quality of assessments conducted by independent contractors. A few grantees have program staff with the necessary qualifications to conduct quality control (QC) inspections. Other grantees have hired firms to inspect properties that have

received assessments to assure the quality of the assessments; these firms fall into the category of *program support contractor*. One grantee allows participating contractors to assign assessors with varying credentials and experience, but the firms bear responsibility for the quality of the assessments. Each firm must employ staff members with BPI certification, who sign off on all assessments, vouching for the quality of each job. (Most grantees do not require that assessors have BPI certification, a topic discussed below.)

Upgrades

The Program Conducts or Assigns Upgrades

This model is used for direct install measures by the few programs conducting direct install (three of the ten successful grantees directly install low-cost measures). It is also the model of one program that assigns home improvement contractors to do both the assessment and the upgrade, yet has the end user, not the grantee, enter into the contract for the upgrade work. Finally, one program that primarily uses independent contractors (discussed next), offers its residential participants the option of having the program "find and evaluate contractor bids for you." This variant stops short of having the program "assign" the upgrade contractor, as the participant makes the final decision; however, participants choosing this option are likely to go with the contractor bid that the program views as most favorable.

Independent Contractors Conduct Upgrades

Most programs use independent contractors to conduct the upgrades, although programs vary in their design with respect to the relationship between assessors and upgrade contractors. The types and skill levels of contractors in the local market are an important factor influencing this variation. To illustrate the differences between grantee program types, we characterize four roles of independent contractors in the grantee (Figure 11).

Figure 11: Roles of Independent Contractors in BBNP Programs

Role 1	Role 2	Role 3	Role 4
Only upgrade contractors are active in the open market; grantee assigns or conducts assessments	Both assessment and upgrade contractors are active in the open market, but the two roles remain distinct	Some contractors are capable of conducting both assessments and upgrades	All contractors conduct both assessments and upgrades

Role 1 describes programs that have program staff conduct or assign the assessments: for these programs, the upgrade contractors are distinct from the assessment contractors. *Role 2* also has

the upgrade contractors distinct from the assessment contractors, but both types of contractors work in the open market and are active in the program. *Role 3* describes programs that have one or more contractors (who may use subcontractors) that conduct the entire job, from assessment through upgrade, but not all active contractors are capable of doing so. *Role 4* describes the programs of a few grantees for which all of their contractors conduct the entire job for the end user. Most programs using *Roles 3* and *4* (as well as two programs using *Role 1*) serve locations with prior building upgrade efficiency and/or training programs. As with most of our demand- and supply-side findings, programs can be successful with any of the possible roles.

Three programs have an interesting twist: the assessing contractor serves the role of manager for the entire job. One of these programs serves the commercial sector and has design engineering firms in the lead role. Said this grantee:

> "The [installation] contractors have really just been acting as the people that put the equipment into the building. Other than that, they really have no relationship with our program. We're relying on the engineers a lot. There's certainly a disconnect between the guys that put the systems in and the guys that design the systems. But that's just part of the industry." (Grantee)

Another program takes what might be considered the opposite approach. The homeowner begins the process by getting bids from one or more contractors to install program-qualifying measures, which the contractors recommend for the participant's home. Program staff then conduct a walk-through assessment to provide assurance that the contractors did not miss upgrade opportunities or, conversely, seek to sell something to the homeowner that the house does not need.

Contractor Characteristics and Experience

General Characteristics

The types of contractors providing services to participants vary within and across programs. In addition to the distinction between contractors that conduct both assessments and upgrades (discussed in the previous section) is the distinction among firms by type of upgrade measures that they install. Some firms do only insulation and air sealing measures, other firms do only equipment measures (predominantly heating and cooling systems), and a few firms do both. Most Better Building upgrades include insulation and air sealing; fewer upgrades include equipment.

Only a handful of grantees mentioned that their participating contractors include home remodelers.

Contractors working in home and building performance exhibit a variety of organizational and subcontracting relationships. In markets that lack much home/building performance supply, jobs may be conducted by three firms working independently (assessors, insulators, and equipment suppliers); in these markets, either the program staff or the end user negotiates with each of the contractors individually. This may be particularly true in the commercial sector. For example, one grantee working in the commercial sector said, "There's no firm that offers all services from

assessment to installation, with engineering [skills] and [installation] contractor all in one package."[Grantee]

In markets that have some integrated suppliers, firms that once worked in any of the three areas have integrated one or both of the other skill sets. Sometimes these skill sets are brought in-house through staff additions, and sometimes these skill sets are added through establishing agreed-upon teaming relationships in which one of the firms consistently serves as the general contractor and the other firms subcontract to that firm. For many grantees, at their programs' outset, their markets included no or few integrated home/building performance firms, yet some have become integrated during Better Buildings. Said a grantee:

> "We have been trying to get the home performance contractors to bring HVAC offerings into their firms, so there is less delay between the contractor and his or her subs coordinating work in the home." {Grantee)

Not surprisingly, grantees expressed the view that contractors providing more comprehensive services (comprehensive on either criteria: assessment/upgrades or insulation/equipment) typically deliver more comprehensive upgrades than more narrowly focused contractors.

Grantees noted that the size of contractors' firms vary widely from one-person firms to very large firms. One grantee serving both the residential and commercial sectors had this critique of the BBNP requirements:

> "Sadly, the rules and regulations are designed for large firms, not small ones. Large firms get the contract and then sub the work to small firms."(Grantee)

Experience

A few grantees described launching their programs in regions with robust contractor networks with extensive home/building performance experience that had developed through previous efficiency programs; conversely, a few of the grantees reported very weak supply markets with no prior programs.

Most of the grantees reported a wide range experience and qualifications among contractors in their markets, with a few qualified contractors and many more unqualified or weakly qualified firms.

One grantee serves a small area within a region served by what the grantee perceived to be an excellent energy efficiency program. This grantee made the assumption that its program would have access to a mature contractor pool when it launched, an assumption that proved wrong. Contractors' skills were highly variable, which resulted in the program manager needing to do a lot of work to ensure that the end users received quality services from the program. "We would have structured the program differently had we realized this at the outset," this grantee said.

Specific experiences described by a few grantees illustrate the overall state of the supply market:

> "We have five qualified contractors in our program. Only one of the five was a true, vertically-integrated home performance contractor. They've been in business for twenty years. Everyone

else is an HVAC contractor or the like, a single-measure contractor, who we are trying to make into home performance contractors. A few of them are BPI building analysts who have been doing assessments for a long time, but they hadn't really done a true assessment as we had it defined in our program. It was a mix."(Grantee)

"There wasn't really that solid of a quality contractor base. There are tons of amazing contractors in this area, but we had so many complaints when we [previously] offered the Climate Smart loan program…. [Then,] the contractors were not up to the standard, not doing inspections, sealing houses too tight, that kind of thing. …On the commercial side, the integrity of the installations was a little higher….We had heard from the utilities that there are A-list contractors and B-list contractors, and that is what we found."(Grantee)

Contractor Requirements and Training

Contractor Requirements

The programs vary widely in their contractor requirements. Three-fourths of the interviewed grantees, including all ten successful grantees, identify a set of contractors as eligible to install projects through the program; the remaining one-fourth of grantees do not impose any minimum requirements and accept (although not necessarily approve) projects using any licensed contractor. The minimum requirements for contractors varied from demonstration that a contractor is licensed, bonded, and insured to required references, background checks, demonstration of financial stability, and experience with related work.

Maintaining an eligible contractor list provides the benefits beyond establishing minimum requirements. First, a list enables grantees to ensure contractors have been informed of how the program works, including customer and project eligibility, so they can accurately represent the program to end users. Second, a list provides grantees with a means of excluding poorly performing contractors. Grounds for exclusion need not be restricted to technical performance but can (and should) include such considerations as contractor politeness and job-site neatness.

A primary reason grantees cited for not establishing an approved contractor list was liability concerns.

Most grantees do not require BPI certifications because few contractors in their markets could meet such requirements at the outset of their programs. For example, one grantee only requires BPI certification for contractors without at least one year of experience that includes ten assessments with blower door tests. Severely restricting the contractor pool through a certification requirement has the potential to undermine both a program's ability to meet end user demand and to meet its goal of developing the supply market; at least one program launched with a certification requirement and subsequently dropped it.

"We see advantages from a best management practice standpoint of requiring contractors to be BPI certified in the future, and see quality assurance and liability reduction as components of that. Yet we don't want to create a barrier to participation. We want to bring contractors along and develop value of the program, rather than shut anybody out." (Grantee)

Seven programs, including five successful ones, require that assessments be conducted by individuals holding BPI certification.[62] However, three of these programs (all successful) use program staff or support contractors as assessors, so that the requirement of BPI certification for assessors may not reflect a large supply of qualified assessors in the marketplace. The success of grantees that require that assessors have BPI certification may be a result of the certification requirement, a program design that hand-selects the assessors, or a bit of both. One successful grantee also requires upgrade contractors to be BPI-certified.

Among other program variants with respect to certification, one program had BPI certification requirements for its insulation and air sealing residential contractors, but not for its residential equipment contractors or for its commercial contractors.[63] Two grantees (serving the commercial sector, including multifamily) require some type of broadly relevant certification, accepting contractors with BPI, Certified Energy Manager, Certified Commercial Energy Auditor, Professional Engineer, and comparable certifications.

Six of the grantee programs, including the programs of two successful grantees, require that upgrades meet Home Performance with ENERGY STAR (HPwES) requirements. Five of these programs do not require participating contractors to have BPI certification, yet require HPwES training and the ability to deliver an HPwES-qualifying upgrade.

Among the grantees not requiring BPI certification, many encourage certification and offer, promote, and/or subsidize BPI training, a topic we turn to in the next section.

Four of the grantees noted that their lenders required assurance of contractor quality for all contractors working on a project before they would approve the loan. Three of these grantees had a more restricted list of contractors approved for projects receiving loans. Said one successful grantee that offers loans, yet has uniform requirements for all contractors:

> "Contractors don't need to have BPI certification, but they have to certify that they are only going to do work that they are trained and licensed to do, and that they carry the appropriate insurance. We told them we'd include them in our search tool [for end users] and we actually tripled our contractor base." (Grantee)

One successful grantee with an active loan program reported that a partnering bank dropped its interest rate and expanded its loan term.

> "They did this just because they know we have good contractors – we do a quality check on the background – and that the loans are good. The risk is lower. One needs to provide comfort to the

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62 Additional grantees require at least one individual in the firm to hold BPI certification, and many grantees encourage but do not require BPI certification.

63 This grantee requires each participating residential insulation/air sealing contractor firm include at least one BPI-certified staff member, and requires that person to sign off on each air sealing and insulation job. This grantee also requires all workers on a job to have completed a two-day training that they developed and dubbed *BPI-light*, described in the next section.

lender that the loans will be repaid. That entails quality contractors and the quality check at the end of the project; with these, we can sell the projects as quality." (Grantee)

Training

The successful grantees were more likely than the other interviewed grantees to offer:

- **Technical training** – typically BPI (70% of the successful grantees compared with 28% of the other grantees)
- **Sales training** – 50% of successful grantees compared with 8% of the others
- **Business training** – 30% of successful grantees compared with none of the others
- **Scholarships** – 20% of successful grantees compared with 8% of the others

Grantees offer training in multiple ways (both across the grantees and across the trainings each grantee offers), including:

- Have qualified program staff conduct the training
- Bring in BPI-accredited trainers
- Work with a partner or consultant to develop training
- Work with a partner (typically, a community college) that offers BPI accredited training

Two grantees offer training funded by grants that their organizations had received from the U.S. Department of Labor. Two grantees encourage their contractors to take training offered by others; one of these grantees serves an area for which the utility and the state offered training; the other grantee offers contractors a training scholarship for private sector training, but said that no training organization has offered training on relevant topics in the area since the grantee launched the scholarships.

Technical training topics mentioned by the grantees include energy codes (including residential and mechanical codes), ASHRAE standards, National Comfort Institute standards, blower door and duct blaster testing, and a code of ethics. Among the sales and business training, two grantees offered Dale Carnegie training, and one grantee includes human resources topics in its business training. One grantee conducts realtor training, another developed a curriculum for middle school students, and still another developed educational forums for homeowners. Grantees also described training for program staff and training for auditors and installation contractors focused on program requirements and program software.

> "Our contractors have been participating in the utility program, but do not have whole house training or experience. They mostly are like, 'I do one thing, I get in the house, I do what I have always done, and then I am getting out of there.' So that's where we have [training] work to do."(Grantee)

Three grantees, all characterized as successful, mentioned conducting one-on-one training and informal ongoing communication with contractors that includes technical discussions. One

grantee pairs new contractors with existing program contractors for mentoring. This grantee recently finalized co-funding for on-the-job weatherization training. Another grantee meets with contractors every few months; these meetings have evolved to be sharing and training sessions. This grantee also provides mini trainings and technical information throughout the year, as well as on-site safety training. The third grantee reported:

> "Our account managers are available to contractors to work with them one-on-one, especially the newer contractors, or when an existing contractor hires some new staff members. They'll actually go into the home with them and help through the process in the beginning." (Grantee)

One successful grantee that conducts sales training reported that subsequent to the training launch, the sales closure rate went from 20% to 60%. The grantee offered this view:

> "The training classes are about bridging the two sides of communication. The homeowner has their concerns about their house, they have deep embedded myths about what their house does, how it performs, how much it's going to cost, and what contractors are likely to deal with. The contractor, if they come in with just a BPI mindset, they've got acronyms and concepts they're trying to explain to a homeowner who really doesn't care about them at all. I think the sales training piece of it really moves the conversation to understanding and listening to what the homeowner wants and understanding their expectations about how the work environment needs to be left – taking off shoes, cleaning up afterwards – and it also teaches the energy auditor to close the deal." (Grantee)

One grantee that offers extensive training through its partners, including a community college, spoke of the benefit of using community college students as interns. These students receive on-the-job training in efficiency outreach and other aspects of program implementation, and the grantee is able to extend its staff at no cost.

Communication with Contractors

Six of the ten successful grantees and about 20% of the other grantees spoke during our interviews about the importance of communicating with their program's contractors. Programs benefit when staff confer with the contractor community before launch. The resulting feedback provides staff with an opportunity to ensure that their assumptions about how end users and contractors engage in the market place are correct and that program processes will work for participants and contractors. Recall from the previous chapter the grantee that commented on changing its rebate structure from performance to prescriptive:

> "Contractor feedback has been valuable. We heard our [performance] rebate was more of a pain than it was helping them."(Grantee)

Grantees also report ongoing interactions with contractors, such as breakfast meetings, workshops, sharing sessions, and informal communication. According to one:

> "Listening to the contractors is vital to any program. Giving them the tools they need helps make your program successful. We help them out, listen to them, communicate with them." (Grantee)

Several of the grantees also spoke of the legacy of communication that their program will leave. For example, one grantee said:

> "We have brought together contractors and the county where before they weren't willing to talk to each other." (Grantee)

Other grantees mentioned that contractors are now talking among themselves when they previously were not. According to interviewed grantees, these contractors now perceive themselves as a defined interest group, and the grantees expect the contractor community will continue to advocate for itself.

Diagnostic Equipment and Financing

Grantees support contractors in ways additional to training and communication, including providing equipment, loans, and bridge financing. Four grantees, including three we characterized as successful, mentioned that they assist their contractors in obtaining the necessary diagnostic equipment. Two of the grantees provided the equipment, one provided loans, and one offered leases. One successful grantee provided access to low-cost loans to contractors that wanted to grow their business but lacked the resources to do so. Another successful grantee provided (through a partnership with the city) access to bridge financing so that contractors could handle a high volume of work without being constrained by cash flow limitations.

Assessments

A few of the grantee interviews touched on the type of assessment conducted – diagnostic or non-diagnostic, and BPI or another approach, such as RESNET – a theme we expect to explore more fully in the final process evaluation.

While a few grantees conduct non-diagnostic assessments, such as a walk-through assessment or an on-line assessment, most grantees conduct diagnostic assessments. DOE does not require the grantees use a specific assessment tool, yet some grantees appeared to believe that they had less latitude in selecting an assessment approach than they actually had, likely because of the grant requirement that they demonstrate savings.

A few grantees offered critiques of a requirement for diagnostic assessments.

- Diagnostic assessments can be inappropriate for some end users that come to the program with clearly defined home or building problems.

  > "For some of these properties, it's just unnecessary. We had a couple [of commercial properties] where they said, 'I just spent $5,000 for someone to give me a ten-page document of everything I already know. I know I need new boilers. I know I need new windows. Why did I have to go through that whole process?'" (Grantee)

- Diagnostic assessments can err on the side of defining a project in excess of what the end user is prepared to undertake.

  > "One of the biggest complaints I have with auditors is that their recommendations are the Cadillac of systems. It's easy to recommend the Cadillac with every option in the world. The reports state, in effect, 'I have certifications and licenses to support my findings.' I'll review the reports and

> think, 'Yes, it's a great system that's proposed, but we need another option for these people that's in their budget.'"(Grantee)

Chapter 5 discussed benefits to allowing an incremental approach to building upgrades. Diagnostic assessments may play a role in this, but an emphasis on recommending large comprehensive projects can also reduce the willingness of end users to engage with the program.

A critique offered by several grantees serving hot climates is that BPI training is Northeast-centric, focused on heating loads, not cooling loads. They seemed to believe BPI was DOE's preferred tool for grantee use.

A program stakeholder experienced with assessments noted during the interview that the home performance professional community itself has a faction that believes diagnostic assessments are necessary and a faction that does not. Further, the professional community is divided according to assessment tools, with different factions supporting different tools. This contact encouraged program implementers to let the market decide and not restrict the playing field. These considerations raise the question of whether the prevalence of diagnostic and specific certification requirements and training in Better Buildings reflects market forces or outcomes of support services provided through Better Buildings, such as the technical advisory service providers, or assumptions made by grantees that DOE had a requirement or preference for a type of assessment.

The interviews with grantees and program contacts, including conversations we held with home performance contractors presenting at BBNP's 2012 *Residential Energy Efficiency Solutions* conference, suggest that residential diagnostic assessments may cost the contractors more than the $400 or so incentives that many of the programs offer for assessments. The following quotation from one grantee is consistent with the information that we learned from home performance contractors presenting at the conference, who indicated a diagnostic assessment typically costs $800 (or more if the home is large):

> "We want to make the energy audit process quicker and less costly. Currently, it takes seven hours; sometimes half of that time is the contractor driving back and forth from home to office and putting the data in the system. We are getting closer to doing onsite data entry and report generation. We want the audits to become something that the contractor absorbs the cost of [and that's not possible at the current level of effort]." (Grantee)

We plan to explore this issue in the final evaluation report. We will seek to understand whether grantees know the typical cost of the assessment to the contractor, the basis of the programs' assessment incentives, and the suggestions – if any – on appropriate incentive levels offered by the technical advisory service providers. Understanding diagnostic assessment costs is essential to understanding the dynamics within the home and building performance market, and the forces affecting the market after Better Building grant funding ends.

One program contact familiar with the home improvement industry offered this observation on contractor requirements:

> "The Better Buildings framework has 'buckets' of contractor types – auditor, installer, et cetera. These are great buckets, but they need to dilute the requirements for these buckets because the

> market is not ready. I commend DOE for what they've done for homes. But these contractors are churning through folks every three to four months." (BBNP program contact)

A grantee expressed a similar view:

> "Our contractors are saying that at the end of the day, they will lose money on this. But they feel they are now in too deep to bail, and they will see it through. Many have said they would not do this again. They've made an investment of sweat equity, tears, and money. They have cash flow impacts – maybe they hired and then don't have the work. Workforce development wants them to hire and train staff, but they don't want to do this in advance of the work; there is not an incentive to do so. We keep going back to them for varying requirements – BPI certification; our legal department requires copy of their general liability policy to verify the additional insured does not exclude municipal government; everything is to protect us and our constituents. The contractors are nervous of the quality assurance. Our QA contractor goes out with them on the first five homes. They are accountable to their scope of work, but there can be surprises in the home as they do the work. The ones doing well have extensive construction business and do energy efficiency. Not all the ones that started up around the time of the grant are doing well. Yet we have production numbers we need to meet; we need them to get going on the retrofits. And materials costs went up for them since the scope of work." (Grantee)

STIMULATING THE SUPPLY OF ENERGY EFFICIENCY FINANCING

Grantees have taken two broad approaches to ensuring that an adequate supply of financing is available to support energy efficiency projects. First, some grantees have used their grant funding or other capital to make loans directly, through mechanisms like revolving loan funds. These grantees noted that using their own capital to make loans provides them greater control over lending requirements and allows them to use the interest that the loans generate to support their programs. However, these grantees also noted that this strategy places them at risk if participants default. According to one grantee:

> "It's our loans, and we don't really have a backstop. If we lose the cash, we're losing our seed capital." (Grantee)

While grantees operating revolving loan funds may not rely on financial institutions for capital, grantee experience suggests that it is advantageous to contract with existing financial institutions in order to administer the loans. Two grantees described their experience establishing the capacity to administer loans internally, and both noted that the process had been difficult.

> "The amount of sweat equity involved in setting up and implementing PACE was not worth the number of projects that we got. So find an outside partner, a credit union. Find a bank to be a bank." (Grantee)

> "The start-up costs and time to create a CDFI [community development financial institution] is substantial and beyond the means of local government."(Grantee)

The second broad approach used to ensure an adequate supply of financing for energy efficiency projects involves partnering with a financial institution that agrees to supply the capital and administer the loans in exchange for the interest the loans generate. In order to establish these relationships, grantees must convince decision-makers at financial institutions that energy efficiency loans (a new product) will be profitable. Grantees must address concerns about the

risks associated with energy efficiency loans, which they typically do through credit enhancements like loan loss reserve funds and interest rate buy-downs.

In addition to addressing risk, however, grantees must convince financial institutions that the benefits associated with energy efficiency loans justify the capital and effort the financial institutions invest. According to one grantee:

> "We realized that another problem with this type of lending is that the banks are afraid that they will set aside this chunk of money and it will just sit there." (Grantee)

The following sections go into greater detail on grantees' experience recruiting financial institution partners and offering incentives to those institutions in order to convince them to offer efficiency loans and make the terms of those loans more appealing.

Grantees' have also faced the challenge of establishing a supply of financing during the economic recession, which has been characterized by frozen credit markets and new decision frameworks for loan approval. The very economic conditions that led to the ARRA funding that enabled Better Buildings make it difficult for grantees to increase the accessibility of financing for home and building upgrades.

Recruiting Financial Institution Partners

For many grantees, recruiting financial institutions to act as partners was more difficult than expected (perhaps reflecting unrealistic expectations, according to a BBNP program contact). In many cases, this difficulty delayed the launch of financing offerings. Grantees that used an RFP process to recruit financial institutions often reported receiving few or no responses. Some organizations issued multiple rounds of RFPs before receiving responses that met their criteria.

Interview findings suggest that lenders may be particularly reluctant to participate in energy efficiency financing programs in areas with lower median incomes and where the population may be reluctant to take on debt. (This reluctance is not confined to energy efficiency financing; it is difficult for lower income consumers to obtain traditional loans.) Two grantees serving these types of populations described difficulty recruiting financial institution partners.

Multiple grantees also reported working with financial institutions that initially expressed interest in partnering on a financing program, but dropped out in the process of designing the program. One grantee reported that this experience had taught him the importance of ensuring that the program's contacts at the financial institution have the authority to make key decisions. According to this contact:

> "That's a big thing, who are you going to be working with?...You don't want to have someone who has to run things by their boss, that will double the time it takes to get things done." (Grantee)

Grantees have found that credit unions, community development financial institutions (CDFIs), and smaller, local banks have been more receptive to offering energy efficiency financing than larger, national banks. This is consistent with the findings of an ACEEE white paper, which states that the assets generated by efficiency finance programs are typically well below the

amounts that large commercial banks seek. In contrast, community banks and credit unions are often more interested in these types of offerings. In addition to generating revenue, efficiency financing offerings may contribute to the goals related to benefitting the community that are part of many credit unions' missions.[64]

In addition to difficulty finding financial institutions interested in providing financing for energy efficiency projects, some grantees described challenges in the process of setting up financing offerings resulting from their organizations' contracting and procurement processes. Two grantees noted that their efforts to develop financing offerings in conjunction with other local governments in the area had increased the need for coordination and added to the difficulty of this process. A third noted that the complexity of the city's procurement process limited their ability to add to or alter elements of their financing program once the process of recruiting a financial institution partner had begun.

Interview findings also suggest that grantees' experiences offering financing outside of energy efficiency may facilitate their efforts to establish loan offerings for efficiency projects. Grantees who had offered financing in other areas (such as for community development) noted that having staff with the skills and knowledge to administer financing programs, and already having addressed regulatory issues, allowed them to launch financing programs more quickly.

Addressing Risk

Grantees cited uncertainty surrounding the risk of energy efficiency loans as a barrier in their efforts to motivate financial institutions to offer financing for energy efficiency projects. According to one grantee, "The main issue is that the banks aren't familiar with this lending product and aren't ready to participate." Similarly, other grantees pointed out that little data exist to predict the default rate that efficiency loan programs might expect. One grantee stated that his program seeks to generate this type of data in order to assist future financing efforts.

In order to overcome concerns over the risk associated with energy efficiency loans, grantees have provided financial institutions with incentives meant to offset the risk of loans and motivate more attractive lending terms. Grantees have most often used loan loss reserve funds for this purpose. The interviewed grantees reported mixed results in their efforts to motivate financial institutions through loan loss reserves. While some credit their loan loss reserve funds with helping to leverage a great deal of capital from lenders, others reported that lenders were reluctant to take on efficiency loans, even when offered the reserve.

[64] Freehling, J. 2011. Energy Efficiency Finance 101: Understanding the Marketplace. Washington D.C.: ACEEE.

The experience of grantees with more established financing offerings suggests that financial institutions become more willing to provide financing as their experience with efficiency loans grows – and as efficiency loans lose their status as new products. According to one grantee:

> "I think selling the whole green loan idea has become so much more popular. That has helped us a lot, the idea that energy efficiency has become much more mainstream." (Grantee)

Another grantee reported that it has enough evidence of the benefits of energy efficiency lending that it no longer needs to offer credit enhancements in order to attract new lenders. This grantee cautioned against over-reliance on incentives to financial institutions, saying:

> "The discussion with the lender needs to assure them that people who enter this program are motivated, they care, and they are responsible….Offer [credit enhancements] only as a fallback, otherwise it makes the loans look bad."(Grantee)

Grantees described efforts in defining lending requirements that balance the need to serve prospective participants with sufficient protection against loan defaulting. Loans are typically offered to the most creditworthy applicants, unless programs use another criterion, such as utility bill payment history. On-bill financing is an approach used to minimize loan defaults by a few grantees with utility partnerships.

Financing Program Processes

Grantee interviews suggest that it is important that program processes related to financing offerings allow for quick and simple processing of participants' applications. Grantees reported efforts to reduce the number of requirements that customers must meet and decisions that they must make in order to receive a loan, and to speed the processing of loan applications. Grantees also described efforts to make the qualification criteria for financing as simple as possible. According to one grantee, "credit criteria, credit scores, can be a huge barrier to financing programs. Many who are interested aren't qualified for a finance program." This grantee stated that contractors help to determine whether participants are qualified for a loan and direct those that are eligible to energy efficiency programs.

PACE

DOE awarded Better Buildings grants after the summer 2010 decision of the Federal Housing Finance Agency (FHFA) not to support property-assessed clean energy (PACE) financing.[65] However, in preparing their grant applications, many grantees had designed programs around PACE and had to redesign their offerings following the FHFA's decision. This delayed several

[65] PACE legislation enables a municipal government to offer a bond to investors to raise capital that the government agency loans to consumers and/or businesses to undertake an energy upgrade or install photovoltaic systems. Loan holders repay the loan through an annual assessment on their property tax bill. The loan is attached to the property, rather than to the individual.

grantees' ability to launch their programs, with particularly notable delays in grantees' ability to launch redesigned financing offerings. According to one program contact:

> "No one predicted the kibosh that the federal home financing restrictions put on PACE…I have spoken with managers whose programs were changed – if not damaged – by the withdrawal of support from that mechanism." (BBNP program contact)

The lack of residential PACE financing altered many grantees' approach to their financing offerings and, in many cases, delayed the launch of those offerings. However, had PACE financing been available, programs likely would have faced many of the same issues described above related to using financing as a tool to build demand for energy efficiency retrofits and providing a sufficient supply of energy efficiency financing. However, without the seemingly straightforward avenue to upgrades that PACE initially offered, it is possible that fewer grantees would have pursued financing at all.

BENEFITS AND CHALLENGES OF RELATIONSHIPS WITH UTILITIES/ PROGRAM ADMINISTRATORS

Existing utility-funded energy efficiency programs are an important element of the energy efficiency markets in which grantees operate. Like grantee programs, many utility programs seek to both drive demand for energy efficiency retrofits and ensure that the market can provide a sufficient supply of energy efficiency products and services. When possible, grantees have sought to leverage utility program offerings, including incentives and energy audit programs. Utilities can also provide grantees with access to data important to determining the impact of program efforts.

The relationships between grantees and their local utilities are multifaceted. Most grantees viewed utility energy efficiency programs as collaborators. Some reported success in leveraging utility programs or in assisting those programs with marketing and outreach. Others were frustrated by the lack of cooperation that they received from utilities – either in data sharing, program coordination, or communication.

Grantees reported primarily positive or neutral experiences working with utilities. Anecdotally, a strong utility-grantee relationship appears to support grantee success. The most successful grantees reported their interactions with utilities as positive more often than less successful grantees. Grantees reported that they benefited from the utility's depth of experience in efficiency and said that the utility partnership improved uptake of the grantees' program offerings.

Below, we summarize the challenges (and, in some cases, grantees' approaches to overcoming them) and opportunities for collaboration reported by grantees.

Challenges Faced by Grantees

Utilities operate in complex regulatory environments that may determine the types of efficiency programs that they can offer and limit their capacity to collaborate with grantee programs. Utilities are also large organizations with multiple priorities that may take precedence over collaboration with grantee programs. These factors have contributed to challenges for grantees, including:

- **Utilities may refuse to share customer data**, turn over only partial data, respond belatedly to data requests, or require special agreements from grantees.
- **The patchwork nature of utility territories complicates the grantees' work**: grantees may need to coordinate with up to eight different utilities, and customers may not be sure which programs they qualify for. One grantee overcame this challenge by creating a grid to show customers and utility account representatives the programs that applied to each geographic area. The grantee reported that the utility is using the grid to advise their customers saying, "I think we have brought some clarity there."
- **Utility and grantee programs may be out of synch:** they may not work with the same measures, financing mechanisms, or over the same time periods. Grantees report that utility programs typically include fewer measures than grantee programs (for example, one utility program did not cover pool pumps) and exclude measures that address health, safety, comfort, or other non-energy benefits. Utilities may also be averse to the on-bill financing programs favored by some grantees. As one grantee explained, "You can't always fit your program into what's [already] in place."
- **The absence of utility programs also burdens grantees**, who did not have a trade ally base or history of incentive programs to build on.
- **Utilities may be unwilling partners**. One grantee attempted to form a partnership with a utility program over the first six months of the grant period, but dropped the effort because they found the utility unresponsive to their requests and unreliable in providing promised services.

Examples of Collaboration

In many cases, utility programs face constraints different from the constraints of grantee programs. As a result, grantees have found opportunities for collaboration that allow them to address gaps in utility program offerings. These opportunities include:

- **Grantees conducted outreach for utility programs**, distributed utility program information, and/or helped customers take advantage of utility programs. One grantee noted that it is able to provide more targeted marketing messages than the local utility, which is constrained by legal concerns related to equity across its customer base.

- **Grantees matched their program specifications to the utility program**, reducing the burden on trade allies and improving the long-term usability of the trade allies' training (i.e., training provided by grantees would be useful to trade allies, even after the grantee program ended).
- **Grantee programs provided retrofit opportunities to customers not covered by a utility program**, for example, customers with oil-heated homes.
- **Grantees worked with utilities to co-brand programs** and leverage marketing opportunities like bill inserts and utility customer lists.
- **Utilities helped grantees develop and implement their program** and/or sat on the grantee program steering committee.

VIABILITY OF PROGRAM EFFORTS

Following the grant period, many of the grantees hope to obtain funding that will allow them to continue to provide program services. Potential funding sources grantees cited include:

- **Utilities/ratepayer funding:** Grantees pointed out that utilities have the infrastructure and capacity to deliver programs. Grantees described a variety of scenarios in which utility funding might allow their programs to continue; utilities may take on grantees' full programs or just certain successful strategies from those programs. In addition, the utility may take on the grantee's program and incorporate it into existing program offerings, or the grantee organization may receive ratepayer funding to continue their program offerings. One DOE staff member was skeptical that utilities will be able to fund grantee efforts because of cost-effectiveness concerns.
- **Local government/tax funding:** A smaller number of grantees cited local governments and tax revenue as a source of funding once the grant period ends. Two of these grantees noted that their programs can help to contribute to local jurisdictions' sustainability goals, potentially in a way that utility programs constrained by cost-effectiveness tests cannot. Two grantees also noted that sustainability, or carbon taxes in particular, could provide a source of funding for their programs.
- **Fees for service:** Grantees stated that the potential to charge participants fees for loans and other program services, and to charge fees for lead generation might provide a source of revenue for their programs once grant funding ends. Nonetheless, some grantees are skeptical that fees for lead generation could provide enough funding to sustain program services and that participants value program services enough to pay significant fees.
- **Other grants:** A few grantees saw some potential in obtaining additional funding from foundations, nonprofit organizations, or private companies.

Despite efforts to find additional sources of funding, the interviewed grantees largely expected that they would not be able to offer the same level of services when grant funding ends. Grantees

stated that they would likely be able to reach a smaller number of participants and/or provide more limited offerings. Two grantees expressed concern that without program funding, they would no longer be able to support independent energy audits for participants. One of these grantees explained that, while contractors might provide audits without a subsidy, these audits might be biased toward the products and services that contractor offers.

Another way some grantees hoped to continue influencing the market after the grant period ends is by laying the groundwork for more stringent energy efficiency codes and standards. One grantee noted that program efforts could build up market acceptance for efficient technologies that could later be incorporated into a code, while another noted that program experience had helped to develop more accurate energy models, which could inform codes.

Grantees also hope that the program infrastructure that they have created – databases, trade ally relationships, and increased efficiency awareness from marketing – will benefit future programs in their communities once the grant period ends. Some grantees plan to create more formal templates and tools, like a "neighborhood sweep in a box," while others simply noted the value of the systems and relationships that they have created. According to one grantee:

> "We feel it is important – we spent so much time and money and effort up front establishing the program and the brand – to at least have some level of keeping this going." (Grantee)

Several grantees stated that, following the grant period, they hoped to establish independent, non-profit organizations to continue delivering program services. Grantees stated that these organizations have the advantage of being more nimble and less connected to political processes than local governments. One grantee also noted that a non-profit organization would be able to expand program services beyond the grantee's jurisdiction. DOE contacts also saw benefits in this approach as potentially sustainable over the long term.

Grantees expressed a hope that their program efforts would lead to market transformation, with multiple grantees elaborating that building awareness of retrofits and their benefits, and drawing on social pressure to keep up with one's neighbors, could create a retrofit market that no longer needed support. One grantee explained that by reaching a large proportion of the community, they hope to move energy efficiency retrofits beyond early adopters and normalize retrofits.

SELECTED FINDINGS FROM CONTRACTOR SURVEYS

We conclude this *Stimulating Supply* chapter with selected findings from our surveys of contractors, both those participating in their local grantees' BBNP programs and nonparticipants. Chapter 8, *Market Assessment: Contractors and Vendors,* provides the remaining findings from these surveys.

The participating and nonparticipating contractors responding to our survey primarily provided insulation, air sealing and shell-related services when involved in residential energy efficiency upgrades (Table 14). Participating and nonparticipating contractors provided similar services.

The few contractors included in the 'other' services category generally reported HVAC or duct sealing services unrelated to building envelope services.

Table 14: Residential Energy Efficiency Building Envelope Services (Multiple Responses Allowed)

	Participants (*n* = 128)		Nonparticipants (*n* = 68)	
Service Offered	Count	Percent	Count	Percent
Insulation	116	91%	58	85%
Air sealing	115	90%	54	79%
Windows and doors	43	34%	24	35%
Siding and roofing	8	6%	6	9%
Other	18	14%	4	6%
Don't know	5	4%	3	4%

Efficiency Activities and BBNP Influence

Surveyed contractors estimated the percentage of efficient upgrades that included insulation that exceeded the ENERGY STAR R-value for their particular climate zone (Table 15). Participants upgrading attic or ceiling insulation were nearly twice as likely as analogous nonparticipants (60% versus 35% of jobs in 2010) to have installed levels exceeding the ENERGY STAR recommended minimum R-value for their climate zone. Between 2010 and 2012, both groups reported an increase in the percentage of insulation projects exceeding recommended minimum levels.

Table 15: Reported Approximate Residential Upgrades that Exceeded ENERGY STAR Recommended Minimum R-Value

		Participants (*n* = 117)	Nonparticipants (*n* = 56)	
Year	Number Reporting	Mean Percent Exceeded (of Those Reporting)	Number Reporting	Mean Percent Exceeded (of Those Reporting)
2010	115	60%	55	35%
2011	115	64%	56	38%
2012	115	65%	55	38%

About 40% of participating contractors and about 10% of nonparticipating contractors indicated their grantee's program had a great deal of influence (ratings of 7 to 10 on a 10-point scale) on the efficiency levels of insulation and air sealing installed by their company over the last two years (roughly since the programs began; Table 16). A smaller proportion of both groups (25% and 7%) indicated their grantee's program had a great deal of influence on installation of efficient lighting. Participants are significantly more likely than nonparticipants to indicate 'a great deal of influence' for all three measures ($p<.05$). Participating contractors indicating 'a great deal of influence' comprise approximately half of the net BBNP projects for both insulation

and air sealing, while the analogous nonparticipating contractors account for less than one percent of the net BBNP projects for those categories.

Table 16: Level of Influence Better Building Program on Energy Efficiency Measures Installed between 2010 and 2012

A GREAT DEAL OF INFLUENCE (7 TO 10)	PARTICIPANTS			NONPARTICIPANTS		
	Respondents Asked	Percent of Respondents Asked	Percent of Net BBNP Projects	Respondents Asked	Percent of Respondents Asked	Percent of Net BBNP Projects
Insulation	116	39%	50%	24	8%	<1%
Air sealing	113	39%	48%	23	13%	<1%
High Efficiency lighting	29	25%	<1%	14	7%	0%

We asked respondents to estimate the percentages of incandescent bulbs and interior lighting fixtures replaced with high efficiency alternatives during typical residential efficiency upgrade projects in 2010 and 2011, and then asked them to project this percentage for 2012. Surprisingly, nonparticipants reported higher percentages of efficient bulb replacements and demonstrated a larger percent increase than participating contractors – respectively an 11% vs. 3% increase between 2010 and 2012 (Table 17). In contrast, for efficient fixtures, participants reported higher percentages than nonparticipants in 2010 and 2011, but similar percentages for 2012.

Table 17: Percent of High Efficiency Bulbs and Lighting Fixtures Installed in Typical Residential Upgrades

	MEAN PERCENT OF LIGHTING EQUIPMENT					
	Participants			Nonparticipants		
EFFICIENCY MEASURE	2010	2011	2012	2010	2011	2012
Incandescent bulbs replaced by CFLs (*n* = 17, 32)	47%	47%	50%	53%	59%	64%
High efficiency interior fixtures installed (*n* = 16, 33)	53%	52%	55%	40%	47%	54%

Participant BBNP Experiences

Nearly three-quarters of surveyed participating contractors indicated that they have been actively participating in their grantee's program – 72% of whom have been active since the program began (Table 18).

Table 18: Type of Program Participation (Base: Participating Contractors)

Type of Participation	Participating Contractors (*n* = 170)	
	Count	Percent
Actively from the beginning	81	48%
Actively but only after the program was underway	41	24%
After the program was underway but not actively	22	13%
From the beginning but not actively	18	11%
Don't know	8	4%

Just under half of participating contractors reported that they were satisfied (as indicated by a rating of 7 or greater on a 10-point scale) with their experiences with the grantee program, while about one-fifth said they were not satisfied (a rating of 3 or lower). Satisfaction with program experiences varied by level of participation (Table 19), with actively participating contractors twice as likely to report satisfactory program experiences, and non-active contractors at least twice as likely to report dissatisfaction (p = .007 by *chi-square*).

Table 19: Participant Program Satisfaction

Level of Satisfaction (Scale of 0 to 10)	Actively Participating Contractors (*n* = 122)		Not Actively Participating Contractors (*n* = 40)	
	Count	Percent	Count	Percent
Satisfied (7 to 10)	65	53%	10	25%
Neither satisfied nor dissatisfied (4 to 6)	36	30%	13	32%
Not satisfied (0 to 3)	19	16%	15	38%
Don't know or refused	2	1%	2	5%

Most commonly, respondents who were satisfied with their program experiences (a satisfaction rating of '6' or higher) cited the ease of working with the program, helpfulness of program staff, and positive effects of the program on the contractor's business (Table 20). The active and non-active contractors tended to respond similarly. One exception is that, while more than one-quarter (22 of 82) of the actively participating contractors reported that the program expanded their business, only one non-active contractor (of 11) gave that response. However, the small number of non-active contractors who reported high satisfaction limits the reliability of this comparison, and the difference did not attain statistical significance (p = .20).

Table 20: Reason for Positive Program Satisfaction Rating* (Multiple Responses Allowed)

	ALL CONTRACTORS (*n* = 93)	
REASON	Count	Percent
Easy to do work through the program	28	30%
Staff very helpful	26	28%
Expanded my business	23	25%
Improved quality of the home/benefits to homeowner/environment	9	10%
Access to financing/funding/incentives	8	9%
Improved marketing/consumer awareness	7	8%
Program design/quality/professionalism/organization	7	8%
New line of work	4	4%
Helpful training and resources	2	2%
Other	1	1%

* Includes respondents who provided a rating of 6 to 10 on the program satisfaction scale.

Reasons for dissatisfaction (asked of respondents who provided a satisfaction rating of '5' or lower) did not significantly vary by active participation status; both active and non-active contractors predominantly indicated that their grantee's program was too complicated or that there were problems with the program design (Table 21).

Table 21: Reason for Low Program Satisfaction Rating* (Multiple Responses Allowed)

	ALL CONTRACTORS (*n* = 65)	
REASON	Count	Percent
Too complicated	28	43%
Problems with program design	19	29%
Too much paperwork or reporting	10	15%
Too few jobs, not enough work, not worth the effort	9	14%
Problems with contractors or auditors	7	11%
Program is politically driven/dishonest/uneven playing field	5	8%
Lack of consumer awareness/education/participation/trust	6	9%
Not profitable, too few leads	4	6%
Other	5	8%

* Includes respondents who provided a rating of 0 to 5 on the program satisfaction scale.

7 PRELIMINARY MARKET ASSESSMENT: MARKET INFORMANTS

This chapter summarizes the findings from 26 in-depth telephone interviews with market informants (informants), including nine contacts from trade associations whose members retrofit and upgrade homes or commercial buildings, five contacts from regional energy efficiency organizations, and twelve contacts we describe as other stakeholders who work with organizations directly involved with the energy efficiency industry, serving a research, program implementation, lending, or supportive function..[66] The analysis that follows distills the range of opinions of the interviewed market informants concerning the current condition of energy efficiency and the building upgrade market. We report findings based on the opinions of a limited number of market informants; as such, these findings suggest – but do not support conclusions about – the current condition of energy efficiency and the building upgrade market.

PURPOSE OF THE MARKET INFORMANT INTERVIEWS

Among the intended outcomes of BBNP are progress toward a self-sustaining retrofit industry that raises the efficiency of energy use in existing homes, businesses, and public buildings. In other words, expected outcomes of BBNP are market effects, which the efficiency profession has defined as "a change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficient products, services, or practices and is causally related to market intervention(s)."[67] The overall goal of the interviews was to identify and understand potential indicators of market effects resulting from the BBNP activities, as well as identify potential indicators of successful grantees.

As noted in the methodology discussion above, several informants had insights of value to both the preliminary process and market assessment. To limit the burden placed on these individuals, we asked these informants a subset of market effects questions during the process interviews. As such, the interview instruments were not identical across informants; therefore, while the team identifies the number of informants that may have responded in a particular way, these findings do not imply that the remaining informants took opposing views. Despite differences in questionnaires, the goals of the interviews remained the same in relation to examining the upgrade market and market effects of the BBNP program.

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66 Table 3 in Chapter 1 identifies the number of contacts by type and Appendix B provides a list of organizations interviewed. Appendix A provides the data collection instrument.

67 Eto, Prahl, and Schlegel, *Scoping Study*.

The rest of this chapter presents interview findings on the following topics:

- *Understanding the Energy Efficiency Upgrade Market*
- *Impact of BBNP on the Energy Efficiency Upgrade Market*
- *Other Influences on the Energy Efficiency Upgrade Market*

THE ENERGY EFFICIENCY UPGRADE MARKET

Key Market Actors

Market informants identified contractors, consumers, manufacturers, government agencies, utilities, and building owners and managers as the key market actors in the energy efficiency upgrade market. In both the residential and commercial markets, informants reported government agencies influence the market through building code requirements, incentive programs, tax codes, and programs. Informants believe utilities influence the market through programs with rebates and components to educate their customers about energy saving opportunities.

Table 22 shows the number of times informants mentioned each market actor.

Table 22: Key Market Actor Mentions by Type of Organization

KEY MARKET ACTOR	ALL (*n* = 26)	TRADE ASSOCIATION (*n* = 9)	REGIONAL ENERGY EFFICIENCY ORGANIZATION (*n* = 5)	STAKEHOLDERS (*n* = 12)
Contractors	**16**	6	3	7
Consumers	**9**	3	3	3
Building owners and building managers	**5**	3	0	2
Government agencies	**5**	2	2	1
Utilities	**5**	1	2	2
Other market actors	**10**	3	3	4

In the residential market, respondents considered contractors to have the most influence, as they work directly with the homeowner. As one stakeholder informant explained:

> "Contractors or HERS raters, or whoever *is in the person's house* – they are the most important. They make the sale. This is the person the homeowner will look to." [Stakeholder]

Respondents went on to say homeowners typically view contractors as their most knowledgeable resource about energy-efficient products and their benefits, cost, maintenance, and use. Thus,

contractor buy-in to program efforts, as well as to energy efficiency upgrades, is an essential program element.

Consumers, that is, homeowners and building owners or managers, were the second most frequently mentioned market actor. According to informants, homeowners research measures on their own more frequently now than in the past and are more informed when selecting the equipment they want installed.

In the commercial market, informants identified building owners and managers as having the most influence, as they are often responsible for supervising energy usage, frequently contacting engineers directly to determine how to reduce costs, and do not rely on contractor guidance. However, one informant noted many commercial buildings either do not have a well-trained onsite facility manager or do not have a facility manager at all.

Informants noted efficiency upgrade decisions in both markets are subject to the availability of equipment from manufacturers and distributors.

At least one contact from each market informant group identified real estate agents and appraisers as influential market actors. Informants said these individuals can drive the perception of value to the homebuyer, yet energy efficiency is typically not on the radar for realtors.

Informants reported the key market actors in the residential and commercial upgrade markets operate almost entirely separately, with little communication between them. When market actors do interact, their conversations rarely center on energy efficiency, but most often concern measure cost.

Key Industry Organizations

Informants mentioned a number of industry organizations to which market actors look when making decisions about energy efficiency upgrades. The following list, in alphabetical order, provides those organizations mentioned by two or more informants, as well as informants' explanations of why they are important:

- **Air Conditioning Contractors of America (ACCA):** ACCA promotes professional contracting, energy efficiency, and healthy, comfortable, indoor environments. It provides contractors with learning opportunities as well as technical, legal, and marketing resources.[68] Contractors look to ACCA as a resource for quality energy audit and home equipment maintenance standards.

[68] Van de Grift, S. and L. Schauer. 2010. "A Hand to Hold: A Holistic Approach to Addressing Barriers in the Home Upgrade Market." Paper presented at the ACEEE Summer Study on Energy Efficiency in Buildings.

- **American Institute of Architects (AIA):** AIA is the voice of the architecture profession through advocacy, information, and community.[69] Architects and manufacturers look to AIA for energy efficiency designs.
- **American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):** ASHRAE is a worldwide organization focused on building systems, energy efficiency, indoor air quality, and sustainability within the industry.[70]
- **Building Performance Institute (BPI):** BPI is a national standards development and credentialing organization for residential energy efficiency upgrade work.[71]
- **National Association of Home Builders (NAHB):** NAHB is a trade association whose mission is to enhance the climate for housing construction and the building industry through research, workforce development, scholarship programs, policy analysis, and housing finance system improvements.[72] NAHB is a resource for understanding "green" issues and is influential in helping consumers to make an informed decision.
- **National Association of the Remodeling Industry (NARI):** NARI's core purpose is to advance and promote the remodeling industry, focuses on professional conduct, continuing education, and fair and ethical treatment within the industry.[73]
- **National Electrical Manufacturers Association (NEMA):** NEMA works to develop technical standards, to advocate industry policies, and to collect, analyze, and disseminate industry data.[74] Contractors look to NEMA for program and incentive information.
- **Residential Energy Services Network (RESNET):** RESNET is a recognized national standards-making body for building energy-efficiency rating and certification systems. A number of industry organizations (including organizations representing builders marketing the energy performance of their homes), federal agencies and other government bodies, and contractors recognize RESNET standards.[75]

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69 See: *http://www.aia.org/about/index.htm.*

70 See: *http://www.ashrae.org/about-ashrae/.*

71 See: *http://www.bpi.org/.*

72 See: *http://www.nahb.org/page.aspx/generic/sectionID=89.*

73 See: *http://www.nari.org/homeowners/.*

74 See: *http://www.nema.org/About/Pages/default.aspx.*

75 See: *http://www.resnet.us/about/what-is-resnet.*

Changes in the Market

Overall, market informants thought that the relationships between key market actors and the ways they interact with each other have not changed much over the years, and that cost has been and remains the predominant consideration in measure selection.

However, the informants also reported changes affecting the efficiency-upgrade market. As mentioned, homeowners have been doing more research about equipment and measures. In the commercial arena, building managers are becoming more educated about energy-efficiency upgrades. Overall, awareness, the availability of efficient equipment, and the cost effectiveness of equipment have improved.

Another major change is the rise in importance of utilities in the energy-efficiency market. Whereas informed observers previously considered governments to constitute the key market actor, governments now are struggling financially; utilities have increased their energy efficiency goals over the past few years, with some aiming for energy efficiency to meet for one to three percent of their annual sales.[76]

MARKET BARRIERS

Market informants identified cost and lack of financing; lack of awareness and understanding especially of non-energy benefits such as comfort or an improved work environment; insufficient communication and messaging among market actors; and the current state of codes, standards, and policies as the greatest barriers to residential and commercial energy-efficiency upgrades. Table 23 shows the number of times market informants mentioned each market barrier.

Table 23: Market Barriers by Type of Organization

Market Barrier	All (*n* = 26)	Trade Association (*n* = 9)	Regional Energy Efficiency Organization (*n* = 5)	Stakeholders (*n* = 12)
First costs and lack of financing	**16**	9	3	4
Lack of awareness	**14**	5	4	5
Insufficient communication	**12**	4	2	6
Codes, standards, and policies	**8**	4	2	2
Other	**12**	3	4	5

[76] For a review of recent increases in funding of electric utility energy efficiency programs, see York, D., P. White, S. Nowak, and M. Kushler, "Three Decades and Counting: A Historical Review and Current Assessment of Electric Utility Energy Efficiency Activity in the States." ACEEE Research Report u123. *http://www.aceee.org/sites/default/files/publications/researchreports/u123.pdf.*

High First Costs and Lack of Targeted Financing

A majority of the market informants (16 of 26) cited high first costs of an upgrade project and limited access to financing for upgrades as the most prominent barriers to energy efficiency upgrades. This finding is consistent with previous studies.[77] In the residential upgrade market, informants reported most customers focus more on upfront and short-term costs than on the long-term savings of energy efficiency. Informants also reported the difficulty of obtaining financing as a major barrier, pointing to a lack of companies willing to provide homeowners with loans for efficiency upgrades or mortgage terms reflective of energy-efficiency savings.

A related barrier is arises from the appraisal and insurance communities which do not properly value energy efficiency upgrades. Currently those industries do not recognize energy efficiency as adding value. Without their support, the economic benefit of energy-efficient measures is lost.

In the commercial market, informants reported building owners and managers focus on the return on investment when considering energy efficiency measures, suggesting building owners mostly install equipment that has a short payback period. Other informants reported commercial building owners make limited investments in their buildings unless they have the ability to pass costs on to tenants, which can be particularly difficult in markets where commercial buildings have high vacancy rates. Staffing constraints limit smaller businesses in particular in their ability to become aware of funding opportunities and to access capital.

Lack of Awareness and Understanding

About half of the market informants (14 out of 26) cited a lack of awareness and understanding of energy efficiency opportunities and benefits in both the residential and commercial markets as a major barrier to efficiency upgrades. DOE identified this issue in a previous study, noting consumers are largely misinformed and are less aware of energy efficiency than they think they are.[78] Informants described a need to educate homeowners about how home systems work, and how new energy-efficiency technologies can improve their comfort and health. Informants also expressed a need to make people more aware of the full range of technologies available to them.

Referring to contractors, one stakeholder informant said that contractors do not have the level of training to enable them to incorporate energy-efficient upgrades into their current business practices. A trade association representative suggested that contractors need to be trained to work effectively with auditors to provide turnkey, whole house solutions to the homeowner.

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77 See, for example, Van de Grift, S., and L. Schauer. 2010. "A Hand to Hold: A Holistic Approach to Addressing Barriers in the Home Upgrade Market." In *Proceedings of the 2010 ACEEE Study on Energy Efficiency in Buildings*. American Council for an Energy-Efficient Economy.

78 Newport Partners. 2012. *Report: Motivating Home Energy Improvements, Focus Groups for the U.S. Department of Energy.*

In the commercial market, informants also considered lack of awareness a major barrier, especially regarding identifying funding sources for projects.

Ineffective Communication and Messaging

Related to, if not the cause of, poor consumer awareness and understanding, about half of the market informants (12 out of 26) cited insufficient or ineffective communication between consumers and key actors as another barrier to energy efficiency in upgrades. In the residential market, informants identified the lack of a consistent message as a source of confusion for homeowners. Providing information in plain language would help make it more accessible to that audience. One informant mentioned the technical nature of home improvements can intimidate homeowners, and suggested contractor messaging revolve around customers' values, such as comfort, rather than equipment.

Other reports support the importance of selling energy upgrades through messages that resonate with customers, such as maintaining the value of the home, saving money, solving health and safety issues, and replacing equipment.[79] Similarly, the Newport Partners focus group research funded by DOE, found not only do consumers need relevant messages; they also need to receive the messages from a trusted source.[80]

Insufficient communication is also a barrier in the commercial market. Benefits of energy efficiency upgrades, such as cost savings and the increased comfort of buildings, are not necessarily being conveyed to building developers. On a related note, the complex nature of implementing commercial projects, which often include multiple decision-makers, can act as a barrier to moving efficiency projects forward. For example, large companies often have accounting departments that are involved in making decisions about maintenance; even if a building manager wants to perform preventive maintenance or is interested in participating in an energy savings program, the accounting department may not allow it due to budget constraints.

Another communication conflict in the commercial market occurs between tenants and building owners: often the person paying the bills is not the same person who owns the energy-using equipment (the "split incentives" barrier). Approaches to maintenance and upgrading also depends on the business model; those who own the building take an interest in it and will upgrade it as a means of preventive maintenance, while those who rent to others are more likely to repair and run equipment until it fails.

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79 Zimring, M., I. Hoffman, and A. Todd. 2011. *Delivering Energy Efficiency to Middle Income Single Family Households.* LBNL-5244E. Berkeley, Calif.: Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory.

80 Newport Partners, *Motivating Home Energy Improvements*.

Codes, Standards, and Policies

National, state, and local codes, standards, and policies relating to energy efficiency currently include those which are outdated, insufficiently supported or enforced, or inconsistent with each other or with the promulgation of energy efficiency.

Six interviewees identified a range of barriers related to energy efficiency specifications, standards and policies, summarized as follows:

- Codes and standards in many localities are outdated and do not have adequate energy efficiency guidelines.
- Codes and standards are insufficiently enforced.
- Voluntary energy efficiency specifications and standards, such as ENERGY STAR, are not as developed or rigorous as they could be to further advance the market.
- Program administrators and the energy efficiency community are not consistently using voluntary efficiency specifications and standards, such as those developed by the American National Standards Institute (ANSI).

Some informants believe depreciation rules and tax incentives in place today actually discourage building owners from replacing equipment, a significant barrier to commercial energy efficiency upgrades. A recent ACEEE report also concludes that for several types of commercial equipment, current depreciation periods are longer than the useful life of the equipment, serving as a disincentive for replacing older, inefficient equipment with newer, high efficiency equipment.[81]

Other Barriers

Market informants discussed other barriers, including a lack of consumer interest and a lack of trust in contractors. To address the latter concern, an informant suggested, "Programs should emphasize their quality control and contractor oversight."

MARKET DRIVERS

Informants identified various drivers of greater efficiency in residential and commercial upgrades, most frequently citing consumer motivations, program elements, and trade ally motivations (Table 24).

[81] Sachs, H.M., C. Russell, E. A. Rogers, and S. Nadel. 2012. Depreciation: Impacts of Tax Policy. ACEEE. *http://www.aceee.org/files/pdf/white-paper/depreciation-tax-paper.pdf*

Table 24: Key Market Driver Mentions by Type of Organization

KEY MARKET DRIVER	ALL (*n* = 26)	TRADE ASSOCIATION (*n* = 9)	REGIONAL ENERGY EFFICIENCY ORGANIZATION (*n* = 5)	STAKEHOLDERS (*n* = 12)
Consumer motivations	**19**	7	5	7
Program elements	**18**	7	4	7
Trade ally motivations	**10**	3	1	6
Other	**4**	2	0	2

Consumer Motivations

Informants mentioned a variety of consumer motivations that are drivers to energy efficiency upgrades in both the commercial and residential upgrade markets. Informants most commonly cited as motivators increased comfort, necessity of the upgrades, a short payback period or an appealing return on investment, and peer influence.

Informants also suggested that if consumers think the upgrade will add value to their home or building, then improvement costs are more acceptable. In the commercial market, building owners are influenced by the likelihood that improvements will reduce costs and lead to an increase in cash flow.

Regarding peer influence, previous research has revealed this trend as well, with one paper noting, "People are influenced by their peers to a far greater degree than they consciously recognize."[82] Informants also suggested recognition, through labeling, is an important behavioral driver to energy efficiency upgrades.

Program Elements

Though not asked directly, more than two-thirds of informants (18 out of 26) described fundamental efficiency program characteristics they believe drive energy efficiency upgrades. Key program elements include using a whole-home energy-performance approach to upgrades, the incorporation of contractors into the program, a staff member dedicated to guiding consumers through the program from start to finish, offering a competitive return on investment, and a program design for a sustainable, ongoing program.

[82] Fuller, M.C., C. Kunkel, M. Zimring, I. Hoffman, K. Lindgren Soroye, and C. Goldman. 2010. *Driving Demand for Home Energy Improvements*. LBNL-3960E. Berkeley, Calif.: Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory.

Market informant contacts believe a whole-home energy-performance approach effectively drives more upgrades than would occur otherwise. Indeed, BBNP is predicated on the perspective that a whole-home, whole-building approach attains higher average savings than is attained by encouraging customers to successively pursue individual measures. (See the section *Comprehensive Upgrades versus Incrementalism*, in Chapter 5.)

Contractor involvement includes contractor training. Contractor training can provide these key trade allies with resources to engage customers more effectively in the value of an energy efficiency upgrade and to provide customers with the resources they need to implement the project. This is consistent with informants' identification of contractors as one of the most influential market actors, mentioned previously.

Program staff to shepherd the customers through the program processes from start to finish make it more likely homeowners will follow through with projects by helping them to overcome confusion or reluctance. A 2008 Wisconsin residential pilot program combined this feature, termed an energy advocate, with what they described as a turnkey model: :

> "[One key customer concern was the] hassles associated with identifying what needs to be done and getting those measures installed. In order to address this, the program was designed as a turnkey model where every actor from advocate, to consultant, to contractor was selected for the customer." [83]

The pilot evaluation found this turnkey approach helpful, although not as effective as other program elements, such as an energy advocate, in increasing equipment up-take and program participation.[84]

A final key factor was the importance of consumer and contractor trust in the sustainability and continuation of the financing mechanisms a program offers. Both consumers and contractors need something they know will be around for a while and will not just be "one-time shots" here and there.

Trade Ally Motivations

The main factors informants cited as drivers for contractors to incorporate energy efficiency upgrades into their business models were belief in the durability of market transformation, consumer demand, and enforcement of standards. For trade allies to commit fully to pushing energy efficiency, they need to feel confident the energy efficiency industry is going to exist in the long term and can, therefore, be an ongoing part of their business practices. Consumer demand is a corollary of market transformation that drives trade allies to adopt energy efficiency upgrades as a common aspect of their business.

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[83] Van de Grift and Schauer, *A Hand to Hold*, pp. 2-308.

[84] Van de Grift and Schauer, *A Hand to Hold*.

Informants reported frustration among contractors arising from the lack of enforcement of regulations and mandates.[85] As one stakeholder informant explained:

> "It's frustrating for a good contractor who is out there trying to compete in the marketplace against somebody that is cutting corners, not following building codes, and not installing equipment properly…." [Stakeholder]

Increased enforcement of energy and building codes would also increase awareness among contractors of the importance of energy efficiency.

EXTERNAL INFLUENCES ON THE UPGRADE MARKET

This section summarizes the informants' insights about the impacts of certain exogenous factors on the energy efficiency market. The two most often cited external factors were changes in energy prices and the economic downturn, both of which were believed to have reduced the number of energy efficiency upgrades. The economic downturn affected the market in several ways including decreasing property values, limiting access to capital, and reducing confidence in future economic conditions. For some of these influences informants saw different, even opposing, consequences as described below. Table 25 shows reported market externalities by informant type.

Table 25: Influential External Factors by Type of Organization

External Factors with Market Influence	Informants Who Discussed Factors (*n* = 26)	Informants Who Noted Influence			
		All (*n* = 26)	Trade Association (*n* = 9)	Regional Energy Efficiency Organization (*n* = 5)	Stakeholders (*n* = 12)
Energy prices	**17**	**16***	7	4	5
Economy	**15**	**15**	6	5	4
Housing boom	**5**	**5**	2	2	1
Perceptions of climate change	**10**	**5**	1	1	3
Energy efficiency policy	**3**	**3**	0	2	1
Other factors	**10**	**10**	3	4	3

* Although an additional informant discussed these factors, the count shown here reflects those that identified this factor as having an influence on the energy efficiency market (either positive or negative).

[85] For example, a recent paper estimated that up to 95% of air conditioner replacements are completed without permits and potentially do not meet code, and that over 80% of recently surveyed contractors said that a competitor would be caught installing residential air conditioners without a permit. The California Contractor State Licensing Board has begun a series of high profile sting operations to help increase code compliance. See Heinemeier, K. 2012. "Contractors Walk on the Wild Side: Why." *ACEEE Summer Study on Energy Efficiency in Buildings*.

Energy Prices

Most informants (17 of 26) commented about the influence of energy prices, either prompted or unprompted. Informants reported energy price declines, specifically for natural gas, have reduced the number of upgrades; however, in the Northeast of the country, where a large number of homes still use oil as their primary heating fuel, a drop in natural gas prices has increased fuel conversions. Other informants saw *rising* energy costs driving upgrades.

Economy

The economic downturn had a considerable effect on the upgrade market, paradoxically both increasing and decreasing the number of upgrades. Informants most commonly referenced the changes in the economy as driving consumers' changed attitudes about their current homes and buildings. For example, because home equity has decreased, people have hesitated about investing in their homes. Consumers may now less concerned with upgrades and more concerned with making repairs such as repairing broken heating equipment.

On the other hand, informants said the economy has caused a shift from new construction to upgrades as people are staying in their homes longer because they cannot afford to buy new homes or cannot sell their existing ones. Economic conditions have compelled consumers to focus on reducing their utility costs as a way of managing other financial losses through investments in energy-efficient upgrades in both residential and commercial sectors. Building owners have also turned to energy efficiency as a way to increase occupancy by tenants who are interested in reducing their occupancy costs.

The economic downturn also limited access to capital to invest in homes and buildings, and given a lack of confidence in the future, those that do have access are unwilling to spend their money or take on debt.

Housing Boom

Informants mentioned energy efficiency was not standard building practice during the housing boom that preceded the Recession. As a result, the expansive housing stock from that period presents an opportunity for energy efficiency upgrades. However, home improvements are typically made immediately following the purchase of the home, when new owners are adjusting their new home according to their needs. Thus, the people who purchased homes during the housing boom are probably not now inclined to make improvements, especially since those homeowners have seen a steep decrease in the value of their homes since buying them.

Perceptions of Climate Change

Although ten informants commented on perceptions of climate change as a driver in the market for energy-efficient upgrades, and some see it as a growing driver, the consensus is those perceptions have little or no influence on the number of energy-efficient upgrades.

Energy Efficiency Policy

Previous reports support the informants who pointed to policy as a driver, citing its ability to encourage energy improvements on a larger scale than programs can.[86] One study summed up the key aspects of a policy that would drive change in the energy efficiency upgrade market:

> "Price-based policies are complements to measures that reinforce positive attitudes through targeted feedback, that use social comparisons to tap into the normative influences on renovation decisions, or that target incentives not at individuals but at the supply chain to promote market transformation." [87]

Informants believe policies in the form of mandates, or at the federal level are most effective.

Other External Factors

Other influential external factors mentioned by informants included weather, which both creates opportunities during rebuilding from natural disasters and diminishes interest when mild winters occur. Other reported factors were the age of the homes and the outdated building materials that might be present in them, public awareness, a concern for energy independence, and residual skepticism from past energy-saving fads (for example, installing aluminum covers over windows in order to reduce cooling costs or installing aluminum siding to reduce energy bills).

INFLUENCES OF OTHER ENERGY PROGRAMS ON THE UPGRADE MARKET

Table 26 presents by informant type the programs respondents identified as influential on the energy efficiency upgrade market. Market informants most commonly identified federal and state tax credits and utility, program administrator or other home efficiency programs, followed by programs funded by the Energy Efficiency Conservation Block Grant program and the Weatherization Assistance program.

86 Zimring, Hoffman, and Todd, *Delivering Energy Efficiency.*

87 Wilson, C. 2008. "Understanding and Influencing Energy Efficient Renovation Decisions." Doctor of Philosophy dissertation, University of British Columbia. Resource Management and Environmental Studies.

Table 26: Influential Non-BBNP Programs by Informant Type

Other Programs with Market Influence	Informants Who Discussed Programs (*n* = 26)	Informants Who Noted Positive Influence			
		All (*n* = 26)	Trade Association (*n* = 9)	Regional Energy Efficiency Organization (*n* = 5)	Stakeholders (*n* = 12)
Utility, program administrator, and other home efficiency programs	**17**	**10***	2	2	5
Federal and state tax credits	**13**	**9***	3	4	2
Weatherization Assistance Program	**9**	**2***	0	1	1
Programs funded by EECBG	**7**	**4***	1	3	0

* While a greater number of informants discussed these factors, only the counts in the columns shown here reflect those that identified these factors as having an influence on the energy efficiency market (either positive or negative).

Utility, Program Administrator, and Other Home Efficiency Programs

Informants made positive comments about programs such as Home Performance with ENERGY STAR, with some saying such programs had an "enormous" impact or were the "most successful" in affecting the market. Other informants noted the programs' effects have varied regionally or the programs have increased the number of audits, but not the number of upgrades. The "auditor model" is reportedly ineffective in stimulating residential upgrades and, as a result, these efforts end up being a waste of program resources.[88] It was surmised those programs may have more impact as a result of demand stimulated by BBNP. Mixed messages and confusion around branding also means more coordination is needed at the federal level.

Federal and State Tax Credits

Informants thought federal and state tax credits for energy-efficient upgrades have had a considerable impact on the number of those upgrades. This is in line with a focus group study on homeowner motivations that found, "Energy improvement decisions are influenced by the availability of tax credits and utility rebates."[89]

[88] This informant was referring to programs where upgrade projects are recommended as a result of a home energy assessment. The programs typically subsidize either part of or the entire customer's cost of the home assessment. These programs might also include direct install measures within their set of offerings.

[89] Newport Partners, *Motivating Home Energy Improvements.*

While confusion existed among informants as to whether or not federal tax credits still exist,[90] all informants agreed discontinuing them has led, or will lead to significant decreases in the number of energy-efficient upgrades. Other informants saw federal tax credits as too burdensome for contractors or are merely a temporary prop for the market.

Weatherization Assistance Program (WAP)

Only two informants thought WAP has changed the market: both saying it stimulated awareness among consumers or trade allies. Other informants saw other value in WAP, such as fostering increased project completion, but had reservations about its effect on changing the market such as through changed business practices or creation of a sustainable infrastructure. One informant reported weatherization programs were reinventing themselves, offering fee-for-service work to participate in some BBNP and utility programs.

Energy Efficiency Conservation Block Grant (EECBG)

Informants believed programs funded by the EECBG have at least temporarily influenced the market and increased the number of upgrades, though some considered it a "one-time shot in the arm." The informants do not believe the program has had a long-term impact on the market.

EFFECT OF BBNP ON THE UPGRADE MARKET

Informant Familiarity with BBNP

Market informants were asked whether they were familiar with BBNP and, if familiar, to identify specific grantees with whom they were familiar. As shown in Table 27, informants fr4om regional energy efficiency organizations were more likely to be aware of specific BBNP grantees

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[90] This confusion is likely caused by the transition of the type of federal tax credit currently available: The Energy Policy Act of 2005 established a federal tax credit program for residential consumers for energy improvements to existing homes. The *Nonbusiness Energy Property Credits* have been available since 2009, were renewed in 2010 and 2011, and targeted measures like HVAC, insulation, and roofing, etc. While an opportunity for residential federal tax credits still exists and will be available through 2016, the *Residential Energy Efficient Property Credit* targets the installation of different alternative power sources like small wind turbines and not the measures covered in the previous set of tax credits. (Commercial tax credits will be available through 2013, but did not appear to create any confusion).

Sources:

U.S. Department of Energy, Energy Efficiency & Renewable Energy. "Energy Savers: Tax Credits for Energy Efficiency." Accessed August 20, 2012. *http://www.energysavers.gov/financial/70010.html#products_2011*.

Database of State Incentives for Renewables & Efficiency. 2012. "Residential Energy Efficiency Tax Credit." Accessed August 20, 2012. *http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US43F*.

ENERGY STAR. 2009. "Tax Deductions for Commercial Buildings." Accessed August 20, 2012. *http://www.energystar.gov/index.cfm?c=tax_credits.tx_comm_buildings*.

than were stakeholders and trade association informants; all five regional organization interviewees were familiar with specific BBNP grantees.[91] Trade association informants were least likely to be familiar with specific grantees. Informants who were familiar with specific grantees had often worked with one or more of the grantees implementing software, taking part in the technical assistance program, leading peer exchange calls, or attending conferences.

Table 27: Market Informants Familiarity with BBNP by Type of Organization

FAMILIARITY	ALL (*n* = 26)	TRADE ASSOCIATION (*n* = 9)	REGIONAL ENERGY EFFICIENCY ORGANIZATION (*n* = 5)	STAKEHOLDERS (*n* = 12)
Familiar with specific grantee(s)	**15**	2	5	8
Familiar with BBNP in general	**6**	3	0	3
Not familiar with BBNP	**5**	4	0	1

Informants who were familiar with the program in general, but not with specific grantees reported coming across the program while conducting research for the development of another program, reading the web page and talking to staff familiar with BBNP, or attending a Better Buildings workshop or conference. Respondents who were not familiar with BBNP were read a brief description of the program before continuing with the interview.

We asked market informants who were previously aware of the program to consider the impact BBNP has had on the market for energy efficiency upgrades as a whole, as well as on specific elements of the market.

Coordination with Market Actors and Existing Programs

To reach more participants, informants suggested BBNP and its grantees should coordinate with a variety of market actors including contractors, state energy departments, and national, commercial, real-estate companies.

Obtaining the active involvement of contractors is always a challenge when working within a limited grant period. However, programs that engage collaboratively with contractors have seen the most success. BBNP program administrators and DOE emphasized the importance of working with contractors at BBNP meetings.

The difference made by engaging contractors in a program was illustrated anecdotally. One BBNP grantee did not collaborate with contractors from the start. Informants characterize the

[91] We coded respondents as familiar with a specific grantee, with BBNP in general, or not familiar with BBNP.

grantee staff as well intended, but lacking prior experience administering programs. They did not know how to reach out to contractors, which contributed to an overall poor program design. In contrast, another grantee's efforts to understand the characteristics of the region's contractor base allowed it to design a program addressing the needs of that market.

Regarding coordination with other market actors, informants highlighted two grantee programs that are working with the Green Multiple Listing Service to promote the value added to a home with energy efficiency upgrades, so homeowners can use this as an attribute when selling the home.

Market informants believed BBNP grantees had made some effort to coordinate with existing energy efficiency programs, but success had been limited. Two informants noted BBNP grantees are missing an opportunity if they are not coordinating with Home Performance with ENERGY STAR.

Addressing Barriers to Efficiency

Market informants were asked to describe ways in which BBNP and its grantees have addressed the previously identified barriers to energy efficiency upgrades. Feedback from informants was mixed regarding BBNP's success in overcoming those obstacles.[92] Some informants believed BBNP or specific grantees have successfully addressed first-cost and financing issues, lack of awareness of energy efficiency benefits, and ineffective or confusing messaging; other informants offered opposing opinions, and some thought the effectiveness of the program has been negligible in overcoming market barriers or doubted the impact of BBNP can be isolated from the impacts of other market activities.

Impact on the Energy Efficiency Upgrade Industry

As with BBNP's success in addressing market barriers, informants' descriptions of the program's impact on the energy efficiency upgrade industry were mixed. Opinions regarding BBNP's impact on energy efficiency upgrades ranged from "immensely constructive" to "negligible." However, the consensus among informants who were familiar with BBNP or BBNP's grantee programs was: some specific grantee programs are positively affecting select aspects of their local energy efficiency market, although the program as a whole has not affected the industry at the national level.

In discussing success factors of specific BBNP grantee programs with which the contacts were familiar, contact most frequently mentioned leveraging funds or otherwise working with existing state or utility programs.

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92 Market informants did not offer feedback on BBNP's impact on some barriers, namely, codes and standards, consumers' lack of trust in contractors, the small size of the energy efficiency industry, and the appraisal and insurance communities' lack of support for energy efficiency upgrades.

A key element to the success of BBNP across all grantees has been DOE's facilitation of conferences and collaboration. One informant said DOE has ensured grantees are learning from each other over time, sharing what works and what does not work, and added this is an important factor that drives success program-wide.

Roughly one-third of the informants (8 of 26) believed the program has had a positive effect on industry growth by creating jobs, establishing best practices, and stirring general interest and demand. Other informants observed that the effect varies dramatically from grantee to grantee, elaborating some grantees are just adding temporary jobs, while others are trying to spur long-term job growth by leveraging BBNP and shifting the market.

Among those who see little or no program impact was an informant whose organization conducts research on the sales of equipment installed during energy efficiency upgrades. The research found there has not been any significant change in the market due to this program. Another respondent from a similar organization reported the organization had not seen BBNP become an important part of the industry, but believes the program is sending an important message to contractors and the public to look into energy efficiency measures.

Most informants could not provide estimates of the impact BBNP has had on the number of energy efficiency upgrades; the three who did offered widely diverging estimates that ranged from less than a 10 percent increase to doubling the number of upgrades that would have occurred without the program.

Sustainability of BBNP Grantee Programs

Several market informants think that some BBNP grantees are likely to continue to offer programs after BBNP concludes. One informant identified the SEEA consortium city programs in Charleston, Charlottesville, and Atlanta, as examples that will outlast the grant cycle.

However, most respondents pointed to grantees that have not generated enough momentum to create a sustainable market. In order to develop sustainable efficiency upgrade businesses, dependable incentives and a consistent message are needed. The most critical limiting factor appears to be absence of a long-term funding source. Were the program to end now, the fate of each program would depend on its context. As one informant stated, "Some will go away; some will sputter along; some will continue," but the general feeling is without continued funding, perhaps through partnerships with a utility program or state agency, sustainability beyond the grant will fall short.

8 PRELIMINARY MARKET ASSESSMENT: CONTRACTORS AND VENDORS

This chapter summarizes the findings from telephone surveys of 189 contractors participating in BBNP program, 151 contractors from grantee areas not participating in the BBNP program, and 164 suppliers of energy-efficient equipment in BBNP grantee areas.[93] We surveyed contractors and suppliers from among 22 grantees identified, with the help of BBNP Account Managers, as having very active programs at the time of the surveys, as described in Chapter 1.

Throughout this chapter, we report statistically significant differences in survey responses by grantee level of success. Significant differences between success levels at the 90% confidence level are indicated with the following symbol: †. We did not test for differences between participating and nonparticipating contractors.

PURPOSE OF THE CONTRACTOR AND VENDOR INTERVIEWS

Among the intended outcomes of BBNP are market effects, which are defined as "a change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficient products, services, or practices and is causally related to market intervention(s)."[94, 95] The overall goal of the surveys was to gather preliminary evidence of market effects resulting from BBNP activities.

Figure 12 illustrates the links between BBNP program elements and expected BBNP-induced market effects (described as short-term, medium-term, and long-term outcomes), indicators of which we examine in this preliminary evaluation. Key elements of the BBNP grantee programs include training and workforce development, financing and other incentives, and marketing and outreach. The BBNP program activities are expected to result in several key outcomes, including increased activity in the energy-efficiency upgrade market, increased availability of trained contractors, increased marketing of energy efficiency, increased adoption of energy-efficient building practices by contractors, increased sales and availability of high efficiency equipment and products. These outcomes contribute to the ultimate goals of increased energy efficiency, reduced energy use and a self-sustaining upgrade industry

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93 Chapter 6, *Stimulating Supply,* includes selected findings from the surveyed contractors that augment the findings presented in this chapter.

94 Eto, Prahl, and Schlegel, *Scoping Study.*

95 Most, but not all, of the intended BBNP outcomes comprise energy efficiency market effects. Some intended outcomes not comprising market effects are increased employment and employment at prevailing wages.

Figure 12: Expected Market Effects Outcomes and Links to BBNP Program Elements

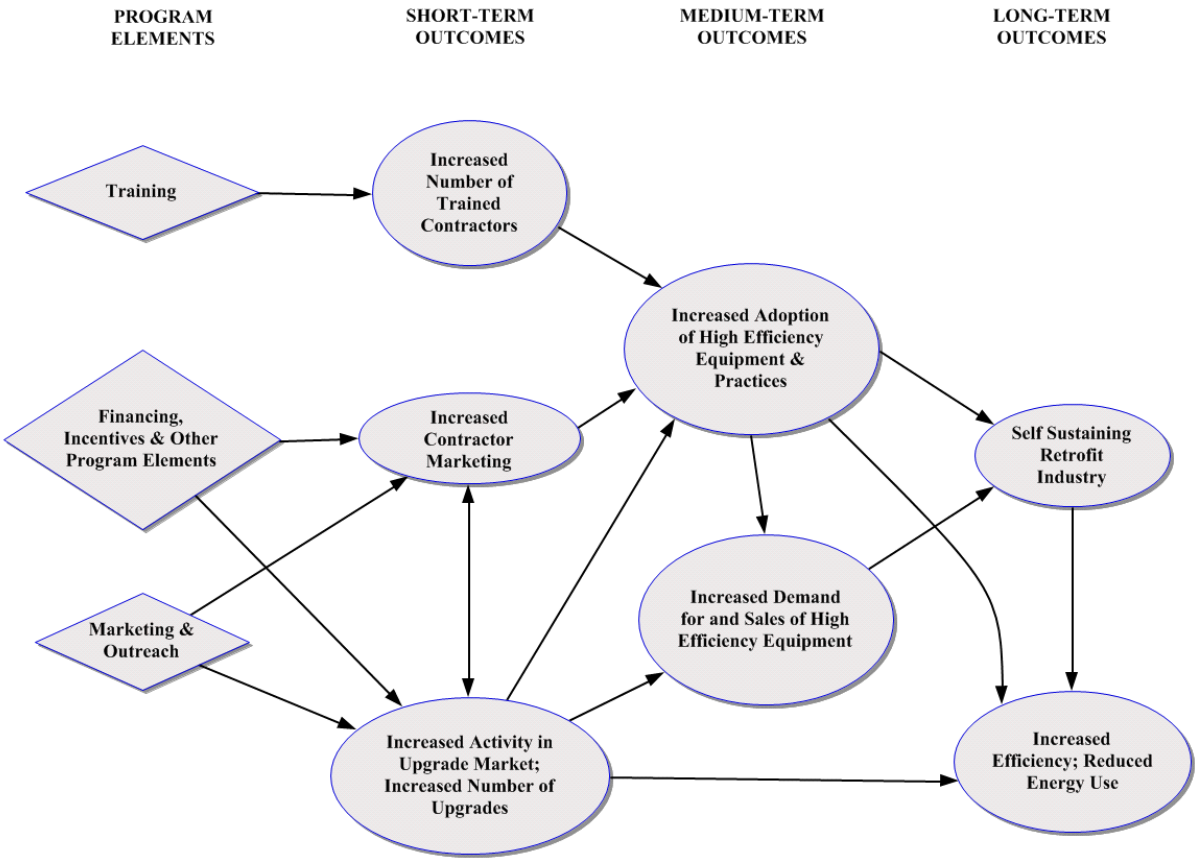


Table 28 provides an overview of the individual indicators of each expected outcome and market effect of BBNP included in this preliminary evaluation.[96] For most of the indicators, such as increased availability of trained contractors or adoption of energy efficient building practices, we first attempt to determine whether a given outcome (market change) has occurred, then examine whether the contractors or distributes attribute the change to BBNP. In other words, we examine the links to the program and see whether the indicators associated with those links point to program influence on the market change – that is, a market effect.

[96] For this preliminary evaluation, we explored financing only to a limited extent. We will address it more comprehensively in the final evaluation. Participating contractors indicated that low-interest financing was the second most important program element (Table 35).

Table 28: Expected Outcomes and Indicators of BBNP Market Effects

OUTCOME	INDICATOR	SOURCE
Increased activity in energy-efficiency upgrade market	Contractors report that the BBNP grantee has had a positive influence on their business and the marketplace	Contractor surveys
	Contractors report that the BBNP grantee will have a positive influence on their business and the marketplace over the next two years	Contractor surveys
	Contractors report a net increase in the number of energy-efficiency upgrades attributable to the BBNP grantee	Contractor surveys
Increased availability of trained contractors	Contractors report an increase in the number of trained contractors	Contractor surveys
	Contractors attribute the increase in trained contractors to the BBNP grantee	Contractor surveys
Increased marketing of energy efficiency by contractors	Contractors report increasing the amount they market energy efficiency	Contractor surveys
	Contractors attribute the increase in their marketing to the BBNP grantee	Contractor surveys
Adoption of energy-efficient building practices	Contractors report increasing their installation of energy-efficient equipment and building practices	Contractor surveys
	Contractors attribute the increase to the BBNP grantee	Contractor surveys
Increased sales of high-efficiency equipment and products	Distributors report increasing their sales of high-efficiency equipment	Distributor surveys
	Distributors attribute the increase to the BBNP grantee	Distributor surveys

The interviews with contractors and suppliers sought data for the following outcomes and their associated indicators of the potential market effects of BBNP:

- *Increased activity in the energy-efficiency upgrade market*: one of the key expected market effects of BBNP is expanded retrofit activity. Indicators of market effects include contractor assessments of the impacts of BBNP on their business, the upgrade market, and number of upgrades completed between 2010 and 2012.
- *Increased availability of trained contractors in the marketplace*: BBNP expects to increase the supply of technically capable contractors through training. An indicator of market effects is an increase in the number of trained contractors in the BBNP grantee regions that contractors attribute to the BBNP grantee training efforts.
- *Increased marketing of energy efficiency by contractors*: BBNP expects to increase consumer demand through marketing and outreach (see Chapter 5). An indicator of market effects is an increase in the level of marketing of energy efficiency by contractors in the BBNP grantee regions that contractors attribute to the BBNP grantee.

- *Adoption of energy-efficient building practices by contractors*: With BBNP training efforts and increased demand, an expected market effect is increased installation of energy-efficient technologies and practices such as high-efficiency HVAC equipment, insulation, and air sealing. BBNP may not only affect the number of energy-efficiency upgrades but also the energy savings realized by non-program upgrades.
- *Increased sales and availability of high-efficiency equipment and products*: If BBNP results in increased demand for energy-efficiency upgrades and adoption of energy-efficient building practices, an expected market effect is increased sales of high-efficiency equipment reported by distributors.

CHARACTERISTICS OF CONTRACTORS AND EQUIPMENT SUPPLIERS

In this section, we provide a summary of the characteristics of the contractors and equipment suppliers. Additional supporting analysis for the findings reported in this chapter may be found in Appendix E, and a complete listing of frequency responses for each survey item is provided in Appendix F. (Note that the final evaluation will include larger samples of contractors and vendors from each grantee at different levels of success, as well as larger samples from BBNP grantees with commercial programs, which will support a more detailed analysis by sector served and level of success.)

Contractors

We completed surveys with 340 contractors from 22 of the BBNP grantees, including 189 contractors who had participated with the BBNP grantee (participating) and 151 contractors who had not participated with the BBNP grantees (nonparticipating). As described in the methodology section in Chapter 1, grantees were selected based in part on DOE account managers identifying the grantee as having active programs that had achieved a substantial numbers of upgrades. Participating contractors were identified by individual grantees. Using the composite success metric described in Chapter 3, five of the 22 programs are low success, eight are medium success, and nine are high success grantees. Just over one-half of the participating contractors (56%) and slightly less than one-half of the nonparticipating contractors (45%) were from high–success grantees (Table 29).

Table 29: Distribution of Contractors by Grantee Level of Success

Level of Success	Number of Grantees	Participants (*n* = 189)	Nonparticipants (*n* = 151)
Low success	5	15%	19%
Medium success	8	30%	36%
High success	9	56%	45%

Participating contractors reported performing more energy upgrades between 2010 and 2012 compared to nonparticipating contractors (Table 30). Almost all (98% of all upgrades, with 82%

completed by participating contractors and 16% by nonparticipating contractors) were completed with existing homes while 2% were with commercial buildings

Among participating contractors, the average number of upgrades increased slightly each year; nonparticipating contractor upgrades rose from 2010 to 2011, but will fall in 2012 according to respondent expectations.

Table 30: Total and Average Number of Energy-Efficiency Upgrades Completed in Existing Buildings, 2010 to 2012

	PARTICIPANTS (*n* = 183)		NONPARTICIPANTS (*n* = 144)	
YEAR	Average Number of Upgrades	Total Number of Upgrades*	Average Number of Upgrades	Total Number of Upgrades
2010	157	28,273	49	6,860
2011	186	33,406	50	7,139
2012 (Prediction)	195	35,746	46	6,575
2010-2012	524	97,425	152	20,574

* We removed one outlier's response from the total number of upgrades based on the response being three standard deviations above the mean number of completed upgrades per employee. We replaced the respondent's estimate with a value equal to the average number of upgrades per employee multiplied by the number of employees.

Overall, the 22 BBNP grantees included in our surveys reported that they have completed 20,511 upgrades through Q2, 2012; participating contractors from the survey reported completing 8,388 upgrades with the BBNP grantees, or 41% of the total upgrades.

Distributors

We completed surveys with 164 distributors from 22 of the BBNP grantees. A large majority of both residential and commercial distributors reported selling HVAC and water heating systems (91% and 86% respectively) while fewer than one-quarter reported selling building envelope products such as insulation, windows, and air sealing (15% of the residential distributors and 18% of the commercial distributors) and lighting equipment (13% and 14%).

IMPACTS ON THE UPGRADE MARKET

One of the key expected market effects outcomes of BBNP is expanded retrofit activity by consumers and contractors. We assessed the impact of BBNP by asking contractors to rate the impact of the BBNP grantee on their business and the marketplace. In addition, we asked contractors to quantify the number of upgrades they attribute to BBNP.

We asked contractors to assess if the BBNP grantee has had an effect on their business and the market for energy-efficiency upgrades and if it will have an effect in the next two years. Contractors were asked to agree or disagree with the following four statements using an 11-point scale, where zero is "strongly disagree" and 10 is "strongly agree":

- There is more business for your company than there would have been without the program
- There is more business in general in the marketplace than there would have been without the program
- In the next two years, there will be more business for your company than there would have been without the program
- In the next two years, there will be more business in general in the marketplace than there would have been without the program

Figure 13 illustrates the percentage of respondents who strongly agreed (a rating of 7 or higher) with a specific statement.[97] BBNP appears to have had a positive impact on participating contractors and there is some preliminary evidence of modest amounts of spillover among nonparticipating contractors. The percentage of total upgrades that these participating contractors represent ranges from 31% to 48%; these nonparticipating contractors represent a negligible amount of upgrades (surveyed contractors completed a total of 117,999 upgrades between 2010 and 2012).

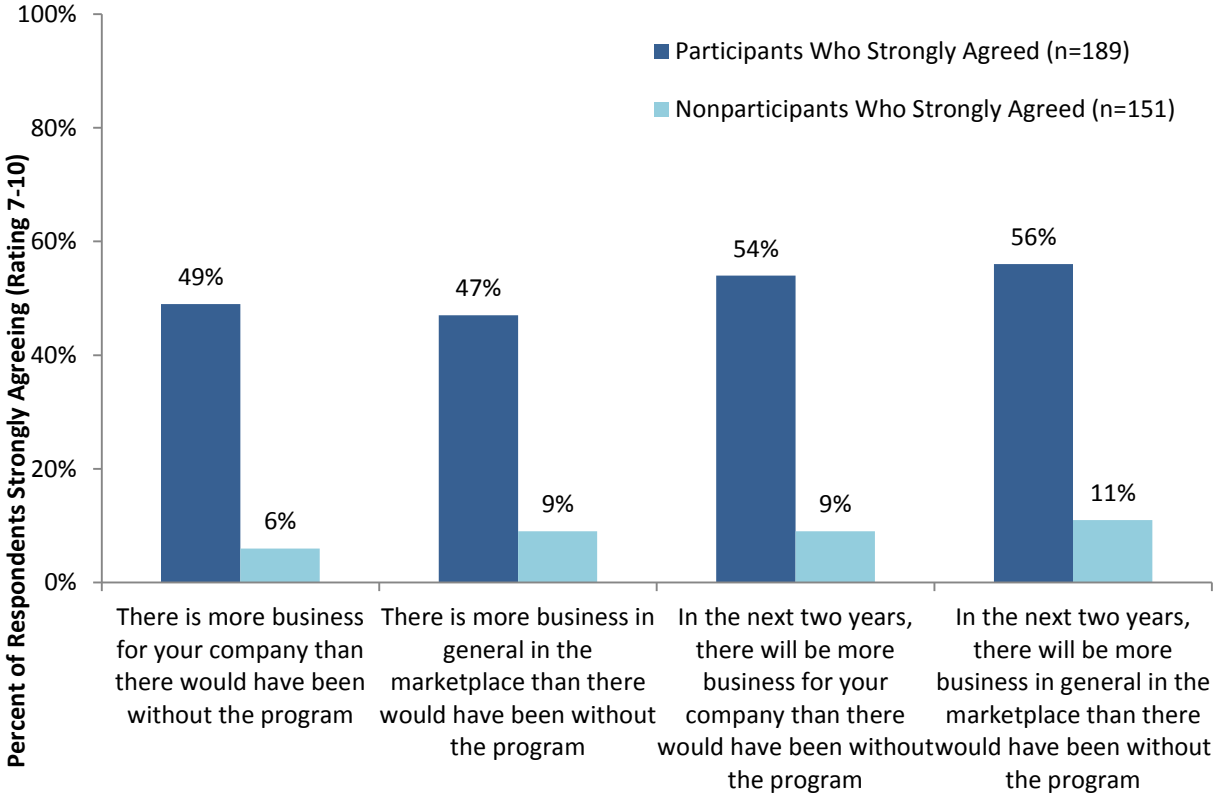
Reviewing these findings, 49% of participating contractors strongly agreed that there was more business for their company because of the BBNP grantee. These contractors represented 31% of all upgrades completed by all respondents from 2010 to 2012. It is important to consider not only the percentage of contractors who attributed changes to BBNP, but also the relative portion of the upgrade marketplace that the contractors represented.

A much smaller percentage of nonparticipating contractors, 6%, reported that the BBNP grantee program had increased the amount of business for their companies. This relatively small level of nonparticipant spillover is noteworthy for programs that have been operating for less than two years.

Similarly, 47% of participating contractors strongly agreed that there was more business in general in the marketplace than there would have been without the program. These contractors represented 35% of all upgrades completed by all respondents from 2010 to 2012. Again, a much smaller percentage of nonparticipating contractors, 9%, reported an increase in business in general in the marketplace due to the program.

[97] All participating contractors and 44% of non-participating contractors are aware of their local BBNP grantee program. (See Appendix E for more details). Figure 13 reports for all participating and non-participating contractors.

Figure 13: Contractor Assessment of the Effect of BBNP Grantee Program on the Market for Energy Efficiency



When considering the energy efficiency market in the next two years, more than one-half of participating contractors strongly agreed that there will be more business for their company (54%) and that there will be more business in general in the marketplace (56%) than there would have been without the program. A small percentage of nonparticipating contractors strongly agreed that there will be an increase in business either for their own company (9%) or in the marketplace in general (11%).

Among both groups of contractors, larger percentages of respondents said they expect more energy-efficiency work in the next two years because of the BBNP program than agreed that the program had already increased business either in general or for their company. This suggests that even though some contractors have not yet seen the impact of the BBNP program on the market, they expected to in the next two years.

Grantee Success Indicators and Contractor Assessments

Comparing responses among the grantees by level of success, we found that a higher percentage of participating contractors from the low-success grantees compared to contractors from the medium and high-success grantees reported that the BBNP grantee program led to more business

for their companies. It is important to note that the differences are not statistically significant, so there is not clear and definitive evidence of differences among the grantees by level of success. In addition, participating contractors from high-success grantees who noted an increase in business were responsible for a higher percentage of the upgrades in their regions than was the case among participating contractors from the low and medium-success grantees (Table 31). Thus, the high-success grantees may be affecting the businesses of relatively larger contractors.

In addition, we found that a higher percentage of participating contractors from the low-success grantees said the BBNP grantee program had led to more business in the marketplace in general, and will result in more business for their company and the marketplace in general in the next two years (see Appendix E for more details). The final evaluation will further examine differences across grantees by level of success.

One conceivable explanation for the differences by level of success could be the presence of other energy-efficiency programs, such as utility-sponsored programs – that is, BBNP could have less influence in markets with other programs. While we found no differences in rates of participation in other energy-efficiency programs, such as utility-sponsored programs, across the grantee level of success, preliminary results from the process evaluation suggest that high success grantees have more energy efficiency experience. The data available through this do not shed light on why there appear to be differences across success levels; the final evaluation will investigate this issue.

Table 31: Respondents Who Strongly Agreed that There is More Business for Their Company with BBNP

	PARTICIPANTS			NONPARTICIPANTS		
LEVEL OF SUCCESS	N	Percent of Participants Who Strongly Agreed (7-10)*	Percent of All Upgrades**	N	Percent of Nonparticipants Respondents Who Strongly Agreed (7-10)*	Percent of All Upgrades
Low success	28	61%	15%	28	4%	<1%
Medium success	56	45%	14%	55	4%	<1%
High success	105	51%	38%	68	9%	<1%
Total	**189**	**51%**	**31%**	**151**	**6%**	**<1%**

* Percentages of respondents are based on the total number of each respective population of participating and nonparticipating contractors for each level of success and overall.
** Percentages of upgrades are based on the total number upgrades for each level of success and overall (i.e., 22,097 for low-success grantees, 38,119 for medium, 57,783 for high, and 117,999 for total).

Net Upgrades Attributable to BBNP

We have made a preliminary estimate of the number of energy-efficiency upgrades attributable to the 22 BBNP grantees included in this preliminary market assessment. This provides an initial estimate of the net impacts of the BBNP grantees for participating

contractors (that is, the estimate includes both free ridership and spillover) and an estimate of nonparticipant spillover for nonparticipating contractors. We estimate a net-to-gross (NTG) ratio for the grantees by combining the total estimated net number of energy-efficiency upgrades from participating and nonparticipating contractors and dividing by the total number of BBNP-supported upgrades reported by participating contractors. It is important to note that the estimate applies only to these 22 grantees, all of which were chosen because of their early success, and that the estimate does not apply to the overall BBNP.[98] Further, the data are self-reported and have not been corroborated by field studies.

We took several steps to estimate the number of net energy-efficiency upgrades; Table 32 illustrates the steps with responses from several participating contractors.

- Respondents (participating and nonparticipating contractors) estimated the number of energy-efficiency upgrades they would have completed in the absence of the BBNP grantee activities during the 2010-to-2012 time period, with all other things remaining the same (i.e., the economy, energy prices, and other energy-efficiency programs). Please see column "C" in Table 32.
- Subtracting this value from a respondent's estimate of total upgrades performed between 2010 and 2012. (column "A" in Table 32) provides an initial estimate of the net impacts of the BBNP grantee for participating contractors (that is, the estimate includes both free ridership and spillover) and an estimate of nonparticipant spillover for nonparticipating contractors (column D, Table 32).

  For example, respondent 1 in Table 32 completed 730 upgrades between 2010 and 2012 (column A) and estimated that he/she would have completed 100 upgrades in the absence of the BBNP grantee (column C), we estimated a net impact of 630 upgrades for the respondent (column D & J). The same respondent completed 600 upgrades with the BBNP grantee, resulting in an estimated net-to-gross (NTG) ratio of 1.05 for the respondent (i.e., 630 divided by 600 = 1.05; column K), meaning that the BBNP grantee program resulted in spillover upgrades for the respondent. In contrast, respondent 3 in Table 32estimated 80 upgrades in the absence of the BBNP grantee, or 50 net upgrades, but completed 60 upgrades with the grantee, resulting in an estimated NTG of 0.83 (i.e., 50 divided by sixty = 0.83), meaning that approximately 17% of the BBNP upgrades were free-riders.
- Next, we used respondents' ratings of the impacts of the BBNP grantee on their business and the energy-efficiency upgrade market as a consistency check of program influence on net upgrades. We combined the four question series (Figure 13 and footnoted in Table 32) into a scale and used an average score of seven or higher[99] (i.e., rating BBNP as

[98] Further, for some grantees the findings only apply to the sub-regions included in the study.

[99] We rounded up scores of 6.5 to 6.9 and considered them as scores of seven or higher.

having a positive impact on their business and the upgrade market) as the minimum required score to use a respondent's estimate of net impacts (column "I", Table 32).[100] Nonparticipating contractors with a score below seven were treated as zeros (i.e., zero spillover upgrades).

For participating contractors, an average score lower than seven is interpreted as indicating that the participating contractor did not believe the program had an overall positive impact on their business and the market, and therefore is not consistent with spillover into non-program upgrades (respondents 5, 6, 7, and 8 in Table 32). For these participating contractors, we estimated the proportion of their BBNP-supported upgrades that were free-riders. In these cases, we used a contractor's assessment of the impact of the BBNP grantee on their business (i.e., column E in Table 32: "There is more business for your company than there would have been without the program") to assign the following net values to their BBNP grantee upgrades:[101]

- A rating of seven or higher = 100% net (i.e., the program had a strong impact on their business, all the BBNP grantee projects are counted as net upgrades). For example, respondent 7 in Table 32.
- A rating of six = 80% net (i.e., 80% of the BBNP grantee projects are counted as net upgrades). For example, respondent 6 in Table 32.
- A rating of five = 60% net
- A rating of four = 40% net
- A rating of three = 20% net
- A rating of two or lower = 0% net (i.e., strong disagreement that the BBNP grantee had a positive effect on their business; none of the BBNP grantee projects are counted as net upgrades)

➡ Last, for participating contractors we examined the ratio of net BBNP upgrades to the number of upgrades completed with the BBNP grantees (i.e., individual NTG ratios) to identify any outliers. Three respondents had NTG ratios more than three standard deviations above the mean NTG ratio, meaning the respondents estimated that, for every one BBNP upgrade, they completed 30 or more additional upgrades. We replaced their estimates of net upgrades with their estimated number of BBNP upgrades.[102]

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100 The four-question scale has a Cronbach's α of 0.93. Cronbach's α is a measure of inter-item correlation and scale reliability. A score of 0.9 or higher is generally considered an excellent indication of inter-item correlation and scale reliability (DeVellis, R. F. 1991. *Scale Development Theory and Applications*. Second Edition. London: Sage Publications).

101 We used the same values for counting nonparticipant spillover.

102 All three respondents had values over 6.5 for the program attribution scale.

Table 32: Examples of Estimating Net BBNP Upgrades, Participating Contractors

Respondent	[A] Number of Upgrades, 2010 to 2012	[B] BBNP Upgrades	[C] Upgrades without BBNP	[D] Initial Net BBNP Upgrades (A – C)	[E] Scale 1*	[F] Scale 2*	[G] Scale 3*	[H] Scale 4*	[I] Average Scale 1 to 4	[J] Final Net BBNP Upgrades (based on E if I < 7)	([K] / [B])
1	730	600	100	630	10	10	10	10	10	630	1.05
2	790	10	750	40	10	8	8	8	8.5	40	4
3	130	60	80	50	9	9	8	8	8.5	50	0.83
4	62	50	5	57	10	5	10	5	7.5	57	1.14
5**	335	150	120	215	6	4	7	7	6	120 #	0.8
6**	3,300	150	2,800	500	3	5	8	8	6	30 #	0.2
7**	14	6	6	8	7	5	0	8	5	6 #	1
8**	300	50	200	100	5	5	5	5	5	30 #	0.6

* Scale 1: There is more business for your company than there would have been without the program
* Scale 2: There is more business in general in the marketplace than there would have been without the program
* Scale 3: There will be more business for your company than there would have been without the program [in the next two years]
* Scale 4: There will be more business in general in the marketplace than there would have been without the program [in the next two years]
** Respondent 5: Final net BBNP upgrades = (0.8)*(column B), based on response of 6 to Scale 1 (column E)
** Respondent 6: Final net BBNP upgrades = (0.2)*(column B), based on response of 3 to Scale 1 (column E)
** Respondent 7: Final net BBNP upgrades = (1)*(column B), based on response of 7 to Scale 1 (column E)
** Respondent 8: Final net BBNP upgrades = (0.6)*(column B), based on response of 5 to Scale 1 (column E)

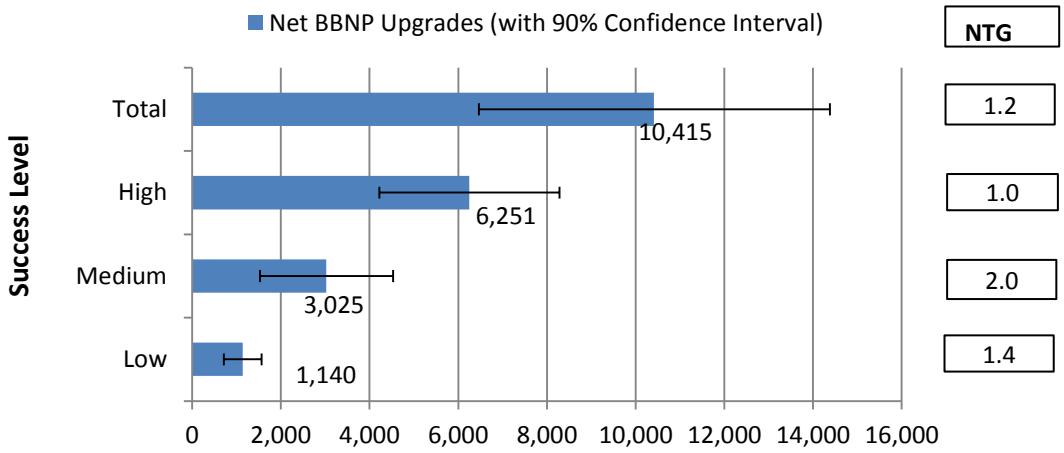
Table 33 and Figure 14 illustrate our estimates of the net number of upgrades attributable to the BBNP grantees included in this preliminary evaluation. Overall, the respondents estimated a total of 10,415 net upgrades attributable to BBNP, compared to 8,388 BBNP-supported upgrades, with the 90% confidence interval ranging from 6,468 to 14,384 upgrades. We estimate a NTG ratio of 1.2 (10,415 divided by 8,388), with the 90% confidence interval ranging from a NTG of 0.8 to 1.7. This means that for the 22 BBNP grantees included in this study, we are relatively confident that contractors are estimating at least low levels of free-ridership and at most relatively high levels of spillover into the upgrade markets served by the grantees.

Table 33: Net Upgrades Attributable to the BBNP (Preliminary Estimates from Participant and Nonparticipant Reports)*

Level of Success	BBNP-Supported Upgrades	Net Number of Upgrades	Spillover	Net BBNP Upgrades	90% Confidence Interval**		Overall NTG
					Low	High	
Low	836	1,140	0	1,140	713	1,567	1.4
Medium	1,484	2,991	34	3,025	1,531	4,530	2.0
High	6,068	6,202	49	6,251	4,224	8,287	1.0
Total	**8,388**	**10,332**	**83**	**10,415**	**6,468**	**14,384**	**1.2**

* Base: 189 participating contractors [data used to estimate "BBNP-Supported Upgrades" and "Net Number of Upgrades", and 151 non-participating contractors [data used to estimate "Spillover"] from 22 BBNP grantees.
** The 90% confidence interval was based on the mean values of net BBNP upgrades.

Figure 14: Preliminary Estimate of Net Upgrades Attributable to BBNP*



* Base: 189 participating contractors and 151 nonparticipating contractors from 22 BBNP grantees included in preliminary process evaluation

Evaluations of whole-house retrofit programs in Massachusetts and New York found similar NTG values of 1.12 for each program. For example, a recent evaluation of Massachusetts Home Energy Assessment program, using a combination of participant self-reports, discrete choice modeling and trade ally interviews, estimated an overall NTG ratio of 1.12.[103] Similarly, a 2006 evaluation of the New York Home Performance with ENERGY STAR program used a combination of homeowner and contractor surveys to estimate a NTG ratio of 1.12.[104]

Interestingly, while the high-success grantees account for the bulk of the net number of upgrades, the low and medium-success grantees appear to have had higher rates of net impacts than the high-success grantees (Figure 14). The final evaluation will further examine differences across the grantee success levels. In addition, we detected nonparticipant spillover only in medium- and high-success grantees. It is important to note that we cannot estimate energy savings from any of the spillover upgrades because we do not have data on the type of equipment installed or replaced in these non-program upgrades.

We extrapolated the net impacts from the sample to the population of participating and nonparticipating contractors in the 22 grantee regions. For participating contractors, we extrapolated proportionally to the percentage of the grantee-reported BBNP upgrades represented by respondents' estimates of BBNP upgrades. For nonparticipating contractors, we extrapolated proportionally to the estimated population of contractors in each grantee region.[105]

Overall, we estimate a total of 29,581 net upgrades attributable to the 20,511 BBNP grantee-reported upgrades, with the 90% confidence interval ranging from 24,521 to 35,238 upgrades (Table 34 and Figure 15). We estimate a NTG ratio of 1.4 (29,581 divided by 20,511), with the 90% confidence interval ranging from a NTG of 1.2 to 1.7.

The NTG values of the extrapolated number of upgrades increase largely because of the impact of nonparticipant spillover. While we found relatively low levels of nonparticipant spillover among our respondents (83 nonparticipant spillover upgrades as reported in Table 35) our respondents represent only 2% of the population of nonparticipating contractors. Extrapolating the low levels of nonparticipant spillover to the entire population of nonparticipating contractors results in an estimated increase of over 4,000 net BBNP upgrades. As we noted earlier, it is important to keep in mind that we cannot estimate energy

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[103] Cadmus. 2011. *2010 Net-to-Gross Findings: Home Energy Assessment*. Prepared for the Electric and Gas Program Administrators of Massachusetts. Waltham, Mass.: The Cadmus Group, Inc.

[104] Quantec and Summit Blue, LLC. 2006. *Home Performance with ENERGY STAR Program: Market Characterization, Market Assessment and Causality (MCAC) Evaluation Final Report.* Prepared for the New York State Energy Research and Development Authority (NYSERDA).

[105] The population of nonparticipating contractors is described in Chapter 1 and Appendix E. Data on the total number of upgrades by nonparticipating contractors were not available.

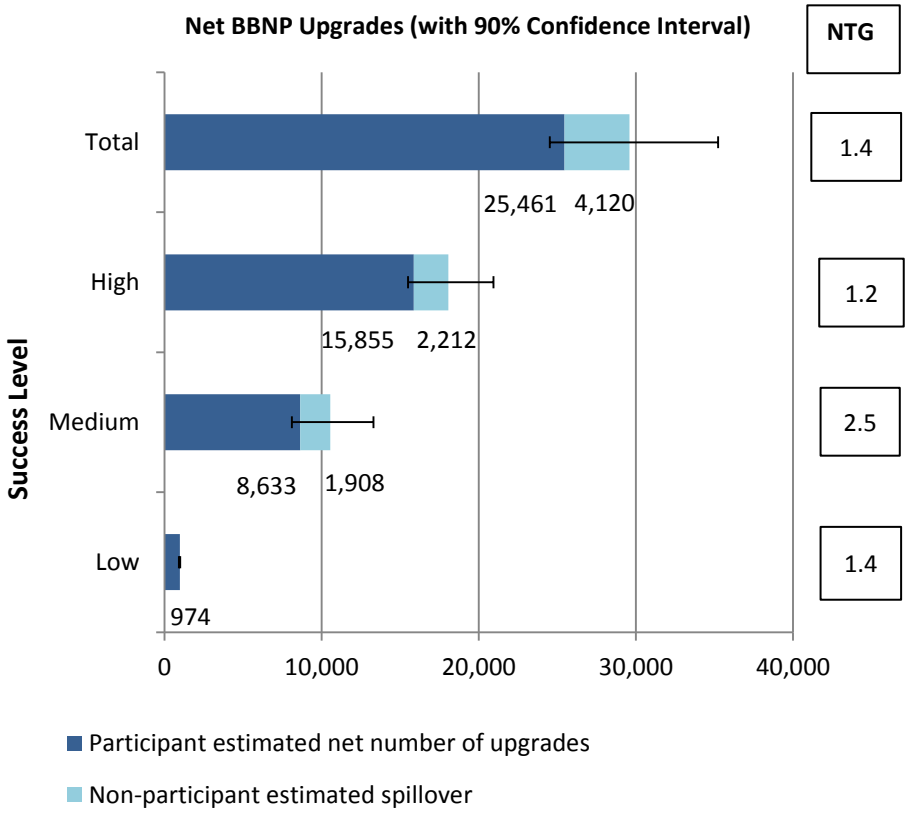
savings from any of the spillover upgrades because we do not have data on the type of equipment installed or replaced in these non-program upgrades.

Table 34: Preliminary Extrapolated Estimate of Net Upgrades Attributable to BBNP*

Level of Success	Grantee Reported Upgrades (Q2, 2012)	Participant Estimated Net Number of Upgrades	Non-participant Estimated Spillover	Net BBNP Upgrades	90% Confidence Interval**		Overall NTG
					Low	High	
Low	714	974	0	974	922	999	1.4
Medium	4,284	8,633	1,908	10,541	8,104	13,304	2.5
High	15,513	15,855	2,212	18,066	15,495	20,934	1.2
Total	**20,511**	**25,461**	**4,120**	**29,581**	**24,521**	**35,238**	**1.4**

* Base: 189 participating contractors and 151 non-participating contractors from 22 BBNP grantees.
** The 90% confidence interval was based on the mean values of net BBNP upgrades.

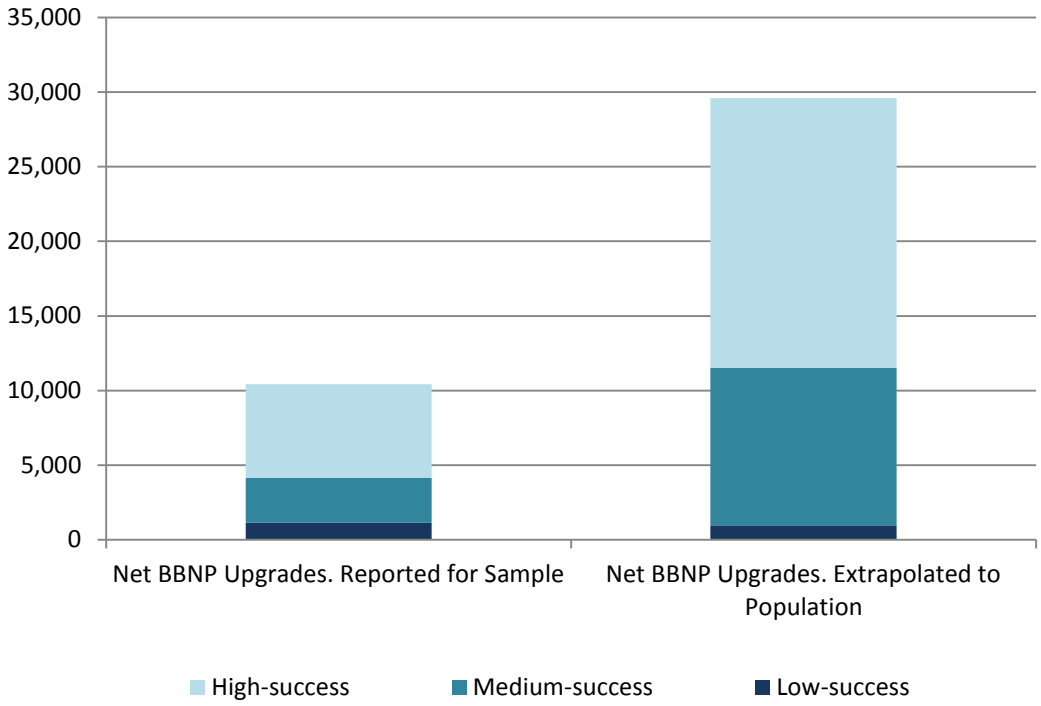
Figure 15: Preliminary Extrapolated Estimate of Net Upgrades Attributable to BBNP*



* Base: 189 participating contractors and 151 non-participating contractors from 22 BBNP Grantees Included in Preliminary Process Evaluation

Figure 16 combines the findings from Figure 11 and Figure 12, showing respondent-reported net BBNP upgrades on the left and; on the right, upgrades estimated via extrapolation for the entire market.

Figure 16: Net BBNP Upgrades, Reported for Sample and Extrapolated to Population



We compared the average number of net upgrades for both participating and nonparticipating contractors who also participated in other programs, such as utility-sponsored programs. We found that participating contractors who also participated in EECBG[106]-funded programs reported a higher average number of net BBNP upgrades than those who did not participate in EECBG-funded programs. Participating contractors who also participated in utility-sponsored programs or WAP[107] also reported more net upgrades, though the differences are not statistically different, so there is not clear and definitive evidence of differences associated with participating in utility-sponsored programs or WAP. We will investigate this issue in the final evaluation.

106 The Energy Efficiency and Conservation Block Grant program is intended to assist U.S. cities, counties, states, territories, and Indian tribes to develop, promote, implement, and manage energy efficiency and conservation projects and programs (http://www1.eere.energy.gov/wip/eecbg.html).

107 The Weatherization Assistance Program is a program designed to reduce the energy bills of low-income families by making their homes more energy efficient *(*http://www1.eere.energy.gov/wip/wap.html*)*.

In addition, both participating and nonparticipating contractors who participated in other programs reported completing more total upgrades than those who did not participate in other programs (though many of the differences are not statistically different, so there is not clear and definitive evidence of differences associated with participating in other programs [see Appendix E for more details on these analyses]). This suggests that participation in other programs may have a complementary and positive effect on net upgrades and total activity in the upgrade market. Alternatively, it may suggest that the programs are reaching the larger contractors in their regions or that active contractors participate in multiple programs.

As a follow-up, we asked contractors to assess the importance of five program elements commonly adopted by the BBNP grantees by asking them to estimate the percentage of their net BBNP upgrades attributable to each program element (Table 35). Participating contractors attributed the highest percentage of their upgrades to rebates and incentives, followed by low-interest financing.

Table 35: Average Percent of Net BBNP Upgrades Attributable to Individual Program Components

	PARTICIPANTS			NONPARTICIPANTS		
GRANTEE PROGRAM ELEMENT	N	Mean Percent of Projects	Percent of Net BBNP Upgrades*	N	Mean Percent of Projects	Percent of Net BBNP Upgrades
Rebates and other incentives	118	33%	26%	6	33%	<1%
Low-interest financing	112	26%	19%	7	16%	<1%
Free/reduced-cost energy assessments	120	23%	24%	6	18%	<1%
Marketing and outreach	113	20%	18%	6	16%	<1%
Training of contractors	98	10%	8%	6	14%	<1%

* Percent of Net BBNP Upgrades does not add up to 100% due to Don't Know/Refused responses not shown here.

INCREASED AVAILABILITY OF TRAINED CONTRACTORS

Another key expected outcome that could indicate market effects of BBNP is increasing the technical capability of contractors through training.

In order to assess the impact, both participating and nonparticipating contractors were first asked whether they or any of their staff had received any training in energy-efficient building practices or technologies, and, if aware of the BBNP grantee program, whether they or their staff had attended any trainings sponsored by that program (Table 36).

Table 36: Contractor Training in Energy-Efficient Building Practices

	PARTICIPANTS (*n* = 189)			NONPARTICIPANTS (*n* = 151)		
	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Upgrades	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Upgrades
Received **any** training	93%	79%	91%	64%	16%	1%
Attended training sponsored by the BBNP grantee	61%	51%	79%	18%	1%	<1%
Believe number of trained contractors has increased (2010 to 2012)	84%	71%	84%	74%	15%	1%
Level of influence of BBNP on increased number of trained contractors is 7 or higher*	48%	31%	67%	8%	1%	<1%

* On a scale from 0 to 10, where 0 is "no influence at all" and 10 is "a great deal of influence."

Almost all participating contractors (93%) and nearly two-thirds of nonparticipating contractors (64%) reported having received training in energy-efficient building practices or technologies; not surprisingly, a higher percentage of participating contractors (61%) had attended training sponsored by a BBNP grantee than had nonparticipating contractors (18%).

When asked whether the number of contractors trained in energy-efficient building practices or technologies had increased from 2010 to 2012, the majority of both groups (84% of participating contractors and 74% of nonparticipating contractors) reported that it had. Those that were aware of the BBNP grantee program and reported an increase in the number of trained contractors were asked to rate the level of influence of the BBNP program on the increase.

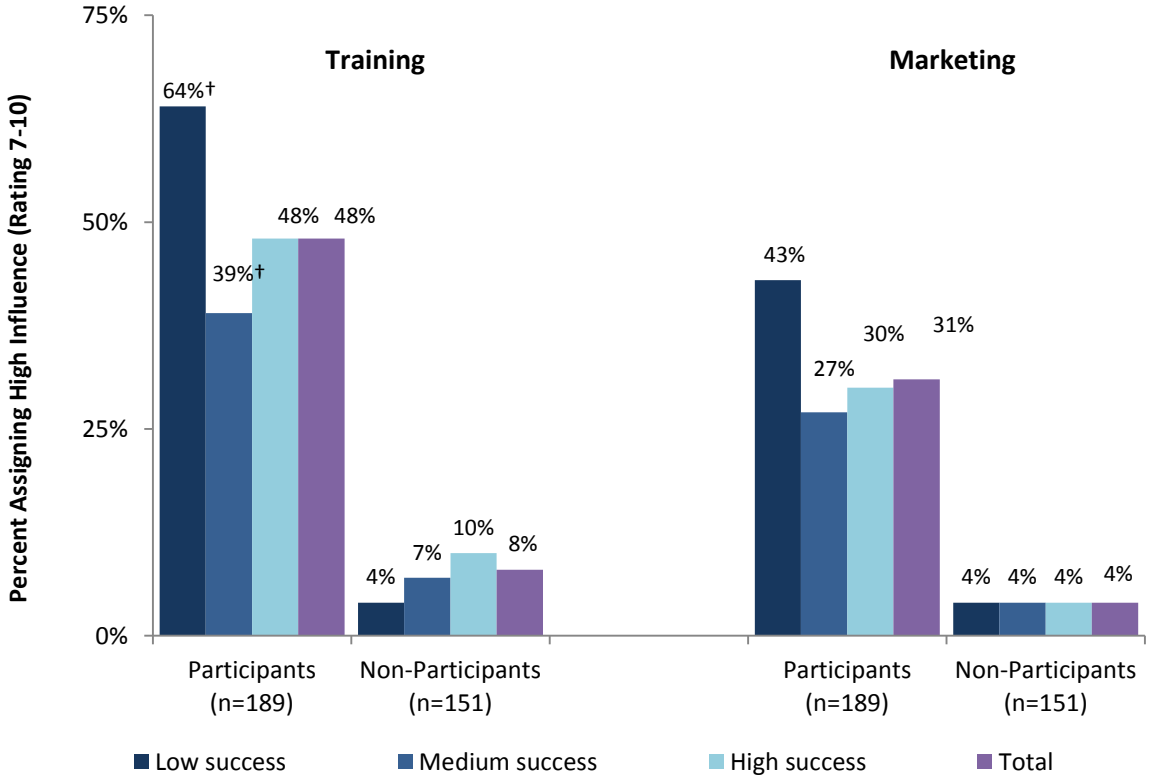
Nearly one-half (48%) of the participating contractors who were responsible for 31% of all upgrades reported the BBNP grantee program had strongly influenced this increase.[108] In addition, 8% of nonparticipating contractors felt the program had had a strong influence. This evidence suggests that BBNP has had a positive impact on the number of trained contractors in the regions served by BBNP grantees.

Comparing responses of those who said the program had strongly influenced the increased number of trained contractors by level of grantee success, we found that a higher percentage of

[108] Includes those rating the program's influence anywhere from 7-10 on a scale of 0-10, where 0 is "no influence at all" and 10 is "a great deal of influence."

participating contractors from the low-success grantees reported the program had strongly influenced an increased number of trained contractors (Figure 17).This may indicate that there were fewer trained contractors in low-success grantee regions compared to medium- and high-success grantee regions, so that training supported by low-success grantees had a larger relative impact on the number of trained contractors. Contractors in this group were also responsible for a higher percentage of the upgrades in their regions. The final evaluation will examine differences across success levels.

Figure 17: Level of Influence Better Building Programs had on Number of Contractors Trained in Energy-Efficient Building Practices by Grantee Level of Success



† Denotes a significant difference between success levels at the 90% confidence level

INCREASED MARKETING BY CONTRACTORS

BBNP expects grantees to increase consumer demand through marketing and outreach. Grantees have used a variety of marketing approaches as discussed in Chapter 5. An indicator of market effects would be an increase in the level of marketing of energy efficiency by contractors in BBNP grantee regions that contractors attributed to the BBNP grantee.

As shown in Table 37, nearly two-thirds of participating contractors (65%), who were responsible for 64% of all upgrades, and one-half of nonparticipating contractors indicated that their marketing of energy efficiency and energy-efficient features had increased since 2010. Furthermore, 47% of participating contractors and 18% of nonparticipating contractors said that changes that they had made to marketing had led to an increase in the number of upgrades.

Nearly one-third (31%) of participating contractors, who were responsible for 14% of all upgrades, reported that the BBNP grantee program had strongly influenced their increased marketing. In addition, 4% of nonparticipating contractors reported that the BBNP grantee had strongly influenced their increased marketing. This evidence suggests that BBNP has had a positive impact on the marketing practices of a notable percentage of participating contractors and even a small percentage of nonparticipating contractors.

Table 37: Marketing of Energy Efficiency Since 2010

	PARTICIPANTS (*n* = 189)*			NONPARTICIPANTS (*n* = 151)*		
CHANGE IN PROJECTS	Percent of Participants	Percent of Total Upgrades	Percent of Net BBNP Upgrades	Percent of Non-participants	Percent of Total Upgrades	Percent of Net BBNP Upgrades
The amount you market energy efficiency and energy-efficient features has increased.	65%	64%	68%	50%	13%	1%
The number of projects you have worked on has increased due to the changes you made to marketing.	47%	51%	62%	18%	7%	1%
Level of influence of BBNP on increased marketing is 7 or higher**	31%	14%	47%	4%	<1%	<1%

* Sample sizes vary across questions.
** On a scale from 0 to 10, where 0 is "no influence at all" and 10 is "a great deal of influence."

Comparing the responses of those who said the program had strongly influenced their marketing practices by level of grantee success, we found that a higher percentage of participating contractors from the low-success grantees (43%), compared to other groups (27% for medium-success and 30% for high-success, reported the program had strongly influenced their marketing practices (though the differences are not statistically different, so these findings do not provide clear and definitive evidence of differences by success level). This group of contractors was responsible for a higher percentage of the upgrades in their regions (Table 38).

Table 38: Influence of the BBNP Grantee on the Amount Contractors Market Energy-Efficiency Upgrade Projects by Grantee Level of Success

Level of Success	Participants (*n* = 189)			Nonparticipants (*n* = 151)		
	Percent of Respondents*	Percent of Total Upgrades**	Percent of Net BBNP Upgrades	Percent of Respondents*	Percent of Total Upgrades**	Percent of Net BBNP Upgrades
Low success	43%	29%	49%	4%	<1%	0%
Medium success	27%	9%	51%	4%	<1%	<1%
High success	30%	12%	44%	4%	<1%	<1%
Total	**31%**	**14%**	**47%**	**4%**	**<1%**	**<1%**

* Percentages of respondents are based on the total number of each respective population of participating and nonparticipating contractors for each level of success and overall.
** Percentages of upgrades are based on the total number upgrades for each level of success and overall (i.e., 22,097 for low-success grantees, 38,119 for medium, 57,783 for high, and 117,999 for total).

IMPACTS ON CONTRACTOR BUILDING PRACTICES

Adoption of energy-efficient products, services, or practices by contractors in regions with BBNP grantees is another indicator of potential market effects. Examining the building practices of participating and nonparticipating contractors allows us to assess preliminary changes in the market or in market actors' behavior resulting from BBNP activities. Contractors were asked about upgrades that reduced energy usage by 15% or more, changes in standard practices, and changes in installation of specific energy-efficient technologies such as insulation, air sealing, lighting and HVAC equipment. We note that these are self-reported data that have not been corroborated by other potential data sources such as field studies or sales data.

We asked contractors to estimate the percentage of the energy-efficiency upgrades that they had installed (or will install in 2012) that reduced energy usage by 15% or more during 2010 to 2012. Participating contractors reported that approximately three-quarters of their projects for each year reduced energy use by 15% or more; nonparticipating contractors reported that just above one-half of their projects for each year reduced energy use by 15% or more.[109] For both

[109] It is difficult to verify contractors' estimates of reduced energy usage associated with their upgrades. The Home Performance with ENERGY STAR (HPwES) website estimates 20% savings in utility bills: *http://www.energystar.gov/ia/partners/reps/pt_reps_home_performance/HPwESSampleBrochure.pdf?fea4-3b94*. However, evaluations of HPwES programs commonly estimate savings in energy units, such as kWh or BTUs, rather than in terms of percent of energy savings. See, for example, Quantec and Summit Blue, LLC. 2006. *Home Performance with ENERGY STAR Program: Market Characterization, Market Assessment and Causality (MCAC) Evaluation Final Report.* Prepared for New York State Energy Research and Development Authority (NYSERDA) or Opinion Dynamics. 2009. *Process and Impact Evaluation of The 2007-2008 Energy Trust of Oregon Home Energy Solutions Program. Volume 1: Summary Report.* (*http://energytrust.org/library/reports/ETO_HES_Process_and_Impact_Report_Volume_1.pdf*)

participating and nonparticipating contractors, there was little evidence to suggest a large change in the percentage of high-savings projects between 2010 and 2012 (Table 39).

Table 39: Average Percent of Upgrades with 15% or More Reduced Energy Usage

	PARTICIPANTS		NONPARTICIPANTS	
PROGRAM YEAR	N	Mean Percent of All Upgrades	N	Mean Percent of All Upgrades
2010	140	73%	97	53%
2011	158	72%	94	52%
2012	158	75%	101	56%

We also asked participating contractors to assess the impact of their participation in the BBNP grantee program on upgrades that they had worked on outside of the program. Participating contractors most commonly talk about energy efficiency more often with customers (19%) and were using materials that are more efficient (12%). Since they began participating in the BBNP grantee programs, more than 40% of participating contractors have changed their standard practices in non-BBNP upgrades (Table 40).

Table 40: Changes to Standard Projects Outside of the Better Building Program (Multiple Responses)

CHANGE	PARTICIPANTS (*n* = 189)
In general, talk about energy efficiency more with customers	19%
Use more efficient materials	12%
Offer more services/changed processes	7%
Compare efficiency levels of different equipment	4%
More focus on/more aware of energy-efficiency services	4%
Better quality work and skill level	4%
Explain payback period/savings	3%
Changed marketing/promotion practices	3%
More staff, training, and jobs	2%
Other	4%
Nothing/None	53%
Don't know	5%

Those participating contractors who said that they had made at least one change to their standard practices for projects outside the program were also asked to rate the level of influence that they felt the BBNP grantee program had on these changes. On an 11-point scale (where zero is "no influence at all" and 10 is "a great deal of influence"), 21% of participating contractors who were responsible for 10% of all upgrades reported that the BBNP program had a strong influence (a rating of 7 or higher) on changes to their standard practices (Table 41). The percentage of

participating contractors who felt the BBNP grantee program had a strong influence on their standard practices did not vary by level of grantee success.

Table 41: Influence of BBNP on Standard Practices for Non-BBNP Upgrades by Level of Success

Level of Success	N	Percent of Respondents Who Rated BBNP Influence 7 to 10*	Percent of Total Upgrades**	Percent of Net BBNP Upgrades
Low success	28	21%	3%	27%
Medium success	56	21%	9%	58%
High success	105	20%	14%	48%
Total	**189**	**21%**	**10%**	**48%**

* Percentages of respondents are based on the total number participating contractors for each level of success and overall.
** Percentages are based on the total number of upgrades for each level of success and overall (i.e., for total upgrades, 22,097 for low-success grantees, 38,119 for medium, 57,783 for high, and 117,999 for total).

Residential Building Practices

We asked residential contractors about their business practices for building envelope measures, HVAC equipment services, and lighting.[110] This sub-section presents the results and our conclusions by measure category. The guidelines that we used for determining high efficiency values, and additional details on contractor installation practices, can be found in Appendix E.

We found that BBNP has affected the practices of residential building envelope and HVAC contractors. For the majority of building envelope and HVAC measures, participating contractors on average have been installing higher-efficiency building envelope and HVAC measures more frequently than they did before the program and more frequently than nonparticipating contractors did.

Moreover, the rate at which they are changing their business practices has been more rapid than that of nonparticipating contractors for many of the building envelope and HVAC measures. Notable shares of participating contractors attributed the changes in their business practices to the BBNP grantee. Evidence also suggests that BBNP has affected the practices of relatively large participating insulation and air sealing contractors.

However, we do not see strong evidence that the program has affected the installation of high-efficiency lighting among participating and nonparticipating contractors. Across all residential

[110] To limit respondent burden, we asked respondents about the two types of services that comprise the largest shares of their companies' businesses. For example, if a respondent primarily installs residential lighting and residential HVAC equipment, we would not have asked them about the residential building envelope work that they conduct even if it is an element of their business.

measure categories, there was minimal to no sign of spillover to the lighting practices of nonparticipating contractors.

Residential Building Envelope

We asked respondents who install insulation to estimate the percent of homes where they install or have installed attic or ceiling insulation to the ENERGY STAR recommended minimum R-values for the respective climate zones that they serve.[111] As shown in Table 42, since 2010, participating contractors on average installed ENERGY STAR recommended minimum R-values in a greater percentage of the homes that they served than did nonparticipating contractors. Between 2010 and 2012, there was a small increase in the percentage of homes in which both groups of contractors installed insulation that met or exceeded ENERGY STAR-recommended minimum R-values.

Table 42: Residential High-Efficiency Attic or Ceiling Insulation Upgrades

	Participants, Mean Percent of Homes (*n* = 116)*			Nonparticipants, Mean Percent of Homes (*n* = 57)*		
Equipment	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Attic or ceiling insulation that meets or exceeds ENERGY STAR recommended minimum R-values	60%	64%	65%	35%	38%	38%

* Percentages are from valid responses only: Responses of don't know, do not sell, and refused were removed. Therefore, sample sizes vary for each year.

There is also evidence that BBNP has had an effect on the efficiency level of building envelope measures installed by participating contractors. More than one-third of participating contractors who install insulation (35%) and conduct air sealing (34%) indicated that the program had a great deal of influence[112] on the efficiency level of the insulation they installed and air sealing they conducted.

These participating contractors represent a notable share of the total upgrades for insulation and air sealing (14% and 17%, respectively) and about one-half of the net BBNP projects (50% and 48%, respectively). A very small percent of nonparticipating contractors also attributed some influence to the program; however, these respondents represented less than 1% of total upgrades and net BBNP projects, suggesting limited spillover from the program for insulation and air sealing installation practices (Table 43).

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111 Interviewers specified a minimum R-value based on the grantee climate zone and the ENERGY STAR recommended minimum R-value for the associated climate zone: *http://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_insulation_table*

112 Includes those rating the program's influence anywhere from 7-10 on a scale of 0-10, where 0 is "no influence at all" and 10 is "a great deal of influence."

Table 43: BBNP Level of Influence on Energy-Efficient Residential Building Envelope Measures Installed between 2010 and 2012

A GREAT DEAL OF INFLUENCE (7 TO 10)	PARTICIPANTS (*n* = 128)*			NONPARTICIPANTS (*n* = 68)*		
	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Projects	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Projects
Insulation	35%	14%	50%	3%	<1%	<1%
Air Sealing	34%	17%	48%	4%	<1%	<1%

* Sample sizes reflect those respondents reporting that building envelope services comprise one of the largest two shares of their company's business. Percentages reflect those that identified the program's level of influence from 7-10 on a scale of 0-10 where 0 is *no influence at all* and 10 is *a great deal of influence*. Only those reporting installing the specific energy-efficient measures from 2010-2012 were asked about the program's level of influence on the respective measure.

Comparing responses among the grantees by level of success, high-success grantees appear to have been more influential than low and medium-success grantees in changing the insulation and air-sealing installation practices of participating contractors (Table 44 and Table 45). For example, over 40% of participating insulation contractors from high-success grantees reported the program was very influential on the efficiency level of the insulation that they installed compared to only 23% of participating contractors from medium-success grantees (a statistically significant difference at the 90% confidence level). Interestingly, respondents from the low-success grantee areas indicating that BBNP was highly influential were responsible for a larger percentage of the total upgrades for their success level than were medium- and high-success grantee respondents, suggesting that BBNP affected the practices of relatively larger insulation contractors in the low-success grantees (see Table 44).

Table 44: BBNP Level of Influence on Residential Insulation Installed between 2010 and 2012 by Success Level

LEVEL OF SUCCESS	PARTICIPANTS (*n* = 128)				NONPARTICIPANTS (*n* = 68)			
	N	Percent of Respondents*	Percent of Total Upgrades**	Percent of Net BBNP Upgrades	N	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Upgrades
Low success	22	36%	29%	44%	16	0%	0%	0%
Medium success	35	23%†	7%	48%	19	0%	0%	0%
High success	71	41%†	13%	52%	33	6%	<1%	<1%
Total	**128**	**35%**	**14%**	**50%**	**68**	**3%**	**<1%**	**<1%**

* Percentages of respondents are based on the total number of each respective population of participating and nonparticipating contractors for each level of success and overall.
** Percentages of upgrades are based on the total number upgrades for each level of success and overall (i.e., 22,097 for low-success grantees, 38,119 for medium, 57,783 for high, and 117,999 for total).
† Denotes a significant difference between success levels at the 90% confidence level.

Similarly, as shown in Table 45, a significantly larger percentage of participating contractors from the high-success grantees reported that the BBNP grantee was highly influential on their air sealing practices than did participating contractors from the low-success grantees. In addition, the respondents from high-success grantees were responsible for a larger percentage of the total upgrades, suggesting that BBNP affected the practices of relatively larger air sealing contractors in the high-success grantees and smaller contractors in low-success grantees. It is not clear why the low-success grantees are affecting the insulation practices compared to air sealing, but perhaps there has been more of a focus on insulation or it may be an easier measure to install compared to air sealing.

Table 45: BBNP Level of Influence on Residential Air Sealing Conducted between 2010 and 2012 by Success Level

	PARTICIPANTS (*n* = 128)				NONPARTICIPANTS (*n* = 68)			
LEVEL OF SUCCESS	N	Percent of Respondents*	Percent of Total Upgrades**	Percent of Net BBNP Upgrades	N	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Upgrades
Low success	22	18%†	4%	30%	16	0%	0%	0%
Medium success	35	29%	8%	50%	19	5%	<1%	<1%
High success	71	42%†	28%	49%	33	6%	<1%	0%
Total	**128**	**34%**	**17%**	**48%**	**68**	**4%**	**<1%**	**<1%**

* Percentages of respondents are based on the total number of each respective population of participating and nonparticipating contractors for each level of success and overall.
** Percentages of upgrades are based on the total number upgrades for each level of success and overall (i.e., 22,097 for low-success grantees, 38,119 for medium, 57,783 for high, and 117,999 for total).
† Denotes a significant difference between success levels at the 90% confidence level.

Residential HVAC

Table 46 illustrates that participating contractors have been installing energy-efficient residential HVAC equipment into a higher percentage of homes in 2012 compared to 2010. With the exception of oil boilers, the trends are similar, though changing less rapidly, for nonparticipating contractors. Some of the trend may be due to the announcement of new federal efficiency standards for residential HVAC equipment in 2011, though many of the standards do not go into effect until 2015.[113]

[113] The announcement of new federal standards can be viewed at the following website: *http://www1.eere.energy.gov/buildings/appliance_standards/residential/residential_furnaces_cac_hp_direct_final_rule.html.* The new standards can be viewed at the following website: *http://buildingsdatabook.eren.doe.gov/ChapterIntro7.aspx?7#3*

Table 46: Residential Energy-Efficient HVAC Upgrades

	Participants, Mean Percent of Units Installed (*n* = 81)**			Nonparticipants, Mean Percent of Units Installed (*n* = 46)**		
Equipment (Value)*	2010	2011	2012	2010	2011	2012
Natural Gas Furnaces (AFUE ≥94%)	60%	64%	69%	57%	58%	63%
Natural Gas Boilers (AFUE ≥90%)	45%	54%	54%	44%	46%	50%
Oil Furnaces (AFUE ≥85%)	36%	39%	41%	38%	39%	43%
Oil Boilers (AFUE ≥85%)	28%	30%	29%	43%	43%	40%
Central Air Conditioners (≥15 SEER)	46%	54%	56%	42%	45%	48%

* An explanation of how we chose these values can be found in Appendix E.

** Percentages are from valid responses only: Responses of don't know, do not sell, and refused were removed. Therefore, sample sizes vary for each year and each equipment type.

Participating contractors reported steep increases in duct sealing and high-efficiency duct insulation between 2010 and 2012 (see Table 47). On average, participating contractors estimated 12 percentage-point increases for both measures from 2010 to the end of 2012 (from 28% to 36% for high-efficiency duct insulation), whereas nonparticipating contractors estimated much slower rates of increase. The difference is particularly distinct for duct sealing, where nonparticipating contractors on average estimated a one percentage-point change from 2010 to 2012 (from 38% to 39%).

Table 47: Residential Ductwork Sealing and High-Efficiency Duct Insulation

	Participants, Mean Percent of Homes (*n* = 73)*			Nonparticipants, Mean Percent of Homes (*n* = 37)*		
Service	2010	2011	2012	2010	2011	2012
Ductwork Insulated to ≥R6	28%	33%	36%	32%	35%	36%
Ductwork Sealed	42%	47%	54%	38%	35%	39%

* Percentages are from valid responses only: Responses of *don't know*, *do not sell*, and *refused* were removed. Therefore, sample sizes vary for each year and for each measure.

Table 48 shows that the program influenced the efficiency level of a portion of the residential HVAC measures that participating contractors installed from 2010 to 2012, ranging from 20% to 26% of participating HVAC contractors. For example, 25% of participating contractors reported that BBNP influenced the efficiency levels of the furnaces and boilers they installed. However, the participating contractors who attributed influence to the program were responsible for relatively small numbers of total upgrades, so that the changing practices may reach a smaller number of homes compared to changing insulation and air sealing practices.

There is minimal indication of spillover to the practices of nonparticipating HVAC contractors. We also compared responses among the grantees by level of success and found differences only for duct sealing: a significantly higher share of participating contractors from the high-success

grantees than from the medium-success grantees indicated the program was highly influential in the efficiency level of their duct sealing practices.

Table 48: BBNP Level of Influence on Energy-Efficient Residential HVAC Measures Installed between 2010 and 2012

A GREAT DEAL OF INFLUENCE (7 TO 10)	PARTICIPANTS (*n* = 96)*			NONPARTICIPANTS (*n* = 62)*		
	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Projects	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Projects
Furnaces and Boilers	25%	6%	20%	2%	<1%	<1%
Central Air Conditioners	21%	7%	19%	2%	<1%	<1%
Duct Insulation	20%	8%	24%	0%	0%	0%
Duct Sealing	26%†	10%	27%	2%	<1%	0%

* Sample sizes reflect those respondents reporting that HVAC and water heating systems comprise one of the largest two shares of their company's business. Percentages reflect those that identified the program's level of influence from 7-10 on a scale of 0-10 where 0 is *no influence at all* and 10 is *a great deal of influence*. Only those reporting installing the specific *energy-efficient* measures from 2010-2012 were asked about the program's level of influence on the respective measure.

† A significantly higher share of participating contractors from the high-success grantees than from the medium-success grantees indicated the program was highly influential in the efficiency level of their duct sealing practices. Significant differences were estimated at the 90% confidence level.

Residential Lighting

Contractors who indicated that lighting represented one of their two primary upgrade practices were asked about installation of energy efficient lighting in their upgrades. Non-participating contractors indicated they have been installing energy-efficient lighting in a larger share of upgrades than participating contractors reported, and they estimated higher rates of increase from 2010 to 2012 (see Table 49). However, it is important to note that the sample sizes for the residential lighting set of questions for both participating and nonparticipating contractors were small (37 and 20, respectively).

Table 49: Residential Energy-Efficient Lighting Upgrades

	PARTICIPANTS, MEAN PERCENT OF HOMES (*n* = 37)*			NONPARTICIPANTS, MEAN PERCENT OF HOMES (*n* = 20)*		
PRODUCT	2010	2011	2012	2010	2011	2012
Light Bulbs	40%	40%	42%	45%	51%	55%
Light Fixtures	42%	42%	44%	36%	42%	48%

* Percentages are from valid responses only: Responses of *don't know* and *refused* were removed. Therefore, sample sizes vary. This set of questions was asked to those respondents reporting that lighting services comprise one of the largest two shares of the respondent's company's business.

We do not see strong evidence that the program affected the installation of high-efficiency lighting among participating and nonparticipating contractors. While one-quarter of participating contractors that provide lighting services (25%) reported that the program has been highly influential in increasing the installation of energy-efficient lighting, they represented less than 1% of total upgrades and 1% of net BBNP projects. There is minimal evidence that BBNP affected the lighting installation practices of nonparticipating contractors (see Table 50).

Table 50: BBNP Level of Influence on Energy-Efficient Residential Lighting Measures Installed between 2010 and 2012

A GREAT DEAL OF INFLUENCE (7 TO 10)	PARTICIPANTS (*n* = 37)*			NONPARTICIPANTS (*n* = 20)*		
	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Projects	Percent of Respondents	Percent of Total Upgrades	Percent of Net BBNP Projects
Lighting	25%	<1%	1%	3%	<1%	0%

* Sample sizes reflect those respondents reporting that lighting comprises one of the largest two shares of the respondent's company's business. Percentages reflect those that identified the program's level of influence from 7-10 on a scale of 0-10 where 0 is *no influence at all* and 10 is *a great deal of influence*. Only those reporting installing the specific *energy-efficient* measures from 2010-2012 were asked about the program's level of influence on the respective measure.

Commercial Building Practices

We asked commercial building contractors about their business practices for building envelope measures, HVAC equipment services, and lighting.[114]

Because of the very small number of commercial building contractors interviewed, it is difficult to draw conclusions about the impact of BBNP on the practices of commercial building contractors. We report the findings only for commercial HVAC contractors here. Given that the sample sizes for the commercial HVAC and commercial lighting contractors were small, we report on commercial HVAC and commercial lighting in Appendix E. Because of extremely small sample sizes, we do not report the results from commercial insulation or air sealing questions. We will attempt to reach more commercial contractors in the final evaluation research.

We found no evidence that BBNP influenced the amount of energy-efficient lighting or building envelope measures installed. We did, however, find some evidence among the participating commercial HVAC contractors with whom we spoke that the program influenced their commercial HVAC practices. Compared with the nonparticipating contractors, participating contractors have made more of a shift to high-efficiency HVAC equipment since 2010. Some

[114] To limit respondent burden, we asked respondents about the two types of services that comprise the largest shares of their companies' businesses. For example, if a respondent primarily installs commercial lighting and commercial HVAC equipment, we would not have asked them about the commercial building envelope work they conduct even if it is an element of their business.

participating commercial contractors reported that BBNP highly influenced this shift. However, these respondents represented less than 1% of total and net BBNP upgrades (see Appendix E).

We did not find any indication that BBNP affected the practices of nonparticipating commercial HVAC contractors.

SALES OF HIGH-EFFICIENCY EQUIPMENT

Our last indicator of BBNP market effects is the level of sales of high-efficiency equipment and materials. Surveys of 164 distributors from 22 of the BBNP grantees provided data for this indicator. If BBNP results in increased demand for energy-efficiency upgrades and adoption of energy-efficient building practices, an expected market effect is increased sales of high-efficiency equipment reported by distributors. The equipment covered includes insulation and air sealing, HVAC equipment, and lighting equipment.

Distributors of Building Envelope Materials – Insulation

We asked distributors who had reported selling building envelope materials a series of questions to gauge any changes in sales from 2010 to 2012 of the various building envelope materials that they sold.

Specifically, we asked insulation distributors whether their company's sales of insulation materials had increased since 2010. About one-third of both residential distributors (36%) and commercial distributors (33%) reported increased sales during this period. Because of small sample sizes, we are cautious in extrapolating from these results, particularly for commercial distributors (Table 51).

Table 51: Increased Sales of Insulation Materials Since 2010*

SECTOR	PERCENT (AND NUMBER) REPORTING AN INCREASE
Residential (*n* = 14)	36% (5)
Commercial (*n* = 3)	33% (1)

* Base: Respondents Who Sell Insulation Materials

Overall, the average increase in sales of insulation materials for the period of 2010 to 2011 was 9% and the average increase between 2011 and 2012 was 16%.[115] Again, due to small sample sizes, these results should be interpreted with caution (Table 52).

[115] The six distributors who had experienced an increase in sales of insulation materials estimated the percent of increase in sales from 2010 to 2011 compared to what they had expected to experience in that period. They reported average increases of 43% for 2010 to 2011 and 59% for 2011 to 2012.

Table 52: Percent of Insulation Materials Sales Increase*

TIMEFRAME	NUMBER OF DISTRIBUTORS	AVERAGE PERCENT INCREASE
2010 and 2011	14	9%
2011 and 2012	15	16%

* Base: Distributors of Insulation Materials, Excluding Responses of Don't Know or Refused

Distributors of HVAC Equipment

We asked distributors who reported selling HVAC/water heating equipment questions parallel to those in the previous section to assess whether sales of energy-efficient HVAC equipment have increased during the BBNP period. The following two tables show the mean percentages reported by residential (Table 53) and commercial (Table 54) respondents.

Sales of high-efficiency HVAC equipment experienced a modest trend upwards during the 2010 to 2012 period. For example, the average proportion of natural gas boilers sold that had an AFUE of 90% or greater was 58% in 2010, 59% in 2011, and 63% in 2012, and the proportion of oil boilers sold that had an AFUE of at least 85% was 72% in 2010, 78% in 2011, and was expected to be 81% in 2012. In addition, with the exception of central air conditioners, the majority of HVAC equipment units sold by residential distributors were high efficiency.

Residential contractors report similar trends in their installation of high-efficiency HVAC equipment especially with high-efficiency gas equipment, though lower rates of high-efficiency oil equipment and central air conditioners. Some of the trends may be due to the announcement of new federal efficiency standards for residential HVAC equipment in 2011, though many of the standards do not go into effect until 2015.[116]

Table 53: Average Percentage of Sales - Heating Equipment by Efficiency Level (Residential)*

EQUIPMENT TYPE	2010	2011	2012
NATURAL GAS FURNACES (AFUE OF 94% OR GREATER)			
Sample size (n)	*62*	*65*	*66*
Mean %	56%	55%	61%
NATURAL GAS BOILERS (AFUE OF 90% OR GREATER)			
Sample size (n)	*52*	*54*	*55*
Mean %	58%	59%	63%

Continued

[116] The announcement of new federal standards can be viewed at the following website: *http://www1.eere.energy.gov/buildings/appliance_standards/residential/residential_furnaces_cac_hp_direct_final_rule.html* The new standards can be viewed at the following website: *http://buildingsdatabook.eren.doe.gov/ChapterIntro7.aspx?7#3*

EQUIPMENT TYPE	2010	2011	2012
OIL FURNACES (AFUE OF 85% OR GREATER)			
Sample size (n)	*29*	*30*	*29*
Mean %	62%	60%	68%
OIL BOILERS (AFUE OF 85% OR GREATER)			
Sample size (n)	*30*	*28*	*26*
Mean %	72%	78%	81%
CENTRAL AIR CONDITIONERS (15 SEER OR GREATER)			
Sample size (n)	*73*	*71*	*76*
Mean %	34%	35%	40%

* Base: Respondents Who Sell HVAC Equipment

Compared to residential distributors, commercial distributors reported smaller percentages of sales of high-efficiency HVAC equipment, and the proportion of energy-efficient equipment sold appears not to have changed substantially during the 2010 to 2012 period. The exception to this is that oil furnaces sold with an AFUE level of at least 85% increased markedly between 2010 and 2011 – from 45% to 90%. However, since the sample sizes are small, these generalizations should be interpreted with caution.

Table 54: Average Percentage of Sales - Heating Equipment by Efficiency Level (Commercial)*

EQUIPMENT TYPE	2010	2011	2012 (PROJECTED)
NATURAL GAS FURNACES (AFUE OF 94% OR GREATER)			
Sample size (n)	10	11	12
Mean % of sales	47%	45%	47%
NATURAL GAS BOILERS (AFUE OF 90% OR GREATER)			
Sample size (n)	*11*	*12*	*11*
Mean % of sales	45%	52%	52%
OIL FURNACES (AFUE OF 85% OR GREATER)			
Sample size (n)	2	2	2
Mean % of sales	45%	90%	75%
OIL BOILERS (AFUE OF 85% OR GREATER)			
Sample size (n)	2	1	1
Mean % of sales	15%	20%	20%
AIR-COOLED UNITARY OR SPLIT SYSTEMS < 5.4 TONS (12.0 EER)			
Sample size (n)	*13*	*13*	*14*
Mean % of sales	50%	50%	48%

Continued

EQUIPMENT TYPE	2010	2011	2012 (PROJECTED)
AIR-COOLED UNITARY OR SPLIT SYSTEMS ≥ 5.4 TO < 20 (11.5 EER)			
Sample size (n)	13	13	14
Mean % of sales	31%	31%	28%
AIR-COOLED UNITARY OR SPLIT SYSTEMS < 20 TONS (10.5 EER)			
Sample size (n)	13	13	14
Mean % of sales	39%	37%	33%

* Base: Respondents Who Sell HVAC Equipment

Distributors of Lighting Equipment

We asked the distributors who sold lighting equipment to estimate the percentage of total lighting sales represented by a number of different types of standard and high-efficiency lighting equipment during the 2010 to 2012 period. Because of the small sample size of commercial lighting distributors, we report only the findings for residential distributors. Data for commercial lighting distributors are given in Appendix E.

As shown in Table 55, for residential distributors, the average percent of lighting sales represented by high-efficiency lighting, such as LED fixtures, fluorescent tube fixtures and pin-based CFL fixtures increased modestly during the 2010-to-2012 time period, while sales of screw-based fixtures (which could use either incandescent or CFL bulbs) declined slightly. Because not all distributors sold all types of lighting, the average percent of sales do not sum to 100% for each year; the average percent of sales represent the average for the distributors who sell each technology. It should be noted that the sample sizes here are small, so these generalizations should be interpreted with caution.

Table 55: Average Percentage* of Lighting Sales by Type of Lighting Equipment (Residential)**

EQUIPMENT TYPE	N	2010 AVERAGE PERCENT OF SALES	2011 AVERAGE PERCENT OF SALES	2012 AVERAGE PERCENT OF SALES
LED fixtures	8	47%	50%	54%
Screw-based fixtures	6	59%	60%	56%
Fluorescent tube fixtures	4	22%	24%	26%
Pin-Based CFL fixtures	3	17%	20%	22%
Other high-efficiency fixtures	2	80%	79%	70%

* Because not all distributors sold all types of lighting, the average percent of sales do not sum to 100% for each year; the average percent of sales represent the average for the distributors who sell each technology.

** Base: Respondents Who Sell Each Type of Lighting Equipment

One-half or more of the distributors who sold lighting controls, such as dimmers or occupant sensors, said that sales of occupant sensors (67%) and motion sensors (50%) had increased during the period from 2010 to 2012 (Table 56).

Table 56: Whether Lighting Controls Sales Increased since 2010*

EQUIPMENT TYPE	N	YES	NO
Dimmers	8	25% (2)	75% (6)
Occupant sensors	6	67% (4)	33% (2)
Photo controls	6	33% (2)	67% (4)
Motion sensors	8	50% (4)	50% (4)

* Base: Respondents Who Sell Lighting Controls

Table 57 shows the average increase in sales of lighting controls from 2010 to 2011 and from 2011 to 2012. The average percent increase in sales ranged from 3% (for dimmers, 2011 to 2012) to 11% (for motion sensors, 2010 to 2011). We again caution that the small samples limit the generalizability of these findings.

Table 57: Average Percentage of Increase in Lighting Controls Sales since 2010*

EQUIPMENT TYPE	N	PERCENT INCREASE 2010 - 2011	PERCENT INCREASE 2011 - 2012
Dimmers	8	4%	3%
Occupant Sensors	5	8%	6%
Photo Controls	5	4%	4%
Motion Sensors	7	11%	4%

* Base: Respondents Who Sell Each Type of Lighting Equipment and Reported Increased Sales

Program Awareness and Market Change

We also included a number of questions to assess the extent to which BBNP influenced increased penetration of energy-efficient equipment into the market. Table 58 shows residential and commercial distributors' awareness of various energy-efficiency programs and policies, including the BBNP grantee program. Nearly all of the residential distributors (96%) said they were aware of federal tax credits for energy-efficiency improvements, and a majority was aware of state credits (77%) and the Weatherization Assistance Program (77%). Fewer than one-half (47%) were aware of the BBNP grantee program. Fewer still (30%) had heard of EECBG.

Results for commercial distributors were somewhat similar to those for residential distributors. A large majority were aware of federal tax credits (89%) and commercial efficiency programs sponsored by local utilities (82%), and three-quarters were aware of state tax credits. Slightly fewer (71%) had heard of benchmarking or labeling programs. Just over one -third (36%) had heard of the BBNP grantee program, and just under one-third (29%) were aware of EECBG.

Table 58: Awareness of Programs and Policies in Existing Homes Among Distributors (Multiple Responses)*

PROGRAM OR POLICY	RESIDENTIAL DISTRIBUTORS (*n* = 136)	COMMERCIAL DISTRIBUTORS (*n* = 28)
Federal tax credits for energy-efficiency improvements	96%	89%
Home or commercial efficiency programs sponsored by local utilities or other groups	85%	82%
State tax credits for energy-efficiency improvements	77%	75%
Weatherization Assistance Program (WAP)	73%	NA
Benchmarking or labeling programs (ex. LEED or ENERGY STAR Portfolio Manager)	NA	71%
BBNP grantee program	47%	36%
Programs funded by Energy Efficiency and Conservation Block Grants (EECBG)	30%	29%

* Base: All Distributors

We asked distributors who reported awareness of the BBNP grantee program about the influence of the program on equipment sales for several equipment types. Table 59 shows that, for each equipment type, the majority of residential distributors said that the BBNP grantee program had no impact on sales. However, a substantial number (ranging from 35% to 44% of distributors, depending of type of equipment) thought the program had a positive impact. Only one respondent said that the program had a negative impact on sales of any of the equipment types.[117]

Table 59: Impact of the BBNP Grantee Program on Equipment Sales (Residential)*

EQUIPMENT TYPE	N	POSITIVE	NEGATIVE	NO IMPACT	DON'T KNOW/ REFUSED
HVAC and water heating systems	50	44%	2%	52%	2%
Building automation and/or controls	20	35%	0%	65%	0%
Building envelope products	5	40% (2)	0%	60% (3)	0%
Lighting	5	40% (2)	0%	60% (3)	0%
Other energy-related equipment	22	41%	0%	55%	5%

* Base: Respondents Aware of a BBNP Grantee Program

As shown in Table 60, the results for commercial distributors are similar to those for residential distributors. For all the equipment types except HVAC, the majority of respondents said that the BBNP program had no impact on sales. One-half of the respondents asked the question about

[117] The respondent did not provide a reason as to why the program had a negative impact on equipment sales.

HVAC and water heating systems thought the program had no impact on sales, while the other one-half thought it had a positive impact. However, a substantial proportion thought the program had a positive impact on sales of motors (40%) and building automation and controls (25%). Again, the sample sizes are quite small, so these results should be interpreted with caution.

Table 60: Impact of the BBNP Grantee Program on Equipment Sales (Commercial)*

EQUIPMENT TYPE	N	POSITIVE	NEGATIVE	NO IMPACT	DON'T KNOW/ REFUSED
HVAC and water heating systems	6	50% (3)	0%	50% (3)	2%
Motors	5	40% (2)	0%	60% (3)	0%
Building automation and/or controls	4	25% (1)	0%	75% (3)	0%
Commercial refrigeration equipment	2	0%	0%	100% (2)	0%
Other energy-related equipment	1	0%	0%	100% (1)	0%

* Base: Respondents Aware of a BBNP Grantee Program

Respondents who were aware of a BBNP program rated the extent of influence of the program on sales of the different equipment types on a scale from 0 ("no impact") to 10 ("a great deal of impact"). Table 61 shows the proportion of respondents out of those who sell each product who gave an influence rating of seven or higher.

A small percentage of respondents who sell each product thought the program had a high degree of positive influence on sales of building envelope products (8%), HVAC and water heating systems (4%), and building automation and controls (2%), whereas for the other products no respondents thought the program had a high degree of positive influence on sales. As would be expected, no respondent thought the program had a high degree of negative influence on sales of any product.

Table 61: Influence of the BBNP Grantee Program on Equipment Sales – Percent of Respondents Who Reported a High Degree of Impact*

EQUIPMENT	N	PROGRAM HAS HAD A POSITIVE INFLUENCE (7-10)
Building envelope products	26	8%
HVAC & water heating systems	148	4%
Lighting	21	0%
Motors	95	0%
Building automation and/or controls	63	2%
Commercial refrigeration equipment	34	0%
Renewables	19	0%

* Base: Respondents Who Sell Each Product

Influence of BBNP on Stocking Practices

We asked distributors aware of a BBNP grantee program whether their business and stocking practices had changed since the BBNP grantee program began – and if so, how they have changed.

Over one-half of the distributors who were aware of the BBNP grantee programs (26% of all distributors) reported that their business or stocking practices had changed (Table 62). Nearly one-half (46%) said that they now compare the efficiency levels of different equipment for their customers, and the same proportion said they now explain to customers how the high-efficiency equipment or materials work and why it is more efficient than standard equipment. Similar percentages (45% and 43%) said that, since the program began, they started talking to customers about payback periods and savings over time, and that they talked more about energy efficiency in general with their customers. More than one-quarter (28%) said they now stock more efficient equipment and materials. Fewer than one-half (43%) said that there had been no changes.

Distributors reporting that their business and stocking practices had changed since BBNP had begun were asked to rate the influence of the BBNP grantee on the changes, using a scale from 0 ("no impact") to 10 ("a great deal of impact"). Out of all distributors, 6% rated the influence of the BBNP grantee as seven or higher.[118] The final evaluation will further investigate causes of the apparent changes in business and stocking practices.

Table 62: Business and Stocking Practice Changes since the BBNP Grantee Program Began (Multiple Responses)*

CHANGE IN PRACTICES	DISTRIBUTORS (*n* = 74)
Compare efficiency levels of different equipment	46%
Explain to customers how the high-efficiency equipment/materials work and why it is more efficient that standard equipment	46%
Talk to customers about payback periods and savings over time	45%
In general, talk about energy efficiency more with customers	43%
Stock more efficient materials	28%
Training and certification of staff to become energy auditors/home performance contractors	4%
Other	3%
Nothing/None	43%
Don't know/Refused	3%

* Base: Respondents Aware of a BBNP Grantee Program

[118] Because of small sample sizes, we did not compare responses across the levels of grantee success.

Distributors who were aware of a BBNP grantee program rated their agreement with statements about the influence of the program on the marketplace in the present (Table 63) using a scale from 0 ("strongly disagree") to 10 ("strongly agree"). The following tables show the percent (out of all distributors) who gave an agreement rating of 7 or higher.

There was little attribution of effects from BBNP for this question. Less than one out of ten distributors (7%) agreed (i.e., gave an agreement rating of 7 or higher) with the statement, "My company has more business than it would have had without BBNP," and slightly more (12%) agreed with the statement, "The marketplace in general has more business than it would have had without BBNP."

Table 63: Agreement with Statements on the Effect of the BBNP Grantee Program on Energy-Efficient Equipment Market*

STATEMENT	PERCENT AGREEING (RATING 7 TO 10) (*n* = 164)
My company has more business today than it would have had without BBNP	7%
The marketplace in general has more business today than it would have had without BBNP	12%

* Base: Respondents Who Made Changes due to the BBNP Grantee Program

9 CONCLUSIONS AND RECOMMENDATIONS

In this chapter, we present conclusions about BBNP and recommendations for the DOE BBNP team to consider during this final year of program implementation.

CONCLUSIONS

The three BBNP objectives are:

1. Initiate building energy upgrade programs that promote projects estimated to achieve energy savings in more than 40 communities.
2. Demonstrate more than one sustainable business model for providing energy upgrades to a large percentage of the residential and/or commercial buildings in a specific community.
3. Identify and spread the most effective approaches to completing building energy upgrades that support the development of a robust retrofit industry in the United States.

The BBNP team has promoted a framework of four pillars as the necessary ingredients for an effective energy upgrade program. These are: *marketing*, *financing*, *workforce*, and *data and reporting*. Our research confirms that these pillars are necessary components to an effective upgrade program. More importantly, our research confirms that these components must work together for an energy upgrade program to be effective and successful, and that one pillar alone is not enough. Further, we found that there is no best way to implement each pillar and that each pillar needs to have multiple components to create an integrated whole. Finally, *data and reporting* is critical to understanding and evaluating program success and is a key component to gaining long-term funding.

We conclude that although the grantees and their programs vary widely, success is *not* associated with specific organizational types (although it is associated with partnerships with financing and nonprofit organizations and having energy efficiency experience), with climate or building types served, with the specific services and measures offered (assessments, qualifying measures, rebates, grants, financing), with the role of private sector firms in delivering program services, or with marketing methods. There is no "silver bullet" of activities that likely lead to success. We identify activities that have yielded good results, yet both successful and unsuccessful grantees engage in these activities and both successful and unsuccessful grantees engage in activities we do not identify as most promising. We conclude that program success is most closely associated with program activities that are complementary, that effectively address market barriers, and that coherently drive customers and trade allies to comprehensive building upgrades. And we conclude that the grantees with prior efficiency experience and strong partnerships are more

likely than other grantees to have such complementary, effective, and coherent program activities.

BBNP is not a scientific experiment; however, as is clear in the three objectives, it was designed to encourage innovative ideas and to assess, through the evaluation process, a variety of approaches to implementing energy efficiency upgrade programs. This research confirms that BBNP has met the objectives. The program generated a wealth of experience in alternative and sometimes very innovative approaches to developing the demand and supply markets for whole house and building upgrades. At the close of the second year of the three-year grant period, nearly a quarter of the grantees have developed business models successful in attaining efficiency upgrades, and several models show promise of being sustainable beyond the funding period.

Assessing Success

To identify factors contributing to grantee success, we needed to discern which of the grantees were most successful to date. We developed a composite metric of success to date based on progress toward goal, rate of conversion of audits to upgrades, average cost per upgrade completed, and average cost per unit of energy saved. We used this metric for the EECBG grants only, since SEP grantee awards occurred later than EECBG. We identified the factors most strongly correlated with the 10 most successful grantees' performance: *partnerships with financing organizations, partnerships with nonprofit organizations*, and *having energy efficiency experience*, either broadly in the community or through collaborating or hiring of staff.

Partnerships with financing organizations are important, as they facilitate the ability of grantees to provide effective and available financing solutions. Nonprofits are effective because they are flexible and nimble, and thus able to adjust programs as needed; collaborating with them seems to enable organizations to capture that nimbleness. Finally, while the statistical association was not clear with respect to the energy efficiency experience metric, the interview data support a conclusion that having strong energy efficiency experience in the community leads to community interest in upgrades, and having organizational experience provides the knowledge and capacity to develop an integrated and effective program.

DOE BBNP Support

Overall, DOE enabled and facilitated an exchange of grantee experiences that grantees describe as highly valuable to the grantees and as contributing to their success to date.

The support structure set up by DOE is valued and well used – account managers generally are the key contacts and provide structure and support for grantees. The project officer provides guidance, as well as oversight, to support compliance. Technical assistance, peer-to-peer networking, conferences, workshops, webinars, and the newsletter are all used and considered useful. Grantees typically desired more support rather than having suggestions to change these supports.

We did find that some grantees had difficulty accessing and using these supports, but this occurred primarily if their project timing lagged the support elements – technical assistance terminated in 2011 and the conference foci changed over time. However, the repository of materials on the Google website meant information did not disappear and grantees have been able to access that throughout the program.

No grantee likes the data and reporting requirements; those with less experience in energy efficiency had the greatest difficulty with the data requirements. Those with experience in energy efficiency were generally familiar with similar types of data requirements, though the lack of a database structure at the outset has been hard for grantees and DOE. Similarly, DOE efforts to clarify the savings expectations came late for some grantees whose programs were in the field, leading to their concerns as to whether their goals will be achievable.

Davis Bacon, Historic Preservation, and other requirements add to the burden, but appear to be manageable with the support provided by DOE.

Better Buildings seeks comprehensive upgrades, yet some grantees find that incremental energy upgrades are appealing to homeowners and businesses. These grantees would like to use incremental upgrades to stimulate demand. This is a challenge because it is inconsistent with reporting formats, which require completed projects with average project savings of 15% or greater.

Program Elements

We can conclude from the preliminary findings that there is not one pattern for program success, but rather multiple patterns. The grantee needs to be capable, if not strong, in several areas. Those areas can vary, as long as the overall strength is sufficient. The final evaluation will further seek to identify successful patterns.

Driving Demand

Demand and supply strategies, and the program processes that support them, must work together in order to attain market success. Program activities should be governed by sound logic linking messaging, roles of the various supply-side actors, incentives, quality assurance, and so on; each of these activities also should be mutually consistent and together drive toward building upgrades.

Many of the lessons learned by grantees will not work when adopted piecemeal – a cobbling together of items without creating a coherent whole, does not work. The logical connections among program elements need to be sound from beginning to end. At the same time, a specific activity that typically does not provide good results can be part of a successful program when contributing to a design that coherently drives upgrades.

Marketing is important – but mostly outreach, promotions, and trust-based marketing, not mass marketing. Marketing needs effective marketing messages, which grantees have found are those

that focus on the primary benefits that appeal to the widest audience, which most grantees and market informants indicated are *comfort*, *health*, and *safety*. Across all of those grantees who have tried it, mass-market advertising is not effective; similarly, targeting customers or housing types up front (such as in a common neighborhood) has not been effective – except for low-income-focused services.

Creating a sense of urgency may be effective if the program can develop multiple creative time-limited promotions (financial or otherwise). However, a single "good deal" offer with an end date is not effective at jumpstarting an ongoing interest.

Sales and marketing are different. Good sales people tailor the sales message to the consumer's individual benefits and concerns. Grantees that paid attention to the sales process and thought about who (and in what role) sales would occur were effective. Thus, sales training appears to be very effective in improving programs and contractors' ability to convert assessments into upgrades. Rebates and financing on their own do not market or sell projects, they facilitate projects – sales approaches are very important.

The degree of success a program attains largely reflects the extent to which all facets of the program design clearly drive toward the goal of completed upgrades, as well as effectiveness of the marketing and sales messaging employed. Programs that meet these criteria moderately well appear to be more successful than programs that do a fabulous job with one piece of the puzzle. We did not find any single model that works significantly more effectively than any other does.

Stimulating Supply

Six grantees assign an energy advisor to each participant, who encourages and facilitates the participant's program involvement, from initial interest through upgrade. Four of these six grantees are among the ten grantees that we characterized as successful, suggesting facilitation works in the sales process, contributing to the conversion of assessments to upgrades. However, six successful grantees do not use project facilitators, suggesting success does not require this costly program feature.

The finding that four of the ten successful grantees use facilitation suggests both that facilitation provides value and that it is not essential for success. It is costly to the program to use program staff in an advisor role. Thus, it is a model that will evolve as the supply market matures, and contractors develop the technical and sales skills to drive quality upgrades. Until then, at least one of the grantees using facilitation is exploring ways to reduce the advisor's role in the average project.

Grantee experience supports the idea that it is important to identify a set of qualified contractors – that includes familiarity with program and developing some basis to address or exclude poor performers. In particular, grantees have found it important to set requirements for contractors to be included on a list of qualified contractors for loan products.

Successful grantees have learned that how sales are conducted is equally or more important than marketing messages; several grantees have used sales training and, to a lesser degree, business training, to help contractors move assessments to upgrades. Similarly, since quality is important, many grantees have supported, offered, or encouraged contractors to get training in building science and building performance. At the same time, few grantees are requiring building science certification from specific organizations, as many of the grantees find that the market may need more time to develop before settling on certification requirements.

Along with encouraging training, grantees that are successful stress the value of communication with contractors – bringing them together so they can learn from each other and using communication to gain their input to enhance and improve the program. Communication, while especially important at the outset of program efforts, should continue during the program period. This is a new market offering in most grantee areas, and contractors benefit from learning that they are part of a community of contractors doing the same type of work.

Across grantees, having a financial institution partner is better than trying to be a bank; credit enhancements can attract financial partners, and success in the program can reduce the need for credit enhancement. Grantees also found that having staff experienced with financial products makes communication with financial organizations more effective and aids in developing systems for loan processing that are simple and quick.

Finally, while not always the case, for most grantees that worked with experienced utilities and ratepayer-funded program administrators, their program experience was an asset.

Market Effects

Market informants reported observing positive changes in the local markets of grantees that appear to be successfully addressing barriers and coordinating with market actors and, in some cases, existing programs. Surveys with efficiency contractors and equipment suppliers has provided preliminary evidence of market effects within the areas served by 22 grantees, grantees identified by DOE contacts and program data as among the more successful.

Market Informants

Interviews with 26 market informants revealed that market informants have many opinions about what works. We solicited their views to identify and understand potential indicators of market effects. Fifteen of the 26 were familiar with BBNP and 11 were not.

Marketing informants identified the major drivers for advancing energy efficiency in both the residential and commercial upgrade markets as consumer motivations, well-designed programs, and trade ally motivations. BBNP outcomes suggest consumers everywhere are potentially motivated and that it is primarily the presence of a well-designed, logical, and fully integrated program along with a knowledgeable trade ally network that leads to upgrades.

Market informants noted that a facilitator was vital for program success, and the BBNP research found that four of the ten successful grantees use facilitation; however, six did not. Facilitation likely provides value, but it is not essential for success.

Market informants noted that contractors have the most influence for residential upgrades, and all of the successful and most of the other BBNP grantees have focused much of their efforts on contractors. Thus, the BBNP research clearly supports that working with contractors is important for success in the residential market, and for the commercial market. Market informants emphasized the importance of building owners over the importance of contractors in the commercial sector.

With respect to the local grantees that the market informants had observed, they attributed grantee program success to their ability to address specific market barriers, and to coordinate with market actors and existing programs. They believe that those grantees that are coordinating and addressing barriers are affecting their local markets.

Efficiency Contractors and Equipment Suppliers

Providing further support of the findings from grantee interviews, we found preliminary evidence that market effects are emerging for grantee programs based on the surveys of participating and nonparticipating contractors and energy efficient equipment suppliers. Both participating and nonparticipating contractors agreed that the BBNP grantee programs were having a positive effect on their businesses and the marketplace in general. The surveys also found that contractors believe there to be increased availability of trained contractors and increased marketing of energy efficiency by contractors, and suppliers believe there to be increased sales and availability of high-efficiency equipment and products. In general, these effects are more pronounced in the most successful grantee areas; however spillover (upgrade activity among customers not participating in grantee programs) appears to be somewhat higher in the least successful grantee areas.

RECOMMENDATIONS

Our findings reinforce the notion that the four pillars offer a sound framework for developing an integrated energy efficiency program. Demand (marketing) and supply (workforce and financing) strategies, and the program processes that support them (including data and reporting), must work together – have the same objectives, complement each other, and reinforce each other – in order to attain any degree of market success. For each of the aspects of the demand and supply side that we investigated, successful grantees vary in their approaches, a finding that indicates there are no “must have” features. Further, less successful grantees may have used one or more aspects of the demand and supply side using approaches used by the successful grantees, a finding that indicates no single feature guarantees success.

We believe the following key factors will increase BBNP success, regardless of the variation among grantees and their programs. We believe DOE should, in this final program year:

- Encourage grantees to clearly identify who has or should have the role of selling the upgrade, and then to provide sales training to those individuals.
- Encourage grantees to include messaging that emphasizes comfort and solutions to building problems, as such messages appear to be influential.
- Encourage grantees in their continued efforts to simplify assessments and connect the assessment to the upgrade sales process; this looks very important, but the best solutions are evolving.
- Encourage grantees to sponsor meetings that give contractors opportunities to share their experience and insights with each other and with the grantees' program teams.
- Encourage grantees to have a program with components that logically and coherently drive demand and stimulate supply; this is a multi-component program process and there are no silver bullets.
- Promulgate these findings to market informants who lack an empirical evidence of the reasons for program success and failure, and are generally unaware of the BBNP efforts; this should increase understanding and opportunities for these important market actors to better support the programs.

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APPENDICES

Appendices provided under separate document.