State of Wisconsin Public Service Commission of Wisconsin

Focus on Energy Evaluation

Renewables: Impact Evaluation CY10
September 2009 through June 2010

January 07, 2011

Evaluation Contractor: Tetra Tech

Prepared by: Bobbi Tannenbaum, Ben Jones, and Brian Bak, KEMA

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State of Wisconsin Public Service Commission of Wisconsin

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Appendices

1. EXECUTIVE SUMMARY

This report presents the results of the impact evaluation of renewable measures implemented by both the statewide Focus on Energy Residential Programs and Business Programs (the Programs).[1] We completed the impact evaluation on measures installed October 1, 2009, through June 30, 2010; the 2010 evaluation period. The principal objective of the impact evaluation was to determine the energy and demand offset attributable to the programs. In this report, we refer to energy and demand offset by renewable energy systems as savings.

KEMA completed participant surveys and engineering reviews to calculate adjustment factors used to determine an overall realization rate. The realization rate is the percentage of program-tracked savings (demand and energy) that is achieved and attributable to the program. We will apply these factors, when finalized, to the population of projects completed from January 1 through December 31, 2010, in the upcoming semiannual report.

The adjustment factors estimated from the data collection and analysis include:

- **Gross savings adjustment factor.** This factor adjusts tracked gross savings for installation and engineering verification of savings estimates. Applying the gross savings adjustment factor to tracked gross savings produces the estimate of verified gross installed savings.
- **Attribution factor.** This factor adjusts verified gross savings for program attribution.
- **Realization rate.** This factor combines the gross savings adjustment factor and the attribution factor. (It is the ratio of net savings to tracking gross savings.)

KEMA analysts called participants in September and October of 2010 to complete the interviews. We had an overall survey response rate of 92 percent, with 93 percent for Business Programs respondents and 91 percent for Residential Program.

KEMA completed 39 surveys (covering 42 measures) representing 30 percent of tracked kWh offset and more than 99 percent of therms for Business Programs. These Business Programs interviews included all biogas and biomass projects, 26 percent of solar electric, 50 percent of solar hot water, and 67 percent of wind projects.

For the Residential Program, KEMA completed 88 surveys (covering 117 measures) representing 38 percent of tracked kWh offset and 44 percent of therms. These included 27 percent of solar electric, 40 percent of solar hot water, and 64 percent of wind projects.

1.1 BUSINESS PROGRAMS RESULTS

1.1.1 Gross savings adjustment factor

We confirmed installation for 100 percent of the projects sampled.

[1] In January 2010, Focus on Energy integrated the Renewable Energy program into the Residential Program and Business Programs.

Verified gross savings are 126 and 111 percent for kWh and kW respectively. Verified gross therm savings are 56 percent of program tracked therm savings. Table 1-1 shows the verified gross adjustment factors by technology.

Overall kWh and kW verified gross adjustments are greater than 100 percent due to the program's overestimation of parasitic load[2] (negative savings) for biomass projects. Overestimation of parasitic load results in an increase in kWh and kW savings. Therm verified gross adjustments are low due to an overestimation of therm savings for biomass projects. This overestimation is due in large part to lower reported hours of use than assumed by the program. The Program's calculation of energy production from wind systems is improving, but continues to overestimate offsets. Solar electric and solar hot water had verified gross ratios near 100 percent.

Table 1-1. CY10 Gross Savings Adjustment Factors
Business Programs[3]

	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
Technology	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Biogas	1	76%	± 0.0%	N/A	1	63%	± 0.0%	N/A				
Biomass[a]	1	18%	± 0.0%	N/A	1	18%	± 0.0%	N/A	2	55%	± 0.0%	± 0.0%
Solar electric	21	99%	± 1.3%	± 1.5%	21	101%	± 1.3%	± 1.7%				
Solar hot water	9	100%	± 14.5%	± 18.8%	9	67%	± 20.7%	± 26.7%	9	103%	± 2.2%	± 4.3%
Wind	8	71%	± 2.3%	± 4.8%	8	71%	± 2.3%	± 4.7%				
Overall[b]	**40**	**126%**	**± 3.7%**	**± 5.4%**	**40**	**111%**	**± 1.6%**	**± 2.2%**	**11**	**56%**	**± 0.0%**	**± 0.1%**

[a] Verified gross installed kWh and kW for biomass are parasitic load. Values less than 100 percent indicate lower parasitic load than tracked by the program.

[b] Overall ratios for kWh and kW are greater than the individual technology ratios because the low ratio for biomass parasitic load results an increase in verified savings for the program.

1.1.2 Attribution adjustment factors

Attribution is the percent of tracked savings that is directly attributable to the program. We used participant self-report surveys to estimate attribution. The CY10 attribution factors for the program overall are 80, 80, and 38 percent for kWh, kW, and therms respectively. Figure 1-1 shows attribution by technology for Business Programs. Solar electric and wind projects have high attribution while solar hot water projects have substantially lower attribution.

The negative value for solar hot water kW attribution requires explanation. Solar hot water peak kW has negative attribution because verified gross savings is less than zero (there is more parasitic kW load than kW savings), but net kW savings is greater than zero. In other words, there is more attributable kW savings than attributable parasitic load).

We do not report biogas and biomass realization ratios to protect respondent confidentiality.

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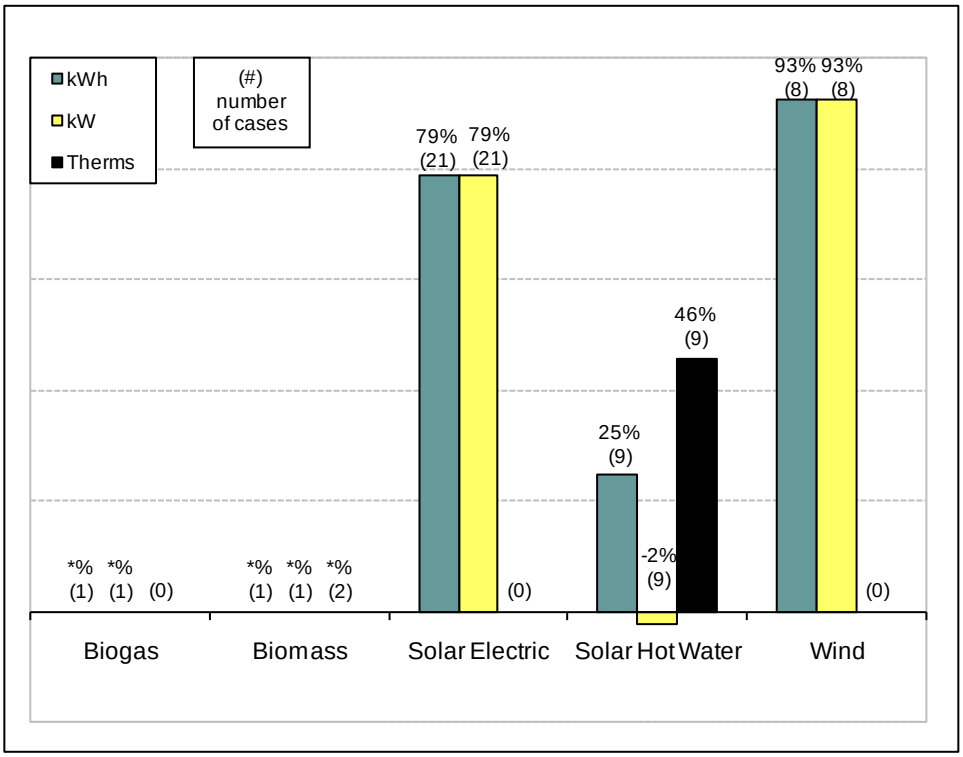
[2] Parasitic load is additional energy use associated with the installation of a renewable energy system, such as electric pumps for a solar hot water system or fans and motors for a biomass system.

[3] See Appendix C for number of observations and 90 percent confidence intervals.

Figure 1-1. CY10 Business Programs Attribution by Technology



* Ratios not reported to protect respondent confidentiality

1.1.3 Net energy impacts

We calculate the net energy impacts based on an overall realization rate. The realization rate combines the effect of the gross savings adjustment factors and the attribution factors. The CY10 realization rates for the program overall are 101, 88, and 21 percent for kWh, kW, and therms, respectively, as shown in Table 1-2. We do not report realization rates for biogas and biomass to protect respondent confidentiality.

Table 1-2. CY10 Business Programs Realization Rates by Technology

	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
Technology	**n[a]**	**CY10**	**CY10**	**Extra-polated**	**n[a]**	**CY10**	**CY10**	**Extra-polated**	**n[a]**	**CY10**	**CY10**	**Extra-polated**
Biogas	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A				
Biomass	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A	2	*%	± 0.0%	± 0.0%
Solar electric	21	78%	± 13.6%	± 17.2%	21	80%	± 13.8%	± 17.7%				
Solar hot water	9	25%	± 30.9%	± 51.4%	9	-1%	± -42.7%	± -54.9%	9	47%	± 23.2%	± 40.2%
Wind	8	66%	± 2.2%	± 8.0%	8	66%	± 2.2%	± 8.0%				
Overall BP[b]	**40**	**101%**	**± 12.5%**	**± 16.3%**	**40**	**88%**	**± 13.5%**	**± 17.4%**	**11**	**21%**	**± 0.3%**	**± 0.5%**

[a] Realization rates are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating the realization rate.

[b] Overall ratios for kWh and kW are greater than the individual technology ratios because the low ratio for biomass parasitic load results an increase in verified savings for the program.

* Ratios not reported to protect respondent confidentiality.

Realization rates are the combined effect of verified gross factors and self-reported attribution. The realization rates vary by technology, as do the reasons for rates below 100 percent. Solar electric has the highest realization rate, roughly equal to attribution due to high verified gross saving factors. Wind has mid-range realization rates due its low verified gross adjustment. Solar hot water (SHW) has a low realization rate for kWh, kW, and therms due to attribution. The negative realization rate for SHW is due to tracked savings being negative and net savings being slightly greater than zero.

1.1.4 Total impacts

We report the total renewable impacts for the CY10 Business Programs in Table 1-3 below.

Table 1-3. Total Impacts CY10 Business Programs

Tracked Savings			Verified Gross Savings			Net Savings		
kWh	Peak kW	Therms	kWh	Peak kW	Therms	kWh	Peak kW	Therms
1,324,913	480	1,853,910	1,678,475	531	1,037,190	1,339,837	423	391,146

1.1.5 Recommendations

Based on these findings we have the following recommendations for renewable projects funding through the Focus on Energy Business Programs public benefits funding.

The program should require documentation associated with parasitic loads. This should include, at a minimum, a list of all parasitic loads and explicit calculations of the energy consumption associated with each load. This should include the assumptions related to the baseline conditions and operating characteristics of the parasitic load.

The program should consider the overall energy impacts of a project (not just a single fuel) when determining funding. This means accurate accounting of electric or gas parasitic loads.

The program should carefully review the production calculations and underlying assumptions when reviewing projects for funding. In particular, the program should assess the baseline conditions and the operating characteristics assumptions. Although it is difficult to determine what will happen, projects funded based on “best case” assumptions, (such as 100 percent use of a biomass system when there is a natural gas system in operation) are unlikely to be realized.

Continue to improve program documentation. We encourage the program to document fully the calculations and assumptions used to determine renewable energy production. This is imperative when the program uses calculation approaches or assumed values that differ from the Standard Calculation guidelines. We recognize that there are advances in knowledge and technology for renewable energy systems (e.g., wind and biogas) that may improve either the calculation approach or the default values. If this information is included in project files, we can use this information in our evaluations. Based on our experience evaluating Business Programs, we expect that the integration of renewables into Business Programs will result in more complete documentation of large projects.

1.2 RESIDENTIAL PROGRAM RESULTS

1.2.1 Gross savings adjustment factor

We confirmed installation for 100 percent of the projects sampled.

Verified gross savings are 97 and 100 percent, for kWh and kW respectively. Verified gross therm savings are 93 percent of program tracked therm savings. Table 1-4 shows the verified gross adjustment factors by technology.

Solar electric projects drive the kWh and kW verified gross adjustments, since they account for 83 percent of Residential Program electric savings. Solar hot water projects are the only Residential Program projects that offset therms. The Program's calculation of energy production from wind systems is improving, but continues to overestimates offsets.

Table 1-4. CY10 Gross Savings Adjustment Factors
Residential Program[4]

	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
Technology	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Solar electric	46	101%	± 1.7%	± 2.0%	46	101%	± 1.7%	± 2.1%				
Solar hot water	57	78%	± 9.8%	± 11.8%	57	78%	± 9.9%	± 11.9%	48	93%	± 4.6%	± 6.0%
Wind	7	84%	± 4.3%	± 8.7%	7	85%	± 4.2%	± 9.0%				
Overall Residential	**110**	**97%**	**± 1.7%**	**± 2.2%**	**110**	**100%**	**± 1.6%**	**± 2.0%**	**48**	**93%**	**± 4.6%**	**± 6.0%**

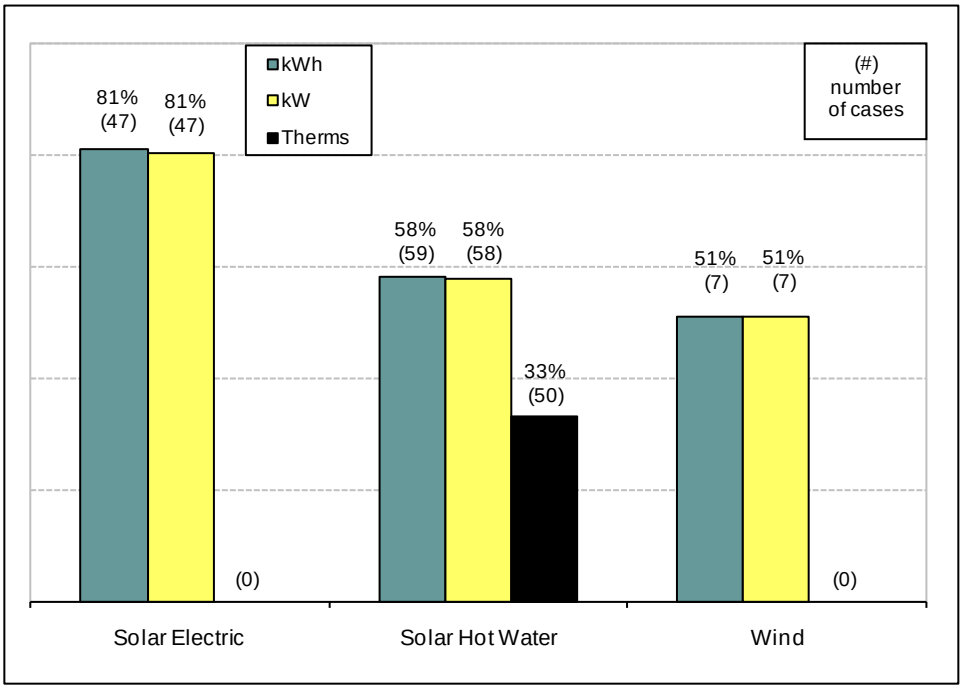
1.2.2 Attribution adjustment factors

Attribution is the percent of tracked savings that is directly attributable to the program. We used participant self-report surveys to estimate attribution. The CY10 attribution factors for the Residential Renewable Program overall are 77, 79, and 33 percent for kWh, kW, and therms respectively. Figure 1-2 shows attribution by technology for Residential Program. Solar electric attribution is high at 81 percent. Wind and solar hot water projects offsetting electricity have lower attribution, with both below 60 percent.

Solar hot water projects with therm savings had the lowest attribution rates, at 33 percent. The low attribution rate for the solar hot water projects with therm savings is due to some unique circumstances where a large portion of these projects received substantial funding from sources outside of Focus on Energy.

[4] See Appendix C for number of observations and 90 percent confidence intervals.

Figure 1-2. CY10 Residential Program Attribution by Technology



1.2.3 Net energy impacts

We calculate the net energy impacts based on an overall realization rate. The realization rate combines the effect of the gross savings adjustment factors and the attribution factors. The CY10 realization rates for the program overall are 74, 79, and 31 percent for kWh, kW, and therms, respectively, as shown in Table 1-5.

Table 1-5. CY10 Residential Program Realization Rates by Technology

	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
Technology	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated
Solar electric	46	82%	± 6.1%	± 7.2%	46	82%	± 6.1%	± 7.3%				
Solar hot water	57	45%	± 18.6%	± 23.1%	57	45%	± 18.6%	± 23.1%	48	31%	± 7.8%	± 10.5%
Wind	7	43%	± 15.2%	± 31.5%	7	43%	± 15.4%	± 31.9%				
Overall	**110**	**74%**	**± 5.5%**	**± 7.1%**	**110**	**79%**	**± 5.8%**	**± 7.0%**	**48**	**31%**	**± 7.8%**	**± 10.5%**

[a] Realization rates are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating the realization rate.

[b] Ratios not reported to protect respondent confidentiality

Realization rates are the combined effect of verified gross factors and self-reported attribution. The realization rates vary by technology, as do the reasons for rates below 100 percent. Solar electric has the highest realization rate, roughly equal to attribution due to high verified gross saving factors. Wind and solar hot water have mid-range realization rates due to the combined effects of verified gross adjustment and attribution.

1.2.4 Total impacts

We report the total renewable impacts for the CY10 Residential Program in Table 1-6 below.

Table 1-6. Total Impacts CY10 Residential Program

Tracked Savings			Verified Gross Savings			Net Savings		
kWh	Peak kW	Therms	kWh	Peak kW	Therms	kWh	Peak kW	Therms
1,291,405	431	14,983	1,249,755	430	13,929	957,122	341	4,619

1.2.5 Recommendations

The Program should consider establishing criteria for Focus funding eligibility that takes into account the percent of project costs directly funded from other sources. Projects that have external funding greater than a predetermined percentage (e.g., 75 percent) should not be eligible for Focus funding.

1.3 OVERALL TECHNOLOGY FINDINGS

1.3.1 Biogas

Realization rates for biogas are not reported for CY10 to protect respondent confidentiality. Program calculation of gross energy saving from biogas projects has improved over the last three years with the only cause for low gross adjustment factors in CY10 being unusual system downtime. Attribution is generally low for biogas projects. Digester systems provide a means for farmers to manage their waste and create revenue from bedding and electricity generation. Projects that add additional generator capacity to existing digesters offer a stable source of revenue for farms by converting unused biogas into electricity. Evaluation respondents have considered both types of projects to be cost effective.

1.3.2 Biomass

The realization rates for CY10 evaluation biomass projects are not reported to protect respondent confidentiality, but gross savings adjustments in CY10 are considerably lower than in previous evaluations. The variability in gross savings adjustment factors over the past three evaluation periods indicates that accurately estimating energy production and parasitic loads of biomass systems is challenging. The projects are usually custom applications that require significant investigation into the use patterns of the participant and the system setup. The program has had errors in parasitic load calculations in each of the past two evaluation periods that have had significant impacts on overall program savings. Attribution is consistently low for biomass projects due to how cost effective they are.

1.3.3 Solar electric

The program achieved an 80 percent realization rate on solar electric kWh in CY10. Gross savings adjustments remain close to 100 percent because the method for estimating solar electric production is well established and the program and evaluation consistently have similar estimations of solar electric production. Attribution has steadily increased in the last three years and now sits at 80 percent.

1.3.4 Solar hot water

Realization rates for solar hot water projects in CY10 are 50, 61, and 41 percent for kWh, kW and therms. Solar hot water installations, especially residential, have increased over the past three years. The program's current estimates of savings are consistent with the evaluation approach, with the exception of the assumption of residential hot water consumption.[5] Attribution for solar hot water systems has remained low over the past three years across all savings types (with the exception of CY09 therms).

1.3.5 Wind

CY10 realization rates for wind are 62 percent for both kWh and kW. The low rate is due primarily to the gross savings adjustment. The calculation tool the program uses to estimate wind system generation consistently overestimates energy production compared to metered data from participants. The calculation tool has improved in each evaluation period but still overestimates production. The program plans to change two key input factors for wind energy calculations. These adjustments should make program estimate align more with metered data and evaluation results. The evaluation team has intergrated these changes into the Standard Calculation Manual.[6] Attribution for wind systems has increased as the program reaches more participants who require Focus on Energy funding to overcome the cost of installing their wind turbines.

[5] The evaluation uses 16 gallons/person/day for residential hot water consumptions where the program uses 20 gallons/person/day.

[6] Bobbi Tannenbaum, Doug Kneale, Brian Dunn, Brian Bak, KEMA, Inc. *Renewable Energy Standard Calculation Recommendations (Draft) – Revised.* December 14, 2010. This manual will be finalized later this month.

2. INTRODUCTION

This report presents the results of the impact evaluation of renewable projects installed through the Focus on Energy Residential Program and Business Programs (the Programs).[7] We completed the impact evaluation on measures installed October 1, 2009, through June 30, 2010. Throughout the report, we refer to this evaluation as the calendar year 2010 (CY10) evaluation, though it covers one quarter of calendar year 2009 (CY09) and two quarters of CY10. The principal objective of the impact evaluation was to determine the energy and demand offset attributable to the programs. In this report, we refer to energy and demand offset by renewable energy systems as savings.

The analysis calculates adjustment factors that we use to determine evaluation verified gross and net energy savings for renewable projects implemented through Focus on Energy overall, and through the Residential and Business Programs separately. Since the start of the Focus programs, the evaluation team has implemented at least one round of data collection and document review annually to estimate net energy savings from the implementation of renewable measures by the Programs.[8] This round of evaluation uses the same survey instrument as the CY09 evaluation.

In this section, we summarize the evaluation approach and describe the organization of the remainder of the report.

2.1 OVERVIEW OF APPROACH

KEMA uses the statistical procedure of ratio estimation to develop estimates of evaluation verified gross and net impacts. There are three basic steps to the process.

- **Verify energy savings for a sample of program participants.** KEMA estimated energy savings under current conditions for a sample of participants that installed renewable energy systems during the CY10 evaluation period. A KEMA engineer conducted detailed engineering reviews to verify program-tracked gross savings. We used program tracking data, project documentation, input from customer interviews, meters or inverter readings, and secondary resources for the engineering reviews.
- **Determine program attribution for a sample of program participants.** KEMA staff conducted interviews with a sample of program participants to verify project installation, to collect detailed information for the engineering review, and to determine the program's impact on the decision to install a renewable energy system (at that time and of that size). If participants had self-reported program attribution of less than 75 percent and they indicated that the vendor influenced their decisions, KEMA completed a survey with the vendor. We used the vendor survey to determine the program's impact on the vendor's actions for that project.

[7] In January 2010, Focus on Energy integrated the Renewable Energy program into the Residential Program and Business Programs.

[8] Prior to CY10, Focus on Energy implemented renewable measures through a separate Renewables Program.

- **Expand sample results to the population of customers.** The sample results obtained above were expanded to the population by calculating the ratios of verified-to-tracked (gross savings adjustment factor) and attributable-to-verified (attribution factor) for the sample. We then added untracked space heating savings from solar hot water systems to the total savings.[9]

The adjustment factors estimated from the data collection and analysis include:

- **Gross savings adjustment factor.** This factor adjusts tracked gross savings for installation and engineering verification of savings estimates. Applying the gross savings adjustment factor to tracked gross savings produces the estimate of verified gross savings.
- **Attribution factor.** This factor adjusts verified gross savings for program attribution.
- **Realization rate.** This factor combines the gross savings adjustment factor and the attribution factor. (It is the ratio of net savings to tracking gross savings.)

2.2 ORGANIZATION OF REPORT

This report contains four primary sections and six appendices.

Section 3: Survey Sampling and Key Indices covers the survey sampling and response rate for both Business Programs and the Residential Program and discusses the key indices used to develop the realization rates for each program.

Section 4: Business Programs Renewables

Energy Savings Results discusses the verified gross and attribution factors that result in an overall realization rate, followed by the energy savings results for renewable projects completed through BP.

Summary and Conclusions summarizes the findings and makes some recommendations to improve realization rates.

Section 5: Residential Program Renewables

Energy Savings Results is discusses the verified gross and attribution factors that result in an overall realization rate, followed by the energy savings results for renewable projects completed through the Residential Program.

Summary and Conclusions summarizes the findings and makes some recommendations to improve realization rates.

[9] Although the program provides incentives for and tracks only solar hot water savings, some solar hot water projects resulted in energy savings from space heat. We quantified these savings separately.

Section 6: Renewable Projects Overall

In this section, we present results by technology and provide comparisons to past years, followed by the energy savings results for the evaluation period.

Following Section 6 are five appendices:

Appendix A: Participant Survey. A copy of the participant survey.

Appendix B: Selected Business Programs Survey Results. We report the results of the direct attribution questions and provide open-ended responses provided by respondents in support of their answers.

Appendix B: Selected Residential Program Survey Results. We report the results of the direct attribution questions and provide open-ended responses provided by respondents in support of their answers.

Appendix D: Lifecycle Net Savings. We provide an alternative calculation method for estimating attribution and realization rate base on the lifecycle (not first year) savings of installed projects and compare these results to the standard calculation methodology.

Appendix E: Ratio Estimation Methodology. We provide a detailed discussion of the ratio estimation method in Appendix E.

Appendix F: Attribution Analysis Methodology. We provide a detailed discussion of the attribution method in Appendix E.

3.1 SURVEY SAMPLING AND RESPONSE RATE

This Renewables impact evaluation is based upon projects installed in the nine month period from October 1, 2009, through June 30, 2010.[10] This evaluation period was neccessitated by reporting deadlines for CY09 and CY10. In CY09, data collection for the impact evaluation included projects completed through September 2009. In CY10, data collection for the impact evaluation included projects completed through June 2010 (including projects from the last quarter of 2009). In July 2010, KEMA selected a sample of projects completed in this period to develop estimated program impacts. The selected sample is representative of each of the programs as a whole and of individual program/technology combinations, (e.g., Residential/solar electric). We completed participant surveys and engineering reviews for this sample of projects. We will apply the results of the analysis to all renewable projects completed in 2010 for program year results in the next annual report.

In this section, we discuss the population characteristics, our sampling approach, and survey response rates. We also describe the key indices used to develop a final realization rate for the program savings.

3.1.1 Sample population

A. BUSINESS PROGRAMS

The Renewable measures implemented by Business Programs have a large number of small projects (as measured in energy savings or offset) and a few very large projects that represent a substantial amount of energy savings (offset). Table 3-1 shows the number of projects and tracked savings for renewable projects in the nine-month CY10 evaluation period.

Installed solar electric projects constitute 70 percent of Business Programs projects and 59 percent of positive electric savings.[11] The two biomass projects encompass 99 percent of therm savings and additional parasitic (negative) electric usage that offsets 35 percent of positive Business Programs electric savings.[12]

B. RESIDENTIAL PROGRAM

The Renewable measures implemented by the Residential Program are uniformly small. Solar projects make up 97 percent of implemented Residential systems, with 51 and 46 percent for solar electric and solar hot water respectively (see Table 3-1). Solar hot water

[10] We evaluated this time period in order to include 2009 projects not evaluated in the CY09 evaluation period and as many 2010 projects as possible for reporting results in the first quarter of 2011.

[11] BP Renewables positive savings totaled 2,067,651 kWh, while parasitic loads (negative savings totaled 742,738 kWh, resulting in BP achieving 1,324,913 kWh of savings.

[12] Parasitic load is additional energy use associated with the installation of a renewable energy system, such as electric pumps for a solar hot water system or fans and motors for a biomass system.

projects are the source of all Residential therm savings, while 78 percent of positive electric savings come from solar electric projects.[13] Wind projects constitute the remaining three percent of installed projects and 11 percent of positive electric savings.

Table 3-1. Population of Projects by Technology and Customer Type

Technology	N	kWh	Peak kW	Therms	Percentage of Program			
					N	kWh	Peak kW	Therms
Business Programs Projects								
Biogas	1	247,522	37		1	19	8	0
Biomass	2	-719,035	-95	1,831,669	2	-54	-20	99
Solar electric (PV)	82	1,225,017	474		70	92	99	0
Solar hot water	20	-14,957	-3	22,241	17	-1	-1	1
Wind	12	586,366	67		10	44	14	0
All Business Programs	**117**	**1,324,913**	**480**	**1,853,910**	**100%**	**100%**	**100%**	**100%**
Residential Program Projects								
Solar electric (PV)	176	1,030,692	403		51	80	93	0
Solar hot water	158	110,662	11	14,983	46	9	3	100
Wind	11	150,051	17		3	12	4	0
All Residential Program	**345**	**1,291,405**	**431**	**14,983**	**100%**	**100%**	**100%**	**100%**
All Renewable Projects	**462**	**2,616,318**	**910**	**1,868,893**	**100%**	**100%**	**100%**	**100%**

3.1.2 Sample stratification

KEMA designed the sample to achieve precision within ±10 percent at the 90 percent confidence level for both the Business and Residential Programs and each of three savings types (kWh, kW, and therms). We stratified projects by technology, by program, by the presence of therm savings and by size. Stratifying by technology and program allowed us to target precision at the program level and better control precision at the technology level, which is of interest to the program. Stratification by the presence of therm savings ensured inclusion of both therm and electricity saving solar hot water projects in the sample. We stratified by size in order to get a range of project sizes, while optimizing precision for the overall savings. We determined project size by estimating utility avoided costs (AC) from tracked project savings. This allowed us to put all savings types into a common unit (dollars).[14] KEMA used Model Based Statistical Sampling (MBSS) to develop our sample design. MBSS produces an optimally allocated sample by maximizing precision based on the population and the expected variance in the population.

We show the stratification cells in Table 3-2. This table also shows the population within each stratum, the range of avoided costs, the percent of avoided costs within the stratification cell,

[13] Residential Renewables positive savings totaled 1,316,873 kWh, while parasitic loads (negative savings) summed to 25,468 kWh, resulting in the Residential Program achieving 1,291,405 kWh savings. All Residential parasitic kWh savings were the result of solar hot water projects with positive therm savings.

[14] Utility avoided costs are the combined dollar value to a Wisconsin utility of the kWh, kW, and therms saved.

and the target number of completed surveys from each stratification cell. The resulting target completes included 40 business and 104 residential projects from a population of 117 business and 345 residential projects.

Table 3-2. Stratification of the Population

Technology	Savings Type	Size	Population					Target
			N	Minimum AC ($)	Maximum AC ($)	Average AC ($)	Percent of Program AC	
Business Programs Projects								
Biogas	No therms	M	1	15,206	15,206	15,206	1	1
Biomass	Therms	S	1	1,849	1,849	1,849	0	1
Biomass	Therms	L	1	1,590,221	1,590,221	1,590,221	89	1
Solar electric	No therms	S	46	176	1,225	733	2	7
Solar electric	No therms	M	22	1,237	2,339	1,763	2	7
Solar electric	No therms	L	14	2,396	5,753	3,311	3	6
Solar hot water	No therms	M	2	107	459	283	0	1
Solar hot water	Therms	S	8	109	670	277	0	2
Solar hot water	Therms	M	4	751	1,050	835	0	2
Solar hot water	Therms	L	3	1,462	1,553	1,502	0	2
Solar hot water	Therms	XL	3	2,426	2,660	2,535	0	3
Wind	No therms	S	6	566	1,475	1,130	0	2
Wind	No therms	M	3	1,533	4,005	3,048	1	2
Wind	No therms	L	3	5,171	6,550	5,737	1	3
All Business Programs			**117**	**107**	**1,590,221**	**15,192**	**100%**	**40**
Residential Program Projects								
Solar electric	No therms	S	93	61	484	311	23	15
Solar electric	No therms	M	52	484	825	630	25	15
Solar electric	No therms	L	31	833	1,932	1,250	30	15
Solar hot water	No therms	S	27	46	195	144	3	6
Solar hot water	No therms	L	17	197	342	260	3	6
Solar hot water	Therms	S	49	24	93	71	3	14
Solar hot water	Therms	M	37	94	113	103	3	13
Solar hot water	Therms	L	28	114	233	146	3	13
Wind	No therms	S	5	72	559	363	1	3
Wind	No therms	M	4	641	1,045	835	3	2
Wind	No therms	L	2	1,639	1,660	1,649	3	2
All Residential Program			**345**	**24**	**1,932**	**373**	**100%**	**104**
All Renewable Projects			**462**	**24**	**1,590,221**	**4,342**		**144**

3.1.3 Data collection and response rate

KEMA analysts completed participant surveys to verify the project equipment characteristics and installation, as well as to determine participant self-reports of project attribution to the program. The survey included a series of questions that addressed aspects of program offerings and their influence on the decision to install the renewable energy system, as well as some general satisfaction questions. The survey instrument is included in Appendix A.

Appendix B includes selected responses from the survey with cross tabulations by attribution results.

KEMA completed engineering reviews on the sample projects to determine a verified gross installed savings (offset) for each of the sample projects. We based the engineering review on the project paperwork, participant responses, and other secondary responses.

KEMA analysts telephoned participants in September and October of 2010 to complete the interviews. We called each sampled participant a minimum of six times before we randomly selected a replacement project for completion. We had an overall survey response rate of 92 percent, with 93 percent for Business Programs respondents and 91 percent for Residential. We did not complete any vendor surveys for this evaluation: none of the respondents with low attribution indicated a substantial vendor role in the decision to install the system.

KEMA completed surveys representing 42 Business Programs projects, 36 percent of all Business Programs projects, (see Table 3-3) that represented 30 percent of tracked kWh offset and more than 99 percent of therms. These Business Programs interviews included all biogas and biomass projects, 26 percent of solar electric, 50 percent of solar hot water, and 67 percent of wind projects.

For the Residential Program, KEMA completed surveys with respondents representing 117 projects, 34 percent of all Residential Programs projects, (see Table 3-3) that represented 38 percent of tracked kWh offset and 44 percent of therms. These included 27 percent of solar electric, 40 percent of solar hot water, and 64 percent of wind projects.

Table 3-3. Completed Surveys by Technology and Customer Type

	Pop	Target	Sample Completes			
				Percent of Population Savings		
Technology	**N**	**N**	**N**	**kWh**	**kW**	**Therms**
Business Programs Projects						
Biogas	1	1	1	18.7%	7.7%	0.0%
Biomass	2	2	2	-54.3	-19.9	98.8
Solar electric	82	20	21	28.3	31.1	0.0
Solar hot water	20	10	10	-0.9	-0.3	0.7
Wind	12	7	8	37.9	12.0	0.0
All Business Programs	**117**	**40**	**42**	**29.6%**	**30.5%**	**99.5%**
Residential Program Projects						
Solar electric	176	45	47	27.3%	30.7%	0.0%
Solar hot water	158	52	63	2.8	0.8	43.8
Wind	11	7	7	8.3	2.8	0.0
All Residential Programs	**345**	**104**	**117**	**38.3%**	**34.4%**	**43.8%**
All Projects	**462**	**144**	**159**	**33.9%**	**32.3%**	**99.1%**

We calculated case weights for each completed survey to report responses to individual questions. (These responses are included in Appendix B) We calculated the case weight based on the ratio of the strata population to the number of completed surveys (projects) in the strata. For example, we completed two surveys from the four medium residential wind projects installed in the evaluation period (see Table 3-2). The case weight for each of these

completed surveys equals 4/2 = 2. We describe ratio weights used for estimating verified gross installation, attribution, and realization rates in Appendix D.

3.2 DESCRIPTION OF KEY INDICES

This impact analysis determines the energy and demand savings attributable to renewable energy projects implemented by the Focus on Energy programs.

Direct impacts are the energy and demand savings of projects implemented through and tracked by the Programs. We consider energy produced by renewable energy systems that displaces electrical or natural gas as savings. Direct impacts are the portion of these impacts that are attributable to the program.

Indirect impacts are energy and demand savings attributable to the Program but not tracked by them. These impacts could result from market effects or untracked direct savings. Renewable measures currently have no quantified market effects. We found untracked direct savings for solar hot water projects that resulted in space heat savings for 14 projects in the CY10 evaluation.

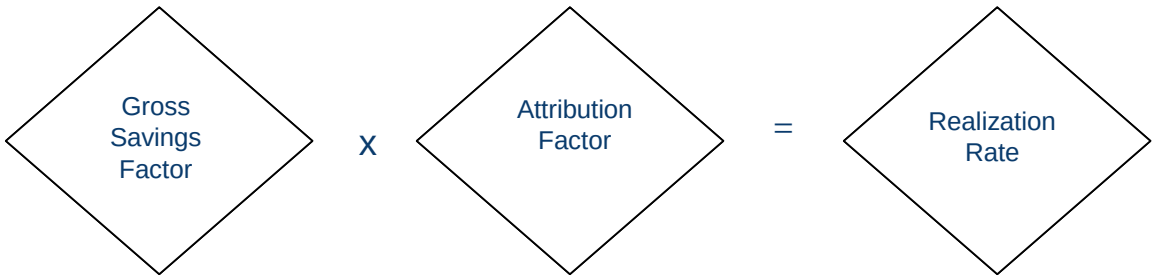
The programs report their estimate of gross savings due to each tracked project. For solar electric, wind, and electricity generating biogas projects, the gross savings is the annual energy generated. For biomass, solar hot water, and thermal biogas projects the gross savings is the difference between participant energy with and without the renewable project. The impact analysis for a measure determines two key adjustment factors to the program-reported gross savings:

- **The gross savings adjustment factor.** This is the ratio of gross savings as verified by the evaluation team to the program-reported savings. This factor adjusts tracked gross savings for installation and engineering verification of savings estimates. Applying the gross savings adjustment factor to tracking gross savings produces the estimate of verified gross savings.
- **The attribution factor.** This is the ratio of the total savings attributable to the program to the verified gross savings.

The two factors are combined, resulting in a realization rate:

- **Realization rate.** This is the ratio of net savings to tracked gross savings.

Figure 3-1. Realization Rate Calculation



We calculated the verified gross savings and program attribution at the technology and overall levels for each program.[15] (We do not report all attribution factors at the technology level to protect respondent confidentiality.) We determined the gross savings adjustment factor for each technology by selecting a sample of completed projects for that technology and conducting an engineering review of the program savings estimates for those projects.

We determine attribution using self-reports from participants and, when appropriate, vendors. This approach relies on responses to survey questions asking participants or their vendors what they would have done in the absence of the program. The accuracy of estimates based on self-reported data depends on the ability (and likely inclination) of the respondent to give accurate answers, as well as on the validity of the statistical sampling and estimation process.

The impact analysis begins with the savings estimates tracked by the Programs. The analysis provides the following information:

- Savings estimates by program and technology as reported in the program tracking systems maintained by WECC and the PSCW (WISEERTS).
- Gross savings adjustment factors.
- Attribution adjustment factors.
- Verified gross savings developed by applying the gross adjustment factors to the savings estimates from the program tracking systems.
- Verified net savings developed by applying the attribution adjustment factors to the verified gross savings.

[15] To allow comparisons with past years' reports, we also present the results at the overall technology level in Section 4.

4.1 ENERGY SAVING RESULTS

4.1.1 Program activities

In this section, we discuss renewable projects implemented by Business Programs for the period from October 1, 2009, through June 30, 2010, the CY10 evaluation period. The Focus Business Programs completed 117 renewable energy measures in this period.[16]

Table 4-1. Business Programs Projects Implemented by Type and Contract Period

Technology	Completed Projects[a]						
	FY02–FY05 Mar 02–Jun 05	FY06 Jul 05–Jun 06	FY07 Jul 06–Jun 07	18MCP Jul 07–Dec 08	CY09 Jan 09–Sep 09	CY10 Oct 09–Jun 10	Program To Date Mar 02 – Jun10
Biogas	5	7	2	6	8	1	29
Biomass	10	16	14	18	6	2	66
Solar electric	15	9	18	78	62	82	182
Solar hot water	4	5	6	38	32	20	85
Wind	9	1	1	4	3	12	18
Hydroelectric	2	0	0	0	0	0	2
Other	1	1	2	0	0	0	4
All Business Programs	**46**	**39**	**43**	**144**	**111**	**117**	**383**

[a] Evaluation periods vary in number and timing of months, making comparisons of totals across periods less meaningful.

4.1.2 Gross savings

The program tracks gross energy savings (generation) for all projects completed that receive a Cash-back Reward or a grant that has associated energy impacts. Table 4-2 includes program-reported gross impacts by technology and segment for the 18MCP, CY09, and CY10.

[16] This report focuses on projects that received direct financial incentives for the installation of renewable energy systems. In addition to financial incentives, the program engages in other activities to promote the adoption of renewable energy systems such as site assessments, feasibility studies, and activities to develop renewable energy markets.

Table 4-2. Renewable Energy Projects-tracked Gross Impacts[17]
Business Programs by Technology

Technology	Energy Impacts	Completed[a]			
		18MCP Jul 07– Dec 08	CY09 Jan 09– Sep 09	CY10 Oct 09– Jun 10	Program To Date Mar 02 – Jun10
Biogas	Peak kW	1,180	1,871	37	8,019
	Annual kWh	10,159,791	17,507,821	247,522	67,448,080
	Annual therms	138,637	1,929	0	249,219
Biomass	Peak kW	-66	-98	-95	-259
	Annual kWh	-329,413	-498,735	-719,035	-1,547,183
	Annual therms	2,213,364	4,873,677	1,831,669	12,081,392
Solar electric	Peak kW	307	261	474	1,254
	Annual kWh	778,759	665,436	1,225,017	2,935,314
	Annual therms	0	0	0	1,283
Solar hot water	Peak kW	-13	0	-3	-16
	Annual kWh	-19,107	-3,344	-14,957	-37,408
	Annual therms	48,752	26,211	22,241	134,089
Wind machine	Peak kW	17	6	67	571
	Annual kWh	127,249	57,813	586,366	1,443,602
	Annual therms	0	0	0	0
Hydroelectric	Peak kW	0	0	0	1,300
	Annual kWh	0	0	0	6,473,600
	Annual therms	0	0	0	0
Other	Peak kW	0	0	0	14
	Annual kWh	0	0	0	29,973
	Annual therms	0	0	0	2,638
All Business Programs	**Peak kW**	**1,425**	**2,040**	**480**	**10,884**
	Annual kWh	**10,717,278**	**17,728,991**	**1,324,913**	**76,745,977**
	Annual therms	**2,400,753**	**4,901,817**	**1,853,910**	**12,468,621**

[a] Evaluation periods vary in number and timing of months, making comparisons of totals across periods less meaningful.

[17] Gross energy impacts are those reported in the program tracking system maintained by WECC and the PSCW (WISEERTS).

4.1.3 Gross savings adjustment factors

The gross savings adjustment factors are used to calculate verified gross savings from the total program-tracked savings. The factors are the product of the installation rate and the engineering verification factor.

We confirmed installation for 100 percent of the projects sampled as part of the telephone survey.

To calculate the engineering verification factor, we first verified the gross savings of a sample of projects by reviewing their project files and completing telephone surveys with them. The telephone surveys included questions to confirm or collect information necessary for estimating project savings. We then calculated verified gross savings for each sampled project following the guidelines established in the Standard Calculation Guidelines and using the standard calculation approach or metered data.[18] We discuss below, by technology, how we verified the gross savings estimates for specific technologies.

Since we confirmed installation of 100 percent of the sampled projects, the verified gross savings factors equal the engineering verification factors (the ratio of verified savings to installed savings).

Overall Business Programs gross savings adjustment factors are 126 and 111 percent, for kWh and kW respectively. Verified gross therm savings are 56 percent of program tracked. Figure 4-1 and Table 4-3 show the gross savings adjustment factors for projects by technology. The overall BP electric verified gross savings ratios are higher than any individual technology's due to the low verified gross ratio for parasitic electric load on biomass projects.

[18] Bobbi Tannenbaum, Doug Kneale, Brian Dunn, Brian Bak, KEMA, Inc. *Renewable Energy Standard Calculation Recommendations (Draft) – Revised.* December 14, 2010. This manual will be finalized later this month.

Figure 4-1. CY10 Business Programs Gross Savings Adjustment Factors

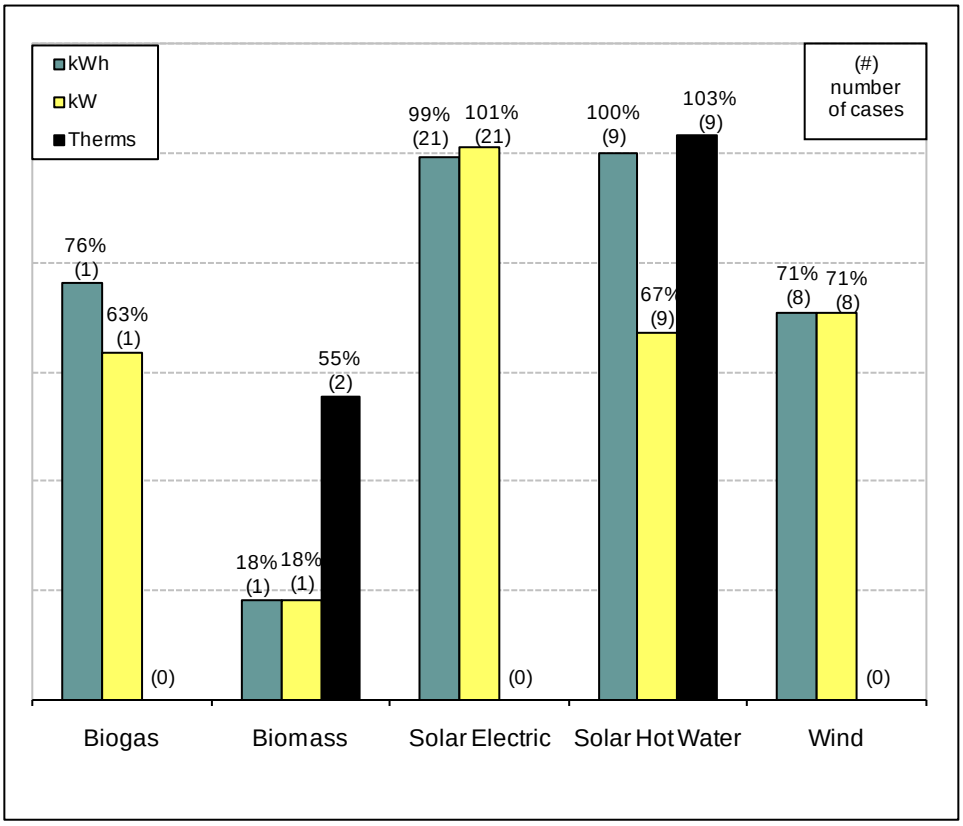


Table 4-3. CY10 Gross Savings Adjustment Factors
Business Programs

	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
Technology	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Biogas	1	76%	± 0.0%	N/A	1	63%	± 0.0%	N/A				
Biomass	1	18%	± 0.0%	N/A	1	18%	± 0.0%	N/A	2	55%	± 0.0%	± 0.0%
Solar electric	21	99%	± 1.3%	± 1.5%	21	101%	± 1.3%	± 1.7%				
Solar hot water	9	100%	± 14.5%	± 18.8%	9	67%	± 20.7%	± 26.7%	9	103%	± 2.2%	± 4.3%
Wind	8	71%	± 2.3%	± 4.8%	8	71%	± 2.3%	± 4.7%				
Overall[b]	**40**	**126%**	**± 3.7%**	**± 5.4%**	**40**	**111%**	**± 1.6%**	**± 2.2%**	**11**	**56%**	**± 0.0%**	**± 0.1%**

[a] Verified gross installed kWh and kW for biomass are parasitic load. Values less than 100 percent indicate lower parasitic load than tracked by the program.

[b] Overall ratios for kWh and kW are greater than the individual technology ratios because the low ratio for biomass parasitic load results an increase in verified savings for the program.

A. BIOGAS

Verified energy production for biogas for CY10 is 76 percent of tracked kWh and 63 percent of tracked kW (see Table 4-3). This is a decrease compared to CY09 estimates.

KEMA completed an interview and detailed engineering review for the one biogas system installed in the CY10 period. We found no errors in the program's estimation of energy savings. However, the participant reported significant system downtime, which led to the project's low verified energy production. KEMA calculated kWh and peak kW savings using the approach outlined in the Standard Calculations guidelines and derated total savings by the percentage of system downtime. An experiment that increased the digester temperature and resulted in an increase of H_2S concentration forced the shutdown of the generator. The participant put the generator back online after resolving the issue, but evaluation protocol is to estimate production values based on what is observed at the time of the evaluation.

B. BIOMASS

The two biomass projects completed in CY10 had a gross savings adjustment factor for therms of 55 percent. Biomass projects had a parasitic kW adjustment factor of 18 percent and a parasitic kWh factor of 18 percent.

Differences between reported and paperwork estimates of usage drive the low gross savings adjustment factors. One participant reported hours of use as only 22 percent of the paperwork estimates due to a change in heating needs at his facility. The other project reported deploying their system only when the relative prices of biomass and natural gas made the biomass system cost effective. The program estimated that the firm would use the system year round; reported usage was 55 percent of the time. This resulted in therm savings of approximately 55 percent versus of the program estimate.

Parasitic load is increased electrical usage associated with the operation of the biomass system, primarily due to additional fans and motors required for operation. The parasitic load has the effect of reducing Focus overall electric savings. The evaluation found that the program overestimated parasitic load. First, since parasitic load is proportional to use, the lower usage of one system resulted in a lower parasitic electric consumption. Second, the program included an induced draft fan in the parasitic load estimate for the biomass system. This induced draft fan is necessary for the operation of both the natural gas and biomass boilers to move steam throughout the facility. The draft fan installed for the biomass system is similar enough to the fan on the displaced natural gas system that it does not add additional parasitic load in this case. The effect of removing this fan from parasitic load calculations reduced the parasitic kWh and kW estimates by 60 percent for this project.

C. SOLAR ELECTRIC

Solar electric projects completed in CY10 have gross savings adjustment factors of 99 percent for kWh and 101 percent for kW. We completed interviews with 21 participants installing solar electric systems in CY10. We verified the production calculations for 21 of these systems using PVWatts for kWh and the peak kW approach outlined in the Standard Calculation guidelines.

The project files contained all the information we needed to reproduce program calculations. Individual projects had verified results that were higher or lower than Focus reported values, but 87 percent were within ten percent of the tracked values.

D. SOLAR HOT WATER

Solar hot water (SHW) projects completed in CY10 had high gross savings adjustment factors: 103 percent for therms, 100 percent for kWh, and 67 percent for kW, a reduction in parasitic kW. Two factors caused the low gross savings adjustment factor for peak kW. First, the program underestimated energy and peak kW savings for the one sampled project that saved electricity. Second, on another project, the evaluation found less parasitic use coincident with peak than the program.

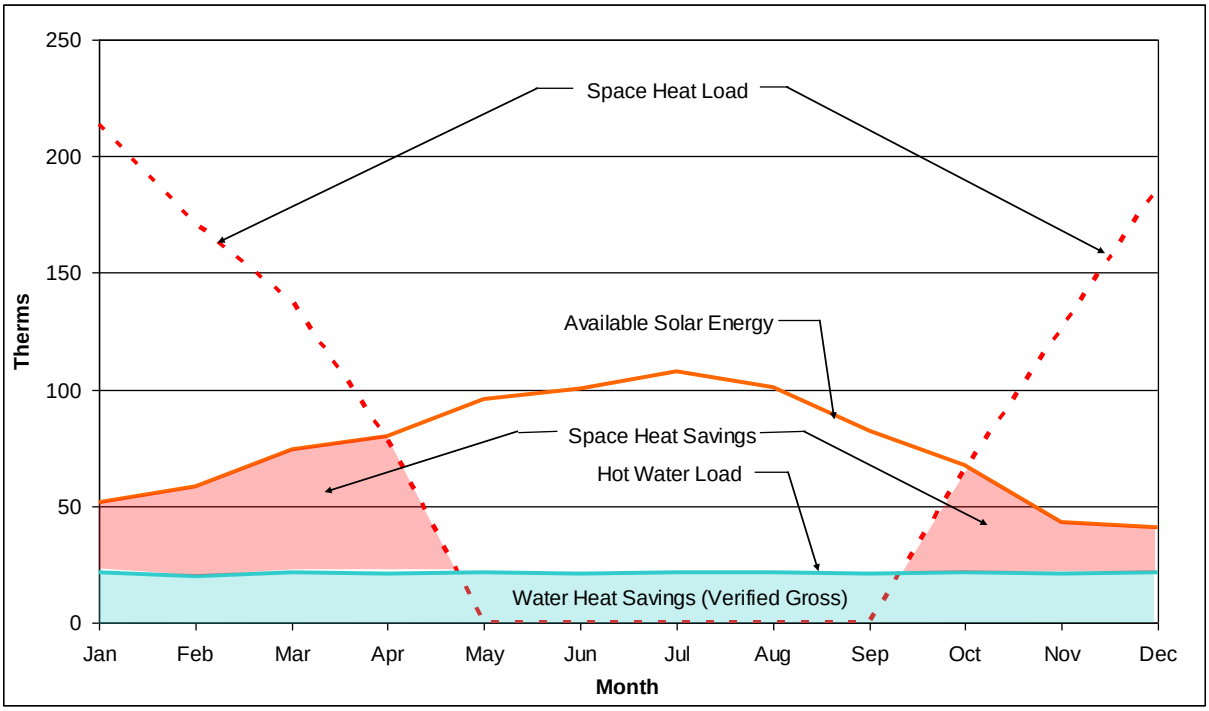
KEMA calculated solar hot water savings based on the project files, project documentation and survey responses, using the standard calculation approach. Parasitic load (kW and kWh) calculated based on available information. All projects clearly indicated solar powered or electric water circulation pumps and provided documentation of the load. When the project documentation did not include RETScreen printouts or alternative calculations, we based our analysis on other information in the file (e.g., receipts), or made assumptions consistent with other completed projects. KEMA made the following assumptions or calculations when the files did not contain documentation of program calculation assumptions:

- Hot water temperatures of 120 degrees F.
- Supply water temperatures recommended by RETScreen for projects.
- Heat exchanger efficiency of 85 percent for systems with a heat exchanger.

Two participants in the sample installed SHW systems with the intent of providing some space heating, in addition to water heating. All SHW projects estimated and tracked only hot water savings, which follows program policy. We verified the hot water usage estimates and then estimated space heating savings, which we refer to as untracked savings.

For systems providing space heating, we calculated the verified gross SHW savings based on annual water usage and estimated untracked savings due to space heat. We calculated the space heat savings as the difference between the energy available and the hot water energy savings during the heating season. (In other words, energy available during the heating seasons first goes to heat water and the remainder is for space heating.) Figure 4-2 shows water heating savings in blue (i.e., verified gross savings) and space heating savings in red. It shows that while solar energy is available year round, excess energy from the sun can be used for space heating only during heating months, when less solar energy is available. Using this estimation method, two systems offset some space heating energy use.

Figure 4-2. Solar Space Heating Estimates



E. WIND ENERGY SYSTEMS

The gross savings adjustment factor for Business Programs wind systems completed in CY10 is 71 percent for kWh and kW. This is similar to the CY09 verified gross savings adjustment factors. The program is changing two input assumptions for wind production estimates that should improve gross savings adjustment factors. The first is a change to the wind shear exponential, α, from 0.2 to 0.3. The second is to change the Weibul shape factor, k, from 2.0 to 2.3.

KEMA completed interviews and detailed engineering reviews for eight wind systems installed in CY10. We used two approaches for determining the verified gross energy production, depending upon the presence of metered data.

Metered production data available. We used this approach for all CY10 installed wind system with six or more months of metered production. This was the case for four of the eight sampled wind systems.

- We annualized the interview reported metered data (A).

  A= kWh_{met} = Annualized metered kWh production.

- We used the 7th Wind calculator[19] to estimate first year kWh production using program documented inputs and 2009–2010 site average wind speed (B).

[19] For this evaluation, we used 7th Wind version 10.75.

B = kWh_{7wind} = kWh production from 7th Wind calculator using 2009–2010 site average wind speed.

- We calculated the site specific ratio between the metered and 7th Wind estimated production (A/B). This ratio adjusts for problems with assumptions imbedded in the 7th Wind calculator, as well as problems with site specific inputs.
- We used the 7th Wind calculator to estimate average annual production using program documented inputs and historic average site wind speed (C).[20]

  C = kWh_{avg} = Annual kWh production from 7th Wind calculator using historic average site wind speed.

- We multiplied the average annual kWh production (C) by the site-specific ratio (A/B) to determine verified gross production for that site.

Metered production data not available. We used this approach for all CY10 installed wind system with fewer than six months of metered production. This was the case for four of the eight sampled wind systems.

- We calculated an overall weighted adjustment factor (D) based on the site-specific ratios (A/B) calculated above.

  $D = \sum A / \sum B$ = average adjustment factor = 0.71 for CY10

- We used the 7th Wind calculator to estimate average annual production using historic average site wind speed (C) for each site (without metered data).
- We multiplied this estimate by the weighted average adjustment factor (D) of 0.71 to estimate average annual production.

4.1.4 Attribution adjustment factors

Attribution is the percent of tracked savings that is directly attributable to the program. Participant self-report surveys were used to estimate attribution. The CY10 attribution factors for the program overall are 80, 80, and 38 percent for kWh, kW, and therms, respectively. This represents a substantial increase in attribution. While the majority of the projects displacing therms are solar hot water, the majority of the tracked therm savings are from biomass projects. We discuss the attribution results by technology below.

Solar electric and wind projects had high attribution ratios in CY10, 79 and 93 percent, respectively. Attribution ratios were low for solar hot water projects offsetting both therms and electricity (see Figure 4-3).

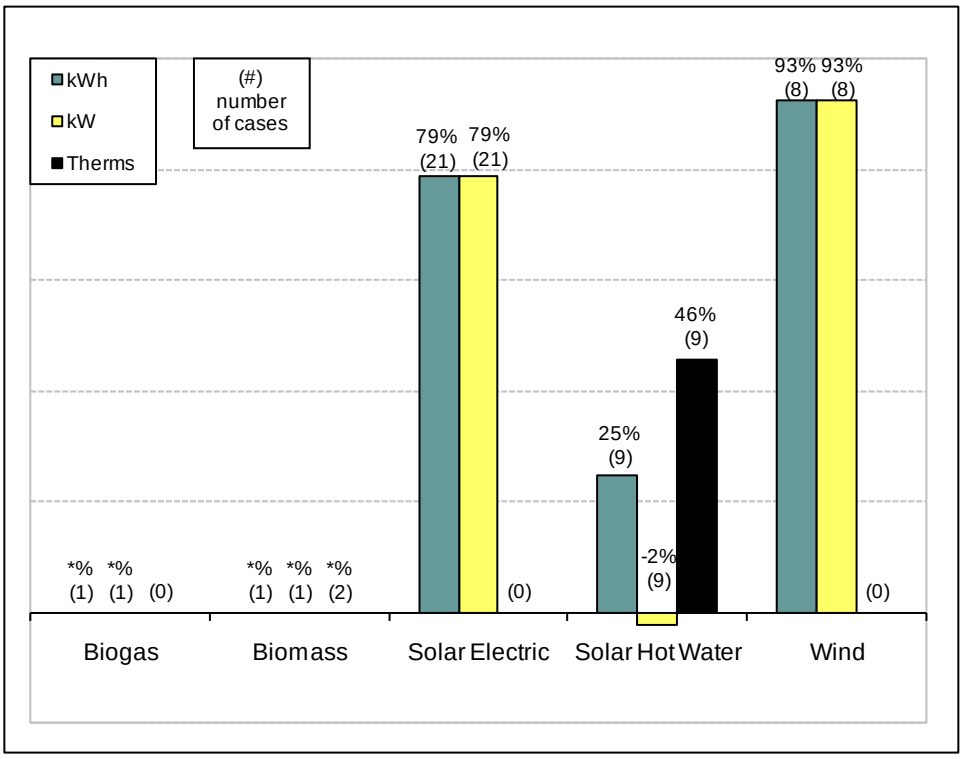
The negative value for solar hot water kW attribution requires explanation. Solar hot water peak kW has negative attribution because verified gross savings is less than zero (there is

[20] We used historical site wind speed data from Weather Underground [http://www.weatherunderground.com] downloaded in September 2010. Six years of data were available for all locations.

more parasitic kW load than kW savings), but net kW savings is greater than zero. In other words, there is more attributable kW savings than attributable parasitic load).

In CY10, we do not report attribution for biogas and biomass systems in order to maintain respondent confidentiality.

Figure 4-3. CY10 Business Programs Attribution by Technology



*Ratio not reported to protect respondent confidentiality

4.1.5 Net energy impacts

KEMA calculates net energy impacts based on an overall realization rate. The realization rate combines the effect of the gross savings adjustment factors and the attribution factors. The CY10 realization rates for the program overall are 101, 88, and 21 percent for kWh, kW, and therms, respectively, as shown in Table 4-4.

Table 4-4. CY10 Business Programs Adjustment Factors

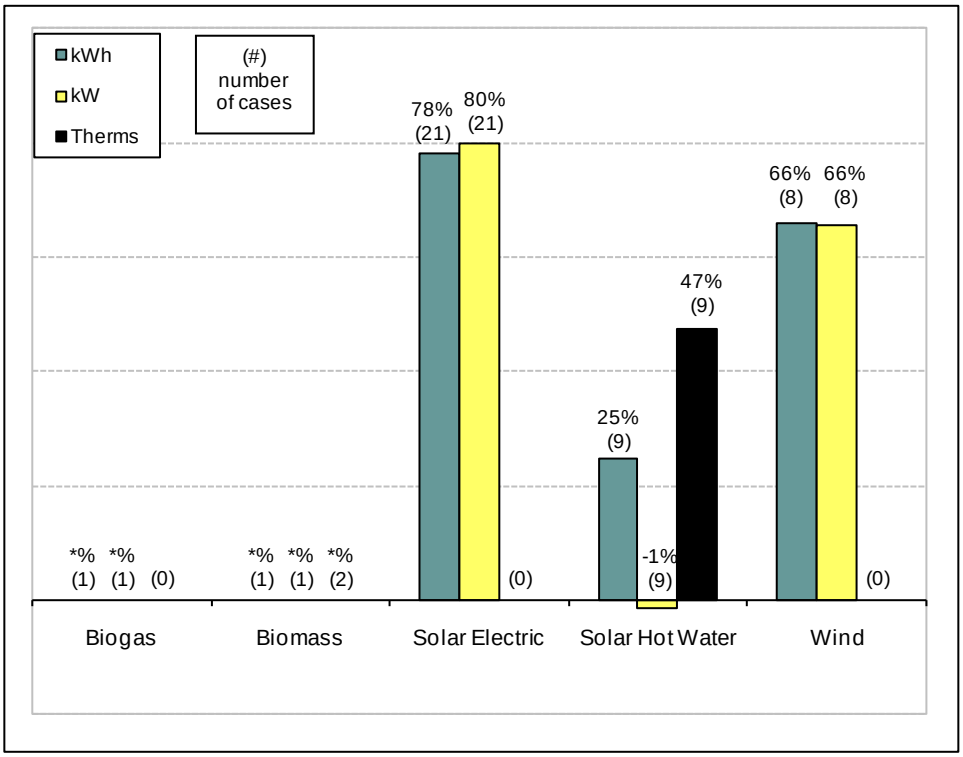
Adjustment Factor	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Installation rate	40	100%	± 0.0%	± 0.0%	40	100%	± 0.0%	± 0.0%	11	100%	± 0.0%	± 0.0%
Engineering verification factor	40	126%	± 3.7%	± 5.4%	40	111%	± 1.6%	± 2.2%	11	56%	± 0.0%	± 0.1%
Gross savings adjustment factor	40	126%	± 3.7%	± 5.4%	40	111%	± 1.6%	± 2.2%	11	56%	± 0.0%	± 0.1%
Attribution factor	40	80%	± 9.6%	± 12.5%	40	80%	± 12.2%	± 15.6%	11	38%	± 0.5%	± 0.8%
Realization rate	40	101%	± 12.5%	± 16.3%	40	88%	± 13.5%	± 17.4%	11	21%	± 0.3%	± 0.5%

[a] The gross savings adjustment factor and the realization rate are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating these two adjustment factors.

The overall realization rates for electric savings have increased significantly compared to CY09 and decreased somewhat for therms.

Realization rates vary by technology. Solar electric has the highest realization rate, roughly equal to the attribution, because verified gross savings are close to the energy and demand savings. Wind projects have mid-range realization rates due to low verified gross adjustments. Solar hot water projects have the lowest realization rates due to low attribution ratios. The realization rate for solar hot water kW savings is negative because weighted net savings are slightly positive, while weighted reported savings are negative. We do not report biogas and biomass realization ratios to protect respondent confidentiality.

Figure 4-4. CY10 Business Programs Realization Rates by Technology



*Ratios not reported to protect respondent confidentiality.

Table 4-5. CY10 Business Programs Realization Rates by Technology

	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
Technology	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated
Biogas	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A				
Biomass	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A	2	*%	± 0.0%	± 0.0%
Solar electric	21	78%	± 13.6%	± 17.2%	21	80%	± 13.8%	± 17.7%				
Solar hot water	9	25%	± 30.9%	± 51.4%	9	-1%	± -42.7%	± -54.9%	9	47%	± 23.2%	± 40.2%
Wind	8	66%	± 2.2%	± 8.0%	8	66%	± 2.2%	± 8.0%				
Overall[b]	**40**	**101%**	**± 12.5%**	**± 16.3%**	**40**	**88%**	**± 13.5%**	**± 17.4%**	**11**	**21%**	**± 0.3%**	**± 0.5%**

[a] Realization rates are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating the realization rate.

[b] Overall ratios for kWh and kW are greater than the individual technology ratios because the low ratio for biomass parasitic load results an increase in verified savings for the program.

* Ratios not reported to protect respondent confidentiality.

4.1.6 Untracked savings (solar hot water)

In CY10, two sampled solar hot water projects reported that their systems included space heating. The program appropriately did not calculate or include space-heating savings in the tracking database for these projects, since the program is designed to provide incentives only for water heating. KEMA calculated a verified gross savings from space heating for two of the sampled projects with space heating and found 293 therms of gross untracked savings. When

we applied the project attribution values to these savings the net untracked savings value for the sampled projects was zero therms.

4.1.7 Total impacts

We report the total impacts for the CY10 Renewables installed by Business Programs in Table 4-6 below.

Table 4-6. Total Impacts CY10
Business Programs

Technology	Tracked Savings			Verified Gross Savings			Net Savings		
	kWh	Peak kW	Therms	kWh	Peak kW	Therms	kWh	Peak kW	Therms
Biogas	247,522	37	0	188,764	23	0	*	*	0
Biomass	-719,035	-95	1,831,669	-129,052	-17	1,014,214	*	*	*
Solar electric	1,225,017	474	0	1,217,613	479	0	958,781	379	0
Solar hot water	-14,957	-3	22,241	-14,986	-2	22,976	-3,725	0	10,532
Wind	586,366	67	0	416,136	48	0	385,985	44	0
Overall	**1,324,913**	**480**	**1,853,910**	**1,678,475**	**531**	**1,037,190**	**1,339,837**	**423**	**391,146**
Untracked savings	0	0	0	0	0	293	0	0	0
Overall including untracked	**1,324,913**	**480**	**1,853,910**	**1,678,475**	**531**	**1,037,483**	**1,339,837**	**423**	**391,146**

* Net Impacts not reported to protect respondent confidentiality.

4.2 SUMMARY AND CONCLUSIONS

In this section, we discuss the overall findings from the evaluation of Business Programs renewable project impacts for CY10. We then address some remaining issues emerging from the evaluation that require further consideration.

4.2.1 Verified gross installation

KEMA verified installation for 100 percent of the projects sampled. CY10 verified gross estimates for kWh, peak kW, and therms improved over CY09 estimates, but the evaluation team is concerned with several issues related to the calculations.

With the exception of PV systems, we found some project documentation of estimated savings incomplete. Project documentation continued to have the following issues.

Reliance on program application materials. In general, the program relies on the estimates submitted with the application materials to determine incentives levels (when based on production) and for program tracking of estimated production (savings). This works well for PV, wind, and most solar hot water applications, where the renewable energy technology is independent of the specific application and production estimates are based primarily on the size and type of system. Biomass and biogas projects are larger, more complicated, and site specific and can require more sophisticated calculations, assumptions, and site specific information (equipment and usage) to estimate production. In these cases greater review of application materials is warranted. We anticipate that the integration of renewables into Business Programs will lead to more thorough review of impact estimates for large projects.

For one biomass system the application paperwork contained incorrect operational assumptions that resulted in inaccurate estimates of savings and parasitic load. The program overestimated usage, which led to a substantial overestimate of production (therm savings) and a corresponding overestimate of parasitic load (electricity consumption).

Estimating wind system generation. The Program's calculation of energy production from wind systems continues to result in overestimation of offsets. The 7th Wind calculator includes updated manufacturer data, in addition to a built-in function to derate for inverter losses. A planned change in two key input factors for wind energy calculations should make program estimations much closer to metered data. The Program (and the wind industry in general) continues to improve estimation approaches for calculating site-specific wind resources.

Estimating parasitic load for biomass systems. Accurate estimation of parasitic load on biomass systems continues to be a problem for the program. Parasitic load for biomass projects can be substantial. In CY10, the verified gross parasitic kWh load from one biomass project is two thirds of the verified gross kWh savings from the biogas project. Two generic issues continue to affect the estimates. First, the program estimates are inaccurate in determining baseline parasitic load. Second, the program is inaccurate in determining the operating hours of the parasitic load. In CY09, it was an error in how often the parasitic equipment ran relative to the renewable system. In CY10, it is an overestimation of the operating hours of the biomass system itself.

4.2.2 Attribution

The CY10 attribution factors for the program overall are 80, 80, and 38 percent for kWh, kW, and therms, respectively. This represents an increase in attribution for electric projects relative to CY09. This is due in large part to lower savings from biogas projects, which historically have had lower self reported attribution than other project types. Therm attribution was slightly less than that of CY09.

The program has its highest attributions on solar electric and wind projects, measures that generate electricity and have long payback periods. In CY10, these projects, while small individually, combined comprise over three-fourths of the overall BP renewables electric savings and a majority of installations.

4.2.3 Realization rates and net energy impacts

The CY10 realization rates for the program overall are 101, 88, and 21 percent for kWh, kW, and therms, respectively. The realization rates for electric projects are significantly higher than the CY09, due in large part to an increase in program attribution. The realization rate for therms decreased slightly this year compared to the CY09, due to generally low attribution for biomass projects.

4.2.4 Recommendations

Based on these findings we have the following recommendations for renewable projects funding through the Focus on Energy Business Programs public benefits funding.

The program should require documentation associated with parasitic loads. This should include, at a minimum, a list of all parasitic loads and explicit calculations of the energy

consumption associated with each load. This should include the assumptions related to the baseline conditions and operating characteristics of the parasitic load.

The program should consider the overall energy impacts of a project (not just a single fuel) when determining funding. This means accurate accounting of electric or gas parasitic loads.

The program should carefully review the production calculations and underlying assumptions when reviewing projects for funding. In particular, the program should assess the baseline conditions and the operating characteristics assumptions. Although it is difficult to determine what will happen, projects funded based on “best case” assumptions, (such as full time use of a biomass system when there is an alternative natural gas system available) are unlikely to be realized.

Continue to improve program documentation. We encourage the program to document fully the calculations and assumptions used to determine renewable energy production. This is imperative when the program uses calculation approaches or assumed values that differ from the Standard Calculation guidelines. We recognize that there are advances in knowledge and technology for renewable energy systems (e.g., wind and biogas) that may improve either the calculation approach or the default values. If this information is included in project files, we can use this information in our evaluations.

5.1 ENERGY SAVING RESULTS

5.1.1 Program activities

In this section, we discuss the residential projects implemented for the period from October 1, 2009, through June 30, 2010, the CY10 evaluation period. In CY10, the Focus program completed 345 renewable energy measures.[21]

As with previous years, solar electric and hot water projects make up the majority of projects with wind projects accounting for approximately three percent of projects.

Table 5-1. Residential Program Projects Implemented by Type and Contract Period

Technology	Completed Projects[a]						
	FY02–FY05 Mar 02–Jun 05	FY06 Jul 05–Jun 06	FY07 Jul 06–Jun 07	18MCP Jul 07–Dec 08	CY09 Jan 09–Dec 09	CY10 Oct 09–Jun 10	Program To Date Mar 02 – Jun10
Solar electric (PV)	95	48	74	133	98	176	448
Solar hot water[b]	-	-	-	160	80	158	240
Wind	11	5	5	13	14	11	48
Other	1	1	0	0	0	0	2
All Residential Programs	**107**	**54**	**79**	**306**	**192**	**345**	**738**

[a] Evaluation periods vary in number and timing of months, making comparisons of totals across periods less meaningful.

[b] Residential solar hot water was included and tracked in the Focus on Energy Residential Program prior to the 18MCP. For years before the CY10 integration of Renewables into the Residential Program, this table includes only projects completed through the Focus Renewable Energy program.

5.1.2 Gross savings

The Residential Program tracks gross energy savings (generation) for all completed renewable energy projects that receive a Cash-back Reward or a grant that has associated energy impacts. Table 5-2 includes program-reported gross impacts by technology for the 18MCP, CY09, and CY10 evaluation periods.

[21] This report focuses on projects that received direct financial incentives for the installation of renewable energy systems. In addition to financial incentives, the program engages in other activities to promote the adoption of renewable energy systems such as site assessments, feasibility studies, and activities to develop renewable energy markets.

Table 5-2. Renewable Energy Projects-reported Gross Impacts[22]
Residential Program Total by Technology

Technology	Energy Impacts	Completed[a]			
		18MCP Jul 07– Dec 08	CY09 Jan 09– Sep 09	CY10 Oct 09– Jun 10	Program To Date Mar 02 – Jun10
Solar electric[b]	Peak kW	263	238	403	1,418
	Annual kWh	681,074	600,489	1,030,692	2,989,453
	Annual therms	0	0	0	3,776
Solar hot water[c]	Peak kW	28	10	11	50
	Annual kWh	140,187	99,912	110,662	350,761
	Annual therms	8,371	5,354	14,693	28,709
Wind machine	Peak kW	27	31	17	345
	Annual kWh	278,909	282,077	150,051	1,081,411
	Annual therms	0	0	0	0
Other	Peak kW	0	0	0	0
	Annual kWh	0	0	0	-15,545
	Annual therms	0	0	0	2,253
All Residential	**Peak kW**	**319**	**279**	**431**	**1,812**
	Annual kWh	**1,100,170**	**982,478**	**1,291,405**	**4,406,079**
	Annual therms	**8,371**	**5,354**	**14,983**	**34,738**

[a] Evaluation periods vary in number and timing of months, making comparisons of totals across periods less meaningful.

[b] In FY03 and FY04, "Solar electric" included residential photovoltaic (PV) installations and projects that combined PV with solar hot water technologies. The therm savings are from the combined projects or PV installations that were off-grid and displacing fossil fuel generators on-site.

[c] Prior to the 18MCP residential solar hot water was included and tracked by the Focus on Energy Residential Program. This table includes only projects from the 18MCP and beyond.

5.1.3 Gross savings adjustment factors

The evaluation team uses gross savings adjustment factors to calculate verified gross savings from total program-tracked savings. The factors are the product of the installation rate and the engineering verification factor.

We confirmed installation for 100 percent of the projects sampled as part of the telephone survey.

To calculate the engineering verification factor, we first verified the gross savings of a sample of projects by reviewing their project files and completing telephone surveys with them. The telephone surveys included questions to confirm or collect information necessary for estimating project savings. We then calculated verified gross savings for each sampled

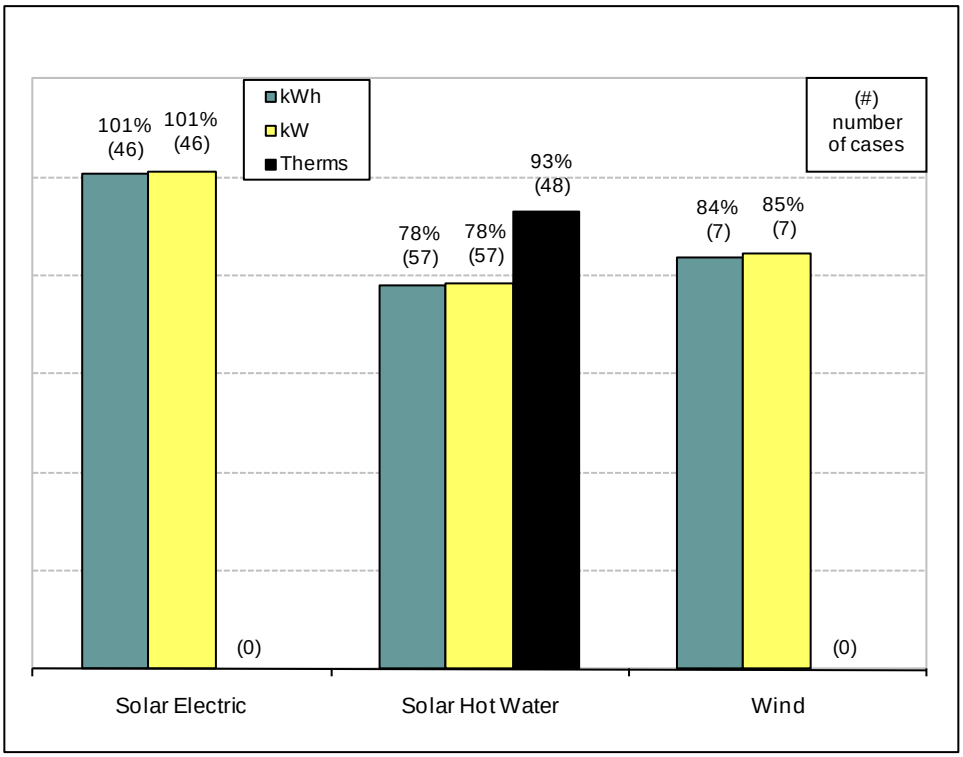
[22] Gross energy impacts are those reported in the program tracking system maintained by WECC and the PSC (WISEERTS).

project, following the guidelines established in the Standard Calculation Guidelines and using the standard calculation approach or metered data.[23] We discuss below, by technology, how we verified the gross savings estimates for specific technologies.

Since we confirmed installation of 100 percent of the sampled projects, the verified gross savings factors equal the engineering verification factors (the ratio of verified savings to installed savings).

Overall, Residential Program gross savings adjustment factors are 97 and 100 percent, for kWh and kW respectively. Verified gross therm savings are 93 percent of program tracked. Figure 5-1 and Table 5-3 show the gross savings adjustment factors for projects by technology.

Figure 5-1. CY10 Residential Program Verified Gross Adjustment Factors



[23] Bobbi Tannenbaum, Doug Kneale, Brian Dunn, Brian Bak, KEMA, Inc. *Renewable Energy Standard Calculation Recommendations (Draft) – Revised.* December 14, 2010. This manual will be finalized later this month.

Table 5-3. CY10 Gross Savings Adjustment Factors
Residential Program[24]

Technology	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Solar electric	46	101%	± 1.7%	± 2.0%	46	101%	± 1.7%	± 2.1%				
Solar hot water	57	78%	± 9.8%	± 11.8%	57	78%	± 9.9%	± 11.9%	48	93%	± 4.6%	± 6.0%
Wind	7	84%	± 4.3%	± 8.7%	7	85%	± 4.2%	± 9.0%				
Overall	**110**	**97%**	**± 1.7%**	**± 2.2%**	**110**	**100%**	**± 1.6%**	**± 2.0%**	**48**	**93%**	**± 4.6%**	**± 6.0%**

A. SOLAR ELECTRIC

Solar electric projects completed in CY10 have gross savings adjustment factors of 101 percent for both kWh and kW. We completed interviews with 47 participants installing solar electric systems in CY10. We verified the production calculations for 46 of these systems using PVWatts for kWh and the peak kW approach outlined in the Standard Calculation guidelines.[25]

The project files contained all the information we needed to reproduce program calculations. Individual projects had verified results that were higher or lower than Focus reported values, but 87 percent of projects were within ten percent of the tracked values.

B. SOLAR HOT WATER

Solar hot water (SHW) projects completed in CY10 had high gross savings adjustment factors: 93 percent for therms and 78 percent for both kWh and kW. The lower verified relative to reported savings is due mostly to an overestimation of hot water consumption. RETScreen estimates hot water use at 16 gallons per person per day. The program paperwork often estimated hot water consumption greater than 16 gallons per person per day, without documentation to support the higher assumption. KEMA discussed this issue with the program in September of 2010. After reviewing various sources that contain residential hot water usage we concluded (and came to an agreement with the program) that 16 gallons per person per day is the best current estimate of residential hot water load.

KEMA calculated solar hot water savings based on the project files, project documentation, and survey responses, using the standard calculation approach. Project documentation includes RETScreen printouts, which KEMA used as inputs for evaluation. KEMA made the following assumptions or calculations when the files did not contain documentation of program calculation assumptions:

- Hot water usage proportional to occupants, as recommended by RETScreen (16 gallons per person per day).
- Hot water temperatures of 120 degrees F.

[24] See Appendix C for number of observations and 90 percent confidence intervals.

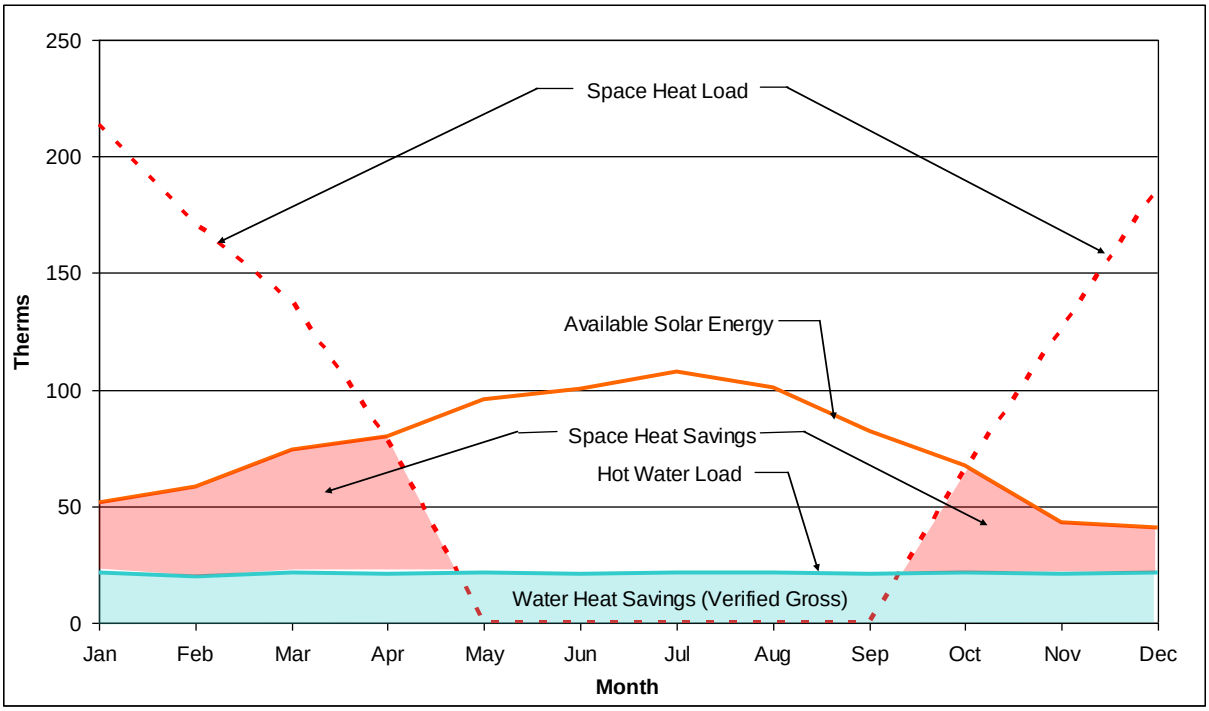
[25] In one case, the respondent refused to answer the engineering section of the survey.

- Supply water temperatures recommended by RETScreen for projects.
- Heat exchanger efficiency of 85 percent for systems with a heat exchanger.
- Parasitic load (kW and kWh) calculated based on available information. All projects clearly indicated either solar powered pumps or electric pumps and provided documentation of the load.

Fourteen participants in the sample installed SHW systems with the intent of providing some space heating, in addition to water heating. All SHW projects estimated and tracked only hot water savings, which follows program policy. We verified the hot water usage estimates and then estimated space heating savings, which we refer to as untracked savings.

For systems providing space heating, we calculated the verified gross SHW savings based on annual water usage and estimated untracked savings due to space heat. We calculated the space heat savings as the difference between the energy available and the hot water energy savings during the heating season. (In other words, energy available during the heating seasons first goes to heat water and the remainder is for space heating.) Figure 5-2 shows water heating savings in blue (i.e., verified gross savings) and space heating savings in red. It shows that while solar energy is available year round, excess energy from the sun can be used for space heating only during heating months, when less solar energy is available. Using this estimation method, 12 of the 14 systems offset some space heating energy use. The remaining two projects with systems installed for space heating used propane fuel for space heating.

Figure 5-2. Solar Space Heating Estimates



C. WIND ENERGY SYSTEMS

The gross savings adjustment factors for Residential Program wind systems completed in CY10 are 84 and 85 percent for kWh and kW, respectively. This is an increase over CY09 in verified gross savings adjustment factors. The program is changing two input assumptions for wind production estimates that should improve gross savings adjustment factors. The first is a change to the wind shear exponential, α, from 0.2 to 0.3. The second is to change the Weibul shape factor, k, from 2.0 to 2.3..

KEMA completed interviews and detailed engineering reviews for seven wind systems installed in CY10. We used two approaches for determining the verified gross energy production, depending upon the presence of metered data.

Metered production data available. We used this approach for all CY10 installed wind system with six or more months of metered production. This was the case for all seven sampled wind systems.

- We annualized the interview reported metered data (A).

  A= kWh_{met} = Annualized metered kWh production.

- We used the 7th Wind calculator[26] to estimate first year kWh production *using program documented inputs* and 2009-2010 site average wind speed (B).

  B = kWh_{7wind} = kWh production from 7th Wind calculator using 2009-2010 site average wind speed.

- We calculated the site specific ratio between the metered and 7th Wind estimated production (A/B). This ratio adjusts for problems with assumptions imbedded in the 7th Wind calculator, as well as problems with site specific inputs.

- We used the 7th Wind calculator to estimate average annual production *using program documented inputs* and historic average site wind speed (C).[27]

  C = kWh_{avg} = Annual kWh production from 7th Wind calculator using historic average site wind speed.

- We multiplied the average annual kWh production (C) by the site-specific ratio (A/B) to determine verified gross production for that site.

Metered production data not available. No wind systems sample for the CY10 impact analysis fell into this category. If they had, the approach would have been:

- Calculate an overall weighted adjustment factor (D) based on the site-specific ratios (A/B) calculated above.

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[26] For this evaluation, we used 7th Wind version 10.75.

[27] We used historical site wind speed data from Weather Underground [http://www.weatherunderground.com] downloaded in September 2010. Six years of data were available for all locations.

D = ∑ A/∑ B = average adjustment factor = 0.71 for CY10

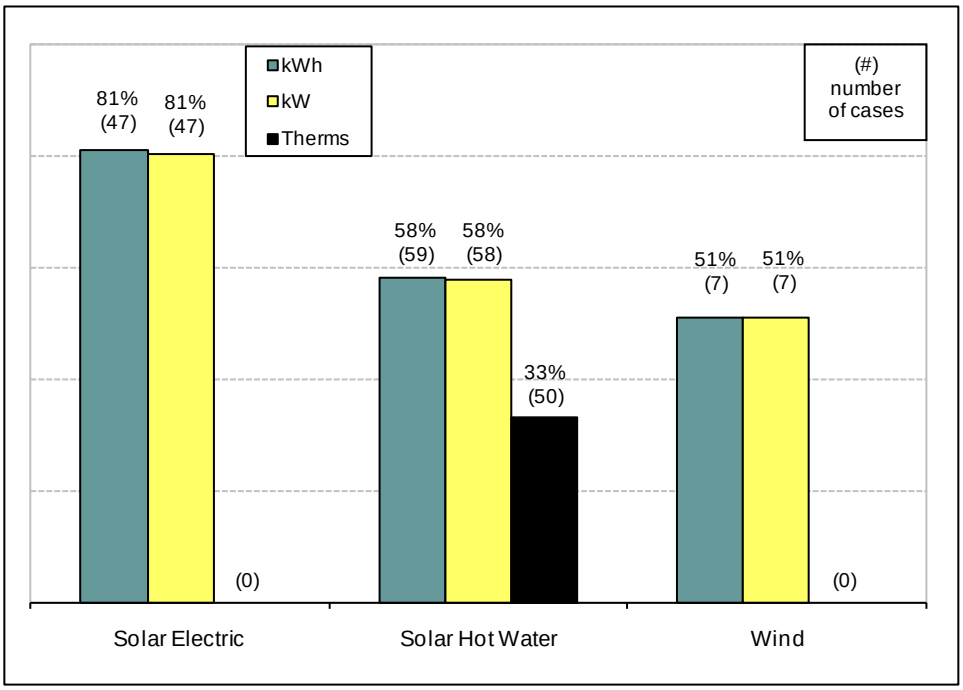
- Use the 7th Wind calculator to estimate average annual production using historic average site wind speed (C) for each site (without metered data).
- Multiply this estimate by the weighted average adjustment factor (D) of 0.71 to estimate average annual production.

5.1.4 Attribution adjustment factors

Attribution is the percent of tracked savings that is directly attributable to the program. Participant self-report surveys were used to estimate attribution. The CY10 attribution factors for the program overall are 77, 79, and 33 percent for kWh, kW, and therms, respectively. This represents a substantial increase in attribution.

Attribution was highest for solar electric projects with rates greater than 80 percent for both kWh and kW. Wind and solar hot water systems offsetting electricity had attribution rates in the 50 percent range. Finally, solar hot water projects with therm savings had attribution rates at 33 percent (see Figure 5-3).

Figure 5-3. CY10 Residential Program Attribution by Technology



5.1.5 Net energy impacts

KEMA calculates net energy impacts based on an overall realization rate. The realization rate combines the effect of the gross savings adjustment factors and the attribution factors. The CY10 realization rates for the program overall are 74, 79, and 31 percent for kWh, kW, and therms, respectively, as shown in Table 5-4.

Table 5-4. CY10 Residential Program Adjustment Factors

Adjustment Factor	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Installation rate	113	100%	± 0.0%	± 0.0%	113	100%	± 0.0%	± 0.0%	50	100%	± 0.0%	± 0.0%
Engineering verification factor	110	97%	± 1.7%	± 2.2%	110	100%	± 1.6%	± 2.0%	48	93%	± 4.6%	± 6.0%
Gross savings adjustment factor	110	97%	± 1.7%	± 2.2%	110	100%	± 1.6%	± 2.0%	48	93%	± 4.6%	± 6.0%
Attribution factor	113	77%	± 5.5%	± 7.2%	112	79%	± 5.7%	± 6.9%	50	33%	± 8.2%	± 11.1%
Realization rate	110	74%	± 5.5%	± 7.2%	110	79%	± 5.8%	± 7.0%	48	31%	± 7.8%	± 10.6%

[a] The gross savings adjustment factor and the realization rate are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating these two adjustment factors.

Realization rates vary by technology. Solar electric has the highest realization rate, roughly equal to the attribution, because verified gross savings are close to the energy and demand savings. Wind and solar hot water have mid-range realization rates due to the combined effects of verified gross adjustment and attribution as shown in Figure 5-4.

Figure 5-4. CY10 Residential Program Realization Rates by Technology

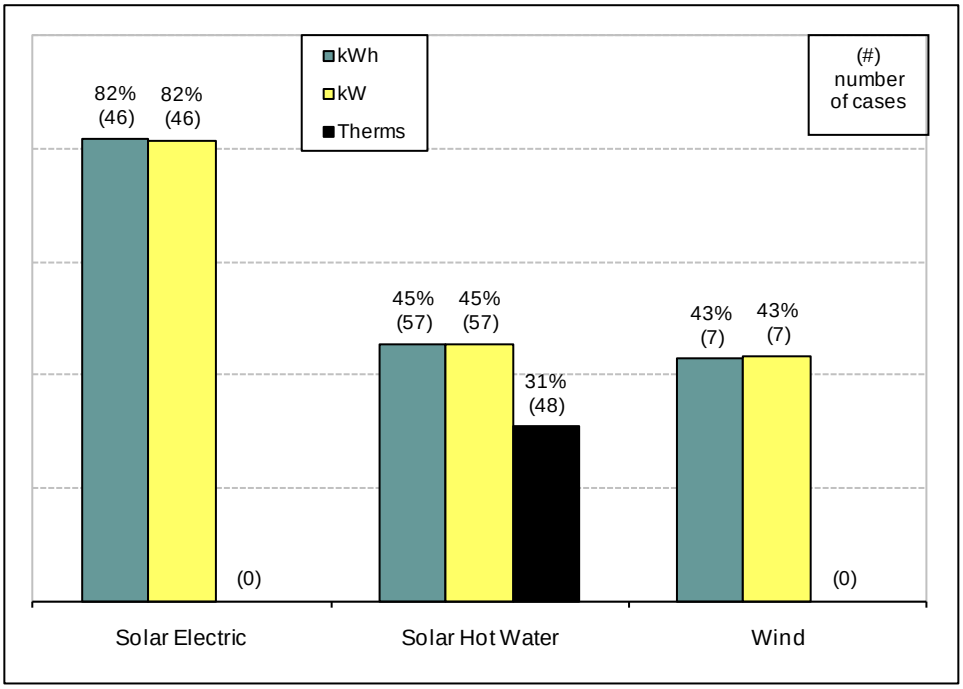


Table 5-5. CY10 Residential Realization Realization Rates by Technology

Technology	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated
Solar electric	46	82%	± 6.1%	± 7.2%	46	82%	± 6.1%	± 7.3%				
Solar hot water	57	45%	± 18.6%	± 23.1%	57	45%	± 18.6%	± 23.1%	48	31%	± 7.8%	± 10.5%
Wind	7	43%	± 15.2%	± 31.5%	7	43%	± 15.4%	± 31.9%				
Overall	**110**	**74%**	**± 5.5%**	**± 7.1%**	**110**	**79%**	**± 5.8%**	**± 7.0%**	**48**	**31%**	**± 7.8%**	**± 10.5%**

[a] Realization rates are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating the realization rate.

[b] Ratios not reported to protect respondent confidentiality.

5.1.6 Untracked savings (solar hot water)

In CY10, 14 sampled solar hot water projects reported that their systems included space heating. The program appropriately did not calculate or include space-heating savings in the tracking database for these projects, since the program is designed to provide incentives only for water heating. KEMA calculated a verified gross savings from space heating for 12 of the 14 sampled projects[28] with space heating and found 3,471 kWh and 1,264 therms of gross untracked savings. When we applied the project attribution values to these savings the net untracked savings value for the sampled projects was 3,004 kWh and 929 therms.

5.1.7 Total impacts

We report the total impacts for renewable projects installed in the CY10 evaluation period by the Residential Program in Table 5-6 below.

Table 5-6. Total Impacts CY10 Residential Program

Technology	Tracked Savings			Verified Gross Savings			Net Savings		
	kWh	Peak kW	Therms	kWh	Peak kW	Therms	kWh	Peak kW	Therms
Solar electric	1,030,692	403	0	1,037,723	407	0	842,499	328	0
Solar hot water	110,662	11	14,983	86,485	9	13,929	50,276	5	4,619
Wind	150,051	17	0	125,547	14	0	64,347	7	0
Overall	**1,291,405**	**431**	**14,983**	**1,249,755**	**430**	**13,929**	**957,122**	**341**	**4,619**
Untracked savings	0	0	0	3,471	0	1,264	3,004	0	929
Overall including untracked	**1,291,405**	**431**	**14,983**	**1,253,226**	**430**	**15,193**	**960,126**	**341**	**5,548**

5.2 SUMMARY AND CONCLUSIONS

In this section, we discuss the overall findings from the evaluation of Residential Program renewable project impacts for CY10. We then address some remaining issues emerging from the evaluation that require further consideration.

[28] The remaining two projects use propane for space heating.

5.2.1 Verified gross installation

KEMA verified installation for 100 percent of the projects sampled. CY10 verified gross estimates for kWh, peak kW, and therms improved over CY09 estimates. While the Program (and the wind industry in general) continue to improve estimation approaches for calculating site-specific wind resources, he evaluation still finds that the Program's estimated energy production from wind systems is high. A planned change in two key input factors for wind energy calculations should make program estimations much closer to metered data.

5.2.2 Attribution

The CY10 attribution factors for the program overall are 77, 79, and 33 percent for kWh, kW, and therms, respectively. This represents an increase in attribution for electric projects relative to CY09. Therm attribution was slightly less than that of CY09. All therm savings for the Residential Program are from solar hot water projects.

5.2.3 Realization rates and net energy impacts

The CY10 realization rates for the program overall are 74, 79, and 31 percent for kWh, kW, and therms, respectively. The realization rates for electric projects are significantly higher than the CY09, due in large part to an increase in program attribution. The realization rate for therms decreased slightly this year compared to the CY09, due to generally low attribution for solar hot water projects offsetting therms.

5.2.4 Recommendations

The Program should consider establishing criteria for Focus funding eligibility that takes into account the percent of project costs directly funded from other sources. Projects that have external funding greater than a predetermined percentage (e.g., 75 percent) should not be eligible for Focus funding.

6.1 ENERGY SAVING RESULTS

6.1.1 Program activities

In this section, we discuss the projects implemented for the period from October 1, 2009, through June 30, 2010, the CY10 evaluation period. In CY10, Focus programs completed 462 renewable energy projects.[29]

Table 6-1. Projects Implemented by Type and Contract Period

Technology	Completed Projects[a]						
	FY02–FY05 Mar 02–Jun 05	FY06 Jul 05–Jun 06	FY07 Jul 06–Jun 07	18MCP Jul 07–Dec 08	CY09 Jan 09–Sep 09	CY10 Oct 09–Jun 10	Program To Date Mar 02 – Jun10
Biogas	5	7	2	6	8	1	29
Biomass	10	16	14	18	6	2	66
Solar electric (PV)[b]	110	57	92	211	160	258	888
Solar hot water	4	5	6	198	112	178	503
Wind	20	6	6	17	17	23	89
Hydroelectric	2	0	0	0	0	0	2
Other	2	2	2	0	0	0	6
All projects	**153**	**93**	**122**	**450**	**303**	**462**	**1,583**

[a] Evaluation periods vary in number and timing of months, making comparisons of totals across periods less meaningful.

[b] Residential solar hot water was included and tracked in the Focus on Energy Residential Program prior to the 18MCP. For years before the CY10 integration of Renewables into the Residential Program, this table includes only projects completed through the Focus Renewable Energy program.

6.1.2 Gross savings

The programs track gross energy savings (generation) for all projects completed that receive a Cash-back Reward or a grant that has associated energy impacts. Table 6-2 includes program-reported gross impacts by technology for the Business Programs in CY10 and for nonresidential Renewables program in the 18MCP and CY09. Program to date savings include all nonresidential and Business Programs renewable installations from March 2002 through June 2010.

[29] This report focuses on projects that received direct financial incentives for the installation of renewable energy systems. In addition to financial incentives, the programs engage in other activities to promote the adoption of renewable energy systems such as site assessments, feasibility studies, and activities to develop renewable energy markets.

Table 6-2. Renewable Energy Projects - Tracked Gross Impacts[30]
Business Programs by Technology

Technology	Energy Impacts	Completed[a]			
		18MCP Jul 07– Dec 08	CY09 Jan 09– Sep 09	CY10 Oct 09– Jun 10	Program To Date Mar 02 – Jun10
Biogas	Peak kW	1,180	1,871	37	8,019
	Annual kWh	10,159,791	17,507,821	247,522	67,448,080
	Annual therms	138,637	1,929	0	249,219
Biomass	Peak kW	-66	-98	-95	-259
	Annual kWh	-329,413	-498,735	-719,035	-1,547,183
	Annual therms	2,213,364	4,873,677	1,831,669	12,081,392
Solar electric[b]	Peak kW	570	498.884	876	2,672
	Annual kWh	1,459,833	1,265,925	2,255,709	5,924,767
	Annual therms	0	0	0	5,059
Solar hot water[c]	Peak kW	15	10.4884	8	34
	Annual kWh	121,080	96,568	95,705	313,353
	Annual therms	57,123	31,565	37,224	162,797
Wind	Peak kW	44	37.57	84	917
	Annual kWh	406,158	339,890	736,417	2,525,013
	Annual therms	0	0	0	0
Hydroelectric	Peak kW	0	0	0	1,300
	Annual kWh	0	0	0	6,473,600
	Annual therms	0	0	0	0

[30] Gross energy impacts are those reported in the program tracking system maintained by WECC and the PSC (WISEERTS).

Technology	Energy Impacts	Completed[a]			
		18MCP Jul 07– Dec 08	CY09 Jan 09– Sep 09	CY10 Oct 09– Jun 10	Program To Date Mar 02 – Jun10
Other	Peak kW	0	0	0	14
	Annual kWh	0	0	0	14,428
	Annual therms	0	0	0	4,891
All programs	**Peak kW**	**1,743**	**2,320**	**910**	**12,696**
	Annual kWh	**11,817,449**	**18,711,469**	**2,616,318**	**81,152,058**
	Annual therms	**2,409,124**	**4,907,171**	**1,868,893**	**12,503,358**

[a] Evaluation periods vary in number and timing of months, making comparisons of totals across periods less meaningful.

[b] In FY03 and FY04, "Solar Photovoltaic" included residential PV installations and projects that combined PV with solar hot water technologies. The therm savings are from the combined projects or PV installations that were off-grid and displacing fossil fuel generators on-site.

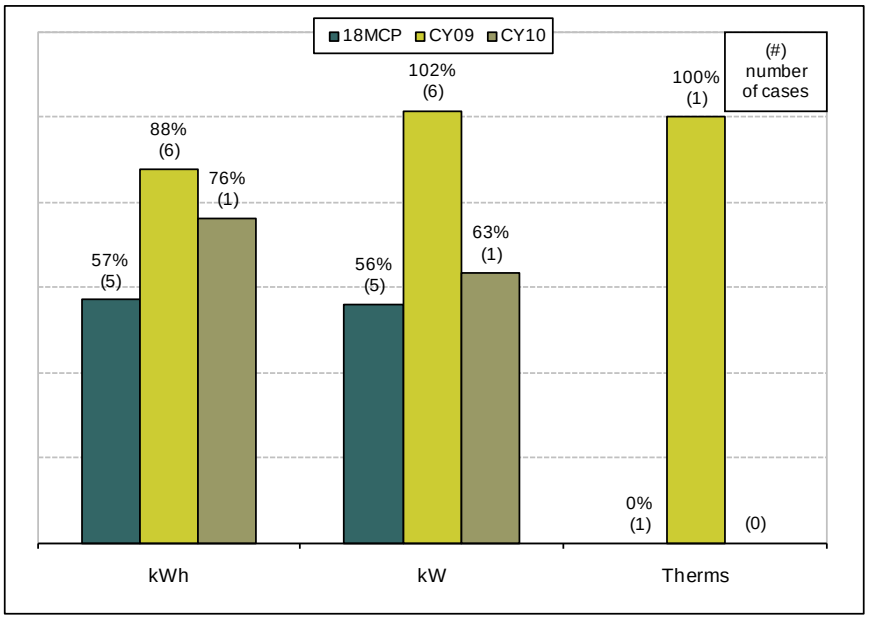
[c] Prior to the 18MCP residential solar hot water was included and tracked by the Focus on Energy Residential Program. This table includes only projects from 18MCP and beyond.

6.1.3 Biogas

i. Gross Savings Adjustment Factors

Gross savings adjustment factors for the biogas project in CY10 are 76 and 63 percent for kWh and kW respectively. These factors are lower than CY09, but higher than in the 18MCP. The single biogas project in CY10 had significant system downtime leading to low gross savings adjustment factors. The program calculations would have been accurate if the system had not experienced this downtime. No projects in CY10 had therm savings.

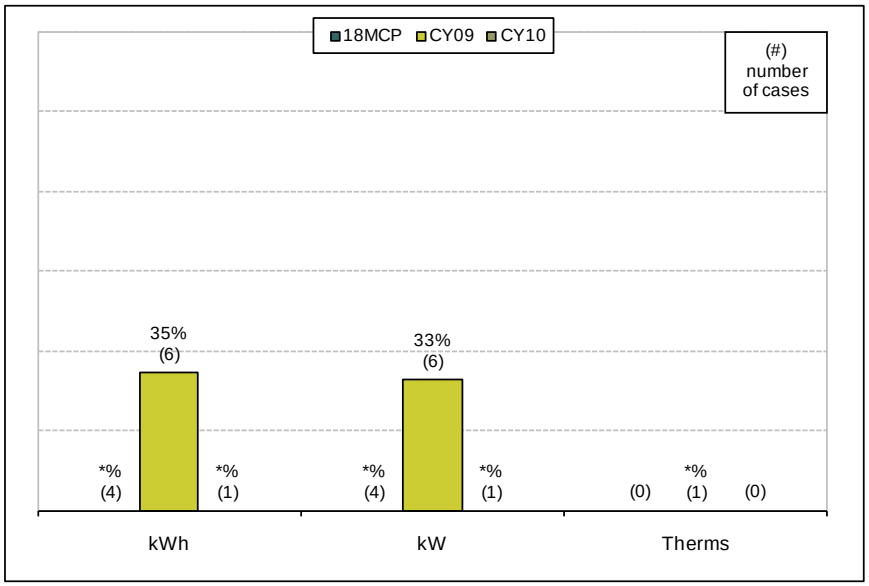
Figure 6-1. Biogas Verified Gross Adjustment Factors by Savings Type



ii. Attribution Adjustment Factors

We do not report the results of the 18MCP and CY10 evaluation biogas projects to protect respondent confidentiality. Attribution for biogas projects are generally low. Respondents have indicated that additional benefits beyond electricity generation, such as bedding production from digesters and waste management, also contribute significantly to the decision to install.

Figure 6-2. Biogas Attribution by Savings Type

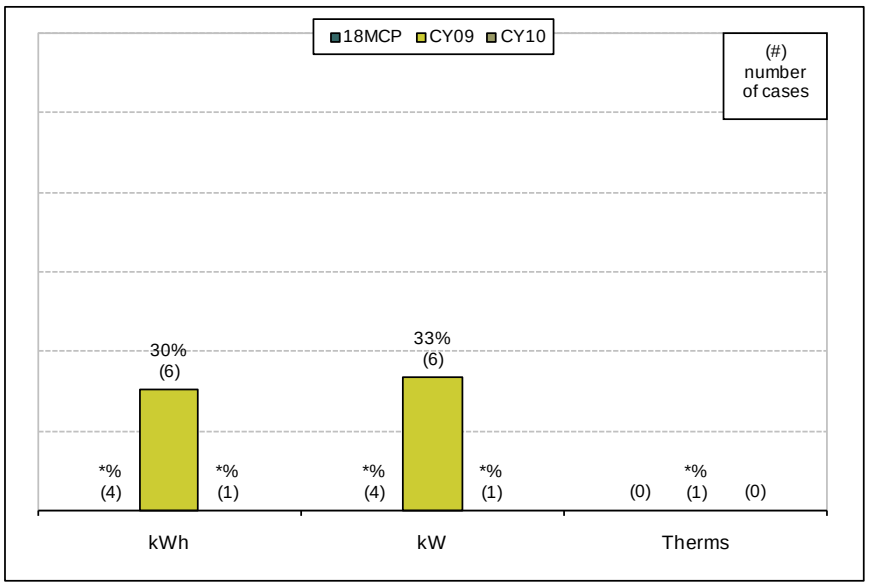


*Ratio not reported to protect respondent confidentiality

iii. Realization Rates

Realization rates for biogas projects are low due to both low attribution and low gross adjustment factors. Results for the 18MCP and CY10 are not shown to protect respondent confidentiality.

Figure 6-3. Biogas Realization Rates by Savings Type



*Ratio not reported to protect respondent confidentiality

iv. Summary

Program calculation of gross energy saving from biogas projects has improved over the last three years with the only cause for low gross adjustment factors in CY10 being unusual system downtime. Attribution is generally low for biogas projects. Digester systems provide a means for farmers to manage their waste and create revenue from bedding and electricity generation. Projects that add additional generator capacity to existing digesters offer a stable source of revenue for farms by converting unused biogas into electricity. Evaluation respondents have considered both types of projects to be cost effective.

6.1.4 Biomass

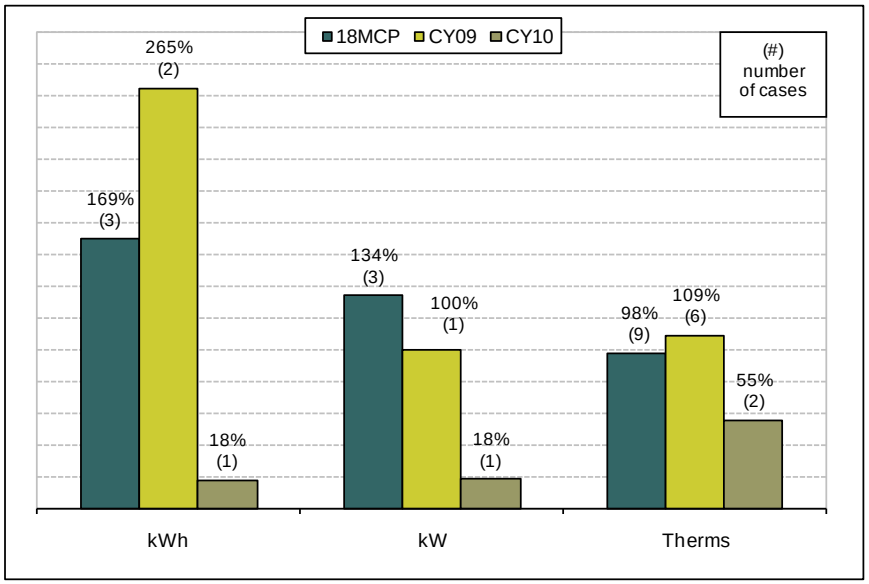
i. Gross Savings Adjustment Factors

The gross savings adjustments for CY10Biomass of 18, 18, and 55 percent for kWh, kW, and therms, respectively are lower than CY09. CY10 respondents indicated reduced usage of their equipment resulting in the low gross adjustment factors for therms. Two separate factors led to this reduction in use: low natural gas prices relative to biomass and a reduction in heating needs at one facility due to the economic downturn.

Electric (kWh and kW) savings are for parasitic load. Whereas in the 18MCP and CY09 the program underestimated parasitic load (adjustment factor greater than 100 percent), in CY10 the program overestimated it. The low adjustment factor for CY10 parasitic load results from two factors: lower usage of the system than expected and the inclusion of electric load from a

fan that was part of base load usage (and did not constitute additional electric usage due to the renewable project).

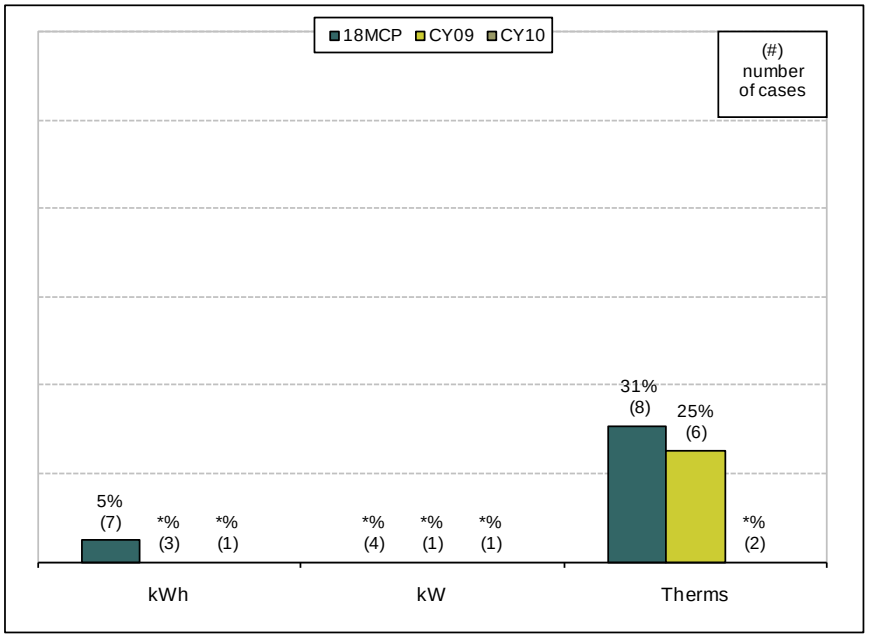
Figure 6-4. Biomass Verified Gross Adjustment Factors by Savings Type



ii. Attribution Adjustment Factors

The attribution of the CY10 evaluation biomass projects are not reported to protect respondent confidentiality. Biomass attribution is generally low because biomass projects are generally cost effective measures for producing space heating and process steam.

Figure 6-5. Biomass Attribution by Savings Type

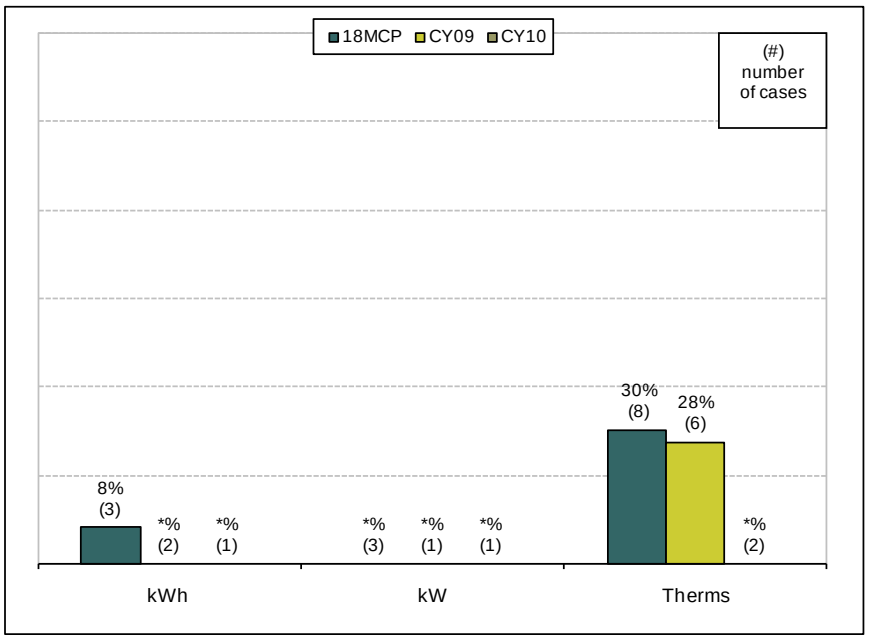


*Ratio not reported to protect respondent confidentiality

iii. Realization Rates

The realization rate for CY10 evaluation biomass projects are not reported to protect respondent confidentiality. Low attribution consistently reduces the reduced realization rates for biomass. The impacts of gross savings adjustment factors vary across evaluation periods.

Figure 6-6. Biomass Realization Rates by Savings Type



*Ratio not reported to protect respondent confidentiality

iv. Summary

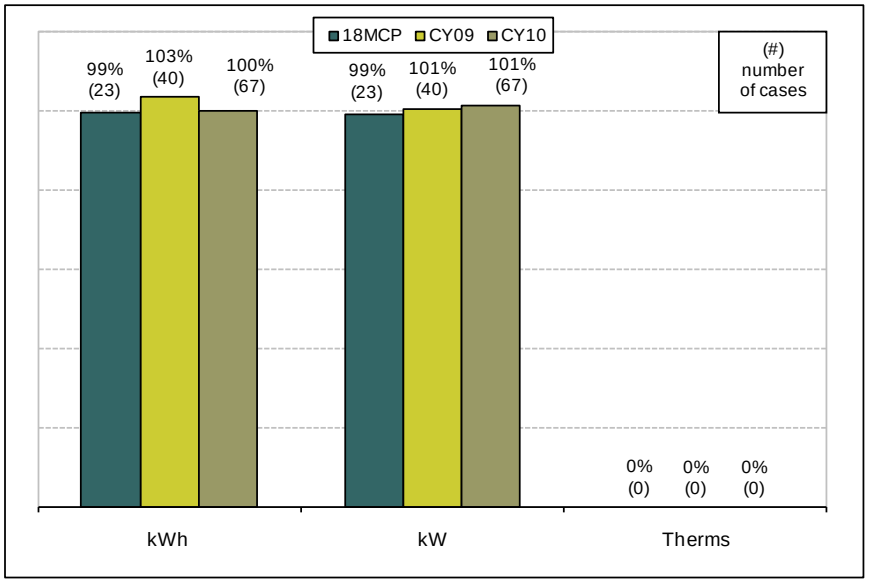
Gross savings adjustments in CY10 are considerably lower than in previous evaluations. The variability in gross savings adjustment factors over the past three evaluation periods indicates that accurately estimating energy production and parasitic loads of biomass systems proves to be challenging for the Program. The projects are usually custom applications that require significant investigation into the use patterns of the participant and the system setup. The program has had errors in parasitic load calculations in each of the past two evaluation periods that have had significant impacts on overall program savings. Attribution is consistently low for biomass projects due to the cost effectiveness of the projects.

6.1.5 Solar electric

i. Gross Savings Adjustment Factors

Verified gross adjustment factors for solar electric projects have been within three percent of 100 for the past three evaluations. The method for estimating solar electric production is well established and the program and evaluation consistently have similar estimations of solar electric production.

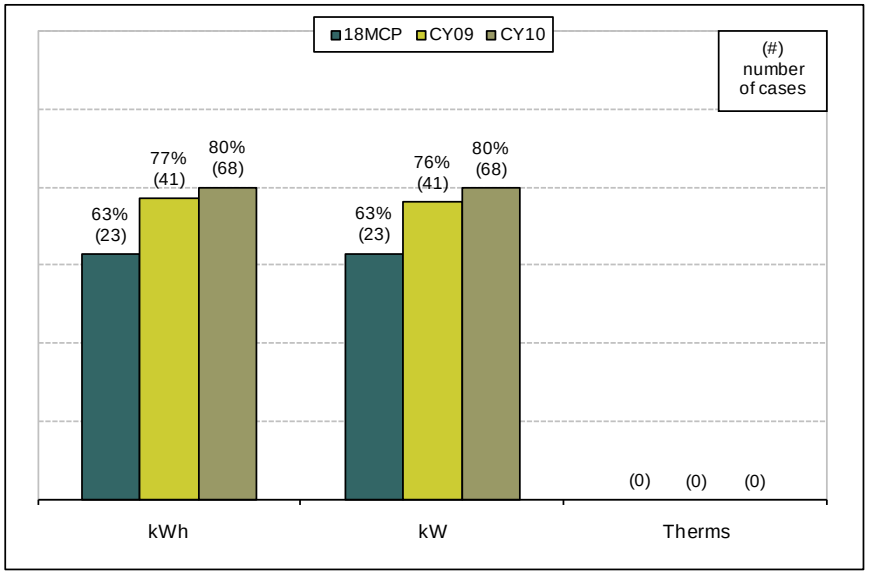
Figure 6-7. Solar Electric Verified Gross Adjustment Factors by Savings Type



ii. Attribution Adjustment Factors

Solar electric projects had attribution of 80 percent in CY10. Attribution for solar electric projects has increased steadily from the 18MCP to the CY10 evaluation. The program is attracting more customers that would not install solar electric projects without the assistance of the program.

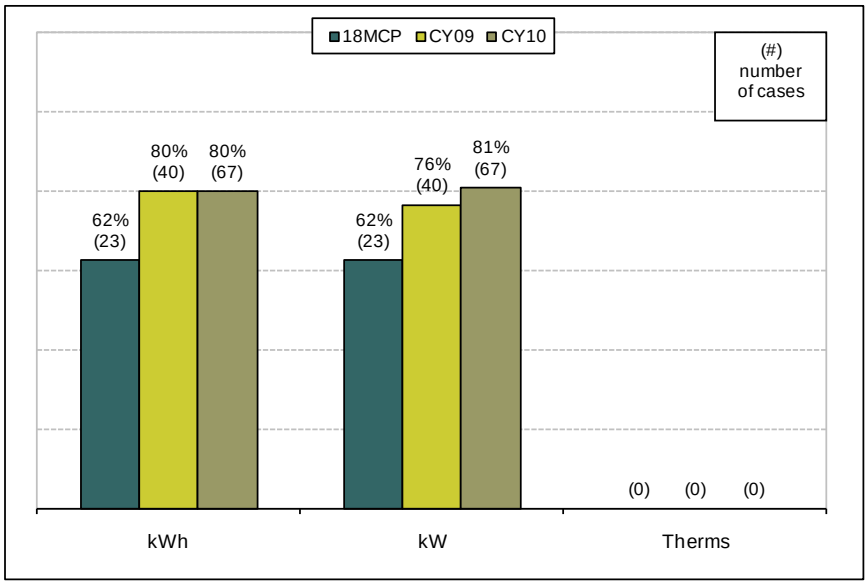
Figure 6-8. Solar Electric Attribution by Savings Type



iii. Realization Rates

The CY10 solar electric realization rates of 80 and 81 percent for kWh and kW are very good. With gross savings adjustments of near 100 percent, attribution ratios drive the solar electric realization rate for each evaluation period. As attribution ratios have increased through evaluation periods so have net energy impacts.

Figure 6-9. Solar Electric Realization Rates by Savings Type



iv. Summary

The program achieved an 80 percent realization rate on solar electric kWh in CY10. Gross savings adjustments remain close to 100 percent because the method for estimating solar electric production is well established and the program and evaluation consistently have similar estimations of solar electric production. Attribution has steadily increased in the last three years and now sits at 80 percent.

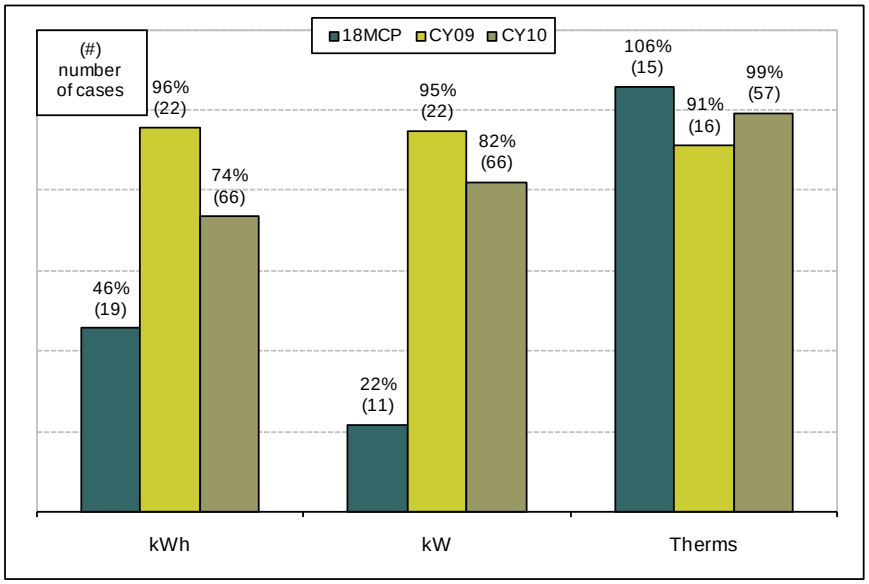
6.1.6 Solar hot water

i. Gross Savings Adjustment Factors

The CY10 gross adjustment factor for solar hot water therms is 99 percent. Therm savings have been between 90 and 110 percent for the past three evaluations. 60 percent of SHW therm savings come from systems installed through business programs.

Gross savings adjustments for electric savings are 74 and 82 percent for kWh and peak kW, respectively. This is an improvement over the 18MCP, but a reduction from CY09 levels. Solar hot water electric savings are mostly from residential systems. The primary reason for why the factors are below 100 percent is a difference in the assumed number of gallons used per person in residences. The adjustment for peak kW is higher than that of kWh due to a lower adjustment factor on BP parasitic kW load.

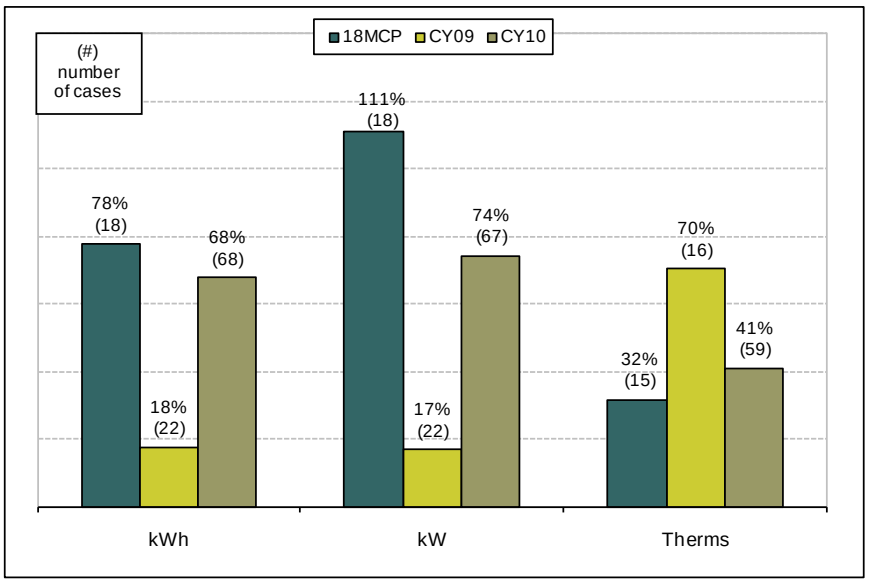
Figure 6-10. Solar Hot Water Verified Gross Adjustment Factors by Savings Type



ii. Attribution Adjustment Factors

Attribution for solar hot water projects in CY10 is 68, 71, and 41 percent for kWh, kW, and therms, respectively. These ratios are similar to those of the 18MCP, low for therms, and higher for electric savings. Residential installations drive electric attributions, while the majority of therms come from commercial applications. In CY09, commercial systems had much higher than usual attribution, while residential electric installations had significantly lower attribution than seen in the other periods.

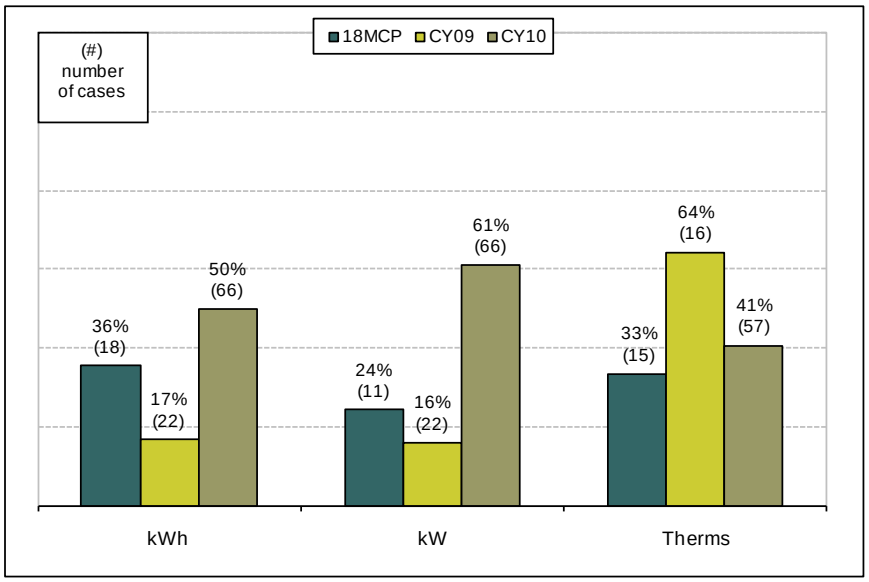
Figure 6-11. Solar Hot Water Attribution by Savings Type



iii. Realization Rates

Realization rates for solar hot water projects in CY10 are 50, 61, and 41 percent for kWh, kW, and therms. Like the attributions, these are an increase over CY09 for electric savings and a decrease from CY09 for therms.

Figure 6-12. Solar Hot Water Realization Rates by Savings Type



iv. Summary

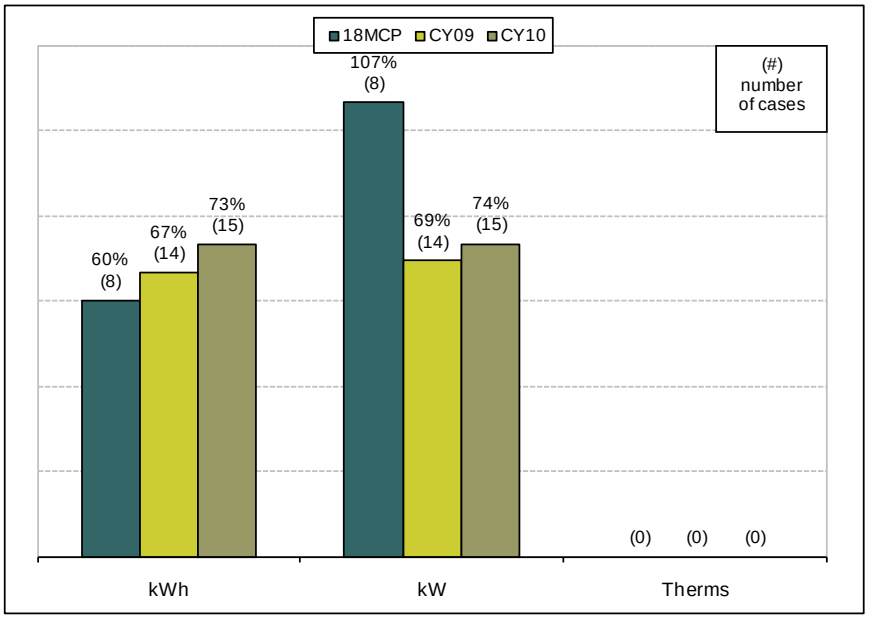
Realization rates for solar hot water projects in CY10 are 50, 61, and 41 percent for kWh, kW, and therms. Solar hot water installations, especially residential, have increased over the past three years. The program's current estimates of savings are consistent with the evaluation approach with the exception of a single assumption used for residential systems. Attribution for solar hot water systems has remained low over the past three years across all savings types (with the exception of CY09 therms).

6.1.7 Wind energy system

i. Gross Savings Adjustment Factors

The gross adjustment factors for CY10 wind projects are 73 and 74 percent for kWh and kW respectively. Wind system gross adjustment factors have been steadily increasing throughout the past three evaluation periods. The calculation tool for wind systems has consistently overestimated production compared to metered data collected during the evaluation. The program is implementing changes to improve wind system estimation in the future. The high gross adjustment factor for kW in the 18MCP is due to a change in calculation methods for peak kW that was implemented during the program implementation period.

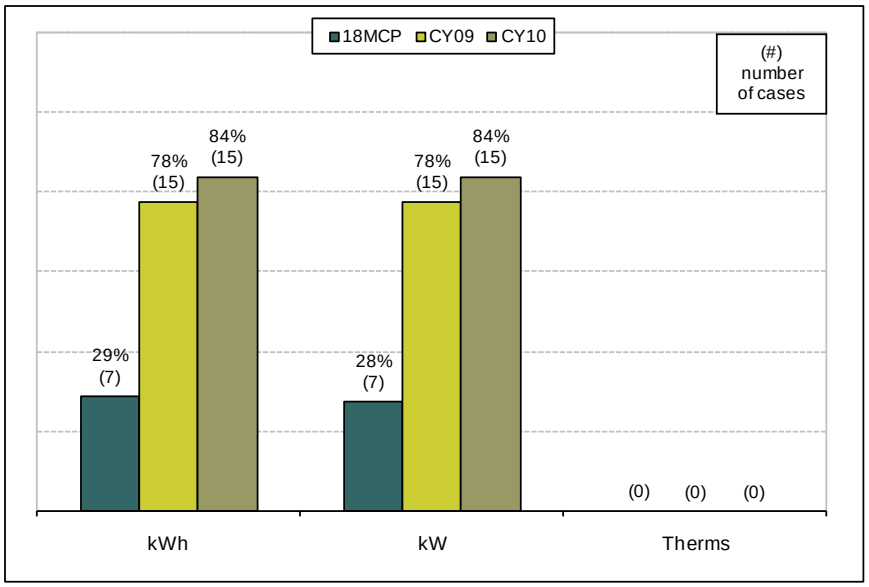
Figure 6-13. Wind System Verified Gross Adjustment Factors by Savings Type



ii. Attribution Adjustment Factors

CY10 wind projects had attribution of 84 percent. Attribution for wind systems has been high during the past two evaluation periods. Many of the participants in the program report having prior interest in installing wind systems and Focus on Energy funds give them the opportunity to overcome the high cost of installing a wind turbine.

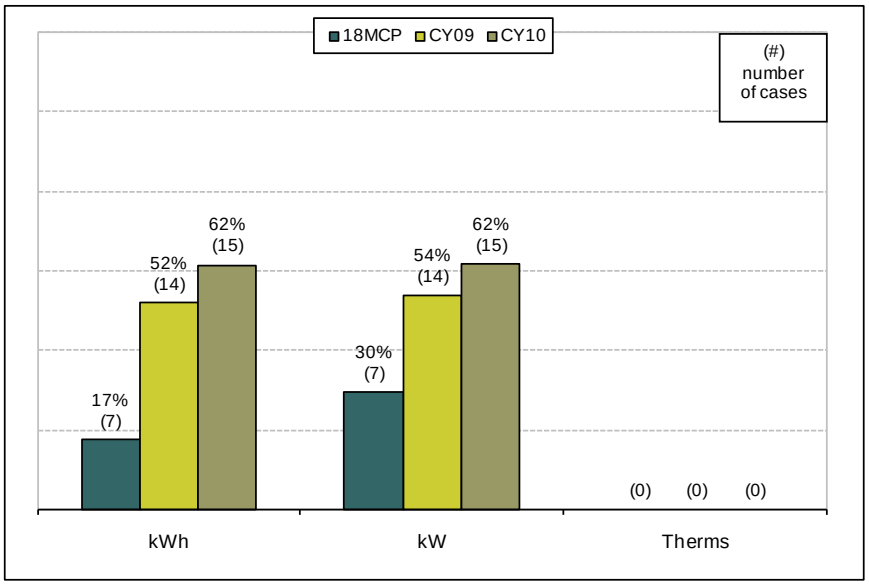
Figure 6-14. Wind System Attribution by Savings Type



iii. Realization Rates

Realization rates (62 percent in CY10) are driven by a mixture of attribution and gross savings adjustment factors. As both ratios have improved over the past three evaluation periods, the realization rates have also increased.

Figure 6-15. Wind System Realization Rates by Savings Type



iv. Summary

CY10 realization rates for wind are 62 percent for both kWh and kW. The low rate is due primarily to the gross savings adjustment. The calculation tool the program uses to estimate wind system generation consistently overestimates energy production compared to metered data from participants. The calculation tool has improved in each evaluation period but still significantly overestimates production. With improvements to energy estimation, gross savings adjustments still have room to improve. Attribution for wind systems has increased as the program reaches more participants who require Focus on Energy funding to overcome the cost of installing their wind turbines.

6.2 OVERALL RESULTS

Realization rates for CY10 are improved over CY09. This is due to a decrease in biogas (electric) and biomass (therms) projects that typically have low attribution and high energy savings that dominate the overall program realization rates. The overall realization rates are higher than any individual technology's rate due to a low realization rate on biomass parasitic load (less negative savings).

Table 6-3. Realization Rates by Technology
CY10

Technology	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated	n[a]	CY10	CY10	Extra-polated
Biogas	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A				
Biomass	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A	2	*%	± 0.0%	± 0.0%
Solar electric	67	80%	± 7.7%	± 9.7%	67	81%	± 7.9%	± 10.1%				
Solar hot water	66	50%	± 24.9%	± 32.1%	66	61%	± 29.5%	± 38.1%	57	41%	± 14.1%	± 24.2%
Wind	15	62%	± 3.2%	± 8.4%	15	62%	± 3.2%	± 8.4%				
Overall	**150**	**88%**	**± 6.7%**	**± 8.8%**	**150**	**84%**	**± 7.6%**	**± 9.7%**	**59**	**21%**	**± 0.3%**	**± 0.5%**

[a] Realization rates are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating the realization rate.

* Ratios not reported to protect respondent confidentiality.

6.2.1 Total impacts

We report the total impacts for CY10 of all Renewable measures installed by Focus on Energy in Table 6-4 below.

Table 6-4. Total Impacts CY10
All Renewable Measures

Technology	Tracked Savings			Verified Gross Savings			Net Savings		
	kWh	Peak kW	Therms	kWh	Peak kW	Therms	kWh	Peak kW	Therms
Biogas	247,522	37	0	188,764	23	0	*	*	0
Biomass	-719,035	-95	1,831,669	-129,052	-17	1,014,214	*	*	*
Solar electric	2,255,709	876	0	2,255,336	887	0	1,801,280	707	0
Solar hot water	95,705	8	37,224	71,500	7	36,905	46,551	5	15,151
Wind	736,417	84	0	541,682	62	0	450,332	51	0
Overall	**2,616,318**	**910**	**1,868,893**	**2,928,230**	**962**	**1,051,119**	**2,296,959**	**763**	**395,765**
Untracked Savings	0	0	0	3,471	0	1,557	3,004	0	929
Overall including untracked	**2,616,318**	**910**	**1,868,893**	**2,931,701**	**962**	**1,052,676**	**2,299,963**	**763**	**396,694**

* Net Impacts not reported to protect respondent confidentiality.

A Informed Respondent

Hello, my name is _____ and I'm calling from KEMA Consulting on behalf of the Focus on Energy Program. Focus on Energy gave you a cash back reward, grant or other assistance to install the <TYPE OF PROJECT> on your <home/business>. I need to ask you some questions about your participation in the Renewable Energy Program. This is not a sales or marketing call. Focus on Energy is required by the state of Wisconsin to conduct these types of interviews to better understand and improve the program. Your responses will be kept entirely confidential.

Are you the best person to talk to about your <household's/business's> decision to install <TYPE OF PROJECT> and your experiences with the program?

[IF NOT, GET CONTACT INFORMATION FOR CORRECT PERSON AND CALL THEM.]

I'd like to start by confirming some information. Our records show that you installed…	[Is this information correct?]	[Correct information if our records were incorrect]
A1. **<EQUIPMENT TYPE>**	[Yes]..... 1 [No] ..... 2 [Don't Know]..... 9997 [Refused]..... 9998	A1a.
A2. **<INSTALLATION MONTH AND YEAR>**	[Yes]..... 1 [No] ..... 2 [Don't Know]..... 9997 [Refused]..... 9998	A2a.
A3. **At <ADDRESS>**	[Yes]..... 1 [No] ..... 2 [Don't Know]..... 9997 [Refused]..... 9998	A3a.
A4. **It was installed by <CONTRACTOR>**	[Yes]..... 1 [No] ..... 2 [Don't Know]..... 9997 [Refused]..... 9998	A4a.

A5. **It was rated to generate _____** [depending on type of project: kW, kWh, therms]	[Yes]..... 1 [No] ..... 2 [Don't Know]..... 9997 [Refused]..... 9998	A5a.

1.

A6. **Our records show your <TYPE OF PROJECT> project's total cost was $_____. Is that correct?**

[YES] .....1 [SKIP TO A8]

[NO] 2

[Don't know].....9997 [SKIP TO A8]

[Refused] .....9998 [SKIP TO A8]

A7. **What was your project's total cost?**

[RECORD AMOUNT] $_____
[Don't know]..... -9999997
[Refused] ..... -9999998

[IF PROJECT TYPE = SOLAR HOT WATER, READ A8.]

A8. **Do you use your solar thermal system for space heating?**
[Yes]..... 1
[No] 2
[Don't Know].....9997
[Refused].....9998

A9. **Is this <TYPE OF PROJECT> still operating?**
[YES]..... 1 [SKIP TO B0]
[NO]..... 2

A9a. **Why not?**

[IF RESIDENTIAL, SKIP TO SECTION C]

B Company Processes, Respondent's Role?

[Ask Series Only For NON-residential]

B0. **Next, I have some questions about your company's decision making process and policies regarding this project.**

B1. **What was your role and involvement in the purchase of <TYPE OF PROJECT>?** [PROBES: when got involved, did you do the research, the legwork? Did you oversee the installation?]

B1a. **How did the approval or decision-making process go at your location?** [PROBES: Who was involved, process, board approval required, understand roles regarding selecting equipment and roles regarding approval of expenditures]

B2. **What purchasing policies, if any, does your organization have for this type of equipment?** [PROBES: rate of return or payback requirements, warrantee requirements, spending limits, schedules]

[IF NONE, SKIP TO C1]

B2a. **What role, if any, did these policies have in the decisions regarding the <TYPE OF PROJECT>?**

C Decision to install

Okay, now I'd like hear more about how the purchase process went, starting from when you first thought about installing <TYPE OF PROJECT>.

C1. **About when did <you/your organization> first start thinking about <TYPE OF PROJECT>?**

(MONTH, YEAR) [RECORD AS MM:YY]: _____

C2. **From where or whom did you hear about <TYPE OF PROJECT>? Anywhere else?**

[DO NOT READ OPTIONS. CIRCLE ALL THAT APPLY]

[Independent reading/research] 1
[Installer/contractor] 2
[MREA – Midwest Renewable Energy Association] 3
[Always knew about renewables] 4
[A friend or relative] 5
[Industry sources] 6
[Previous renewable system at same or other facility] 7
[Focus on Energy] 8
[From utility] 9
[Site assessor / Site assessment] 10

[Other] (describe) 9996

[Don't know / Don't Remember] 9997
[Refused] 9998

C3. **As you were making decisions about the <TYPE OF PROJECT>, who or what were your main sources of advice and information?** [PROBE: **What did they tell you?**] [RECORD VERBATIM]

C4. **What role, if any, did your contractor(s) (supplier or installer) play in your decision to install <TYPE OF PROJECT>?** [RECORD VERBATIM]

Workshops and Conferences

C5**. Did you or anyone else in your <household/company> attend a conference about <TYPE OF PROJECT>?**

[Yes] 1

[No]..... 2 [SKIP TO C7]

[Don't know] 9997 [SKIP TO C7]

[Refused] 9998 [SKIP TO C7]

C6. **I'm going to read some statements about the extent, if any, that the conference affected your decision to install the <TYPE OF PROJECT>.**

The conference(s) was/were . . . [READ OPTIONS]

a *very important* factor in your decision to do the project 1
***somewhat important* factor in your decision**.....2
made no difference in your decision.....3
or made you less inclined to do the project 4

[Other, describe _____] 9996
[Don't know] 9997
[Refused].....9998

C6a. **Why do you say that?**

C7**. Did you or anyone else in your <household/company> attend a workshop about <TYPE OF PROJECT>?**

[Yes] 1

[No]..... 2 [SKIP TO C9]

[Don't know] 9997 [SKIP TO C9]

[Refused] 9998 [SKIP TO C9]

C8. **I'm going to read some statements about the extent, if any, that the workshop affected your decision to install the <TYPE OF PROJECT>.**

The workshop(s) was/were . . . [READ OPTIONS]

a *very important* factor in your decision to do the project 1
***somewhat important* factor in your decision**.....2
made no difference in your decision.....3
or made you less inclined to do the project 4

[Other, describe _____] 9996
[Don't know] 9997
[Refused].....9998

C8a. **Why do you say that?**

Site Assessment or (Feasibility Study for biomass or biogas)

C9. **Did you have a <site assessment / feasibility study> done for the <TYPE OF PROJECT> at your <home / business>?**

[Yes] 1

[No] 2 [SKIP TO C15]

[Don't know] 9997 [SKIP TO C15]

[Refused] 9998 [SKIP TO C15]

C10. **Was the <site assessment / feasibility study> done by…?** [READ OPTIONS]

You, or someone else in your household/business.....1

The installer or contractor 2

A Focus On Energy approved site assessor 3

Or someone else (describe: _____) 4
[Don't know].....9997 [SKIP TO C15]
[Refused].....9998 [SKIP TO C15]

C11. **Did Focus on Energy share the cost of the <site assessment / feasibility study> with you?**

[Yes] 1

[No] 2

[Don't know] 9997

[Refused] 9998

C12. **Overall, how satisfied or dissatisfied would you say you were with the <site assessment / feasibility study>? Would you say you were:** [READ OPTIONS]

Very DISsatisfied 1

Somewhat DISsatisfied 2

Somewhat Satisfied..... 3 [SKIP TO C13]

or Very Satisfied ..... 4 [SKIP TO C13]
[Don't know].....9997 [SKIP TO C13]
[Refused].....9998 [SKIP TO C13]

C12a. **Why do you say that?**

C13. **What benefits, if any, did you get from the <site assessment / feasibility study>?** [PROBE: **Anything else?**] [RECORD VERBATIM]

C14**. I'm going to read some statements about the extent, if any, that the <site assessment / feasibility study> affected your decision to install the <TYPE OF PROJECT>. Please tell me which of the following statements best applies.**

The <site assessment / feasibility study>. . [READ OPTIONS]
was a *very important* factor in your decision to do the project 1
was a *somewhat important* factor your decision.....2
made no difference your decision.....3
or made you *less* inclined to do the project.....4

[Other, describe _____]9996
[Don't know] 9997
[Refused].....9998

C14a. **Why do you say that?**

Learning About Focus

C15. **What plans, if any, did you have to install <TYPE OF PROJECT> before learning about the Focus on Energy Program?** [Describe existing plans: -system type, system size, timing, cost; RECORD VERBATIM]

C16. **Before this <TYPE OF PROJECT> project, had you ever participated in the Focus on Energy Program?**

[Yes] 1

[No] 2 [SKIP TO C17]
[Don't know] ..... ….9997
[Refused]..... 9998

C16a. **What kind of Focus assistance or services did you receive at that time**?
[Rebate or grant]..... 1
[Advice]..... 2
[Other] (describe)..... 9996

[Don't Know] 9997
[Refused] 9998

C16b. **For what type of equipment?** (PROBE: type of renewable or EE measure)

[Energy Advisor(s) **-** Put in energy advisor name(s) from IS or other paperwork]

C17.From where or whom did you hear about Focus on Energy? Anywhere else?

[DO NOT READ OPTIONS. CIRCLE ALL THAT APPLY]

[Installer/contractor] 1
[MREA – Midwest Renewable Energy Association] 2
[Utility] 3
[Friend or relative or colleague] 4
[the Internet] 5
[Site assessor / Site assessment] 6

[Other] (describe) 9996

[Don't know] 9997
[Refused] 9998

Paste in from Impact Statement response to following question and use for probing. 1. Briefly explain how you or other Focus staff got involved with the customer and the project (outline how Focus on Energy services helped make this project happen).

C18. **What did you hear about Focus at that time?** [PROBE: **Anything else?**]

[RECORD VERBATIM]

Sources of Advice

C19. **At what point in the process did you first contact Focus on Energy? Was it. . .** [READ OPTIONS]

before you started considering or planning for <project>.....1

while you were considering or planning for <project> 2

after you decided to install <project>but before installation.....3

after <project> was installed 4

[Did not contact Focus].....5

[Don't know].....9997

[Refused].....9998

C20. **Next, concerning your installation of the <TYPE OF PROJECT>, approximately how many times did you have contact with Focus on Energy staff, either by phone, email, or in person?** [If respondent is unsure, probe using name of Focus staff member assigned to project]

_____ Number of times in contact with Focus staff

[If 0 times →skip to C21]

C20a. **What did you discuss with Focus on Energy staff?** [PROBE: application process, technical issues, insurance, contractors, other?]

[RECORD VERBATIM]

C20b. **How much did these conversations affect your decision to go ahead with the project? Would you say that the contacts with Focus on Energy staff**...

[READ OPTIONS]

Were a *very important* factor in your decision to do the project 1
Were a *somewhat important* factor.....2
Made no difference 3

Or made you *less* inclined to do the project 4

[Other, describe].....9996

[Don't know] 9997
[Refused].....9998

Cash Incentive

C21. **Our records show that you received an incentive of $_____ from Focus on Energy for your <TYPE OF PROJECT> project. Is that correct?**

[YES] ..... 1 [SKIP TO C23]

[NO] 2

[Don't know] ..... 9997 [SKIP TO C23]

[Refused] ..... 9998 [SKIP TO C23]

C22. **How much incentive did you receive from Focus?**

[RECORD AMOUNT] $_____
[Don't know] ..... -9999997
[Refused] ..... -9999998

C23. **Did you hear about Focus on Energy cash incentives** . . . [READ OPTIONS]

before you started considering or planning for <PROJECT> 1

while you were considering or planning for <PROJECT> 2

after you decided to install <PROJECT> but before installation 3

or after <PROJECT> was installed 4

[Don't know] 9997

[Refused] 9998

C24. **Did you receive rebates, grants, reduced financing, or tax credits from any other sources for this <TYPE OF PROJECT>?**

[Yes] 1

[No] ..... 2 [SKIP TO C25]

[Don't know] .....9997 [SKIP TO C25]

[Refused] .....9998 [SKIP TO C25]

C24a. **From what sources?** [DO NOT READ. CIRCLE ALL THAT APPLY]

[Federal tax credits] 1

[U.S. Department of Agriculture grant] 2

[Utility buyback rates / Feed-in tariff] 3

[Supplier or Manufacturer] (name) 4

[Utility grants or financing] 5

[Other] (describe) 9996

[Don't know] 9997

[Refused] 9998

C24b. **About how much**?

_____ Record $ Amount

[Don't know] 9997

[Refused] 9998

C25. **Are you aware of any *other* programs that provide financial assistance for this kind of project?**

[Yes] 1

[No]..... 2 [SKIP TO C27]

[Don't know].....9997 [SKIP TO C27]

[Refused] .....9998 [SKIP TO C27]

C26. **What programs are you aware of?** [DO NOT READ. CIRCLE ALL THAT APPLY]

[Federal tax credits] 1

[U.S. Department of Agriculture grant] 2

[Utility buyback rates / Feed-in tariff] 3

[Supplier or Manufacturer] (name) 4

[Utility grants or financing].....5

[Other] (describe)..... 9996

[Don't know].....9997

[Refused] 9998

[IF C24A *OR* C26 INCLUDES 3 (UTILITY BUYBACK RATES) OR 5 (UTILITY GRANTS OR FINANCING), ASK C27]

C27.**Where did you hear about the utility programs?** (Probe: **Anywhere else?**)

[DO NOT READ OPTIONS. CIRCLE ALL THAT APPLY]

[Independent reading/research] 1
[Installer/contractor] 2
[MREA – Midwest Renewable Energy Association] 3
[A friend or relative] 4
[Industry sources] 5
[Focus on Energy] 6
[From utility] 7
[Site assessor or site assessment] 8

[Other] (describe) 9996

[Don't know / Don't Remember] 9997
[Refused] 9998

Barriers

Paste in this section from the Impact Statement:

2. **Briefly explain your understanding of the largest customer barriers preventing the project's implementation.**

- ☐ **Payback**
- ☐ **Confidence in realizing estimated savings**
- ☐ **Unknown technology or process**
- ☐ **Lack of time/unwilling to make time to understand what energy options make sense for the facility**
- ☐ **Finding a vendor to implement equipment**
- ☐ **Lack of credibility/legitimacy. Customer needs a third party reference**
- ☐ **Permit barriers**
- ☐ **Internal bureaucracy/inability to gain decision maker's attention**
- ☐ **Lack of access to financing**
- ☐ **Competition for funding with other internal projects**
- ☐ **Lack of internal advocate**
- ☐ **Other (Please describe)**

Other _____

C28. **What types of challenges or obstacles, if any, did you encounter in the process of installing the <TYPE OF PROJECT>?** [PROBE FOR ISSUES such as insurance, installers, permits, dealing with utility connection, money, technical problems.]

[RECORD VERBATIM]

[None]..... 1 [SKIP TO C31]

C29. **How were these resolved?** [RECORD VERBATIM]

Paste in this section of the Impact Statement and use for probing. Briefly describe if and how Focus Staff involvement helped overcome the customer's barriers.

C30. **What role, if any, did Focus on Energy staff play in resolving this (these) issues?** [RECORD VERBATIM]

Final Decision

C31. **To summarize, what were the main reasons that <you/your organization> decided to go ahead with the <TYPE OF PROJECT>?** [RECORD VERBATIM]

C32. **For what reasons did you participate in the Focus on Energy Renewable program?** [RECORD VERBATIM]

C33. **What benefits, if any, did <your household/business> get from the renewable energy system that you did *not* expect when you installed it? Any others?** [RECORD VERBATIM]

D Attribution

Now that we have discussed the services and incentives you received from the Focus on Energy Renewable Program, I'd like you to think about the effect these services and financial incentives had on your decision to install <equipment type>.

[INTERVIEWER: ADDRESS INCONSISTENCIES WITH PREVIOUS RESPONSES AS THEY ARISE.]

DAT0. **Without the Focus on Energy Program, would you say the likelihood of installing the <TYPE OF PROJECT> was…** [READ LIST]

Very likely 1

Somewhat likely 2

Not very likely 3

Or very unlikely 4

[Don't know] 9997

[Refused] 9998

TIMING

DAT1a. **I'd like to know about the effect, if any, that Focus on Energy incentives and other Focus services had on your decision to install <TYPE OF PROJECT> *when you did*.**

Without Focus on Energy would you have installed <TYPE OF PROJECT> at the same time, earlier, later or never?

About the same..... 1

Earlier 2

Later 3

Or never..... 4

[Don't know].....9997

[Refused] 9998

DAT1a_O. **Why do you say that?** [RECORD VERBATIM]

[IF DAT1a ≠ 3 LATER, SKIP TO DAT3]

DAT1b. **Approximately how many months later?** [TRY TO GET A NUMBER]

[RECORD NUMBER OF MONTHS] ..... _____

[Don't know].....9997

[Refused] 9998

SIZE

Next, I'd like to know about the effect, if any, that Focus on Energy incentives and other Focus services had on the capacity of the renewable energy system you installed.

DAT3. **Without Focus on Energy, how different would the size of the <TYPE OF PROJECT> have been? Would you have installed a <TYPE OF PROJECT> with the same, lesser, or greater capacity, or not have installed anything?** [READ LIST]

Same size 1

Lesser capacity 2

Greater capacity 3

Not installed anything 4

Not Applicable 5

[Don't know] 9997

[Refused] 9998

DAT3_O. **Why do you say that?**

[IF DAT3 ≠ 2 LESS, SKIP TO DAT4]

DAT3a1. **According to Focus records, the size of your <TYPE OF PROJECT> system was _____.**

Without Focus on Energy, approximately what size system would you have installed?

DAT3a2. Size_____

DAT3a3. Units_____

DAT 3a4. [To be filled out by interviewer: calculate percent difference from installed project and complete percent response where result is: Percentage = DAT3a1 / DAT3a2 (after converting both units to kW)]

[INTERVIEWER RECORD PERCENTAGE] ..... _____

[Don't know] 9997

[Refused] 9998

DAT4. **We've just discussed the different effects that Focus on Energy had on your decisions regarding the <TYPE OF PROJECT> that you installed. I'd like you to summarize the program's influence on the timing and size of <TYPE OF PROJECT> that you installed. [**PROBE ON TIMING AND CAPACITY]

[IF RESPONSE IS INCONSISTENT WITH PREVIOUS ANSWERS, ATTEMPT TO RESOLVE. NOTE ANY FINAL INCONSISTENCIES.]

DAT7. [To be filled out by interviewer: Vendor surveys are required if the respondent indicates that the program did not have an effect on decision to install, timing, or size AND the respondent indicates that the vendor had substantial influence.

Is a vendor survey required?]

[Yes] 1

[No] 2

DAT8. [To be filled out by interviewer: Note any final inconsistencies]

DAT9. [To be filled out by interviewer: Summarize the project and impact that the program had on the purchase. If you have noted unresolved inconsistencies in DAT8, summarize what you know at this point. Be sure to cover timing, quantity, and why.]

E OVERALL SATISFACTION

E1. **Overall, how satisfied or dissatisfied are you with the performance of the <TYPE OF PROJECT>? Would you say you are:** [READ OPTIONS]

Very DISsatisfied 1

Somewhat DISsatisfied 2

Somewhat Satisfied.....3 [SKIP TO E1b]

or Very Satisfied .....4 [SKIP TO E1b]
[Don't know].....9997 [SKIP TO E2]
[Refused].....9998 [SKIP TO E2]

E1a. **Why do you say that?** [DISSATISFIED. RECORD VERBATIM, THEN SKIP TO E2]

E1b. **Why do you say that?** [SATISFIED. RECORD VERBATIM]

E2. **Next I'd like to know how satisfied or dissatisfied you are with the Focus on Energy program. Using a scale of 1 to 5, where 1 means "not at all satisfied" and 5 means "very satisfied," overall, how satisfied are you with the Focus on Energy Program?**

[1 (not at all satisfied)]....1
[2]....2
[3]....3
[4]....4
[5 (very satisfied)]....5
[Don't know]....9997
[Refused]....9998

E2a. **Why do you say that?** [RECORD VERBATIM]

E3. **Do you have any additional comments about these projects or the Focus on Energy program that they should take into account in the future?** [RECORD VERBATIM]

F Engineering Questions

2. These are questions specific to the technology and site developed by the reviewing engineer. These questions are developed to collect any additional information needed to verify generation/savings calculation. For PV, wind and biogas they also include questions to obtain the inverter or meter readings.

[IF NON-RESIDENTIAL SKIP TO X1]

G Demographics –for Residential Participants only

Finally, I need to ask you a few questions about your household. These questions are for classification purposes only. All of your answers are confidential.

G1. **What type of residence is the [project type] installed on. Is it a...**

[READ LIST, CIRCLE ONE OPTION]

Single family home (house on separate lot, includes modular homes) ... 1 [SKIP TO G2]

Row or townhouse (adjacent walls to another house) ..... 2 [SKIP TO G2]

A unit in a multi-family structure, 2-4 attached units (example: duplex, triplex, fourplex, or single family house converted to flats) 3

A unit in a multi-family structure, 5 or more attached units (example: apartment building, high-rise condominium, garden apartments).....4

Mobile home, house trailer ..... 5 [SKIP TO G2]

Other, please describe: _____9996

[Don't know/not sure].....9997

[Refused].....9998

G2. **In approximately what year was this residence built?** (Fill in blank)

[PUT IN FULL YEAR – Ex: 1957] Year Built.....____

[Don't know/not sure].....9997

[Refused].....9998

G3. **How many people live in this residence full-time, including yourself and any infants?**

[RECORD NUMBER] ..... _____

[Refused] 9998

G4. **What is the total enclosed square footage of your unit /house? Your best estimate is fine**.

[RECORD # SQ FT] ..... _____

[Don't know] 9997

[Refused] 9998

G5. **What was your total household income in 2008, before taxes? Was it** ...

[READ OPTIONS]

Less than $35,000 1

$35,000 to less than 50,000 2

$50,000 to less than 75,000 3

$75,000 to less than 100,000 4

$100,000 to less than 150,000 5

$150,000 to less than 200,000 6

or more than $200,000 7

[Don't know] 9997

[Refused] 9998

Those are all the questions I have for today. Thank you for taking the time to talk with me.

X Firmographics –for Non-residential only

Finally, I need to ask you a few questions about your business. These questions are for classification purposes only. All of your answers are confidential.

X1. **What is the primary economic activity at** <address>? [RECORD VERBATIM]

[Don't know/not sure] 9997

[Refused] 9998

X2. **Is your business for-profit or not-for-profit?**

[For profit] 1

[Not for profit] 2

[Don't know/not sure] 9997

[Refused] 9998

X3. **Approximately how many full-time employees do you have at this location?**

_____ Record number of FTEs

Those are all the questions I have for today. Thank you for taking the time to talk with me.

In Appendix B we include responses to questions used to determine attribution (B.1) and responses to questions used to confirm the attribution score (B.2). Where we provide percents, they represent case weighted percent of technology respondents.

We show some results in this appendix by overall attribution quartile, which we define in Table B-1.

Table B-1. Attribution Quartile

Overall Attribution Quartile	Project Total Attribution Score
1	Less than 25 percent
2	25 percent to less than 50 percent
3	50 percent to less than 75 percent
4	Seventy five percent to 100 percent

We modified verbatim responses to protect the confidentiality of respondents where necessary.

B.1 ATTRIBUTION RESPONSES

After each of the DAT (direct attribution questions), we asked an open-ended question to allow the respondents to describe the rationale for their response. When the open-ended response was inconsistent with the answer given, the interviewer clarified the discrepancy with the respondent to ensure that the program received proper credit. Subsequent to the interview, a KEMA analyst reviewed the survey responses and checked for inconsistencies. This year we found no inconsistencies that lead us to make changes to attribution.

Table B-2. Timing Attribution Responses

Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	Response				
1	About the same	3%	34%	-	8%
	Earlier	-	-	-	-
	Later	7%	8%	-	6%
	Never	-	-	-	-
2	About the same	4%	-	-	3%
	Earlier	-	-	-	-
	Later	-	8%	-	3%
	Never	-	-	-	-

Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**Response**				
3	About the same	7%	-	-	5%
	Earlier	-	-	-	-
	Later	-	-	8%	1%
	Never	-	-	-	-
4	About the same	-	-	-	-
	Earlier	-	-	-	-
	Later	32%	30%	42%	32%
	Never	48%	21%	50%	42%
All		**100%**	**100%**	**100%**	**100%**

In Table B-3, respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-3. Timing Attribution Reasons

Dat1a: Without Focus on Energy, would you have installed system at the same time, earlier, later or never?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Initial Cost/Financially feasible	77%	31%	21%	62%
Payback too long	14%	8%	50%	17%
General Focus resources were needed	-	28%	-	5%
New Construction/Remodel	3%	7%	-	3%
Other incentives were a major component.	-	-	-	1%
Already had money/plans for the project regardless.	11%	14%	-	10%
We would have to build up more funds/find additional funds/wait for decrease in price.	14%	18%	33%	17%
Not sure exactly what we would have done.	-	20%	-	3%
Environmental/Resource Concern	-	-	-	-
Replace failing equipment at lower or same efficiency level	-	20%	-	3%
Other	-	-	29%	3%
Don't Know/Refused	-	-	-	-
All	**118%**	**144%**	**133%**	**124%**

Table B-4. Timing Attribution Open Ended Responses

Solar Electric	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
1 Same time	Because this is new construction, it was part of a total financial package to do it during the building process. It makes more sense to do it while the building is being built, than afterwards.
	I was interested in doing this project for educational purposes.
	We had the money allocated.
3 Later	I would have continued to evaluate the project but because of the upfront cost I would have delayed doing it.
	I would have to wait for a better price or another incentive.
	Our other funding is running out, everything is paid for by donations because we are a nonprofit, and we would likely only have funding for fewer projects.
	The payback would not be good enough for the customers to buy homes like this. Most of my customers are families starting out that are interested in going green but do not necessarily have a lot of money to do something like this as a fashion. It has to make economical sense. I think though that the costs will finally go down as there are more people manufacturing the products.
	We needed the money.
	We would hope that another incentive would come to complement the utility buyback program.
4 Never	We did not think about doing one there until we found out about the Focus on Energy incentive.
	I cannot afford the system. The Focus on Energy grant made it make sense.
	It is cost prohibitive.
	It is not economically viable.
	It would not be a good rate of return.
	Price would have to come down for it to be feasible.
	The money was a significant factor.
	We could not do it without the money.
	We needed the incentive to do it.
	We took advantage of the fact there was a grant. If the cost went down another way we would do it in two years. Otherwise, we could not afford it.

Table B-5. Timing Attribution Open Ended Responses

Solar Hot Water	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
1 Same time	We had the money allocated.
	We needed a heating system, so we would have had to do it then.
	We wanted to be LEED platinum.

Solar Hot Water	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
3 Later	It would have taken longer to figure out what we wanted to do from both a monetary and informational standpoint. It helps to have a knowledgeable and reputable entity behind it.
	We would have to build up more reserves to foot the money.
	We would wait for the panel price to come down.
	We would not have had Focus on Energy as a resource.
4 Never	Cost
	It would not have been in our budget and a retrofit is cost prohibitive.
	The payback would not be worth it.

Table B-6. Timing Attribution Open Ended Responses

Wind	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
3 Later	I would have to save more money.
	I would need to get more funds together, might have done something else like a solar panel once we had money to do something.
	It is harder to sell without the rebate. The payback is too high.
	The USDA asked in their application if we are supported in any other way. I have the feeling that if Focus on Energy was not supporting us, we would not have been able to get the USDA grant.
4 Never	Even with the private funder, we could not have afforded it.
	It would not have made financial sense. The payback would be too long.
	The payoff does not look good.

Table B-7. Sizing Attribution Responses

Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**Response**				
1	Same Size	10%	42%	-	14%
	Lesser Capacity	-	-	-	-
	Greater Capacity	-	-	-	-
	Not installed anything	-	-	-	-
2	Same Size	-	8%	-	3%
	Lesser Capacity	4%	-	-	3%
	Greater Capacity	-	-	-	-
	Not installed anything	-	-	-	-

Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**Response**				
3	Same Size	-	-	-	-
	Lesser Capacity	7%	-	8%	6%
	Greater Capacity	-	-	-	-
	Not installed anything	-	-	-	-
4	Same Size	-	27%	13%	6%
	Lesser Capacity	17%	-	17%	14%
	Greater Capacity	-	-	-	-
	Not installed anything	62%	24%	63%	55%
All		**100%**	**100%**	**100%**	**100%**

In Table B-8 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-8. Sizing Attribution Reasons

Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Cost Is Not Worth The Savings of a Smaller Project/Want to Maximize Savings	3%	7%	-	3%
Size Needed/Replaced Existing/Determined by Contractor	14%	49%	63%	26%
Impact of System Too Small/Have Smallest System	17%	-	13%	13%
Not Worth It	14%	-	21%	12%
Too Expensive/Payback Too Long	41%	-	-	29%
Personal Funds/Other Incentives Available for Current Size	-	7%	-	1%
I would do the size I could afford.	8%	-	25%	8%
System is larger than needed/More than Planned/Took advantage of maximum Focus money	7%	-	-	5%
Focus Effect Not Just Economical	-	8%	-	1%
Other	-	30%	-	6%
Don't Know/Refused	-	-	-	-
All	**103%**	**100%**	**121%**	**104%**

Table B-9. Sizing Attribution Open Ended Responses

Solar Electric	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
1 Same size	Basically, long-term, this maximizes the savings.
	The way the money was generating it looks like it was the best size if we were going to do it at all and we wanted to be green.
2 Lesser capacity	I would have done something smaller because of the cost of the project.
	It would decrease the cost.
	The cost is too high and we are non-profit.
	We could not afford the size we did get with funding from Focus on Energy.
	We got a nice size that covers 1/4 of the roof.
	We had to consider the cost. Our current system was sized where we could take advantage of the maximum Focus on Energy money. Due to cost it we would make it smaller.
	We only had so much allocated. The Focus on Energy money helped to expand.
4 Not installed anything	Could not afford it and it was not the first thing on our mind.
	It is not economically viable.
	It would be incidental if smaller.
	The expense would be too high. It does not make any sense for a smaller one as the one I have only covers maybe half of what electricity I use now.
	The juice is not worth the squeeze. Not enough energy would be produced.
	The money was a big factor so we would not have done anything.
	The payback would not have been very good.
	The price would still be too high and the payback too long.
	We based our decision on the engineering beliefs.
	We could not afford it.
	We try to do the same size at all our locations and it would not be worth it doing something smaller with only the donation money.

Table B-10. Sizing Attribution Open Ended Responses

Solar Hot Water	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
1 Same size	I am not an engineer. I cannot speak on what we would have done.
	It was the right size, maximized the efficiency, and maximized the unit it would hold.
	That was what we calculated to be the optimum for our goal.
	This is not applicable because the project was already installed; just some wiring had to be redone.
	We did not think of alternatives.
	We had the money allocated to do this size.
	We would have done the same size but at a later time. We still would have come to the same conclusion at what size it needed to be.
4 Not installed anything	It would have been cost prohibitive.
	It would not be effective to have a smaller size. This was the size we needed for it.
	We did a larger size so we could do radiant regardless of their involvement. Without Focus on Energy we would have done radiant only.

Table B-11. Sizing Attribution Open Ended Responses

Wind	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
1 Same size	I would have installed the same but at a later time because I wanted it to be as close to a zero balance with my utilities.
2 Lesser capacity	Assuming we still got the funding from the private giver, we would do something smaller. We would not have done the additional wind system or the solar tracker that we also did.
	I would do something smaller because I could not have afforded something larger, but it would end up being a token wind turbine.
	We would have done something smaller because of cost and we were given smaller ones as options.
4 Not installed anything	I am not sure why they picked this size, but I think it was optimal.
	My demands are so high in electricity that something small would have been a waste of time.
	This is a good size. It would not be worth doing a smaller size.

In Table B-12 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-12. Summary of Focus on Energy Impact

Dat4: Summary of Focus on Energy effects on project.	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
No affect on timing or sizing	-	14%	-	2%
Affect on timing	7%	22%	-	10%
Affect on sizing	11%	-	8%	8%
Affect on both timing and sizing	20%	14%	29%	20%
Would not have done the project without Focus	56%	20%	63%	50%
Other	6%	30%	-	9%
Don't Know/Refused	-	-	-	-
All	**100%**	**100%**	**100%**	**100%**

Table B-13. Summary of Focus on Energy Impact

Solar Electric	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
1	There was really no effect. We were either going to do the project or not. There is a slight possibility I would not have done it.
	When we learned about Focus on Energy the timing was right because we were interested in going green. The size of the unit was based on our needs, so it was either that or nothing. We might have done the project later since there was the utility incentive
2	With the Focus on Energy grant I just changed the size of the PV system to something larger; I still would have done the project because we had the money allocated for something smaller.
3	It was very important. Without the Focus on Energy program we would have to downscale the project. Focus on Energy's support was also extra important compared to the other money we received.

Solar Electric	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
4	Focus on Energy was very influential and very important. It is not likely I would have done the project or I may have done a smaller project.
	It definitely caused the timing to be now, made it happen right away. It made the system take full advantage of Focus on Energy and full payback.
	It finally got me off the couch and really into doing it and doing a large project. The USDA grant had a cap and Focus on Energy allowed for a larger project.
	The ability with the rebates is huge. Over the years it can be weaned off because more will be manufactured than right now.
	The bigger the solar panels, the more money you get. Between Focus on Energy and the federal tax credit, it helped it make sense. This is something that can help me for ten years.
	The funding was critical to do this project.
	The main thing Focus on Energy did was to provide funding. We would have to raise the money and do a smaller size without Focus on Energy.
	The program influenced us completely. It determined the timing and the size. Without the money we would not have done it.
	The timing was not an issue. We did the project as soon as we could when Focus on Energy provided the incentive. We would not have done it at all without the incentive.
	Without Focus on Energy we would not have been able to do the project at all. Not only did they give us a large amount of the money, but they also helped us to get the large grant from the utility.
	Without Focus on Energy the organization could not afford to do the project. We would have to wait for another incentive, a lower cost, or done something smaller.
	Without Focus on Energy we would not have done this project at all.
	Without Focus on Energy we would not have done this project at this location, period.
	Without Focus on Energy, and with the cost of solar, I would not have done anything with it.
	Without Focus on Energy, this project would not have been economically viable to do.
	Without the Focus on Energy incentive we would not have done the project because the money was such a big factor in our ability to do it.

Table B-14. Summary of Focus on Energy Impact

Solar Hot Water	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
1	The Focus on Energy incentive helped to do the project six months earlier, helped us to reach the community with it, but I am not sure if we would have done a different size without Focus on Energy.
	Without Focus on Energy I still would have done the project. We had the money allocated for it already.
	Without Focus on Energy, it is somewhat likely we would have done the project anyway and we needed a new system. Focus on Energy was an incentive for us to definitely go ahead with it.
	Without the Focus on Energy program we still would have done this project as it is and at this time because we were looking to be a LEED platinum building.
2	The program was instrumental. Without it, it would have been difficult economically but it would have been reasonable. It would have been a longer payback, but acceptable. I appreciate the resources for the people, and it my opinion, without the Focus on Energy resources, the process would have been slower.
4	Focus on Energy combined with the federal tax credit is why we did it last year, not knowing if the federal money would be gone.
	It would not have made sense to do something smaller and without Focus on Energy the payback would not have been worth doing the project at all.
	The main reason that we did it was because of the saving. Without Focus on Energy we would not have had the saving that we were looking for. There would not be another size because the panels were already installed.
	The rebate was important to us to put the solar heating in at the time of the construction. A retrofit would be too costly.
	Without Focus on Energy, it would have taken four years or more to do this project.

Table B-15. Summary of Focus on Energy Impact

Wind	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
3	They helped us install the project sooner rather than later and made the payback shorter. We would have had to wait a while and gone with a smaller system.
4	Focus on Energy may have helped us to do it. Without Focus on Energy it would have been much further in the future to put up even a small one.
	If they had not been available, I probably would not have done it.
	It just all came together. The timing was perfect because Focus on Energy helped with the other funding. If we did something when the private funder came in without Focus on Energy we would have done something much smaller.
	The Focus on Energy program helped the preliminary planning stages and the financial help. Without it, I would not have proceeded with the project.
	The timing was everything. I know I would not have done it without Focus on Energy or it would be a toy.
	Without Focus on Energy I would not have been able to do it any time soon and I wanted to do a size that made sense.

B.2 QUESTIONS USED FOR VERIFICATION OF RESPONSES

We used responses to verification questions in two ways. First, the interviewer probed further when he or she found inconsistencies between responses. Second, after the survey was complete, an analyst compared responses to the DAT questions to responses to other questions that established the “story” being told by the survey. In cases where the respondent’s answers were at odds with the DAT questions, the analyst assessed the survey as a whole to verify attribution scores, where necessary.

After these adjustments, there remain some survey responses that appear inconsistent with the final attribution level. In these cases, the preponderance of evidence from the survey responses supported the initial overall attribution score and we made no changes.

B.2.1 Contacts with Focus on Energy

We reviewed surveys with low attribution in which the respondent indicated that contact with Focus on Energy was a very important or somewhat important factor in the decision to install the projects. On these projects, most respondents indicated that they based their system size on usage requirements. Some of these projects received timing acceleration and many projects received additional funding apart from Focus on Energy. No projects required a change in attribution due to these reviews. Table B-16 shows the importance of contact with Focus on Energy by attribution quartile and technology.

Table B-16. Importance of Focus Contacts on Decision to Install

C20b: Would you say that the contacts with Focus on Energy staff...		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**Response**				
1	Were a very important factor in your decision to do the project	-	28%	-	5%
	Were a somewhat important factor in your decision to do the project	10%	-	-	7%
	Made no difference in your decision	-	14%	-	2%
2	Were a very important factor in your decision to do the project	-	8%	-	1%
	Were a somewhat important factor in your decision to do the project	-	-	-	1%
	Made no difference in your decision	4%	-	-	4%
3	Were a very important factor in your decision to do the project	7%	-	8%	6%
	Were a somewhat important factor in your decision to do the project	-	-	-	-
	Made no difference in your decision	-	-	-	-
4	Were a very important factor in your decision to do the project	17%	7%	29%	17%
	Were a somewhat important factor in your decision to do the project	14%	20%	13%	15%
	Made no difference in your decision	38%	24%	-	30%
	Don't Know/Refused	11%	-	50%	12%
All		**100%**	**100%**	**100%**	**100%**

Most participants (85 percent) knew about Focus on Energy incentives prior to considering or planning for the project. Only one percent learned about Focus funding after deciding to install the project and none learned about the availability of Focus incentives after completing their installation.

Table B-17. Focus on Energy Incentive Information

C23: Did you hear about Focus on Energy cash incentives. . .		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**Response**				
1	Before considering or planning for the project	10%	34%	-	13%
	While considering or planning for the project	-	-	-	-
	After deciding to install the project, but before installation	-	8%	-	1%
	After the project was installed	-	-	-	-

C23: Did you hear about Focus on Energy cash incentives. . .		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	Response				
2	Before considering or planning for the project	4%	8%	-	5%
	While considering or planning for the project	-	-	-	1%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
3	Before considering or planning for the project	7%	-	-	5%
	While considering or planning for the project	-	-	8%	1%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
4	Before considering or planning for the project	63%	51%	92%	62%
	While considering or planning for the project	17%	-	-	12%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
All		**100%**	**100%**	**100%**	**100%**

While only eight percent of participants overall reported no contact with Focus, over half of wind participants did not speak directly with the program. 52 percent made initial contact with Focus while considering or planning for the project.

Table B-18. First Contact with Focus on Energy

C19: At what point in the process did you first contact Focus on Energy? Was it. . .		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	Response				
1	Before considering or planning for the project	-	-	-	-
	While considering or planning for the project	10%	20%	-	10%
	After deciding to install the project, but before installation	-	15%	-	3%
	After the project was installed	-	7%	-	1%
	Did not contact Focus	-	-	-	-
2	Before considering or planning for the project	-	8%	-	1%
	While considering or planning for the project	-	-	-	-
	After deciding to install the project, but before installation	-	-	-	2%
	After the project was installed	4%	-	-	3%
	Did not contact Focus	-	-	-	-

C19: At what point in the process did you first contact Focus on Energy? Was it. . .		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**Response**				
3	Before considering or planning for the project	7%	-	-	5%
	While considering or planning for the project	-	-	8%	1%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
	Did not contact Focus	-	-	-	-
4	Before considering or planning for the project	21%	38%	-	21%
	While considering or planning for the project	47%	13%	42%	41%
	After deciding to install the project, but before installation	7%	-	-	5%
	After the project was installed	-	-	-	-
	Did not contact Focus	4%	-	50%	8%
All		**100%**	**100%**	**100%**	**100%**

In Table B-19 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-19. Information about Focus on Energy

C18. (When you first heard of Focus on Energy) What did you hear about Focus at that time?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Focus offers incentive, rebate	50%	78%	58%	56%
They provide technical information.	-	-	21%	2%
They provide general education.	-	-	-	-
They provide installer, manufacturer information.	-	-	-	-
They have an energy efficiency program.	11%	15%	29%	13%
They provide help with assessments.	-	-	-	-
Other	18%	7%	-	14%
Don't Know/Refused	22%	-	13%	16%
All	**100%**	**100%**	**121%**	**101%**

In Table B-20 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-20. Reasons for Participating In Focus on Energy

C32. For what reasons did you participate in the Focus on Energy program?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Rebate(s)	92%	100%	100%	95%
Environmental/Resource Concern	4%	15%	-	5%
Non-monetary assistance	17%	28%	29%	20%
Good program/easy process	21%	-	-	15%
Previous experience	7%	-	-	5%
Other	4%	-	-	3%
Don't Know/Refused	-	-	-	-
All	**145%**	**143%**	**129%**	**142%**

B.2.2 Site assessments

We reviewed surveys with low attribution that indicated that a site assessment was very important or somewhat important in the decision to do the project. Most indicated that the site assessment helped them in deciding the correct size to meet their needs or to confirm that their original intent to install the system was a good investment. Respondents also indicated that the site assessments gave them a better understanding of the full cost of the system. No projects required a change in attribution due to these reviews.

Table B-21. Site Assessment Impact on Project

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	C9	C14: The site assessment/feasibility study...	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
1	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	-	-	-	-
		Made no difference in your decision	7%	14%	-	7%
		Don't Know	-	20%	-	3%
	No		3%	8%	-	3%

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	**C9**	**C14: The site assessment/feasibility study...**	**Solar Electric (n= 21)**	**Solar Hot Water (n= 10)**	**Wind (n= 8)**	**Overall (n= 42)**
2	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	-	-	-	1%
		Made no difference in your decision	4%	8%	-	5%
	No		-	-	-	-
3	Yes	a very important factor in your decision to do the project	-	-	8%	1%
		a somewhat important factor in your decision to do the project	7%	-	-	5%
		Made no difference in your decision	-	-	-	-
	No		-	-	-	-
4	Yes	a very important factor in your decision to do the project	17%	17%	21%	17%
		a somewhat important factor in your decision to do the project	32%	27%	63%	33%
		Made no difference in your decision	15%	8%	8%	12%
	No		14%	-	-	10%
	Refused		3%	-	-	2%
All			**100%**	**100%**	**100%**	**100%**

Table B-22. Site Assessor

C10. Who was the site assessment done by...	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Self or someone in the household/business	-	10%	-	2%
The installer/contractor	42%	48%	8%	39%
A Focus approved Site Assessor	39%	29%	71%	39%
Someone else	18%	8%	-	15%
None	17%	8%	-	14%
Don't Know/Refused	3%	20%	29%	8%
All	**118%**	**122%**	**108%**	**117%**

Table B-23. Satisfaction with Site Assessment

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	**C9**	**C12. Overall, how satisfied would you say you were with the site assessment / feasibility study? Would you say you were...**	**Solar Electric (n= 21)**	**Solar Hot Water (n= 10)**	**Wind (n= 8)**	**Overall (n= 42)**
1	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	-	-	-
		Somewhat Satisfied	-	8%	-	1%
		Very Satisfied	7%	7%	-	6%
		Don't Know	-	20%	-	3%
	No		3%	8%	-	3%
2	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	-	-	-
		Somewhat Satisfied	-	-	-	1%
		Very Satisfied	4%	8%	-	5%
	No		-	-	-	-
3	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	-	-	-
		Somewhat Satisfied	-	-	-	-
		Very Satisfied	7%	-	8%	6%
	No		-	-	-	-

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	**C9**	**C12. Overall, how satisfied would you say you were with the site assessment / feasibility study? Would you say you were...**	**Solar Electric (n= 21)**	**Solar Hot Water (n= 10)**	**Wind (n= 8)**	**Overall (n= 42)**
4	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	-	-	-
		Somewhat Satisfied	7%	-	13%	6%
		Very Satisfied	56%	51%	50%	53%
		Don't Know	-	-	29%	3%
	No		14%	-	-	10%
	Refused		3%	-	-	2%
All			**100%**	**100%**	**100%**	**100%**

Table B-24. Satisfaction with Site Assessment

Solar Electric	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
3 Somewhat satisfied	It took a while for us to get a site assessment done but we are satisfied with the work done once it was done.
4 Very satisfied	Everything was done as promised and more.
	He has a lot of experience and has done them a number of times.
	I do not recall it well but it gave us information as to how to situate everything.
	It confirmed that I have the dream solar site.
	It was very straightforward and the site was not complicated. It was well done and well explained.
	It was built into the cost. It went slick. They gave plenty of options.
	It was done in the best interest of the property in terms of appearance and the best location for the sun.
	It went well and gave me some information.
	She was competent.
	The print out gave us the best time and place for solar exposure. We knew what we would get from the project.
	The project is now in a good spot and produces well.
	Told us the roof was adequate to hold the panels.
	We did not have to pay any extra money for it and the contractor said it looked like a good spot.

Table B-25. Satisfaction with Site Assessment

Solar Hot Water	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
3 Somewhat satisfied	I wanted to go with a ground type pole application, but they needed to do the roof.
4 Very satisfied	He agreed with what I wanted and I thought he was very thorough.
	It convinced us to go ahead.
	It really gave us a good idea and validated that we would get enough sunlight.
	It told us what we needed to know and the savings we would get.
	It told us what we needed.
	It was built into the cost. It went slick. They gave plenty of options.
	It works well. The grants made it logical. The technology was simple.

Table B-26. Satisfaction with Site Assessment

Wind	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
3 Somewhat satisfied	It went through a lot of stuff that was a waste of time.
4 Very satisfied	It helped assemble all the pieces of information in one place. It went through the entire process to make sure there would not be any issues.
	It was a detailed report and a lot of information was learned about wind generation.
	It was a good job. The assessor kept contact with me and gave me more information when I needed it and did an addendum when I needed it. The assessor helped me know who to contact for the grant process.
	It was informative.
	They worked with our people for a good location and the right products.

Table B-27. Benefits of Site Assessment

Solar Electric
C13: What benefits did you get from the site assessment?
Confirmation it was a good site. Gave us information of how much to put on.
I confirmed that the physicality of it would work.
I do not recall it well but it gave us information as to how to situate everything.
It gave us information as to where to put it and be able to use the site for building expansion.
I got to learn a lot and there were alternate options given.
It gave me an idea of practicality.
It gave us another site to consider and we went with it.
It told me where to put the panels and how much electricity we could produce and other technical information that helped me.
It was verification that the site was suitable and gave us knowledge of the angle we needed and the orientation.
Knowing what kWh we would use here.
She provided preferred installers.
We found out that the project was feasible.
We found out that there would be no impediments.
We needed it to apply for the Focus on Energy money.

Table B-28. Benefits of Site Assessment

Solar Hot Water
C13: What benefits did you get from the site assessment?
He told us the azimuth and used his data in my calculations.
I got to learn a lot and there were alternate options given.
It helped confirm the data. Helped set goals of where to locate it.
It told us that we would get enough energy.
None
Validation that we would get enough sunlight.
We learned how much energy we would get and how to situate the panels.

Table B-29. Benefits of Site Assessment

Wind
C13: What benefits did you get from the site assessment?
I learned how much wind was expected.
It gave us projections if the project would be feasible, different scenarios, and payback periods.
It helped me know exactly what I should be looking for in the height, etc..
It helped us get the right type of turbine for our wind.
It renewed that we thought the site was good.
It told us what to expect so there would be no guessing on the production.

B.2.3 Conferences and workshops

We reviewed all surveys with low attribution that indicated a conference was a very important or somewhat important factor in the decision to do the project. Most respondents indicated that they had already been thinking about doing a project before attending the conferences or workshops and that the workshops helped them to learn more details about their project. No projects required a change in attribution due to these reviews.

Table B-30. Conference Impact on Project

C5: Did you or anyone else in your household/company attend a conference about your system?			Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**C5**	**C6: The conference(s) was/were...**				
1	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	7%	-	-	5%
		Made no difference in your decision	-	15%	-	3%
	No		3%	27%	-	7%
2	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	-	-	-	-
		Made no difference in your decision	-	-	-	1%
	No		4%	8%	-	5%
3	Yes	a very important factor in your decision to do the project	7%	-	-	5%
		a somewhat important factor in your decision to do the project	-	-	-	-
		Made no difference in your decision	-	-	-	-
	No		-	-	8%	1%

C5: Did you or anyone else in your household/company attend a conference about your system?			Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**C5**	**C6: The conference(s) was/were...**				
4	Yes	a very important factor in your decision to do the project	7%	-	8%	6%
		a somewhat important factor in your decision to do the project	29%	-	13%	21%
		Made no difference in your decision	-	7%	8%	2%
	No		41%	44%	63%	43%
	Refused		3%	-	-	2%
All			**100%**	**100%**	**100%**	**100%**

Table B-31. Workshop Impact on Project

C7: Did you or anyone else in your household/company attend a workshop about your system?			Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**C7**	**C8: The workshop(s) was/were...**				
1	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	-	7%	-	1%
		Made no difference in your decision	-	8%	-	1%
	No		10%	28%	-	12%
2	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	4%	-	-	4%
		Made no difference in your decision	-	-	-	-
	No		-	8%	-	2%

C7: Did you or anyone else in your household/company attend a workshop about your system?			Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Attribution Quartile	**C7**	**C8: The workshop(s) was/were...**				
3	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	-	-	-	-
		Made no difference in your decision	-	-	-	-
	No		7%	-	8%	6%
4	Yes	a very important factor in your decision to do the project	7%	10%	8%	7%
		a somewhat important factor in your decision to do the project	4%	-	-	3%
		Made no difference in your decision	-	-	-	-
	No		66%	41%	83%	62%
	Refused		3%	-	-	2%
All			**100%**	**100%**	**100%**	**100%**

B.3 OTHER RESPONSES

In Table B-32 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-32. Reasons for Doing Project

C31. To summarize, what were the main reasons that you decided to go ahead with the project?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Commitment to Environment/Sustainability	37%	35%	25%	35%
To set an example/Educated others	38%	27%	8%	32%
Reduce Energy Cost/Use	13%	21%	29%	17%
Reduce national dependence	-	-	-	-
Good Investment/Reimbursement/Good Payback	4%	8%	29%	7%
New construction, remodeling, expansion	4%	-	-	3%
Replacing existing equipment/already equipped just not turned on	-	-	-	-
Become energy independent	3%	-	8%	3%
General interest in the technology	21%	10%	-	16%
Rebate(s) available/Financial feasible	17%	20%	-	16%
Promote Company/Company's Job	14%	18%	33%	16%
Other	7%	8%	-	8%
Don't Know/Refused	-	-	-	-
All	**158%**	**145%**	**133%**	**152%**

Table B-33. Alternative Sources of Funding

C24. Did you receive rebates, grants, reduced financing, or tax credits from any other sources for this <TYPE OF PROJECT>?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Federal Tax Credit	33%	25%	71%	36%
US Department of Agriculture	4%	8%	83%	14%
Utility Buyback Rates/Feed-in Tariff	37%	-	54%	32%
Supplier/Manufacturer	-	-	-	-
Utility Grants/Financing	18%	15%	17%	17%
Other	7%	-	8%	6%
No additional sources of funding	29%	40%	-	28%
Don't Know/Refused	-	20%	-	3%
All	**127%**	**108%**	**233%**	**135%**

Table B-34. Sources of Utility Funding Information

C27. Where did you hear about the Utility Programs?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Not aware of Utility Programs	53%	85%	29%	57%
Independent Research/the Internet	10%	-	-	7%
Installer/Contractor	12%	8%	25%	13%
MREA -Midwest Renewable Energy Association	7%	-	-	5%
Friend/Relative/Colleague	-	-	-	-
Industry Source	-	-	-	-
Focus on Energy	18%	8%	-	14%
Utility	4%	-	17%	4%
Site Assessment	-	-	-	-
Other	-	8%	29%	4%
Don't Know/Refused	-	-	-	-
All	**104%**	**108%**	**100%**	**104%**

Table B-35. Unexpected Benefits

Solar Electric
C33: What benefits did your business get from the renewable energy system that you did not expect when you installed it?
I am getting money back from the utility.
I get inquiries that may help my business. I am starting to realize that I am helping the environment when I watch the meter move.
It is highly visible and we get a lot of positive comments.
None
Our energy bill is much lower.
People are interested and contact us about the project.
The amount we generate when it is not completely sunny out is surprising.
We are getting recognition from the community.

Table B-36. Unexpected Benefits

Solar Hot Water
C33: What benefits did your business get from the renewable energy system that you did not expect when you installed it?
It has generated a lot of buzz in the community. Our organization has been in the newspaper.
It is a lower cost than we thought it would be. The cost savings are higher than we expected.
It is popular on our tour of the facility.
It was a lower cost and better performance than originally thought.
None
We have received more publicity than we thought.
We received free advertizing for our business.

Table B-37. Unexpected Benefits

Wind
C33: What benefits did your business get from the renewable energy system that you did not expect when you installed it?
It gives a sense of pride for the employees and us.
It is good for public relations.
It is good publicity. People stop to ask questions.
None
We received more publicity than we expected.
We were surprised at all the publicity.

Table B-38. Sources of Project Information

C2. From where or whom did you hear about <type of project>? Anywhere else?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Independent Research/the Internet	11%	38%	46%	19%
Installer/Contractor	20%	8%	-	16%
MREA -Midwest Renewable Energy Association	15%	8%	38%	15%
Always knew about	31%	28%	46%	31%
Friend/Relative/Colleague	3%	-	13%	3%
Industry Source	3%	-	-	3%
Previous Renewable system	10%	34%	-	13%
Focus on Energy	14%	-	8%	11%
Utility	-	-	-	-
Site Assessment	-	-	-	-
News/media source	3%	14%	21%	7%
Energy fair/tour	4%	-	29%	6%
Other	42%	34%	42%	41%
Don't Know/Refused	-	20%	-	3%
All	**154%**	**183%**	**242%**	**168%**

In Table B-39 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-39. Main Sources of Project Information

C3. As you were making decisions about the project, who or what were your main sources of information?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Within Company/Within Community	7%	8%	8%	7%
Installer/Contractor	56%	55%	50%	55%
Utility	10%	-	-	7%
Focus	18%	51%	71%	30%
MREA	25%	8%	-	19%
Internet/Independent Research	7%	23%	46%	14%
Family/Friends/Neighbor	-	-	-	-
Personal experience/Previous system	21%	10%	-	16%
Other people with systems	11%	7%	-	9%
Industry Sources	32%	14%	-	25%
Other	14%	14%	-	12%
Don't Know/Refused	-	20%	-	3%
All	**199%**	**208%**	**175%**	**198%**

Table B-40. Sources of Focus on Energy Information

C17. From Where or Whom did you hear about Focus on Energy? Anywhere else?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Installer/Contractor	9%	7%	-	8%
MREA -Midwest Renewable Energy Association	11%	-	8%	8%
Utility	-	28%	-	6%
Friend/Relative/Colleague	-	-	-	-
Independent Research/the Internet	17%	-	33%	15%
Site Assessor	-	-	-	-
News/media source	10%	-	38%	11%
Trade Association	8%	7%	-	7%
Work in energy industry	10%	10%	8%	9%
Other	18%	66%	46%	28%
Don't Know/Refused	22%	-	-	15%
All	**103%**	**117%**	**133%**	**108%**

Table B-41. Awareness of Other Sources of Funding

C25/C26. What other programs that provide financial assistance for this kind of project are you aware of?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Federal Tax Credit	20%	34%	13%	21%
US Department of Agriculture	4%	10%	-	5%
Utility Buyback Rates/Feed-in Tariff	-	-	-	-
Supplier/Manufacturer	-	-	-	-
Utility Grants/Financing	-	-	-	-
Other	7%	8%	-	7%
No knowledge of additional sources of funding	66%	56%	88%	66%
Don't Know/Refused	4%	-	-	3%
All	**100%**	**108%**	**100%**	**102%**

In Table B-42 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-42. Role of Contractor in Decision Making

C4. What role, if any, did your contractor(s) (supplier or installer) play in your decision to install the project?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
None	25%	22%	71%	29%
Self Install/Hired Own Contracting Company	14%	10%	-	12%
Confirmed Good Investment/ Economically Feasible/Production Rates	10%	34%	-	13%
Confirmed Physically Feasible/Location/Site Assessment	4%	20%	-	7%
Informed of Incentive(s)	7%	-	-	5%
Suggested Technology for System Already Decided/Size of System	14%	8%	8%	12%
Advised On Exact System	22%	-	8%	16%
Provided a Bid	-	-	-	-
General Positive Feedback	23%	7%	-	18%
Gave General Help with Approval Process	-	-	21%	2%
Designed System	-	-	-	1%
Provided a Good Price/Warrantee	3%	7%	-	3%
General Negative Feedback	-	-	-	-
Other	3%	8%	-	3%
Don't Know/Refused	-	20%	-	3%
All	**124%**	**134%**	**108%**	**124%**

Table B-43. Satisfaction with Project

Solar Electric	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar electric project?	
3 Somewhat satisfied	We are not finished yet. We would like to do something larger because we are an educational place.
	We are satisfied except that the local utility does not do a buyback making the return longer.

Solar Electric	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar electric project?	
4 Very satisfied	I am ecstatic because of the amount of production and I get a lot of positive feedback.
	I am very happy with the performance of the panels and I am saving money.
	I like the fact that everything seemed to have gone off with no hitch and the grant was a big help.
	It blends in and is operating and generating well.
	It is doing what it is suppose to.
	It is exceeding our goals and expectations.
	It is producing beyond our expectations and nothing has broken.
	It is working well.
	It works like they said it would.
	It works very well.
	There have not been any performance issues.
	We are producing more electricity than expected.
	We like that it is on the internet and that there is a kiosk in front of the building that shows the savings.

Table B-44. Satisfaction with Project

Solar Hot Water	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar hot water project?	
3 Somewhat satisfied	I did not think we needed to go that big on the panels; it could have been done at 6 foot. It does not blend in well.
4 Very satisfied	I did not have any trouble with Focus on Energy and the system is working and meeting our expectations.
	It works well.
	It is performing very well. The design was calculated to fulfill the hot water needs, then the pool. It is a good rise in temperature.
	It is performing well. The cost savings is higher than expected.
	It is working well and we get a lot of positive publicity.
	It is working well.
	It is working.
	It performs better than planned and it is a great way to communicate with our community.
	It works. It does what we expected it to do. There is buzz about it.

Table B-45. Satisfaction with Project

Wind	
E1: Overall, how satisfied or dissatisfied are you with the performance of the wind project?	
2 Somewhat dissatisfied	It has only been operating for 8 months and it is not generating as much as we thought it would. It needs more time for a good evaluation.
3 Somewhat satisfied	It is producing a little less than predicted.
4 Very satisfied	I am producing power and getting checks. I have gotten inquiries, a lot of good publicity, and have motivated other < > growers.
	I have had minimal difficulties, it is working nicely, and has exceeded the anticipated production.
	It is doing great. It is cool.
	It is getting close to what it was projected to do. I think it is a little under, but I do not know that.
	The system is operating as expected. I get comments from people that they like to watch it. There is some public relations value.

Table B-46. Satisfaction with Focus on Energy

E2. Next I'd like to know how satisfied or dissatisfied you are with the Focus on Energy program.		Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
Satisfaction	**E2. Why do you say that?**				
3	Gave Rebate/Made Project Economical	-	-	-	1%
	General Negative Feedback	-	-	-	1%
4	General Positive Feedback	-	-	21%	2%
	General Negative Feedback	7%	-	58%	11%
	Great Resource/Helpful, Professional, Informative Staff	14%	-	-	10%
5 (very Satisfied)	Gave Rebate/Made Project Economical	17%	8%	21%	16%
	Easy to follow program	11%	14%	-	11%
	General Positive Feedback	38%	78%	13%	42%
	General Negative Feedback	-	8%	-	1%
	Great Resource/Helpful, Professional, Informative Staff	25%	34%	29%	27%
DK/Refused	None	11%	-	-	8%
All		**121%**	**142%**	**142%**	**129%**

In Table B-47 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-47. Problems with Project

C28. What types of challenges or obstacles, if any, did you encounter in the process of installing the project?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
None	45%	100%	58%	56%
Initial Cost	3%	-	8%	3%
Length of payback	3%	-	-	2%
Unforeseen additional cost	-	-	-	-
Shipping delays	14%	-	13%	11%
Zoning, Town Regulation, Permits, Inspections	-	-	17%	2%
Contractor Problems	4%	-	-	3%
Technical, Physical Issues	18%	-	13%	14%
Utility Issues	4%	-	-	3%
Weather	-	-	-	-
General installation delay	4%	-	-	3%
Other	14%	-	13%	12%
Don't Know/Refused	-	-	-	-
All	**108%**	**100%**	**121%**	**108%**

In Table B-48 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table B-48. Resolution of Project Issues

C29. How were your problems resolved?	Solar Electric (n= 21)	Solar Hot Water (n= 10)	Wind (n= 8)	Overall (n= 42)
No problems	45%	100%	58%	56%
Had to wait	18%	-	25%	15%
Contractor/installer resolved issue	14%	-	-	10%
Respondent resolved issue	28%	-	17%	22%
Respondent found other sources of funding.	3%	-	-	2%
Not resolved	-	-	-	-
Focus resolved issue	3%	-	-	2%
Focus incentive	-	-	8%	1%
Hired additional help	7%	-	8%	6%
Utility resolved issue	4%	-	-	3%
Resolved by local officials	-	-	-	-
Focus provided information	-	-	-	-
Other	-	-	-	-
Don't Know/Refused	-	-	-	-
All	**121%**	**100%**	**117%**	**117%**

Table B-49. Source of Metered Data for Wind Systems

Metered Data Used in Engineering Estimate?	Source	Number of Respondents
Yes	Inverter	1
	Separate Utility Meter	2
	Other (website)	1
No	Inverter	1
	Other (a guess from reports received in the mail)	1
	N/A	2

In Appendix C we include responses to questions used to determine attribution (C.1) and responses to questions used to confirm the attribution score (C.2). Where we provide percents they represent case weighted percent of technology respondents.

We display some results in this appendix by overall attribution quartile, which we define in Table C-1.

Table C-1. Attribution Quartile

Overall Attribution Quartile	Project Total Attribution Score
1	Less than 25 percent
2	25 percent to less than 50 percent
3	50 percent to less than 75 percent
4	Seventy five percent to 100 percent

We modified verbatim responses to protect the confidentiality of respondents where necessary.

C.1 ATTRIBUTION RESPONSES

After each of the DAT (direct attribution) questions, we asked an open-ended question to allow the respondents to describe the rationale for their response. When the open-ended response was inconsistent with the answer given, the interviewer clarified the discrepancy with the respondent to ensure that the program received the proper credit. Subsequent to the interview, a KEMA analyst reviewed the survey responses and checked for inconsistencies. This year we found no inconsistencies that led to changes in attribution.

Table C-2. Timing Attribution Responses

Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	Response				
1	About the same	17%	52%	27%	33%
	Earlier	2%	-	-	1%
	Later	3%	2%	-	2%
	Never	-	-	-	-
	Don't Know/Refused	-	-	-	-
2	About the same	-	-	-	-
	Earlier	-	-	-	-
	Later	5%	8%	15%	7%
	Never	-	-	-	-
	Don't Know/Refused	-	-	-	-

Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**Response**				
3	About the same	2%	-	-	1%
	Earlier	-	-	-	-
	Later	-	3%	15%	2%
	Never	-	-	-	-
	Don't Know/Refused	4%	-	-	2%
4	About the same	-	-	-	-
	Earlier	-	-	-	-
	Later	38%	11%	18%	25%
	Never	29%	25%	24%	27%
	Don't Know/Refused	-	-	-	-
All		**100%**	**100%**	**100%**	**100%**

In Table C-3 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-3. Timing Attribution Reasons

Dat1a: Without Focus on Energy, would you have installed system at the same time, earlier, later or never?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Initial Cost/Financially feasible	57%	29%	33%	44%
Payback too long	16%	8%	-	12%
General Focus resources were needed	-	10%	39%	6%
New Construction/Remodel	6%	19%	-	12%
Other incentives were a major component.	10%	30%	-	19%
Already had money/plans for the project regardless.	10%	11%	27%	11%
We would have to build up more funds/find additional funds/wait for decrease in price.	10%	5%	15%	8%
Not sure exactly what we would have done.	2%	5%	-	3%
Environmental/Resource Concern	-	2%	15%	1%
Replace failing equipment at lower or same efficiency level	-	2%	-	1%
Other	9%	15%	-	11%
Don't Know/Refused	-	-	-	-
All	**121%**	**136%**	**130%**	**128%**

Table C-4. Timing Attribution Open Ended Responses

Solar Electric	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
1 Same time	Because we were building a new home.
	Focus on Energy was just a bonus.
	I had wanted to do it for a while.
	I think we should do these projects for the environment.
	The cost is high. I would have given more thought to doing it. I would have done a smaller one I think.
	The money makes all the difference. The tipping point for me to do this project was the tax credit, and the government removing the cap. Without that it would have been harder.
	The timing is wrapped up in the training timetable set up by the program.
	This is a new build and not a retrofit.
2 Earlier	There was some application and hoops to jump through with Focus on Energy. This slowed things down.

Solar Electric	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
3 Later	Because of the cost. We would need to save the money.
	Cost. I would be worried that the Federal program would go.
	I do not have the cash flow.
	I do not know what I would have done. I probably would have done my on installation, so it would have cost less. But I still would not have been able to afford the whole thing. I would have to put it on gradually.
	I like being self sufficient. I already had the money invested somewhere else at the time. This project probably would have happened in at a different property in town.
	I needed the financial help. I would have to save the money to do the project.
	I would have to wait for the cost to decrease.
	I would wait for the price to go down.
	It helped me economically.
	It is hard to come up the initial investment and there are financial implications.
	It is not feasible, and I would not have thought about it without all the incentive options.
	It is possible we would have held off due to the financial costs.
	It was always part of our long-term goal to have a source of renewable energy. It would have taken longer to save up for it if there was not an incentive.
	The cash incentive was the driving force.
	The cost of this will eventually go down. Now it is still high. People would not pay for a house with that type of cost.
	The incentive was good to get the money back. If we got the same payback but delayed it over time, we may have done it later to save money.
	The payback would not be good enough for the customers to buy homes like this. Most of my customers are families starting out that are interested in going green but do not necessarily have a lot of money to do something like this as a fashion. It has to make economical sense. I think though that the costs will finally go down as there are more people manufacturing the products.
	We needed the payback to be reasonable.
	We would have found a way to make up the funding somehow.
	We would not have been able to raise the capital if we were not going to get the return. The price of energy would have to go up for us to do it in the future.

Solar Electric	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
4 Never	I needed a reasonable payback. The panels only have a warrantee for 20 years so if the payback is that long it is not worth it.
	It was too expensive. It would have a bad payback.
	I would not have been able to afford it.
	I would not have been able to save enough money to have it make sense.
	I would not be able to afford it.
	It is a matter of economics.
	It is too expensive.
	It made a substantial reduction in cost.
	It would be too expensive.
	It would not be a good rate of return.
	Part of the timing was the federal rebate and I did not know when that would be gone. So I do not think I would have been able to wait to do it and I would not have had the money at the time without Focus to do it.
	The Focus on Energy rebate shortens the payback to something that is reasonable.
	The cost is too high and the length of payback is too long.
	The rebate is such a help. Without it I do not know if we would have the money available.
	We could not have afforded it.

Table C-5. Timing Attribution Open Ended Responses

Solar Hot Water	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
1 Same time	At first we thought the cost was not going to be that much. We based our estimate on using the original panels and thought it was unlikely that we would have to install new ones. And we figured we would qualify for the incentives. If we knew then what we know now we would have never done it.
	Because I wanted to be green and I could afford it.
	Because of the role the panels played in the tax credit application we would have done the install at approximately the same time.
	Because of the venting issue, I wanted to avoid an additional hole being cut into my house. By doing them both at the same time I avoided this.
	Because that was when we went to the home show and met the contractor, the timing was the earliest they could do it.
	Because we were building a new home.
	Building a new house, integrated renewable energy into the design.
	I already liked it in the last house.
	It was always part of our long-term goal to have a source of renewable energy.
	The utility money covered all of the costs; Focus on Energy had little effect.
	The previous system had equipment failures.
	The timing is wrapped up in the training timetable set up by the program.
	The weather, in another month it would have been too cold to install it. I needed to get moving on it.
	We were driven to do it.
	We would have installed the water heating components but not the space heating without the incentive. As for the water heating, I was already in the planning process, I was thinking about it doing
	Would have gone ahead without it.

Solar Hot Water	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
3 Later	I could not afford it.
	I expect by then I would have had some other things paid off.
	I probably would have sat down and calculated the payback and interest rates at the time. Assess the investment environment, interest rate, federal tax rebates and determine my return on investment. Our current project was four years and it doesn't get much better than the
	I would wait until the price of natural gas goes up.
	If I were to have done it at all I would have done it later.
	It helped us shorten the length of time by enhancing the learning process and by providing us an incentive. It was a gentle push that was staring me in the face.
	It would have taken me longer to save up for it and based on my knowledge of these systems I probably would have waited for the cost to come down.
	Later, but not too much later might have taken a little longer to figure out but once we heard about the federal tax credit we were motivated to take advantage of it before the year's end.
	Probably would have needed sometime to figure out system design options, contractors and equipment suppliers etc.
	The payback would not be good enough for the customers to buy homes like this. Most of my customers are families starting out that are interested in going green but do not necessarily have a lot of money to do something like this as a fashion. It has to make economical sense. I think though that the costs will finally go down as there are more people manufacturing the products.
	We needed the payback to be reasonable.

Solar Hot Water	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
4 Never	Because of the cost.
	Because the funding we received from our town was insufficient, we needed the boost from Focus on Energy
	I had a new mortgage and construction underway I needed to get moving there was a FEMA grant I was making use of. I was planning all along to do the space heating the water heating was because of the incentives that were available.
	It was too expensive. It would have a bad payback.
	Incentives were an important aspect to reduce the cost.
	It is not financially feasible.
	No, it is harder to do after construction than doing during a new build.
	Return on investment would have been too long.
	The cost is too high. The money made it happen.
	The cost would be too high and it would not be worth it.
	The incentive and services were crucial; the program helped me make my final decision to go with the project.
	The incentive and technical assistance is what helped make the project possible.
	The incentive was important and the independent review, the program was really the reason we went ahead with it.
	The rebates allowed us to do it.
	We would not have spent $12,000 because it was too long of a payback.

Table C-6. Timing Attribution Open Ended Responses

Wind	
Dat1a: Without Focus on Energy would you have installed system at the same time, earlier, later or never?	
1 Same time	We had talked about it a lot and kind of had our mind set to do a project like this.
	We were going to do it regardless it was just a perk.
3 Later	Everything fell into place after I communicated with Focus on Energy. I would have procrastinated and the cost the incentive covered would have held me back a bit longer.
	It was not a very desirable job from the perspective of a contractor because it is not a new installation and it would have taken us a while to identify a contractor. The program helped us find someone.
	The program expedited the process. We would have installed it eventually because this is part of our core values but it would have taken a little longer to save up for it.
4 Never	I relied on the program to help offset the cost and the provided me invaluable technical assistance.
	The resources they provided were critical to my success.

Table C-7. Sizing Attribution Responses

Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**Response**				
1	Same Size	22%	50%	9%	35%
	Lesser Capacity	-	3%	-	1%
	Greater Capacity	-	-	18%	1%
	Not installed anything	-	-	-	-
2	Same Size	2%	8%	15%	5%
	Lesser Capacity	3%	-	-	2%
	Greater Capacity	-	-	-	-
	Not installed anything	-	-	-	-
3	Same Size	4%	3%	15%	4%
	Lesser Capacity	2%	-	-	1%
	Greater Capacity	-	-	-	-
	Not installed anything	-	-	-	-

Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	Response				
4	Same Size	6%	5%	-	6%
	Lesser Capacity	24%	3%	9%	14%
	Greater Capacity	-	-	18%	1%
	Not installed anything	37%	28%	15%	32%
All		**100%**	**100%**	**100%**	**100%**

In Table C-8 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-8. Sizing Attribution Reasons

Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Cost Is Not Worth The Savings of a Smaller Project/Want to Maximize Savings	2%	-	-	1%
Size Needed/Replaced Existing/Determined by Contractor	30%	56%	15%	41%
Impact of System Too Small/Have Smallest System	7%	9%	-	8%
Not Worth It	8%	4%	-	6%
Too Expensive/Payback Too Long	29%	12%	-	20%
Personal Funds/Other Incentives Available for Current Size	7%	3%	-	5%
I would do the size I could afford.	8%	2%	9%	5%
System is larger than needed/More than Planned/Took advantage of maximum Focus money	2%	-	-	1%
Focus Effect Not Just Economical	-	2%	15%	1%
Other	13%	7%	36%	11%
Don't Know/Refused	-	-	9%	0%
All	**106%**	**95%**	**85%**	**100%**

Table C-9. Sizing Attribution Open Ended Responses

Solar Electric	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
1 Same size	Focus on Energy was just a bonus.
	Focus on Energy was not the primary reason for these four panels, just the icing.
	I think we should do these projects for the environment.
	I would prefer to do it as is or not at all.
	It does not make economic sense to do a lower capacity.
	It was the right size for the roof.
	That is the right size.
	The cost is only slightly greater as you increase size. There is still the labor cost. The panels would only be slightly cheaper.
	The size is based on an agreement between ourselves, the utility and training sponsors of the program. It is based on the minimum size eligible for payback.
	This is the best option.
	We built it based on our needs.
	We preferred the size. We just would have done it at a different time.
	We wanted to need a battery back up to store power.
	We were trying to get the most we could and this covered our roof.
2 Lesser capacity	I could try it out. I could install it myself to save money. But I would do it over a few years, one piece at a time. I would start with 1kW.
	I do not have the cash flow.
	I had a budget of $60,000, so what that would pay was what I wanted to do.
	I may have, for cost reasons.
	I would have done something smaller because of the cost of the project.
	Initial cost is too high.
	The cost is high. The incentive helped make it the size it is. The aesthetics of the roof would be nice with a smaller system.
	The cost is too high so I would have done a smaller project on my property in town.
	The cost would be too high to do the system we did do.
	The overall cost, at a later date, but something smaller at the same time.
	This system produces more than the residence needs so I would do something smaller because of the cost.
	We could not afford such a large capacity system. Something smaller would be ok.
	We went with a larger system due to a combination of the three incentives (Focus on Energy, utility buyback, and federal) because of these we put the largest system we could possibly install. Without them there would be no reason to over produce.
	We would need to bring down the cost.
	We would not have been able to afford something so large without the funds.

Solar Electric	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
4 Not installed anything	I would have waited to get what we wanted.
	I would not have installed anything. When you number crunch, you really need to maximize the number of panels. Anything lower drags on.
	It cost too much and it is hard to finance.
	It does not pay and it is not enough of a benefit to do something smaller.
	It does not make any difference. The payback still does not work.
	It is not cost effective.
	It is not worth it.
	It is not worth putting in a partial system. The money is in all the labor.
	It is too costly and the Focus on Energy rebate shortens it to something that is more reasonable.
	It is too expensive.
	It would have been all or nothing.
	The cost would be too high.
	The juice is not worth the squeeze. Not enough would be produced.
	This is what I need to run the household.
	We already have a small system.
	We wanted something with a big impact but probably would have never been able to save the money.
	We would not put in actual panels, just make the house solar ready with the wires and everything running so they would not have to do a retrofit.

Table C-10. Sizing Attribution Open Ended Responses

Solar Hot Water	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
1 Same size	Because of the overall cost.
	Because sizing was not a factor it just would not have made sense to go smaller.
	Because the decision was based on the amount of hot water my family typically uses.
	Because they went by the size of the house and the family members we had here.
	Design to meet our needs.
	For the water heater, the capacity or size was determined by the number of occupants in our household.
	I do not think anything smaller would have supplied the amount of hot water we needed.
	I knew what size was best.
	I like the size that it is.
	It is just the two of us in this household and 45 gallons is just fine. We are on a time of use metering system so we try and be conservative with when and how much we use.
	Our contractor made the proposal and size decision, I am not sure why but it was larger than what we had before.
	Size recommended by the installer.
	Size we needed
	Sized according to our needs.
	Sized according to the existing panels and contractor recommendations.
	That was decided by the installers and our needs.
	The utility money covered all of the costs; Focus on Energy had little effect.
	The size is based on an agreement between ourselves, the utility and training sponsors of the program. It is based on the minimum size eligible for payback.
	The system was designed to handle an average small family.
	We already went with the smallest size system.
	We sized the system for a larger family for resale value.
	We wanted something that would provide a good amount of hot water.
2 Lesser capacity	Dual system would not have installed the heating component and would not have needed it to be as large. Would have been half the size.
	I probably would have only installed enough panels to support the space heating component.
	The contractor gave us a good deal because it was good public relations for him.

Solar Hot Water	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
4 Not installed anything	Because of the overall cost.
	Because the funding we received from the town was insufficient, we needed the boost from Focus on Energy.
	It is not worth it.
	It is not worth putting in a partial system. The money is in all the labor.
	It would not be worth it.
	Not applicable but she says, "Size would have been smaller".
	Would not have installed anything.
	The cost would still be too high.
	The incentive and technical assistance is what helped make the project possible.
	The juice is not worth the squeeze. Not enough would be produced.
	The rebates made it financially viable.
	Too expensive
	We might have made it solar ready.

Table C-11. Sizing Attribution Open Ended Responses

Wind	
Dat3: Would you have installed a system with the same, lesser, or greater capacity, or not have installed anything?	
1 Same size	Because it was a repair of an existing system and therefore based on the size of the existing system.
2 Lesser capacity	Without the program I may have built a smaller one by myself.
3 Greater capacity	As I look back the size was in the 10 to 20 kW range.
	We might have gone larger because our needs are more than what the turbine generates. I don't know why we went with a smaller system it might of had something to do with using 60 percent of the energy used year around, not sure.
4 Not installed anything	The program was instrumental.

In Table C-12 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-12. Summary of Focus on Energy Impact

Dat4: Summary of Focus on Energy effects on project.	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
No affect on timing or sizing	20%	30%	18%	25%
Affect on timing	12%	18%	30%	15%
Affect on sizing	3%	1%	9%	2%
Affect on both timing and sizing	26%	5%	-	15%
Would not have done the project without Focus	33%	19%	15%	26%
Other	7%	23%	27%	15%
Don't Know/Refused	-	3%	-	2%
All	**100%**	**100%**	**100%**	**100%**

Table C-13. Summary of Focus on Energy Impact

Solar Electric	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
1	Focus on Energy had no influence and was just an added bonus.
	Focus on Energy was an incentive, but I probably would have done it.
	Likely we would have done it without Focus on Energy at that time and at that size but it is hard to say I definitely would have. The federal credit weighted more.
	No effect.
	The effect of Focus on Energy was nominal because we received the rest of the money via a utility grant. We would have had to do it a bit later so that we could find the money some other way.
	We had plans to do this project way before we knew about Focus on Energy and there were not any effects that Focus had on our decision to do it.
	We just wanted to do it, so Focus did not affect the timing or the size of the project.
	Without the program, I still would have done it for the environment.
2	Focus on Energy and the US government incentive were very instrumental in us doing it as a slightly larger project and slightly earlier than previously planned. Without Focus on Energy we would have had to wait a little and do something smaller.
	The timing of the Focus on Energy grant was beneficial because it lined up with the Federal grant. The educational aspect is almost as important as the monetary rebate. So we would still have done it, but maybe waited a year to get the money elsewhere.

Solar Electric	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
3	There was no influence on the timing or the size. The decision was to do it or not to do it. Without Focus on Energy it might not have happened.
	I do not know what I would have done because I would not have gone smaller and I might have done it at the same time, but I might not have done it at all because of the cost. But we had thought about it for so long that we may have just gone ahead and done it.
	The program dictated to me the size of the system. If I had waited too long I probably would not have done it.
	Timing was because we were building a new home, size can be attributed to the programs available to us.

Solar Electric	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
4	Because we were able to get a rebate form Focus on Energy, it made a difference to even do it, saved us from delaying it, and allowed us to do it now.
	Focus on Energy enabled us to do the project now. A smaller size would have been ok.
	Focus on Energy made it possible to do it at this size at this time. Otherwise, we would have done it either later, or at a smaller size.
	Focus on Energy was a huge influence and made the whole thing feasible.
	Focus on Energy was very influential and very important. It is not likely I would have done the project or I may have done a smaller project.
	Focus on Energy's participation was absolutely key.
	I knew I wanted to do it before the end of the year. I would have gone smaller to do that.
	I knew what I wanted. It is more efficient to do it at one time. Focus on Energy was a tremendous help with getting the project done. I would have to wait for the price to go down without them.
	I may have done a smaller system, if I did one, and at a later date.
	It gave me an opportunity to get into it in one step instead of smaller sequential steps. Though the additional utility meter was also costly.
	It had the biggest influence on when and at what size.
	It helped push through project forward, but I likely would have eventually done it.
	It would have taken us longer to save up for it but eventually we would have done it anyways. Size would have been the same.
	The ability with the rebates is huge. But over years it can be weaned off because more will be manufactured than right now.
	The contractor told us how many panels we needed and then drafted the Focus on Energy paperwork. Without the Focus on Energy incentive it is not likely we would have ever done the project.
	The influence of Focus on Energy was strong. I do not think the utility would have participated in it. Then it would have been impossible. The utility's view is they are paying for it.
	The influence was great. That and the buyback were key features. Both had to come together to make me jump. They were equally important.
	We built all we wanted to invest in. I would not have done it without Focus on Energy. You would have to care you do not get a dollar back.
	We did the project because the city asked us to. When we calculated the rebate in with the city money, we could do it. It may have been likely with just the city, but not really. We may have just made the house solar ready.
	We would have installed something, just at a different time.
	Without Focus on Energy it is unlikely I would have done the project at all.
	Without Focus on Energy we may have waited a couple more years to do it.
	Without Focus on Energy we probably would do nothing at his particular property. Focus on Energy made that possible and they are easy to work with. Though later I might have done something at my property in town.

Solar Electric	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
	Without Focus on Energy, I would have gone with a reduced scale project.
	Without Focus on Energy, it would not be cost effective to do it at all.
	Without Focus on Energy, it would not have happened at all.
	Without Focus on Energy, we would not have installed anything.
	Without the Focus on Energy program I would not have done the project. It would have been too costly and I do not think a smaller system would have been worth the cost of the labor.
	Without the Focus on Energy program we would not have been able to raise the money in the cohousing community to pay for the project. We may have chosen to do something smaller or waited until the price of energy went up.
	Without the cash incentive, it would not have been worth doing.
	Without the incentives available, I probably would not have done it, or I might have waited a while until I gave in to my wife or the costs of fuel went up enough to make sense.
	Without the program the project would have to wait a couple of years so we could save money.

Table C-14. Summary of Focus on Energy Impact

Solar Hot Water	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
1	Focus on Energy offered a good share of input as far as planning and development but I did a lot of the research on my own. The contractor was in contact with Focus on Energy a lot and collectively they made some of the decisions. My system was fairly unique; I would have done it at least part of the water heating component.
	Focus on Energy did not have an effect on the timing or the size of the project that I installed.
	Focus on Energy funding provided nearly $70,000 of discretionary funds for the project. This fund paid for equipment and services that were necessary for the project but ineligible for federal funding. The funding also helps build confidence in board members who are uncomfortable with the technology, the money off makes it an easier pill to swallow.
	Had no influence.
	I would have gotten the same size. Timing, the Focus on Energy money did help in terms of making the decision less scary for me to do it. Without the incentive there would have been a 52 percent chance I would have done it otherwise due to the boiler change out.
	Initially we were quoted about half of the total system cost and that was without Focus on Energy.
	It had no effect.
	It had no impact, a small incentive relative to the total project cost.
	May not have installed it, size did not matter.
	No effect.
	No influence
	The Focus on Energy money did not carry much weight in the face of utility funding.
	There was very little effect by Focus on Energy because we are conscious of energy savings and going to alternative energy sources.
	Timing was a result of the impending weather and size was a result of our household needs.
	Timing was because we were building a new home, size can be attributed the number of household occupants.
	Timing was mainly due to the failure and size was based on contractor recommendations however we knew we wanted the system to be closed-loop with anti-freeze.
	Timing was no more than six months because of the tax credit.

Solar Hot Water	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
2	I do not know if it had much influence on the sizing, which came from the site assessment. Timing, it helped move it up by a year.
	It was always in the back of our mind that we would have done this. I imagine that there is an increase in price by installers because they know Focus on Energy is giving money. We would have waited to do this if Focus on Energy was not around.
	Nothing to do with it, that is, the idea and desire was already there. But they were an important resource to help plan our design and identify equipment suppliers.
	Sizing and timing impact, Focus on Energy impacted us. It accelerated my willingness to install the system. At that stage I would still be thinking about it.
3	As for size the program had no impact, once we heard about the incentives we looked at the total package of incentives available to us and decide to go for it.

Solar Hot Water	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
4	Because of the incentive we could afford to incorporate the space heating and pool heating elements.
	Focus on Energy had a huge influence on the fact that we did do it.
	Focus on Energy supplied nearly 40 percent of the funding for these systems, without that money there was no chance of installing at all.
	Focus on Energy was a huge influence and made the whole thing feasible.
	I think it is a great thing to do, Focus on Energy has added an incentive to get people motivated which helps reduce the payback and you save on water heating and it improves the resale value of our home.
	Size did not change, but it is unlikely I would have done it without the incentive.
	Size was determined by household occupants and our needs. Timing, without Focus on Energy the project would have been indefinitely delayed. I would have waited for a better investment environment.
	The ability with the rebates is huge. But over years it can be weaned off because more will be manufactured than right now.
	The rebate incentivized me to install it now. It was not a big factor on size.
	The timing of the program was good for us because we were building at that time. If the program had not been around my husband might not have agreed because of the cost, or we may have done something smaller. We would not have done it after the build because a retrofit is just more expensive.
	The timing was directly related to all the financial incentives available this year.
	Focus on Energy made the project more attractive because it offset the cost.
	We probably would have done it in about two to three years because there are likely different technologies available that are less expensive.
	Without Focus on Energy I would not have done it at all. It would not have been feasible.
	Without Focus on Energy, I would not have done the project.
	Without the Focus on Energy program I would not have done the project. It would have been too costly and I do not think a smaller system would have been worth the cost of the labor.
	Without the Focus on Energy program, we would not have done the project. It would be too expensive and something smaller that I do not want.
	Would not have done it without them.

Table C-15. Summary of Focus on Energy Impact

Wind	
Attribution Quartile	**Dat4: Summary of Focus on Energy effects on project.**
1	Our electric company only allowed 20 kW for residential customers. We would have considered more if they allowed larger systems And the incentive levels are also substantially lower for commercial.
	They had little influence on unit size.
2	Size had no impact because it was an existing system, timing they helped to get the process started.
3	We still would have gone with a 10 kW system. Our tower is 100 feet while the turbine is at 110feet. It is already on an extension and it probably would have been better to have it at 120 feet but we did not know that at the time. Again, this is a result of the changing parameters concerning assessing wind turbulence. The program did motivate us to do it sooner than we would have.
4	For lack of better words it helped me focus on what I needed to understand to make the right decision. A big part of that was the installer list and product list that accounted for low maintenance. Assessing the systems lifecycle cost redirected my final
	I would not have been able to build a large system without them.
	The Focus on Energy site assessment provided me with information on the size and how much energy I would produce.

C.2 QUESTIONS USED FOR VERIFICATION OF RESPONSES

We used responses to verification questions in two ways. First, the interviewer probed further when he or she found inconsistencies between responses. Second, after the survey was complete, an analyst compared responses to the DAT questions to responses to other questions that established the “story” being told by the survey. In cases where the respondent’s answers were at odds with the DAT questions, the analyst assessed the survey as a whole to verify attribution scores, where necessary.

After these adjustments, there remain some survey responses that appear inconsistent with the final attribution level. In these cases, the preponderance of evidence from the survey responses supported the initial overall attribution score and we made no changes.

C.2.1 Contacts with Focus on Energy

We reviewed surveys with low attribution in which the respondent indicated that contact with Focus on Energy was a very important or somewhat important factor in the decision to install the projects. For size, most of the responses indicated that usage requirements were the determining factor for size of system. Some projects received some timing acceleration and many projects were receiving additional funding apart from Focus on Energy. No projects required a change in attribution due to these reviews. Table C-16 shows the importance of contact with Focus on Energy by attribution quartile and technology.

Table C-16. Contact with Focus on Energy

C20b: Would you say that the contacts with Focus on Energy staff...		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**Response**				
1	Were a very important factor in your decision to do the project	-	-	-	-
	Were a somewhat important factor in your decision to do the project	3%	12%	9%	7%
	Made no difference in your decision	19%	32%	18%	25%
	Don't Know/Refused	-	10%	-	5%
2	Were a very important factor in your decision to do the project	-	3%	15%	2%
	Were a somewhat important factor in your decision to do the project	2%	2%	-	2%
	Made no difference in your decision	3%	3%	-	3%
	Don't Know/Refused	-	-	-	-
3	Were a very important factor in your decision to do the project	-	-	-	-
	Were a somewhat important factor in your decision to do the project	-	-	-	-
	Made no difference in your decision	6%	-	15%	4%
	Don't Know/Refused	-	3%	-	1%
4	Were a very important factor in your decision to do the project	21%	8%	24%	15%
	Were a somewhat important factor in your decision to do the project	13%	6%	18%	10%
	Made no difference in your decision	29%	16%	-	22%
	Don't Know/Refused	4%	5%	-	5%
All		**100%**	**100%**	**100%**	**100%**

Most participants (56 percent) knew about Focus on Energy incentives prior to considering or planning for the project. About one-third of participants learned about Focus on Energy funding during the planning stage of their project. Eight percent learned about Focus funding after deciding to install the project and none learned about the availability of Focus incentives after completing their installation.

Table C-17. Focus on Energy Incentive Information

C23: Did you hear about Focus on Energy cash incentives. . .		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**Response**				
1	Before considering or planning for the project	12%	16%	-	14%
	While considering or planning for the project	2%	34%	9%	17%
	After deciding to install the project, but before installation	8%	3%	18%	6%
	After the project was installed	-	-	-	-
	Don't Know/Refused	-	-	-	-
2	Before considering or planning for the project	5%	7%	15%	6%
	While considering or planning for the project	-	2%	-	1%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
	Don't Know/Refused	-	-	-	-
3	Before considering or planning for the project	3%	3%	-	3%
	While considering or planning for the project	1%	-	15%	1%
	After deciding to install the project, but before installation	2%	-	-	1%
	After the project was installed	-	-	-	-
	Don't Know/Refused	-	-	-	-
4	Before considering or planning for the project	50%	17%	9%	33%
	While considering or planning for the project	14%	18%	33%	16%
	After deciding to install the project, but before installation	2%	-	-	1%
	After the project was installed	-	-	-	-
	Don't Know/Refused	1%	1%	-	1%
All		**100%**	**100%**	**100%**	**100%**

Nearly 80 percent of participants contacted Focus on Energy before or during the planning of their project. Only two percent of participants indicated that they did not contact Focus.

Table C-18. First Contact with Focus on Energy

C19: At what point in the process did you first contact Focus on Energy? Was it. . .		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**Response**				
1	Before considering or planning for the project	3%	15%	-	9%
	While considering or planning for the project	10%	15%	27%	13%
	After deciding to install the project, but before installation	8%	17%	-	12%
	After the project was installed	-	2%	-	1%
	Did not contact Focus	-	3%	-	2%
	Don't Know/Refused	-	1%	-	1%
2	Before considering or planning for the project	-	5%	-	2%
	While considering or planning for the project	5%	2%	15%	4%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
	Did not contact Focus	-	-	-	-
	Don't Know/Refused	-	1%	-	1%
3	Before considering or planning for the project	-	-	-	-
	While considering or planning for the project	6%	3%	15%	5%
	After deciding to install the project, but before installation	-	-	-	-
	After the project was installed	-	-	-	-
	Did not contact Focus	-	-	-	-
	Don't Know/Refused	-	-	-	-
4	Before considering or planning for the project	13%	9%	9%	11%
	While considering or planning for the project	46%	24%	33%	36%
	After deciding to install the project, but before installation	3%	1%	-	2%
	After the project was installed	-	-	-	-
	Did not contact Focus	2%	-	-	1%
	Don't Know/Refused	2%	1%	-	2%
All		**100%**	**100%**	**100%**	**100%**

In Table C-19 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-19. Information about Focus on Energy

C18. (When you first heard of Focus on Energy) What did you hear about Focus at that time?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Focus offers incentive, rebate	68%	84%	30%	74%
They provide technical information.	3%	3%	18%	4%
They provide general education.	3%	3%	-	3%
They provide installer, manufacturer information.	3%	2%	-	2%
They have an energy efficiency program.	19%	9%	-	14%
They provide help with assessments.	-	-	27%	1%
Other	5%	4%	18%	5%
Don't Know/Refused	7%	3%	15%	5%
All	**109%**	**108%**	**109%**	**108%**

In Table C-20 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-20. Reasons for Participating in Focus on Energy

C32. For what reasons did you participate in the Focus on Energy program?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Rebate(s)	94%	94%	100%	94%
Environmental/Resource Concern	7%	6%	9%	7%
Non-monetary assistance	6%	8%	91%	10%
Good program/easy process	8%	8%	33%	9%
Previous experience	3%	3%	-	3%
Other	8%	7%	-	7%
Don't Know/Refused	-	1%	-	1%
All	**127%**	**128%**	**233%**	**131%**

C.2.2 Site assessments

We reviewed surveys with low attribution that indicated that a site assessment was very important or somewhat important in the decision to do the project. Most indicated that the site assessment helped them in deciding the correct size to meet their needs or to confirm that their original intent to install the system was a good investment. Respondents also indicated that the site assessments gave them a better understanding of the full cost of the system. No projects required a change in attribution due to these reviews.

Table C-21. Site Assessment Impact on Project

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	**C9**	**C14: The site assessment/feasibility study...**	**Solar Electric (n= 47)**	**Solar Hot Water (n= 63)**	**Wind (n= 7)**	**Overall (n= 117)**
1	Yes	a very important factor in your decision to do the project	7%	26%	9%	16%
		a somewhat important factor in your decision to do the project	5%	7%	-	6%
		Made no difference in your decision	8%	18%	18%	13%
		Don't Know	-	-	-	-
	No		2%	1%	-	2%
2	Yes	a very important factor in your decision to do the project	2%	2%	-	2%
		a somewhat important factor in your decision to do the project	3%	3%	-	3%
		Made no difference in your decision	-	2%	-	1%
		Refused	-	-	15%	0%
	No		-	1%	-	1%
3	Yes	a very important factor in your decision to do the project	-	-	-	-
		a somewhat important factor in your decision to do the project	3%	-	15%	2%
		Made no difference in your decision	2%	3%	-	2%
	No		1%	-	-	1%

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	C9	C14: The site assessment/feasibility study...	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
4	Yes	a very important factor in your decision to do the project	16%	12%	24%	15%
		a somewhat important factor in your decision to do the project	18%	6%	18%	12%
		Made no difference in your decision	23%	8%	-	16%
		Made you less inclined to do the project	3%	-	-	2%
		Other	1%	-	-	1%
		Don't Know	-	1%	-	1%
	No		5%	6%	-	5%
	Refused		-	1%	-	1%
All			**100%**	**100%**	**100%**	**100%**

Table C-22. Site Assessor

C10. Who was the site assessment done by...	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Self or someone in the household/business	3%	2%	15%	3%
The installer/contractor	68%	51%	36%	59%
A Focus approved Site Assessor	44%	65%	58%	54%
Someone else	5%	3%	-	4%
None	8%	9%	-	8%
Don't Know/Refused	-	3%	-	1%
All	**128%**	**133%**	**109%**	**130%**

Table C-23. Satisfaction with Site Assessment

C9: Did you have a site assessment / feasibility study done for the system at your home/business?						
Attribution Quartile	**C9**	**C12. Overall, how satisfied would you say you were with the site assessment / feasibility study? Would you say you were...**	**Solar Electric (n= 47)**	**Solar Hot Water (n= 63)**	**Wind (n= 7)**	**Overall (n= 117)**
1	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	5%	-	2%
		Somewhat Satisfied	5%	19%	-	11%
		Very Satisfied	15%	28%	27%	22%
		Don't Know	-	-	-	-
	No		2%	1%	-	2%
2	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	-	-	-
		Somewhat Satisfied	-	2%	-	1%
		Very Satisfied	5%	5%	-	5%
		Refused	-	-	15%	0%
	No		-	1%	-	1%
3	Yes	Very Dissatisfied	-	-	-	-
		Somewhat Dissatisfied	-	-	15%	0%
		Somewhat Satisfied	-	-	-	-
		Very Satisfied	5%	3%	-	4%
	No		1%	-	-	1%
4	Yes	Very Dissatisfied	1%	2%	18%	2%
		Somewhat Dissatisfied	2%	2%	-	2%
		Somewhat Satisfied	11%	6%	-	8%
		Very Satisfied	48%	17%	24%	33%
		Don't Know	-	1%	-	1%
	No		5%	6%	-	5%
	Refused		-	1%	-	1%
All			**100%**	**100%**	**100%**	**100%**

Table C-24. Satisfaction with Site Assessment

Solar Electric	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
1 Very dissatisfied	The site assessment was not accurate. It gave us an inaccurate placement and it overstated the abilities of production.

Solar Electric	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
2 Somewhat dissatisfied	He was not responsive after the assessment. I did not like what they wanted. We talked to the manufacturer and gave them the other person's assessment and they looked to see what could be done.
3 Somewhat satisfied	I would have liked it to be at the elevation the roof would be at and not on the ground with their arms holding it up. This discouraged us to do the project on our garage.
	You would want your site assessor and contractor there at the same time to get a sense of how the layout would be.
	It took months to get the report and there were many things that were incorrect.
	It was alright, but it takes ten years to get money.
	It was good but you need to be thorough. I thought we had it all right. I thought there was not any shading but we still got a small amount of shading.
	My original plans were to put it on the roof but the assessor said to use the barn and I feel that I settled. It was the better choice for the construction of the house, but I did not get the best option for the angle and orientation.
	The contractor confirmed it was a good site but we knew this already.
	The site assessment discouraged me to do wind, but it was ok.
4 Very satisfied	He confirmed that what I wanted to do would work.
	He explained every step, the angle, the sunlight hours, and laid it out clearly.
	He was able to advise me about things I did not know. He did both wind and solar.
	He was more open and told me more than the installer did. He gave a thorough assessment.
	He was very professional and accurate.
	I did it myself and with a friend.
	I did not know my site was this good.
	I got to see the equipment that gives you an idea of the shading. The evaluation and report was thorough.
	I think our contractor did a good assessment on how the house should face to get the best sun.
	The assessment came out showing we would get a full days sun with the solar electric panels and knew the water heating component would be feasible as well.
	It gave us the final information on where panels needed to be and specific information.
	It gave me good information.
	It helped to plan the orientations of the homes and determined what type of system would be installed on the homes.
	It helped us to know what to do.
	It provided information for estimates on the system.
	It told us that we should focus on removing trees for better sun.
	It was performed well and quickly. It told us the best way to get production.

Solar Electric	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
	It was simple.
	It was very positive, very complete, and very accurate.
	It was not anything formal, just happy with it.
	The contractor showed us how the meter worked and how things work and told us about it and how the sun hits the roof.
	They were really easy to work with.
	Their assessment was very accurate.
	Their concerns where in concert with my concerns and it gave me confidence. They were very knowledgeable.
	They came out and looked around, but nothing very official.
	They did a casual look around with the panels because it was obvious we could do the project.
	They did a very thorough job.
	They did the project the way we agreed to do it after the assessment.
	They provided useful information on the orientation, the ability to collect solar energy, rough estimates and even information about solar hot water.
	We had an easy place, not sure it was necessary. It was just easy.
	He looked at the site and told me what I could do.

Table C-25. Satisfaction with Site Assessment

Solar Hot Water	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
1 Very dissatisfied	Because it worked out well as far as [placement] for traffic in our yard.
2 Somewhat dissatisfied	I felt that the assessors were pretty green. When I asked about any differences between taking readings at ground level and at the roof level (where the panels would go) they said that there was not any difference. That did not make any sense to me.
	They told me I would get a larger Focus on Energy rebate but I got less than what I was told and the system is not generating enough hot water. It was only after the system was installed that I was told I had to move a tree and re-landscape my yard.

Solar Hot Water	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
3 Somewhat satisfied	He told us they could get the system up and running using the existing panels, which did not turn out to be true.
	It does not give you everything but I thought it was done fairly well.
	It gave me information, but I already knew what the assessment would say.
	It was just a requirement for the funding, it was good to know that standards exist for these systems.
	They needed to validate my application information; I was not at the house at the time they did the assessment.
4 Very satisfied	In many ways, it was a formality, by this time we knew we wanted to do it but it did help us figure out where things should go.
	Intrinsic to our new house plans.
	The assessment came out showing we would get a full days sun with the solar electrical panels and knew the water heating component would be feasible as well.
	It gave me good information.
	It helped to plan the orientations of the homes and determined what type of system would be installed on the homes.
	It made things easy.
	It told me exactly where the panels would go and where to run the pipes.
	It was not much. I already knew that it would be a good idea. It was just a confirmation.
	It works fabulously.
	They did a casual look around with the panels because it was obvious we could do the project.
	Very satisfied, we worked through many scenarios such as cost, efficiency, and location.

Table C-26. Satisfaction with Site Assessment

Wind	
C12. Overall, how satisfied would you say you were with the site assessment? Would you say you were...	
2 Somewhat dissatisfied	Because the parameters had changed since we did the original assessment. There are new guidelines on how to correctly assess wind turbulence. Many of the site assessment recommendations are driven by MREA and there are varying factors that are constantly changing to fine tune the process. For instance, we discovered we had more turbulent wind than what was originally assessed. The turbulence has negatively impacted our ability to consistently generate power and the tower is essentially too short to get wind that flows at a constant volume.
4 Very satisfied	It was very through and it helped me understand the potential to utilize wind at this site, the data presented assured me that wind is a resource..

Table C-27. Benefits of Site Assessment

Solar Electric
C13: What benefits did you get from the site assessment?
Because we did the site assessments on site before construction actually began it helped inform a number of decisions including how to orient the homes, which, if any, trees had to be removed.
He told us exactly what to do.
Helped me understand how the beginning of the process would be.
I do not know. I think we could have gone without it.
I got clarification on what system would work well.
I was given verification that I had a good site. It told me about other things like wind loading and snow loading.
It confirmed that it was a good site.
It encouraged us that we had enough sun to make it worthwhile.
It gave me the information I needed to decide if I wanted to go through with the project.
It gave our contractor something to work with.
It gave us an idea of what to do and the payback.
It gave us information as to how many panels we could do and the angle of the roof.
It gave us knowledge about how much to do.
It helped me make sure the panels would get good exposure.
It helped me to understand how to build houses for possible future installations.
It made my house construction easier.
It reaffirmed my belief we could make it work.
It showed that it was a feasible project for us to do. It told us the weight of the panels to reinforce the trusses of the roof.
It told me what system would be best and what to do with it.
It told me what was more feasible and where to put it.
It told me where to put it and how much it generates.
It told me which trees to remove and it told me where I would get energy.
It told us how much we would get back.
It told us the best place to put it with minimal interference.
It told us the best way to get production.
It was essential for me to be able to do the project and he gave good advice.
It was not anything formal, just happy with it.
Just the confirmation that what I wanted to do would work.
None
None, really, because we already knew that it could work.
Nothing
Reassurance that the project would pay for itself.

Solar Electric
C13: What benefits did you get from the site assessment?
The authorization for the Focus rebate.
The confirmation that it was a good site and the knowledge of the tracking system.
The site assessment told us how to do it, where to put it and how much sun we would be getting.
They provided useful information on the orientation, the ability to collect solar energy, rough estimates and even information about solar hot water.
We decided it would be feasible.
We got information on where and how to put the solar panels. We learned about the tracking system.
What we would gain if we went ahead with the system, and it addressed whether or not there were any other limitations. It turned out we were getting a full days sun during the peak hours.

Table C-28. Benefits of Site Assessment

Solar Hot Water
C13: What benefits did you get from the site assessment?
Because it turned out to be the right thing if done properly; the information we got out of it at this juncture validated the project was feasible.
Because we did the site assessments on site before construction actually began it helped inform a number of decisions including how to orient the homes, which, if any, trees had to be removed.
Design specifications, it covered the where and what. As I designed the house, I integrated these aspects to accommodate the solar water heating system.
He told me what to expect, what I would get out of it, the time of year it would operate best, the angle it should be installed; it was an educational experience.
I designed the house to have the correct exposure and pretty much knew what I was doing.
I do not remember the site assessment.
I knew what was going on, the contractor had put one solar electric system in a year or two before. He was informative and told me about the system.
Informed more about the tank, panels and site location.
The site assessment was a prelude to having solar installed, they did it and confirmed it would work correctly. Made recommendations to trim our trees and told us where the panels should go.
It confirmed the system would work and informed us of the need to trim back some trees to reduce shading. The post-assessment was actually also very valuable as we learned the installed anti-freeze was only rated to go down to 2 degrees as opposed to what it should be at minus 25 degrees.
It did give us, what I assume, is a worst case scenario for shading measurements.
It gave me options on what to install.
It gave us a better idea of how things work, practical aspects such as getting ample sunlight and where the system should be installed.
It gave us knowledge about how much to do.
It helped us select sites.

Solar Hot Water
C13: What benefits did you get from the site assessment?
It helped us to plan the next project more precisely, and will certainly inform future project designs.
It told me exactly where the panels would go and where to run the pipes.
It told me the exact location.
It told me where to put it and how much it generates.
My representative was very level headed. I learned about the hours of exposure, and that I needed to cut a few trees to make the system more efficient. It provided verification that it would be a beneficial site; it confirmed what I already knew.
None
Reassurance that the project would pay for itself.
The assessment was very through and professional with helpful charts. From the information obtained, I knew I could achieve my goal and do what I wanted to do.
The contractor and I negotiated and put together an estimate. He informed me about the rebates, and the proposed energy savings. I realized through this process I wanted to capture more heat for space heating. He helped address this issue, and we talked about rot, distributing the load, uplift from the wind, the anchor system and I provided him some structural information about the home.
The evaluation revealed we would get an adequate amount of sun on the roof chosen. And they walked through the home and pointed out where the pipes would be routed.
They came out with their equipment, measured the sun exposure, the angle, assessed the trees, informed me about the shading, where the panels would go, they did the whole thing.
They sat down with me provided diagrams explaining why certain projects were better than others. They provided suggestions to increase coverage and gave me an estimate on days of coverage we could expect per year.
Understand the best location, learned about when the system is in peak operation, received a booklet on our package with all the pertinent information including meter readings showing us projected energy savings, very thorough.
Validation
Very satisfied, we worked through many scenarios such as cost, efficiency, and location.
We knew we could go forward with it.
What we would gain if we went ahead with the system, and it addressed whether or not there are any other limitations. It turned out we were getting a full days sun during the peak hours.

Table C-29. Benefits of Site Assessment

Wind
C13: What benefits did you get from the site assessment?
I strongly agree that site assessments play a crucial role and it is very important. Someone needs to tell people if wind is truly a viable option.
He did one assessment for solar electric and one assessment for wind. We decided we would go with wind over solar because the power generated is more in line with our energy needs.

Wind
C13: What benefits did you get from the site assessment?
I had the assessment done simply to meet the Focus on Energy requirements. We already knew what it was going to cost us. The assessment was a way to get the contractor out here to assess the location. Because they were very timely, we were paid for half of the assessment cost, and it fulfilled our expectations.
Minimal, it was a requirement by Focus on Energy to get approval. I was just following their procedure. There was no problem with the product but from my perspective, there was no value added. From the perspective of Focus on Energy, I can understand why they do it, to make sure customers have the right level of knowledge.
None, I simply gave FOE the data on speed outputs from years prior when the system was running.
Technical information there was several references to equipment options that were supported/approved by the program.
The assessment validated that it was a good idea and gave me figures on what it should produce. Overall, he was very knowledgeable.

C.2.3 Conferences and workshops

We reviewed all surveys with low attribution that indicated a conference was a very important or somewhat important factor in the decision to do the project. Most respondents indicated that they had already been thinking about doing a project before attending the conferences or workshops and that the workshops helped them to learn more details about their project. No projects required a change in attribution due to these reviews.

Table C-30. Conference Impact on Project

C5: Did you or anyone else in your household/company attend a conference about your system?			Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**C5**	**C6: The conference(s) was/were...**				
1	Yes	a very important factor in your decision to do the project	3%	10%	-	6%
		a somewhat important factor in your decision to do the project	2%	5%	-	3%
		Made no difference in your decision	7%	3%	-	5%
	No		10%	33%	27%	21%
	Refused		-	2%	-	1%
2	Yes	a somewhat important factor in your decision to do the project	-	2%	-	1%
	No		5%	6%	15%	6%

C5: Did you or anyone else in your household/company attend a conference about your system?			Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**C5**	**C6: The conference(s) was/were...**				
3	Yes	a somewhat important factor in your decision to do the project	-	3%	-	1%
	No		6%	-	15%	4%
4	Yes	a very important factor in your decision to do the project	2%	2%	-	2%
		a somewhat important factor in your decision to do the project	7%	5%	-	6%
		Made no difference in your decision	-	5%	15%	3%
	No		57%	23%	27%	41%
	Refused		-	1%	-	1%
All			**100%**	**100%**	**100%**	**100%**

Table C-31. Workshop Impact on Project

C7: Did you or anyone else in your household/company attend a workshop about your system?			Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**C7**	**C8: The workshop(s) was/were...**				
1	Yes	a very important factor in your decision to do the project	-	1%	-	1%
		a somewhat important factor in your decision to do the project	3%	10%	18%	7%
		Made no difference in your decision	3%	3%	-	3%
	No		15%	37%	9%	25%
	Refused		-	2%	-	1%
2	Yes	a very important factor in your decision to do the project	-	3%	-	1%
	No		5%	5%	15%	6%

C7: Did you or anyone else in your household/company attend a workshop about your system?			Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Attribution Quartile	**C7**	**C8: The workshop(s) was/were...**				
3	Yes	a very important factor in your decision to do the project	-	3%	-	1%
		a somewhat important factor in your decision to do the project	-	-	15%	0%
	No		6%	-	-	3%
4	Yes	a very important factor in your decision to do the project	4%	2%	-	3%
		a somewhat important factor in your decision to do the project	-	5%	-	2%
		Made no difference in your decision	2%	5%	15%	4%
		Don't Know	1%	-	-	1%
	No		60%	22%	27%	42%
	Refused		-	1%	-	1%
All			**100%**	**100%**	**100%**	**100%**

C.3 OTHER RESPONSES

In Table C-32 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-32. Reasons for Installing Project

C31. To Summarize, what were the main reasons that you decided to go ahead with the project?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Commitment to Environment/Sustainability	46%	24%	36%	35%
To set an example/Educated others	6%	1%	-	4%
Reduce Energy Cost/Use	30%	35%	36%	32%
Reduce national dependence	3%	-	-	2%
Good Investment/Reimbursement/Good Payback	13%	3%	33%	9%
New construction, remodeling, expansion	11%	21%	-	15%
Replacing existing equipment/already equipped just not turned on	-	8%	15%	4%
Become energy independent	14%	2%	15%	8%
General interest in the technology	11%	18%	-	14%
Rebate(s) available/Financial feasible	27%	29%	33%	28%
Promote Company/Company's Job	11%	16%	-	13%
Other	14%	28%	15%	20%
Don't Know/Refused	-	1%	-	1%
All	**186%**	**188%**	**185%**	**187%**

Table C-33. Alternative Sources of Funding

C24. Did you receive rebates, grants, reduced financing, or tax credits from any other sources for this <TYPE OF PROJECT>?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Federal Tax Credit	80%	67%	67%	74%
US Department of Agriculture	3%	-	18%	2%
Utility Buyback Rates/Feed-in Tariff	45%	1%	67%	25%
Supplier/Manufacturer	-	-	-	-
Utility Grants/Financing	12%	27%	9%	19%
Other	5%	28%	9%	16%
No additional sources of funding	7%	11%	33%	9%
Don't Know/Refused	1%	4%	-	3%
All	**153%**	**138%**	**203%**	**148%**

Table C-34. Source of Utility Program Information

C27. Where did you hear about the Utility Programs?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Not aware of Utility Programs	40%	71%	33%	54%
Independent Research/the Internet	8%	4%	-	6%
Installer/Contractor	27%	4%	-	15%
MREA -Midwest Renewable Energy Association	7%	-	15%	4%
Friend/Relative/Colleague	3%	-	-	2%
Industry Source	-	-	-	-
Focus on Energy	-	-	15%	0%
Utility	14%	-	18%	8%
Site Assessment	1%	-	-	1%
Other	8%	3%	-	6%
Don't Know/Refused	2%	-	-	1%
All	**110%**	**82%**	**82%**	**96%**

Table C-35. Unexpected Benefits

Solar Electric
C33: What benefits did you get from the renewable energy system that you did not expect when you installed it?
A bonus is the website for monitoring production.
During a recent set of floods the homes with solar hot water were the only homes in the area with hot water.
I am getting money back from the utility.
I generated a good relationship with the utility.
I have no way of gauging how much we are saving on the solar water heater. With the solar electric system we are earning at most $185 a month so this is a tangible reward however as for the solar water heater we know we are getting some payback but not sure how much. But the system is maintenance free so for this reason we are satisfied with the results.
I have to fix a lot myself because I do not have a general contractor. So I have learned a lot about it and have helped others.
I received some education on the comparison of systems.
I was not expecting my bills to be so low.
It attracts attention. People talk with us.
It gives me a good feeling that I am producing my own energy. People ask us about it.
It may work better than we thought it would, better results, more kilowatts per hour.
None
That people do not even notice the solar panels. We love to watch the meter generate power and know we are reducing carbon.
The organization has received free publicity.
The performance is a little better than expected.

Solar Electric
C33: What benefits did you get from the renewable energy system that you did not expect when you installed it?
We are getting significant electricity production. My wife is no longer skeptical.
We are using less electricity and saving 30% on the electricity bill.
We did real time education and information with the meter. There is a public relations value.
We get self satisfaction and are more conscious of our use of electricity.
We got additional funds we did not know we would get. They look cool.
We were not expecting to get such a large payback through the utility from the production. We knew we would save, but we did not think we would not be paying any money at all on our utility bill.

Table C-36. Unexpected Benefits

Solar Hot Water
C33: What benefits did you get from the renewable energy system that you did not expect when you installed it?
Cold showers, does that count? This whole process had made me jaded.
During a recent set of floods the homes with solar hot water were the only homes in the area with hot water.
Having hot water all of the time, especially great for our whirl pool tub.
How much fun it would be to look at the control panel, I am excited about the savings, and it is solar, it is in my house.
I can say my basement is substantially warmer due to the solar heating.
I guess there were no surprises we got close to what we anticipated.
I have no way of gauging how much we are saving on the solar water heater. With the solar electric system we are earning at most $185 a month so this is a tangible reward however as for the solar water heater we know we are getting some payback but not sure how much. But the system is maintenance free so for this reason we are satisfied with the results.
I now have enough hot water.
I think I knew everything I could expect.
I would have to think about that, I do not know.
It attracts attention. People talk with us.
It causes us to be more conservative in our water usage if it is a cloudy day. We currently have the backup hot water tank shut off and for the last three months we have been completely dependent on our solar thermal storage tank.
It is nice to talk to people about the project and spread the word about solar. Get to set an example and educate people, you can tell they are interested, which gives you a sense of satisfaction to talk with them about what we did.
Just having a lot of hot water.
None
Nothing I am getting what I had expected.
Nothing, exactly what we planned.
On the plus side, the hot water system is very efficient and because my other tank is all electric

Solar Hot Water
C33: What benefits did you get from the renewable energy system that you did not expect when you installed it?
it is practically eliminated the standard tank.
Our project is on the contractor's website, kind of fun.
Return on investment is better than what we thought it would be.
Really none.
Still learning how it is working.
There has been a lot of public awareness and education of the community.
To get our water temperature up to 165 degrees was not something we expected the previous system hovered just a few degrees over 100.
We did not know how much hot water we would generate. We ran the plumbing for an outdoor shower and with the heat and humidity we keep out of the house, we are able to save a little energy cooling our home in the summer.
We got what we expected.
We no longer have complaints about taking too long of showers since we have the free hot water and our source of water is from a well or complaints about hot water used for laundry.
We save a lot on gas and we get plenty of hot water.

Table C-37. Unexpected Benefits

Wind
C33: What benefits did you get from the renewable energy system that you did not expect when you installed it?
Awareness, to look at energy efficient measures prior to contemplating a renewable energy source and the extent to which we are using energy.
I cannot say there was any.
I am happy with the electricity it produces, the way it looks, and given the opportunity I would like to allow Focus on Energy to provide tours to other prospective customers.
It pretty much followed what I expected. I guess everyone knows where I live now they make an immediate connection. And I even got my picture put in the local newspaper.
It serves as a great bird habitat too.
None
Only two months out of the last twelve did we got an electric bill and with the excess energy we create the utility buys it back.

Table C-38. Sources of Project Information

C2. From where or whom did you hear about <type of project>? Anywhere else?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Independent Research/the Internet	34%	13%	45%	25%
Installer/Contractor	11%	11%	15%	11%
MREA -Midwest Renewable Energy Association	21%	29%	15%	24%
Always knew about	36%	22%	-	28%
Friend/Relative/Colleague	6%	8%	9%	7%
Industry Source	12%	10%	-	11%
Previous Renewable system	22%	15%	45%	20%
Focus on Energy	3%	11%	33%	8%
Utility	9%	15%	-	11%
Site Assessment	-	-	-	-
News/media source	19%	5%	18%	13%
Energy fair/tour	15%	21%	9%	18%
Other	32%	36%	15%	33%
Don't Know/Refused	-	1%	-	1%
All	**221%**	**198%**	**206%**	**210%**

In Table C-39 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-39. Main Sources of Project Information

C3. As you were making decisions about the project, who or what were your main sources of information?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Within Company/Within Community	3%	18%	-	10%
Installer/Contractor	44%	40%	33%	42%
Utility	5%	-	-	3%
Focus	22%	27%	48%	25%
MREA	13%	15%	30%	15%
Internet/Independent Research	31%	14%	52%	24%
Family/Friends/Neighbor	4%	3%	-	3%
Personal experience/Previous system	11%	8%	18%	10%
Other people with systems	10%	3%	-	6%
Industry Sources	18%	14%	-	16%
Other	4%	2%	-	3%
Don't Know/Refused	-	1%	-	1%
All	**165%**	**147%**	**182%**	**157%**

Table C-40. Sources of Focus on Energy Information

C17. From Where or Whom did you hear about Focus on Energy? Anywhere else?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Installer/Contractor	37%	21%	9%	29%
MREA -Midwest Renewable Energy Association	16%	9%	15%	13%
Utility	11%	8%	24%	10%
Friend/Relative/Colleague	13%	3%	-	8%
Independent Research/the Internet	7%	6%	67%	9%
Site Assessor	3%	-	9%	2%
News/media source	14%	13%	9%	14%
Trade Association	9%	22%	9%	15%
Work in energy industry	11%	9%	-	10%
Other	12%	35%	15%	23%
Don't Know/Refused	8%	3%	-	6%
All	**143%**	**129%**	**158%**	**137%**

Table C-41. Awareness of Other Sources of Funding

C25/C26. What other programs that provide financial assistance for this kind of project are you aware of?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Federal Tax Credit	3%	-	-	2%
US Department of Agriculture	5%	-	9%	3%
Utility Buyback Rates/Feed-in Tariff	3%	-	-	2%
Supplier/Manufacturer	-	-	-	-
Utility Grants/Financing	4%	2%	-	3%
Other	-	5%	-	2%
No knowledge of additional sources of funding	86%	94%	91%	90%
Don't Know/Refused	1%	1%	-	1%
All	**103%**	**102%**	**100%**	**102%**

In Table C-42 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-42. Role of Contractor in Decision Making

C4. What role, if any, did your contractor(s) (supplier or installer) play in your decision to install the project?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
None	21%	45%	52%	33%
Self Install/Hired Own Contracting Company	4%	-	15%	2%
Confirmed Good Investment/ Economically Feasible/Production Rates	8%	11%	-	9%
Confirmed Physically Feasible/Location/Site Assessment	10%	5%	9%	7%
Informed of Incentive(s)	15%	10%	-	12%
Suggested Technology for System Already Decided/Size of System	12%	10%	24%	11%
Advised On Exact System	10%	6%	-	8%
Provided a Bid	5%	9%	-	7%
General Positive Feedback	34%	17%	-	25%
Gave General Help with Approval Process	2%	1%	-	2%
Designed System	-	3%	15%	2%
Provided a Good Price/Warrantee	13%	-	-	7%
General Negative Feedback	1%	2%	-	1%
Other	7%	8%	-	7%
Don't Know/Refused	-	1%	-	1%
All	**142%**	**126%**	**115%**	**134%**

Table C-43. Satisfaction with Project

Solar Electric	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar electric project?	
2 Somewhat dissatisfied	The materials are great. The installation and service is awful.
3 Somewhat satisfied	They are ok. We thought we would get more energy. We had problems with our utility charging for 2 meters.
	We cannot obtain the data on how much power the system is generating. The system was not properly tilted and was covered with snow for two months.
	We have not gotten any complaints, no news is good news.

Solar Electric	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar electric project?	
4 Very satisfied	After the completion of the project I talked with the contractor about full sized panels, so I like what I have.
	Because of the money it saves us each month.
	I am ecstatic because of the amount of production and I get a lot of positive feedback.
	I think the installation and the construction is good. It performs how we thought it would.
	It works very well.
	It works. It was free, reduces electric costs and seems long-term.
	It either meets or exceeds expectations.
	It generates power.
	It has surpassed what we estimated we would make.
	It is a good investment.
	It is aesthetically pleasing and is producing very well.
	It is covering 80% or more of our usage. It meets our goal. The money we owe is something we are comfortable with.
	It is doing what I expected.
	It is doing what it is supposed to do.
	It is in place, doing what I want and the investment was minimal. The energy goes in the grid and sometimes helps my neighbors.
	It is producing energy and I get a check for the energy I produce.
	It is producing well and we are getting money back. It is doing what we expected.
	It is producing what it was designed to produce and contributing to helping the environment.
	It is putting out what I thought it would at the least.
	It is working for us, reducing bills, and taking CO2 out of the air.
	It is working well. It is producing more than what we use.
	It is working well. The output is higher the first year than expected. We have had no problems with it.
	It meets more of my needs during the summer than using gas.
	It produces well and it cut my electricity by 40 percent.
	It runs really well, not a lot of maintenance and it is making a lot of electricity.
	It was installed correctly and they took the time to educate us on how the product works.
	It works well and it is producing what it was expected to.
	It works well.
	The productivity and reliability of the system has been very high.
	The system works very well, produces very well, I have had no problems, and it is great.
	The system is producing approximately what it was intended to produce.

Solar Electric	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar electric project?	
	There have been no problems and I am very happy.
	They did exactly as promised.
	We are getting money back from the utility.
	We are happy with the money spent, the credits we get and the low maintenance.
	We are over producing the estimate and getting checks every month.
	We are producing more electricity than expected.
	We are saving money and energy.
	We have not had to pay a utility bill. It is producing better than we thought it would.
	We have not had any problems.

Table C-44. Satisfaction with Project

Solar Hot Water	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar hot water project?	
1 Very dissatisfied	Not happy about it, I wish I would have never done it. I never have hot water when I needed it.
3 Somewhat satisfied	Because of the poor installation and leaking pipes.
	Hard for me to tell what the savings are since I cannot compare it to my previous bill because of household changes.
	Heating up the water, it is doing what it should be, reducing my water heat I am feeling slightly confident in adding another panel.
	It works well.
	Satisfied with water heating, dissatisfied with space heating component.
	The residents certainly see that they are saving money on water; they are pleased with the systems.
	We have not gotten any complaints, no news is good news.

Solar Hot Water	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar hot water project?	
4 Very satisfied	A few glitches, we had a broken line and lost fluid.
	Because I see how much hot water I have and they have done a great job.
	Because it has resulted in instant savings.
	Because it works even in the middle of winter.
	Because of the money it saves us each month.
	Free hot water.
	I brag about it to the extent that I annoy most people. The fact is if you are concerned about the environment you should be looking at ways to generate your own power.
	I have no problems and I get all the hot water I want.
	It could be better, it could be worse.
	It generates power.
	It heats the water and looks good.
	It is doing what I expected.
	It is producing well and there have been no problems.
	It lowers my bills.
	It was an enjoyable project and the new owner has a good system they can rely on.
	It works very well and lowers the bills.
	It works very well, saves energy and money.
	It works well, generates, and is a good product.
	It is an excellent system, rebates put it over the top. I was able to build the cost into my existing loan. I would advocate for people to do this.
	It is really performing like I had hoped it would. My natural gas prices have dropped 70-80 percent over these summer months. The water is so hot we have to be bit careful.
	Its saved us 600g of heated water
	Never expected the water temperature to get as hot as it did today at 165 degrees.
	The fact that we have been using 100 percent solar for the last five month I did not anticipate we could completely rely on solar and shut of our standard water tank. We spent an extra 100 dollars to have the plumbing option and it has been well worth it.
	The system generated enough hot water to have an outdoor shower.
	The system works great and the installer was very professional, knowledgeable of installations. His ability to install the pipe insulation and make it aesthetically pleasing was very much appreciated.
	The system works very well, produces very well, I have had no problems, and it is great.
	We have low gas usage.
	We knew when the sun is shining it would generate hot water.

Solar Hot Water	
E1: Overall, how satisfied or dissatisfied are you with the performance of the solar hot water project?	
	Works correctly and the payback is good.

Table C-45. Satisfaction with Project

Wind	
E1: Overall, how satisfied or dissatisfied are you with the performance of the wind project?	
2 Somewhat dissatisfied	I would prefer it be 15 kW rather than 10 kW so that it actually meets our electrical needs.
	It will never get to 10 kW because the voltage is inconsistent. The turbine is not high enough which is one of the reasons we added the capacitor to boost the power. And secondly, one of the blade tips bends, their designed to deflate all of the air off of it. One of the blades moves at a different speed from the others, about 10-12 mph, which makes it wobble and the tower to wobble when the wind speed picks up. The manufacturer is developing a replacement for our defective parts but it has been a long process although we are supposed to get it sometime in November.
3 Somewhat satisfied	I would like the wind to blow a little but more but the output is pretty much on target. Great installer.
4 Very satisfied	Although it is not producing as much as I had hoped it is operating and there is a savings and the cost is fixed.
	It is saving us electricity and working good.
	It is working well.
	Would like it if there were more wind.

Table C-46. Satisfaction with Focus on Energy

E2. Next I'd like to know how satisfied or dissatisfied you are with the Focus on Energy program.		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Satisfaction	E2. Why do you say that?				
1 (very DISsatisfied)	General Negative Feedback	-	2%	-	1%
2	None	-	-	-	-
3	Should raise incentive/Broaden Incentive Range	-	3%	-	1%
	General Negative Feedback	3%	5%	-	4%

E2. Next I'd like to know how satisfied or dissatisfied you are with the Focus on Energy program.		Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
Satisfaction	**E2. Why do you say that?**				
4	Gave Rebate/Made Project Economical	5%	-	-	3%
	Should raise incentive/Broaden Incentive Range	4%	2%	-	3%
	Elements of Program Unclear	3%	-	-	2%
	General Positive Feedback	7%	12%	-	9%
	General Negative Feedback	9%	5%	-	7%
	Great Resource/Helpful, Professional, Informative Staff	-	2%	-	1%
	Other	-	3%	-	1%
5 (very Satisfied)	Gave Rebate/Made Project Economical	31%	18%	18%	24%
	Easy to follow program	11%	1%	-	7%
	Should raise incentive/Broaden Incentive Range	3%	-	9%	2%
	General Positive Feedback	49%	28%	42%	39%
	General Negative Feedback	3%	-	15%	2%
	Great Resource/Helpful, Professional, Informative Staff	13%	17%	48%	16%
	Other	-	2%	-	1%
DK/Refused	None	4%	20%	-	12%
All		**147%**	**120%**	**133%**	**134%**

In Table C-47 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-47. Challenges with Project

C28. What types of challenges or obstacles, if any, did you encounter in the process of installing the project?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
None	41%	47%	42%	44%
Initial Cost	7%	3%	-	5%
Length of payback	1%	2%	-	1%
Unforeseen additional cost	1%	15%	-	8%
Shipping delays	-	-	15%	0%
Zoning, Town Regulation, Permits, Inspections	16%	15%	18%	15%
Contractor Problems	11%	13%	-	12%
Technical, Physical Issues	13%	28%	-	19%
Utility Issues	8%	-	-	4%
Weather	3%	3%	15%	3%
General installation delay	5%	-	-	2%
Other	17%	19%	18%	18%
Don't Know/Refused	1%	1%	-	1%
All	**124%**	**146%**	**109%**	**134%**

In Table C-48 respondents provided an open-ended response that a KEMA analyst later grouped into categories. One response may fall into multiple categories.

Table C-48. Resolution of Project Issues

C29. How were your problems resolved?	Solar Electric (n= 47)	Solar Hot Water (n= 63)	Wind (n= 7)	Overall (n= 117)
No problems	41%	47%	42%	44%
Had to wait	7%	-	30%	5%
Contractor/installer resolved issue	26%	10%	-	18%
Respondent resolved issue	30%	33%	-	31%
Respondent found other sources of funding.	7%	3%	-	5%
Not resolved	1%	2%	-	1%
Focus resolved issue	-	-	18%	1%
Focus incentive	3%	3%	-	3%
Hired additional help	-	-	-	-
Utility resolved issue	17%	10%	-	13%
Resolved by local officials	7%	12%	-	9%
Focus provided information	-	2%	-	1%
Other	8%	2%	9%	5%
Don't Know/Refused	-	-	-	-
All	**148%**	**124%**	**100%**	**135%**

Table C-49. Metered Data Sources for Wind Systems

Metered Data Used in Engineering Estimate?	Source	Number of Respondents
Yes	Inverter	3
	Separate Utility Meter	3
	Other (read out display from a week ago)	1

Under the direction of the PSCW, the evaluation team developed an alternative attribution analysis method called the life-cycle net savings (LCNS) method. The life-cycle method provides for a different treatment of accelerated measures and produces lifetime net savings instead of the first-year net savings produced by the current Focus evaluation method (Y1NS). The purpose of this analysis is to explore the viability of the life-cycle method as an alternative net savings methodology that takes a more nuanced approach to program attribution. This effort is part of the evaluation team's continued effort to adapt, adjust and refine the life-cycle method analysis assumptions. To that end, we:

1. Present results by program and technology
2. Compare the life-cycle method and results with those of the first-year method

We begin with a complete description of the life-cycle methodology and the factors used to calculate program realization rates, largely taken from the 2008 memo titled *Business Programs Life Cycle Attribution Analysis Results*.[31] In the next section, we report the results using the life-cycle method by program and technology, and compare the results determined using the life-cycle method with the results determined using the first-year method.

D.1 LCNS METHODOLOGY

D.1.1 Defining attribution analysis parameters

The LCNS attribution analysis is based on a number of parameters that are determined from the engineering review and participant survey, many of which are also used in the Y1NS method.

- **Installation rate.** This factor corresponds to the fraction of measures installed. Each measure is assigned a binary factor that identifies whether it was installed or not installed. Adjustments to the number of units installed for a particular measure are included in the engineering verification factor, not in the installation rate.
- **Engineering verification factor.** This is the ratio of the verified gross savings to the tracking estimate of gross savings for installed measures. The engineering verification factor includes corrections to the numbers of units installed, changes in operating hours, changes in operating levels, etc.
- **Attribution factors.** These factors are used to determine the proportion of the verified gross savings attributable to the Focus on Energy Programs. For Renewable measures, the attribution factors are determined from the participant's responses to a battery of survey questions designed to determine how influential the Focus on Energy Programs were in the decision to install a particular measure.

For Renewable measures, there is one attribution factor and two time periods that affect the final lifetime net savings in the life-cycle method.

[31] Tammy Kuiken and Shawn McNulty, KEMA. *Business Programs Life Cycle Attribution Analysis Results*. December 2, 2008.

- **Acceleration Period, m_a:** This is a measure of the effect the program had on when the equipment was installed. The Acceleration Period corresponds to the number of months between the time the equipment was actually installed and the time it would have been installed in the absence of the program. For respondents who say they would have installed at the same time or earlier without the program, $m_a = 0$. For those who say they would have installed later, m_a is the number of months later the equipment would have been installed, up to a maximum of 48.[32]

- **Measure Life, m_L:** This represents the amount of time a piece of equipment will remain installed and operating before being replaced by a new piece of equipment.

- **Quantity Attribution, A_Q:** This measures the effect the program had on the quantity of the equipment installed. The quantity attribution measures the proportion of savings attributable to the program for increasing the quantity of equipment above what would have been installed otherwise.

The acceleration period and quantity attribution are based on responses to the attribution questions in the impact evaluation survey.

The complement of attribution is free ridership. Attribution measures the portion of the savings that result because of the actions of the program. Free ridership measures the portion of the savings that would have happened in the absence of the program. The free ridership equivalent of the quantity attribution factors is used to determine the overall program net savings. It is:

- **Quantity Free ridership, f_Q:** This is the fraction of installed units that would have been installed without the program (free rider quantity factor). This value is also equivalent to the factor Q used in previous attribution analysis reports.

The free ridership values is easily calculated from the attribution factor.

- $f_Q = 1 – A_Q$

D.1.2 First-year attribution analysis

A detailed description of the first year net savings (Y1NS) Focus evaluation attribution methodology is available in Appendix E.

D.1.3 Life-cycle attribution analysis

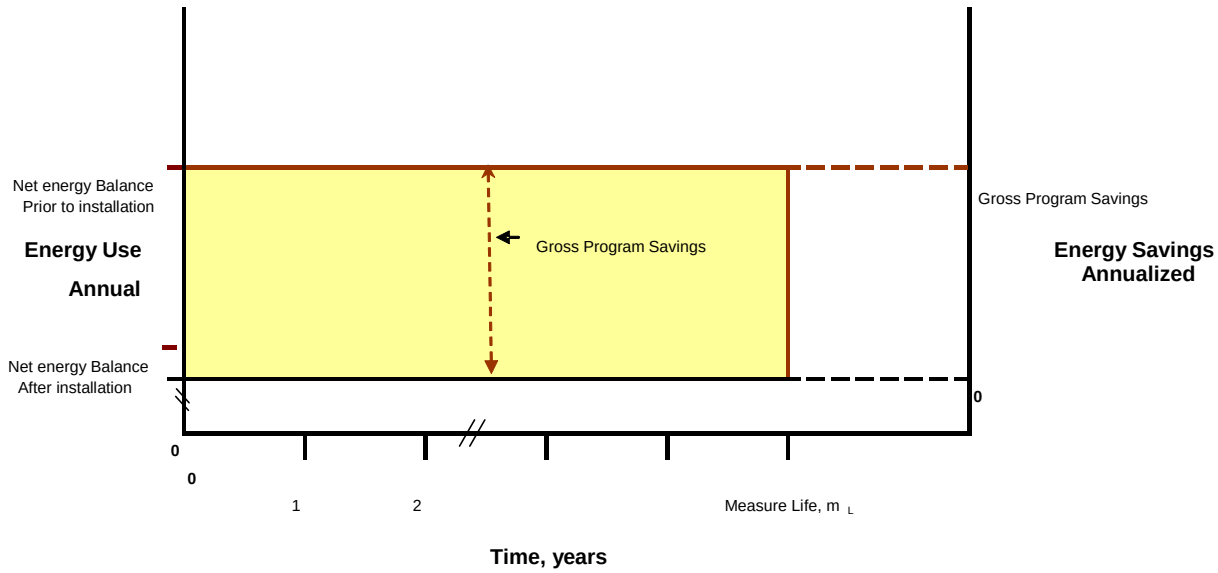
This section outlines the calculation methods necessary to determine net program savings using the attribution analysis parameters defined above.

The impact evaluation starts with the program-reported gross savings for a measure. The goal of the new methodology is to produce lifetime net savings as opposed to the first-year net savings produced with the current Focus evaluation methodology. If the program-reported

[32] More than 48 months of acceleration is functionally the same as a response of “never would have installed.” Measures with more than 48 months of acceleration are given full attribution and are not considered “accelerated.”

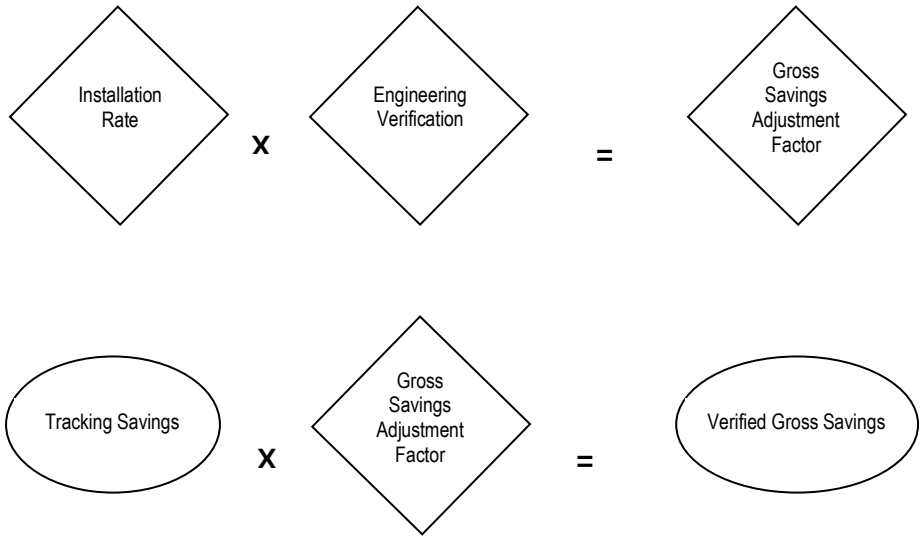
annual gross savings are combined with the measure life, m_L, then the simple lifetime gross savings can be plotted as shown in Figure D-1.

Figure D-1. Simple Lifetime Savings of a Focus on Energy Measure



The simple lifetime savings are simply the first year savings multiplied by the measure life.

The annualized verified gross (VGI) savings are determined by multiplying the annualized tracking savings (from the tracking database) by the installation rate and the engineering verification factor. The combined installation rate and engineering verification factor is also called the gross savings adjustment factor.



The final net savings are a function of the Simple Program Attribution (SPA) and the acceleration period. The SPA is the fraction of VGI savings that are attributable to the program and for renewable measures equals the inverse of the quantity free ridership.

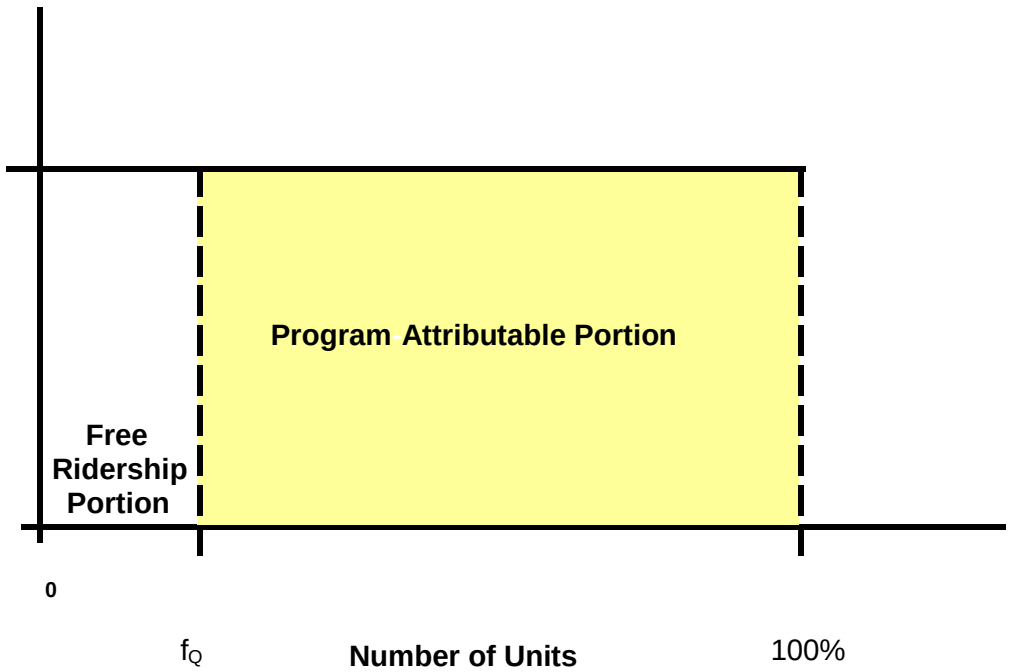
The fraction of VGI savings that would have occurred *without* the program is the fraction of units that would have been installed without the program, f_Q.

The SPA is the complement of this free rider portion.

$$SPA = 1 - f_Q$$

The relationship is illustrated in Figure D-2.

Figure D-2. Graphical Derivation of the SPA Equation



For a replacement measure with acceleration, the program caused the participant to install an renewable system before they originally intended to install it. During the acceleration period, the energy savings caused by the program are the full VGI savings. The VGI savings are either the electric generation of the system (in the case of biogas, solar electric and wind systems) or the energy offset by the installation of the renewable system (biomass, solar hot water). We call this value the Acceleration Period Savings.

There is no “net” or “gross” associated with the Acceleration Period Savings. The concept of acceleration already incorporates elements of net savings so no further adjustments to acceleration period savings are necessary (essentially Acceleration Period Savings are by definition 100 percent attributable).

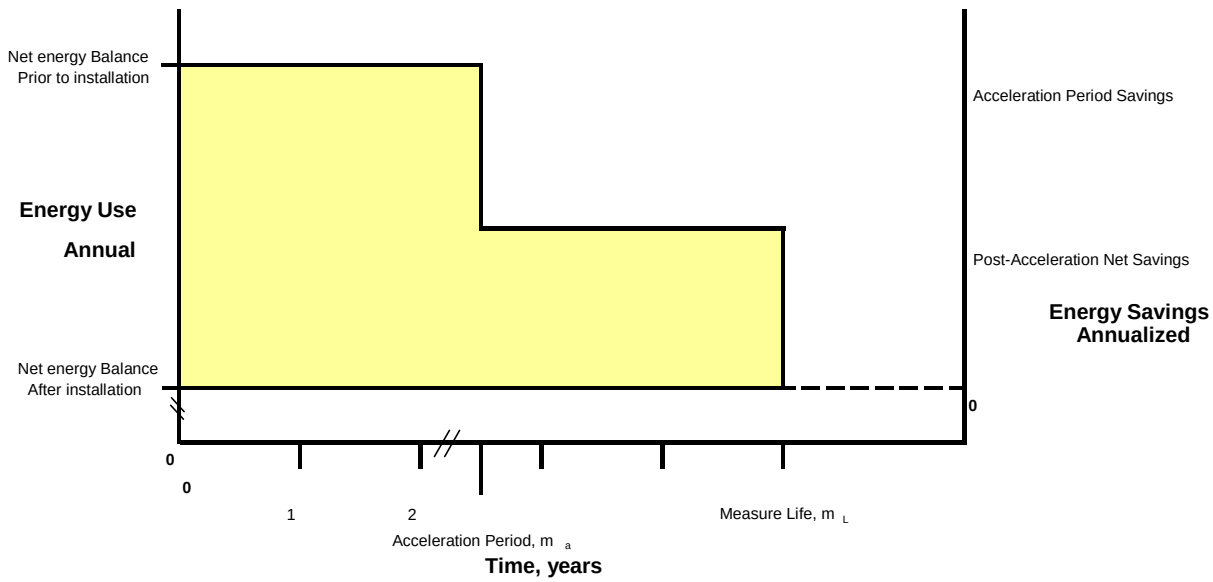
The post-acceleration net savings are equal to the VGI savings times the SPA defined above.

The lifetime net savings for an accelerated measure are the sum of the acceleration period savings and the post-acceleration net savings. This can also be written as

Lifetime net savings (accelerated) = Acceleration Period Savings + VGI * SPA

The lifetime net savings are shown graphically in Figure D-3.

Figure D-3. Simple Lifetime Net Savings



D.1.4 Determining attribution parameters

The attribution factors defined above are determined from the participant responses gathered during the survey. The survey questions and procedure for calculating the Acceleration Period, m_a , Quantity Attribution, A_Q, and incorporation of supplier effect is detailed in Appendix E.

D.1.5 Differences between life-cycle and first-year methods

In this section, we describe the important differences between the life-cycle and first-year methods.

a. SUMMARY OF DIFFERENCES

Like the first-year method, the life-cycle method calculates attribution as a ratio of net savings to a ratio of verified gross savings and the realization rate as a ratio of net savings to tracked savings; however, for renewable measures, the life-cycle approach has one significant difference in its estimation of net savings for the measure. The life-cycle method looks at the total lifetime savings of the equipment.

Table D-1 shows the differences in methodology among the first-year method and the life-cycle method.

Table D-1. Methodological Differences between Y1NS Method and LCNS Method

Assumption	LCNS	Y1NS
Type of savings	Lifetime savings	First year savings
Acceleration period net savings	Verified gross savings multiplied by the acceleration period.	n/a
Post-acceleration period net savings	Verified gross savings times the simple program attribution (SPA).	n/a
Net savings calculation	Acceleration period net savings plus post-acceleration period net savings	Verified gross savings times [SPA + (m_a /48)(1-SPA)]

D.2 ANALYSIS RESULTS

D.2.1 Measure life

To complete the analysis, we assigned measure lives to each measure in our analysis sample based on their technology.

Measure lives are taken from the 2009 Focus On Energy Benefit Cost Study.[33] Table D-2 shows the measure lives assigned in our analysis.

Table D-2. Measure Life in Years

Technology	Measure Life
Biogas	15
Biomass	20
PV	20
Solar Hot Water	20
Wind	20

D.2.2 Business Programs results

The LCNS method results in overall attributions of 69, 70, and 8 percent for kWh, kW, and therms respectively as shown in Table D-3. The highest attribution for kWh is solar electric with 70 percent. Attribution for solar hot water kW savings have a negative ratio because weighted net savings are slightly positive, while weighted VGI savings are negative.

[33] Miriam L. Goldberg, Bobbi Tannenbaum, Ben Jones, Betty Seto, Matt Pettit, Nicole Buccitelli, and Brian Bak, KEMA Inc. *Focus on Energy Evaluation: Benefit-cost Analysis CY09 Evaluation Report.* November 24, 2009.

Table D-3. Business Programs LCNS Attribution by Technology

Technology	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Biogas	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A				
Biomass	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A	2	*%	± 0.0%	± 0.0%
Solar electric	21	70%	± 13.9%	± 17.4%	21	70%	± 13.7%	± 17.3%				
Solar hot water	9	19%	± 30.1%	± 49.8%	9	-9%	± 68.0%	± 86.2%	9	30%	± 21.2%	± 36.8%
Wind	8	68%	± 13.3%	± 25.8%	8	68%	± 13.3%	± 25.8%				
Business Programs	**40**	**69%**	**± 10.7%**	**± 14.5%**	**40**	**70%**	**± 12.4%**	**± 15.8%**	**11**	**8%**	**± 0.4%**	**± 0.8%**

[a] The gross savings adjustment factor and the realization rate are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating these two adjustment factors.

Table D-4 shows overall LCNS realization rates of 89, 78, and 4 percent for kWh, kW, and therms respectively. The highest realization rate for kWh is solar electric with 69 percent. The realization rate for solar hot water kW savings is negative because weighted net savings are slightly positive, while weighted reported savings are negative.

Table D-4. Business Programs LCNS Realization Rate by Technology

Technology	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Biogas	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A				
Biomass	1	*%	± 0.0%	N/A	1	*%	± 0.0%	N/A	2	*%	± 0.0%	± 0.0%
Solar electric	21	69%	± 13.8%	± 17.4%	21	71%	± 13.5%	± 17.1%				
Solar hot water	9	19%	± 29.6%	± 49.1%	9	-6%	± 45.7%	± 58.0%	9	31%	± 21.8%	± 37.8%
Wind	8	48%	± 10.4%	± 19.3%	8	48%	± 10.4%	± 19.3%				
Business Programs	**40**	**89%**	**± 14.7%**	**± 19.8%**	**40**	**78%**	**± 13.8%**	**± 17.6%**	**11**	**4%**	**± 0.2%**	**± 0.4%**

[a] The gross savings adjustment factor and the realization rate are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating these two adjustment factors.

a. COMPARISON TO Y1NS

We expect attributions for all technologies to be lower using the LCNS method than the Y1NS method. This is because the measure lives for renewable systems are all longer than the four-year maximum acceleration period used in the Y1NS method. In a simple example, if a solar electric measure was accelerated three years, but had no other attribution (SPA=0), then its attribution under Y1NS is 3/4=75 percent. Under the LCNS method, the attribution on this measure would be the number of years accelerated divided by the measure life, or 3/20=15 percent.

All technologies have lower attributions using LCNS than using the Y1NS method as shown in Table D-5. Wind has the greatest reduction in attribution since more of its attribution is due to acceleration than is true for other technologies.

Table D-5. Business Programs LCNS vs. Y1NS Attribution by Technology

Technology	kWh			kW			Therms		
	CY10	LCNS	Difference	CY10	LCNS	Difference	CY10	LCNS	Difference
Biogas	*%	*%	*%	*%	*%	*%			
Biomass	*%	*%	*%	*%	*%	*%	*%	*%	*%
Solar electric	79%	70%	9%	79%	70%	9%			
Solar hot water	25%	19%	6%	-2%	-9%	7%	46%	30%	15%
Wind	93%	68%	25%	93%	68%	25%			
Business Programs	**80%**	**69%**	**11%**	**80%**	**70%**	**10%**	**38%**	**8%**	**30%**

* Ratio not reported to protect respondent confidentiality.

The realization rates have a similar pattern to the attribution ratios: again, wind projects show the greatest reduction in realization rate as shown in Table D-6.

Table D-6. Business Programs LCNS vs. Y1NS Realization Rates by Technology

Technology	kWh			kW			Therms		
	CY10	LCNS	Difference	CY10	LCNS	Difference	CY10	LCNS	Difference
Biogas	*%	*%	*%	*%	*%	*%			
Biomass	*%	*%	*%	*%	*%	*%	*%	*%	*%
Solar electric	78%	69%	9%	80%	71%	9%			
Solar hot water	25%	19%	6%	-1%	-6%	5%	47%	31%	16%
Wind	66%	48%	18%	66%	48%	18%			
Business Programs	**101%**	**89%**	**12%**	**88%**	**78%**	**10%**	**21%**	**4%**	**17%**

* Ratio not reported to protect respondent confidentiality.

D.2.3 Residential Program results

The LCNS method results in overall attributions of 58, 60, and 29 percent for kWh, kW, and therms respectively as shown in Table D-3. The highest attribution for kWh is solar electric with 63 percent.

Table D-7. Residential Program LCNS Attribution by Technology

Technology	kWh				kW				Therms			
			Margin of Error (90% Confidence)				Margin of Error (90% Confidence)				Margin of Error (90% Confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Solar electric	46	63%	± 7.1%	± 8.7%	46	62%	± 7.0%	± 8.6%				
Solar hot water	57	42%	± 22.4%	± 27.5%	56	42%	± 22.3%	± 27.4%	48	29%	± 8.0%	± 10.8%
Wind	7	28%	± 7.7%	± 27.0%	7	28%	± 7.7%	± 27.0%				
Residential Program	**110**	**58%**	**± 6.3%**	**± 8.0%**	**109**	**60%**	**± 6.7%**	**± 8.2%**	**48**	**29%**	**± 8.0%**	**± 10.8%**

[a] The gross savings adjustment factor and the realization rate are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating these two adjustment factors.

Table D-8 shows overall LCNS realization rates of 56, 60, and 27 percent for kWh, kW, and therms respectively. The highest realization rate for kWh is solar electric with 63 percent.

Table D-8. Residential Program LCNS Realization Rate by Technology

Technology	kWh				kW				Therms			
			Margin of Error (90% confidence)				Margin of Error (90% confidence)				Margin of Error (90% confidence)	
	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated	n[a]	Estimate	CY10	Extra-polated
Solar electric	46	63%	± 7.0%	± 8.6%	46	63%	± 7.1%	± 8.7%				
Solar hot water	57	33%	± 16.8%	± 20.6%	57	33%	± 16.8%	± 20.6%	48	27%	± 7.4%	± 10.1%
Wind	7	24%	± 6.4%	± 24.0%	7	24%	± 6.5%	± 24.4%				
Residential Program	**110**	**56%**	**± 6.0%**	**± 7.7%**	**110**	**60%**	**± 6.7%**	**± 8.2%**	**48**	**27%**	**± 7.4%**	**± 10.1%**

[a] The gross savings adjustment factor and the realization rate are not calculated directly but are products of other adjustment factors. Therefore, sample sizes reflect the minimum sample size used in calculating these two adjustment factors.

a. COMPARISON TO Y1NS

We expect attributions for all technologies to be lower using the LCNS method than the Y1NS method. This is because the measure lives for renewable systems are all longer than the four-year maximum acceleration period used in the Y1NS method. In a simple example, if a solar electric measure were accelerated by three years, but had no other attribution (SPA=0), then its attribution under Y1NS is 3/4=75 percent. Under the LCNS method, the attribution on this measure would be the number of years accelerated divided by the measure life, or 3/20=15 percent.

All technologies have lower attributions using LCNS than using the Y1NS method as shown in Table D-9. Wind has the greatest reduction in attribution since more of its attribution is due to acceleration than is true for other technologies.

Table D-9. Residential Program LCNS vs. Y1NS Attribution by Technology

Technology	kWh			kW			Therms		
	CY10	LCNS	Difference	CY10	LCNS	Difference	CY10	LCNS	Difference
Solar electric	81%	63%	18%	81%	62%	19%			
Solar hot water	58%	42%	16%	58%	42%	16%	33%	29%	4%
Wind	51%	28%	23%	51%	28%	23%			
Residential Program	**77%**	**58%**	**19%**	**79%**	**60%**	**19%**	**33%**	**29%**	**4%**

The realization rates have a similar pattern to the attribution ratios: again, wind projects show the greatest reduction in realization rate as shown in Table D-10.

Table D-10. Residential Program LCNS vs. Y1NS Realization Rates by Technology

Technology	kWh			kW			Therms		
	CY10	LCNS	Difference	CY10	LCNS	Difference	CY10	LCNS	Difference
Solar electric	82%	63%	18%	82%	63%	19%			
Solar hot water	45%	33%	13%	45%	33%	13%	31%	27%	4%
Wind	43%	24%	19%	43%	24%	19%			
Residential Program	**74%**	**56%**	**18%**	**79%**	**60%**	**19%**	**31%**	**27%**	**4%**

D.2.4 Conclusions

The life-cycle method results in lower realization rates for all projects for which the program impact is acceleration. Since acceleration is the predominant program impact, the overall effect of LCNS analysis is lower program effects. This is because all renewable projects have an estimated life of greater than 4 years. The life-cycle method provides a more realistic estimate of the lifetime savings attributable to the program than simply projecting the first-year results forward. We recommend the PSCW consider continued development and refinement of this method in addition to the current Focus (first-year) methods in future evaluations.

Conceptually, there are two key differences between the approaches:

1. The first-year approach treats the reported acceleration period more as an indicator of the likelihood the measure would have been installed without the program rather than as a literal indicator of the time until the measure would have been installed.
2. The first-year approach determines aggregate attribution for a program, sector, or portfolio weighting measures only by their estimated first-year savings. The life-cycle approach weights measures according to the estimated lifetime savings. Therefore, the first-year approach gives more weight to shorter-lived measures, with the life cycle approach weighing longer life projects more heavily.

Further work remains to be done on understanding how best to obtain meaningful information on timing of installations absent the program, or conversely on how to interpret self-reported acceleration. However, taking measure life into account in assessing aggregate attribution is important in its own right.

KEMA used the statistical procedure of ratio estimation to develop estimates of evaluation verified gross and net impacts. There are two basic steps in the process. The first step is to verify energy savings (offsets) in a sample of participating customers. KEMA accomplished this first step via engineering reviews, customer interviews, and supplier interviews. The second step is to expand the sample results to the population of customers. This is accomplished by calculating the ratios of verified-to-reported and attributable-to-verified for the sample. The ratios are also referred to in this analysis as adjustment factors. The adjustment factors estimated from the data collection and analysis include:

- **Gross savings adjustment factor.** This factor combines the installation rate and the engineering verification factor. It corresponds to the ratio of the verified gross savings to the tracking estimate of savings.
- **Attribution factors.** This factor adjusts verified gross savings for program attribution. It is the estimated proportion of verified gross savings attributable to the Focus Programs. It corresponds to the ratio of net savings to verified gross savings.
- **Realization rate.** This factor combines the gross savings adjustment factor and the attribution factor. It corresponds to the ratio of the net savings to the tracking estimate of savings.

E.1 EXPANSION OF SAMPLE RESULTS TO THE POPULATION VIA RATIO ANALYSIS

The calculation of the adjustment factors for tracking system gross and net savings uses appropriate weights corresponding to the sampling rate. The three primary adjustment factors are the installation rate, the engineering verification factor, and the attribution factor. Each of these is calculated as a ratio estimator over the sample of interest (Cochran, 1977, p.165). The formulas for these factors are given below.

Notation: The following terms are used in calculating the adjustment factors:

G_{Tj} = tracking estimate of gross savings for project *j*

G_{Ij} = tracking estimate of gross savings for project *j*, adjusted for non-installation

G_{Vj} = verified gross savings for project *j* based on engineering review

N_{Vj} = net savings determined from the survey.

w_j = weighting factor for project j used to expand the sample to the full population (case weight)

E.2 INSTALLATION RATE

The installation rate R_I is calculated from the sample as

$$R_I = \frac{\sum_{j\varepsilon} G_{Ij} W_j}{\sum_{j\varepsilon} G_{Tj} W_j}$$

E.3 ENGINEERING VERIFICATION FACTOR

The engineering verification factor R_V is calculated from the sample as

$$R_V = \frac{\sum_{j\varepsilon} G_{Vj} W_j}{\sum_{j\varepsilon} G_{Ij} W_j}$$

E.4 ATTRIBUTION FACTOR

The attribution factor R_{FR} uses data from the sample:

$$R_{FR} = \frac{\sum_{j\varepsilon} N_{Vj} W_j}{\sum_{j\varepsilon} G_{Ij} W_j}$$

E.5 STANDARD ERRORS

The ratio estimator is calculated using a SAS® macro provided by SAS for ratio estimation by domains. The procedure also returns the standard error of the estimate. The standard error is calculated using two methods.

The first method recognizes the sample as drawn from a finite population: the projects completed within the analysis period with associated energy impacts in the program-tracking database. This calculation uses the Finite Population Correction (FPC) factor. This factor is a reduction to the calculated variance that accounts for the fact that a relatively large fraction of the population of interest has been observed directly and is not subject to uncertainty. It is appropriate to apply precision statistics, such as confidence intervals, based on the standard error calculated in this manner when quantifying the results of the program during the study period only.

The second calculation treats the population of interest as essentially infinite. Thus, the projects completed to date and the sample selected from them is regarded as random instances of a virtually infinite number of projects that could have been completed under the program. In this case, the FPC is not included. It is appropriate to apply standard errors calculated in this manner when applying the verification factors developed from this study to tracked savings from other years to estimate verified savings in those years.

E.6 GROSS VERIFICATION FACTOR AND OVERALL REALIZATION RATE

The gross verification factor is the ratio of verified gross to tracking estimate of gross savings. This factor is calculated by chaining together the installation rate and the engineering verification factor:

$$R_G = R_I R_V = \left[\frac{\sum_{j\varepsilon} G_{Ij} W_j}{\sum_{j\varepsilon} G_{Tj} W_j} \right] \left[\frac{\sum_{j\varepsilon} G_{Vj} W_j}{\sum_{j\varepsilon} G_{Ij} W_j} \right]$$

This is an example of a chained ratio estimator using a nested sample. The standard error for the chained ratio is approximated by the formula

$$\mathrm{SE}\ \ \mathrm{AB} \simeq \mathrm{AB}\sqrt{\left[\left(\frac{\mathrm{SE(A)}}{\mathrm{A}}\right)^2 + \left(\frac{\mathrm{SE(B)}}{\mathrm{B}}\right)^2\right]}.$$

(This formula overstates the standard error, because it ignores the correlation between the numerator of R_I and the denominator of R_V, which reduces the variance of the product.)

Likewise, the overall realization rate is calculated by chaining together the gross verification factor with the attribution factor. The same approximation formula allows (an over-estimate of) the standard error of the realization rate to be calculated from the two separate standard errors.

This appendix provides a detailed explanation of the program attribution methodology used in this impact evaluation.

F.1 OVERVIEW OF APPROACH

The attribution analysis uses data collected from the engineering review, participant surveys, and supplier surveys. We calculate the following adjustment factors based on this data:

- **Installation rate.** This factor corresponds to the fraction of savings that were installed. Each project is assigned a binary factor that identifies whether it was installed or not installed. Adjustments to the size of the system installed for a particular project are not included in the installation rate, rather they are included in the engineering verification factor.

- **Engineering verification factor.** This is the ratio of the verified gross savings to the tracking estimate of gross savings for installed measures. The engineering verification factor includes corrections due to differences between the number of tracked and the number of verified units installed, changes in operating conditions, and errors in calculation or assumptions.

- **Attribution factors.** These factors are used to determine the proportion of the verified gross savings attributable to Focus on Energy. The attribution factors are determined from the participant's responses to a battery of survey questions designed to determine how influential the Focus on Energy Programs were in the decision to install a particular measure.

The two attribution factors that affect the final net savings are timing and quantity. Both attribution factors are based on responses to the attribution questions in the impact evaluation survey. The following is a brief description of each factor:

- **Timing attribution, A_T.** This measures the effect the program had on *when* the equipment was installed. The timing attribution is a linear function of the *Acceleration Period, m_a*, which corresponds to the number of months between when the equipment was actually installed and when it would have been installed in the absence of the program. For respondents who say they would have installed at the same time or earlier without the program, $m_a = 0$. For those who say they would have installed later without the program, m_a is the number of months later they say they would have installed, up to a maximum of 48.

- **Quantity attribution, A_Q.** This measures the effect the program had on the quantity of the equipment installed. The quantity attribution measures the proportion of savings attributable to the program for increasing the quantity of equipment above what would have been installed otherwise.

The complement of attribution is free-ridership. Attribution measures the portion of the savings that result because of the actions of the program. Free-ridership measures the portion of the savings that would have happened in the absence of the program. The free-

ridership equivalents of the attribution factors are used to determine program net savings. They are:

- **Timing free-ridership, f_T.** The timing free-ridership is also a linear function of the Acceleration Period, m_a, defined under Timing Attribution above.

- **Quantity free-ridership, f_Q.** This is the fraction of installed units that would have been installed without the program (free rider quantity factor). This value is also equivalent to the factor Q used in previous attribution analysis reports.

The free-ridership values are easily calculated from the attribution factors.

- $f_T = 1 - A_T$

- $f_Q = 1 – A_Q$

F.2 ATTRIBUTION ANALYSIS

The impact evaluation starts with the program-reported gross savings for a measure. This is the savings value reported by the program in the program tracking database. The verified gross savings are determined by multiplying the tracking savings by the installation rate and the engineering verification factor. The combined installation rate and engineering verification factor is referred to as the gross savings adjustment factor. These equations are illustrated in Figure F-1 and Figure F-2.

Figure F-1. Gross Savings Adjustment Factor Calculation

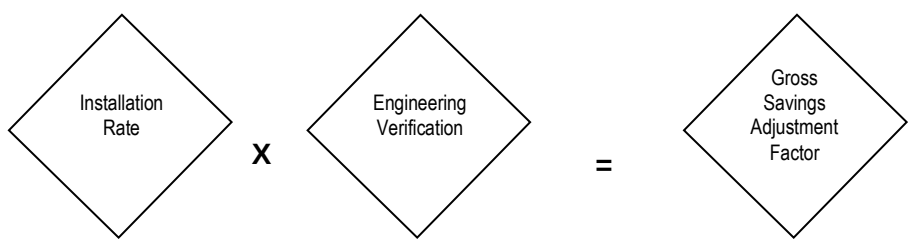
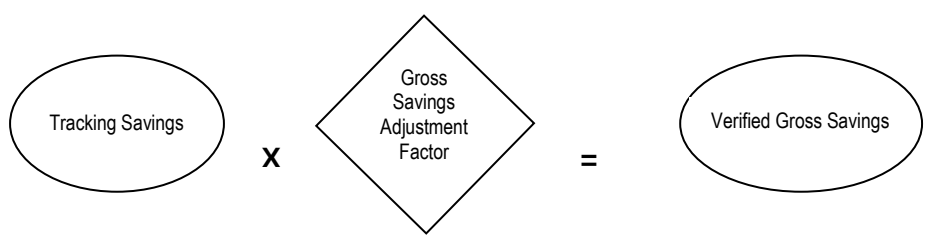
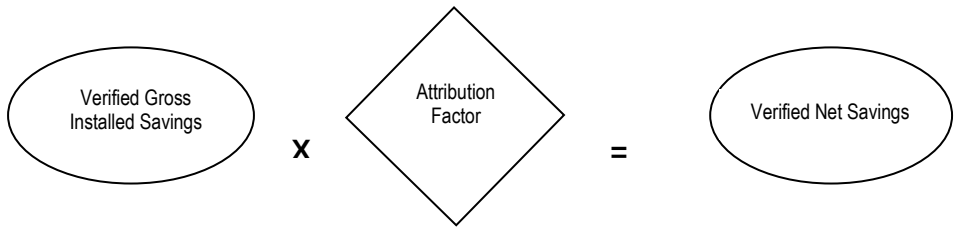


Figure F-2. Gross Savings Adjustment Factor Calculation



As shown in Figure F-3, the verified net savings for each measure are equal to the VGI savings multiplied by the overall **Attribution Factor, A**.

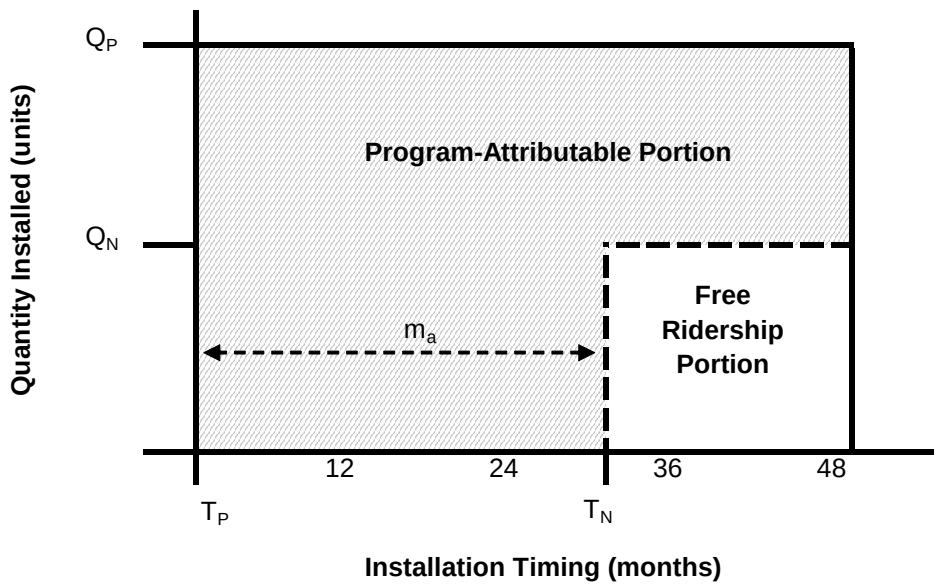
Figure F-3. Verified Net Savings Calculation



The overall attribution factor is a function of the quantity free-ridership and the timing free-ridership. The attribution factor is the fraction of VGI savings that are attributable to the program.

The relationship is illustrated in Figure F-4. Subscript **P** refers to "program-influenced" and **N** refers to "naturally occurring" (i.e., without program influence).

Figure F-4. Attribution Illustration



In Figure F-4, we see how the program-attributable portion of energy savings depends on the attributable quantity installed and the program influenced acceleration of installation.

The acceleration period can be calculated from this graph using:

$$m_a = T_N - T_P$$

The timing attribution then is calculated from the acceleration period using:

$A_T = m_a/48.$

Therefore timing free-ridership is calculated from the acceleration period using:

$f_T = 1 – A_T = 1 – m_a/48.$

The quantity attribution can also be calculated from this graph using:

$A_Q = (Q_P – Q_N) / Q_P$

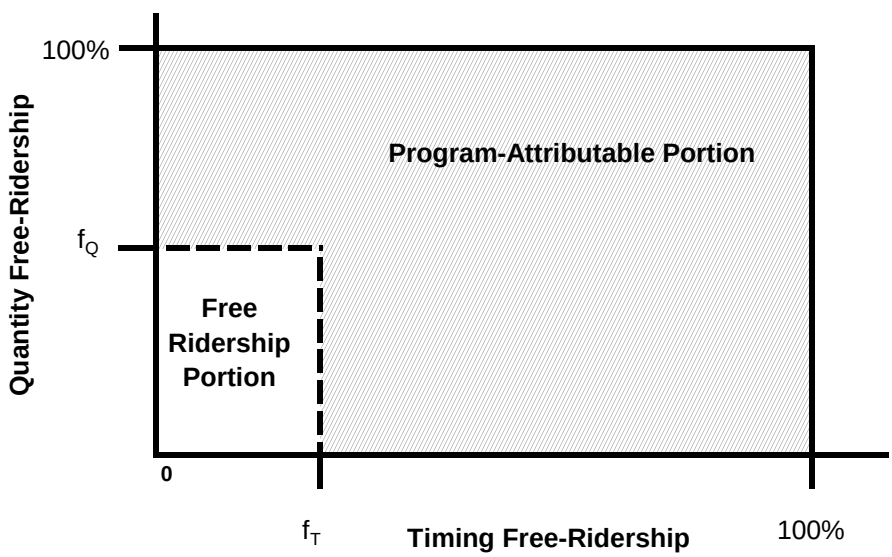
The overall attribution factor is

$A = 1 – f_Q f_T = A_Q + A_T (1- A_Q)$

Thus, if the measure was accelerated by more than 48 months, the timing free-ridership, f_T is 0 and the attribution is 1, regardless of quantity free-ridership, f_Q. If the measure was not accelerated at all, $f_T = 1$ and attribution is based solely on the quantity attribution.

Figure F-5 shows the attribution equation in graphical format.

Figure F-5. Graphical Derivation of the Attribution Equation



The net savings can be calculated

First-year net savings = VGI Savings * A

F.3 DETERMINING ATTRIBUTION PARAMETERS

The attribution factors defined in the previous section are determined from the participant responses gathered during the survey. This section provides an overview of the survey data

and how it is used to determine each attribution factor. It also includes more detailed sections for each factor that show exactly how all survey responses are handled.

F.3.1 General procedure

This section provides an overview of the attribution factors and how they are determined.

- **Timing attribution, A_T.** The timing attribution is determined directly from the acceleration period, m_a, which is in turn provided directly by the respondent. The timing attribution is equal to $A_T = m_a/48$ for values of m_a less than or equal to 48. There is no timing attribution effect for values of m_a greater than 48; in those instances we assume that the measure would never have been installed without the influence of the program.

- **Quantity attribution, A_Q.** The quantity attribution is based on the percent increase in quantity caused by the program, **Inc**, which is in turn provided directly by the respondent. The quantity attribution is equal to A_Q = Inc / (Inc + 100%).

The next few sections deal with determining the timing, efficiency, and quantity attributions on a more detailed level.

F.3.2 Detailed assignments

This section gives a detailed accounting of how the attribution factors are determined from the survey responses.

a. TIMING

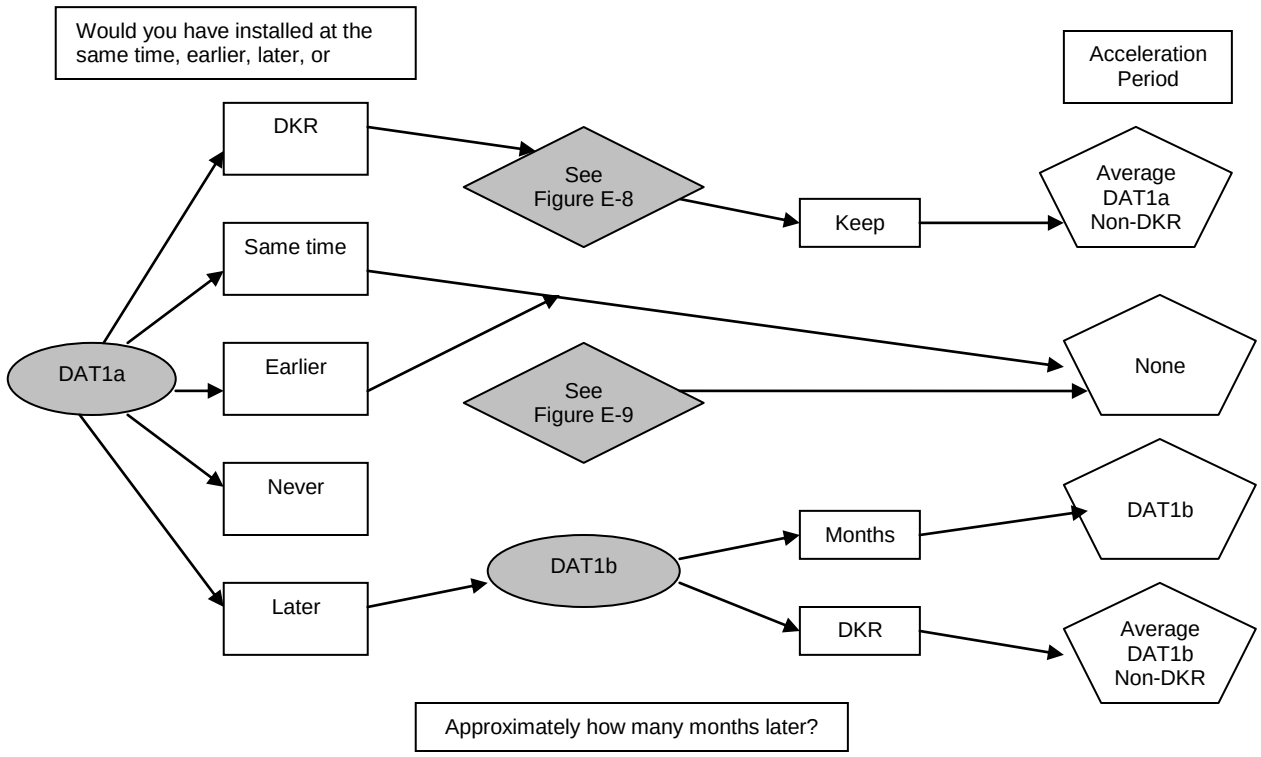
The timing attribution, A_T, is determined from the first set of attribution survey questions. These questions are used to determine whether or not Focus accelerated implementation of a measure or caused it to be implemented before it would have been without the program. The two relevant questions are DAT1a and DAT1b.

> DAT1a: "Without Focus incentives and other Focus assistance, how different would the timing have been? Would you say you would have installed (TYPE OF PROJECT] at the same time, earlier, later, or never?"
>
> DAT1b: "Approximately how many months later?" (DAT1b is only asked if DAT1a is "Later.")

b. DETERMINATION OF THE ACCELERATION PERIOD

Figure F-6 shows a decision tree for DAT1a and DAT1b. In the decision tree, "DKR" refers to "Don't Know" and "Refused."

Figure F-6. Decision Tree for the Acceleration Period



The measure is considered accelerated if the respondent indicates that the measure would have been installed less than four years later without the influence of Focus. The acceleration period is determined based on the answer to DAT1b. If the respondent is unable to answer DAT1b, the measure is assigned the average acceleration period across all accelerated measures of the same customer and project type.

If the respondent answers DAT1a with Earlier or Same Time then there is no acceleration period. If the respondent answers DAT1a with Never and the project is assigned full attribution. If the respondent answers DAT1a with Don't Know or Refused but does provide answers to inform the Quantity Attributions then the project is assigned the average Acceleration Attribution for all projects of the same customer and project type.

c. QUANTITY

Quantity Attribution, A_Q, gives the program credit for increasing the size of a renewable system beyond the size that would have been installed in the absence of the program. The two relevant questions are DAT3 and DAT3a.

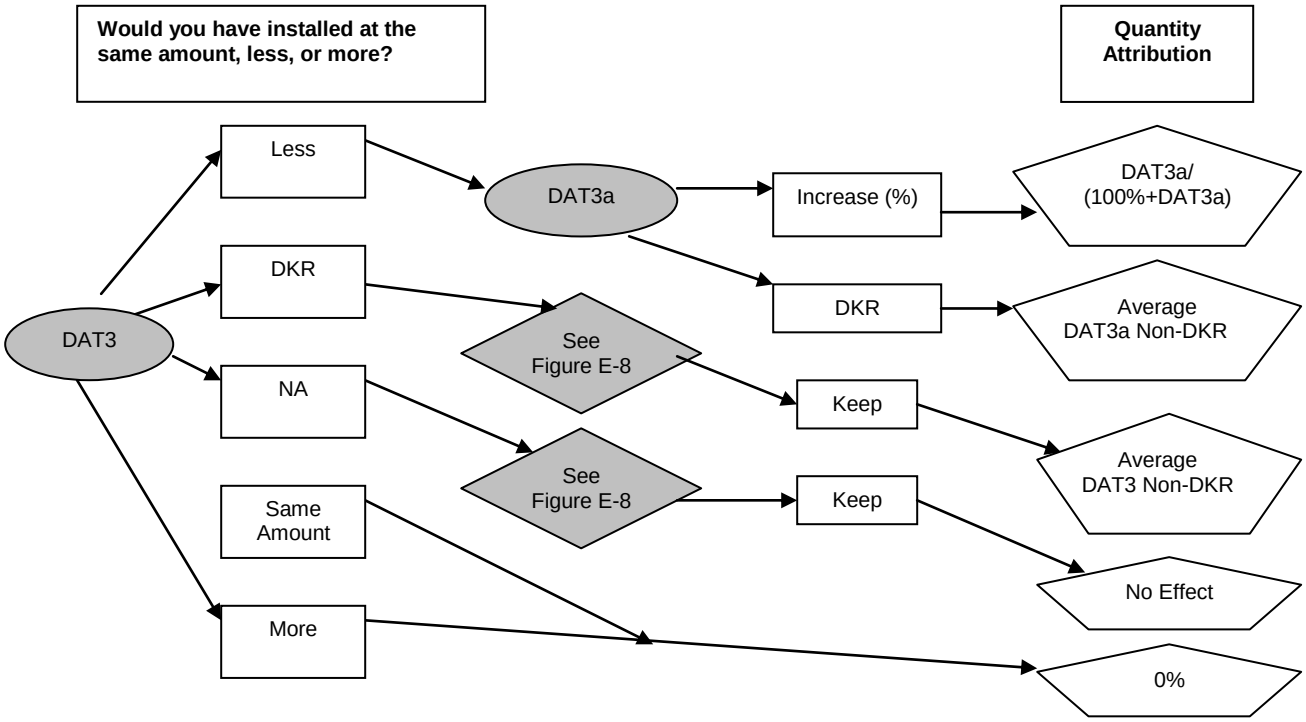
The questions below are from the round 1 survey.

> DAT3: "Without Focus on Energy, how different would the size of [PROJECT TYPE] installed have been? Would you say you would have installed the same amount, less, or more?"

DAT3a: "By what percentage did you increase the amount of [PROJECT TYPE] installed because of the Focus on Energy Program?" (DAT3a is only asked if DAT3 is "Less.")

Figure F-7 shows a decision tree for DAT3 and DAT3a.

Figure F-7. Decision Tree for Quantity Attribution



The program receives Quantity Attribution if the respondent indicates that they would have installed a smaller system without the influence of Focus. Quantity Attribution is

$$A_Q = Inc / (Inc + 100\%)$$

where

Inc = percent increase in quantity because of Focus.

If the respondent answers DAT3 with Same Amount or More then the survey skips to the next section and there is zero Quantity Attribution. If the respondent answers DAT3 or DAT3a with Don't Know or Refused but does provide answers to inform the Acceleration Period then the measure is assigned the average Quantity Effect for all projects of the same technology in the same sector.

F.3.3 What if they don't know or refuse?

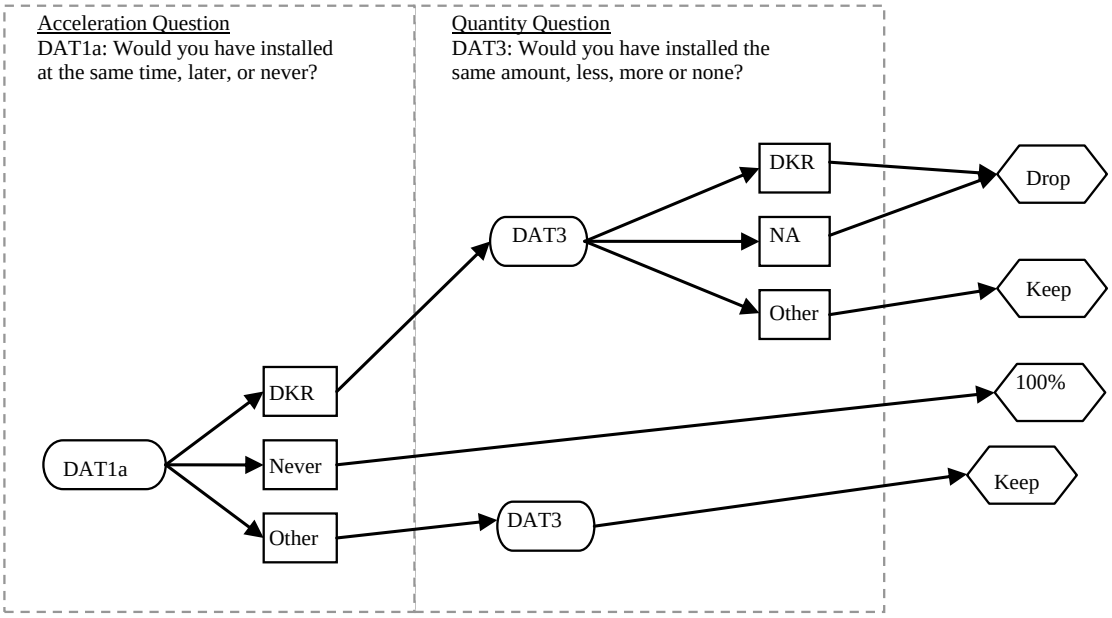
If a respondent is unwilling or unable to answer one of the attribution questions, the attribution is assigned the attribution value for the other attribution question. Some respondents are unable or unwilling to answer either of the attribution questions. If a participant is unable or unwilling to answer any of the attribution questions then the participant is dropped from the attribution analysis. However, the respondent information will still be included as part of the installation rate, engineering verification, and gross savings adjustment factors.

F.3.4 When quantity doesn't apply

Quantity questions do not apply to all measures: when only one unit of the measure could possibly have been installed through the program, and when the size of the given measure is not variable quantity becomes variable.

Figure F-8 shows a decision tree that indicates the relationship between the question responses and how they affect attribution. If a measure goes to the "Keep" decision then the ultimate resolution of each effect is shown in Figure F-7 and Figure F-8.

Figure F-8. NTG Case Retention Decision Tree for Don't Know/Refused/Not Applicable



F.4 INCORPORATING SUPPLIER EFFECT

KEMA currently determines when a supplier survey is necessary to supplement the participant survey after completing the interview. Each survey completed with a participant in our sample is reviewed to determine the effect the supplier had on the participant's decision to install a given measure relative to the program's effect. If a participant indicates that the program did not have a significant effect on their decision to install high efficiency equipment (attribution less than 75 percent) but the supplier had substantial influence then we will also complete a survey with the supplier.

F.4.1 Post-participant engineering survey analysis

The current supplier survey follows the same sequence of attribution questions that have been used for participant surveys in the past.

For measures with both participant surveys and supplier surveys the analysis will produce two separate attribution values. The first reflects the influence that Focus on Energy had on the participant's decision to install the project. The second reflects the influence that Focus on Energy had on the vendor's business practices and therefore their ability to sell the measure. We choose the higher of the two values as the final program attribution for that measure. That is, if either the supplier or the customer indicates that Focus influenced the decision to install the project, Focus is credited with influencing the decision.