Learning from the U.S. Department of Energy's Large "Experiment" in Obtaining Comprehensive Building Retrofits

Marjorie R. McRae, Research Into Action, Inc., Portland, OR
Joe Van Clock, Research Into Action, Inc., Portland, OR
Jane S. Peters, Research Into Action, Inc., Portland, OR
Edward L. Vine, Lawrence Berkeley National Laboratory, Berkeley, CA

Abstract

The U.S. Department of Energy's (USDOE) four-year, $500 million stimulus-policy-funded Better Buildings Neighborhood Program (BBNP) was an innovative initiative to explore the potential for different marketing strategies and program designs to sell building energy upgrades that result in significant energy savings and economic stimulus. Forty-one state and local governments, assisted by 24 sub-grantees, received BBNP grants and developed community-based programs, incentives, and financing options for comprehensive energy-saving upgrades. Programs targeted single-family residential, multifamily residential, low income, commercial, and agricultural energy users. Although not conforming to experimental design, USDOE encouraged the grant recipients to try new approaches and solicited an evaluation that would identify factors driving program success.

The study verified that more than 99,000 upgrades across multiple sectors generated 3.5 million British Thermal Units (MMBtu) in annual net source energy savings, 0.5 million metric tons annually of avoided carbon emissions, and provided $40.2 million annual energy bill savings. Over the three-year grant period, the program generated about $2 billion of economic activity and led to 13,000 jobs (specifically, person-years of employment) that would not have occurred without the policy stimulus (American Recovery and Reinvestment Act of 2009), representing a benefit-cost ratio of 4.7.

The evaluation study identified preliminary indications that one-third of participating contractors changed their standard upgrade practices to be more comprehensive. Statistical regression modeling of the 54 residential programs offered by grantees and subgrantees revealed that providing contractor training prevents poor program outcomes, and offering multiple pathways to participation (specifically, offering multiple types of energy audits, directly installing measures, and including larger numbers of eligible contracting firms) contributes to program success.

Introduction

The U.S. Department of Energy's (USDOE) four-year, $500 million stimulus-policy-funded Better Buildings Neighborhood Program (BBNP) was an innovative initiative to explore the potential for different marketing strategies and program designs to sell building energy upgrades that result in significant energy savings and economic stimulus. Monies from the American Recovery and Reinvestment Act of 2009 (ARRA) funded BBNP.

The USDOE administered the BBNP to support local programs promoting comprehensive retrofits to improve the energy efficiency of existing buildings. The BBNP provided funding to state and local governments across the U.S., selected through competitive funding opportunity announcements. Ultimately, the program provided $508 million to 41 grantees in grants ranging from $1.3 million to $40 million each. Five grantees each divided their funds among groups of local governments, together providing grant funding to 24 subgrantees. Although not conforming to experimental design, USDOE

encouraged the grant recipients to try new approaches, with the awareness that not all approaches would be successful. USDOE solicited an evaluation that would identify factors driving program success.

Grantees and their subgrantees operated in 34 states and one territory. While some grantees served an entire state, others served a particular city or county. One grant recipient served multiple states, distributing grant funds among 13 subgrantees throughout the Southeastern U.S. and the U.S. Virgin Islands.

USDOE issued funding opportunity announcements for the BBNP in October 2009 and April 2010 and awarded grants between May and October 2010. The grants initially provided funding over a three-year period ending September 30, 2013. USDOE subsequently extended that period by one year, allowing grantees to use BBNP funds exclusively for financing until September 2014 so grantees could continue offering BBNP-funded financing mechanisms.

Like all stimulus efforts funded by ARRA , the BBNP sought to create and save jobs and spur economic activity and investment that would lead to long term growth while providing accountability and transparency in the use of federal funds. The program also had specific objectives related to energy savings, in three broad categories. First, the BBNP sought to bring about high-quality retrofits resulting in significant energy improvement; USDOE set a goal that these retrofits, which could also be described as whole building or comprehensive, would save on average 15% of a building's energy use. Second, the BBNP set out to foster and support programs with a viable strategy for program sustainability, defined as the ability to continue operating beyond the grant period without additional federal funding. Third, the BBNP sought to transform energy markets to make energy efficiency and renewable energy the options of first choice (U.S. Department of Energy 2009). Through the BBNP, USDOE sought innovative approaches to achieving these objectives. USDOE staff did not expect that all of the local BBNP-funded programs would be highly successful, but sought to draw on their experiences collectively to identify new, promising approaches to promoting energy efficiency retrofits in buildings.

The BBNP grantees operated in diverse jurisdictions, with unique energy efficiency needs, barriers, and opportunities. As a result, while the programs each grantee proposed and implemented were designed to meet the objectives listed above, they differed in the strategies used to encourage retrofits. Grantees worked with nonprofits, building energy efficiency experts, contractor trade associations, financial institutions, utilities, and other organizations to develop and deliver community-based programs, incentives, and financing options to encourage efficiency retrofits. While the bulk of BBNP-funded program activity focused on the single-family residential sector, grantees also developed unique combinations of program offerings for the multifamily, low-income residential, commercial, industrial, and agricultural sectors.

This paper presents findings from a national evaluation of the BBNP, which consisted of three broad research efforts. An impact evaluation investigated the program's direct impacts in terms of energy savings, emissions reductions, economic stimulus, and job creation. A market effects assessment investigated ways the program brought about changes in the building retrofit market to favor energy efficiency. A process evaluation investigated the experience of USDOE and the grantees in designing and administering the program to identify successful practices to guide future programmatic efforts to spur building efficiency. The research team collected evaluation data between 2012 and 2014, and USDOE published the team's six-volume report summarizing evaluation findings late in 2015.

Impact Evaluation

Methods

The impact evaluation integrated two methods to generate estimates of the energy savings the BBNP achieved (Research Into Action, Inc., Evergreen Economics, Nexant, Inc., and NMR Group, Inc. 2015). The first method used regression modeling to identify changes in energy use resulting from efficiency retrofits, based on participants' utility billing data, obtained from 19 grantees. (Only 19 of the utilities serving customers targeted by the grantees provided the grantees with participant billing data.) The second method took a measurement and verification (M&V) approach, conducting engineering analyses of projects to estimate the energy savings of a representative sample of projects. This method employed visits to participant sites to verify installation and measure conditions, desk reviews of retrofit documentation, and interviews and phone surveys with participants.

The samples used in regression and M&V methodologies included some of the same participants. This situation enabled the evaluation to compare the regression and M&V results for those participants and to calculate an adjustment factor that accounted for differences in estimates due to methodological differences. Applying this adjustment factor made the regression and M&V results comparable and thus enabled the evaluation to estimate impacts based on a larger sample than would have been otherwise possible. This adjustment approach constituted an innovation in impact analysis, as the authors are aware of no previous U.S. study that applied a rigorous method to make use of both regression and M&V findings.

Applying this adjustment factor, the evaluation generated for each methodology a realization rate of savings estimated from post-retrofit conditions relative to the pre-retrofit estimates grantees submitted to USDOE. The evaluation team combined these two realization rate estimates into a combined realization rate using a weighted average of the realization rates based on the total reported savings of the grantees within each sample frame. This combined realization rate was used to extrapolate energy savings estimates to the full population of grantees. The evaluation also adjusted savings estimates to account for energy efficiency retrofits that would have occurred in the absence of the program, as determined through surveys of participants and contractors, thus generating an estimate of net energy savings.

The evaluation conducted an input-output analysis using IMPLAN (IMpact analysis for PLANning; a data and software system for modeling the U.S. economy) to determine the macro economic impacts of the BBNP. Inputs to the model included upgrade project costs and energy bill savings as determined by the analysis described above. The model estimated direct economic impacts – including jobs and income for grantee program administrator staff, contractors, and equipment suppliers and changes in household spending or business output resulting from energy savings. The IMPLAN model calculates indirect economic impacts resulting from business-to-business purchases of intermediate goods and services (such as purchases of supplies and equipment, calculated from BBNP inputs that distinguished between labor and nonlabor expenditures) that would benefit related areas of the economy. Finally, the model estimated induced impacts resulting from expanded consumer spending and investment resulting from the direct and indirect benefits, including additional employment and participants' energy savings.

The impact findings were adjusted to account for free ridership and spillover effects, where free ridership describes savings that would have occurred in the absence of the program (the BBNP) and spillover describes savings from retrofits that were not reported to or incentivized by the program yet would not have occurred in the program's absence and thus are attributable to the program. The study investigated free ridership and spillover through the survey of building retrofit contractors (see the methods discussion in the *Market Effects and Process Evaluation* section).

BBNP Direct Impacts

The BBNP succeeded in both generating energy savings and stimulating economic growth. It met the ARRA goals based on the metrics of number of jobs created and retained, dollars of economic activity, and benefit-cost ratio (Research Into Action, Inc. et al. 2015).
Over the three-year grant period, the program generated about $2 billion of economic activity and led to 13,000 jobs (specifically, person-years of employment, as estimated by the modeling of the U.S. economy) that would not have occurred without the ARRA stimulus, representing a benefit-cost ratio of 4.7. As

Figure 1 suggests, this level of economic stimulus and job creation exceeds that typically achieved by federal spending. The BBNP generated more than $1.3 billion in economic activity and 10,000 jobs more than would be expected had the federal government engaged in typical historical, non-defense outlays, rather than energy efficiency. Energy-efficiency upgrades are labor-intensive, with one-half to two-thirds of project costs going to labor – providing local jobs and stimulating the local economy. Energy efficiency further stimulates the economy through energy bill savings; households and businesses spend the positive income effect derived from these bill savings on goods and services that are more labor-intensive than the production of the displaced energy consumption.

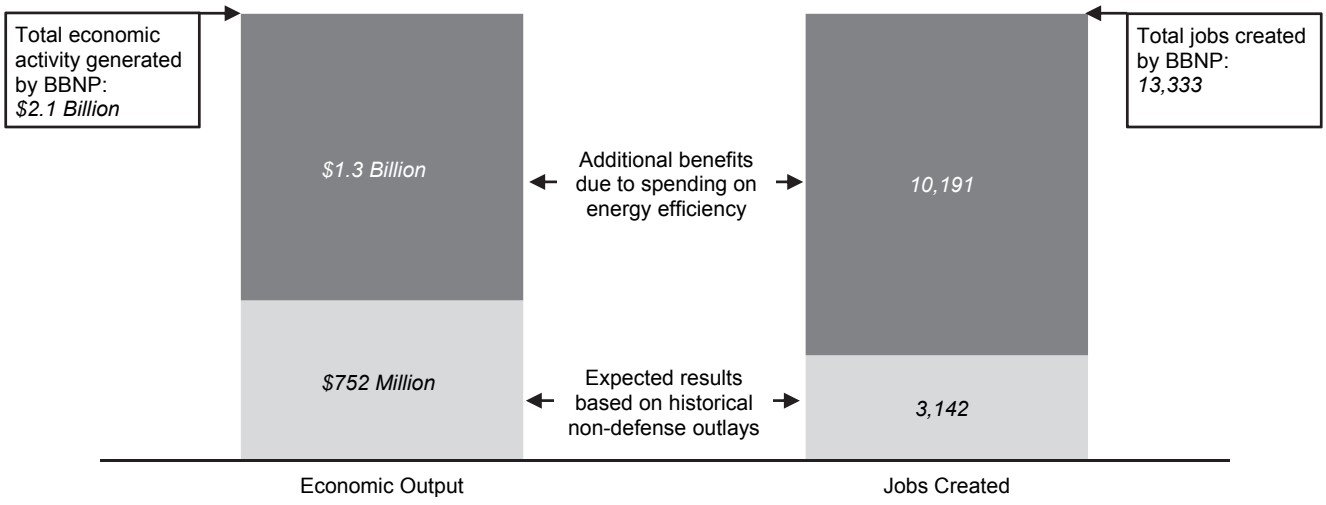

Figure 1: Economic Impacts of the BBNP

More than 99,000 buildings received energy upgrades with support from BBNP-funded programs. Table 1 provides the net annual and lifetime savings associated with these upgrades – MMBtu of source energy savings, avoided carbon emissions (carbon dioxide equivalent, or CO_2e), and participant energy bill savings. The estimates are net of free ridership and spillover effects.

Table 1. BBNP Energy, Carbon, and Bill Savings – Annual and Lifetime

Metric	Annual	Lifetime
Source energy savings (net)	3.5 million MMBtu	56.7 million MMBtu
Avoided CO_2e (net)	0.5 million metric tons	7.2 million metric tons
Bill savings	$40.2 million	$668.6 million

As a percentage of energy use, single-family residential savings were greatest, with verified savings estimated at 15% of total energy use (Table 2).

Table 2. BBNP Percent Savings per Upgrade, by Upgrade Type

Sector	Percent Savings
Single-family residential	15.1%
Multifamily	13.8%
Commercial	4.6%
Overall	10.9%

Market Effects and Process Evaluation

Methods

The market effects evaluation drew on surveys of building retrofit contractors, including both those participating in BBNP-funded programs and those not participating in BBNP-funded programs, product distributors that supply those contractors, and single-family homeowners, including both those who participated and those who did not participate in BBNP-funded programs (Research Into Action, Inc. and NMR Group, Inc. 2015). The sample was drawn from contractors active in the areas served by 22 grantees, selected to include grantees across low, medium, and high success groupings (based on residential outcomes, as described further below), as well as the grantees with the most successful program offerings targeting commercial buildings. Ultimately, 147 participating contractors, 446 nonparticipating contractors, and 291 distributors completed surveys.

The evaluation team administered the household and business participant survey as an online survey with email invitations sent to participants in BBNP-funded programs. In order to avoid survey fatigue, the participant survey for the market effects and process evaluations was administered in grantee service territories not sampled for the impact evaluation. Administering the participant survey required participation from grantee program managers. Two-thirds of those who cooperated with the evaluation sent survey invitations to their participants themselves, while the remaining third provided participant contact information to the evaluation team, which sent survey invitations. A small group of grantee program managers were not responsive to requests for support in administering the survey. Ultimately, survey invitations were sent to 10,844 participants in 24 grantee programs, 2,399 of whom responded.

The non-participant survey sought to capture the experience of homeowners in areas served by BBNP-funded programs targeting the residential sector who had completed a home improvement project in the previous two years or were planning to do so in the next year, but had not received support from a BBNP-funded program. The survey was administered using a mixed mode approach, with an initial web survey followed by phone surveys as needed to meet regional quotas. Ultimately, 2,453 respondents, located in areas served by 35 grantees and 9 sub-grantees, completed the survey.

The process evaluation drew on the same surveys of contractors, distributors, program participants, and non-participating homeowners that informed the market effects evaluation (Research Into Action, Inc. 2015a, 2015b, 2015c). In addition, the process evaluation incorporated extensive data collected from the grantees themselves. Thirty-eight of the 41 grantees and 13 of 22 sub-grantees completed a web survey designed to collect consistent data on the low-income residential, non-income-qualified residential, and non-residential programs they considered most successful. All but one of the grantees also completed at least one in-depth interview with the evaluation team, with interviews typically lasting about two hours. These interviews took place at two points during the evaluation process, first in the summer of 2012 and

again between April 2013 and January 2014. Most grantees (32 of 41) were interviewed during both periods. Finally, the evaluation included an extensive review of grantee program documents and reporting. The process evaluation also drew on interviews with USDOE staff and support contractors involved in the BBNP.

Transformation of the Home and Building Remodeling Market

Beyond the program's immediate impacts, our research found initial indications that the BBNP brought about changes in the building renovation market that favor energy efficiency, as evidenced by contractors' survey reports of changed business and technical practices and of spillover retrofits, although our research could not address whether these changes will persist beyond the grant period (Research Into Action, Inc. and NMR Group, Inc. 2015).

Participating contractors reported:

- Changing services to be more comprehensive to adapt to BBNP (60%)
- Increasing their focus on energy efficiency (46%)
- Changing their standard practices in non-BBNP upgrades (34%)
- Observing positive impacts on their business and on the local energy efficiency market from BBNP (~50%)

In addition to the benefits participating contractors reported, a small proportion (5%) of nonparticipating contractors reported a positive impact from the program, suggesting the program's benefits extended beyond the upgrades it directly supported.

Overall, the research found that for every five energy upgrades that received financing or incentives from a BBNP-funded program, BBNP-funded programs motivated contractors and building owners to complete two additional energy upgrades that did not receive program funding or incentives.

Contractor survey findings suggest that the BBNP accelerated a trend toward increasing energy efficiency practices among contractors. Nearly three-fourths (72%) of participating contractors reported changing their business practices as a result of BBNP. These changes included offering more comprehensive energy upgrade services, forming partnerships with other firms or contractors, and increasing the focus of their businesses on energy efficiency.

Fewer contractors reported changing their standard approaches to measure installation, and contractors participating in BBNP-funded programs were equally likely as non-participating contractors to report changing their standard approaches to measure installation during the grant period. Nonetheless, 15% of the surveyed participating contractors and 3% of the non-participating contractors reported that BBNP had been highly influential in their decision to change installation practices. About one-fifth of surveyed distributors of building envelope materials, heating, ventilation, and air conditioning (HVAC) equipment, or lighting equipment indicated that BBNP had a positive impact on their sales (17% to 20% for each equipment type).

The 21 BBNP-funded programs that reported data to USDOE on their training offerings provided training to more than 5,000 workers, and more than 2,000 workers earned certifications with the support of grantee programs. As with contractor business practices, contractor survey findings suggest these training efforts accelerated growth in the number of contractors trained in energy efficiency. Majorities of both the participating contractors (86%) and non-participating contractors (68%) surveyed reported the number of contractors trained in energy efficient building practices had increased over the grant period. Forty-two percent of the participating contractors surveyed and 6% of the non-participating contractors surveyed credited BBNP as highly influential in bringing about that change.

Despite contractors' perceptions of an increase in the availability of trained staff, membership in professional organizations focused on energy efficiency and certifications by those organizations did not show significant increases as a result of BBNP programs. This could reflect an increase in the number of trained contractor staff who did not join professional organizations or pursue certification, an increase in the number of contractors trained in energy efficiency throughout the industry, or both.

Growth of the Energy Efficiency Program Industry

In addition to these early signs of transformation in the building remodeling industry, the BBNP appears to have left a lasting impact on energy efficiency programs and program administrators (Research Into Action, Inc. 2015b). Eighty-four percent of grantees reported that their programs or elements thereof would continue after the three-year evaluation period.

Some grantees received state, local, or utility ratepayer funding to continue their program offerings, while other grantee programs, or elements of those programs, were subsumed into existing utility ratepayer-funded programs. While few of the BBNP-funded programs were able to continue without further public support at the end of the grant period, the willingness of the organizations that assumed BBNP or BBNP-type activities to provide ongoing support demonstrates the value of the program approaches grantees developed. Grantees also developed program infrastructure – including contractor networks and financing offerings – that continue to benefit the ongoing efficiency programs in their territories.

Financing offerings in particular are likely to remain as a legacy of BBNP-funded programs. Grantees devoted a total of approximately $153 million to efforts to make attractive loans available for energy efficiency retrofits, with the large majority of that funding invested in revolving loan funds and loan loss reserve funds. These funds will be replenished as borrowers repay their loans, allowing the loan offerings to continue well beyond the grant period. Three-fourths of the financial institutions the grantees worked with to make attractive loans available to the market planned to continue offering energy efficiency loan products after the grant period was over.

The BBNP also brought a new cohort of professionals into the field of energy efficiency program administration. More than one-third of grantees reported that at their program's outset their most senior staff member had less than four years of experience in the areas of program design, program implementation, green building trades, and financial institution involvement. Because many of the BBNP teams were made up of local government employees who reflected the demographics of the diverse participating communities, these relative newcomers to the energy efficiency industry represented a greater diversity of backgrounds than the established energy efficiency program administrator workforce.

Notably, many of these new energy efficiency professionals were also in the middle of the workforce age demographic. As such, these professionals helped to fill a significant gap in the energy efficiency industry (and utility operations workforce as a whole). There are few mid-career professionals in the energy efficiency program workforce as a result of what one source described as "massive hiring freezes and downsizing when the [electric utility] industry deregulated and focused on cost-cutting measures in the 1980s and 1990s" (University of Cincinnati 2006).

Knowledge Gain

Finally, the BBNP provided the energy efficiency program industry with a great deal of information about effective practices in program implementation. The BBNP was unique in collecting a

uniform set of metrics from similar yet diverse programs implemented across the country. State-level policies have traditionally driven the vast majority of American energy efficiency program activity. As a result, program reporting has reflected each state's unique regulatory environment, precluding the comparability in metrics necessary to draw meaningful conclusions from an analysis of outcomes across jurisdictions. While each grantee's program offerings were unique, BBNP's uniform reporting process, in combination with the large scale of the program and the common framework of goals that drove program designs, allowed for a much greater degree of cross-program comparison than is typically possible.

The availability of these data allowed for a first-of-its-kind program cluster analysis and multivariate regression to identify residential program elements associated with success, regardless of the environments in which their programs operated. This analysis began by identifying 12 quantitative metrics that each had the potential to indicate some element of program success. These metrics included the market penetration of the program had achieved with its energy upgrades, the costs per upgrade and unit of energy savings, the overall value of the energy savings the program achieved, and the average energy savings per project. A latent class analysis conducted on these variables found that grantees clustered into three distinct groups reflecting their overall program success. A small group of grantees performed better on all but one metric than the other groups, and the evaluation classified these as "high success grantees". Another small group of grantees performed worse than the others on all metrics ("low success grantees"), and most grantees' clustered into a group whose performance fell in between these extremes ("average success grantees") (Research Into Action, Inc. 2015a).

That grantees would cluster into groups reflecting overall program success in this way was not a foregone result of the analysis. The clusters might have fallen between groups of grantees that were strong on some metrics but weak on others. Clusters that so clearly reflected differences in overall program success suggested the existence of factors rising above the diversity of grantees' program structures and operating environments to determine program success. Through multivariate regression estimation the evaluation identified factors predicting program success (that is, cluster membership), and identified factors associated with program success from bi-variate correlation analysis.

Factors driving success (significant multivariate regression correlation)

- Providing contractor training prevents poor program outcomes
- Offering multiple pathways to participation contributes to program success, specifically:
  - Multiple types of energy audits offered
  - Direct installation of measures, in addition to contractor-installed measures
  - Larger numbers of contracting firms participating in the program

Factors associated with success (significant bi-variate correlation)

- Having at least one staff member with 15 or more years of relevant experience
- Offering financing as a component of the program
- Offering incentives of around 25% as a component of the program
- Targeting outreach activities to specific populations (while not restricting participation to narrowly defined populations)
- Conducting community-based outreach efforts
- Providing a flexible approach to home and building owners to conduct comprehensive upgrades, including allowing participants to stage their upgrades
- Conducting effective quality assurance/quality control

A study examining how homeowners select contractors for home improvement projects suggests one reason why larger contractor networks (one aspect of offering multiple pathways to participant) were associated with program success. Homeowners most often reported using contractors with whom they, or

people they knew, had a previous relationship. Further, approximately half of the surveyed homeowners contacted only one contractor prior to completing a home improvement project (KEMA, Inc. 2014). Given these consumer behaviors, programs with a larger network of participating contractors have a greater likelihood that any given homeowner planning a home improvement will contact a participating contractor, giving that contractor an opportunity to offer energy efficiency improvements.

The experience of one BBNP grantee illustrates this dynamic. In one community, the grantee's program promoted retrofits by a group of contractors that largely came from outside the community. The program saw little uptake within that community, and one of the participating contractors established a satellite office to more effectively build relationships with local residents. In contrast, in another area, the program worked with a contractor who was deeply embedded in the community. Staff at this contractor organization were closely involved with local sustainability efforts and were connected to community organizations. The program was much more successful in motivating energy efficiency retrofits in this latter community than in the former (The Cadmus Group, Inc. and Research Into Action, Inc. 2013).

The grantees pursued different approaches to their existing remodeling and renovation markets. Some programs worked within existing remodeling and renovation markets to increase the energy efficiency of upgrade activities, while others essentially fostered a parallel *energy-efficiency* upgrade market. The latter approach seeks to develop a distinct market for energy efficiency retrofits, in which suppliers structure their businesses around providing efficiency retrofits and consumers, who explicitly demand efficiency retrofits, seek out those suppliers. The former approach seeks to integrate energy efficiency into the existing building remodeling industry and related trades. For example, a home remodeler might incorporate building shell improvements or other measures to save energy and water into a proposal to build an addition or remodel a kitchen (Jacobsohn, Ely, Subid Wagley, Eric Werling, Stephen Bickel 2014).

An approach that seeks to integrate energy efficiency into existing building retrofit markets may be more compatible with the structure of contractor firms, at least in the residential market. While most home improvement contracting firms are small, an approach that seeks to develop a distinct market for efficiency retrofits favors larger firms (McEwen 2012; KEMA, Inc. 2014). Large firms are likely to be better able to bear the considerable costs of transitioning their business to focus on energy-efficiency upgrades, and may be able to draw on income from an existing business area while their energy efficiency business becomes established. Large firms may also be better able to attract customers for energy-efficiency upgrades by offering energy audits as a loss leader, recovering lost audit labor costs with profits from measure installation work.

The finding that multiple audit types are associated with grantee success also relates to the program's approach to a specialized energy-efficiency market. Programs typically required that contractors conducting comprehensive audits have staff with Building Performance Institute certification or a similar credential, and contractors needed to purchase specialized equipment for the audits. Contractors seeking to establish businesses focused specifically on energy efficiency were most likely to make the investments in training and equipment to conduct comprehensive audits. Less comprehensive audit option provided a path for contractors in the existing home remodeling market to be involved in the BBNP-funded programs. One grantee noted that this was particularly important in attracting specialty contractors like HVAC, insulation, and window installers to the program (Research Into Action, Inc. 2015c).

Another advantage of offering less comprehensive audits that BBNP grantees reported was easier integration of energy efficiency into contractors' existing sales process. More comprehensive audits require more staff time than less comprehensive audits both in gathering building characteristics data (done on-site for comprehensive audits) and in the modeling, using building energy analysis models, conducted to identify energy efficiency opportunities and estimate energy savings potential. As a result,

when conducting a comprehensive audit, contractors could not "make the sale at the kitchen table, on the first visit," a practice one grantee described as important in gaining a participant's commitment to making a retrofit. Less comprehensive audit options allowed contractors to develop a scope of work and present it to the customer more quickly, reducing the likelihood that the customer would change their mind about making a retrofit or select a different contractor (Research Into Action, Inc. 2015c).

Several grantees succeeded in achieving comprehensive retrofits while offering multiple audit types. Five leading grantees that adopted this strategy were able to achieve retrofits and energy savings at a considerably lower cost than other grantees, while achieving similar amounts of energy savings per upgrade and similar proportions of upgrades that encompassed a wide range of measures (Research Into Action, Inc. 2015c).

Conclusion

The BBNP, while not conforming to experimental design, was a real-world experiment in which 65 grantees and subgrantees received funding to design and implement comprehensive energy-efficiency upgrades in their communities. An ARRA-funded project undertaken in response to the US Great Recession, USDOE sought to stimulate economic activity and generate energy savings and associated environmental benefits. BBNP succeeded in both goals. The variety of programs grant recipients implemented, as well as the extensive data reporting required of grant recipients, enabled the evaluation team to identify effective approaches to upgrade programs. Thus, the BBNP also succeeded in its goal to approximate an experiment in innovation and learning.

The program design also addressed longer term goals, including transformation of the building retrofit market and identification of successful innovative program approaches for energy efficiency program delivery. The timing of the evaluation precluded assessment of the BBNP's long term effects, but initial indicators suggested that the program had influenced building retrofit markets, at least in the short term, and generated industry knowledge to inform energy efficiency program design and delivery.

Additional research is necessary to determine whether efforts to create a distinct energy efficiency retrofit market are more or less likely to create lasting change within the market than the alternative. Contractors incorporating energy efficiency into their existing business lines may be more likely to revert to their prior practices in the absence of program support. On the other hand, a contractor's existing business lines may provide the resources necessary to continue offering energy efficiency services without program support, which might not be possible for a contractor focused entirely on energy efficiency. Additional research is also necessary to determine the extent to which the programs and program elements established by the grantees continue to serve customers. Anecdotally, the authors are aware of four grantees that continue to provide services in the absence of federal funding, as well as several utilities that have incorporated elements of BBNP programs into their efficiency program portfolio.

The economic stimulus and employment implications of seeking to integrate energy efficiency into existing building retrofit markets as opposed to creating a unique market for energy efficiency retrofits are another potential area for future research. In the short term, approaches consistent with integrating energy efficiency into existing markets appear to generate more retrofits, and thus more economic activity. There may be longer term benefits, however, in the creation of a stand-alone retrofit industry.

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