Better Buildings
NEIGHBORHOOD PROGRAM
U.S. DEPARTMENT OF ENERGY

Nevada State Energy Program Summary of Reported Data From July 1, 2010 – September 30, 2013

Better Buildings Neighborhood Program

Report Produced By:
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ACKNOWLEDGMENTS

This document presents a summary of data reported by an organization awarded federal financial assistance (e.g., grants, cooperative agreements) through the U.S. Department of Energy's (DOE's) Better Buildings Neighborhood Program (BBNP) from July 2010 or September 2010 through September 30, 2013. Although some awards have been extended into 2014, only the data reported through the end of September 2013 are included in this document.

We would like to thank the BBNP recipients who submitted these data, reviewed the information in this document, and provided revisions. We appreciate their perseverance and patience with the reporting process.

We would also like to thank Rebecca Ciraulo and Aayush Daftari at Navigant Consulting and Dave Roberts and Mike Heaney at the National Renewable Energy Laboratory (NREL) for compiling the quarterly information and the graphs and tables for this report.

Please contact Dale Hoffmeyer at betterbuildings@ee.doe.gov with any questions about this report.

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Awardee Number	Recipient Name	State	Total Grant
4471	State of Nevada	Nevada	$5,000,000

1.1 Introduction

This document presents a summary of data reported by an organization awarded federal financial assistance (e.g., grants, cooperative agreements) by DOE's BBNP from July 2010 or September 2010 through September 30, 2013. Although some awards were extended into 2014, only the data reported through the end of September 2013 are included in this document.

This document is not an evaluation of the recipient's BBNP program or a final report of the recipient's activities. The purpose of this document is to provide a summary of data reported quarterly by recipients. As the programmatic and building upgrade project data reported quarterly by each recipient is released, it will be available on the BBNP website at http://energy.gov/eere/better-buildings-neighborhood-program/progress. This report may be useful to researchers and others who plan to study what recipients reported.

This document, and one like it for each BBNP award recipient, follows a similar structure with graphs and tables. Each document includes the following sections: Funding Synopsis, Program Design Synopsis, Driving Demand Synopsis, Financing Synopsis, Workforce Development Synopsis, and Energy Savings Synopsis. A similar document showing results from all BBNP recipients titled *Better Buildings Neighborhood Program Summary of Reported Data* is also available on the BBNP website.

Two additional sources of information may be useful to researchers interested in the accomplishments of BBNP award recipients. The first is an independent evaluation of BBNP conducted by Research Into Action, NMR Group, Nexant, and Evergreen Economics. A Preliminary Process and Market Evaluation report was released in December 2012, and a Preliminary Energy Savings Impact Evaluation report was released in November 2013. Final reports will be released in 2014 and 2015. Second, as the recipient's final technical report is completed, it will be available online on the BBNP website. The final technical report was written by the recipient and contains more detailed information about the recipient's accomplishments and lessons learned. Some recipients conducted independent evaluations of their programs, and the final technical report is a source for locating those evaluations.

1.2 Source of Data

BBNP included 34 (i.e., 25 Topic 1 and 9 Topic 2) competitively awarded Recovery and Reinvestment Act (ARRA or Recovery Act)-funded Energy Efficiency Conservation Block Grants (EECBGs) and 7 competitively awarded FY10-funded State Energy Program (SEP) cooperative agreements. Topic 1 EECBGs were awarded at the beginning of June 2010, Topic 2 EECBGs were awarded in August 2010, and SEP agreements were awarded in October 2010. The first Quarterly Program Reports were due from recipients for Q4-2010 (grant start date through December 30, 2010) regardless of when the awards occurred.

All BBNP financial assistance agreements were originally set to expire between May and September 30, 2013. Four EECBGs awards were completed in 2013 (i.e., Toledo, Ohio; Connecticut; Omaha, Nebraska; and University Park, Maryland).The remaining agreements were modified to expire in 2014. For awards with an extended expiration date, the BBNP spending in this report will not equal the total awarded amount.

Organizations that received federal financial assistance under BBNP were required to submit a quarterly Federal Financial Report (SF-425), DOE Progress Report, and a BBNP Program Report. Most of the information in this document is based on recipient's' BBNP Program Report submissions. A copy of the BBNP Program Report (Excel Template) may be obtained by emailing betterbuildings@ee.doe.gov. Recipients were also given the option to submit Program Report information via XML Web service.

EECBG awards were funded by the American Recovery and Reinvestment Act (ARRA or Recovery Act). All federal recipients of ARRA funds were required to submit quarterly ARRA reports, in addition to agency-specific reports, via the ARRA federal reporting website. Information reported under the authority of ARRA is available on www.recovery.gov. Estimated job creation information in this report was obtained from www.recovery.gov.

EECBG (34) and SEP (7) awards had slightly different mandatory reporting requirements for BBNP Quarterly Program Reports. For example, reporting job hours worked was mandatory for EECBG awards and voluntary for SEP. Reporting workers trained and certified was mandatory for SEP awards and voluntary for EECBG. Reporting the number of active contractors performing building upgrades under the program was mandatory for EECBG awards and voluntary for SEP.

1.3 Data Quality

The data summary provided in this document is based on information recipients formally submitted to DOE using the BBNP Quarterly Program Report or ARRA report (EECBG only). Recipients reported quarterly totals for some information like spending, estimated energy savings, assessments completed, and workers trained or certified. Information like invoiced cost and loan amount was reported for each upgrade project. A total invoiced cost or loan amount is obtained from summing all the values reported for each upgrade project record that included this information. Estimated energy savings was reported as a total for the quarter and an estimate was reported for each upgrade project. Where appropriate, the percent or quantity of upgrade projects that had complete information has been indicated. These upgrade project records were used to determine some values in the figures and tables.

The data reported by recipients may include three types of errors: non-response, incorrect response, or processing errors.

Non-Response: Although some data in the BBNP Program Report was mandatory and other information was optional, not all recipients consistently reported the mandatory data elements. Missing mandatory data elements can be characterized as not available, not applicable, or not reported.

Incorrect Response: Data reported by recipients could be incorrect because the requested information was not understood; there was a lack of attention to detail; or information was misrepresented.

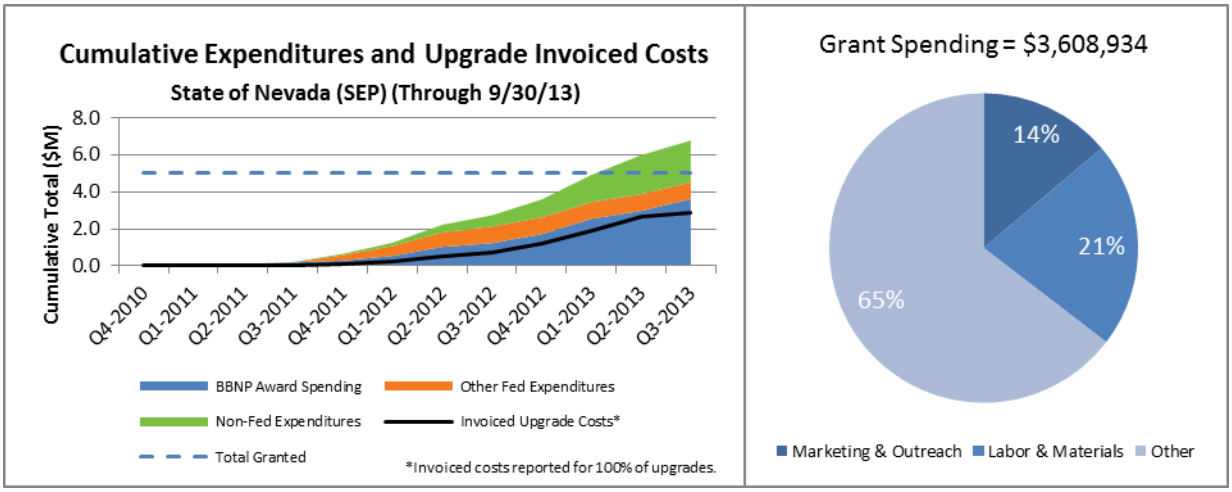
Processing Errors: Data reported could also be incorrect because of errors introduced when extracting the data from Program Reports and loading it into a central database. Processing errors can also be introduced when querying the central database to provide summary information.

DOE made several attempts to ask recipients to provide missing information and to verify the information that was reported. For example, recipients were provided a summary of what had been reported and a list of data quality issues following each quarterly reporting period, along with numerous requests to correct errors.

1.4 Funding Synopsis

The Nevada Governor's Office of Energy received a $5 million State Energy Program (SEP) grant. Figure 1 shows total recipient expenditures, other federal expenditures,[1] and non-federal expenditures[2] (leveraged spending) compared to the total investment in building upgrades (reported as invoiced cost).

Figure 1. Nevada SEP Cumulative Expenditures and Upgrade Invoiced Costs



The pie chart shows that recipient BBNP spending by category. Fourteen percent was spent on marketing and outreach activities; 21% on labor and material associated with energy assessments or building improvements; and 65% for other program expenses. Labor and material spending included: assessment subsidies, homeowner rebates, and energy modeling software costs.

The Nevada Governor's Office partnered with five sub-grantees in Northern and Southern Nevada to accomplish the award goals. The City of Las Vegas was charged with marketing and outreach. Truckee Meadows Community College (TMCC) was awarded funding to provide workforce development and training. Market research were headed up by University of Nevada, Las Vegas (UNLV). Financing and program sustainability was spearheaded by University of Nevada, Reno (UNR). HomeFree Nevada (HFN), the nonprofit sponsor of Home Performance with ENERGY STAR® (HPwES) for the state, was tasked with vetting assessors and contractors, facilitating participants through the program and performing quality assurance for assessments and upgrades.

[1] Other federal expenditures may include additional federal financial assistance award funds or loans from DOE or another federal agency.

[2] Non-federal expenditures may include third-party, in-kind contributions and the portion of the costs of a federally assisted project or program not borne by the federal government. This should include building owner contributions to building upgrade project cost.

1.5 Program Design Synopsis

The initial program design targeted the Reno/Sparks and Las Vegas metropolitan areas and was based on the existing HomeFree Nevada HPwES program. HPwES requires a test-in and test-out assessment based on Building Performance Institute (BPI) standards and a quality assurance/quality control review. Homeowners could receive a BBNP-funded rebate if they contributed a minimum match of $1,000 toward the upgrade costs.

As the grant progressed, it became evident that one lead organization coordinating the various efforts was needed to increase program success. HomeFree Nevada was re-branded as EFN (EFN) in mid-2012 to simplify messaging to both homeowners and stakeholders. EFN officially launched to the public as a formal rebate program along with a logo and brand identity on Earth Day, April 21, 2012. In late 2012, EFN was designated the lead organization, coordinating training and workforce development, partner recruitment, marketing and outreach activities, and homeowner financing in addition to program implementation and rebate processing.

1.6 Driving Demand Synopsis

In early 2012, the University of Nevada–Las Vegas conducted local homeowner surveys and focus groups and evaluated national market research trends to identify factors that drive buyers' decisions. They learned that homeowners are more receptive to energy efficiency improvements if they hear about them from a neighbor or friend, or a trusted voice. This was confirmed in practice when the *Reno Gazette Journal* ran an earned media print article on July 1, 2012 generating 100 homeowner leads that resulted in 81 energy assessments and 32 completed upgrades. As of October 2013, this article had returned the biggest result of any single outreach or marketing effort during the grant period.

In October 2012, EFN hired a full-time marketing manager to spearhead marketing efforts. Her first task was a marketing plan and budget that identified target markets and strategies. The marketing plan focused on developing channels that utilized trusted voices and included the following outreach efforts:

- Developing outreach relationships with large employers including gaming corporations, utilities, and local jurisdictions. EFN effectively leveraged its Board of Directors and relationships with other non-profits and created video testimonials and newsletter content to push the program out to these audiences. EFN also staffed tables at employee events, such as sustainability and health fairs, generating nearly 1,000 "touches." These touches resulted in more than 70 assessments and 15 completed upgrades.
- Pitching and producing a minimum of two statewide earned media pieces each month utilizing PMA press contacts and looping in elected officials to showcase their home assessments whenever possible. Through the third quarter of 2013, these officials included Mayor Hafen and Councilwoman March of the City of Henderson and Reno Councilwoman Jenny Brekhus. In total, earned media resulted in 186 assessments and 42 completed upgrades, more than 10% of the program total.
- Creating a homeowner referral program to encourage program participants to refer their friends and neighbors. Along with a completion certificate, homeowners who complete upgrades also received a postcard that invites them to refer friends; if the resulting referral also completed an upgrade, the original homeowner received a gift card. This program was instituted in spring 2013 and resulted in 14 completed upgrades. However, over the entire grant period, a total of 32 upgrades were completed as a result of a personal referral.
- Supporting a collaborative K-12 energy efficiency education program together with community allies (Desert Research Institute and the electric and gas utilities). This program provided curriculum, teacher training and practical student kits to teach energy

efficiency basics in the classroom. In fall 2013, EFN was working on expanding the curriculum to include take-home and parent education.

- Communicating the value of an energy-efficient home to the real estate community through sponsorships of green realtor designation courses, high-performance home summits, and promotion of energy-efficient mortgages.
- Expanding EFN's social media network from the usual Facebook and Twitter accounts to include LinkedIn, Pinterest, and Instagram with steadily growing audiences on all six platforms.
- Leveraging national efforts around October as National Energy Awareness Month by setting up presentations, proclamations and receptions in 2012 and 2013 at Reno, Sparks, Las Vegas, North Las Vegas, and Henderson City Councils and Washoe and Clark County Commission meetings.
- Expanding efforts to the public health sphere. In fall 2013, EFN developed asthma- and allergy-focused marketing collateral that communicated the benefits of good air quality. EFN was awarded a seat on the state asthma coalition, aligning with its goal of creating a statewide asthma plan for Nevada through ensuring healthy, efficient homes, schools and buildings for all Nevadans.

EFN recognized early in the grant period that although its marketing and outreach efforts were essential to program success, contractor partners were the primary driver of completed upgrades. In 2011, all completed upgrades were from contractor partner leads. In all subsequent quarters, at least 50% of completed upgrades originated from contractor partners. EFN marketing staff worked to consistently include contractor feedback in the development of materials and activities that supported its partners' marketing needs:

- EFN yard signs for partners to place outside homes undergoing upgrades
- EFN-approved contractor car magnets
- Door hangers, finance marketing material and rebate postcards with blank space for partner logos and contact information
- Subsidized booths for partners at community events and home expos, cooperative print marketing and subsidized partner sponsorships of events that reach target audiences

EFN also deployed traditional paid advertising, but only through channels that leveraged nonprofit opportunities. Examples included underwriting public radio and paid advertisements in publications that closely matched the target audience. In late 2012 through early 2013, EFN contracted with the Shelton Group, a national sustainability advertising company that specializes in disruptive marketing to develop a creative campaign designed to change behavior and drive sign-ups. The "Whip Your Home Into Shape" campaign was launched in late summer 2012, and featured Coach Sparky waking Nevadans up to the fact that everyone wastes energy

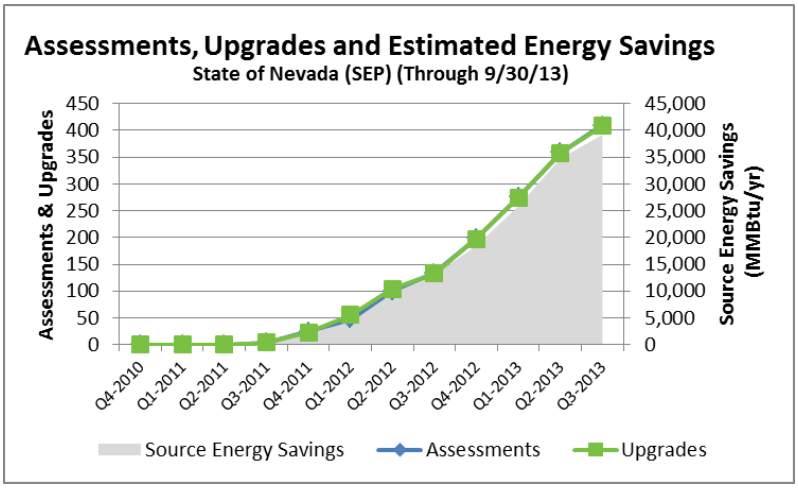
and with a call to action to sign up for the program. This campaign was rolled out on cable channels statewide, in print advertising and through social media.

Part of EFN's outreach strategy used demonstration homes located in target neighborhoods. In February 2012, EFN partnered with another nonprofit, Green Alliance, the Building America Research Alliance, and the City of Las Vegas to upgrade two foreclosed homes. One home was upgraded to a 30% overall energy savings and another to 50% energy savings. Contractor training was incorporated into the upgrade process. One of the homes was staged like a model home and was opened to the public for neighborhood open houses, and corporate and industry group tours and was made available for community group meetings.

In summary, EFN recognized the importance of using multiple channels to drive demand. Combining partner marketing, homeowner and contractor incentives, community outreach, the "trusted voice" and traditional paid advertising reaped the greatest results.

Figure 2 shows the cumulative energy assessments and upgrades reported by Nevada SEP from all building sectors through September 30, 2013, and the estimated annual source energy savings[3] (right axis).

Figure 2. Nevada SEP Assessments, Upgrades, and Estimated Savings



	Residential Single-Family	Residential Multi-Family Units	Commercial Buildings	Industrial Buildings	Agricultural Buildings
Assessments	409	0	0	0	0
Upgrades	408	0	0	0	0

[3] Source energy, also called primary energy, is the amount of fossil fuels and electricity plus the losses associated with the production of electricity (i.e., losses that occur in the generation, transmission, and distribution). Total estimated source energy savings was calculated by DOE. See Appendix B.

Figure 2 appears to show that 100% of assessments resulted in an upgrade, but only assessments that resulted in upgrades were reported. Although not reflected in Figure 2, EFN tracks conversion rates from sign-up to completed assessment to completed upgrade. Through the second quarter of 2013, the overall program conversion rate from sign-up to completed upgrade was 44%.

1.7 Financing Synopsis

Table 1 shows the grant funding investments in revolving loan funds (RLFs), loan loss reserves (LLRs), or interest rate buy-down (IRBDs).

Table 1. Financing Investments and Results (Through September 30, 2013)

Financing Investments and Results (Through 9/30/13)	
RLF (Commercial)	$0
RLF (Residential)	$0
Percent of Total Award Invested in RLF	0%
LLR (Multi-Sector)	$0
LLR (Commercial)	$0
LLR (Residential)	$0
Percent of Total Award Invested in LLR	0%
Interest Rate Buy-Down	$0
Total Financing Investment	$0
Percent of Total Award	0%
Total Capital (Private and Other Non-BBNP) Leveraged for Lending	$0
Results	
Amount Loaned Out (Residential)	**$97,579**
Number of Loans (Residential)	**17**
Average Loan Amount (Residential)	**$5,740**

EFN offered a standard $1,000 rebate to homeowners for completed upgrades estimated to reduce energy use by 20%. During the first half of 2012, the program increased the primary incentive by an additional $1,000 (leveraging municipal EECBG funds) for upgrades that reduced energy use by 30%. The response to this additional incentive was very positive, with all 20 available slots subscribed. In summer 2012, EFN introduced a reduced homeowner rebate of $500 for overall energy savings between 15 to 19%. The intention was to achieve more upgrades with a lower savings threshold, while still maintaining a portfolio average of 20% savings for all reported projects. However, only seven upgrades were submitted in this savings range. Throughout the grant period, the program regularly saw participation increase with incentives, even when increased energy savings was a requirement. In June 2012, the program offered a tiered homeowner rebate—$1,000 for upgrades estimated to reduce energy use by 20% plus an additional $100 for every percent up to 30% reduction or a maximum rebate of $2000. In October 2012, EFN announced a limited number of rebates (100) of $3,000. This

rebate was fully subscribed and led to a record number of assessments submitted in the fourth quarter of 2012 (158) and of upgrades in the first half of 2013.

Originally, contractor partners set their own price for the required test-in assessment; some partners charged as much as $700 while other partners would not charge the homeowner an assessment fee if an upgrade was completed. In June 2012, to establish a consistent marketing message, HomeFree Nevada instituted a standard assessment price of $199 plus a $100 subsidy paid directly to the contractor. A secondary purpose was to incent contractors to submit assessments for projects that did not progress to an upgrade. The program wanted to be able to calculate a more realistic conversion rate and capture data about homes and homeowners that did not complete the program. For a project that proceeded to upgrade and was approved for rebate, HomeFree Nevada paid a $200 job-complete bonus. Paid only to submitting contractor partners, the bonus was designed to serve as an additional incentive to the contractor for participating in the program and to also help off-set the cost of the required test-out.

In 2013, EFN continued to offer the standard $1,000 homeowner rebate, assessment subsidy and job completion bonus with several limited time specials of an extra $250 to $500 for achieving savings goals.

The University of Nevada, Reno worked with banks to establish low-interest loans and other energy efficiency financing options. While not implemented during the grant period, programs explored included the Clinton Foundation's HEAL (Home Energy Affordability Loan) and the WHEEL (Warehouse for Energy Efficiency Loan) programs. EFN plans to continue to pursue these and other energy efficiency financing options for Nevada homeowners, including on-bill and PACE financing, recognizing that these programs require additional time, resources, and often legislative intervention beyond the scope of the grant.

Green Chips, a local sustainability nonprofit, the City of Las Vegas, and Nevada State Bank created a residential low-interest loan program with a 2.3% interest rate for homeowners performing energy efficiency upgrades through EFN. The loan was funded with $200,000 from City of Las Vegas EECBG funding and administered through Nevada State Bank; EFN reviewed and qualified the energy efficiency projects for loan eligibility. The loan product was an unsecured personal loan with a maximum loan amount of $7,500 (after rebates); lending criteria included minimum credit score and proof of income.

Through September 30, 2013, only 23 Green Chips loans had been issued, comprising just over 5% of total completed upgrades. In an attempt to increase subscription, EFN worked with Nevada State Bank during summer 2013 to increase the program's flexibility and appeal for contractors expediting project approval and fund disbursement. In its first incarnation, loan

funds were not disbursed until after the upgrade was completed and had received final program approval. This meant that the contractor carried the entire cost of the upgrade (loan amount and rebate) until the final quality-assurance review was complete. Under a new process, project approval and fund disbursement happened after an assessment and scope of work was approved. The homeowner was issued two checks, each for 50% of the project cost. The homeowner and contractor can then arranged partial payment at the initial stages and then final payment when the work was complete and the homeowner was satisfied. While the program has received positive feedback about the changes from partners, an increase in subscription had yet to be realized.

Many EFN contractor partners offered their own in-house financing, often 12 or 18 months same as cash, with a market-level interest rate.

EFN made efforts in promoting energy efficiency mortgages in both the northern and southern Nevada markets. Several partner auditors were also RESNET raters and the program paid an incentive to a rater for submitting an assessment done for the purposes of an energy efficiency mortgage. However, the demand for energy efficiency mortgages was low in the state overall. During the grant period, only eight upgrades were completed with an energy efficiency mortgage approved through the program. As a frame of reference, the U.S. Housing and Urban Development Single-Family Data Warehouse reported only 6 energy efficiency mortgages funded in 2011, 20 in 2012, and 13 in 2013. In summer 2013, EFN entered into a relationship with a major national bank to co-market the energy efficiency mortgage product, but as of September 30, 2013, no upgrades had resulted from the effort.

1.8 Workforce Development Synopsis

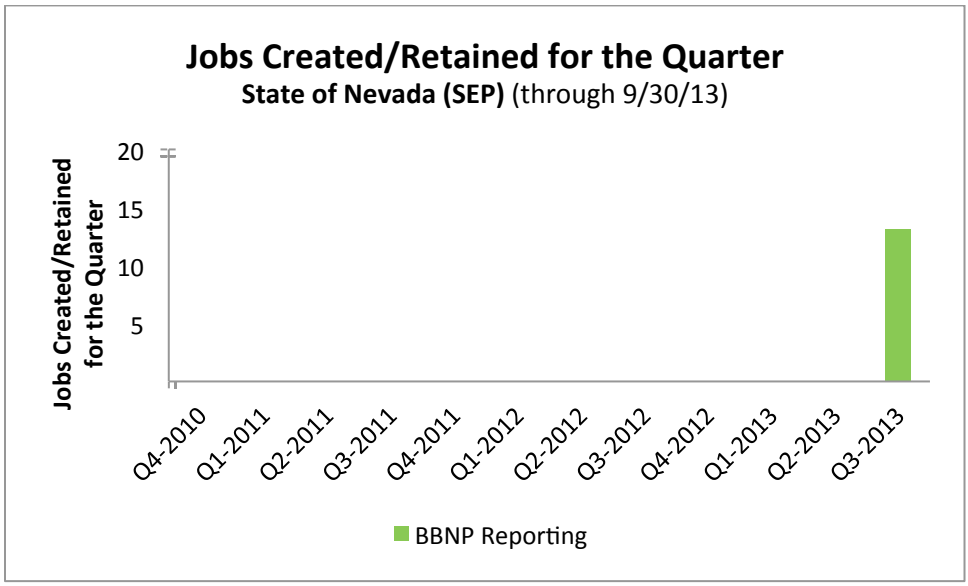
Table 2 shows the total number of workers trained and certified as reported by recipients. Most recipients reported the number of workers trained and certified each quarter; the table shows the cumulative total through September 30, 2013. The table also shows the number of active participating contractors reported by recipients for one quarter. The number of participating contractors may increase or decrease each quarter. However, it is not summed across quarters because many of the same contractors actively participated during multiple quarters. Therefore, only the number of participating contractors reported in the most recent quarter is provided in the table.

Table 2. Workforce Development Results (Through September 30, 2013)

Workforce Development Results[4] (Through 9/30/13)	
Number of Trained Workers	35
Number of Certified Workers	33
Active Participating Contractors (Q3-2013)	18

Figure 3 shows jobs created or retained. This is estimated based on total hours worked during the quarter reported by the recipient divided by 520 hours per quarter.

Figure 3. Nevada SEP Jobs Created/Retained for the Quarter[5]



[4] Reporting the number of active contractors was mandatory for EECBG and voluntary for SEP. Reporting the number of trained and certified workers was mandatory for SEP and voluntary for EECBG.
[5] Reporting job hours worked was mandatory for EECBG and voluntary for SEP.

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Truckee Meadows Community College began offering RESNET and BPI certification training in northern Nevada in spring 2011. This training continued through the spring of 2013. During this time, 35 students completed the course and 33 were certified. In Southern Nevada, EFN leveraged Workforce Investment Act dollars through the state's workforce development and training program to provide BPI certification training through the summer of 2012. For the remainder of the grant period, the new contractors were offered a training reimbursement.

In addition to building science training, EFN offered energy efficiency business development, HVAC to home performance, marketing (e.g., social media, website training), and sales training to its partners free of cost as part of its quarterly program training.

EFN faced a unique challenge increasing the number of partner contractors. Partner contractors were required to maintain at least one staff member with BPI Building Analyst certification. However, the State of Nevada required energy assessor to obtain a state-issued energy auditor license. The energy auditor license required 40 hours of classroom training from one of only two state-approved trainers, a background check, and proof of a minimum of $1 million in errors and omissions insurance and $1 million in general liability insurance. In addition the law required the energy auditor to maintain a legal separation from the company performing the upgrade work. In August of 2013, the Nevada Real Estate Division, which administers the state energy auditor license, approved a homeowner disclosure form—for use by EFN partners only—that allows the assessment and the upgrade work to be performed by the same company, based on the third-party quality assurance review performed by EFN.

1.9 Estimated Energy Savings Synopsis

Recipients reported estimated energy savings in two ways. First, recipients were asked to report estimated savings data quarterly: total kilowatt-hours (kWh) of electricity, therms of natural gas, gallons of fuel oil, and gallons of propane saved, along with dollars in energy costs saved. Table 3 shows the total estimated annual energy savings of the recipient's activities reported through September 30, 2013.

Table 3. Estimated Annual Energy Savings (Through September 30, 2013), as Reported in Program Summaries

Estimated Annual Energy Savings (Through 9/30/13)	
kWh Electricity	2,379,805
Therms Natural Gas	96,829
Gallons of Oil	1,855
Gallons of Propane	9,649
Total Estimated MMBTU Savings (Source Energy)[6]	39,213
Total Estimated Energy Cost Savings	$415,907

Secondly, recipients were asked to report estimated savings data quarterly for each upgrade project. Table 4 shows the sum of the estimated energy savings of all building upgrade projects reported by the recipient through September 30, 2013. The second column shows the number of upgrade projects that were summed to estimate the energy savings in the third column.

Table 4. Sum of Estimated Annual Energy Savings (Through September 30, 2013), as Reported for Individual Upgrade Projects

Sum of Estimated Annual Energy Savings (Through 9/30/13)		
	Number of Projects Summed	**Sum of Estimated Savings Reported**
kWh Electricity	400	2,379,760
Therms Natural Gas	270	96,782
Gallons of Oil	5	1,995
Gallons of Propane	20	9,596
Sum of Estimated Annual Energy Cost Savings	406	$419,074
Method(s) of Savings Prediction	OPTIMISER, REM/RATE, SMOC-ERS	

The program-reported total in Table 3 will not necessarily equal the sum of estimated savings in Table 4. Recipients were originally asked to only report individual building upgrade projects that were estimated to achieve at least a 15% reduction in total building energy use. Recipients

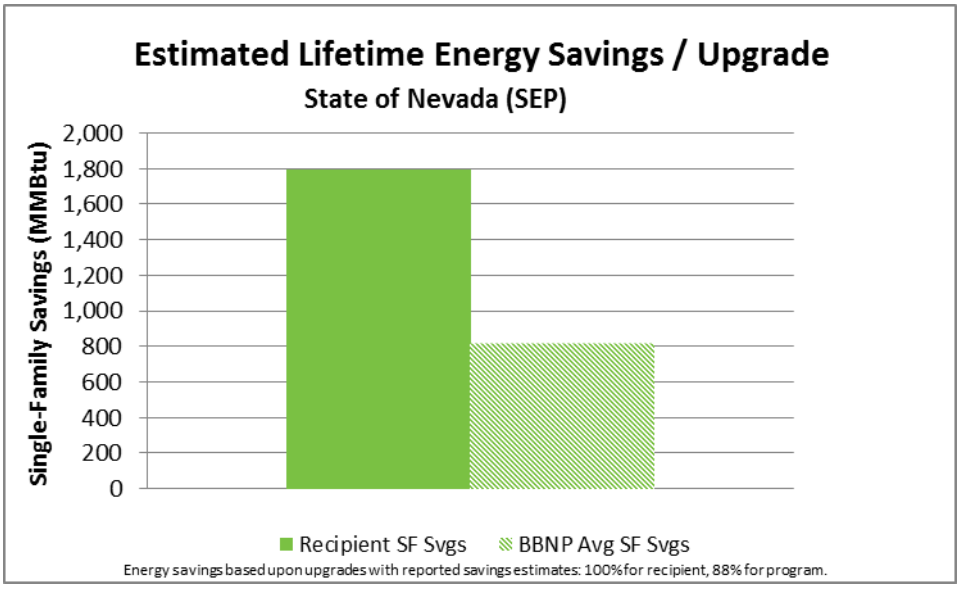
[6] Total estimated source energy savings is calculated by DOE.

were also told to include estimated energy saving from all upgrades in their program summaries, including upgrades that achieved less than a 15% reduction in total building energy use, in their program totals. In 2012, recipients were given the option to continue to report only building upgrade projects that saved 15% or to report all building upgrade projects so long as the total portfolio of projects (by building sector) achieved an average savings of 15%.

1.9.1. Estimated Lifetime Energy Savings per Upgrade Analysis

From the beginning of BBNP, recipients expressed interest in understanding how their results compared to other recipients. Figure 4 shows an estimated lifetime energy savings per upgrade for the recipient and an average estimated lifetime energy savings per upgrade based on all BBNP-reported projects. This analysis was completed by NREL using recipient-reported project information. The methodology used to complete the analysis is provided in the Appendix C. Eighty-eight percent of the reported BBNP upgrade projects were used in the analysis to calculate the BBNP average because energy savings estimates were missing or incomplete for 12% of reported projects.

Figure 4. Estimated Lifetime Energy Savings per Upgrade



There could be several reasons why a recipient's results are higher or lower than the BBNP average. Recipients implemented a variety of program design approaches, including different mixes of energy efficiency measures, and targeted different building types and customer segments. Reviewing the summary report of other recipients may provide insights into program design choices and other factors that could influence results.

In addition to program design decisions, other factors could influence results. For example, programs in more energy-intensive climates may be able to achieve greater savings per

upgrade because average energy consumption is higher than the national average. Programs in states with high energy costs may find that customers are more motivated to save more energy than states with low energy costs.

APPENDIX A: GLOSSARY OF TERMS

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ARR or Recovery Act:	American Recovery and Reinvestment Act of 2009
Active Participating Contractors:	Active contractors are qualified (qualified according to the individual recipients' program guidance) contractors who have performed one or more building upgrades in the reporting quarter.
Assessments:	Expert review of building's energy savings opportunities, which typically includes an onsite inspection of the building and its systems and results in recommendations for building energy performance improvements.
BBNP:	Better Buildings Neighborhood Program
BBNP Award Spending:	Total outlay amount for recipients through 9/30/13
Certified Workers:	Number of workers with a nationally-recognized certification. Recipients could choose to adopt an alternative to nationally-recognized certification and provide a justification for the alternative certification chosen.
EECBG:	Energy Efficiency Conservation Block Grant
IRBD:	(Interest Rate Buy-Down) Program administrators provide lenders or investors with an up-front payment when a financial product is originated to reduce the interest rate a customer pays. The payment is typically the present value of the difference between the interest rate the customer will pay and the "market" interest rate of the financial product over the expected life of the financial product.
Invoiced Upgrade Costs:	Total cost of the building energy efficiency upgrades, as invoiced by the contractor performing the work, which includes the building owner's contribution, and any incentives or grants funded by BBNP funds, other federal funds or non-Federal sources intended to reduce the building owner's cost.

APPENDIX A: GLOSSARY OF TERMS

Jobs Created/Retained:	For the purpose of Recovery Act reporting jobs created and retained was estimated based on the job hours directly funded with BBNP funds during a reporting quarter divided by 520 hours per quarter. EECBG recipients were required to report jobs created or retained expressed as ‘‘full-time equivalent’’ (FTE) for Recovery Act reporting. The Recovery Act reporting specified direct jobs created and retained by sub-recipients and vendors. For the purpose of BBNP Quarterly Program reporting, jobs created and retained was estimated based o the job hours worked directly funded with BBNP funds and job hours worked funded by other federal funds and leveraged funds (i.e. state and local funds, utilities, financial institutions, private contributions, etc.) during reporting quarter divided by 520 hours per quarter. This includes, but is not limited to; administrative staff, consultants, and contractors involved in the management or deployment of assessment and building upgrade activities. The BBNP Program Report definition was broader than direct jobs reported for the Recovery Act
LLR:	(Loan Loss Reserve) A form of credit enhancement through which a program administrator (or other entity) promises to pay lender some portion (less than 100%) of losses the lender endures on financial product or pool of financial products. 5% to 20% LLRs are common.
Labor & Materials:	Recipient outlays of BBNP award funds incurred as part of an assessment or upgrade directly associated with the installation of energy efficient equipment, appliances, or building components (e.g. insulation, windows, etc.). This includes incentives or grants to reduce a building owner’s labor or material costs to complete and energy assessment or upgrade.
Marketing & Outreach:	Recipient outlays of BBNP award funds for communication activities designed to identify, reach and motivate potential customers to participate in a program and learn more (e.g. assessment or other informational activity) about energy efficiency or initiate an energy efficiency upgrade.
MMBtu	One million British thermal units (Btu).
Multi-Family Unit:	unit in a building with multiple housing units--a structure that is divided into living quarters for two or more families or households in which one household lives above or beside another. This category also includes houses originally intended for occupancy by one family (or for some other use) that have since been converted to separate dwellings for two or more families.

APPENDIX A: GLOSSARY OF TERMS

Non-Federal Expenditures:	These may include third-party, in-kind contributions and the portion of the costs of a federally assisted project or program not borne by the Federal Government. This should include building owner contributions to building upgrade project cost.
Other Federal Expenditures:	These may include additional federal financial assistance award funds or loans from the Department of Energy or another federal agency.
Other Program Expenses:	Recipient outlays of BBNP award funds not classified as labor & materials or marketing & outreach. These expenses are often associated with program overhead. Outlays are distinct from DOE's definition of expenditures, which is most relevant with financing programs (i.e., Funds drawn down and provided by the recipient to a third party, to capitalize a loan fund, are considered outlays. Funds drawn down by the recipient to capitalize a loan fund in-house are not considered outlays until the funds are loaned out.).
RLF:	(Revolving Loan Fund) Funds of capital used to provide loans for energy efficiency and renewable energy improvements; loan repayments recapitalize the funding pool to enable additional lending.
SEP:	State Energy Program
Single-Family:	housing unit, detached or attached, that provides living space for one household or family. Attached houses are considered single-family houses as long as they are not divided into more than one housing unit and they have an independent outside entrance. A single-family house is contained within walls extending from the basement (or the ground floor, if there is no basement) to the roof. mobile home with one or more rooms added is classified as single-family home. Townhouses, row-houses, and duplexes are considered single-family attached housing units, as long as there is n household living above another one within the walls extending from the basement to the roof to separate the units.
Source energy:	Also called primary energy, is the amount of fossil fuels and electricity plus the losses associated with the production of electricity (i.e., losses that occur in the generation, transmission, and distribution).
Total Capital (Private and Other non-BBNP) Leveraged for Lending:	Capital committed by one of more third parties for financing energy efficiency building upgrades. This can include federally funded (non-BBNP) revolving loan funds and private capital from credit unions, banks or other financial institutions.
Trained Workers:	Number of workers trained under a nationally-recognized organization or curriculum. Recipients could choose to adopt an alternative to nationally-recognized training and provide a justification for the alternative training chosen.

APPENDIX A: GLOSSARY OF TERMS

Upgrades:	Also called building upgrades or retrofits, an individual or group of measures that a customer undertakes to improve building performance, with benefits including more efficient energy use, improved comfort and indoor air quality, ensured combustion safety, and lower utility bills.

APPENDIX B: METHODOLOGY TO CALCULATE SOURCE ENERGY SAVINGS

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DOE used the following methodology to calculate source energy savings:

$$E_{svgsv} = \sum_{i=Energy\ Typep} E_{svgs\ source,i}$$

$$E_{svgs\ source,i} = E_{svgs\ site,i} \times CF_{MMB\ u,i} \times CF_{Siteito\ Source,i}$$

where,

E_{svgs} is the total annual energy savings in MMBtu
$E_{svgs\ source,i}$ is the annual source energy savings in MMBtu for each energy type *i* as shown in Table B- 1
$E_{svgs\ site,\ i}$ is the total estimated annual site energy savings for each energy type *i* as shown in Table B- 1
$CF_{MMBtu,\ i}$ is the MMBtu conversion factor for each energy type *i* as shown in Table B- 1
$CF_{Site\ to\ Source,\ i}$ is the site to source conversion factor for each energy type *i* as shown in Table B- 1.

Table B- 1. MMBtu and Site to Source Conversion Factors by Energy Type

Energy Type	MMBtu Conversion Factor	Site to Source Conversion Factor
Electricity	0.00341214 MMBtu/kWh	3.365
Natural Gas	0.1027 MMBtu/ccf	1.092
Natural Gas	0.1 MMBtu/therm	1.092
Fuel Oil (Type 2)	0.14 MMBtu/gallon	1.158
Propane/LPG	0.09133 MMBtu/gallon	1.151
Kerosene	0.135 MMBtu/gallon	1.205
Wood	20 MMBtu/cord	1

APPENDIX C: LIFETIME ENERGY SAVINGS CALCULATIONS

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The Lifetime Energy Savings, LES, is the total source energy savings over the expected life of the installed efficiency upgrades, expressed in MMBtu. An LES value is calculated for each grant recipient as follows:

$$LES_r \times = E_{svgs,r} \times \overline{L}_r$$

where,

LES_r is the Lifetime Energy Savings for grant recipient *r*

$E_{svgs,r}$ is the total estimated annual energy savings for all projects reported by the recipient (MMBtu/yr)

$\overline{L}_r$ is the project weighted lifetime of the efficiency upgrades reported by a recipient, expressed in years and calculated as follows:

$$\overline{L}_r = \frac{\left(\overline{L}_{res} \times E_{svgs,res}\right) + \left(\overline{L}_{com} \times E_{svgs,com}\right)}{\left(E_{svgs,res} + E_{svgs,com}\right)}$$

where,

$\overline{L}_{res}$ is the source energy-savings-weighted lifetime of the residential efficiency upgrades installed for a recipient

$E_{svgs,res}$ is the total estimated annual source energy savings in MMBtu for all residential upgrades reported by the grant recipient

$\overline{L}_{com}$ is the project-count-weighted lifetime of the commercial efficiency upgrades installed for a recipient

$E_{svgs,com}$ is the total estimated annual source energy savings in MMBtu for all commercial upgrades reported by the grant recipient

$\overline{L}_{res}$ is calculated as follows:

$$\overline{L}_{res} = \frac{\sum_{i=1}^{4}\left(Cnt_i \times E_{svgs,i} \times L_i\right)}{\sum_{i=1}^{4}\left(Cnt_i \times E_{svgs,i}\right)}$$

where,

i is the type category of efficiency upgrades installed as shown in Table C- 1.

Cnt_i is the number of energy efficiency upgrades of type *i* installed by a recipient

$E_{svgs,i}$ is the assumed annual energy savings in MMBtu for each energy efficiency upgrade of type *i* as shown in Table C- 1.

APPENDIX C: LIFETIME ENERGY SAVINGS CALCULATIONS

L_i is the assumed lifetime in years for energy efficiency upgrades of type *i* as shown in Table C- 1.

Table C- 1. Residential Project Energy Upgrade Categories, Lifetimes and Energy Savings[7]

Type Category	Description	Assumed Lifetime (Years)	Assumed Source Energy Savings (MMBtu/yr/measure)
R1	Simple direct-install measures including CFL's, low-flow showerheads, water heater blankets, HVAC tune ups and other low cost measures	5	0.5
R2	HVAC replacement, programmable thermostats, refrigerators, dishwashers, hot water heaters and any large appliance	15	7
R3	Duct sealing and duct insulating	15	10
R4	House air sealing, house insulating, window replacement and any other insulating (except duct insulating)	20	20

$\overline{L}_{com}$ is calculated as follows:

$$\overline{L}_{como} = \frac{\sum_{j=1}^{4}(Cn_j \times L_j)}{\sum_{j=1}^{4}(Cn_j)}$$

where,

j is the type category of efficiency upgrades installed as shown in Table C- 2.

Cnt_j is the number of energy efficiency upgrades of type *i* installed by a recipient

L_j is the assumed lifetime in years for energy efficiency upgrades of type *j* as shown in Table C- 2.

[7] Assumed Lifetime for residential measures was estimated by NREL based on a review NAHB Study of Life Expectancy of Home Components, DEER, and consulting with evaluation experts. Assumed Source Energy Savings was estimated/adapted from the Better Building Energy Savings Measure Packages developed by NREL using BEopt. General methodology is documented here: http://www.nrel.gov/docs/fy11osti/50572.pdf

APPENDIX C: LIFETIME ENERGY SAVINGS CALCULATIONS

Table C- 2. Commercial Project Energy Upgrade Categories and Lifetimes[8]

Type Category	Description	Assumed Lifetime (Years)	Assumed Source Energy Savings (MMBtu/yr/measure)
C1	CFLs, faucet aerators and HVAC tune ups	5	100
C2	Commercial kitchen equipment, thermostats	11	6
C3	HVAC (packaged), refrigeration, hot water heaters, LED and linear fluorescent lighting	15	100
C4	Chillers, boilers, PV, solar thermal, insulation, windows	20	100

[8] Assumed Lifetime for commercial measures was estimated by NREL based on a review of DEER and consulting with evaluation experts. Assumed Source Energy Savings was derived using regression analysis of reported commercial projects with energy savings and installed measures. A measure may include several instances of one technology installed in a project.

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