Better Buildings
NEIGHBORHOOD PROGRAM
U.S. DEPARTMENT OF ENERGY

# State of New Hampshire Summary of Reported Data From July 1, 2010 – September 30, 2013

## Better Buildings Neighborhood Program

**Report Produced By:**
**U.S. Department of Energy**
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U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

# STATE OF NEW HAMPSHIRE SUMMARY OF REPORTED DATA

## 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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# STATE OF NEW HAMPSHIRE SUMMARY OF REPORTED DATA

| Awardee Number | Recipient Name | State | Total Grant |
|---|---|---|---|
| 3576 | State of New Hampshire | New Hampshire | $10,000,000[1] |

## 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] State of New Hampshire Award Summary (2013), Recovery.gov, Accessed June 2014: http://www.recovery.gov/arra/Transparency/RecoveryData/pages/RecipientProjectSummary508.aspx?AwardIdSur=108302

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## 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.

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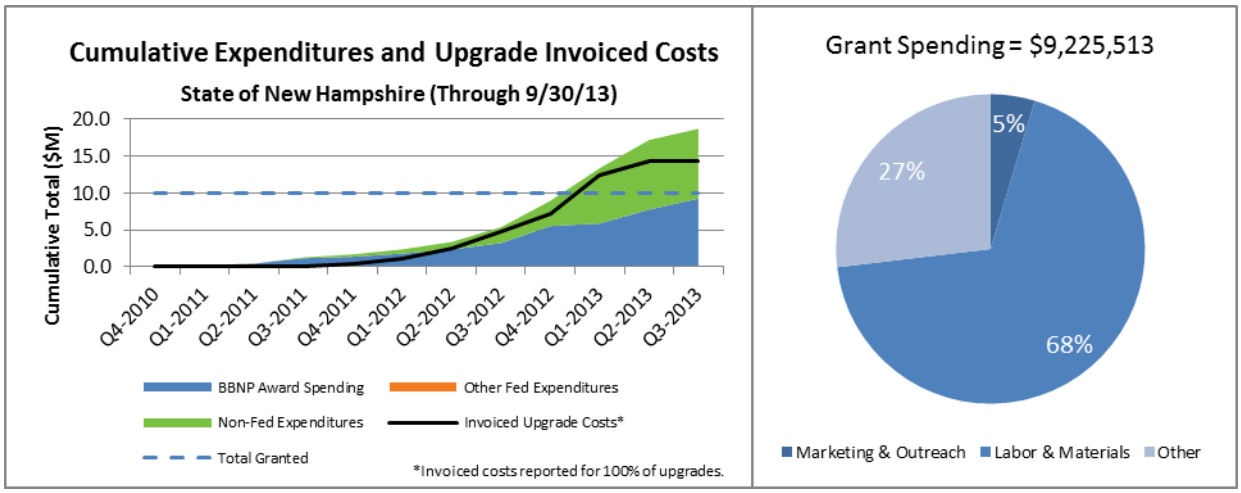
## 1.4 Funding Synopsis

The State of New Hampshire received a $10 million EECBG. Figure 1 shows total recipient expenditures, other federal expenditures,[2] and non-federal expenditures[3] (e.g., leveraged spending) compared to the total investment in building upgrades (reported as invoiced cost). Total investments in building upgrades exceeded BBNP spending.

**Figure 1. State of New Hampshire Cumulative Expenditures and Upgrade Invoiced Costs**




The pie chart in Figure 1 shows recipient reported spending by category. Five percent of BBNP funds were spent on marketing and outreach activities; 68% on labor and material expenses associated with energy assessments or building improvements; and 27% on other program expenses. About 35% of BBNP funds were allocated for residential and commercial revolving loan funds, loan loss reserves, and interest rate buy-downs.

The program leveraged federal funds with local banks and credit unions by entering into co-lending agreements (i.e., participatory lending), providing loan loss reserves, and buying down interest rates. For commercial projects, the program partnered with other energy efficiency programs in the state, such as the NH Retail Association and NH Pay for Performance program (e.g., Regional Greenhouse Gas Initiative funds); state regulated utility efficiency programs (e.g., Home Performance with ENERGY STAR® [HPwES], commercial programs administered by four utilities); and Department of Housing and Urban Development-funded Greener Homes program for large multifamily and Enterprise Energy Fund (e.g., ARRA-SEP program). For residential

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

[3] 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.

projects, the program partnered with the state utilities' HPwES program to leveraged funds to expand the on-bill financing program and enable deep building upgrade projects.

## 1.5 Program Design Synopsis

The New Hampshire (NH) Better Buildings program was administered by the New Hampshire Office of Energy and Planning (OEP) and managed by the Community Development Finance Authority (CDFA). The three initial "beacon" communities—Berlin, Nashua, and Plymouth—were selected from more than 30 applicants based on their mix of geography, economic status, building types, and other demographics. Community offices were established on Main Street of each community. A community manager and technical advisor staffed each office and served as the main points of contact for customer interaction and outreach in the communities.

The NH Better Buildings program focused on whole building deep energy upgrades, and program design encouraged building owners to understand all of the opportunities available for improving their space. An energy assessment was required for every project, and the assessment requirements were robust. Residential projects used either modeled savings with Targeted Retrofit Energy Analysis Tool (TREAT) software, or deemed savings with NH Surveyor, a third-party product created specifically for the state utility programs. For commercial properties, assessments were required to meet at least ASHRAE Level II standards and a set of assessment guidelines helped to provide consistent information while recognizing that a variety of approaches to analysis can work well, depending on the building type, size, and use. After the assessment, NH Better Buildings helped building owners understand their options and utilized a list of qualified contractors to implement measures. A quality control process including mid-point and final inspections, and post-construction blower door testing when appropriate, gave building owners and the program assurance that measures were installed properly and operating as specified. The program design created confidence for building owners and encouraged them to move beyond low-hanging fruit and invest in long-term energy savings measures.

## 1.6 Driving Demand Synopsis

The NH Better Buildings program established a local office in each of the three "beacon" communities to coordinate outreach, and guide businesses and homeowners through the energy efficiency improvement process. A community manager generated support for the program by hosting outreach events and making presentations at local meetings; maintained lists of qualified energy professionals; and assisted in identifying financial opportunities for energy efficiency upgrades. In addition, a technical advisor was on hand to address specific energy efficiency questions; facilitate energy check-ups and timely completion of projects; and help building owners interpret energy assessment findings and recommendations. Relationships with local businesses, nonprofits, and other organizations grew through these outreach and assistance efforts.

The program's northern most community, Berlin, partnered with the Northern Forest Center on its innovative Model Neighborhood Project. Through this partnership, Berlin residents made their homes more energy-efficient through building upgrades and reduced their heating bills by installing pellet boiler systems that take advantage of local and renewable fuel for heat in the cold New Hampshire winters. A significant and successful outreach effort in Berlin was the monthly "Lunch and Learn" sessions on topics related to energy efficiency and renewable energy. These sessions provided the foundation to create an ever growing group of interested and informed citizens.

As a model for institutional and citizen-based sustainability efforts, the university town of Plymouth used its early successes to motivate additional residents and businesses to adopt energy efficiency. Door-to-door business visits in partnership with the Retail Merchants Association and New Hampshire Division of Economic Development recruited participants for the commercial program and enabled the NH Better Buildings program to leverage multiple funding sources.

Nashua, the second largest city in the state and one with a rich industrial history, retrofitted many old commercial buildings and multifamily housing structures with upgrades improving the building's energy performance and bringing them into compliance with today's energy codes. A unique incentive structure for contractors encouraged them (qualified contractors) to sell the program to their customers.

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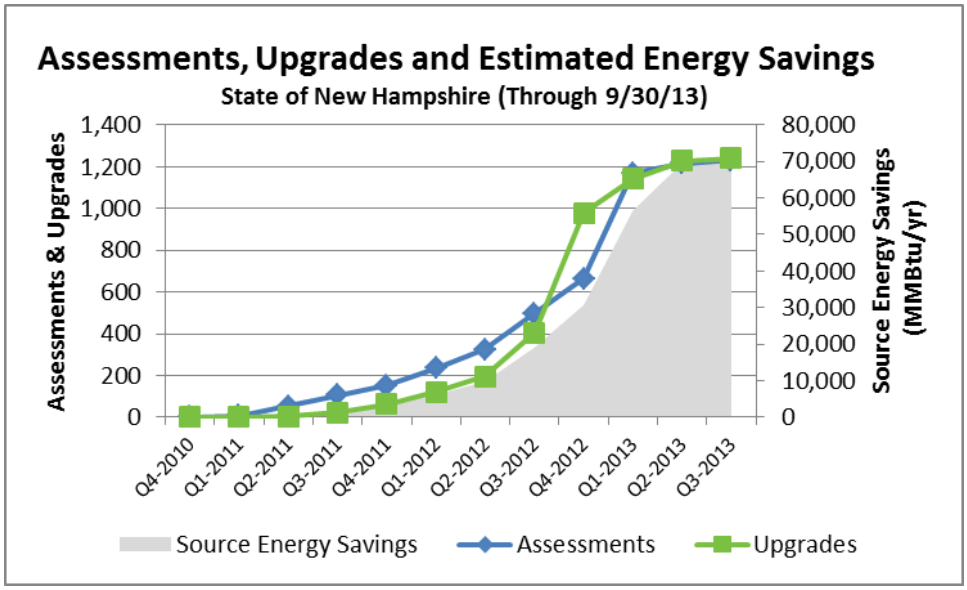
Figure 2 shows the cumulative energy assessments and upgrades reported by the State of New Hampshire from all building sectors through September 30, 2013, and the estimated annual source energy savings[4] (right axis).

**Figure 2. State of New Hampshire Assessments, Upgrades, and Estimated Savings**




| | Residential Single-Family | Residential Multi-Family Units | Commercial Buildings | Industrial Buildings | Agricultural Buildings |
|---|---|---|---|---|---|
| Assessments | 768 | 370 | 82 | 0 | 0 |
| Upgrades | 808 | 365 | 66 | 0 | 0 |

[4] 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.

# STATE OF NEW HAMPSHIRE SUMMARY OF REPORTED DATA

## 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 (September 30, 2013)**

| Financing Investments and Results (Through 9/30/13) | |
|---|---|
| **RLF (Commercial)** | **$1,298,326** |
| **RLF (Residential)** | **$1,276,164** |
| Percent of Total Award Invested in RLF | 26% |
| **LLR (Multi-Sector)** | **$597,775** |
| LLR (Commercial) | $0 |
| LLR (Residential) | $0 |
| Percent of Total Award Invested in LLR | 6% |
| **Interest Rate Buy-Down** | **$272,957** |
| **Total Financing Investment** | **$3,466,899** |
| Percent of Total Award | 35% |
| Total Capital (Private and Other Non-BBNP) Leveraged for Lending | Not Reported |
| **Results[5]** | |
| **Amount Loaned Out (Residential)** | **$2,104,492** |
| **# of Loans (Residential)** | **305** |
| **Average Loan Amount (Residential)** | **$6,900** |
| **Amount Loaned Out (Commercial)** | **$2,700,041** |
| **# of Loans (Commercial)** | **38** |
| **Average Loan Amount (Commercial)** | **$71,054** |

NH Better Buildings funds leveraged private investment from banks and credit unions to create attractive financing terms to encourage program participation. For residential and small commercial projects (up to $20,000), the program paid to reduce the interest rate for qualified loans to allow an attractive 1% interest rate loan product with terms up to 10 years. Two of the utility companies in New Hampshire that run the state's HPwES program were able to expand their loan offerings by partnering with NH Better Buildings. The maximum residential loan was increased to $20,000 with a maximum term of 10 years. Customers taking loans from the joint

[5] New Hampshire's Final Technical report shows 193 residential loans through a utility partnership totaling $1,276,164; 134 non-utility residential and commercial loans through bank and credit union partnerships totaling $1,197,138; and 18 commercial loans totaling $2,596,652.

HPwES/Better Buildings program were also allowed to finance “deep dive” measures that are not typically available through the utility programs.

For medium and large commercial projects, the program created a co-lending loan product with financial institutions. This was achieved as a participatory lending agreement with local banks. NH Better Buildings provided one-half the capital at a 0% interest rate, and the bank provided the other half at a fair market rate negotiated with the borrower, usually 5-7%, which resulted in a lower-than-market blended rate for the borrower, usually 2.5 to 3.5%.

NH Better Buildings funding was used to address existing barriers in the private market such as building owner concerns about upfront costs and bank concerns about loan defaults. For residential and small commercial projects, the NH Better Buildings program provided a loan loss reserve account to help mitigate risk. NH Better Buildings provided partner banks and credit unions with a 50% loan loss reserve. For medium and large commercial projects, NH Better Buildings did not provide a loan loss reserve but instead mitigated risk to bank partners with a structure that put the Better Buildings portion of the loan capital in second position to the bank portion of the capital in the event of default.

To stimulate demand, increase return on investment, and further off-set up-front costs, NH Better Buildings provided additional incentives in the form of grants and rebates. All NH Better Buildings commercial projects were offered a rebate of 25% of the total project cost up to $150,000. Residential customers residing in a beacon community were offered a rebate of $250 to $1,000 depending on the total projected energy savings. During the partnership between NH Better Buildings and the state utilities’ HPwES program, residential customers were eligible for HPwES rebates equal to 50% of total project cost up to $4,000. NH Better Buildings funded one-half of this rebate.

# STATE OF NEW HAMPSHIRE SUMMARY OF REPORTED DATA

## 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 (September 30, 2013)**

| Workforce Development Results[6] (Through 9/30/13) | |
|---|---|
| **Number of Trained Workers** | 42 |
| **Number of Certified Workers** | Not Reported |
| **Active Participating Contractors (Q3-2013)** | 43 |

NH Better Buildings worked with a list of 42 qualified contractors and auditors throughout the program. The NH Better Buildings program required energy professionals to be Building Performance Institute (BPI)-certified and rated based on their experience installing energy efficiency improvements. Working through local community colleges, the NH Better Buildings program provided BPI certified Building Analyst and Building Installer classes to help develop more qualified workers and foster employment in the three beacon communities and throughout the state. In addition to classroom training sessions, the NH Better Buildings program and Lakes Region Community College offered a mentoring program for workers who had completed classroom trainings but needed additional experience and hours in the field before working on their own. NH Better Buildings also partnered with the Community College system to offer training programs for contractors. Trainings that were sponsored included TREAT auditing software training, Introduction to How Buildings Work training, a realtor workshop, and an installation workshop focused on manufactured homes. NH Better Buildings also provided scholarships to several other BPI, infrared, and heating system classes offered by the Community College System.

Figure 3 shows jobs created or retained. EECBG recipients were required to report jobs created or retained expressed as ‘‘full-time equivalent’’ (FTE) for Recovery Act reporting. The Recovery

[6] Reporting the number of trained and certified workers was mandatory for SEP and voluntary for EECBG. Reporting the number of active contractors was mandatory for EECBG and voluntary for SEP.

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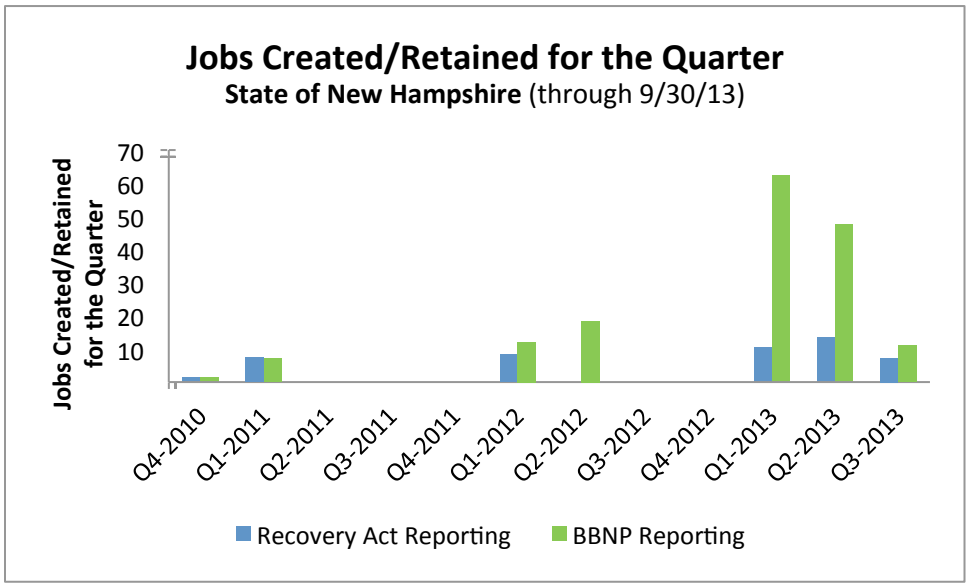
Act reporting specified direct jobs created and retained by sub-recipients and vendors. This information is in blue in Figure 3.

EECBG recipients were asked on the BBNP Program Report to report hours worked per quarter directly funded by BBNP funds, as well as hours worked administrating or working on the BBNP program if funded by other federal and leveraged funds (e.g., state and local funds, utilities, financial institutions, private contributions, etc.). This includes but is not limited to administrative staff, consultants, and contractors involved in the management or deployment of BBNP-related building upgrades and assessment activities. This information is in green in Figure 3 and is estimated based on total hours worked during the quarter reported by the recipient divided by 520 hours per quarter. The BBNP Program Report definition was broader than direct jobs reported for the Recovery Act and is one reason why Recovery Act Reporting and BBNP Reporting in Figure 3 differ.

**Figure 3. State of New Hampshire Jobs Created/Retained for the Quarter**[7]




[7] Reporting job hours worked was mandatory for EECBG and voluntary for SEP.

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## 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** | 1,463,936 |
| **Therms Natural Gas** | 222,117 |
| **Gallons of Oil** | 182,398 |
| **Gallons of Propane**[8] | 0 |
| **Total Estimated MMBtu Savings (Source Energy)**[9] | 70,634 |
| **Total Estimated Energy Cost Savings** | $1,169,782 |

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** | 649 | 1,520,304 |
| **Therms Natural Gas** | 259 | 218,615 |
| **Gallons of Oil** | 505 | 147,811 |
| **Gallons of Propane** | 75 | 101,693 |
| **Sum of Estimated Annual Energy Cost Savings** | 891 | $1,170,353 |
| **Method(s) of Savings Prediction** | ASHRAE LEVEL 1, ASHRAE LEVEL 2, DEEMED SAVINGS, EQUEST ENERGY MODELING, OTHER, TREAT | |

[8] New Hampshire had some propane savings, but an error in the reporting form resulted in misreporting it as fuel oil.

[9] Total estimated source energy savings was calculated by DOE. See Appendix B.

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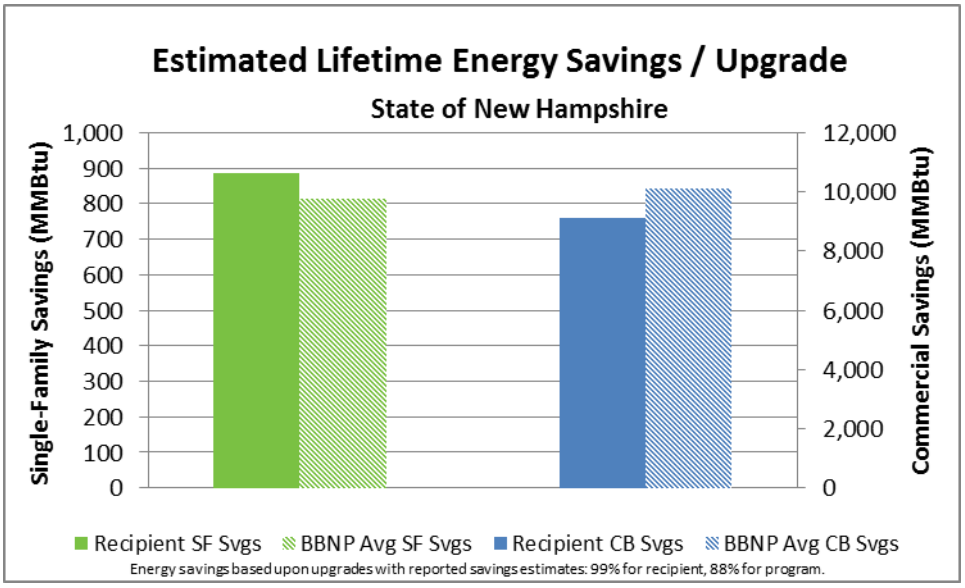
The program-reported total in Table 3 will not necessarily equal the sum of estimated savings in Table 4. Recipients were originally asked to only report individual building upgrade projects that were estimated to achieve at least a 15% reduction in total building energy use. Recipients were also told 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 the Better Buildings Neighborhood Program, 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[10]**




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

[10] SF is single-family home. CB is commercial building.

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.<br>For the purpose of BBNP Quarterly Program reporting, jobs created and retained was estimated based on 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 52 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

# APPENDIX B: METHODOLOGY TO CALCULATE SOURCE ENERGY SAVINGS

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

# APPENDIX C: LIFETIME ENERGY SAVINGS CALCULATIONS

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:

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

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 CALCULATION

$L_i$ 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[11]**

| 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.

[11] 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 CALCULATION

**Table C- 2. Commercial Project Energy Upgrade Categories and Lifetimes[12]**

| 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 |

[12] 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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