Better Buildings Neighborhood Program: An Economic Impact Analysis of a Whole-Building Retrofit Program

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ABSTRACT

This paper presents the results of the preliminary economic impact analysis of the Better Buildings Neighborhood Program's (BBNP). Sections of the paper describe the BBNP, key economic impact metrics associated with the program, analysis methodology, and detailed findings. The BBNP was found to have positive economic impacts that greatly exceed the cost of program implementation. The results of this analysis will be of interest to government policy makers, and energy service industry professionals that are interested in understanding the job creation potential (and estimation methods) associated with energy efficiency programs.

Introduction

The BBNP is an energy efficiency program administered by the U.S. Department of Energy's (DOE's) Office of Energy Efficiency and Renewable Energy and funded through the American Recover and Reinvestment Act of 2009 (ARRA). Beginning in 2010, the program allocated approximately $508 million among 41 grantees representing state and local governments, as well as local community organizations throughout the United States. In turn, these entities worked with nonprofits, energy efficiency professionals, financial institutions, and utilities to develop community-based programs and incentives for residential and non-residential building upgrades. On a grantee level, energy upgrade goals and grants vary greatly from 200 to 35,000 upgrades and one to forty million dollars. Likewise, total energy savings vary among grantees; however, the program required that each grantee attain an overall level of energy savings greater than or equal to fifteen percent. This paper presents the results of a preliminary economic impact analysis of the BBNP on the United States' economy.

In order to quantify key metrics including jobs, economic output, income (personal and business), and tax revenue, we used the IMPLAN input-output model and data furnished by BBNP grantees and the National Renewable Energy Laboratory (NREL).

For this analysis, gross impacts are calculated and then compared against a base case spending scenario that assumes the funds that were used to support program activities and incentives are spent on other government expenditures. The difference in economic impacts attributed to the BBNP and the base case scenario are referred to as net impacts.

In addition to the economic benefits that occur with the initial equipment expenditures, energy bill savings continue to benefit program participants beyond the first year of measure implementation. Consequently, this analysis also measures the economic and fiscal impacts attributed to energy savings that continue in the future over the expected lifespan of the installed energy efficiency equipment.

Key Findings

BBNP investments in energy efficiency have resulted in energy savings, increased economic output, personal and business income, jobs, and state, local and federal taxes in 2010, 2011, and 2012. As shown in

Table 1, between Q4 2010 and Q2 2012[1] we estimate that the program resulted in the following aggregate net impacts:

- Over $655.6 million in economic output, including $155.4 million in wages to laborers;
- Nearly 4,266 person-years of employment over the program period;
- Increased state and local tax revenue by $24.3 million;
- Increased federal tax revenue by $30.1 million.

Table 1: Total Gross and Net Economic Impacts ($ millions)

Impact Measure	Gross	Net
Output	$1,070.7	$655.6
Personal Income	$376.9	$155.4
Jobs (person-years)	6,681	4,266
State and Local Taxes	$42.2	$24.3
Federal Taxes	$68.4	$30.1

The remainder of this paper documents the analysis that was completed to develop these economic impact estimates beginning with analysis methodology, continuing onto detailed results, and ending with a brief conclusion.

Methodology

Measuring the economic impacts attributable to efficiency programs is a complex process, as spending by program grantees—and subsequent changes in spending by program participants—unfold over a lengthy period of time in numerous varying climate zones and building types. From this perspective, the most appropriate analytical framework for estimating the economic impacts is to classify them into the following categories:

- *Short-term* impacts are associated with changes in business activity as a direct result of changes in spending (or final demand) by program implementers; energy efficiency program participants; and ratepayers who provide funding for energy efficiency programs.
- *Long-term* impacts associated with the potential changes in relative prices, factor costs (e.g.,. changes in wage rates, cost-of-capital, and fuel prices), and the optimal use of resources among program participants, as well as industries and households linked by competitive, supply-chain, or other factors.

This analysis measures the short-term economic impacts associated with the BBNP efficiency programs. These impacts are driven by changes (both positive and negative) in final demand, and are measured within a static input-output modeling framework that relies on data for an economy at a point in time and assumes that program spending does not affect the evolution of the state economy. Energy efficiency programs may have longer lasting effects, and this is clearly the case for continued energy savings beyond the end of the program, however, these long-term, dynamic effects are not measured in this analysis.

The IMPLAN input-output model has several features that make it particularly well suited for estimating these short-term impacts.

- The IMPLAN model is widely used and well respected. IMPLAN is constructed with data assembled for national income accounting purposes, thereby providing a tool that has a robust link to widely accepted data development efforts. The United States Department of Agriculture (USDA) recognized the IMPLAN modeling framework as "one of the most credible regional impact models used for regional economic impact analysis" and, following

[1] The Preliminary Impact Evaluation does not include Q3 2012 through Q4 2013, due to time constraints and a lack of data availability though these will be included in the Final Impact Evaluation.

a review by experts from seven USDA agencies, selected IMPLAN as its analysis framework for monitoring job creation associated with the ARRA of 2009.[2]

- The IMPLAN model's input-output framework and descriptive capabilities allow for the construction of economic models with region-specific data for 440 different industry sectors, as well as for households and government institutions. These details permit accurate mapping of program spending and energy savings to industry and household sectors in the IMPLAN model.
- Finally, the IMPLAN model is based on historical economic data for the United States and, therefore, reflects the unique nature of the national economy.

Input-output analysis employs specific terminology to identify the different types of economic impacts. Energy efficiency programs affect the country *directly*, through the purchases of goods and services within the US, and *indirectly*, through the purchases of intermediate goods and services from related sectors of the economy. Specific direct impacts include spending by staff administering the energy efficiency programs, manufacturers and contractors that produce and install the energy efficient equipment, and changes in spending or output attributed to energy bill savings for households and businesses participating in the BBNP. In addition, the direct and indirect increases in employment and income enhance overall economic purchasing power, thereby inducing further economic impacts as households increase spending and businesses increase investment. This cycle continues until the spending eventually leaks out of the regional economy as a result of taxes, savings, or purchases of non-locally produced goods and services.

Within this framework, the IMPLAN model reports the following impact measures:

- *Output* is the value of production for a specified period of time. Output is the broadest measure of economic activity, and includes intermediate goods and services and the components of value added (personal income, other income, and indirect business taxes).
- *Wages* includes workers' wages and salaries, as well as other benefits such as health and life insurance, and retirement payments, and non-cash compensation.
- *Business income* is also called proprietary income (or small business income) and represents the payments received by small-business owners or self-employed workers
- *Job impacts* include both full- and part-time employment. Over time, these job impacts are expressed as person-years of employment, as they represent the number of jobs sustained over a single year.

Given the static nature of the input-output model used in this analysis, it is important to note that the cumulative impacts presented do not take into account changes in production and business processes that businesses make in anticipation of future increased energy prices and/or competition to increase production efficiency. To the extent that US businesses are already adjusting in anticipation of these factors, the cumulative impacts presented here may be overstated, as the overall market would become more efficient due to factors outside program influence.

The cumulative numbers also rely on the critical assumption that each dollar saved will translate into a dollar of increased economic output for those businesses adopting conservation measures. This assumption conforms to findings in previous research conducted by Evergreen staff[3], and is reasonable in the short run. In the long run, however, it is likely that a dollar of energy savings will translate to less than a dollar of increased economic output as the businesses adopt more efficient production practices. Despite these caveats, the ongoing and cumulative effect of conservation due to energy efficiency program activities is nevertheless a significant net benefit to the national economy.

[2] See excerpts from an April 9, 2009 letter to MIG, Inc., from John Kort, Acting Administrator of the USDA Economic Research Service, on behalf of Secretary Vilsack, at www.implan.com.

[3] For more information please see "Washington Western Climate Initiative Economic Impact Analysis" http://www.ecy.wa.gov/climatechange/docs/20100707_wci_econanalysis.pdf.

Gross and Net Economic Impacts

For this analysis, gross impacts refer to economic impacts that do not include a counterfactual base case scenario that compares alternative uses of program funding. The gross impacts are calculated based on the annual program spending and energy savings discussed below. These input parameters are then compared against a base case spending scenario that assumes all program funding is spent on other government expenditures following historical purchase patterns. The difference between the gross economic impacts attributed to the BBNP and the base case scenario impacts is referred to as net impacts.

For the portfolio of BBNP programs, specific gross spending impacts include:

- Program administration as program implementers incur administrative costs and purchase labor and materials to carry out energy efficiency programs.
- Incremental measure spending represents additional spending on energy efficiency above what would have been spent on standard efficiency measures in the base case.
- Reductions in energy consumption and the associated increase in household disposable income and lower operating costs for businesses.
- For residential program participants, lower energy costs will increase household disposable income, which is assumed to be spent following historical purchase patterns.
- For businesses, energy savings lowers production costs, which, in the short run, leads to changes in productivity. To estimate the economic impacts associated with these lower energy costs, we used an elasticity-based approach to measure the direct change in output, and associated changes in direct employment and income.
- Energy savings begin to accrue on a quarterly basis after energy efficiency measures have been installed and continue into future quarters with some equipment degradation.
- The efficiency gains result in some loss of utility revenues due to lower power sales.

Detailed Findings

The economic impacts associated with the BBNP efficiency program are reported in this section. Results are arranged as follows:

- Program expenditures;
- Energy efficiency measure spending by program participants;
- Total gross and net economic impacts. This section also reports the distribution of net impacts by residential, commercial, and industrial programs;
- Economic impacts attributed to energy savings continuing in future years after federal program funding has ended in 2013.

Outlays

For this analysis, data relating to the BBNP were provided by program grantees, in the form of quarterly submissions, and NREL. The data were then aggregated into three general outlay categories to facilitate our modeling efforts. For contextual purposes, Table 1 shows the distribution of program spending for residential and non-residential customers through the program period. Between Q4 2010 and Q2 2012, total program outlays by BBNP grantees amounted to approximately $245.7 million (48.4 percent of total funds granted).

Table 1: Total Grantee Outlays During Program Period ($ millions)

Quarter / Year	Marketing & Outreach (M&O)	Labor & Materials Cost (L&M)	Other	Total Outlays
Q4 2010	$1.9	$2.1	$11.0	$15.0
Q1 2011	$4.7	$2.4	$11.1	$18.2
Q2 2011	$6.1	$11.2	$26.5	$43.9
Q3 2011	$6.8	$12.9	$20.8	$40.5
Q4 2011	$6.5	$5.3	$31.3	$43.1
Q1 2012	$13.5	$5.4	$24.5	$43.5
Q2 2012	$6.9	$9.4	$25.3	$41.6
Total All Quarters	$46.5	$48.7	$150.5	$245.7

The data and modeling assumptions for each major outlay category is discussed below.

- **Marketing and Outreach (M&O)** outlays amounted to $46.5 million over the Q4 2010 through Q2 2012 time period. This represents 18.9 percent of total outlays over the seven quarters. M&O outlays consist of "grant outlays for communications activities designed to identify, reach and motivate potential program participants to take actions to either learn more (e.g. audit or other informational activity) energy efficiency or initiate an energy efficiency retrofit at the PROGRAM level."[4] Total M&O outlays are reported by grantee for each quarter. These are summarized and reported in Table 1. Detailed M&O activities—e.g., business organization outreach, online and traditional advertising, neighborhood meetings, websites and webinars—are reported, by grantee and quarter, in the Quarterly Summary Reports. However, there is no correspondence or conformity between outlays and activities. That is, detailed M&O spending is not reported. As such, this analysis applies a dollar-value-weighting factor (or roughly an average cost per M&O activity) to the reported number of activities taking place each quarter to allocate total M&O spending in that quarter.
- **Labor and Materials (L&M)** outlays totaled $48.7 million (or 19.8 percent of total outlays) over the Q4 2010 through Q2 2012 period. According to BBNP reporting instructions, L&M outlays are "Outlays incurred as part of an audit or retrofit directly associated with the installation of more energy efficient equipment, appliances, or building components (e.g. insulation, windows, etc.) at the PROGRAM level."[5] Accordingly, L&M outlays are not explicitly included as inputs into the economic impact model. Rather, they are included as part of audit and retrofit spending.
    - Audit (or assessments) counts are reported for residential and commercial sectors, by grantee and quarter, in the Quarterly Summary Reports. Between Q4 2010 and Q2 2012, BBNP grantees accomplished 113,412 residential audits and 3,855 commercial audits. Spending on audits, however, is not explicitly reported and, as discussed previously, audit spending is assumed to be a component of L&M. Audit spending was estimated using data compiled from the Detailed Quarterly Spreadsheets submitted by grantees.[6]
- Other outlays totaled $150.5 million (or 61.3 percent of total outlays) between Q4 2010 and Q2 2012. Other outlays consist of "Other program grant outlays at the PROGRAM level not classified as materials, labor, marketing, or outreach…(they) represent actual grant funds spent

[4] From the Quarterly Programmatic spreadsheet of the Detailed Quarterly Program Reports.
[5] Ibid.
[6] Audit spending was estimated as follows: 1) observations with the number of audits, the total job hours for audits, and total audit invoiced cost were gathered from the Detailed Quarterly Spreadsheets, 2) these observations allowed for the calculation of average audit costs for residential ($322 per audit) and commercial ($2,893 per audit) audits conducted between 4Q2010 and 2Q2012, 4) these estimated average audit costs were multiplied by the reported number of audits for each quarter to estimate total audit spending in each quarter. Audit spending was modeled as follows: 1) the average number of job hours per audit and average hourly costs were estimated for residential and commercial audits, 2) average job hour.

on program delivery and any associated incentives or loans issued during the quarter." BBNP reporting includes total. Other outlays, by grantee and quarter. It does not, however, include additional information that would enable us to divide outlays among program incentives and program delivery costs, or to better understand the exact nature of program delivery costs. As such, this analysis relies on energy efficiency program cost data from the US Energy Information Administration for 2011.[7] This data has direct costs, incentive costs, and indirect costs for residential, commercial, and industrial energy efficiency programs in the US. Using national data for 2011, we found that 55.2 percent of total program costs went towards incentives, with the remaining 44.8 percent allocated toward direct (37.1 percent of total program costs) and indirect (7.6 percent) program costs.

Measure Spending

Our analysis also considered incremental equipment spending by residential and commercial program participants. Net incremental spending represents additional spending on energy efficiency equipment in homes and businesses above what would have been spent on standard equipment in the absence of energy efficiency programs. Table 2 summarizes the BBNP retrofit activities including the number of, and total spending on by residential and commercial program participants.

Table 2: Summary of Measure Spending for Residential and Commercial Retrofits

	Residential Retrofits			Commercial Retrofits			All Retrofits
Quarter / Year	Number of Retrofits	Weighted Average Invoiced Cost	Total Invoiced Costs ($ millions)	Number of Retrofits	Weighted Average Invoiced Cost	Total Invoiced Costs ($ millions)	Total Invoiced Costs ($ millions)
Q4 2010	3,115	$6,300	$19.5	38	$17,300	$0.7	$20.2
Q1 2011	4,083	$6,600	$26.8	83	$8,300	$0.7	$27.5
Q2 2011	3,451	$6,400	$22.0	112	$43,300	$4.9	$26.9
Q3 2011	3,791	$8,000	$30.4	162	$53,600	$8.7	$39.1
Q4 2011	4,730	$8,800	$41.6	310	$45,000	$14.0	$55.6
Q1 2012	5,066	$7,800	$39.4	293	$57,700	$16.9	$56.3
Q2 2012	6,617	$6,700	$44.4	352	$31,200	$11.0	$55.4
Total All Quarters	30,853	$7,300	$224.2	1,350	$42,000	$56.7	$280.9

According to calculations made using data from the Quarterly Summary Reports, we estimate that the BBNP supported approximately $224.2 million in residential retrofits and $56.7 million in commercial retrofits by program participants.

Energy Savings

Taking into account savings that accrue over time (beyond the initial installation quarter), we estimate that over $92 million was saved over the Q4 2010 to Q2 2012 time period (including the cumulative effect of savings within this time period). This includes reported energy savings for both residential and business customers as is sourced from the grantee quarterly data submissions to DOE.

[7] US Energy Information Administration's (EIA) *Annual Electric Power Industry Report*, 2011, Survey From EIA-861, File 3A. According to the EIA, direct costs are "The cost for implementing energy efficiency programs (in thousand dollars) incurred by the utility." Incentive costs or payment represent a "Payment by the utility to the customer for energy efficiency incentives. Examples of incentives are zero or low-interest loans, rebates, and direct installation of low cost measures, such as water heater wraps or duct work." Lastly, indirect costs are "A utility cost that may not be meaningfully identified with any particular DSM program category. Indirect costs could be attributable to one of several accounting cost categories (i.e., Administrative, Marketing, Monitoring & Evaluation, Utility-Earned Incentives, Other)."

Table 3: Energy Savings, by Fuel Type, and Estimated Annual Cost Savings

Quarter / Year	Electricity (kWh)	Natural Gas (therms)	Heating Oil (gallons)	Liquefied Petroleum Gases (gallons)	Estimated Annual Cost Savings ($ millions)
Q4 2010	3,112,100	278,300	258,200	2,700	$1.7
Q1 2011	8,637,700	291,100	448,200	34,400	$4.1
Q2 2011	5,656,400	221,700	204,700	24,300	$2.3
Q3 2011	8,165,300	2,504,500	269,000	29,100	$3.5
Q4 2011	12,561,000	501,900	346,200	43,300	$4.0
Q1 2012	12,209,200	602,800	188,300	44,900	$5.5
Q2 2012	24,148,800	647,300	257,400	53,300	$6.6
Total All Quarters	74,490,400	5,047,600	1,971,800	231,900	$27.8

Total Direct and Secondary Net Economic Impacts

Table 4 shows the total net economic impacts resulting from program and measure spending on residential and commercial efficiency programs within the BBNP from Q4 2010 to Q2 2012. Net impacts include program spending by grantees, measure spending by program participants, and energy savings resulting from the implementation of efficiency measures. Over this seven-quarter program period, the BBNP had the net effect of increasing economic output by $655.6 million relative to the base case scenario where the programs do not exist and the BBNP program funds are assumed to be spent on other government, non-military expenditures. This includes $155.4 million in personal income and 4,266 person-years of employment. Additionally, Table 4 illustrates the increasing trend of all key metrics due to increases in program and measure spending over time.

Table 4: Total Net Economic Impacts by Quarter ($ millions)

Quarter / Year	Output	Personal Income	Jobs (person-years)	State and Local Taxes	Federal Taxes
Q4 2010	$46.4	$11.0	390	$1.7	$2.2
Q1 2011	$70.0	$18.3	424	$2.7	$3.6
Q2 2011	$47.2	$4.8	340	$1.7	$0.9
Q3 2011	$81.5	$16.3	523	$3.0	$3.2
Q4 2011	$129.9	$32.0	810	$4.8	$6.2
Q1 2012	$148.8	$39.9	967	$5.6	$7.7
Q2 2012	$131.8	$33.1	814	$4.8	$6.4
Total All Quarters	$655.6	$155.4	4,266	$24.3	$30.1

Table 5 and Table 6 separate out the direct and secondary net economic impacts for all activities by quarter and impact type. Table 5 illustrates that program spending, measure spending, and energy savings directly increased economic output by $228 million including $23.6 million in personal income, and 1,680 person-years of employment. While Table 5 presents the direct impacts associated with the initial wave of BBNP spending, all secondary economic impacts resulting from increases in laborer income or business productivity are summarized in Table 6.

Table 5: Summary of Direct Net Economic Impacts ($ millions)

Quarter / Year	Output	Personal Income	Jobs (person-years)	State and Local Taxes	Federal Taxes
Q4 2010	$16.4	$2.0	107	$0.5	$0.3
Q1 2011	$25.4	$4.7	165	$0.7	$0.8
Q2 2011	$14.2	-$5.8	145	$0.4	-$1.1[8]
Q3 2011	$27.6	-$0.3	211	$0.8	-$0.1
Q4 2011	$45.2	$6.1	319	$1.2	$1.0
Q1 2012	$53.1	$10.0	410	$1.4	$1.7
Q2 2012	$46.0	$6.8	323	$1.1	$1.1
Total All Quarters	$228.0	$23.6	1,680	$6.0	$3.7

The direct impacts in Table 5 begin a multiplier spending process in the form of supply-chain (indirect impacts) and consumption-driven (induced impacts) spending that benefits workers and business owners in other sectors of the economy. Between Q4 2010 and Q2 2012, we estimate that these secondary effects increased economic output by an additional $427.6 million including $131.8 million in personal income, and $44.7 million in tax revenue (Federal, State and Local tax revenue combined).

Table 6: Summary of Secondary Net Economic Impacts ($ millions)

Quarter / Year	Output	Personal Income	Jobs (person-years)	State and Local Taxes	Federal Taxes
Q4 2010	$30.0	$9.0	283	$1.3	$1.8
Q1 2011	$44.6	$13.6	259	$1.9	$2.8
Q2 2011	$33.0	$10.5	195	$1.3	$2.0
Q3 2011	$53.9	$16.6	312	$2.2	$3.3
Q4 2011	$84.7	$25.9	491	$3.6	$5.2
Q1 2012	$95.7	$29.9	557	$4.2	$6.0
Q2 2012	$85.7	$26.3	491	$3.7	$5.3
Total All Quarters	$427.6	$131.8	2,587	$18.3	$26.4

On a net basis, the BBNP has the following multipliers:[9]

- **Output multiplier is 2.9.** This means that every million dollars in direct output (BBNP purchases captured by US businesses) is linked to another $1.9 million in output for workers in other sectors of the economy.

- **Job multiplier is 2.5.** This shows that every 10 jobs (person-years of employment) support another 15 jobs elsewhere in the economy.

Overall, the portfolio of residential and commercial energy efficiency programs achieved significant gains in national economic activity beyond the base case scenario. Though measure and program spending play an important role, the primary driving force behind future gains in net economic activity are the energy bill savings enjoyed by households and businesses that result from an increase in energy efficiency. As discussed below, these energy savings continue beyond the initial installation period, resulting in a substantial amount of economic benefits that accrue throughout the program period and beyond.

[8] Negative impact measures indicate that the Base Case scenario resulted in larger economic impacts than the BBNP; however, it is also important to note that the energy savings that persist into the future as a result of the efficiency measures installed through the BBNP will result in greater impacts.

[9] This analysis reports Type SAM multipliers. SAM stands for "Social Accounting Matrix." A Type SAM multiplier is calculated by dividing the sum of direct, indirect, and induced impacts by the direct impacts.

Cumulative Energy Savings and Energy Savings Economic Impacts

Project installations occur in the same year that the equipment and program costs are incurred, energy savings from the new equipment will extend into future years beyond the initial installation. As a consequence, the energy cost savings for homes and businesses also extend into future years (with some degradation as equipment ages). These energy cost savings continue to benefit the economy as households spend less on electricity and more on other consumer products, and businesses are able to produce goods and services more efficiently. As this suggests, the net economic impacts from the first year, when the equipment and program spending occur, only capture a fraction of the overall economic impacts of these programs. The following section presents the economic impacts resulting from the implementation of efficiency measure and consequent energy savings accrued by program participants.

Error! Reference source not found. shows the cumulative estimated annualized cost savings, by quarter, for efficiency upgrades completed between Q4 2010 and Q2 2012. By the end of the seven-quarter time period, it is estimated that efficiency upgrades will lower energy costs by $27.8 million annually.

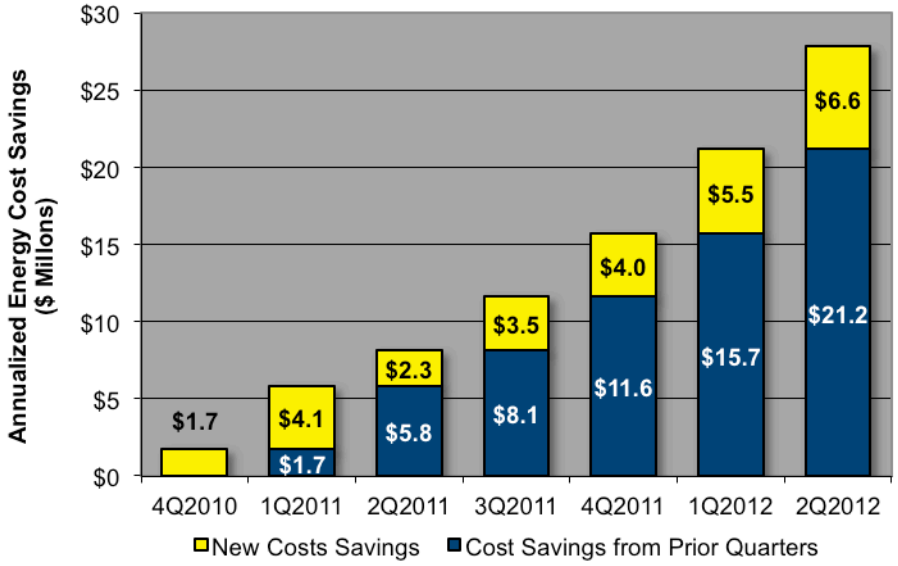

Figure 1: Cumulative Energy Cost Savings of Efficiency Upgrades by Quarter

Table 7 shows the net economic and fiscal impacts associated with the estimated energy cost savings from efficiency measures installed between Q4 2010 and Q2 2012. These estimates were calculated using the input-output model to estimate the economic impacts of reduced energy costs while setting all other costs (i.e., equipment purchases and program implementation costs) equal to zero. To truly isolate the impact of the energy cost savings, we also assumed that there were no lost utility revenues resulting from the measures installed and that utilities (and others) would be able to sell the unused power (fuel) to other customers. This forms the basis of energy efficiency benefits in future post-installation years based solely on the reduced energy costs to the economy and excludes any additional benefits due to the spending on these programs and measures.[10]

[10] Future net energy savings were not adjusted to account for the EULs of installed measures.

Table 7: Total Net Economic Impacts Due to Annualized Energy Savings Alone During Program Period ($ millions)

Impact Measure	Annual Net Impacts
Output	$61.8
Personal Income	$19.4
Jobs	420
State and Local Taxes	$3.2
Federal Taxes	$4.3

As shown in Table 7, the $27.8 million in estimated annual energy savings associated with efficiency upgrades between Q4 2010 and Q2 2012 is linked to $61.8 million in economic output, including $19.4 million in personal income, and 420 jobs (person-years) annually. These estimated annual energy savings and net economic impacts form the basis of annual energy savings and economic impacts in future post-installation years. However, both energy savings and net economic impacts will decline in future years depending on the EULs for measures installed in between Q4 2010 and Q2 2012.The following figures illustrate how the effects of energy efficiency accumulate in the future, assuming that energy cost savings continue at the quarterly levels observed from 2010-2012. These figures highlight the fact that the incremental benefit of any single quarter is only a fraction of the cumulative effect of efficiency gains achieved in prior years.

Error! Reference source not found. shows the cumulative effect for the economic activity (output) in subsequent post-installation years that results from efficiency upgrades accomplished between Q4 2010 and Q2 2012. In the first year, economic output will increase an additional $61.8 million based on energy cost savings achieved in that year. The energy cost savings will continue in future years and generate additional economic impacts. By the end of the fifth year, output will have increased by $309.0 million due efficiency upgrades accomplished between Q4 2010 and Q2 2012.

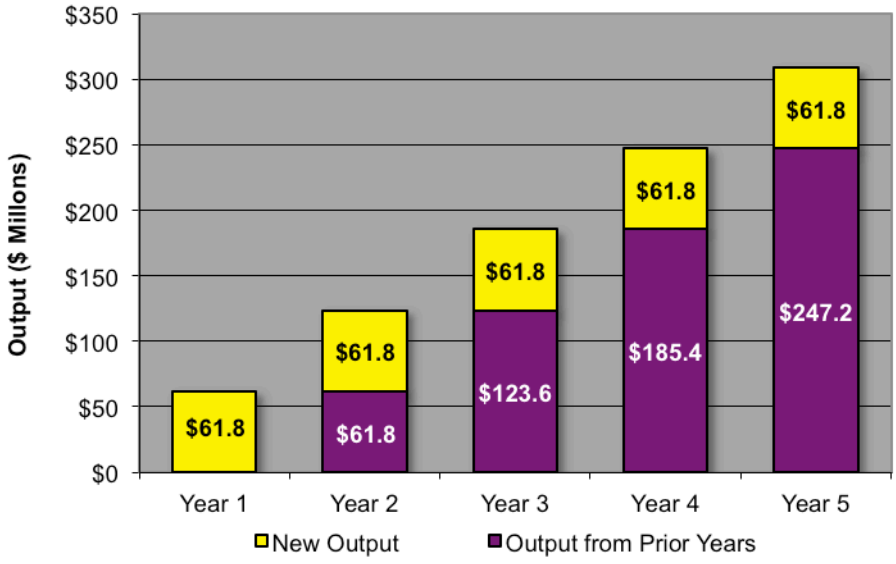

Figure 2: Cumulative Output Effects in Post-Installation Years (Five Year Period)

If energy cost savings can be sustained over time, then the employment impacts should persist as well, at least in the short term. The energy savings associated with BBNP efficiency upgrades between

Q4 2010 and Q2 2012, will have sustained 2,100 person-years of employment over the following five-year period.

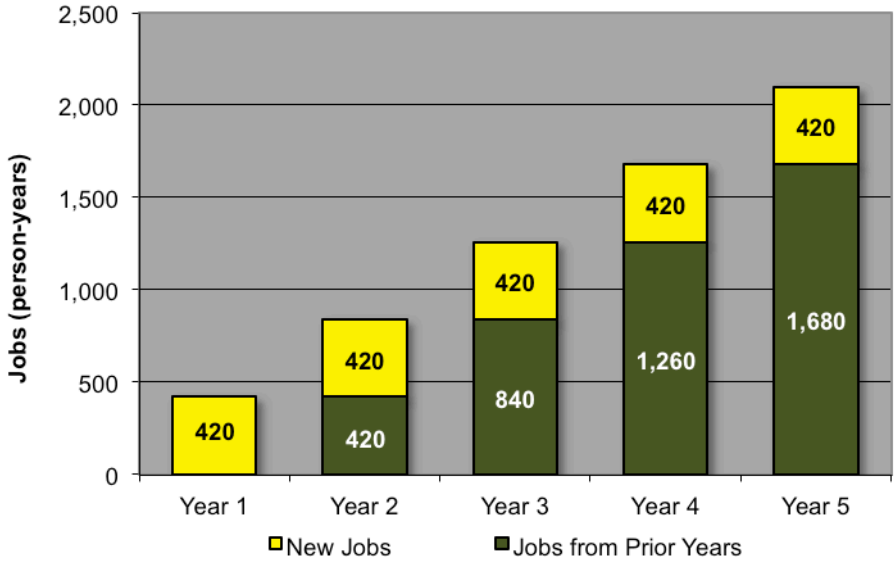

Figure 3: Cumulative Employment Effects (Measured in Person-Years of Employment) in Post-Installation Years (Five Year Period)

Together, spending and energy savings associated with the BBNP supported, on a net basis, $655.6 million in output, including $155.4 million in personal income, 4,266 person-years of employment, $24.3 million in state and local tax revenue, and $30.1 million in federal tax revenues between Q4 2010 and Q2 2012.

To these one-time impacts, we can now also include the economic benefits attributed to energy cost savings that persist over time, at least in the short run. Over a five-year, post-installation time period, those impacts amount to $309.0 million in output, including $97.0 million in personal income, 2,100 person-years of employment, $15.9 million in state and local tax revenues, and $21.4 million in federal tax revenues.[11]

Conclusions

In this paper, we examined the effects of the Better Buildings Neighborhood Program on the United States economy. We found that the BBNP program, administered by state and local grantees, and overseen by the U.S. Department of Energy, has supported an increased number of jobs, economic output, business

[11] In addition to the EULs for installed energy efficiency measures, there are other economic factors that could cause the economic impacts to decline over time, in which case the economic impacts reported above would be overstated. The cumulative impacts do not take into account changes in production and business processes that US businesses make in anticipation of future higher energy prices and/or increased market pressure from international competition to increase production efficiency. To the extent that US businesses are already adjusting in anticipation of higher costs and/or tougher competition, then cumulative impacts presented here are overstated, as the overall market would become more efficient due to factors outside of BBNP influence. Although over 70 percent of the energy cost savings accrue to households, the cumulative numbers also rely on the critical assumption that each dollar saved will translate into a dollar of increased economic output for those businesses undergoing efficiency upgrades. This assumption is reasonable in the short run, but in the long run it is likely that a dollar of energy savings will translate to less than a dollar of increased economic output as the overall market adopts more efficient production practices in anticipation of increased competition and higher energy costs. Consequently, the cumulative impacts shown here represent an upper bound. Despite these caveats, the ongoing and cumulative effect of energy savings due to the BBNP is nevertheless a continuing benefit to the US economy.

income, and tax revenue. While energy efficiency programs should not be primarily seen as an economic development tool, our preliminary analysis of the BBNP finds evidence of economic benefits that far outweigh the direct costs associated with the conservation efforts. Spending on the BBNP is also shown to demonstrate significant net economic benefits relative to the base case scenario representing the most likely alternative use of program funds.

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