

State of Wisconsin Public Service Commission of Wisconsin

Focus on Energy Evaluation

*Residential Programs: ACES CY09 Impact
Attribution Report*

December 3, 2009

Evaluation Contractor: PA Consulting Group

Prepared by: Jeremy Kraft, Laura Schauer, Kimberly Bakalars,
Bryan Ward, and Pam Rathbun, PA Consulting Group



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1. EXECUTIVE SUMMARY

1.1 OVERVIEW

The ACES program offers a full range of energy efficiency measures to owners and managers of apartments and condominiums. To encourage installations that are comprehensive, ACES offers a tiered approach for incentives with more comprehensive installations receiving higher incentives. Services are provided under the Existing Buildings and New Construction program components of ACES.

The Existing Buildings program component offers the energy efficiency services under two different efforts. Through the Whole Building portion, contracted energy advisors located throughout the state provide no cost building assessments to determine a building's energy usage, potential energy savings, and potential prescriptive and custom cash incentives for installed eligible measures in buildings of four units or more. The Direct Install component installs CFLs, low flow showerheads, and aerators at no cost in buildings of four units or more. In planning for calendar year 2009 (CY09), WECC expected participation levels to be 10,000 units for Existing Buildings and 14,000 units for Direct Install.

The New Construction component provides a full range of energy efficiency services to owners and developers of new multifamily buildings with four or more units. The program is designed to influence the project team early in the design process to include energy efficient measures in the buildings. Energy modeling is provided at no cost to the owner to encourage a whole building approach. The program offers both prescriptive and custom cash incentives. In CY09, WECC estimates participation levels to be 1,500 units.

In addition to the Whole Building and New Construction components, there is a pilot program, the Rental Housing Energy Efficiency Program (RHEEP), which combines the building shell measures offered by Home Performance with ENERGY STAR and the prescriptive measures offered through the ACES program for two- and three-unit apartments that are not occupied by the owner. This was originally piloted in the Madison and Oshkosh metropolitan areas, but Oshkosh was dropped from the pilot this year. There has been minimal activity in this pilot program so far this year resulting in no evaluation at this time.

This report summarizes the net impact results based on primary data collection conducted in 2009 with participants of the New Construction, Whole Building, and Direct Install components of the Apartment and Condominium Energy Services program (ACES). Additional research is planned that is expected to provide additional insights on these findings.

1.1.1 ACES net impact evaluation approach

The analysis for this report drew upon two primary research activities—telephone surveys with Whole Building and Direct Install participants (the survey instrument is provided in Appendix A) and in-depth interviews with New Construction participants (the IDI protocol is provided in Appendix B). Across all three program components, PA interviewed 240 respondents representing 276 individual projects. The interviews were conducted between July 2 and August 21, 2009. This report also briefly discusses the purchase of CFLs by tenants in multi-family housing based on data collected for the Wisconsin ENERGY STAR® lighting evaluation conducted in July 2009.

Consistent with the protocols for Focus, PA provided WECC and the PSC the opportunity to review the survey and sampling plan prior to conducting the research. Key differences in the net impact evaluation approach taken for this report vs. the last net impact report¹ are:

- Sampling was done at the measure category level for the Whole Building component. (Note that for the Direct Install component sampling at the project level provides robust results at the measure category level because all projects include both measure categories)
- For the New Construction component, interviews were conducted by consulting staff and rather than interviewers using computer-assisted telephone interviewing software.

A. ENERGY IMPACTS

For the CY09 impact research and analysis, we again used self-reported methods based on the criteria agreed upon for attribution method selection². This approach was similar to that used in the 18-month Contract Period (18MCP). The survey developed for the 18MCP evaluation was based on the NTG whitepaper prepared by the evaluation team. Minor modifications were made to the survey based on experience from implementation of the survey for the 18MCP. Especially for the New Construction program component, these modifications resulted in more detailed questions on existing plans and the timing and extent of program staff involvement in the project.

As proposed, PA added questions to the net-to-gross (NTG) battery to further investigate awareness and impact of other influences such as the pending stimulus funds. Across all program components, there was no mention of any other funding besides that received through the ACES program. In addition to program attribution, the survey addressed measure installation and use characteristics (e.g., quantities, equipment efficiencies, and operating hours), spillover, and limited program process issues.

¹ Bryan Ward, Pam Rathbun, Laura Schauer, and Jeremy Kraft, PA Consulting Group. *Focus on Energy Evaluation Residential Programs: ACES Impact Attribution*. February 20, 2009.

² Please refer to the following white paper for a more detailed discussion. Miriam Goldberg, Oscar Bloch, Ralph Prah, David Sumi, Bryan Ward, Rick Winch, and Tom Talerico, *Net-to-Gross Method Selection Framework for Evaluating Focus on Energy Programs*, March 16, 2006.

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B. MARKET EFFECTS

The FY08 self-report survey indicated some evidence of program-related spillover savings; however, these savings could not be quantified simply based on the data we collected from participants. In order to quantify the savings during this round of data collection, we revised the survey to attempt to gather more information on the installed equipment in order to estimate savings for those cases where customers are able to provide enough information about the equipment. Based on these revisions, we were able to estimate spillover savings as part of the CY09 impact research.

C. PROCESS

The self-report participant survey included a number of process related questions regarding participants' experiences through the program. The findings from these questions are included later in this report. We believe that it is worthwhile to capture information on process issues when conducting the impact surveys.

The remainder of Section 1 consists of the key findings from the primary data collection with program participants. Section 2 summarizes the methodology for this portion of the evaluation. Section 3 provides detailed results of the primary data collection conducted in 2009 for the Apartment and Condominium Energy Services program (ACES). Results are presented on the following topics, which include details for the Whole Building, Direct Install, and New Construction components of the program.

- Program attribution
- Spillover
- Source of program information
- Perceived program benefits
- Barriers to energy efficiency installation.

Following this evaluation, PA will conduct interviews with contractors who participated in the Whole Building program component in order to determine any supply-side and market transformation effects attributable to the ACES program.

1.2 KEY FINDINGS

This section summarizes the key findings. These findings, and supporting evidence, are detailed in the remainder of the report.

1.2.1 Program impacts

The overall net-to-gross rate for the ACES program is 62.4 percent of the year one kWh savings and 49.0 percent of the year one therms savings. The New Construction program component has the highest net kWh rate and Direct Install has the highest net therms attribution ratio. The attribution rates for each of the ACES program components were calculated using participant self-reports through telephone interviews (Table 1-1) and include spillover savings.

Table 1-1. Attribution Rate for ACES by Program Component

Program Component	Projects Surveyed/ Project Population	Measures	kWh Attribution Rate	90% Confidence Interval	Therms Attribution Rate	90% Confidence Interval
Direct Install	64/562	126	70.1%	± 8.9%	66.1%	± 9.2%
New Construction	25/45	132	75.6%	± 9.4%	49.2%	± 11.0%
Whole Building	187/520	217	48.1%	± 4.8%	36.4%	± 4.6%
Overall	276/1127	493	62.4%	± 4.2%	49.0%	± 4.3%

Data is weighted by savings and non-response.

Program participants reported implementing additional energy efficiency measures outside of the program that we have estimated result in unweighted spillover savings of approximately 358,768 kWh and 14,871 therms. These spillover savings represent less than one percent of the gross Direct Install kWh savings, 5.4 percent of the gross Whole Building kWh savings, and 1.5 percent of the gross Whole Building therms savings. No spillover savings could be attributed to the New Construction initiative.

Based on self-reports through the telephone interviews, respondents stated that they had installed similar energy efficient equipment outside of the program. The majority of the kWh spillover savings were attributed to water heaters and lighting and a majority of the therms spillover savings were attributed to shell measures and boiler clean and tunes. It is unclear why participants did not apply for incentives for these measures. Additional questions would need to be added to the survey to determine the rationale.

1.2.2 Process findings

Participants were most likely to hear of the program through ACES or Focus staff.

Participants most frequently cited ACES or Focus staff when asked how they heard about the program. Participants also mentioned other property owners, contractors and vendors, mailings, and contact with the utility as other sources of information.

The primary program benefit cited by participants was reduced energy costs. When asked what benefits they have realized at their property(s) as a result of participating in the program, participants most often cited reduced energy costs. Increased tenant comfort, increased lighting levels, increased tenant savings, and being able to market themselves as “green” were other benefits mentioned frequently.

Participants said they would participate again. Over 95 percent of the new construction participants said they would participate in the program again³. Additionally, a majority of participants said they have already recommended the program to other owners and building managers.

Respondents provided several areas of improvement for the program and discussed barriers to program participation. Participants had few suggestions for program changes,

³ Whole Building and Direct Install participants were not asked this process question.

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but possible improvements mentioned were incentives for additional measures, reduced paperwork, better advertising, and more input and guidance from Focus staff. The barriers participants reported most often when considering or seeking approval for new projects were budget and return on investment. New Construction participants also mentioned their own lack of knowledge about new products and uncertainty of equipment reliability as barriers.

1.3 ORGANIZATION OF THIS REPORT

The remainder of this report summarizes the study methodology (Section 2), the energy impacts of the program (Section 3), and detailed process findings (Section 4). The survey instrument for Whole Building and Direct Install can be found in Appendix A and the New Construction IDI protocol can be found in Appendix B.

2. METHODOLOGY

This section discusses the study methodology, including the sampling strategy for identifying and speaking with the appropriate respondent.

2.1 SAMPLING

The ACES customer population includes projects in three program components: Direct Install, New Construction, and Whole Building. WECC provided PA with the population of ACES participants from April 1, 2008, to March 31, 2009. Projects are defined by their customer ID number and the location at which the project was completed. The sample design to examine the ACES customer population is stratified by the three program components. We further stratified by measure for the Whole Building component.

For the Direct Install component, we sampled at the project level. However, there are only two measure categories in the Direct Install component and both are installed for all projects. Therefore, the sample design yielded roughly the same sampling error at the project- and measure-levels for the Direct Install component.

For the New Construction component, we drew a 100 percent sample of all projects (a census). This component had far fewer completed projects relative to the other two components and we included all to ensure adequate coverage of the population. However, given the small number of measures installed through this component, sampling error at the measure level is relatively high. Attribution rates are only statistically reliable in aggregate.

For the Whole Building component, we stratified the sample at the measure category level. The Whole Building component includes ten measure categories. We subdivided these into five groups. Four of the measure categories (heating equipment, water heating equipment, lighting, and boiler clean and tunes) realize a majority of the component savings and each of these four was defined as sample strata. Defining these four as separate strata ensured adequate sample sizes to estimate attribution rates at desired levels of precision for these measures. The remaining six measure categories were combined into a single (fifth) stratum. The sample size for the fifth strata is not large enough to estimate attribution at the measure level. This fifth stratum is used to increase the precision of the attribution at the program component level.

Sampling Whole Building measures instead of projects allows some attribution rates to be interpreted at the measure level instead of in aggregate at the program component level. This is a result of sample size and the corresponding sampling error. All things being equal, smaller samples of a population have greater sampling error than larger samples. However, if subgroups are to be examined (in our case, specific measures), a larger sample may be necessary as the margin of error for each subgroup is determined by the number of people in it. For example, although a national survey with a probability sample of 1,000 adults has a margin of error of roughly 1–3 percentage points (using a 95% confidence interval), analyses of responses from the African Americans in that sample (who would probably number about 100) would have a margin of error of roughly 4–10 points. For this research, in order to decrease the sampling error around attribution rates of the selected Whole Building measures, a larger sample of the population was drawn for the four measure categories. While we present results for other measures in the fifth stratum, those results are only reliable in aggregate at the program component level due to high sampling error. When presented in

aggregate, the results are more reliable as we infer they represent a less specific population (the program component instead a specific measure sub-group). We have provided confidence intervals to clarify the sampling error of the results at the project and measure level in Tables 3-6, 3-8, 3-9, and 3-10.

Table 2-1 details the number of projects included in the study within each program component along with the number of projects surveyed. In total, telephone surveys or in-depth interviews were completed on 276 projects, with 240 participants⁴.

Table 2-1. ACES Sampling and Survey Summary by Program Component

Program Component	Sampling Method	Population	Telephone	
			Sampled	Completed
New Construction	Census	45	45	25
Whole Building	Sample	520	366	187
Direct Install	Sample	562	134	64
	<i>Telephone random sample</i>	547	119	59
	<i>Telephone high savers (top 10%)</i>	15	15	5
Total		1127	545	276

Table 2-2 details the response rate to the telephone survey by program component. To maximize the response rate, we made an average of six attempts over the field period to contact participants to complete the survey. In addition, experienced interviewers attempted to convert any refusals to complete the interview.

Table 2-2. ACES Detailed Telephone Response Rate by Program Component

	Direct Install	New Construction	Whole Building
Starting sample	134	45	366
<i>No working number</i>	10	2	48
<i>No knowledgeable respondent</i>	4	1	9
Adjusted sample	120	42	309
<i>Refusal</i>	6	0	24
<i>Active sample</i>	56	17	122
Completed surveys	64	25	187
Response rate	53%	60%	61%

The types of measures sampled varied by program component. Tables 2-3 through 2-5 detail the types of measures included in each program component, the number sampled from each category, the number of measures represented in the survey data, and the percent of overall savings coverage. Note that summing the measures will not equal the number of projects detailed above as more than one measure type is typically installed for each project.

⁴ Some respondents represented multiple projects.

Only two types of measures are installed via the Direct Install program component—lighting and water saving measures. Table 2-3 shows the Direct Install population, sample size, and number of measures surveyed by sampling category. Sampling categories were split between high savers (a census of the 11 projects with the highest savings) and the random sample group that was selected from the remaining sample. The table also details the percentage of the population kWh and therms savings covered by the surveyed participants.

The response rate for the Direct Install high savers group is lower than expected as several of the projects were represented by the same point of contact. Despite a minimum of six attempts, we were unable to complete an interview with several of these participants.

Table 2-3. Direct Install Measures Surveyed for Net-to-Gross Estimates

Measure		Direct Install Measures						
		Population	Sampled	Surveyed	kWh Savings in Population	kWh Savings Covered by Survey	Therm Savings in Population	Therm Savings Covered by Survey
Lighting	High savers	11	11	2	1,209,648	14.50%	NA	NA
	Random sample	522	118	60	4,542,487	11.50%	NA	NA
	Total	533	129	62	5,752,135	12.10%	NA	NA
Water saving devices	High savers	11	11	3	265,349	39.10%	201,528	21.10%
	Random sample	545	125	61	3,757,311	7.30%	605,701	11.20%
	Total	556	136	64	4,022,660	9.40%	807,229	13.70%
Total		1089	265	126	9,774,795	11.00%	807,229	13.70%

PA called a census of the projects in the New Construction program component. Of those 45 projects, the majority installed heating, lighting, and insulation. Table 2-4 presents the number of measures in the New Construction program component and the number surveyed.

Table 2-4. New Construction Measures Surveyed for Net-to-Gross Estimates

Measures	New Construction Measures						
	Population	Sampled	Surveyed	kWh Savings in Population	kWh Savings Covered by Survey	Therm Savings in Population	Therm Savings Covered by Survey
AC	18	18	8	65,337	39%	NA	NA
Clothes washer	27	27	14	41,444	49%	1,024	25%
Dishwasher	24	24	13	38,334	33%	1,839	35%
Heating equipment	36	36	15	-636,911	105%	179,102	67%
Lighting	36	36	18	1,627,017	56%	NA	NA
Other	21	21	12	132,478	58%	3,600	32%
Refrigerator	27	27	16	36,234	46%	NA	N/A
Insulation	29	29	14	99,775	46%	26,623	58%
Water heating	20	20	12	165,303	37%	-562	14%
Water saving devices	15	15	10	57,249	84%	17,310	63%
Total	253	253	132	1,626,260	41.40%	228,936	59.50%

Table 2-5 details the measures included in the Whole Building program component. Again, the most prevalent measures were heating and lighting equipment. However, an effort was made to include a large percentage of the boiler tune-ups and water heater measures in order to report attribution rates with confidence at the measure level.

Table 2-5. Whole Building Measures Surveyed for Net-to-Gross Estimates

Measure	Whole Building Measures						
	Population	Sampled	Surveyed	kWh savings in Population	kWh Savings Covered by Survey	Therm Savings in Population	Therm Savings Covered by Survey
Air conditioner	14	7	3	11,371	6.3%	NA	NA
Clothes washer	65	25	6	167,928	13.5%	7,915	12.2%
Dishwasher	21	11	1	22,590	12.7%	1,250	12.8%
Heating equipment	166	116	52	654,306	17.2%	567,857	32.5%
Boiler clean and tune	115	74	40	NA	NA	328,450	23.1%
Lighting	127	125	79	4,525,182	47.3%	NA	NA
Other	23	11	5	149,189	7.3%	11,500	20.1%
Refrigeration	9	3	2	15,941	18.6%	NA	NA
Shell	48	17	7	72,391	14.4%	60,102	13.3%
Water heating	42	42	22	869,059	46.9%	2,568	466.4 % ⁵
Total	630	504	217	6,487,956	41.8%	979,643	29.0%

⁵ Some water heating measures in the Whole Building category were credited with therm savings while others were credited with therm penalties. Though we attempted to contact all projects with water heating measures installed, we were unable to complete surveys with several projects that contained large therm penalties, which results in this high coverage rate.

2.2 WEIGHTING METHODOLOGY

The data was weighted to account for non-response and magnitude of annual first year savings. To ensure the survey data was reflective of the population (defined by first year kWh and therms savings), the data was stratified and savings weighted by program component, measure, and, in the case of Direct Install, high savers and random sample.

Savings weighting ensures that attribution for a specific measure has the appropriate impact on the overall attribution rate. Figure 1-1 provides a simplified illustration of how weighting by savings impacts the net-to-gross analysis. In this example, the analysis estimates the weighted net-to-gross ratio for a Direct Install project that installed lighting and electric water savings measures. Note that this figure is for illustrative purposes only and does not represent actual calculations for a program component attribution rate.

Figure 2-1. Illustration of the Impact of Weighting by Savings on Net-to-Gross Rates

Direct Install Lighting Measures through Project	Direct Install Water Saving Measures through Project
<i>Hypothetical situation.</i>	
Calculated attribution rate = 75%	Calculated attribution rate = 25%
Annual savings = 10,000 kWh	Annual savings = 1,000 kWh
<i>Calculate kWh attributed savings.</i>	
Attributed savings = $10,000 \times 75\% = 7,500$	Attributed savings = $1,000 \times 25\% = 250$
<i>Sum the attributed savings and population savings.</i>	
Total attributed savings = $7,500 + 250 = 7,750$ kWh	
Annual project savings = $10,000 + 1,000 = 11,000$ kWh	
<i>Divide the total attributed savings by population savings to determine weighted attribution rate for project.</i>	
Net attribution rate = $7,750 / 11,000 = 70\%$	

As the illustration shows, lighting measures result in higher savings than water saving measures and subsequently have a greater impact on the overall attribution rate when weighted by savings.

2.3 TARGET RESPONDENT

Since one key objective of the data collection efforts was to understand the influence of the program in their decision to implement the energy efficiency measure(s), it was critical to identify the individual most responsible and involved in the decision-making process. The survey specifically asked if the respondent (identified via the program database) was directly involved in the decision-making process and, if not, attempted to identify the appropriate person to speak with.

The questions in the telephone survey that addressed this issue are as follows:

- C5** Were you personally involved in the decision of whether or not to install/receive the energy efficient [measure types] at [business name] in [city] through this program?
- C6** [IF PERSONALLY INVOLVED] Was anyone else within or outside your organization involved in the decision of whether to install/receive this equipment/ this service through this program? [COLLECT OTHER CONTACT NAMES IF NECESSARY]
- C7** [IF NOT PERSONALLY INVOLVED] Who else was involved in the decision of whether to install/receive this equipment/ these services at this location? How are they affiliated with this property and what was their role in the decision? [COLLECT OTHER CONTACT]

In order to minimize respondent burden and maximize response rate, respondents that were identified as being the primary contact for multiple projects were grouped together. Of the 276 projects interviewed by telephone, 107 were completed by a senior interviewer or consultant who interviewed 38 participants responsible for the multiple projects.

In general, the individual we interviewed was the contact name identified in the database. Respondents that participated in the Whole Building or Direct Install component of the program were most likely to be the building owner or property manager, followed by a management executive (Table 2-6)⁶.

Table 2-6. Telephone Survey Respondent Title – Direct Install and Whole Building

Respondent Title	Number of Respondents	Percent
Owner	94	37.5
Property manager	76	30.3
Executive	30	12
Maintenance manager	16	6.4
General manager	14	5.6
Architect	8	3.2
Maintenance staff	7	2.8
Assistant	3	1.2
Builder	2	0.8
Purchasing agent	1	0.4
Total	251	100

Participants in the New Construction component of the program were contacted and interviewed by PA staff. Most often, the individual interviewed was a developer, project manager, or architect involved with the construction. As necessary, others involved with the project were contacted and asked follow-up questions.

⁶ Interviewee title is self-defined through question F6, “What is your job title?”

3. PROGRAM ATTRIBUTION AND SPILLOVER

This section summarizes the study findings regarding the program attribution and program spillover.

3.1 PROGRAM ATTRIBUTION

The attribution rate was calculated using participant self-reports through telephone interviews. The methodology for calculating program attribution is very similar to the Year 1 net savings approach (Y1NS) used in our 2008 impact evaluation with one key difference. In this year's evaluation, Direct Install participants were asked if they would have installed less efficient equipment without the program. The effect of including this battery of questions for Direct Install participants is discussed later.

In addition to the Y1NS approach, we also calculated life cycle net savings (LCNS) based on the KEMA methodology⁷. At this point, the LCNS are included for comparison to the Y1NS. The LCNS approach and its findings are detailed later in the report.

The attribution rate uses three elements: timing, efficiency, and quantity. This section discusses how we calculated values for each. The analysis does not include records where the participant said the measure was no longer installed.

It was not possible to compute values for timing, efficiency, and quantity for all participants because some participants were not able or refused to answer a specific question. For this reason, several imputations to the data were made before the calculation of timing, efficiency, and quantity program attribution rates. Likewise, adjustments to the calculation of the overall attribution rate were made to compensate for inconsistencies in the data. These steps are detailed in the sub-sections below.

Prior to assessing the timing, quantity, and efficiency, PA assigned 100 percent attribution for those measures where participants said they would not have installed the measure *at all* absent the program. The two questions related to this analysis are N16 and N17. If the participant said "No" to both these questions, then the measure under review would automatically receive 100 percent attribution.

N16 If the [measure type] had not been available through the Apartment and Condominium Efficiency Services program, would you have purchased any on your own/ pay to have service(s) done at the same time?

N17 Would you have purchased it/had the service done at a later date?

⁷ KEMA's methodology is explained in detail in *Business Programs Life Cycle Attribution Analysis Results*, December 2, 2008.

3.1.1 Timing

The timing analysis is based on four variables (N16, N17, N18, and N19).

N16 If the [IF DIRECT INSTALL: free] [OTHER: incentivized] [measure type] had not been available through the Apartment and Condominium Efficiency Services program, would you have (IF EQUIPMENT: purchased any [measure type] on your own/IF SERVICE: paid to have the boiler clean and tune done) at the exact same time?

N17 Would you have (purchased it/had it done) at a later date?

N18 When do you think you would have (purchased it/done this)?

N19 (IF DON'T KNOW) Do you think you would have purchased it/done this within...?
(READ: 1 year, 1–2 years, 3–4 years, never)

Participants that said they would not have purchased any of the equipment at the same time were asked several follow-up questions related to timing (N17–N19). The timing data captured through N18 and N19 were recoded and combined into one item, TIME. This variable was calculated to equal the number of months the program accelerated the purchase and installation of the equipment.

If the participant could not provide a response to N18, the interviewer asked the participant to identify how much the program accelerated the installation by providing a range of years (N19). This range was recoded where the upper limit is the number of months captured in the data. For example, the response of “within a year” was recoded as 12 months and “between one and two years” was recoded as 24 months.

From this analysis, the acceleration rate is determined. Consistent with how attribution is historically calculated for the Business Programs per the attribution analysis memorandum prepared by KEMA, PA, and Ralph Prah⁸, the acceleration rate is calculated as the number of months the program accelerated installation divided by 48 months. Then the acceleration rate is applied to the timing attribution factor.

If the participant could not provide any estimate of the influence of the program on their timing to install the equipment, the attribution rate was assumed to be 100 percent. This assumption is based on the idea that if they could not provide any sense of timing then the activity was not in the latter stages of planning and the program influenced installation. This hypothesis was compared against the planning questions and found to be consistent with the timing attribution score of 100 percent. For example, participants who could not provide timing information stated that the ACES program first became involved “before the start of planning” or “right at the beginning of the project” or stated that contact from the ACES program “instigated the project.”

⁸ KEMA, PA Consulting Group, and Ralph Prah, *Updated Attribution Analysis for Business Programs*, September 16, 2008.

Table 3-1. Calculation of Timing Attribution Factor

Condition	Variables and Values	Timing Attribution Factor
The measure would have been installed at the same time in absence of the program.	N16 = Yes	0%
The measure would have never been installed in absence of the program.	N17 = No	100%
The measure would have been installed at a later date.	N17 = Yes	TIME/48 months
The participant did not know if the measure would be installed at a later date or when that later date would be.	N17 = DK or N18 = DK	100%

3.1.2 Efficiency

The efficiency attribution factor is calculated using three variables (N29a, N29b, and N29c). One change was made to the Direct Install survey procedures from 2008. During the most recent round of surveys, Direct Install participants were asked the efficiency questions to account for the fact that Direct Install participants could have installed less efficient lighting or showerheads in the absence of the program.

N29a If the incentive for the [measure type] had not been offered under Apartment and Condominium Efficiency Services program, would you have purchased a less efficient [product type]?

N29b What efficiency level would you have purchased? (PROBE FOR HOW THE EFFICIENCY LEVEL WOULD HAVE RELATED TO MEASURE RECEIVED)

N29c (IF QUANTITY > 1) What percent of the [product type] would have been less efficient?

Table 3-2. Calculation of Efficiency Attribution Factor

Condition	Variables and Values	Efficiency Attribution Factor
Participant would have purchased less efficient equipment and only one quantity of the measure was installed.	N29a = Yes	100%
Participant would have purchased less efficient equipment and more than the quantity of one of the measure was installed.	N29a = Yes	Less efficient percent installed (N29c)
Participant would have purchased same efficiency of equipment.	N29a = No	0%

Records where the participant answered “don’t know” for N29a or N29c were manually reviewed in order to assign an efficiency attribution factor. In order to minimize these unknown values, records in which the participant did not know the amount of equipment that would have been less efficient were given an imputed efficiency attribution factor. This factor was calculated by finding the average attribution factor of like cases (same program element and less efficient equipment in the absence of the program). Eight measures were assigned an imputed efficiency attribution factor of 0.8795.

3.1.3 Quantity

The quantity attribution factor is calculated using two variables (N30 and N31).

N30 If the [IF DIRECT INSTALL: free] [IF WHOLE BUILDING: incentivized] [measure type] had not been offered under Apartment and Condominium Efficiency Services program, would you have purchased the same quantity of [measure type] on your own?

N31 Would you have installed fewer or more [measure type]? [RECORD QUANTITY OF FEWER OR MORE]

Table 3-3. Calculation of Quantity Attribution Factor

Condition	Variables and Values	Quantity Attribution Factor
The participant would have purchased the same quantity without the program.	N30 = Yes	0%
The participant would have purchased fewer measures without the program.	N31 = Fewer	Number fewer reported /quantity installed
The participant would have purchased additional measures without the program.	N31 = More or N31 = fewer but reported number is greater than quantity installed	0%

After this exercise, 44 measures were missing a quantity attribution factor. In these cases, the participant said they would have purchased the equipment in the absence of the program, but said “don’t know” or “refused” for N30 or N31. While the incidence of participants unable to respond seems high, this rate is in line with previous results. We ask the quantity items of all participants to clearly distinguish between quantity installed and timing.

PA imputed these missing values using mean substitution (this approach is consistent with that used by KEMA for Business Programs). To ensure the differences in each program were captured, we determined the average quantity attribution factor of both Whole Building and Direct Install participants that were able to provide a response to N30 and N31. The mean attribution rates were also compared at a measure level. Differences between measures were not found to be significant and the mean substitution occurs at the program component level. The resulting imputed quantity attribution factors, along with the number of measures, are detailed below.

- Thirty Whole Building measures were assigned an imputed quantity attribution factor of 49.1 percent (based on the average quantity attribution factor for 33 measures).
- Fourteen Direct Install measures were assigned an imputed quantity attribution factor of 51 percent (based on the average quantity attribution factor for 28 measures).

3.1.4 New Construction non-financial program influence

The New Construction data collection was handled differently than the data collection for the Whole Building and Direct Install components because the decision making process of participants differs fundamentally from that of the other two components. The purpose was to obtain a more accurate reflection of how New Construction participants make their decisions and the program's influence. As we were conducting the interviews, we recognized that the

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survey did not appropriately capture the non-financial assistance provided by the program (including technical assistance, existing relationships with Focus staff, and comprehensive “laundry lists” of recommendations) and focused only on the financial incentives available. Recognizing the importance of evaluating both the financial and non-financial assistance provided by the program, New Construction participants were re-contacted and asked what non-financial assistance, if any, the ACES program provided and how influential on a 0–10 scale this non-assistance was in installing or specifying the equipment provided through the program.

Q1cb What technical assistance did the ACES program provide to {stakeholders} other than a financial incentive to the owners for the equipment installed? (PROBE FOR TECHNICAL ASSISTANCE, VALIDATION OF NEW TECHNOLOGY, INDUSTRY DIRECTION INSIGHTS, LIST OF RECOMMENDATIONS).

Q2cb On a 0–10 scale, with 0 being no influence and 10 being a great deal of influence, please rank the influence the ACES representative and the technical assistance they provided had on your decision to specify/install this equipment?

These callback interviews were conducted by the original consulting staff who conducted the initial interviews to properly understand what, if any, influence the non-financial assistance had on the participants’ decisions. The response to Q2cb was then divided by 10 to create a program influence factor that acts as a credit to the final attribution score. In two projects, the participant was unable to respond to this question and a mean factor of 0.473 was substituted.

This methodology assumes that the financial and non-financial assistance act independently and that participants would be able to disentangle the two factors from each other. PA acknowledges that this additive methodology may result in some overlapping credit being applied to the New Construction program component. However, analysis of the responses to the two questions does indicate that respondents were at some level able to differentiate between the influences of the incentive vs. the non-financial assistance. Over 60 percent of the respondents had a least a 4-point difference in their rating of the influence of the financial vs. the non-financial assistance.

3.1.5 Overall program attribution

Overall program attribution was calculated using a process in which each condition accounted for an exclusive set of records. Table 3-4 illustrates the 11 conditions used to assign the overall attribution for a particular measure and how the three attribution elements discussed above (timing, efficiency, and quantity) inform the overall attribution.

Conditions 1 through 10 are mutually exclusive of each other and cleanly assign attribution. However, in condition 11, the process could not assign an overall attribution for 12 measures due to missing data (e.g., “don’t know” responses). For these cases, the survey data were reviewed to determine a final score using open-ended responses, consistency check questions (detailed below), and attribution elements that *were* assignable.

In the event the review process still drew inconclusive results, the cases were dropped from the analysis. This resulted in seven measures being eliminated.

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For New Construction projects, after final attribution savings are calculated, the program influence credit is applied to the New Construction net savings. This credit is equal to the difference in gross and attributed program savings multiplied by the program influence factor. As an example, if a project had 100,000 kWh gross program savings and a program attribution rate of 50%, the attributed program savings would be 50,000 kWh savings. However, if the program influence factor is 0.5, a credit of 25,000 kWh $((100,000 - 50,000) \times 0.5)$ is applied to the final net savings for that project. In this example, the final net program savings would be 75,000 kWh.

One New Construction project was hard-coded as zero percent attribution. The participant stated that the tenants selected and paid for the equipment installed in their units. If a tenant selected equipment that qualified for the ACES program, the participant would fill out the paperwork and apply for the rebate. The participant kept the rebate to help with the “cost of doing business.” The participant stated that the tenant cost of the program-qualifying equipment was not reduced based on the rebate nor was the selection of equipment available influenced by the program. As those that were making the decision to purchase the equipment were unaware of the program or its rebate, the program could not have any influence and received zero percent of the savings for that project.

Table 3-4. Overall Attribution Assignments at the Measure Level

Condition	Timing Attribution (N16 – N19)	Efficiency Attribution (N29a – N30)	Quantity Attribution (N16, N17, N30, N31)	Overall Attribution (at Measure-level)	Discussion	n
1	100%	100%	100%	100%	Attribution is 100 percent if the participant said they would not have installed the measure without the program, would have installed more than 48 months later, and would not have installed the same efficiency. Participants that said they would not have installed the measure in the absence of the program (N16 and N17) automatically received an attribution rating of 100 percent for that measure.	53
2	0%	0%	0%	0%	Participants that said they would have installed the measure at the same time, would have installed the same efficiency, and would have installed the same or greater quantity of measures received zero percent attribution for that measure.	59
3	0%	0%	> 0%	Quantity Attribution	These participants receive the quantity attribution, as they claim that although they would have installed the same efficiency at the same time, they would have installed a smaller quantity.	18
4	0%	> 0%	0%	Efficiency Attribution	These cases said they would have installed the equipment at the same time and in the same quantity; however, a portion of the equipment they would have installed would have been at a lower efficiency. The program receives credit for the portion that would have been replaced at a lower efficiency.	14
5	0%	> 0%	> 0%	Quantity Attribution × Efficiency Attribution	These cases said they would have installed the equipment at the same time, but would have installed a lesser quantity, some of which would have been lower efficiency. Because the program induced higher efficiency installation for the measure installed, the program receives a factor of the quantity and efficiency attribution.	18
6	> 0%	0%	0%	Timing Attribution	This condition provides credit to the program for accelerating the retrofit or adoption of the technology, estimated in the timing attribution calculation.	14

3. Program Attribution and Spillover



Condition	Timing Attribution (N16 – N19)	Efficiency Attribution (N29a – N30)	Quantity Attribution (N16, N17, N30, N31)	Overall Attribution (at Measure-level)	Discussion	n
7	> 0%	0%	> 0%	Quantity Attribution × Timing Attribution	This condition provides credit to the program for accelerating the retrofit or adoption of the technology. However, this acceleration is only applied to the quantity that would not have been installed in the absence of the program.	14
8	> 0%	> 0%	0%	Efficiency Attribution	These cases said they would have installed the equipment at a different time and would have installed the same quantity, although all of the measures would have been of a lower efficiency. Because the program induced higher efficiency installation for the measure installed, the program receives the efficiency attribution.	18
9	> 0%	> 0%	> 0 and < 100%	Efficiency Attribution	These cases said they would have installed the equipment at a later date in the absence of the program and a lesser quantity; however, they would have installed what would have been lower efficiency. The program receives credit because the equipment would have been replaced at a lower efficiency.	34
10	NA	NA	NA	Timing Attribution	These participants had a boiler clean and tune performed. Efficiency and quantity attribution factors do not apply. Therefore, the program receives credit for any timing attribution. Services were treated the same way in the 2008 report.	35
11	Manual review	Manual review	Manual review	Manual assignment	These cases were manually reviewed due to insufficient data, primarily resulting from “don’t know” and “refused” responses.	41
12	Manual review	Manual review	Manual review	Manual assignment	These cases were manually reviewed due to inconsistent responses.	12

3.1.6 Consistency checks and final review

The last step in the attribution assignment process was to review the overall attribution factors at the measure level in light of responses to background and consistency check questions. Two PA staff reviewed the results together and manually reviewed the attribution assignments case-by-case to determine (1) if the overall attribution factor was consistent with the consistency and background questions, (2) if there was inconsistency, whether the overall attribution rating should change, and (3) to agree upon what that change should be.

This was not a black-and-white process. Some participants may have replied inconsistently with one question, but then consistently with another. Therefore, the analysis attempted to take into account the full story and experiences discussed by the participant. Additionally, due to the relatively subjective nature of the review, the overall attribution was changed *only when there was clear evidence that it should be different*.

The questions included in the consistency checks, and how those questions were used, are detailed below in Table 3-5. Not all consistency check questions were applicable to all measures reviewed.

Table 3-5. Questions Manually Reviewed for Consistency with Attribution Rating

Question	Use of Question
M6 At exactly what point in the planning, purchasing or installation process were you when you first began to talk with someone about the Apartment and Condominium Efficiency Services program?	Open-ended response to planning question reviewed with overall attribution assignment.
M26 How many more years do you think [measure type] would have continued to function?	Provided context for the condition of the equipment and planning process.
N32 On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is that you would have bought the same [measure type] if you had not received [IF DIRECT INSTALL OR SERVICE: it at no cost] [OTHER: this incentive] through the Apartment and Condominium Efficiency Services program?	Consistency check on the likelihood of participating without the program. Inconsistent if: <ul style="list-style-type: none"> • N32>5 and Attribution=1 • N32<5 and Attribution=0
N33 Can you please describe in your own words what impact, if any, the Apartment and Condominium Efficiency Services program or program representative had on your decision to install/receive [measure type] at the time you did?	Reviewed to make sure the response to N32 made sense and to understand the program's impact from the participant's perspective.
Interviewer Notes	Interviewers were asked to record any comments or notes they felt to be pertinent to the client's decision-making processes and attribution rates. These notes were reviewed as another qualitative consistency check.

A final attribution variable based and created on this consistency review either assigned the original estimate or a revised estimate. The analysis file contains the rationale for all attribution estimate changes. In total, twelve measures were reassigned an attribution estimate—all in favor of the program (i.e., a higher attribution).

3.1.7 Y1NS attribution rates

As mentioned earlier, Year 1 net savings (Y1NS) was calculated using participant self-reports through telephone interviews. Table 3-6 details the attribution rate for each of the program components and the ACES program overall. New Construction has the highest kWh attribution rate of 75.6 percent while Direct Installation has the highest therm attribution rate—66.1 percent attribution. The overall program attribution rates at the bottom of the table contain credits for spillover savings.

Table 3-6. Attribution Rate for ACES by Program Component

Program Component	Projects Surveyed/ Project Population	Measures	Project kWh Attribution Rate	90% Confidence Interval	Project Therms Attribution Rate	90% Confidence Interval
Direct Install	64/562	126	70.1%	± 8.9%	66.1%	± 9.2%
New Construction	25/45	132	75.6%	± 9.4%	49.2%	± 11.0%
Whole Building	187/520	217	48.1%	± 4.8%	36.4%	± 9.2%
Overall	276/1127	493	62.4%	± 4.2%	49.0%	± 4.3%

Data is weighted by savings and non-response.

The way that Whole Building projects evolve often makes it difficult for the program to become involved earlier in the process. This difficulty explains much of the difference between program component attribution. The analysis of open-ended responses indicates that, when compared to the other program initiatives, Whole Building participants were more likely to report hearing about the program toward the latter end of the participant's planning process or at the point of equipment installation. Conversely, Direct Install and New Construction projects were involved with the program early and participants made decisions based on that involvement. A handful of open-ended comments that support this assertion are detailed below.

Whole Building comments

"We had already planned for a complete remodel, so [ACES became involved] during the purchasing and installation."

"[ACES became involved] after decision was made to purchase new light fixtures."

"I plan to do these measures year after year, but found out this year from my contractor I would get a rebate for doing this. So I called these people, and set up the rebate."

"[ACES became involved] during the planning, we had already contacted several contractors and started to collect bids."

New Construction comments

"[ACES became involved] right off the bat. During the design process so it was pretty early on."

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“[ACES became involved] very early. During the budgeting stage before construction documents were drafted. It was really a huge advantage to have it involved that early.”

Direct Install comments

“[We] heard about using the program and we began to plan.”

“The mailing from Focus on Energy triggered everything.”

Table 3-7 compares Y1NS attribution rates from PA’s 2008 report with those from this report. The 2009 rates contain spillover credits.

Table 3-7. Comparison of 2008 and 2009 Attribution Rates

Program Component	2008 Project kWh Attribution Rate	2009 Project kWh Attribution Rate	Relative Change	2008 Project Therms Attribution Rate	2009 Project Therms Attribution Rate	Relative Change
Direct Install	85.7%	70.1%	-18.2%	88.0%	66.1%	-24.9%
New Construction	63.6%	75.6%	18.9%	43.0%	49.2%	14.4%
Whole Building	53.3%	48.1%	-9.8%	49.8%	36.4%	-26.9%
Overall	77.4%	62.4%	-19.4%	67.4%	49.0%	-27.3%

Data is weighted by savings and non-response.

The Direct Install attribution scores in this report are significantly lower than the 2008 rates. After comparing survey responses between the two years, PA determined that this year’s drop in attribution is a result of including the efficiency questions in the attribution algorithm. In 2008, the efficiency questions were not asked and all Direct Install participants were assigned an efficiency attribution factor of one. In 2009, 53 percent of the Direct Install participants said they would have installed the same high efficiency equipment in the absence of the program. Now that we include those responses in the attribution assignment process, that proportion who would have installed high efficiency equipment anyway, taken in conjunction with the other components of timing and quantity, lowers the attribution rate.

We also examined occupant CFL installation rates from the Wisconsin ENERGY STAR lighting evaluation conducted in July of 2009 by PA. Of those who lived in multi-family buildings (n =37), 27 percent had installed an average of three CFL bulbs during 2008. While this figure does not factor into the Direct Install attribution rate, it does support the inclusion of the efficiency questions for that program component.

In addition, we compared the percentage of 2008 Direct Install participants that have previously installed CFLs with the percentage of 2009 participants. In 2008, 36.4 percent had previously installed CFLs. In 2009, this percentage increased to 45.2 percent. We do acknowledge that a portion of this increase may be due to program marketing efforts and previous participation.

The Whole Building attribution rates are also significantly lower than rates reported in 2008. Within the kWh attribution rate calculation, this difference is driven by timing. In 2009, 71.3 percent of Whole Building participants would have purchased the measure at the same time without the program. In 2008, only 38.4 percent would have purchased at the same time

without the program. The therms attribution rate is driven by the participants responses with regard to the efficiency of the measures implemented. In 2009, 65.4 percent of participants indicated they would have implemented measures with the same efficiency without the program versus 43.6 percent in 2008. A review of how respondents first heard of the program shows that 32 percent of Whole Building participants reported hearing about the program from Focus on Energy staff. Another five percent stated that they were previous program participants. Additional research with program associated contractors is planned to better understand the causes of changes in the attribution rates for the Whole Building component of the program. When compared to the 2008 reports, New Construction attribution rates have increased. As discussed earlier, this increase is a direct result of factoring non-financial assistance into the calculation of the New Construction attribution rates.

Tables 3-8 through 3-10 provide measure-specific results that may be informative for program design. As only certain measures were sampled for measure-level results, these estimates should be interpreted cautiously in light of the number of projects represented in the measure category analysis. The confidence intervals included in the tables provide a gauge as to the precision levels at the measure level. Spillover results are only included at the program level.

Table 3-8 presents the attribution rate for lighting and water saving devices through the Direct Install component of the program. The difference in rates between the lighting and water saving devices is a result of participants often stating that they have been replacing incandescent bulbs with compact fluorescent lamps as needed or as tenants turn over. However, they are less likely to replace the faucet aerators and showerheads either at all or with energy efficient alternatives. Both lighting and water saving devices were sampled at the measure level.

Table 3-8. Direct Install Attribution Rate by Measure

Measure	kWh Measure Attribution Rate	90% Confidence Interval	Therms Measure Attribution Rate	90% Confidence Interval	Surveyed
Lighting	62.4%	+ 9.5%	NA	NA	62
Water saving devices	88.8%	+ 6.1%	66.1%	+ 9.2%	64
Total	70.1%	+ 8.9%	66.1%	+ 9.2%	126

Data is weighted by savings and non-response.

Table 3-9 shows that New Construction heating received low kWh and therm attribution when compared with other New Construction measures. This low rate drives down the overall therm program attribution rate as the majority of savings are accounted for by heating equipment. The kWh attribution is consistently high across measures with the lowest rate at 64 percent.

There are not enough measures in the New Construction component to support measure-level analysis with a high-level of precision. These results are only robust at the program level.

Table 3-9. New Construction Attribution Rate by Measure

Measure	kWh Measure Attribution Rate	90% Confidence Interval	Therm Measure Attribution Rate	90% Confidence Interval	Surveyed
AC	68.2%	± 20.2%	NA	NA	8
Clothes washer	74.8%	± 13.2%	73.8%	± 13.4%	14
Dishwasher	69.4%	± 14.2%	67.8%	± 14.4%	13
Heating equipment	64.0%	± 15.6%	43.6%	± 16.1%	15
Lighting	70.6%	± 12.5%	100%	± 0.0%	18
Other	86.9%	± 10.5%	88.9%	± 9.8%	12
Refrigerator	69.8%	± 12.1%	NA	NA	16
Insulation	81.2%	± 12.4%	73.6%	± 13.9%	14
Water heating equipment	73.6%	± 13.2%	16.8%	± 11.2%	12
Water saving devices	77.6%	± 12.5%	58.8%	± 14.8%	10
Total	75.6%	± 9.4%	49.2%	± 11.0%	132

Data is weighted by savings and non-response.

Table 3-10 details the attribution factors by measure for Whole Building participants. In order to present meaningful attribution rates, water heating equipment with therm penalties was separated into its own reporting category. If we aggregated them together, the mix of projects with therm penalties in the population and surveyed creates a therm attribution rate of over 400 percent.

Table 3-10. Whole Building Attribution Rate by Measure

Measure	kWh Measure Attribution Rate	90% Confidence Interval	Therms Measure Attribution Rate	90% Confidence Interval	Surveyed
AC	67.1%	± 39.6%	NA	NA	3
Clothes washer	83.5%	± 23.7%	82.5%	± 24.3%	6
Dishwasher	100%	± 0.0%	100%	± 0.0%	1
Heating equipment	21.8%	± 7.8%	44.7%	± 9.4%	52
Boiler clean and tune	NA	NA	19.0%	± 8.2%	40
Lighting	44.8%	± 5.7%	NA	NA	79
Other	99.5%	± 4.6%	84.5%	± 23.6%	5
Refrigerator	71.1%	± 46.5%	NA	NA	2
Shell	96.3%	± 10.8%	3.1%	± 4.1%	7
Water heating equipment	101.6%	± 0%	45.3%	± 13.0%	19
Water heating equipment with therm penalties	25.3%	± 29.2%	24.3%	± 28.8%	3
Total	48.1%	± 4.8%	36.4%	± 4.6%	217

Data is weighted by savings and non-response.

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The overall Whole Building attribution rate is driven by a few categories. Lighting, heating equipment, and water heating equipment affect the kWh attribution rate a great deal. Removing those measures from analysis, the weighted kWh attribution rate is above 90 percent. Boiler tune-ups and heating equipment have the greatest effect on the therms attribution rate. Removing those two categories from analysis increases the attribution rate to above 60 percent.

Both heating and shell measures show large differences between kWh and therms attribution rates. For the heating measures, this difference is a result of few measures having kWh savings and one large kWh saver affecting the overall rate. Likewise, only one surveyed shell measure had kWh savings and received 100 percent program attribution. This participant had no therm savings. The remaining shell measures *with* therm savings received low program attribution rates.

3.2 OUTSIDE PROGRAM FUNDING

All participants were asked if they received any outside funding for the installed measures. Across all programs, all participants stated they had not received any additional funding or could not recall.

3.3 LCNS METHODOLOGY

In addition to the Y1NS approach, PA also calculated life cycle net savings (LCNS) based on the KEMA methodology⁹. At this point, the LCNS are included for comparison to the Y1NS.

Energy efficiency measures' savings typically last for a number of years, so their lifetime energy impacts would be calculated by multiplying the annual energy savings by the number of years that the energy efficiency measure is expected to be in operation.

The LCNS determines the impacts across the life of the equipment that are attributable to the program. Measure life is interpreted as the median number of years a measure is expected to be in operation. This value was determined as part of the Focus on Energy Cost Benefit analysis and is detailed in Table 3-11.

⁹ KEMA's methodology is explained in detail in *Business Programs Life Cycle Attribution Analysis Results*, December 2, 2008.

Table 3-11. Assumed Measure Life for LCNS

Measure	Average Measure Life (Years)
AC	14.5
Clothes washer	12
Dishwasher	11
Heating equipment	19.1
Boiler clean and tune	5
Lighting	9.4
Other	12.3
Refrigerator	13
Shell	25
Water heating	10
Water saving devices.	11.1

The LCNS approach uses three factors to calculate the stream of savings:

- **Efficiency attribution.** Efficiency attribution is a computed value based on the survey responses to questions about installed efficiency levels in the absence of the program. Values range from 0 to 1. When the efficiency attribution is 0, the program receives no credit for the efficiency level installed (the participant would have installed the same level of efficiency without the program). Conversely, a value of 1 indicates that the program receives all credit for the efficiency (the participant would have installed less efficient equipment without the program).
- **Quantity attribution.** Quantity attribution is a computed value based on the survey responses to questions about the quantity of equipment installed. Similar to the efficiency attribution, values range from 0 to 1.
- **Acceleration period.** Acceleration period is the amount of time by which the program sped up equipment installation and is calculated based on survey responses to questions about timing of installation in the absence of the program (n18, n19). For example, if the participant would have installed the equipment two years later, the acceleration period would be two years. If the participant would have installed it at the same time, there is no acceleration period. Acceleration period is capped at four years. We assume that any response past four years is too uncertain to include in analysis. Conversely, if the participant never would have installed the equipment, the acceleration period is four years.

In general, LCNS is the sum of the acceleration savings and the program-attributed post-acceleration savings. Acceleration savings is the difference in energy between the existing equipment and the installed high efficiency equipment energy use for every year of acceleration (up to four years). Attributed post-acceleration savings is the difference in energy use between the program baseline equipment and the installed high efficiency equipment multiplied by a simple program attribution factor (SPA). The SPA is computed from both the efficiency and quantity attribution rates.

$$LCNS = \text{Acceleration savings} + \text{Post-acceleration savings} \times SPA$$

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As existing equipment energy use data is not available, some assumptions are made. For custom measures, the difference in energy use between the existing equipment and the high efficiency equipment is assumed to be double the program baseline savings. For deemed measures, there are too many unknown variables to make reasonable assumptions. Therefore, deemed measures receive no acceleration savings and are instead given gross program savings for the acceleration period.

$$\text{Acceleration savings (custom)} = \text{gross program savings} \times 2 \times \text{acceleration period}$$

$$\text{Acceleration savings (deemed)} = \text{gross program savings} \times \text{acceleration period}$$

The SPA factor is calculated based on analysis of the efficiency and quantity attribution rates. If one rate is zero and the other rate something greater than zero, the SPA equals the positive rate. If both rates are greater than zero, the SPA is a factor of the two rates. If both rates are zero, the SPA is also zero. Table 3-12 displays the possible combinations.

Table 3-12. SPA Calculation

Efficiency Attribution	Quantity Attribution	SPA
0	0	0
0	>0	Quantity attribution
>0	0	Efficiency attribution
>0	>0	Quantity × Efficiency

This method for determining the SPA ensures that the program receives credit for participant influence, even if the participant said they would have done one of the components absent the program. For example, if the participant said they would have purchased the same quantity (quantity attribution = 0), but would not have purchased the same efficiency (efficiency attribution = 1), then the program should receive full credit for its influence on the customer's decision to install the higher efficiency equipment.

From this point, we calculate post-acceleration savings. The calculation accounts for the gross program savings for the measure life remaining after the acceleration period. SPA is applied to result in attributed post-acceleration savings.

$$\text{Post-acceleration savings} = (\text{Measure life} - \text{Acceleration period}) \times \text{gross program savings}$$

$$\text{Attributed post-acceleration savings} = \text{Post-acceleration savings} \times \text{SPA}$$

LCNS is the sum of the acceleration savings and post-acceleration savings.

$$\text{LCNS} = \text{Acceleration savings} + \text{Attributed post-acceleration savings}$$

The last step is determining the net to gross ratio across the life of the measure. The gross savings is simply the product of the measure life and gross savings claimed by the program. The net savings is the LCNS. Therefore, the final net-to-gross ratio is:

$$\text{Lifecycle net-to-gross ratio} = \text{LCNS} / (\text{measure life} \times \text{gross savings})$$

3.4 LCNS ATTRIBUTION RATES

The overall Direct Install and Whole Building LCNS kWh attribution rates are 62.1 percent and 38.1 percent respectively and the therm attribution rates are 33.1 percent and 41.7 percent. LCNS were not calculated for the New Construction component as the acceleration period calculation does not apply and the lifecycle savings would be merely a factor of year one savings. Overall program component LCNS attribution rates are compared to Y1NS attribution rates in Table 3-13.

Table 3-13. LCNS and Y1NS Attribution Rates

Component	LCNS kWh Attribution Rate	Y1NS kWh Attribution Rate	LCNS Therms Attribution Rate	Y1NS Therms Attribution Rate
Direct Install	76.9%	70.1%	58.1%	66.1%
Whole Building	38.2%	48.1%	42.1%	36.4%

Table 3-14 details the LCNS versus Y1NS attribution rates for the Direct Install program component by measure type. The results are very similar to the Y1NS results. The largest difference is in the therm savings attribution rate for water saving devices. As water saving devices have a long measure life, they do not receive as great a benefit from the acceleration period savings as lighting receives.

Table 3-14. Direct Install LCNS and Y1NS Attribution Rates

Measure	LCNS kWh Measure Attribution Rate	Y1NS kWh Measure Attribution Rate	LCNS Therms Measure Attribution Rate	Y1NS Therms Measure Attribution Rate
Lighting	68.6%	62.4%	NA	NA
Water saving devices	91.2%	88.8%	58.1%	66.1%
Total	76.9%	70.1%	58.1%	66.1%

Table 3-15 details the LCNS versus Y1NS attribution rates for the Whole Building program component by measure type. Similar to the Direct Install component, differences in rates are a result of acceleration period savings when compared to the overall measure life. Participants that would have installed the measure at the same time in the absence of the program (56.2 percent) are reducing overall lifecycle savings.

Table 3-15. Whole Building LCNS and Y1NS Attribution Rates

Measure	LCNS kWh Measure Attribution Rate	Y1NS kWh Measure Attribution Rate	LCNS Therms Measure Attribution Rate	Y1NS Therms Measure Attribution Rate
AC	76.8%	67.1%	NA	NA
Clothes washer	83.5%	83.5%	82.5%	82.5%
Dishwasher	100.0%	100%	100.0%	100%
Heating equipment	14.5%	21.8%	42.4%	44.7%
Boiler clean and tune	NA	NA	43.3%	19.0%
Lighting	42.1%	44.8%	NA	NA
Other	57.7%	99.5%	52.0%	84.5%
Refrigerator	71.1%	71.1%	NA	NA
Shell	96.3%	96.3%	3.1%	3.1%
Water heating equipment	101.6%	101.6%	38.8%	45.3%
Water heating equipment w/ therm penalties	30.4%	25.3%	29.2%	24.3%
Total	36.2%	48.1%	42.1%	36.4%

The largest difference is in the “Other” category. Given the small number of measures in this category, the results are heavily impacted by one measure with a high savings. This measures attribution scores varying as timing is taken out of the SPA calculation in the LCNS methodology.

3.5 SPILLOVER

Spillover is defined as any additional energy savings that are an indirect result of program participation but were not specific addressed by the program. For example, if a program participant was impressed by the energy savings that he or she saw as a result of having a program-incentivized boiler clean and tune performed, that participant might be encouraged to perform non-incentivized boiler clean and tunes at other properties. A participant might not apply for an incentive for these measures for several reasons, including an unwillingness to complete further paperwork, timeliness, or uncertainty about whether or not additional incentives were available. The survey did not explore why participants did not apply for incentives but future efforts could follow-up with additional questions to explore the reasoning.

The survey attempted to quantify spillover savings by asking if participants had installed similar energy efficient equipment since participation **without program assistance**. If so, we would ask about the type and quantity of equipment installed and what influence program participation had on the decision to purchase and install this equipment. Only those participants that said that the program influenced their decision to install the equipment received spillover savings.

Using average per unit savings from the surveyed program participants, PA was able to estimate spillover savings based on these responses. These results are presented in Table 3-16. We combined spillover savings with the program-attributed savings calculated as part of

the Y1NS process. We then, at the measure and program level, divided the spillover-adjusted net savings by the population savings to calculate a final attribution rate. This final rate is the figure reported throughout this report.

Table 3-16. Estimated Spillover Savings by Measure and Program Component

Measure	Direct Install		Whole Building	
	Estimated kWh Spillover Savings	Estimated Therms Spillover Savings	Estimated kWh Spillover Savings	Estimated Therms Spillover Savings
Water heating equipment	-	-	171,592.5	2,254.7
Heating equipment	-	-	4,089.8	2,676.5
Boiler clean and tune	-	-	-	3,068.6
Lighting	10,852.0	-	168,567.7	-
Water saving devices	-	-	1,528.4	341.1
Shell measures	-	-	1,881.5	6,530.5
Refrigeration	-	-	256.7	-
Total	10,852.0	0.0	347,916.7	14,871.5

While two New Construction participants reported that they had installed similar equipment without program assistance, neither said that the program was influential in the decision.

4. PROCESS FINDINGS

4.1 SOURCE OF PROGRAM INFORMATION

All participants were asked how they heard about the incentive available through the ACES program. The most frequent response was from ACES or Focus staff (Table 4-1). Participants also frequently became aware of the program incentive through their utility, mailings, and contractors or vendors they were working with. Direct Install and Whole Building participants also mentioned other property owners and meetings or trade shows.

Table 4-1. How Participants Heard about ACES

Heard about the program through...	Direct Install (n=64)	New Construction (n=23)	Whole Building (n=187)
ACES staff	25%	35%	32%
Utility company	13%	22%	8%
Mailing or literature	19%	9%	12%
Contractor or vendor	3%	9%	16%
Other property owners	11%		13%
Meeting, exhibit, trade show	14%		5%
Previous participation	6%		4%
Research (e.g., Internet)		9%	
Designer or architect	2%	4%	
Advertisements	2%		5%
WHEDA		4%	

If the Whole Building participant did not indicate that they heard about the program from the vendor or contractor they worked with, they were asked if the contractor, subcontractor, or vendor who they purchased the equipment from mentioned that they could receive a rebate for the energy efficient equipment. Almost 40 percent of those who had not initially heard about the Whole Building program from a contractor had at some point been told by the contractor, subcontractor, or vendor that they could receive a rebate through ACES.

Just over half of the New Construction participants had previously participated in the ACES program at other locations. New Construction participants also tend to get Focus staff involved early in the building process. Twenty-two percent were in discussion with Focus staff during planning and another 35 percent were consulting them during the design phase. The majority of participants had Focus information before construction started (87 percent)

Many participants said they have a policy relating to energy efficiency in their buildings, although it is much more typical for participants in the New Construction program component (70 percent) than for the Direct Install and Whole Building participants (39 percent each).

4.2 PROGRAM BENEFITS

Participants were asked what benefits, if any, they have realized at their property(s) as a result of participating in the program. For all components, the benefit from program participation cited most often was the reduced energy costs (Table 4-2). Several New Construction participants have not been able to fill their units, so they feel they have not realized the full benefits the energy efficient equipment could provide. While outside the

4. Process Findings

program’s control, this finding indicates that due to the current economic climate, the first year gross savings claimed by the New Construction component are likely overstated.

Table 4-2. Reported Benefits of Program Participation

Benefits of Participation	Direct Install (n=64)	New Construction (n=23)	Whole Building (n=187)
Reduced energy costs	80%	39%	68%
Increase lighting levels			10%
Increase safety	2%		5%
Increase tenant comfort	9%		5%
Better understanding of energy efficiency options	6%		5%
Better understanding of maintenance issues			1%
Tenant savings		9%	
Nicer lighting/equipment		9%	
Green building marketing		9%	
No results yet – units empty		22%	

New Construction participants were asked whether or not they would participate in the program again in the future at another location and 96 percent agreed that they would participate again. All participants were asked if they had also recommended the program to other owners and building managers. A majority of participants across all project types recommended the program to others, but New Construction participants were much more likely to have done so (91 percent) compared with Direct Install (73 percent) and Whole Building (69 percent) participants.

When asked about suggested improvements to the program, many participants thought the program worked well and suggested no changes (55 percent of Whole Building participants, 53 percent of Direct Install participants, and 35 percent of New Construction participants). Those who did offer a suggestion were most often looking for higher incentives in general and more incentives for equipment not currently covered by the program. Building shell measures such as windows, doors, and insulation were frequently mentioned along with solar as equipment that should be incentivized through the ACES program. Other suggestions common across all programs were the need to raise awareness of the programs by advertising or other means, a reduction in the quantity and complexity of paperwork, and more input, recommendations, and guidance by Focus staff. Direct Install and Whole Building participants also felt improvements could be made in the timing of the programs, both in the scheduling of visits and in how long the program runs.

As typical with most incentive programs, the incentives are not paid until after measures are installed and verified. However, some New Construction participants suggested the ability to secure a funding commitment from the program for the project early in the process, instead of it coming at the end with no certainty, would have a greater effect on their decision. This might be in the form of either a minimum dollar amount by measure type or a contractual commitment. The uncertainty regarding receiving the incentives, or what the amount might be, often limited the amount of influence the incentive had on the decision to install the measure as the participant in essence had to make the decision without a firm dollar amount.

Actual participant comments to support these findings are shown below.

- "Money could be secured up front, instead of bonus money at the back-end. Firm commitment that it would be coming. If we're able to know that the money is assured before we start construction, that would be very helpful because then we could design that we know that we're going to get that money eventually. It's a risk."
- "I thought FOE did a great job. If they can legally do it, it would be nice if throughout the process FOE staff could have made more recommendations on best equipment. Right now they just give information and customers have to decide."
- "A better incentive for geo-thermal. It would save a bundle of energy but the incentive is not enough to make up for the cost. More prescribed rebates - we don't have much flexibility when it comes to site planning."
- "Getting the rebates was a confusing process at first. Understanding what you have to do to get the rebates. Now that he is working with Sharon it has become easier."
- "It seems to me that the biggest efficiency loss in many buildings is windows and doors. There should be a program for multifamily properties to replace these."
- "More information needs to be given to the building inspectors, so they can give the information to the landlords."
- "My only comment is that they need to give a clearer definition of the rebates they provide."
- "The program is not highly advertised, word of mouth at the moment. I didn't realize without someone telling me. So better advertising. Some people would be looking for these services."

4.3 BARRIERS

Interviewers asked participants about the barriers they face when considering or seeking approval for new projects. This question was asked of respondents about all project improvements in general and was not specifically related to projects incentivized through ACES. Finding room in already tight budgets and ROI or payback concerns were the most often mentioned barriers to installing energy efficient equipment, although more so for New Construction participants (Table 4-3).

Table 4-3. Reported Barriers Faced for New Projects

Barrier	Direct Install (n=64)	New Construction (n=23)	Whole Building (n=187)
Budget	53%	65%	59%
Difficulty determining ROI, long payback	5%	17%	9%
No barriers		17%	
Lack of capital	6%		9%
Lack of easy access to apartments	2%		0%
Time constraints	2%		3%
Lack of resources to implement	0%		1%
Approval by board or owner	0%		5%
Too much paperwork		4%	
Lack of product knowledge		9%	
Equipment functionality/dependability		9%	

APPENDIX A: ACES PARTICIPANT SURVEY: DIRECT INSTALL AND WHOLE BUILDING

Sample Information

Contact name
Contact phone
Contact city
Building location

Program:

Whole Building program
 Direct Install program

Product type:

- 1 Air conditioner
- 2 Clothes washer
- 3 Dishwasher
- 4 Heating equipment
- 5 Boiler clean and tune
- 6 Lighting
- 7 Other equipment
- 8 Refrigerator
- 9 Shell measures
- 10 Water heater equipment
- 11 Water saving devices

Measure type: Specific energy efficient measures within product type categories

- 1 Energy efficient air conditioner
- 2 Energy efficient clothes washer
- 3 Energy efficient dishwasher
- 4 Energy efficient heating equipment
- 5 Boiler clean and tune
- 6 Energy efficient lighting
- 7 Other energy efficient equipment
- 8 Energy efficient refrigerator
- 9 Efficient building shell measures
- 10 Energy efficient water heater equipment
- 11 Low flow showerheads and faucet aerators

Measure description: Detailed descriptions of energy efficient equipment

Action:

Whole Building: purchase and install
 Direct Install: receive

Date: Date of delivery

Incentive: Amount of rebate

Introduction

Hello, my name is _____ and I am calling on behalf of the Wisconsin Focus on Energy Apartment and Condominium Efficiency Services Program. May I speak with [**contact name**]?

- 1 Yes
- 2 No [attempt to convert; if R not available, ask for the person who is responsible for making decisions about purchasing new equipment for this property]

According to our records, your facility in [**city**] participated in the Apartment and Condominium Efficiency Services Program within the past 12 months. I'm with PA Consulting Group, an independent research firm, and I am calling to learn about your experiences with the [**measure types(s)**] this facility received through this program.

I'm not selling anything; I'd just like to ask your opinion about this program. I'd like to assure you that your responses will be kept confidential and your individual responses will not be revealed to anyone.

(Who is doing this study: The Public Service Commission of Wisconsin, which oversees Focus on Energy and the Apartment and Condominium Efficiency Services Program, is overseeing evaluations of the energy efficiency equipment being installed through different programs.)

(Why are you conducting this study: Studies like this help the state of Wisconsin better understand property owners' and managers' need for and interest in energy programs and services.)

(Timing: This survey should take less than 15 minutes of your time. Is this a good time for us to speak with you? IF NOT, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-445-5070)

(Sales concern: I am not selling anything; we would simply like to learn about your experience with the [**measures type**] you received through the Apartment and Condominium Efficiency Services Program. Your responses will be kept confidential. If you would like to talk with someone from the Public Service Commission about this study, feel free to call Oscar Bloch at 608-264-8267. If you would like to talk with the Apartment and Condominium Efficiency Services Program, feel free to call Mike Plunkett at 608-249-1271, extension 175)

(NOTE: For all questions, "DON'T KNOW" and "REFUSED" will be coded if offered as a response.)

Identification of Appropriate Decision-Maker(s)

C1 Do you recall participating in the Apartment and Condominium Efficiency Services **[Program]** around **[date]**?

- 1 Yes (SKIP TO C5)
- 2 No
- D DON'T KNOW

C2 (FILL WITH APPROPRIATE DESCRIPTION FROM BELOW) Let me give you some more information about the program.

DIRECT INSTALL: Under the Apartment and Condominium Efficiency Services Program In-Unit Direct Install Program, contractors replace existing incandescent light bulbs with compact fluorescent lamps (CFLs) and replace showerheads and faucet aerators with new low-flow versions throughout all dwelling units in the building. This equipment is installed at no cost to the property owner.

WHOLE BUILDING EXISTING: Under the Apartment and Condominium Efficiency Services Program Whole Building Program, multi-family residential building owners receive an audit report that outlines energy efficiency improvements that could be made to the property, and discusses rebates you could receive for voluntarily installing recommended lighting improvements and other energy conservation measures to buildings' common areas and systems.

ALL: Do you recall participating in this program?

- 1 Yes (SKIP TO C5)
- 2 No
- D DON'T KNOW

C3 (ASK IF DOESN'T RECALL) Is it possible that someone else at this property would know about the **[measure types]** you received through the Apartment and Condominium Efficiency Services **[Program]**? (RECORD ONE NUMBER)

- 1 Yes
- 2 No (THANK AND TERMINATE)
- D DON'T KNOW (THANK AND TERMINATE)
- R REFUSED (THANK AND TERMINATE)

C4 May I please speak with that person? (RECORD ONE NUMBER)

- 1 Yes (BEGIN THE SURVEY AGAIN WITH THIS NEW RESPONDENT)
- 2 No (TERMINATE)
- D DON'T KNOW (TERMINATE)
- R REFUSED (TERMINATE)

A.: ACES Participant Survey: Direct Install and Whole Building

C5 Were you personally involved in the decision of whether or not to **[Action]** the **[measure types]** at **[business name]** in **[city]** through this program?

- 1 Yes
- 2 No (SKIP TO C7)

M9 According to the program records, this property received **[quantity]** **[measures]** through the Apartment and Condominium Efficiency Services **[program]**. Does this sound correct?

- 1 Yes
- 2 No (SPECIFY WHAT IS INCORRECT)
- D DON'T KNOW
- R REFUSED

C6 Was anyone else within or outside your organization involved in the decision of whether to **[Action]** the **[measure types]** through this program?

- 1 Yes
- 2 No (SKIP TO C8)
- D DON'T KNOW (SKIP TO C8)
- R REFUSED (SKIP TO C8)

C7 Who else was involved in the decision of whether to **[Action]** the **[measure types]** at this location? How are they affiliated with this property and what was their role in the decision?

Name	Title	Phone number	Probe for role:
C7_1a	C7_1b	C7_1c	C7_1d
C7_2a			
C7_3a			
C7_4a			

(IF R WAS INVOLVED IN THE DECISION, CONTINUE; ELSE TERMINATE AND DIAL ONE OF DECISION MAKERS IN C7)

C8 Do you own or manage the property in **[city]**?

- 1 Own
- 2 Manage
- 3 Other (SPECIFY)

Context and Decision Making

M1 [IF OWN: Do you/IF MANAGE: Does your management company or the building owner] have a policy that specifies the installation of energy efficient equipment when purchasing new equipment for multifamily properties?

- 1 Yes
- 2 No (SKIP TO M3)
- D DON'T KNOW (SKIP TO M3)
- R REFUSED (SKIP TO M3)

M2 What is the policy?
(PROBE FOR SPECIFIC POLICY AND WHAT EQUIPMENT IT APPLIES TO)

M3 What are some of the major obstacles or barriers that you face when [IF OWN: considering/IF MANAGE: seeking approval for] energy efficient improvements at your multifamily properties? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 Budget
- 2 Lack of capital
- 3 Lack of easy access to apartments
- 4 Time constraints
- 5 Lack of resources to implement
- 6 Tenants pay for their energy use
- 7 Approval by board or member
- 8 Uncertainty regarding return on investment
- 9 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

A.: ACES Participant Survey: Direct Install and Whole Building

M4 How did you hear about the [IF DIRECT INSTALL: free] [IF WHOLE BUILDING: energy assessment and incentive for] **[measure type(s)]** available through the Apartment and Condominium Efficiency Services program? (DO NOT READ; INDICATE ALL THAT APPLY)

- 1 From Apartment And Condominium Efficiency Services Program/Focus/Franklin Energy staff
- 2 From a meeting/exhibit/trade show (SPECIFY NAME, DATE)
- 3 From a contractor/subcontractor/equipment vendor (SPECIFY NAME)
- 4 From a designer/architect (SPECIFY NAME)
- 5 From other property owners
- 6 Mailing/Literature (SPECIFY)
- 7 Advertisement (SPECIFY)
- 8 Utility
- 9 Previous participant in ACES - Direct Install
- 10 Previous participant in ACES - Whole Building
- 11 Previous participant in ACES - New Construction
- 12 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

M4a (IF WHOLE BUILDING and M4 NE 3) Did the contractor, subcontractor or vendor that you purchased this from mention that you could receive a rebate if you purchased an energy efficient **[measure type]**?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

M5 (IF M4 = 3 or M4 = 4 or M4a = 1) Was this [M4 or M4a response] already doing work for you at this or another property?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

M5a (IF M4 = 3 or M4 = 4 or M4a = 1) Do you have the name and/or contact information for the [M4 or M4a response] that first told you about the program?

- 1 Yes (SPECIFY AS MUCH DETAIL AS POSSIBLE – BREAK INTO FIELDS)
- 2 No
- D DON'T KNOW
- R REFUSED

M6 At exactly what point in the planning, purchasing or installation process were you when you first began to talk with someone about the Apartment and Condominium Efficiency Services program? (PROBE: Was it before or at the start of planning (no contractor referral), during planning (contractor identifies need) or purchasing process, after planning/purchase but before installation, or after installation.

M7 (IF WHOLE BUILDING) According to the program records, this property received an energy assessment, which identified opportunities for installing energy efficiency measures or practices to improve the efficiency of this facility. Is this correct?

- 1 Yes
- 2 No (SPECIFY WHAT IS INCORRECT)
- D DON'T KNOW
- R REFUSED

M8 (IF WHOLE BUILDING) On a 0 to 10 scale, with 0 being no impact at all and 10 a great amount of impact, what impact did the Apartment and Condominium Efficiency Services program representative have on your decision to have an assessment done?

[REPEAT M12a-N34 FOR EACH MEASURE TYPE]

M12a (IF QUANTITY > 1 AND PRODUCT TYPE NE 5) Based on what you have seen or heard, approximately what percent of these are still installed and in operation?

- D _____%
DON'T KNOW
- R REFUSED

M12b (IF QUANTITY=1 AND PRODUCT TYPE NE 5) Is this still installed and operating?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

A.: ACES Participant Survey: Direct Install and Whole Building

M13 (IF QUANTITY > 1 AND M12a NE 100% AND PRODUCT TYPE NE 5) Why are some/all of these no longer installed and operating?

(IF QUANTITY=1 AND M12b = NO AND PRODUCT TYPE NE 5) Why is this no longer installed and operating?

[INDICATE ALL THAT APPLY]

- 1 Equipment didn't work properly
- 2 Equipment failed/broke
- 3 Tenants took them when they moved
- 4 Wrong size—too small or too large
- 5 Didn't like the color
- 6 Didn't like appearance/unattractive
- 7 Poor water flow
- 8 Temperature was uncomfortable
- 9 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

M14 (IF WHOLE BUILDING AND PRODUCT TYPE=6) I'd like to ask about the lighting installed in the common areas of the building. For most of this lighting, is the number of hours the lighting is on during a week about the same all year round?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

M15 (IF M14=YES: On average/ IF M14=NO: For the majority of months on average), would you say this lighting is on during a typical week . . .

- 1 About 70 hours, which would be about 10 hours a day including weekend days
- 2 Less than 70 hours a week
- 3 Or more than 70 hours a week
- D DON'T KNOW
- R REFUSED

M16 (IF M14 = NO) For the remaining months, on average, how many hours is this lighting on during a typical week?

- 1 About 70 hours, which would be about 10 hours a day including weekend days
- 2 Less than 70 hours a week
- 3 Or more than 70 hours a week
- D DON'T KNOW
- R REFUSED

M17 (IF WHOLE BUILDING) Our records also indicate that you received about **[incentive amount]** from the Apartment And Condominium Efficiency Services Program to offset the cost of the **[measure type]**. Does this amount sound about right?

- 1 Yes (SKIP TO M19)
- 2 No
- D DON'T KNOW
- R REFUSED

M18 (IF WHOLE BUILDING) What would you estimate to be the actual amount of the incentive you received?

- \$ _____
- D DON'T KNOW
 - R REFUSED

M19 Did your organization receive financial assistance or rebate from a source other than Focus on Energy for the **[measure type]**?

- 1 Yes
- 2 No (SKIP TO M22a)
- D DON'T KNOW (SKIP TO M22a)
- R REFUSED (SKIP TO M22a)

M20 Who did you receive it from? (READ LIST)

- 1 Dealer
- 2 Manufacturer
- 3 Local government
- 4 State tax credit
- 5 Federal tax credit
- 6 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

M21 About how much was that other financial assistance?
(Record to the nearest dollar)

\$ _____
D DON'T KNOW
R REFUSED

M21b How did you hear about this funding?

(RECORD VERBATIM RESPONSE)

M22a Had you researched the cost of (IF EQUIPMENT: purchasing) **[measure type]** before learning that you could get [DIRECT INSTALL: it at no cost/OTHER: an incentive for **[measure type]**] through the Apartment and Condominium Efficiency Services program?

1 Yes
2 No
D DON'T KNOW
R REFUSED

M22b Do you know what the total cost for this **[measure type]** would have been if you had not received [DIRECT INSTALL: it at no cost/OTHER: this rebate] through the Apartment and Condominium Efficiency Services program?

1 Yes (SPECIFY)
2 No
D DON'T KNOW
R REFUSED

M22c Had you already been planning to purchase **[product type]** before you thought about participating in the Apartment and Condominium Efficiency Services program?

1 Yes
2 No (SKIP TO M23)
D DON'T KNOW
R REFUSED

M22d (ASK IF PRODUCT TYPE NE 5) Did you have to purchase a higher efficiency level of [**product type**] than you had initially planned in order to qualify for the rebate through the Apartment and Condominium Efficiency Services program?

- 1 Yes (SPECIFY CHANGES TO EFFICIENCY, QTY, TIMING)
- 2 No
- D DON'T KNOW
- R REFUSED (IF PRODUCT TYPE = 5, SKIP TO N16)

M23 Did this [**measure type**] replace (an) existing [**product type**]?

- 1 Yes
- 2 No (SKIP TO N16)
- D DON'T KNOW (SKIP TO N16)
- R REFUSED (SKIP TO N16)

M24 How would you describe the working condition of the old equipment? Was it in good, fair, poor working condition or did it not work at all?

- 1 Good
- 2 Fair
- 3 Poor
- 4 Did not work
- D DON'T KNOW
- R REFUSED

M25 Approximately how many years had the [IF QUANTITY >1: majority of the] old [**product type**] been installed at this building? Would you say less than 2 years, 3-5 years, 6-10 years, 11-15 years, or more than 15 years?

- 1 Less than 2 years
- 2 3-5 years
- 3 6-10 years
- 4 11-15 years
- 5 More than 15 years
- D DON'T KNOW
- R REFUSED

M26 (ASK IF M24 NE 4) How many more years do you think **[product type]** would have continued to function?

- 1 Less than 2 years
- 2 3-5 years
- 3 6-10 years
- 4 11-15 years
- 5 More than 15 years
- D DON'T KNOW
- R REFUSED

Direct Attribution—Timing

N16 If the [IF DIRECT INSTALL: free] [OTHER: incentivized] **[measure type]** had not been available through the Apartment and Condominium Efficiency Services program, would you have (IF PRODUCT TYPE NE 5: purchased any **[measure type]** on your own/IF PRODUCT TYPE = 5: paid to have the boiler clean and tune done) at the exact same time?

- 1 Yes (SKIP TO N23)
- 2 No
- D DON'T KNOW
- R REFUSED

N17 Would you have (purchased it/had it done) at a later date?

- 1 Yes
- 2 No (SKIP TO N23)
- D DON'T KNOW
- R REFUSED

N18 When do you think you would have (purchased it/done this)?

- _____ months _____ years (SKIP TO N20)
- D DON'T KNOW
 - R REFUSED (SKIP TO N20)

N19 (IF DON'T KNOW) Do you think you would have (purchased it/done this) within. . . ? (READ LIST)

- 1 1 year
- 2 1-2 years
- 3 3-4 years
- 4 More than 4 years
- 5 Never
- D DON'T KNOW
- R REFUSED

Consistency – Timing

N20 (ASK IF PRODUCT TYPE NE 5 AND IF OLD MEASURE WAS IN POOR WORKING CONDITION, M24=3 or 4, OR SAYS THAT IT WOULDN'T HAVE RUN FOR MORE THAN 2 YEARS, M26=LESS THAN 2 YEARS, AND SAYS WOULDN'T HAVE PURCHASED THE NEW EQUIPMENT WITHIN 2 YEARS—N18 > 2 OR N19 > 2)

Earlier you said that the old **[measure type]** [was in poor working or nonworking condition/wouldn't have run for more than 2 years]. Would you actually have waited [fill with N18 OR N19 YEAR] years to purchase a new **[measure type]** if the program had not been available?

- 1 Yes→Why do you say that? _____
- 2 No
- D DON'T KNOW
- R REFUSED

N21 (ASK IF PRODUCT TYPE NE 5 AND IF OLD MEASURE WAS IN GOOD WORKING CONDITION, M24=GOOD, OR SAYS THAT IT WOULD HAVE RUN FOR MORE THAN 5 YEARS, M26 > 3-5 YEARS, AND SAYS WOULD HAVE PURCHASED THE NEW EQUIPMENT AT SAME TIME, N16=1) Earlier you said that the old **[measure type]** [was in good working condition/would have run for at least 3-5 more years]. Would you actually have purchased **[measure type]** at that same time if the program had not been available?

- 1 Yes→Why do you say that? _____
- 2 No
- D DON'T KNOW
- R REFUSED

N22 (IF N20 OR N21 = NO) When do you think you would have purchased this equipment would you have purchased it/them within . . . ? (READ LIST)

- 1 1 year
- 2 1-2 years
- 3 3-4 years
- 4 Never
- D DON'T KNOW
- R REFUSED

Direct Attribution – Efficiency and Quantity

Efficiency

[IF PRODUCT TYPE = 5, SKIP TO N32]

N23 DIRECT INSTALL: Before installing this [measure type], had you installed [measure type] of the same high efficiency level at this or another property without receiving an incentive like you received from the Apartment and Condominium Efficiency Services Program?

WHOLE BUILDING: Before installing this [measure type], had you installed [measure type] of the same high efficiency level at this or another property without receiving an incentive like you received from the Apartment and Condominium Efficiency Services Program?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

N23a (IF DIRECT INSTALL AND N23 = 1) What percent of the building did you retrofit with [measure type] ?

- _____ ENTER PERCENT
- 77 DON'T KNOW
- 99 REFUSED

N24 Prior to talking with anyone from the Apartment and Condominium Efficiency Services Program, did you know that [measure type] came in different ranges of efficiency levels?

- 1 Yes
- 2 No (SKIP TO N27)
- D DON'T KNOW (SKIP TO N27)
- R REFUSED (SKIP TO N27)

N25 Do you know what the range of efficiency levels is?

- 1 Yes (DESCRIBE)
- 2 No
- D DON'T KNOW
- R REFUSED

N26 How did you first learn that they came in different efficiency levels?

- 1 Colleagues
- 2 Rental association
- 3 Advertising/news articles
- 4 Sales person
- 5 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

N27 Did the Apartment and Condominium Efficiency Services Program representative talk with you about the range of efficiency levels available for [measure type]?

- 1 Yes
- 2 No (SKIP TO N29)
- D DON'T KNOW
- R REFUSED

N28 What did the representative say about efficiency levels? (ALLOW MORE THAN ONE ANSWER)

- 1 Explained specific cost benefits of higher efficiency
- 2 Explained general benefits of higher efficiency
- 3 Described the range of efficiencies available
- 4 Gave specific recommendation regarding efficiency level needed
- 5 Other recommendation (SPECIFY)
- D DON'T KNOW
- R REFUSED

N29a If the incentive for the [measure type] had not been offered under Apartment and Condominium Efficiency Services Program, would you have purchased a less efficient [product type]?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

N29b What efficiency level would you have purchased? (PROBE FOR HOW THE EFFICIENCY LEVEL WOULD HAVE RELATED TO MEASURE RECEIVED)

- 1 Minimum required by code
- 2 Lower efficiency than received through program
- 3 Same or higher efficiency level as received through program (SKIP TO N30)
- 4 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

N29c (IF QUANTITY > 1) What percent of the **[product type]** would have been less efficient?

_____%
D DON'T KNOW
R REFUSED

Quantity

N30 [IF PRODUCT TYPE NE 5] If the [IF DIRECT INSTALL: free] [IF WHOLE BUILDING: incentivized] **[measure type]** had not been offered under Apartment and Condominium Efficiency Services Program, would you have purchased the same quantity of **[measure type]** on your own?

1 Yes (Skip to N32)
2 No
D DON'T KNOW
R REFUSED

N31 [IF EQUIPMENT] Would you have installed less or more **[measure type]**?

1 Less
2 More
D DON'T KNOW
R REFUSED

N31b How much would you have installed?

PROBE: Would you have installed [IF N31=Less: any? Half?] [IF N31=More: Double?]

D DON'T KNOW (9998)
R REFUSED(9999)

Consistency—Overall

N32 On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is that you would have bought the same **[measure type]** if you had not received [IF DIRECT INSTALL OR SERVICE: it at no cost] [OTHER: this incentive] through the Apartment and Condominium Efficiency Services Program?

- D _____ DON'T KNOW
- R REFUSED

N33 Can you please describe in your own words what impact, if any, the Apartment and Condominium Efficiency Services Program and/or the program representative had on your decision to install/receive **[measure type]** at the time you did?

N34 (ASK IF RECEIVED OTHER ASSISTANCE—M19=YES) Earlier you said you also received financial assistance from [FILL WITH M20 RESPONSE]. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is that you would have bought the same **[measure type]** if you had not received this other financial incentive?

- D _____ DON'T KNOW
- R REFUSED

Spillover

S1 Since participating in the Apartment and Condominium Efficiency Services Program, are you considering or have you installed similar energy efficiency measures at this or other rental properties without program assistance?

- 1 Yes, considering
- 2 Yes, already have implemented
- 3 No, not considering (SKIP TO S4)
- D DON'T KNOW (SKIP TO S4)
- R REFUSED (SKIP TO S4)

S2 (IF S1=CONSIDERING OR DONE) What [are you considering doing/have you done?] PROBE ON ALL SPECIFICS BELOW; RECORD VERBATIM

(S2_a) Location of installation:

(S2_b) Type of measure:

- 1 Water heater
- 2 HVAC
- 3 Lighting
- 4 Water saving devices (showerheads, faucet aerators)
- 5 Insulation
- 6 Other (SPECIFY)

(S2_c) Quantity of measure:

(S2_d) How do you know they are energy efficient?

- 1 Previous experience
- 2 Same equipment as received through program
- 3 ENERGY STAR label
- 4 On Focus on Energy list
- 5 Salesperson/contractor information
- 6 Other (SPECIFY)
- D Don't know

S3 What role did your previous participation in Apartment and Condominium Efficiency Services Program have on your decision to install this/these energy efficiency measure(s) on your own? RECORD VERBATIM; PROBE TO DETERMINE IF WAS SOLE CAUSE OR ONE OF SEVERAL REASONS

Satisfaction

S4 Have you had any complaints or problems regarding the installation or operation of the new equipment/services provided?

- 1 Yes
- 2 No (SKIP TO S8)
- D DON'T KNOW (SKIP TO S8)
- R REFUSED (SKIP TO S8)

S5 What were the complaints or problems?

S6 What has been done to resolve these complaints or problems?

S7 Are you satisfied with this outcome?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

S8 What benefits, if any, have you realized at this property as a result of participating in the Apartment and Condominium Efficiency Services Program? DO NOT READ; RECORD ALL THAT APPLY

- 1 Reduced energy costs
- 2 Increased lighting levels
- 3 Increase safety
- 4 Increase in tenant comfort
- 5 Better understanding of energy efficient options
- 6 Better understanding of maintenance issues
- 7 Other (SPECIFY)
- D DON'T KNOW
- R REFUSED

S10 Will your organization consider making similar energy efficiency improvements in the future at the same or another rental property?

- 1 Yes
- 2 No (SKIP TO S12)
- D DON'T KNOW
- R REFUSED

S11 (IF S10 = 1) Will your organization consider these improvements with or without assistance from the Apartment and Condominium Efficiency Services program?

- 1 With
- 2 Without
- D DON'T KNOW
- R REFUSED

S12 Have you recommended the program to other building owners or managers?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

S13 What changes, if any, to the program would you recommend?

S14 Other than the Apartment and Condominium Efficiency Services program, have you participated in any other programs offered through Focus on Energy?

- 1 Yes
- 2 No
- D DON'T KNOW
- R REFUSED

Firmographics

F1 How many buildings are there at this property?

- _____ buildings
- D DON'T KNOW
- R REFUSED

F2 How many total rental units are in this/these building(s)?

- _____ units
- D DON'T KNOW
- R REFUSED

F3 Are the rental units at this property individually metered for electricity use, or is the property master metered?

- 1 Individually metered
- 2 Master metered
- D DON'T KNOW
- R REFUSED

F4 Are the rental units at this property individually metered for natural gas use, or is the property master metered?

- 1 Individually metered
- 2 Master metered
- 3 No natural gas
- D DON'T KNOW
- R REFUSED

F5 (IF F3 = 1) Do the tenants at this property pay the utility company directly for their electricity use, or is it included in their rent?

- 1 Tenants pay utility bill
- 2 Included in rent
- D DON'T KNOW
- R REFUSED

F6 (IF F4 = 1) Do the tenants at this property pay the utility company directly for their natural gas use, or is it included in their rent?

- 1 Tenants pay utility bill
- 2 Included in rent
- D DON'T KNOW
- R REFUSED

F7 (IF DIRECT INSTALL) What percent of the rental units at this property have 1 shower? What percent have 2 showers? What percent have 3 or more showers?

- ___% 1 shower
 - ___% 2 showers
 - ___% 3 or more showers
- (Must total 100%)*

F8 Including the building(s) in [**city**], how many different buildings with four or more rental units do you [**own/manage**] in Wisconsin?

- ___ buildings
- 666 N/A (Condo)
- 777 DON'T KNOW
- 999 REFUSED

F9 Including the building(s) in [**city**], how many total rental units do you [**own/manage**] in Wisconsin?

- ____ units
- 6666 N/A (Condo)
- 7777 DON'T KNOW
- 9999 REFUSED

F10 How long have you [**owned/managed**] the property at [**location**]?

- ____ years
- D DON'T KNOW
- R REFUSED

F11 What is your job title?

- 1 Owner
- 2 Maintenance manager
- 3 Maintenance staff
- 4 Property manager
- 5 Purchasing agent
- 6 Architect
- 7 General contractor
- 8 Builder
- 9 Other (SPECIFY)
- R REFUSED

F12 And just to confirm, your name is [**contact name**]?

- 1 Yes
- 2 No
- R Refused

F12n [IF F12 = 2] Contact name:

F12A And would it be all right to call you back if we have any follow-up questions?

- 1 Yes
- 2 No

A.: ACES Participant Survey: Direct Install and Whole Building

F13 (INTERVIEWER: WAS THIS THE ORIGINAL CONTACT PERSON OR DID YOU IDENTIFY SOME OTHER CONTACT?)

- 1 Original contact
- 2 New contact

That's all the questions I have. Do you have any questions or comments?

(THANK AND TERMINATE)

**APPENDIX B: ACES PARTICIPANT SURVEY: NEW CONSTRUCTION IDI
PROTOCOL**

Introduction

Hello, my name is _____ and I am calling on behalf of the Wisconsin Focus on Energy Apartment and Condominium Efficiency Services Program. May I speak with [**contact name**]?

According to our records, your facility in [**city**] participated in the Apartment and Condominium Efficiency Services New Construction Program within the past 12 months. I'm with PA Consulting Group, an independent research firm, and I am calling to learn about your experiences with the [**measure types(s)**] this facility received through the Apartment and Condominium Efficiency Services Program within the past 12 months.

I'm not selling anything; I'd just like to ask your opinion about this program. I'd like to assure you that your responses will be kept confidential and your individual responses will not be revealed to anyone.

(Who is doing this study: This study is being conducted for the Public Service Commission of Wisconsin, which oversees Focus on Energy including the Apartment and Condominium Efficiency Services Program.

(Why are you conducting this study: Studies like this help the state of Wisconsin better understand property owners' and managers' need for and interest in energy programs and services.)

(Timing: This survey should take less than 15 minutes of your time. Is this a good time for us to speak with you? IF NOT, SET UP CALL BACK APPOINTMENT OR OFFER TO LET THEM CALL US BACK AT 1-800-445-5070)

(Sales concern: I am not selling anything; we would simply like to learn about your experience with the [**measures type**] you received through the Apartment and Condominium Program. Your responses will be kept confidential. If you would like to talk with someone from the Public Service Commission about this study, feel free to call Oscar Bloch at 608-264-8267. If you would like to talk with the Apartment and Condominium Program, feel free to call Mike Plunkett at 608-249-1271, extension 175)

Identification of Appropriate Decision-Maker(s)

C1 Do you recall participating in the Apartment and Condominium Efficiency Services New Construction program around **[date]**?

C2 (IF NO) Let me give you some more information about the program. Under the Apartment and Condominium Efficiency Services Program New Construction Program, multi-family residential building owners work with program staff to identify energy efficiency improvements that could be incorporated during construction of your building. You would have also received an analysis of energy usage and the estimated energy savings from installing recommended measures as well as the actual incentives you could get for following through with the recommendations. Do you recall participating in this program?

C5 Were you personally involved in the decision of whether or not to install the energy efficient **[measure types]** at **[business name]** in **[city]** through this program?

C6 Was anyone else within or outside your organization involved in the decision of whether to install the **[measure types]** through this program?

Who else was involved in the decision of whether to install the **[measure types]** at this location? How are they affiliated with this property and what was their role(s) in the decision to work with Apartment and Condominium Efficiency Services Program staff?

- Name
- Title
- Phone number
- Role

(IF R WAS INVOLVED IN THE DECISION, CONTINUE; ELSE TERMINATE AND DIAL ONE OF DECISION MAKERS IN C6)

C8 What is your role in the construction project at [address], [city]?

- 1) Owner
- 2) Developer
- 3) Architect
- 4) General Contractor
- 5) Other contractor (specify)
- 6) Other (Specify)

Firmographics

- F1** How many buildings are there at this property?
- F2** How many total rental units are in this/these building(s)?
- F3** Are the rental units at this property individually metered for **electricity use**, or is the property master metered? Do the tenants pay directly for electricity use or is it included in rent?
- F4** Are the rental units at this property individually metered for **natural gas use**, or is the property master metered? Do the tenants pay directly for natural gas use or is it included in rent?
- F8** Including the building(s) in [**city**], how many different buildings with four or more rental units do you [**own/manage**] in Wisconsin?
- F9** Including the building(s) in [**city**], how many total rental units do you [**own/manage**] in Wisconsin?

Context and Decision Making

- M1** Does your company have a policy relating to energy efficiency when developing building specifications for new construction projects of multi-family properties? [Can you describe the policy?
- M3** What are some of the major obstacles or barriers that you face when considering energy efficient specifications for your new construction multifamily projects?
- M4A** Had you previously participated in the ACES program prior to the construction of the project at [**address**]?
- M4** How did you first hear about the energy assessment and incentive for [**measure type(s)**] available through the Apartment and Condo New Construction Services program?

B.: ACES Participant Survey: New Construction IDI Protocol

M5 (IF HEARD ABOUT PROGRAM THROUGH CONTRACTOR, DESIGNER, OR ARCHITECT)
Was this contractor/designer/architect already doing work for you at this or another property?

(IF DID NOT HEAR ABOUT PROGRAM THROUGH CONTRACTOR, DESIGNER, OR ARCHITECT)
Did a contractor, designer or architect involved with this project mention that you could receive a rebate if you purchased energy efficient equipment?

M6 At exactly what point in the planning, purchasing or installation process were you when you first began to talk with someone about the Apartment and Condo New Construction Services program?
(PROBE: Was it before or at the start of planning (no contractor referral), during planning (contractor identifies need) or purchasing process, after planning/purchase but before installation, or after installation.

M7 According to the program records, the Apartment and Condominium Efficiency Services program provided you with an analysis of energy usage which specified the savings you could realize by installing energy efficient measures or adopting energy efficient practices in the new building. Is this correct?

M8 What impact did the Apartment and Condominium Efficiency Services program representative have on your decision to have the analysis done?

M9 According to the program records, this property received **[quantity] [measures]** through the Apartment and Condominium Efficiency Services New Construction program. Does this sound correct?

M12a Based on what you have seen or heard, approximately what percent of these are still installed and in operation?

M13 Why are some/all of these no longer installed and operating?

M15 I'd like to ask about the lighting installed in the common areas of the building. On average, how many hours would you say this lighting is on during a typical week or will be on if the building is currently not occupied? (PROBE FOR GREATER THAN 70 HOURS)

Does this amount vary at different times during the year?

- M17** Our records also indicate that you received about **[incentive amount]** from the Apartment and Condominium Efficiency Services Program to offset the cost of the **[measure type]**. Does this amount sound about right? If not, what was the correct amount?
- M19** Did your organization receive financial assistance or rebate from a source other than Focus on Energy for the energy efficient equipment? From whom did you receive it?
- M21** About how much was that other financial assistance?
(RECORD TO THE NEAREST DOLLAR)
- M22a** Had you researched the cost of purchasing the energy efficient equipment before learning that you could get an incentive for the equipment through the Apartment and Condominium Efficiency Services program?
- M22b** Do you know what the total cost for this energy efficient equipment would have been if you had not received this rebate through the Apartment and Condominium Efficiency Services program?

Direct Attribution—Timing

- N16** If the incentivized energy efficient equipment had not been available through the Apartment and Condominium Efficiency Services program, would you have purchased any energy efficient equipment on your own **at the exact same time?**
(PROBE FOR DIFFERENCES IN EQUIPMENT TYPES)
- N17** (IF N16 = NO OR DK) Would you have purchased it at a later date?
- N18** (IF N17 = YES) When do you think you would have purchased it? (ASK FOR MONTHS OR YEARS. IF DK, PROBE FOR RANGE)

Direct Attribution—Efficiency and Quantity

- N23** Before installing this energy efficient equipment, had you installed energy efficient equipment of the same high efficiency level in another property without receiving an incentive like you received from the Apartment and Condominium Efficiency Services New Construction program?
- N24** Prior to talking with anyone from the Apartment and Condominium Efficiency Services New Construction program, did you know that energy efficient equipment came in different ranges of efficiency levels? (Describe)

N27 Did the Apartment and Condominium Efficiency Services New Construction program representative talk with you about the range of efficiency levels available for energy efficient equipment? (Describe)

N29a If the incentive for the energy efficient equipment had not been offered under Apartment and Condominium Efficiency Services New Construction program, would you have **purchased less efficient equipment**? (PROBE FOR DIFFERENCES IN EQUIPMENT TYPES)

N29b (If N29a = Yes) What efficiency level would you have purchased?

N29c (IF MORE THAN ONE INSTALLED) What percent of the equipment would have been less efficient?

N30 If the incentivized energy efficient equipment had not been offered under Apartment and Condominium Efficiency Services New Construction program, would you have purchased the **same quantity** of energy efficient equipment?

N31 [IF N30 = NO OR DK) Would you have installed less or more energy efficient equipment?

N31b How much would you have installed?

Consistency—Overall

N32 On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is that you would have bought the same energy efficient equipment if you had not received this incentive through the Apartment and Condominium Efficiency Services New Construction program?

N33 Can you please describe in your own words what impact, if any, the Apartment and Condominium Efficiency Services New Construction program had on your decision to install energy efficient equipment at the time you did?

N34 (ASK IF RECEIVED OTHER ASSISTANCE) Earlier you said you also received financial assistance from [FILL WITH M20 RESPONSE]. On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is that you would have bought the same the energy efficient equipment if you had not received this other financial incentive?

Measure	N16	N17	N18	N24	N27	N29a	N29b	N29c	N30	N31	N31b	N32	N33
	Y/N	Y/N	MM- YYYY	Y/N	Y/N	Y/N	Qty	%	Y/N	Less/ More	Qty	0-10	Verb- atim
1 Energy efficient air conditioner													
2 Energy efficient clothes washer													
3 Energy efficient dishwasher													
4 Energy efficient heating equipment													
5 Boiler clean and tune													
6 Energy efficient lighting													
7 Other energy efficient equipment													
8 Energy efficient refrigerator													
9 Efficient building shell measures													
10 Energy efficient water heater equipment													
11 Low flow showerheads and faucet aerators													

Spillover

[IF HAS NO OTHER 4+ UNIT PROPERTIES, SKIP TO S4]

S1 Since participating in the Apartment and Condominium Efficiency Services New Construction program, are you considering or have you installed similar energy efficient equipment at your other properties without program assistance?

S2 (IF S1=CONSIDERING OR DONE)
What [are you considering doing/have you done?] PROBE ON ALL SPECIFICS BELOW; RECORD VERBATIM

Location of installation: _____
Type of measure: _____
Quantity of measure: _____
How know is EE: _____

S3 What role did your previous participation in the Apartment and Condominium Efficiency Services New Construction program have on your decision to install this/these energy efficiency measure(s) on your own?
(RECORD VERBATIM; PROBE TO DETERMINE IF WAS SOLE CAUSE OR ONE OF SEVERAL REASONS)

Satisfaction

S4 Have you had any complaints or problems regarding the installation or operation of the new equipment/services incentivized through the program?

S5 (If complaints) What were the complaints or problems?

S6 (If complaints) What has been done to resolve these complaints or problems and are you satisfied with the outcome?

S8 What benefits, if any, have you realized at this property as a result of participating in the Apartment and Condominium Efficiency Services New Construction program?

S9 Would you participate in this program again in the future?

S10 Have you recommended the program to other building owners or managers?

- S11** What changes, if any, to the program would you recommend?
- S12** Other than the Apartment and Condominium Efficiency Services New Construction program, have you participated in any other programs offered through Focus on Energy (probe for specific program name and/or component)?
- F12A** And would it be all right to call you back if we have any follow-up questions?
- 1 Yes
 - 2 No

Those are all the questions I have. Do you have any questions or comments?

Follow-up call

Hello. My name is {name} and I'm from PA Consulting Group. We're working with Focus on Energy evaluating the Apartment and Condominium Efficiency Services program. I spoke with you around {date} regarding your involvement with the program at {business name}. I have a couple of follow-up questions.

When we spoke previously, I asked you about the influence the financial incentive had your decision to installed {measures}.

{Review N32 responses as needed}

Today, I'd like to find out more about what other things might have influenced that decision.

- Q1cb** First, what technical assistance did the ACES program provide to {stakeholders} other than a financial incentive to the owners for the equipment installed? (PROBE FOR TECHNICAL ASSISTANCE, VALIDATION OF NEW TECHNOLOGY, INDUSTRY DIRECTION INSIGHTS, LIST OF RECOMMENDATIONS).
- Q2cb** On a 0-10 scale, with 0 being no influence and 10 being a great deal of influence, please rank the influence the ACES representative and the technical assistance they provided had on your decision to specify/install this equipment?
- Q3cb** Prior to any Focus involvement, did you typically specify/install energy efficient equipment for new construction projects? (PROBE FOR EXTENT – all, some, few?)
- Q4cb** When working on new construction projects, what has influenced you to increase a project's overall energy efficiency?

Q5cb What else has had an influence on you to increase overall energy efficiency - customer demand, federal standards, stimulus funding, Focus? What was the most influential?