August 8, 2013

Town of University Park, Maryland
6724 Baltimore Avenue
University Park, MD 20782

ATTENTION: **Mr. Chuck Wilson**
Program Director
Phone: 202-530-2228
Email: cwilson@ase.org

SUBJECT: **STEP Actual Energy Savings – Insight from the SIMS Utility Bill Analysis**

Dear Mr. Wilson:

ICF Incorporated, L.L.C. – an ICF International, Inc. company hereafter referred to as "ICF" – is one of the world's leading management and analytical consulting firms, assisting clients in managing the world's natural, physical, economic and community resources in a sustainable way. We provide services and products to help meet environmental challenges, optimize energy resources, and foster economic and community development.

We have been working to help you and your team collect and analyze pertinent programmatic and utility usage data for participants in the Small Town Energy Project (STEP) to gain a better understanding of the actual energy savings achieved through the efficiency upgrades completed in the program. I am pleased to provide this report summarizing the energy usage trends and actual energy savings observed to-date across the program participants.

Due to limitations in the utility billing data currently available for these participants and the scope of this project, there is not a sufficient sample to make broad claims about the actual energy savings that can be projected across your program with statistical significance at this time. There are, however, a number of energy use insights ranging from savings observed to-date and the general energy use characteristics of the program participants outlined below that I think you'll find valuable.

If you have any questions about the information contained in this report or if there is anything we can do to further assist your efforts, please don't hesitate to contact me.

Sincerely,

Tim Hillman, PhD
Specialist – Strategic Intelligence
Phone: 303-817-3325
Email: Timothy.Hillman@icfi.com

Enclosure

Project 2012_1529

Small Town Energy Program (STEP) Assessment of Program Impacts through Utility Bill Analysis

August 8, 2013

Submitted to Client:
Town of University Park, Maryland
6724 Baltimore Avenue
University Park, MD 20782

Submitted by Contractor:
ICF Incorporated, L.L.C. (“ICF”)
9300 Lee Hwy
Fairfax, VA 22031

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Executive Summary

The Town of University Park, MD has overseen the implementation the Small Town Energy Program (STEP), a 3-year program designed to achieve energy efficiency market transformation among the communities surrounding University Park and to serve as a roadmap for energy transformation in small towns across the US. The main focus of STEP is residential energy audits and retrofits and was made possible by a grant from the Better Buildings Neighborhood Program of the US Department of Energy.

ICF was contracted to assist the STEP program with consulting services to help coordinate the collection of utility billing information (from Pepco and Washington Gas utilities) and customer participation data as well as to complete a utility bill analysis of STEP program participants to evaluate actual utility bill savings (gross) being achieved using ICF's Strategic Intelligence Management System (SIMS). This report summarizes the results of the utility bill analysis, which involves a pre/post assessment of weather normalized annual consumption for each individual meter, comparing one full year (12 months) prior to the first measure install date to the first 12 months following the measure install date.

Utility billing data (including natural gas and electricity consumption) has been collected for about 350 participating residences. No building characteristic data – such as size or age of the building – was collected or used in this analysis so only a summary of the energy use across these homes is presented (i.e., no energy use intensity information is provided). To further inform program staff of energy use distributions among residences over the seasons of a year, summary information on usage by month is also provided. On average, the sample homes use about 10 times as much natural gas in the winter (130 therms/month – November through February) as they do in the summer (13 therms/month – June through August). In terms of electricity use, the sample homes on average use about twice as much electricity in the summer (1,240 kWh/month – June through August) as they do in the swing season months in the spring and fall (650 kWh/month – March, April and October). General energy use summary statistic for the sample of program participants is shown in Table ES-1.

Table ES-1 Summary natural gas and electricity energy use characteristics of program participants in 2012

Number of Homes	Average Gas Usage (therms/mo)	Standard Deviation (therms/mo)	Average Electricity Usage (kWh/mo)	Standard Deviation (kWh/mo)
~ 350	63	27	880	432

Based on the data provided, and after the data quality checks and minimum data requirements (a full 12 months of usage history before and after the month the first upgrade was completed) were assessed on this data set, 20 homes were evaluated based on their natural gas savings and 35 homes were evaluated based on their electricity savings. All homes evaluated and represented in the savings estimates here completed air sealing and insulation upgrades (some additional equipment upgrades were made in a couple of homes). Upon further inspection of the savings for each individual participant, there were two homes that resulted in a much greater increase in their electricity use compared to the other homes in the sample (electricity use increased by 71% and 62% for these two homes during the year after the upgrades were completed). This analysis includes a summary of average electricity savings with and without these two homes included. Table ES-2 provides a summary of the number of participants STEP staff provided data for and the number of homes that were evaluated by utility service.

The sample size included in this analysis is too small to speak in terms of statistical significance and shouldn't be applied as representative of overall program savings, however the trends to-date highlight that a majority of pariticipants are realizing a reduction in natural gas and electicity use in the year after completing efficiency upgrades compared to the year prior. In addition, the natural gas and electricity energy savings results to-date benchmarched well with another Better Buildings Neighborhood Program grantee in Denver metro Colorado, which represents a similar climate region in terms of heating and cooling degree days. A summary of the relative (percent) and absolute (native units, therms or kWh) savings are provided in Tables ES-3 to ES-5 below.

Table ES-2 Summary of program participants and data availability for utility bill analysis

	Number of Homes with Air Sealing, Insulation or HVAC Upgrade	Number of Homes who made Updgrades that also have Utility Data	Number of Homes with Sufficient Data to Evaluate (Gas)	Number of Homes with Sufficient Data to Evaluate (Electricity)[1]
Participant Pool	226	140	20	35

Table ES-3 Summary of relative (percent) natural gas and electricity savings for program participants

		Annual Savings per Program Participant		Confidence Interval for Average Savings [1]		
	Number of Homes	Median (%)	Average (%)	Absolute (+/- %)	Relative (+/- %) [2]	Standard Deviation (%)
Natural Gas	20	19.0	14.6	6.3	43.4	14.4
Electricity	35	5.9	1.4	6.8	484.0	20.5
Electricity (two outliers excluded)	33	7.0	5.5	4.0	73.0	11.8

[1] Confidence intervals defined for a 95% confidence level.
[2] Relative confidence interval calculated as absolute confidence level divided by the mean.

Table ES-4 Summary absolute natural gas savings for program participants

		Annual Savings per Program Participant		Confidence Interval for Average Savings [1]		
	Number of Homes	Median (therms)	Average (therms)	Absolute (+/- therms)	Relative (+/-%) [2]	Standard Deviation (therms)
Natural Gas	20	190	137	61	44	139

[1] Confidence intervals defined for a 95% confidence level.
[2] Relative confidence interval calculated as absolute confidence level divided by the mean.

Table ES-5 Summary absolute electricity savings for program participants

		Annual Savings per Program Participant		Confidence Interval for Average Savings [1]		
	Number of Homes	Median (kWh)	Average (kWh)	Absolute (+/- kWh)	Relative (+/-%) [2]	Standard Deviation (kWh)
Electricity	35	600	511	676	132	2,041
Electricity (two outliers excluded)	33	701	832	536	64.4	1,571

[1] Confidence intervals defined for a 95% confidence level.
[2] Relative confidence interval calculated as absolute confidence level divided by the mean.

The remainder of this report summarizes the following: the scope of this analysis; the methodology used to complete the utility billing analysis; results of utility bill analysis and conclusions of this assessment. Additional detail related to the energy use across the program participants is provided in Appendix A.

[1] An additional analysis is presented that excludes two homes due to the potentially anomalous increase in their electricity use after upgrades were completed, thus making the number of homes included 33.

Analysis Scope

The scope for this analysis is limited to ICF performing a utility bill analysis of STEP program participants to evaluate actual utility bill savings (gross) being achieved using ICF's Strategic Intelligence Management System (SIMS). The utility bill analysis involves a pre/post assessment of weather normalized annual consumption for each individual meter, comparing one full year (12 months) prior to the first measure install date to the first 12 months following the measure install date. Utility bill data was not collected for residential customers that did not participate in the program, so no control adjusted savings are included in this assessment. This analysis does not include any assessment of program outreach, marketing, cost (and resulting cost effectiveness), or any assessment of program impacts accounting for spillover, additionality or free ridership. The sample size of program participants included in this assessment was insufficient to attempt a meaningful benchmarking comparison of measured energy savings to deemed savings for a few applicable measures. However, the measured energy savings for each individual participant included in this analysis are being provided to STEP staff to facilitate any future research (such as an assessment of deemed savings compared to actual savings) or customer outreach that the STEP program wishes to pursue.

Methodology

The program savings methods used by the Strategic Intelligence Management System (SIMS) are consistent with the approaches related to whole building retrofit utility billing analysis outlined in the International Performance Measurement and Verification Protocol (IPMVP) – Option C and the Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures (EVO, 2012; NREL, 2013). These protocols outline recommended approaches based on program type, data availability, inferences to be made on program impacts and fundamentally have two key components: 1) data collection and validation; and 2) regression modeling of utility billing data to account for changes in weather over the analysis period. The regression modeling and data collection/validation techniques utilized by the SIMS are discussed in more detail below.

Common in these program savings quantification approaches is the use of weather normalized billing consumption data that is totaled on an annual basis to yield the normalized annual consumption (NAC). The NAC is simply the sum of the normalized consumption for a consecutive 12 month period. The utility bill regression modeling used by the SIMS to produce the NAC is based on the variable base degree day method (VBDD) that was originally established by the PRISM (PRInceton Scorekeeping Method) model (Fels, 1986).

This analysis looks at the snapshot of annual energy use (NAC) before and after the first upgrades were reportedly completed. The difference of the NAC prior to initial upgrade completion and the NAC after initial upgrade completion for each program participant is quantified to yield estimates of overall savings:

$$Unadjusted\ Program\ Savings = \sum_{i=0}^{n} \Delta NAC = \sum_{i=0}^{n} NAC_{pre} - NAC_{post}$$

where: NAC_{pre} = Pre-enrollment NAC value covering period up to 1 month prior to enrollment
NAC_{post} = Post-enrollment NAC covering period starting 1 month after enrollment

Note that the savings presented in this report are quantified based on the first measure install date of the participants (regardless of multiple program measure installs). In addition, the first measure install month is discarded from the NAC analysis since this billing record can combine both pre- and post-measure energy consumption. For example, if a home completed an attic insulation upgrade in February of 2011, the NAC_{pre} would cover an annual period from February 2010 to January 2011 and the NAC_{post} would cover from March 2011 to February 2012. Furthermore, as discussed earlier in the project scope that due to the lack of having access to non-program participant utility billing data to be used as a control or comparison group, this analysis does not attempt to account for exogenous effects (non-program related effects such as the economy or other factors that affect energy use).[1]

Data cleaning methods are required to provide reliable energy savings (TecMarket Works, 2006; NREL, 2007), whose significance is measured by having a small standard error (Fels, 1986). Using existing protocols and methodologies (Fels, 1986; NREL, 2007; TecMarket, 2006; Snoderegger, 1998), a multitude of data cleaning approaches are used to ensure unbiased removal of incomplete and anomalous data:

- **Remove records with intermittent service or with potential billing errors –** Properties that have intermittent service will have less than 365 days of service (DOS) for each NAC value, while those with billing period overlaps (and thus a potential billing error) would have more than 365 DOS (366 DOS in leap years). Only NAC values with 365 DOS (Leap year: 366) are retained in the analysis. All other incomplete or overlapping data activity records are removed from the analysis.

- **Minimum of 12 months of pre- and post-measure install billing data –** PRISM, NREL, California's PUC and others require a minimum of 12 months of complete billing data. Incomplete data accounts are removed from the data analysis.

- **Remove data outliers to reduce outlier influence on reported savings –** Reported savings can be heavily influenced by data outliers, causing a significant change in reported savings. Two approaches are used to identify and remove outliers. First, anomalous data activity records with an NAC savings +/- 3 standard deviations of the mean NAC savings are removed from the data analysis (NREL, 2007). Second, manual inspection is employed to determine if there are any savings estimates that aren't consistent with the overall dataset and an additional analysis can be presented that excludes these potential outliers to demonstrate the impact on the overall savings estimates.

[1] Weather changes over the analysis period, while considered exogenous effects, are controlled for in the NAC analysis.

Results

This section provides a characterization of the natural gas and electricity energy use among program participants as well as the energy savings observed to-date. Supplemental information is also provided in Appendix A.

Energy Use Characteristics

Utility billing data (including natural gas and electricity consumption) has been collected for about 350 participating residences. No building characteristic data – such as size or age of the building – was collected or used in this analysis so only a summary of the energy use across these homes is presented (i.e., no energy use intensity information is provided). On average, the program participant homes use 63 therms of natural gas (standard deviation +/- 27 therms) and 880 kWh of electricity (standard deviation +/- 432 kWh) a month (see Table 1).

Table 1 Summary natural gas and electricity energy use characteristics of program participants in 2012

Number of Homes	Average Gas Usage (therms/mo)	Standard Deviation (therms/mo)	Average Electricity Usage (kWh/mo)	Standard Deviation (kWh/mo)
~ 350	63	27	880	432

To further inform program staff of energy use distributions among residences over the seasons of a year, the box-plots in Figures 1 and 2 summarize the 5th, 25th, 75th and 95th percentiles as well as the median and average energy use on a monthly basis for natural gas and electricity use, respectively. On average, the sample homes use about 10 times as much natural gas in the winter (130 therms/month – November through February) as they do in the summer (13 therms/month – June through August). In terms of electricity use, the sample homes on average use about twice as much electricity in the summer (1,240 kWh/month – June through August) as they do in the swing season months in the spring and fall (650 kWh/month – March, April and October). Detailed tabular data of the information presented in Figures 1 and 2 is located in Appendix A.

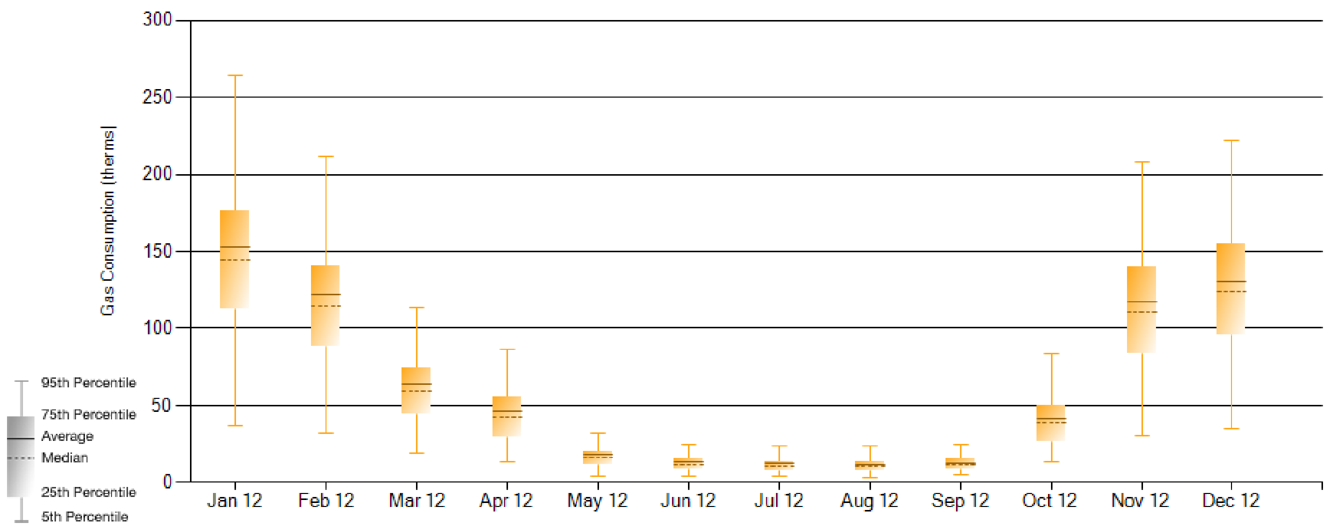

Figure 1 Natural gas energy use distribution by month among program participants in 2012

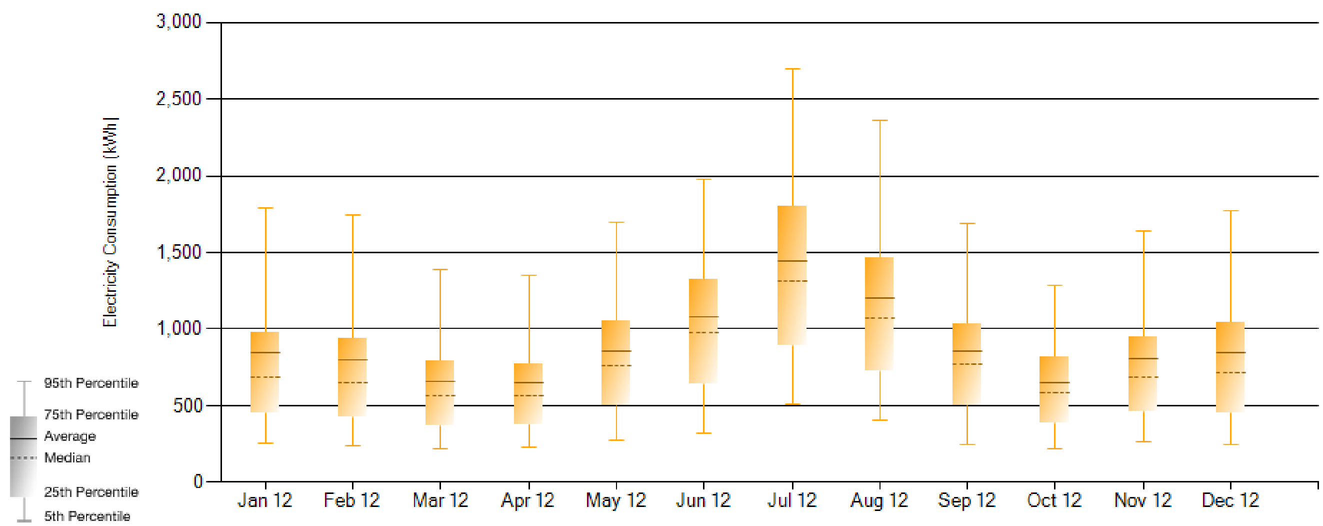

Figure 2 Electrical energy use distribution by month among program participants in 2012

Utility Bill Analysis

STEP program staff collected and maintained data on the energy efficiency improvements being completed by program participants and when those improvements were completed. STEP staff also interfaced directly with the local natural gas and electric utilities (Washington Gas and Pepco, respectively) to collect utility billing data for the program participants. These data were provided separately by the STEP staff to ICF for analysis. The remainder of this section summarizes the programmatic data provided (what improvements were made when), the number homes included in the final utility bill analysis after the data cleaning procedures described above were applied and the resulting natural gas and electricity energy use changes observed in the year following the date of the first completed upgrade.

STEP staff provided efficiency upgrade data to ICF that included participant utility account information (to enable linking to utility data received separately), the dates that upgrades were completed and details about what exact upgrades were completed. Details on the completed upgrades were broken into three main categories: 1) air sealing and/or insulation upgrades; 2) HVAC or water heater upgrades; and 3) other appliances and/or window upgrades. A vast majority of the program participants completed air sealing and/or insulation upgrades with a marginal number of participants completing HVAC or other appliance upgrades.

This analysis only focused on homes that *at least* completed some level of air sealing and/or insulation work (i.e., they may have completed HVAC or other appliance upgrades in addition to the air sealing and/or insulation work) due to the small sample size of homes that only made HVAC or other appliance/window upgrades. It turns out that only a couple of homes in the final evaluated pool made upgrades beyond the air sealing and/or insulation work, so the results are primarily representative of savings observed in homes that made some level of air sealing and/or insulation improvements. Finally, given the limited sample size and scope of this analysis, no attempt was made to differentiate savings resulting from different levels of air infiltration reduction, levels of insulation added, or where that insulation was added (attic versus walls versus crawl space, etc.). Results of this analysis for each individual participant are being provided separately to the STEP staff to aid any additional analysis they'd like to complete.

Based on the data provided, there were a total of 226 program participants that completed air sealing, insulation or HVAC upgrades. Of these participants, utility billing data was provided and was successfully linked with 140 of them. After the data quality checks and minimum data requirements (a full 12 months of usage history before and after the month the first upgrade was completed) were assessed on this data set, 20 homes were evaluated based on their natural gas savings and 35 homes were evaluated based on their electricity savings. Upon further inspection of the savings for each individual participant, there were two homes that resulted in a much greater increase in their electricity use compared to the other homes in the sample (electricity use increased by 71% and 62% for these two homes during the year after the upgrades were completed). The results below provide a summary with and without these two homes included in the electricity savings analysis to illustrate the impact on the estimated savings.
All homes evaluated and represented in the savings estimates here completed air sealing and insulation upgrades. Table 2 provides a summary of the number of participants STEP staff provided data for and the number of homes that were evaluated by utility service.

Finally, a couple of notes and considerations. Given the small sample of participants with sufficient billing data to use for this analysis, all results should be considered preliminary – from a program performance perspective – and represent the best energy savings estimates across the participants to-date. A larger dataset is required to make statistically valid inferences from this data and savings estimates may shift as more participants are analyzed.

Table 2 Summary of program participants and data availability for utility bill analysis

	Number of Homes with Air Sealing, Insulation or HVAC Upgrade	Number of Homes who made Updgrades that also have Utility Data	Number of Homes with Sufficient Data to Evaluate (Gas)	Number of Homes with Sufficient Data to Evaluate (Electricity)[1]
Participant Pool	226	140	20	35

The natural gas and electricity savings observed among the program participants are summarized in Tables 3 – 5 and Figures 3 – 6. The relative, or percent, savings for natural gas use across the evaluated participants are shown in Table 3 and the relative savings by customer are shown via a histogram in Figure 3. Similarly, the absolute savings (in native units or therms) for natural gas use for these customers are shown in Table 4 and the absolute savings by customer are shown in Figure 4.

For the 20 homes evaluated in this analysis, the natural gas savings are as follows. The median relative annual natural gas savings are 19% and the average savings are 14.6% (+/- 6.3% at a 95% confidence level). The median absolute annual savings are 190 therms/year and the average savings are 137 therms/year (+/- 61 therms at a 95% confidence level). The histograms in Figures 3 and 4 show noticeable skew to the right, indicating that a majority of the participants in this sample achieved measurable natural gas reductions after upgrades were completed. The sample size for these natural gas savings is too low to provide statistically significant results at this time (typically need a sample size of at least 30), however the trends with this sample indicate that on average, homes do appear to be reducing their natural gas use after upgrades are completed.

Table 3 Summary of relative (percent) natural gas and electricity savings for program participants

		Annual Savings per Program Participant		Confidence Interval for Average Savings [1]		
	Number of Homes	Median (%)	Average (%)	Absolute (+/- %)	Relative (+/- %) [2]	Standard Deviation (%)
Natural Gas	20	19.0	14.6	6.3	43.4	14.4
Electricity	35	5.9	1.4	6.8	484.0	20.5
Electricity (two outliers excluded)	33	7.0	5.5	4.0	73.0	11.8

[1] Confidence intervals defined for a 95% confidence level.
[2] Relative confidence interval calculated as absolute confidence level divided by the mean.

Table 4 Summary absolute natural gas savings for program participants

		Annual Savings per Program Participant		Confidence Interval for Average Savings [1]		
	Number of Homes	Median (therms)	Average (therms)	Absolute (+/- therms)	Relative (+/-%) [2]	Standard Deviation (therms)
Natural Gas	20	190	137	61	44	139

[1] Confidence intervals defined for a 95% confidence level.
[2] Relative confidence interval calculated as absolute confidence level divided by the mean.

[1] An additional analysis is presented that excludes two homes due to the potentially anomalous increase in their electricity use after upgrades were completed, thus making the number of homes included 33.

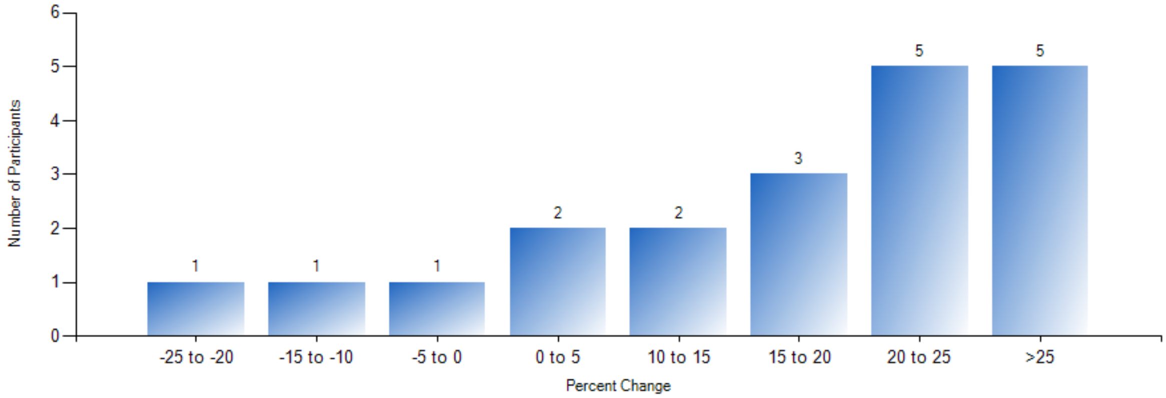

Figure 3 Distribution of annual relative (percent) natural gas savings by program participant

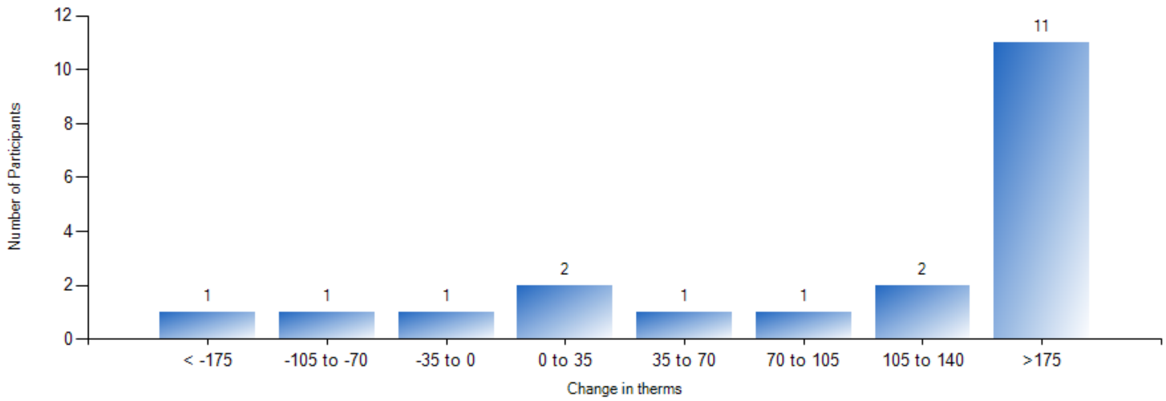

Figure 4 Distribution of annual absolute natural gas savings by program participant

Two sample data sets were analyzed to determine electricity savings: one with 35 homes that includes all participants with sufficient data; and a second with 33 homes that excludes two participants from the sample because they resulted in a substantially greater increase in energy use after upgrades were completed compared to the other homes in the analysis (electricity use increased by 71% and 62% for these two homes during the year after the upgrades were completed). For the analysis that includes all 35 homes, the median relative annual electricity savings are 5.9% and the average savings are 1.4% (+/- 6.8% at a 95% confidence level) (see Table 3 and Figure 5). The median absolute annual savings are 600 kWh/year and the average savings are 511 kWh/year (+/- 676 kWh at a 95% confidence level) (see Table 5 and Figure 6). These results shift a fair amount when two of the homes are excluded from the assessment. For the analysis that only includes 33 homes, the median relative annual electricity savings are 7.0% and the average savings are 5.5% (+/- 4.0% at a 95% confidence level) (see Table 3). The median absolute annual savings are 701 kWh/year and the average savings are 832 kWh/year (+/- 536 kWh at a 95% confidence level) (see Table 5).

Similar to what was observed with the natural gas savings, the electricity savings shown in Figures 5 and 6 show some skew to the right, with a greater number of participants achieving savings than an increase in energy use after the upgrades were completed. However, there is much greater variation in the electricity savings compared to the natural gas savings observed across these participants, as is evidenced by the larger relative confidence interval and standard deviation for electricity savings compared to natural gas savings. In essence, about 30% of the homes in this sample resulted in an increase in their electricity use after upgrades were completed, which is about twice as many as the percentage of homes that resulted in an increase in natural gas use after upgrades were completed (about 15% of the homes evaluated showed an increase in their natural gas use). The marginal error across this relatively small sample is still too great to make claims about statistically significant savings, however it does appear that a majority of the homes are realizing a reduction in their electricity use over the year after upgrades are completed.

Table 5 Summary absolute electricity savings for program participants

		Annual Savings per Program Participant		Confidence Interval for Average Savings [1]		
	Number of Homes	Median (kWh)	Average (kWh)	Absolute (+/- kWh)	Relative (+/-%) [2]	Standard Deviation (kWh)
Electricity	35	600	511	676	132	2,041
Electricity (two outliers excluded)	33	701	832	536	64.4	1,571

[1] Confidence intervals defined for a 95% confidence level.

[2] Relative confidence interval calculated as absolute confidence level divided by the mean.

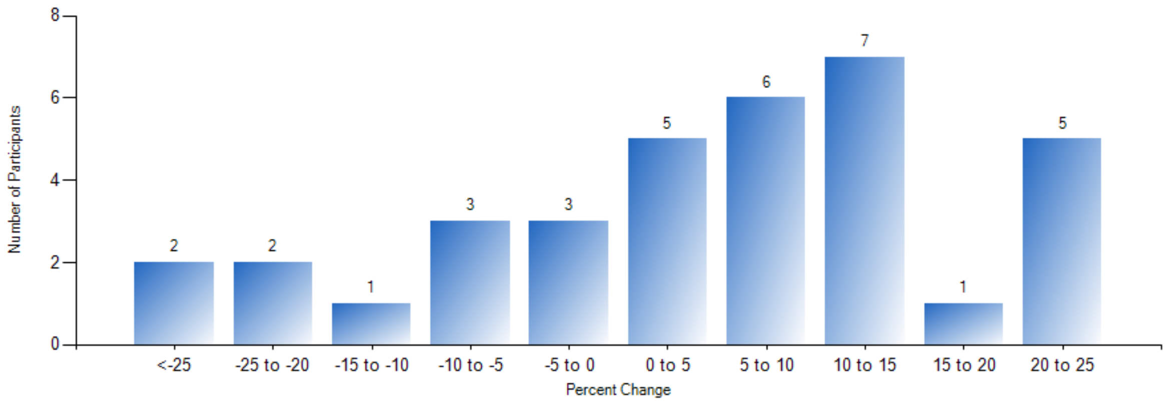

Figure 5 Distribution of annual relative (percent) electricity savings by program participant

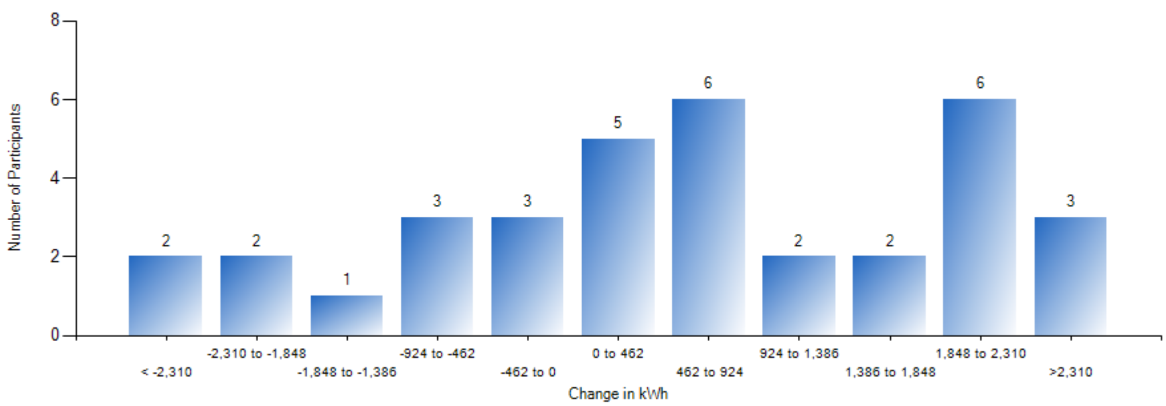

Figure 6 Distribution of annual absolute electricity savings by program participant

ICF has also used the SIMS to provide an assessment of actual energy savings achieved after efficiency upgrades were completed for another Better Buildings Neighborhood Program grantee in Denver metro Colorado. Although not identical, Denver represents a similar climate region to University Park, MD in terms of heating and cooling degree days. For informational purposes, the energy savings results were compared between these two programs and the natural gas and electricity energy savings results to-date benchmarked well.

Conclusions

Utility billing data for about 140 STEP program participants was collected and analyzed via a pre/post normalized annual consumption (NAC) process to determine the energy savings realized by these customers in the first 12 months following the completion of their efficiency upgrades. Out of these 140 participants, a limited number had sufficient utility data to complete the pre/post NAC assessment at the time of this analysis, namely 20 and 35 participants had sufficient natural gas and electricity usage data, respectively. Given the small sample of participants with sufficient billing data to use for this analysis, all results should be considered preliminary – from a program performance perspective – and represent the best energy savings estimates across the participants to-date. A larger dataset is required to make statistically valid inferences from this data and savings estimates may shift as more participants are analyzed.

The energy savings trends analyzed to-date highlight that a majority of pariticipants are realizing a reduction in natural gas and electicity use in the year after completing efficiency upgrades compared to the year prior (although it is important to note that the sample size included in this analysis is too small to speak in terms of statistical significance and shouldn't be applied as representative of overall program savings). In addition, the natural gas and electricity energy savings results to-date benchmarched well with another Better Buildings Neighborhood Program grantee in Denver metro Colorado, which represents a similar climate region in terms of heating and cooling degree days.

Finally, the sample size of program participants included in this assessment was insufficient to attempt a meaningful benchmarking comparison of measured energy savings to deemed savings for a few applicable measures. However, the measured energy savings for each individual participant included in this analysis are being provided to STEP staff to facilitate any future research (such as an assessment of deemed savings compared to actual savings) or customer outreach that the STEP program wishes to pursue.

Appendix - A

Table A-1 Tabular data used to produce the box-and-whisker plot in Figure 1, namely the monthly average, median, 5th, 25th, 75th and 95th percentiles of natural gas use among program participants in 2012

			Percentiles (therms)				
Date	**Sample Size (mtr)**	**Average Consumption (therms/mtr)**	**5th**	**25th**	**Median**	**75th**	**95th**
Jan 12	337	153	37	112	145	176	264
Feb 12	337	121	33	89	115	141	212
Mar 12	337	64	19	45	59	74	113
Apr 12	338	46	13	30	42	55	87
May 12	339	18	5	12	16	20	32
Jun 12	329	14	4	9	12	15	25
Jul 12	334	12	4	7	10	14	24
Aug 12	339	12	3	8	10	13	24
Sep 12	334	13	5	8	12	15	25
Oct 12	348	42	13	27	38	50	83
Nov 12	350	117	30	83	111	140	208
Dec 12	358	130	35	96	124	154	222

Table A-2 Tabular data used to produce the box-and-whisker plot in Figure 2, namely the monthly average, median, 5th, 25th, 75th and 95th percentiles of electricity use among program participants in 2012

			Percentiles (kWh)				
Date	**Sample Size (mtr)**	**Average Consumption (kWh/mtr)**	**5th**	**25th**	**Median**	**75th**	**95th**
Jan 12	364	842	254	456	683	981	1,794
Feb 12	364	796	237	428	652	938	1,744
Mar 12	367	658	218	373	563	794	1,386
Apr 12	367	646	229	375	564	773	1,351
May 12	372	851	275	497	757	1,051	1,692
Jun 12	376	1,078	319	635	980	1,322	1,978
Jul 12	379	1,444	510	896	1,317	1,803	2,697
Aug 12	382	1,201	404	728	1,070	1,467	2,360
Sep 12	378	851	246	496	769	1,029	1,691
Oct 12	380	653	217	384	584	821	1,287
Nov 12	380	806	266	462	691	952	1,636
Dec 12	378	847	245	455	713	1,043	1,768

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