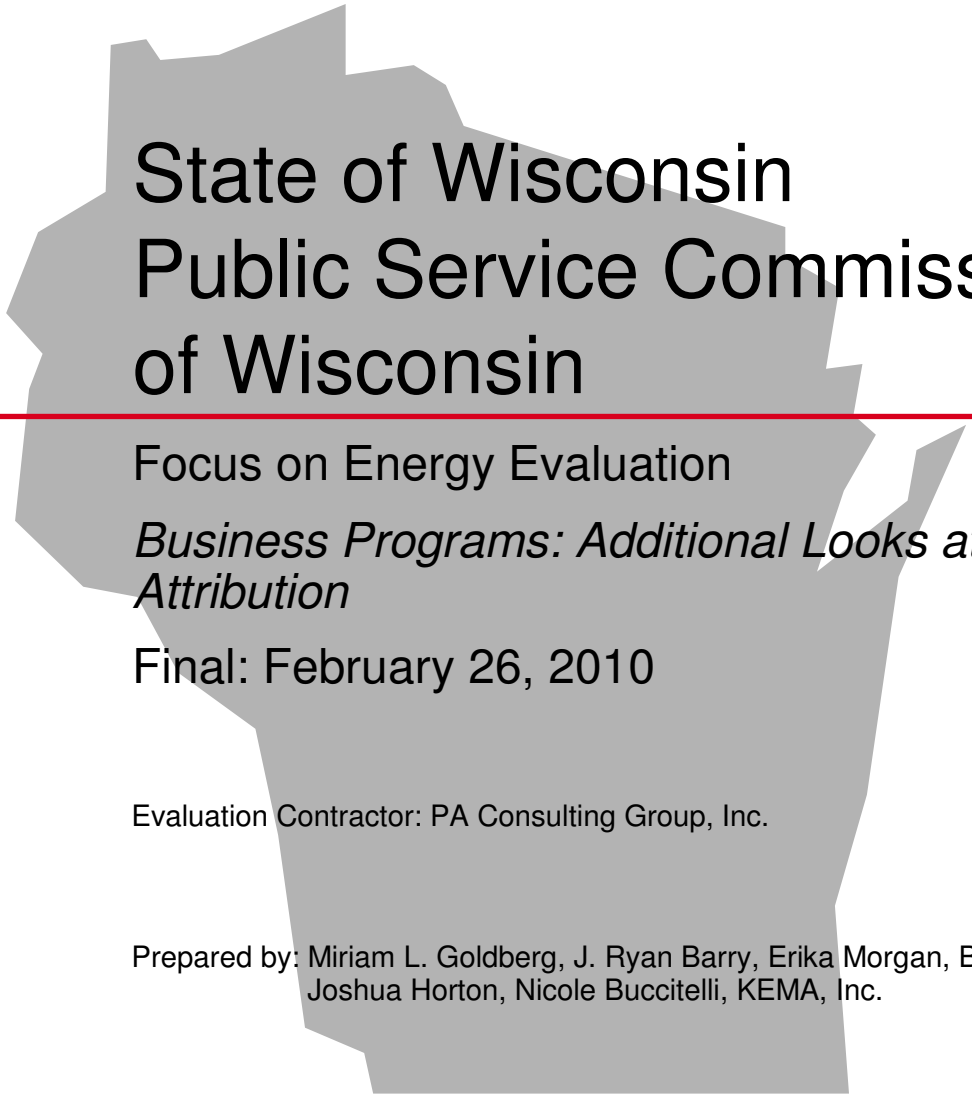
PA Consulting Group

KEMA



State of Wisconsin Public Service Commission of Wisconsin

Focus on Energy Evaluation

Business Programs: Additional Looks at Attribution

Final: February 26, 2010

Evaluation Contractor: PA Consulting Group, Inc.

Prepared by: Miriam L. Goldberg, J. Ryan Barry, Erika Morgan, Ben Jones, Joshua Horton, Nicole Buccitelli, KEMA, Inc.

focus on energy℠

The power is within you.

State of Wisconsin Public Service Commission of Wisconsin

Focus on Energy Evaluation

Business Programs: Additional Looks at Attribution

Final: February 26, 2010

Liaison Contact: Dr. David Sumi
PA Consulting Group Inc.
6410 Enterprise Lane, Suite 300
Madison, WI 53719
Tel: +1 608 316 3700
Fax: +1 608 661 5181
E-mail: david.sumi@paconsulting.com

Prepared by: Miriam L. Goldberg, J. Ryan Barry, Erika Morgan, Ben Jones, Joshua Horton, Nicole Buccitelli, KEMA Inc.

Acknowledgment: Ralph Prahl, Prahl & Associates, contributed critical review and analysis.

This report is the property of the state of Wisconsin, Public Service Commission of Wisconsin, and was funded through the Wisconsin Focus on Energy Program.

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

The purpose of this report is to provide attribution factors by end-use and other additional measure characteristics based on the data collected for the impact evaluation of the Focus Business Programs (BP) completed in April 2009[1]. The analysis examines the effect of the channel initiatives, project size, measure types, and variations in incentive levels on program attribution.[2] This Executive Summary provides the evaluation approach and a summary of the key findings and conclusions.

1.2 OVERVIEW OF APPROACH

On April 2, 2009, the *Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period*[3] was finalized. This report presents the results of the Impact Evaluation of the statewide Focus on Energy Business Programs measures implemented during the first five quarters (July 1, 2007, through September 30, 2008) of the 18-month contract period[4] (18MCP). The main objective in designing the sample for the 18MCP study was to provide the best possible estimates for Business Programs overall and each of the four primary sectors (Agriculture, Commercial, Industrial, and Schools & Government).

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

- **Gross savings adjustment factor.** This factor adjusts tracking gross savings for installation and changes based on the engineering review. Applying the gross savings adjustment factor to tracking gross savings produces the estimate of verified gross savings.
- **Attribution factor.** This factor adjusts verified gross savings for program attribution.
- **Realization rate.** This factor combines the gross savings adjustment factor and the attribution factor. It is the ratio of net savings to tracking gross savings.

---

[1] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* April 2, 2009.

[2] The use of regression analysis to explore multiple variables simultaneously was not performed in order to reallocate funds to the investigation of the effect of incentive change on attribution rates.

[3] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* April 2, 2009.

[4] The "18-month Contract Period" refers to program implementation between July 1, 2007, and December 31, 2008.

The statistical precision for the Additional Looks provided in this report may not be as high as reported in the 18MCP Business Programs impact evaluation report. This is a direct result of the sample design's primary objective—to produce the best possible estimates for Business Programs overall and each of the four primary sectors, rather than for the breakouts reported in this document. If the purpose of the 18MCP impact evaluation had been to develop estimates for the breakouts provided in this report, the sample would have been designed differently. Sampling strata and target sample sizes would have been developed to support the best estimates at these levels given budget constraints. As with all statistical analyses, results derived from small sample sizes with corresponding low levels of statistical precision should be treated with caution. This report includes numerous measures of precision including sample sizes, confidence intervals and results of statistical difference tests.

Program attribution levels are the focus of this analysis. The data cuts that create and provide the "Additional Looks" explored in this report are:

- *Attribution Factors by End-Use.* This look examines the attribution factors according to the different end-uses addressed by customer projects and installed measures.
- *Four Primary Sectors by Channel.*[5] The influence of the Channel initiatives on the sectors is examined through three different looks, each in their own subsections:
  - *Channel versus Non-Channel Measures (18MCP).* In this look, we examine the 18MCP differences in attribution factors for measures delivered through the Channel initiatives, verses those measures not delivered through the Channel initiatives.
  - *Channel Measures over Time (FY06 vs. 18MCP).* This look at Channels over time highlights changes in attribution factors as the Channel initiatives become more established and handle a higher volume of measures.
  - *Non-Channel Measures over Time (FY06 vs. 18MCP).* This look examines whether attribution factors for non-Channel measures has shown any changes over the same period of Channel evolution.
- *Four Primary Sectors by Project Size (Large vs. Small).* Comparing program attribution by size reveals ways in which project size is related to participant behavior and program effectiveness.
- *Four Primary Sectors by Measure Type (Deemed vs. Custom).* The 18MCP results for the four primary sectors were used to investigate the impact of custom versus deemed measures on attribution. This look at attribution can provide insight into the effects that program delivery mechanisms can have on attribution:
  - The custom versus deemed look effectively isolates the effect that increased customer effort, and (often) the financial investment required for custom projects, has on attribution.

[5] Measure were classified as Channel Measure if any of the three following conditions were true: (1) the WATTS field "billmeasureto" included the word "Channel"; (2) the WISeerts field "ChannelInd" identified one of the Channels; or (3) the measure was in the Rebates database (mail-in rebates processed by EFI (e.g. CFLs, clothes washers)).

  - Additionally, this comparison can offer another view of the effect that Channel initiatives have on attribution versus other program mechanisms. This arises because Channels predominately handle deemed measures versus custom.

- *Four Primary Sectors by Measure Type and Project Size.* This look considers sector results by both measure type (deemed vs. custom) and project size, essentially combining the two previous breakouts. By examining both dimensions simultaneously, the relative contributions of each factor to rates of program attribution are assessed.

- *Variations in Program Incentive Levels.* This analysis examines the effects of raised incentive levels. Program logic suggests that, all things being equal, higher rebate levels should result in higher levels of program attribution. It is important to investigate the extent to which this proposition is supported by the data.

- This report presents empirically based results for each of the above Additional Looks. In addition to the attribution factor estimates and measures of precision, we also provide a clear explanation of the measure classification process and the fraction of population and sample energy savings for which each category accounts. These breakouts provide the reader with additional context for interpretation of the empirical findings.

- The framing and development of hypotheses is a legitimate and valuable evaluation activity. In addition to the empirical findings, we also offer numerous insights based on those results. It is important to distinguish factual results from more hypothetical insights, and we underline this difference throughout the text.

1.3 KEY FINDINGS AND CONCLUSIONS

The Additional Looks demonstrate that attribution rates vary considerably according to end-use, project size, measure type, Channel initiative coverage, and incentive level. Based on the one-dimensional looks, we identified several general patterns and associations. These general associations should not be interpreted as recommendations for programmatic changes, such as eliminate custom projects and focus exclusively on deemed/prescriptive projects. Rather, the results highlight general association at the overall Business Programs level that may be quite different by sector, technology, or market. In addition, the one-dimensional Looks control for only one dimension within a highly complex relationship. The uncontrolled-for-dimensions should be considered when interpreting the Additional Look results. We encourage the reader to explore the general associations further beyond this report.

Several key observations emerge from the empirical findings. Results show that a number of factors are closely associated with high attribution rates, including:

- **CFLs.** Attribution rates for the CFL end-use segment were over 100 percent for both electric units. CFL attribution rates increased by a statistically significant margin between FY06 and the 18MCP for both kWh and kW. Program attribution results for CFLs, calculated with market-based methods, were 100 percent in FY06, and 111 percent and 91 percent in the 18MCP for Agriculture and Commercial, respectively. The influence of the CFLs on the Agriculture and Commercial sector Looks is a reoccurring theme in this report. For these two sectors, we provided additional breakouts by Channel, Size, Measure Type, and

Measure Type-Size with the exclusion of CFLs. Attribution rates tended to be lower with the removal of the CFLs thereby altering the general associations observed with CFLs. More specifically, Agriculture Deemed-Small measures that were associated with high attribution became associated with low attribution with the removal of CFLs; a similar drop in attribution occurred for the Commercial Deemed-Large measures; and Deemed-Small Commercial measures decreased, though to a lesser degree. These findings support the thought that CFLs are key drivers for Agriculture and Commercial sector electric attribution rates.

- **Channel initiative coverage[6].** Within the Agriculture and Commercial sectors, attribution factors for those electric measures supported by the Channel initiatives averaged 88 percent. These attribution rates were significantly higher than comparable Non-Channel rates. Channel rates were also significantly higher in the 18MCP than in FY06. High CFL attribution rates contributed to high Channel attribution rates.

- **Project size.** Program attribution was generally higher for small-size projects. In the Commercial sector, for example, attribution rates for small projects measured 84 percent for kWh and 82 percent for kW[7]. Differences between these rates and those for large projects were statistically significant. Evidence suggests, however, that program attribution was high for some of the largest projects as well. In the Industrial sector, for instance, large project attribution levels were significantly greater than small project attribution levels for both kWh and therms, by margins of 18 percentage points and 41 percentage points, respectively.

- **Deemed measures.** For virtually all measure types in all primary sectors, deemed incentives outperformed custom incentives. These differences were statistically significant for electric measures in the Agriculture sector, for kWh in the Schools and Government sector, for kW measures in the Commercial sector, and for gas measures in the Industrial sector. In addition, a comparison of incentive type to project size indicates that deemed measures are a better predictor of high program attribution than small size.

- **New incentive levels.** For electric measures, incentives raised one to 25 percent declined in attribution over FY06 by a statistically significant amount. Incentives raised more than 25 percent were not statistically different from the FY06 results. The opposite pattern was true for gas; measures with incentives raised more than 25 percent declined while incentive raised by 1-25 percent experience no change in attribution rates at the 95 percent level of confidence.

---

[6] While interpreting these data, it is important to recognize that the efforts of the sectors and Channels are not mutually exclusive. Measures rebated through the Channel initiatives may have received Energy Advisor involvement and similarly the program has reported custom project leads developed through the Channel efforts.

[7] CFLs are key drivers of high attribution rates for small projects and deemed projects (next bullet) in the Agriculture and Commercial Sectors.

The empirical results also show a number of program features accompany low attribution rates. These features include:

- **Building shell measures.** The therm attribution factor of 32 percent was low relative to other gas end-use categories. The building shell results for electric measures were derived using small sample sizes, but the sample size for therms measures was large enough (n = 24) to produce results worthy of consideration. Attribution levels for these measures have also declined over time, suggesting the possibility that the program may be providing incentives for measures that have reached a degree of market acceptance.
- **Non-Channel initiative coverage[8].** Within the Agriculture and Commercial sectors, attribution factors for electric measures not supported by the Channel Initiatives were between 47 percent and 52 percent. These levels were significantly lower than those for Channel measures, which benefit significantly from the inclusion of CFLs in the Channels.
- **Large projects.** Program attribution was generally lower for large-size projects. Attribution factors for large Commercial projects were 53 percent for kWh and 54 percent for kW. These levels were significantly lower than those for small Commercial projects. Results also show a closer link between custom incentives and low attribution, than between large project size and low attribution. In the Industrial segment, however, small projects correlate more strongly with low attribution than large projects.
- **Custom measures.** Attribution rates for custom measures were less than those for deemed measures. This observation holds across nearly all combinations of measure type and sector. Differences are statistically significant in multiple cases.
- **New measure incentives.** For electric measures, attribution levels for entirely new measures registered the lowest rates of any incentive category. These levels were below those measured for older incentive levels that remained unchanged.

Taken together, the evidence presented in these looks suggests that measure type and project size may be influential in driving project attribution rates. Both measure type and project size tends to be associated with specific end-uses. Specifically, program incentives for CFL and Lighting end-uses are typically deemed measures, and project size for these end-uses is typically small. Projects within the HVAC and Manufacturing Process segments are larger and comprise a mix of measure types (although HVAC end-uses are more likely to receive deemed measures). Lastly, custom measures and large size characterize Building Shell end-use measures.

Conceptually, then, it is possible to cluster end-use segments into three groups, based on this discussion of measure characteristics and program attribution levels. In one cluster, CFL and Lighting segments (typified by small size, deemed incentives) exhibit high

[8] While interpreting these data it is important to recognize that the efforts of the sectors and Channels are not mutually exclusive. Measures rebated through the Channel initiatives may have received Energy Advisor involvement and similarly the program has reported custom project leads developed through the Channel efforts.

attribution, while in a second cluster HVAC and Manufacturing Process segments exhibit medium attribution. Building Shell measures, characterized by custom measures and larger project size, tend to correlate with low attribution factors[9]. Very large projects, particularly Industrial sector undertakings that are characterized by a high degree of customization, also exhibit high attribution.

These findings suggest that the attribution factor of a given end-use segment is a product of project size and especially measure type. Small projects receiving deemed incentives, such as CFLs and Lighting, are likely to display high levels of program attribution. High attribution is also typical of very large, industrial-scale projects. By contrast, large, custom projects such as Building Shell measures are likely to register low program attribution. Market segments that fall between these two extremities are likely to register moderate levels of attribution.

There are a number of possible reasons why deemed measures and smaller projects have higher program attribution. Among the potential hypotheses, Channel initiatives, typically associated with deemed measures, also focus attention on upstream market actors, thereby strengthening ties between those measures and the supply side. The ease and convenience associated with deemed incentives might attract a larger number of participants who would not purchase energy-efficient technology in the absence of the program. A prescribed rebate amount might figure as a more influential marketing feature for customers otherwise unlikely to participate in the BP. The complexity of custom projects may diminish the motive force of incentives in relation to other project considerations such as BP's technical assistance services, and receipt of custom incentives may represent more an instance of opportunistic behavior than program success.

With respect to project size, smaller projects may be regarded as less important and relatively inconsequential by businesses, and incentives may be necessary to make them compelling investments. Rebates may represent a greater portion of project costs for smaller measures compared to larger measures, thereby exercising greater leverage over purchase decisions. Small measures may be easier to implement relative to large measures, and so attract greater participation and fewer free riders. For large projects, incentives might be overshadowed by multiple, competing variables, resulting in higher levels of freeridership among program participants. The results for large Industrial Sector projects represent a notable exception to this pattern.

The general patterns of program attribution discussed in this section have not been rigorously tested and remain to be investigated by further empirical analysis. In particular, the numerous hypotheses regarding links between measure type and project size, on the one hand, and program attribution, on the other, must be subjected to systematic evaluation. Testing of the hypotheses developed in this report is beyond the scope of this study; however, we believe there is value in the development of hypotheses.

[9] The Building Shell results were derived using small sample sizes, kWh: n = 8; kW n = 2; and therms: n = 24. Building shell measures account for more than one percent of tracked electric savings and 7 percent of tracked therms savings. The therms result of 32 percent attribution merits further considerations..

The conclusions offer guidance to program managers seeking to enhance program attribution. The empirical evidence provided by the Additional Looks give program managers additional data points on which to base program decision-making. The empirical results show that deemed measures, as defined in this report, had a tendency to have higher attribution levels compared with custom incentives, with the exception of the industrial sector. A similar result was found for project size. By taking greater account of measure type and project size as correlates of attribution, program managers might be able to leverage program funds in the most effective manner possible, thereby maximizing the societal benefits produced by the program. We are not recommending the program shift all resources more toward small, deemed measures at the expense of the considerable energy savings afforded by many large, custom projects. Rather, we are recommending a closer look by program managers at the measure groups identified in this report with tendencies toward low and high attribution.

- Changes to the program should also consider the current and future economic climate. As stated in this report, the 18MCP and the empirical results of this report were likely impacted by the recession that overlapped 10 of the 15 months covered by the impact evaluation. Future changes in economic climate are likely to have a similar effects on drivers to attribution.

The discussion also stresses the importance of future research on these relationships, to ensure that these correlations are robust under a wider array of program variables. The report concludes with a repeat of the caution that changes in the program dimensions examined here (measure type, size, incentives, etc.) should not be undertaken without a holistic reexamination of overall program logic and design. Three prior studies by the evaluation team bolster the core conclusion that all program modifications must be made in context not isolation:

- The 2006 report *Business Programs: Measure Review* suggested modifying incentive levels, possible elimination of some incentives, and distinguishing between replacement and retrofit contexts[10].
- The 2006 *Business Programs: Delivery Review* recommended limiting incentives to “first-timers,” creating tiers of incentives, and examining delivery mechanisms, in addition to suggesting modifications to incentive levels and conditions under which incentive increases would be most effective[11].
- The 2006 *Business Programs: A Behind-the-Scenes Look at Attribution* examined potential changes to rebate/incentive levels, in parallel with modifications to efficiency levels and Energy Advisor roles[12].

---

[10] The Focus on Energy Evaluation Team. *State of Wisconsin Department of Administration Division of Energy, Focus on Energy Evaluation, Business Programs: Measure Review*, February 3, 2006.

[11] The Focus on Energy Evaluation Team. *State of Wisconsin Department of Administration Division of Energy, Focus on Energy Evaluation, Business Programs: Delivery Review*, April 4, 2006.

[12] The Focus on Energy Evaluation Team. *State of Wisconsin Department of Administration Division of Energy, Focus on Energy Evaluation, Business Programs: A Behind-the-Scenes Look at Attribution,* June 21, 2006.

2. INTRODUCTION

The purpose of this report is to provide attribution factors by end-use and other additional measure characteristics based on the data collected for the impact evaluation of the Focus Business Programs (BP) completed in April 2009[13]. The analysis examines the affect of the channel initiatives, project size, measure types, and variations in incentive levels on program attribution.[14] In this section, we summarize the evaluation approach and describe the organization of the remainder of the report.

2.1 OVERVIEW OF APPROACH

On April 2, 2009, the *Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period*[15] was finalized. This report presents the results of the Impact Evaluation of the statewide Focus on Energy Business Programs measures implemented during the first five quarters (July 1, 2007, through September 30, 2008) of the 18-month contract period[16] (18MCP). The main objective in designing the sample for the 18MCP study was to provide the best possible estimates for Business Programs overall and each of the four primary sectors (Agriculture, Commercial, Industrial, and Schools & Government).

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

- **Gross savings adjustment factor.** This factor adjusts tracking gross savings for installation and changes based on the engineering review. Applying the gross savings adjustment factor to tracking gross savings produces the estimate of verified gross savings.
- **Attribution factor.** This factor adjusts verified gross savings for program attribution.
- **Realization rate.** This factor combines the gross savings adjustment factor and the attribution factor. It is the ratio of net savings to tracking gross savings.

[13] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* April 2, 2009.

[14] The use of regression analysis to explore multiple variables simultaneously was not performed in order to reallocate funds to the investigation of the effect of incentive change on attribution rates.

[15] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* April 2, 2009.

[16] The "18-month Contract Period" refers to program implementation between July 1, 2007, and December 31, 2008.

Program attribution levels are the focus of this analysis. The data cuts that create and provide the "Additional Looks" explored in this report are:

- Attribution Factors by End-Use (Section 4.2)
- Attribution Factors for the Four Primary Sectors by Channel[17] versus Non-Channel (Section 4.3)
- Attribution Factors for the Four Primary Sectors by Project Size (Section 4.4)
- Attribution Factors for the Four Primary Sectors by Deemed versus Custom Measures (Section 4.5)
- Attribution Factors for the Four Primary Sectors by Deemed versus Custom Measures by Size (Section 4.6)
- Attribution Factors by Changes in Incentive Levels (Section 4.7).

2.2 ORGANIZATION OF REPORT

The remainder of this report presents the attribution adjustment factors for each of these Additional Looks. Section 3 describes the background to this analysis. It provides a more complete discussion of the program attribution approach as a means of assessing the effectiveness of the Focus Business Programs, and details how the adjustment factors are developed. Section 4 presents adjustment factor results broken down by the aforementioned Additional Looks.

Finally, Section 5 combines results, findings, and insights from all of the previous sections, in order to draw conclusions and hypothesize which program features are likely to have the biggest impact on attribution rates. Particular attention is paid to questions about the effects of different incentive levels.

[17] Measure were classified as Channel Measure if any of the three conditions were true: (1) the WATTS field "billmeasureto" included the word "Channel"; (2) the WISeerts field "ChannelInd" identified one of the Channels; or (3) the measure was in the Rebates database (mail-in rebates processed by EFI (e.g. CFLs, clothes washers)).

3. APPROACH

In this section, we explain the rationale for this analysis and provide a brief description of the methods used to estimate adjustment factors.[18]

3.1 PURPOSE OF ANALYSIS

The purpose of this "Additional Looks at Attribution" is to provide a closer examination of program attribution results based on the data collected for the 18MCP impact evaluation completed in April 2009. By examining the data in different ways—taking "additional looks"—it is hoped that additional insight into attributes that influence program attribution results will be gained. In this report, we present results, or findings drawn directly from the data, as well as numerous insights based on those results. It is important to distinguish factual results from more hypothetical insights, and we underline this difference throughout the text.

The availability of data from the 18MCP impact evaluation provided evaluators with an opportunity to examine the data further, performing "additional looks" that fell outside the scope of the impact evaluation itself. The methodology and "looks" presented in this analysis follow similar analyses conducted in FY05[19] and FY06[20]. In addition to the existing looks at end-use and the Channel initiatives, the Public Service Commission of Wisconsin's (PSCW) and the program expressed interest in the influence on program attribution factors of different project sizes, different measure types, and different incentive levels. Therefore, the current analysis expanded upon the previous analyses with an investigation into these characteristics.

The Additional Looks included in this report are:

1. Attribution Factors by End-Use
2. Four primary sectors by 18MCP Channel versus 18MCP Non-Channel Measures
3. Four primary sectors by 18MCP Channel versus FY06 Channel Measures
4. Four primary sectors by 18MCP Non-Channel versus FY06 Non-Channel Measures
5. Four primary sectors by Project Size
6. Four primary sectors by Deemed versus Custom Measures

---

[18] For more information on the statewide Focus on Energy Business Programs Impact Evaluation methodology, refer to *Business Programs Impact Evaluation Report: First Five Quarters of the 18-Month Contract Period,* April 2, 2009.

[19] *Business Programs: End-use Specific Attribution Factors.* Focus on Energy Statewide Evaluation, October 28, 2005.

[20] *Business Programs End-Use Specific Attribution Factors—Fiscal Year 2006.* Focus on Energy Statewide Evaluation, April 20, 2007.

7. Four primary sectors by Deemed versus Custom Measures and Project Size
8. Variations in Program Incentive Levels.

3.2 GENERAL APPROACH

KEMA used the same methodology, protocols, and instruments that were developed and used in previous BP impact evaluation work conducted by KEMA.[21] Specifically, the 18MCP evaluation utilized two rounds of data collection and a document review to estimate net energy savings for Business Programs. The 18MCP impact evaluation rounds also used a revised survey instrument[22] and, for the first time, the PSCW's new statewide energy savings tracking database, WISeerts. These methodological adjustments are explained in the 18MCP Impact Report.[23]

The 18MCP survey addressed measure installation and characteristics (e.g., quantities, equipment efficiencies, and operating hours), program attribution, and program process issues, among other topics. Each BP impact evaluation has also included an engineering review of program documentation on how the tracking gross savings were calculated. Tracking gross savings are equivalent to the gross savings reported in the tracking database. This information is combined to develop the following adjustment factors.

1. **Gross savings adjustment factor**. This factor is the product of the Installation Rate and the Engineering Verification Factor. Applying the gross savings adjustment factor to tracking gross savings produces the estimate of verified gross savings.
2. **Attribution factor.** This factor adjusts verified gross savings to take account of program attribution.
3. **Realization rate**. This factor simply combines the effects of all adjustment factors. It is the ratio of net savings to tracking gross savings.

The attribution factor is the subject of this report.

---

[21] Abbreviated FY07: *Business Programs Impact Evaluation Report.* February 18, 2008.
FY06: *Business Programs Impact Evaluation Report.* March 7, 2007.
FY05: *Business Programs Impact Evaluation Report–Year 4, Round 1.* June 1, 2005.
FY04: *Business Programs Impact Evaluation Report–Year 3, Round 1.* June 17, 2004.
FY03: *Business Programs Impact Evaluation Report–Contract Year 2 Complete.* January 14, 2004.
FY02: *Volume III, Impact Evaluation of the Business Programs Comprehensive Report.* December 23, 2002.

[22] This revised survey instruments are found in Appendix I-K of *Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* Focus on Energy Evaluation, April 2, 2009.

[23] *Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* Focus on Energy Evaluation, April 2, 2009.

The main objective in designing the sample for the 18MCP study was to provide the best possible estimates for Business Programs overall and each of the four primary sectors (Agriculture, Commercial, Industrial, and Schools & Government).

Each of the adjustment factors were calculated separately for each energy unit (kWh, kW, and therms) in combination with each sector and for Business Programs overall. The calculation of the adjustment factors uses appropriate weights corresponding to the sampling rate within each stratum.

The statistical precision for the Additional Looks provided in this report may not be as high as reported in the 18MCP Business Programs impact evaluation report. This is a direct result of the sample design's primary objective—to produce the best possible estimates for Business Programs overall and each of the four primary sectors, rather than for the breakouts reported in this document. If the purpose of the 18MCP impact evaluation had been to develop estimates for the breakouts provided in this report, the sample would have been designed differently. Sampling strata and target sample sizes would have been developed to support the best estimates at these levels given budget constraints. As with all statistical analyses, results derived from small sample sizes with corresponding low levels of statistical precision should be treated with caution. This report includes numerous measures of precision including sample sizes, confidence interval, and results of statistical difference tests.

Table 3-1 provides the attribution factors by sector and Business Programs overall from the 18MCP impact evaluation report. These results provide perspective and a point of comparison for the Additional Look results.

Table 3-1. Attribution Factors by Sector
Based on Samples from Participants Who Installed a Measure during 18MCP

	kWh						kW						Therms					
			90% Confidence Interval						90% Confidence Interval						90% Confidence Interval			
Segment	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture	126	60%	14.2%	8.4%	51.1%	68.0%	107	57%	18.7%	10.6%	46.1%	67.4%	22	17%	8.5%	8.5%	8.1%	25.2%
Commercial NCL	131	70%	12.1%	8.4%	61.1%	77.9%	126	69%	13.9%	9.6%	59.6%	78.9%	26	33%	12.7%	12.7%	20.5%	45.8%
Industrial NCL	130	57%	12.9%	7.4%	49.8%	64.6%	124	54%	14.0%	7.5%	46.2%	61.3%	38	63%	11.6%	7.3%	56.0%	70.7%
Schools and Government NCL	77	43%	26.6%	11.4%	31.5%	54.4%	68	46%	14.1%	14.1%	31.8%	59.9%	62	38%	30.2%	11.5%	26.7%	49.7%
Business Programs Overall	464	60%	8.4%	5.0%	54.6%	64.5%	425	58%	9.0%	5.2%	53.0%	63.4%	148	52%	11.9%	6.2%	46.2%	58.6%

3.3 PRESENTATION OF RESULTS

Each Additional Look is presented and discussed in a separate section below. In each section, the presentation begins with a discussion of the definitions used in the analysis, to clarify how observations were categorized for the purposes of this look. In addition, each category is then shown as a percentage of the sample used in this analysis, and of the population frame from which the sample was drawn. In this way, it is possible to assess the magnitude of each category's contribution to the analysis overall.

Following the definitions, each section also contains a summary table showing the attribution factors calculated for each energy unit (kWh, kW, and therms), in combination

with the program dimension under specific consideration. The adjustment factors are provided with indicators of statistical precision, the 90 percent confidence interval, and sample sizes. The relative error (%) indicated for each confidence interval is the relative difference between the estimated percentage and the upper or lower confidence bound, not the absolute difference. The ± amount indicated for each confidence interval is the absolute difference in the estimated percentage.[24] The adjustment factors are calculated using a SAS® macro provided by SAS for ratio estimation by domains.[25] In several tables, values have been replaced with *. This indicates that the adjustment factor was not calculated because there were not enough sample points for this segment and energy type combination.

Following the presentation of the adjustment factor estimates in the tables are a series of comparison charts similar to those provided in the 18MCP impact evaluation report. A separate chart is provided for kWh, kW, and therms. Included in the charts are statistical difference comparisons at the 95 percent level of confidence. General notes that apply to all charts:

- The n above the bar signifies the number of observation in that sample.
- Where the sample size consisted of a single observation, that observation and the corresponding bar in the chart was removed to protect the confidentiality of the single observation.
- Cross-hatched bars indicates the difference between the adjustment factors is statistically significant at the 95 percent level of confidence.

The Business Programs have been continuously evolving since inception. Many of these changes have resulted in methodological changes in the impact evaluation that may have affected the trends in adjustment factors, yet may not have necessarily resulted from improvements or reductions in program effectiveness. Noteworthy methodological changes that occurred in the 18MCP analysis and may impact the attribution results include:

- **Revised survey instrument.** A revised survey instrument was developed based on the recent evaluation framework paper[26]. Revisions were made to the question sequence used to calculate program attribution (Direct Attribution questions). All other factors being equal, changes in impact evaluation survey methodology were expected to result in declines in attribution.

  More specifically, prior to the 18MCP the program was awarded full attribution credit if the respondent indicated that overall they were “very unlikely” to implement the energy efficiency improvement without the services provided by BP. All respondents that did not respond “very unlikely” were then asked specifically about the influence of BP on the timing, efficiency, and quantity

[24] The critical value for calculating the confidence interval ± for each adjustment factor is determined using Student's t-distribution and n-1 for the degrees of freedom, where n is the sample size.

[25] SRATSUB v 1.2. SAS Institute Inc. 2002. Cary, NC: SAS Institute.

[26] *“Focus on Energy Evaluation Framework for Self-Report Net-To-Gross (Attribution) Questions”,* memorandum to Oscar Bloch of the Public Service Commission of Wisconsin, dated July 2, 2008.

installed. Beginning in the 18MCP the overall question was removed from the attribution algorithm and all respondents were asked specifically about the influence of BP on the timing, efficiency, and quantity installed. KEMA expected this more rigorous question sequence to result in lower levels of attribution.

- **Deemed savings for CFLs.** Energy savings values for CFLs were deemed starting in FY06. In the 18MCP analysis, the only potential adjustment for gross savings would have been based on the quantity of bulbs installed. The deemed values were developed with input from evaluation and are based on data collection in prior impact evaluation.
- **Other deemed measures.** Starting in FY07, a number of other measures were deemed. Most of these measures were not included as part of the FY07 impact evaluation, but were included in the 18MCP. As a result, this analysis round includes a significant number of deemed measures. Other deemed measures include a number of lighting measures, premium efficiency motors, furnaces, boilers, air conditioners, and others.
- **Market-based attribution.** In FY06, the program changed its method of estimating attribution for CFLs from one based on self-reported program response to a "market-based method." The market-based method compares aggregate sales data to a baseline estimate of what would have been sold in the absence of the program. In adopting this method, attribution factors previously calculated by the evaluation team[27] were used for all low wattage (<30 W) CFLs in the CATI sample. These attribution rates were 111 percent for the Commercial sector and 91 percent for the Agricultural sector. This is the first evaluation that uses separate adjustment factors for Commercial and Agriculture[28]. The FY06 evaluation used 100 percent for Commercial and Agriculture CFLs[29].
- Low wattage CFLs account for a significant fraction of electric savings for the Agriculture and Commercial sectors; therefore, the high attribution rates for low wattage CFLs are key drivers in many of the Agriculture and Commercial sectors' electric looks. Figure 3-1 shows the Agriculture and Commercial sector level attribution rates with and without CFLs. The CFLs increased the overall attribution for both sectors for kWh and kW. The effect of the CFLs on Agriculture increased the attribution rates from 47 percent and 44 percent for kWh and kW respectively to 60 percent and 57 percent. The effect on Commercial increased the attribution rates from 49 percent and 43 percent to 69 percent and 69 percent, respectively.
- In this report, we note the effect the CFLs are having on the applicable Agriculture and Commercial sectors' electric looks.

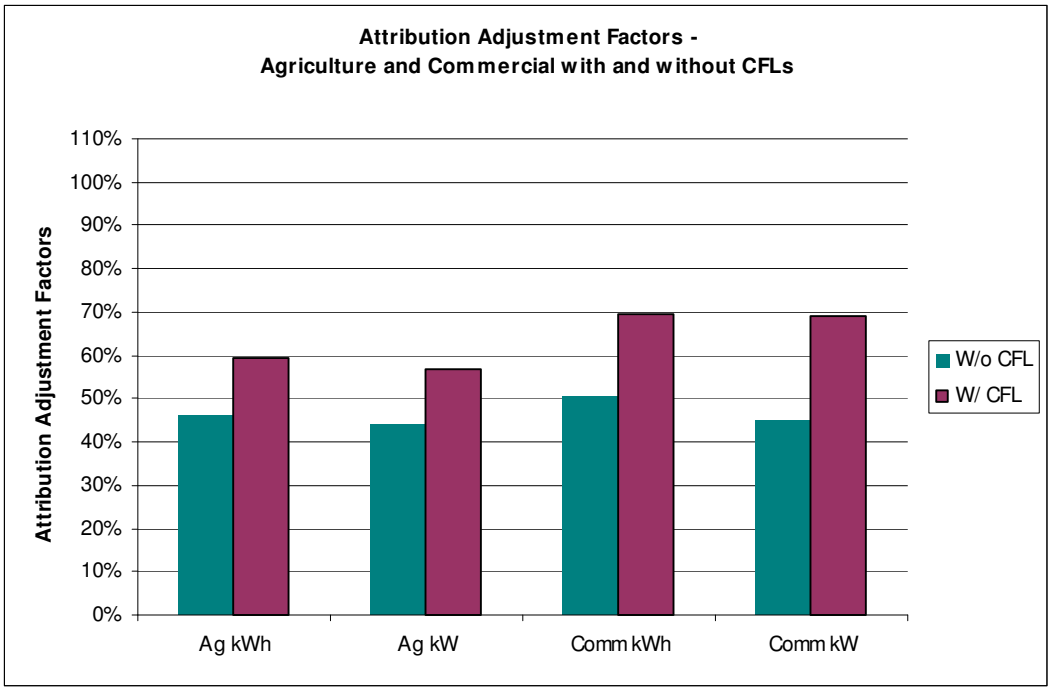
---

[27] *Second Annual Comprehensive CFL Market Effects Study – Final Report*, prepared by Glacier Consulting Group, LLC for the State of Wisconsin Public Service Commission, September 30, 2008.

[28] The Commercial value of 111 percent attribution was applied to CFLs in the CATI sample that fell under the Industrial or Schools & Government sectors.

[29] "FY04/05 Net-to-Gross Savings Adjustments for CFLs Rewarded through the ENERGY STAR Products Program," memorandum to Oscar Bloch, Wisconsin DOA, dated January 11, 2006 (Revised Draft).

Figure 3-1. Attribution Factors
Agriculture and Commercial with and without CFLs



- **Abbreviated FY07 approach.** By comparison with FY06 and the 18MCP, the FY07 evaluation used an abbreviated approach. The approach combined a sample of the largest projects implemented in FY07 and the sample of all BUT the largest projects from the FY06 impact evaluation. This approach assumed that the net-to-gross components for all projects except the largest are essentially the same in FY06 and FY07. A detailed discussion of the abbreviated approach is provided in the memorandum that reports the FY07 results.[30] Because the FY07 adjustment factors include the effects of participants from both FY06 and FY07, we did not include FY07 abbreviated impact results in the across years statistical comparison charts. Rather, the 18MCP results are compared with the FY06 results.

- **Growing fraction of deemed savings.** The 18MCP evaluation is the first impact evaluation with a large fraction of deemed savings in the impact evaluation sample frame. The engineering sample includes some deemed measures, but the vast majority of the CATI non-CFL savings come from deemed measures. A modification was made to the calculation of the Gross Savings Adjustment Factor and the Attribution Factor to account for the large fraction of deemed savings in the CATI sample. KEMA assumed the engineering estimates for CATI non-CFL measures were equal to verified installed savings. That is, no engineering adjustment was made to these measures (engineering verification factor assumed to be 100 percent). The deemed sector-level CFL energy savings values were applied to CATI CFLs.

[30] Mimi Goldberg, Ryan Barry, Tammy Kuiken, Paula Ham-Su, and Ben Jones, KEMA, Inc. *Focus on Energy Evaluation Abbreviated FY07 Business Programs Impact Evaluation*. February 19, 2008.

4. RESULTS

This section presents the attribution results for the eight Additional Looks.

4.1 18MCP ADDITIONAL LOOK RESULTS

The eight breakouts presented in this section include:

- *Attribution Factors by End-Use.* This look examines the attribution factors according to the different end-uses addressed by customer projects and installed measures.
- *Four Primary Sectors by Channel.* The influence of the Channel initiatives on the sectors is examined through three different looks, each in their own subsections:
  - *Channel versus Non-Channel Measures (18MCP).* In this look, we examine the 18MCP differences in attribution factors for measures delivered through the Channel initiatives, verses those measures not delivered through the Channel initiatives.
  - *Channel Measures over Time (FY06 vs. 18MCP).* This look at Channels over time highlights changes in attribution factors as the Channel initiatives become more established and handle a higher volume of measures.
  - *Non-Channel Measures over Time (FY06 vs. 18MCP).* This look examines whether attribution factors for non-Channel measures has shown any changes over the same period of Channel evolution.
- *Four Primary Sectors by Project Size (Large vs. Small).* Comparing program attribution by size reveals ways in which project size is related to participant behavior and program effectiveness.
- *Four Primary Sectors by Measure Type (Deemed vs. Custom).* The 18MCP results for the four primary sectors were used to investigate the impact of custom versus deemed measures on attribution. This look at attribution can provide insight into the effects that program delivery mechanisms can have on attribution:
  - The custom versus deemed look effectively isolates the effect that increased customer effort, and (often) the financial investment required for custom projects, has on attribution.
  - Additionally, this comparison can offer another view of the effect that Channel initiatives have on attribution versus other program mechanisms. This arises because Channels predominately handle deemed measures versus custom.
- *Four Primary Sectors by Measure Type and Project Size.* This section considers sector results by both measure type (deemed vs. custom) and project size, essentially combining the two previous breakouts. By examining both dimensions simultaneously, the relative contributions of each factor to rates of program attribution are assessed.
- *Variations in Program Incentive Levels.* This analysis examines the effects of raised incentive levels. A common principle in energy efficiency program design is that, all things being equal, higher rebate levels should result in higher levels of program attribution. It is important to investigate the extent to which this proposition is supported by the data.

In each section, KEMA provides a discussion of the definitions used to classify each measure into the various look categories; followed by a table illustrating the fraction of 18MCP tracking gross savings the look categories account for in the population and the fraction of population savings included in the sample. The results are then presented in a summary table with measures of statistical precision and graphically to illustrate statistical differences across look categories.

4.2 ATTRIBUTION FACTORS BY END-USE

This section summarizes the 18MCP attribution factors by end-use. Table 4-1 presents the six end-use categories and examples of technologies within each end-use category. Table 4-2 shows the fraction of tracking gross savings each category represents in the population. It also shows the fraction of total population tracking gross savings included in the sample by end-use. For example, 24 percent of tracking gross kWh savings is included in the sample; and the lighting end-use in the sample accounts for eight percent of the total gross kWh savings.

Table 4-1. Definitions and Examples of Measures by End-Use Category

End-Use Category	Category Definition and Examples
Lighting (excluding CFL <30W)	High-efficiency bulbs, fixtures, and ballasts for application in any sector, excluding CFLs less than 30 Watts. Includes LEDs in some applications. Exterior, parking lots, signage lighting; Long-Day Lighting in the Ag sector, etc. In most cases, measures must meet CEE, ENERGY STAR and/or other FOE-specified technical specifications.
HVAC	High-efficiency refrigeration, heating and cooling measures, including H-E boilers, steam traps, A/C, chillers, heat pumps/exchangers, etc., and eligible tune-up measures.
Building Shell	Roof insulation, window replacement, wall insulation, custom building envelope measure
Manufacturing process	Compressed air/vacuum pumps, industrial ovens and furnaces, regenerative thermal oxidizer, radiant tube Inserts, grain dryers
Other	Measures that are not covered by any other category. Includes measures such as low-flow showerheads, faucet aerators, pre-rinse sprayers, etc.
CFLs (excludes large CFLs)	Compact fluorescents, appropriate ballasts. This end-use excludes CFLs greater than 30 Watts.

Table 4-2. Percentage of the 18MCP Tracking Gross Savings by End-Use

End-Use Category	Percent of Population Tracking Gross Savings			Percent of Population Tracking Gross Savings in the Sample		
	kWh	kW	Therms	kWh	kW	Therms
Lighting (excluding CFL <30W)	41%	39%	0%	8%	7%	0%
HVAC	15%	21%	70%	5%	4%	36%
Building Shell	0%	0%	7%	0%	0%	3%
Manufacturing Process	19%	15%	21%	6%	4%	9%
Other	9%	6%	2%	2%	2%	2%
CFL	15%	19%	0%	3%	4%	0%
Total	**100%**	**100%**	**100%**	**24%**	**20%**	**50%**

The 18MCP attribution factors by end-use are provided in Table 4-3. For all measures except CFLs, program attribution was determined using self-reported program response methods. As described in Section 3.3, the evaluation began using market-based methods for CFL attribution in FY06. The 18MCP evaluation was the first impact evaluation to use separate market-based estimates for agriculture and commercial sectors.

The highest attribution results are for CFLs, which measure 103 percent for kWh and 104 percent for kW. The market sales-based method used to determine CFL attribution is calculated by comparing actual sales volume to a baseline estimate of the volume that would have been sold in the absence of the program. During the 18MCP, actual sales exceeded the levels projected had there been no program, thus producing attribution rates greater than 100 percent.

After CFLs, the highest attribution results are for lighting measures, at 56 percent for kWh and 55 percent for kW. This is followed by "other," manufacturing process, HVAC, and building shell measures. For the building shell segment, attribution factors are particularly low for therms (32 percent) and kW (16 percent). These low rates should be viewed with caution due to the small number of respondents from the building shell category. Responses were especially small for electric measures, with eight respondents for kWh and two for kW.

Table 4-3. Attribution Factors by End-Use Based on Samples from Participants Who Installed a Measure during the 18MCP

Segment	kWh						kW						Therms					
			90% Confidence Interval						90% Confidence Interval						90% Confidence Interval			
	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Lighting (excluding CFL <30W)	171	56%	16.0%	8.9%	46.9%	64.7%	157	55%	17.9%	9.9%	45.5%	65.3%	0	*	*	*	*	*
HVAC	98	54%	22.8%	12.2%	41.4%	65.8%	84	38%	31.6%	11.9%	25.7%	49.5%	85	52%	14.8%	7.7%	44.6%	60.0%
Building Shell	8	45%	84.4%	38.0%	7.0%	82.9%	2	15%	169.5%	26.2%	0.0%	41.7%	24	32%	53.9%	17.2%	14.7%	49.2%
Manufacturing Process	96	50%	21.8%	11.0%	39.4%	61.4%	85	49%	19.9%	9.8%	39.6%	59.2%	25	64%	22.2%	14.2%	49.7%	78.1%
Other	76	55%	17.2%	9.5%	45.7%	64.8%	56	52%	23.1%	12.1%	40.1%	64.2%	23	47%	33.8%	15.7%	30.8%	62.2%
CFL	135	103%	4.8%	5.0%	98.5%	108.4%	135	104%	4.2%	4.3%	99.8%	108.5%	0	*	*	*	*	*

* The adjustment factor or measure of precision was not calculated due to insufficient sample points

Figure 4-1 through Figure 4-3 show the attribution factors by end-use over time for kWh, kW, and therms. These charts utilize impact evaluation data collected for evaluations conducted for FY03 through the 18MCP. By comparing attribution rates across these periods, a picture can be created of changes in the programs' performance. The charts show whether attribution rates have increased, decreased or remained the same over time; changes may reflect changes in the programs' implementation, external effects, or a combination of factors.

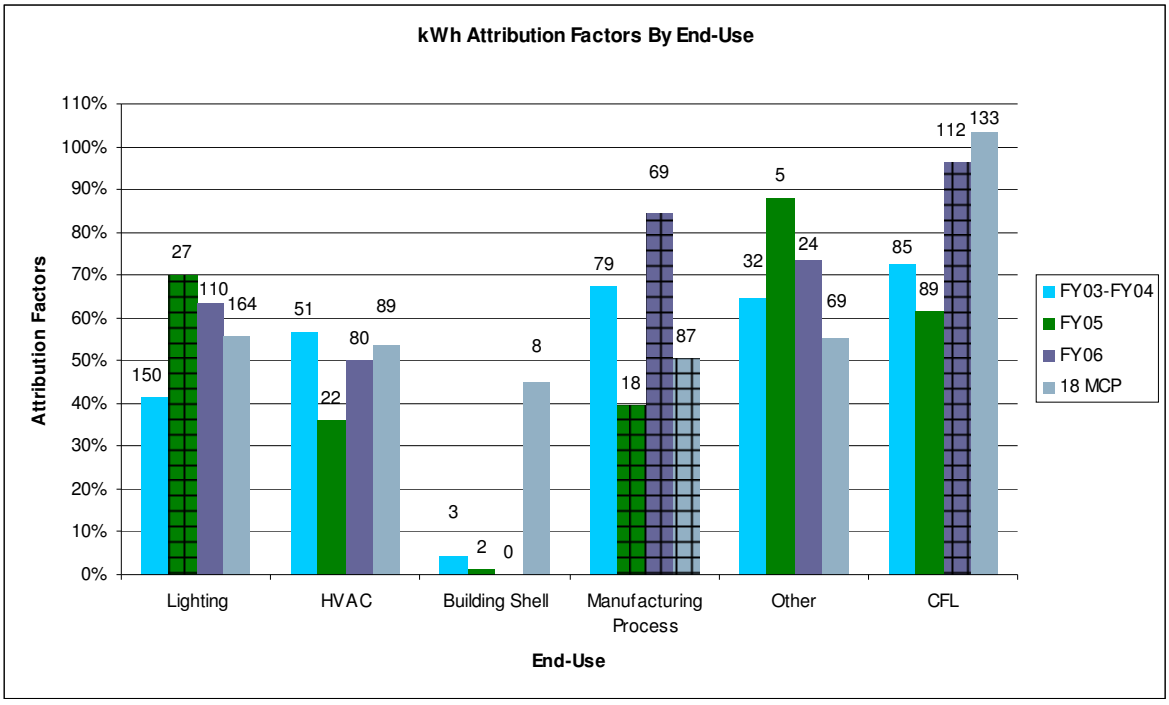
In some cases, changes in program results were significant. A cross-hatched bar in the comparison charts indicates that the increase or decrease in the adjustment factor over the previous year's result is statistically significant at the 95 percent level of confidence. Comparison of end-use results across years should be viewed with caution, for several reasons. As noted in this discussion, in several instances large changes in attribution levels shown on the charts are not statistically significant, but rather reflective of small sample sizes in one or both of the comparison years. Year-over-year differences may also be affected by the technology mix and evolving program delivery methods between the two time periods. Furthermore, a small number of large projects in a given year otherwise characterized by high or low attribution can have a significant effect on the attribution result for that end-use during that period.

Following are some observations from the comparison of end-use attribution factors across several years:

- Changes both up and down are to be expected each year, even if the programs are consistently working to improve program attribution.
- Since FY06, attribution rates have been consistently highest for CFLs, measuring slightly above and below 100 percent for both kWh and kW. FY06 was the first attribution analysis to use a market-based method to estimate attribution for CFLs, as well as the first report to use deemed energy savings values for CFLs. These methodological changes have resulted in higher CFL attribution factors compared with CFL rates for earlier years.
- Manufacturing process attribution rates have varied considerably since the FY03–FY04 analysis:
  - Attribution for kWh have ranged widely between 40 and 85 percent, with statistically significant changes.
  - Attribution for kW have measured between 30 and 75 percent, with statistically significant variations.
  - Following a significant decline from FY03–FY04 to FY05, Attribution for therms have risen from approximately 10 percent to approximately 60 percent, again with significant changes.
  - This variation across fuel types is likely caused by significant variability among the project types and projects themselves within the different periods, as well as the potential for very large projects to swing the averages one way or another.
- HVAC attribution levels have been relatively stable between 40 and 60 percent for all energy types since FY03–FY04.

- Attribution levels for "other" measures have also been relatively stable since FY03–FY04.
- Building shell measures have exhibited the lowest attribution rates over these years. However, these rates have generally been derived using very small sample sizes, so that resulting attribution rates must be regarded with caution.
- The remaining end-use segments are undistinguished by any overarching patterns or trends. These segments tend to group together, with attribution factors ranging between 32 and 64 percent. No consistent trend characterizes these end-use segments between FY03–FY04 and the 18MCP.

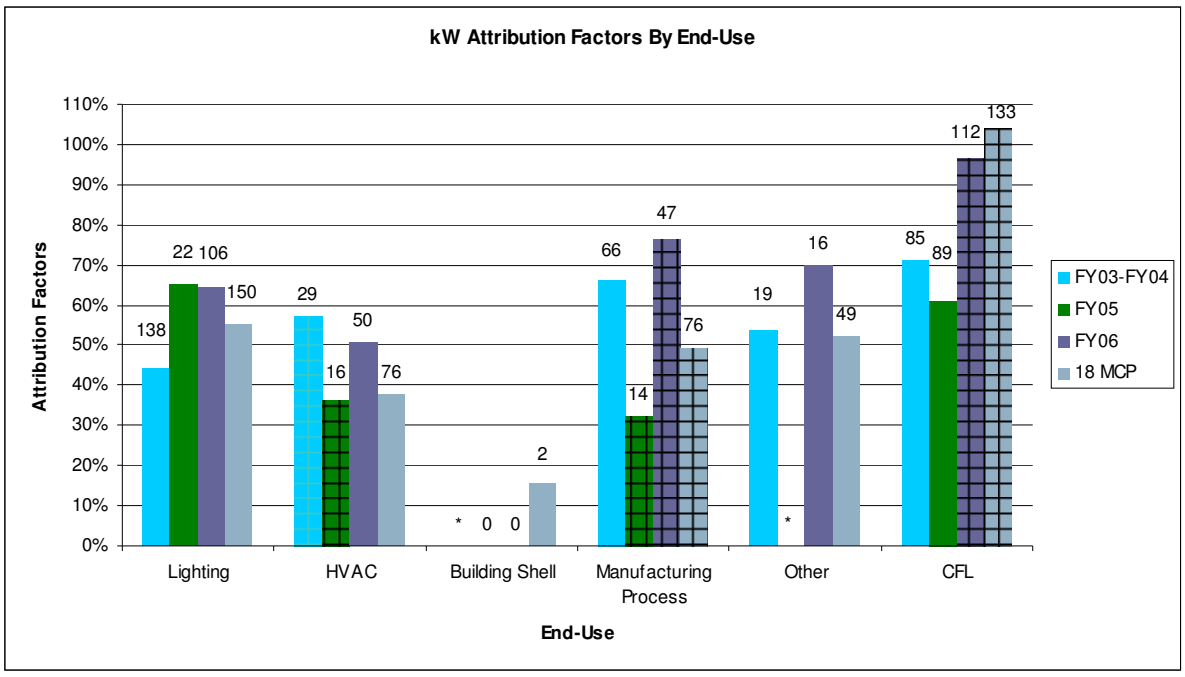
Figure 4-1. kWh Attribution Factors by End-Use across Years [a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates that the increase or decrease of the adjustment factor compared to the previous fiscal year's result is statistically significant at the 95 percent level of confidence.

"Lighting" category excludes CFLs less than 30 Watts.

Figure 4-2. kW Attribution Factors by End-Use across Years [a]

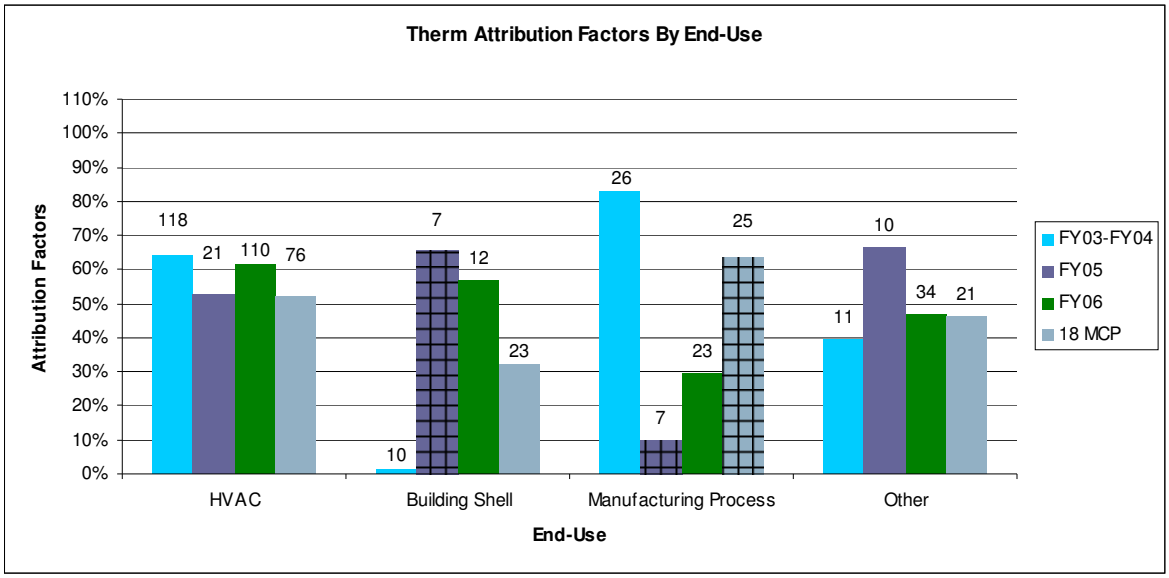


[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates that the increase or decrease of the adjustment factor compared to the previous fiscal year's result is statistically significant at the 95 percent level of confidence.

"Lighting" category excludes CFLs less than 30 Watts.

* The FY03–FY04 Building Shell and FY05 Other results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of these categories was included in the sample. Two sample points are needed to protect respondent confidentiality.

Figure 4-3. Therm Attribution Factors by End-Use across Years [a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates that the increase or decrease of the adjustment factor compared to the previous fiscal year's result is statistically significant at the 95 percent level of confidence.

"Lighting" category excludes CFLs less than 30 Watts.

4.3 FOUR SECTORS BY CHANNEL

In addition to the end user focused primary business sector[31] efforts, the program also has supply-side initiatives designed to target the following market channels: Lighting, HVAC, Rotary (motors, fans, pumps), and New Construction. The 18MCP results for the four primary sectors are disaggregated in this section to investigate the effect the Channel initiative are having on the attribution factors for each sector. In this section, we also take advantage of the FY06 attribution factor analysis to make comparisons between the influences of Channel initiatives over time.

While interpreting these data, it is important to recognize that the efforts of the sectors and Channels are not mutually exclusive. Measures rebated through the Channel initiatives may have received Energy Advisor involvement and, similarly, the program has reported custom project leads developed through the Channel efforts. As the number of different technologies rebated through the Channels increases, the Channel and Non-Channel classification will likely become increasing correlated with the measure attributes of prescriptive and custom, respectively.

Table 4-4 defines the categories and Table 4-5 provides the fraction of population tracking gross savings for each category.

Table 4-4. Delivery Category Definitions

Delivery Category	Definition and Examples
Channel	Measures rebated through the Channel initiatives as documented in the program tracking databases. Measure were classified as Channel Measure if any of the three conditions were true: (1) the WATTS field “billmeasureto” included the word “Channel”; (2) the WISeerts field “ChannelInd” identified one of the Channels; or (3) the measure was in the Rebates database (mail-in rebates processed by EFI (e.g. CFLs, clothes washers)).
Non-Channel	Measures not rebated through the Channel initiatives as documented in the program tracking databases.

[31] The Focus on Energy Business Programs Area is divided into four primary sectors: Agriculture, Commercial, Industrial, and Schools & Government.

Table 4-5. Percentage of the 18MCP Tracking Gross Savings by Delivery Category (Channel vs. Non-Channel)

Sector	Channel vs. Non-Channel	Percent of Population Tracking Gross Savings			Percent of Population Tracking Gross Savings in the Sample		
		kWh	kW	Therms	kWh	kW	Therms
Agriculture	Channel	2%	3%	0%	0%	0%	0%
	Non-Channel	6%	8%	6%	1%	2%	3%
Commercial	Channel	22%	29%	3%	3%	4%	0%
	Non-Channel	10%	7%	9%	3%	3%	5%
Industrial	Channel	25%	22%	1%	2%	2%	0%
	Non-Channel	24%	16%	55%	11%	7%	30%
Schools & Government	Channel	5%	7%	5%	0%	0%	0%
	Non-Channel	5%	9%	22%	2%	3%	11%
Total		**100%**	**100%**	**100%**	**24%**	**20%**	**50%**

The three subsections that follow look at the attribution results for Channel initiatives in three ways:

1. The current influence of Channels on attribution, as shown in the 18MCP Channel versus Non-Channel looks (Section 4.3.1)

2. The influence of Channels over time, as shown through a comparison of attribution factors to Channels in FY06 compared to the 18MCP (Section 4.3.2)

3. The attribution factors for Non-Channel measures, again comparing FY06 with the 18MCP (Section 4.3.3).

4.3.1 Channel vs. Non-Channel measures (18MCP)

This comparison examines whether attribution differs when measures are handled as part of a BP Channel initiative. The 18MCP attribution factors by primary sector and the Channel versus Non-Channel cut are provided in Table 4-6.

Table 4-6. Attribution Factors by Channel vs. Non-Channel Measures (18MCP)

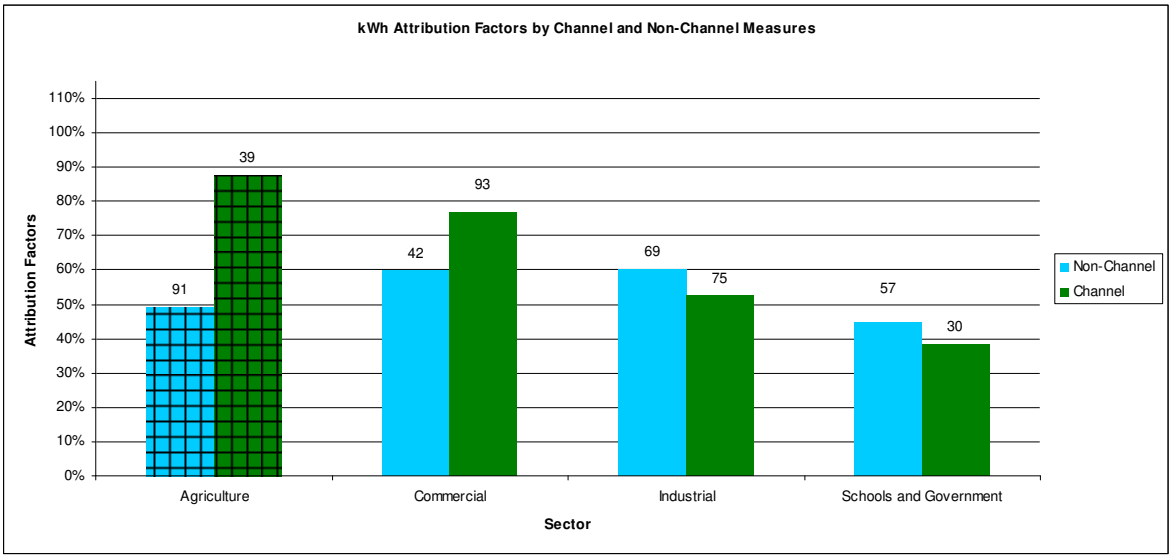
Segment	kWh						kW						Therms					
			90 % Confidence Interval						90 % Confidence Interval						90 % Confidence Interval			
	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture NCL	91	49%	26.0%	12.7%	36.2%	61.7%	73	46%	30.9%	14.3%	31.9%	60.5%	21	16%	53.1%	8.6%	7.6%	24.8%
Agriculture CL	39	88%	3.5%	3.1%	84.7%	90.9%	38	88%	3.3%	2.9%	85.3%	91.1%	1	*	*	*	*	*
Commercial NCL	42	60%	24.0%	14.4%	45.6%	74.3%	40	52%	37.0%	19.4%	33.0%	71.8%	23	30%	42.2%	12.5%	17.1%	42.1%
Commercial CL	93	77%	13.6%	10.4%	66.4%	87.2%	90	79%	12.7%	10.0%	68.9%	88.9%	3	64%	37.9%	24.3%	40.0%	88.7%
Industrial NCL	69	60%	15.7%	9.5%	50.8%	69.8%	65	57%	17.0%	9.7%	47.6%	67.0%	36	64%	11.6%	7.4%	56.3%	71.0%
Industrial CL	75	53%	22.6%	11.9%	40.7%	64.5%	72	51%	24.1%	12.3%	38.6%	63.1%	4	19%	209.6%	40.3%	0.0%	59.5%
Schools and Government NCL	57	45%	31.6%	14.2%	30.7%	59.0%	48	46%	34.5%	15.9%	30.1%	61.9%	52	41%	30.0%	12.2%	28.6%	53.0%
Schools and Government CL	30	38%	37.3%	14.2%	23.9%	52.4%	27	48%	31.2%	14.9%	32.8%	62.6%	7	<1%	181.3%	0.8%	0.0%	1.2%

* The adjustment factor, or measures of precision, was not calculated due to insufficient sample points. The Agriculture Channel therm result was not reported to protect respondent confidentiality. Only one respondent meeting the criteria of this category was included in the sample. Two sample points are needed to protect respondent confidentiality.

The comparison charts that follow illustrate the difference between each sector's Channel and Non-Channel attribution factors. When the difference between the attribution factors has been found to be statistically significant at the 95 percent level of confidence, the paired bars with the statistically significant relationship have been shown with a cross-hatched pattern. Finally, there was only one Agriculture Channel participant with therms savings in the sample, therefore those results in Figure 4-6 were suppressed in order to protect the confidentiality of the customer.

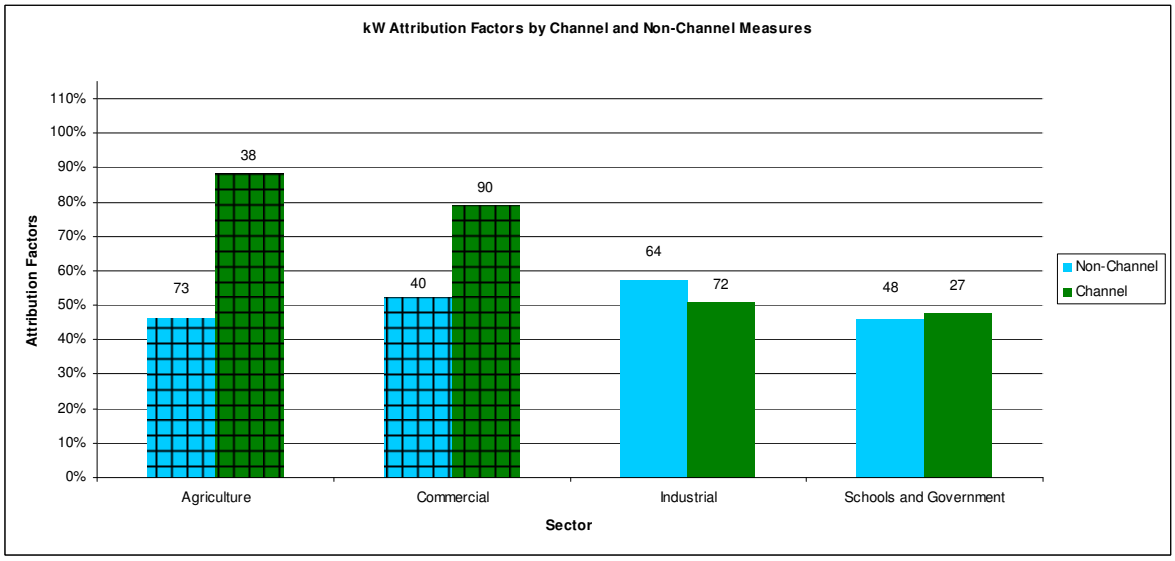
Figure 4-4 through Figure 4-6 show the comparison of attribution factors for each energy type (kWh, kW, and therms) for the 18MCP period between those measures installed through the Channel initiatives versus those measures that were not installed through the Channels. Figure 4-4 and Figure 4-5 indicate that, for electric measures in both Agriculture and Commercial sectors, Channel measures tend to be associated with higher levels of program attribution compared with Non-Channel measures. For Agriculture kWh and kW, and Commercial kW the Channel versus Non-Channel differences were statistically significant at the 95 percent level of confidence. Once again, we hypothesize that this finding reflects the high volume of CFLs provided to both of these sectors through the Channel initiatives, and the market-based method of that attribution (see discussion in Section 3.3).

Figure 4-4. kWh Attribution Factors by Channel vs. Non-Channel (18MCP)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

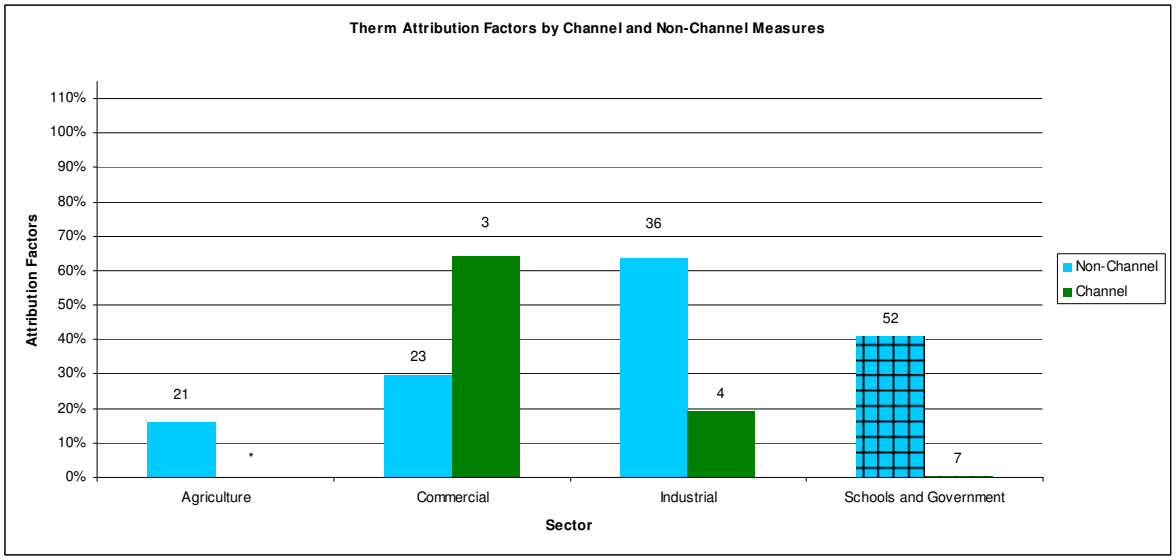
Figure 4-5. kW Attribution Factors by Channel vs. Non-Channel (18MCP)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-6 shows that Channel attribution factors for gas measures in the Schools and Government sector were less than non-Channel attribution factors by a statistically significant margin. However, this result must be treated with caution given the small sample size for therm Channel measures.

Figure 4-6. Therm Attribution Factors by Channel vs. Non-Channel (18MCP)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

[*] The Agriculture Channel and Commercial Channel therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of these categories was included in the sample. Two sample points are needed to protect respondent confidentiality.

In the Agriculture sector, attribution factors are substantially higher for Channel measures compared to Non-Channel measures. As a specific example, the attribution factor for Agriculture Channel measures are 39 percentage points higher than for Non-Channel factors for kWh and 42 percentage points higher for kW. It is likely that this reflects the high level of CFLs that are provided through the Channel effort to Agriculture sector end-users. Attribution factors exhibit a similar pattern in the Commercial sector, where Channel attribution levels are 17 percentage points higher than Non-Channel levels for kWh and 27 percentage points higher for kW. As with the Agriculture section, it is possible to hypothesize that this rate reflects the very high attribution factor for CFLs (refer to Table 4-3 for CFL attribution rates).

KEMA removed the CFLs from the analysis to test the hypothesis that CFLs are driving the significant differences between Channel and Non-Channel attribution rates for the Agriculture and Commercial sectors. This supplemental analysis supports the aforementioned hypothesis. Once the CFLs are removed[32] the attribution rates decrease and the differences between Channel and Non-Channel attribution rates are no longer statistically different from each other at the 95 percent level of confidence. Table 4-7 shows the Channel and Non-Channel attribution factors with CFLs removed. Agriculture Channel kWh dropped from 88 percent to 53 percent and Commercial Channel kWh dropped from 77 percent to 46 percent. The Non-Channel reductions were relatively minor.

[32] CFLs were removed from both the Channel and Non-Channel categories because not all CFLs reported in the program tracking database were identified as Channel measures.

Table 4-7. Attribution Factors by Channel vs. Non-Channel Measures (18MCP) Excluding CFLs

Sector	Channel vs. Non-Channel	Attribution Adjustment Factors	
		kWh	kW
Agriculture	Non-Channel	47%	44%
	Channel	53%	56%
Commercial	Non-Channel	58%	49%
	Channel	46%	43%

In both the Industrial and Schools and Government sectors, attribution factors for Channel and Non-Channel electric measures are relatively comparable. For gas measures, however, Non-Channel attribution rates are greater than Channel attribution rates. In the Industrial sector, Non-Channel attribution factors are 44 percentage points higher, the same as in the Schools and Government sector, where again Non-Channel factors are 40 percentage points higher. We note, however, that the sample size is very small in both of these cases (n = 4 for Industrial Channel measures, n = 7 for Schools and Government Channel measures), so these results should be treated with caution.

4.3.2 Channel measures over time

By comparing the 18MCP attribution results with those from the FY06 impact study, we can examine changes in the attribution factors due to Channel influence over time. Table 4-6 in the previous section summarized the attribution factors for Channel and Non-Channel Initiatives in the 18MCP. Table 4-8 summarizes the FY06 attribution factors for measures handled through Channel initiatives, and the charts that follow (Figure 4-7 to Figure 4-9) compare these two sets of results.

Table 4-8. FY06 Attribution Factors for Channel Initiatives

	kWh						kW						Therms					
			90% Confidence Interval						90% Confidence Interval						90% Confidence Interval			
Segment	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture CL	39	99%	1.1%	1.1%	98.0%	100.3%	37	100%	0.1%	0.1%	100.0%	100.3%	3	52%	25.5%	13.3%	38.8%	65.4%
Commercial CL	87	96%	4.5%	4.3%	91.6%	100.2%	80	96%	4.4%	4.2%	91.4%	99.9%	18	35%	36.0%	12.6%	22.4%	47.6%
Industrial CL	6	57%	35.2%	20.2%	37.1%	77.4%	5	57%	36.2%	20.8%	36.7%	78.3%	4	31%	83.6%	25.7%	5.0%	56.3%
Schls & Govmt CL	1	*	*	*	*	*	0	*	*	*	*	*	2	92%	1.7%	1.5%	90.6%	93.7%

* The adjustment factor or measures of precision was not calculated due to insufficient sample points. The Schools and Government Channel kWh results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of this category was included in the sample. Two sample points are needed to protect respondent confidentiality.

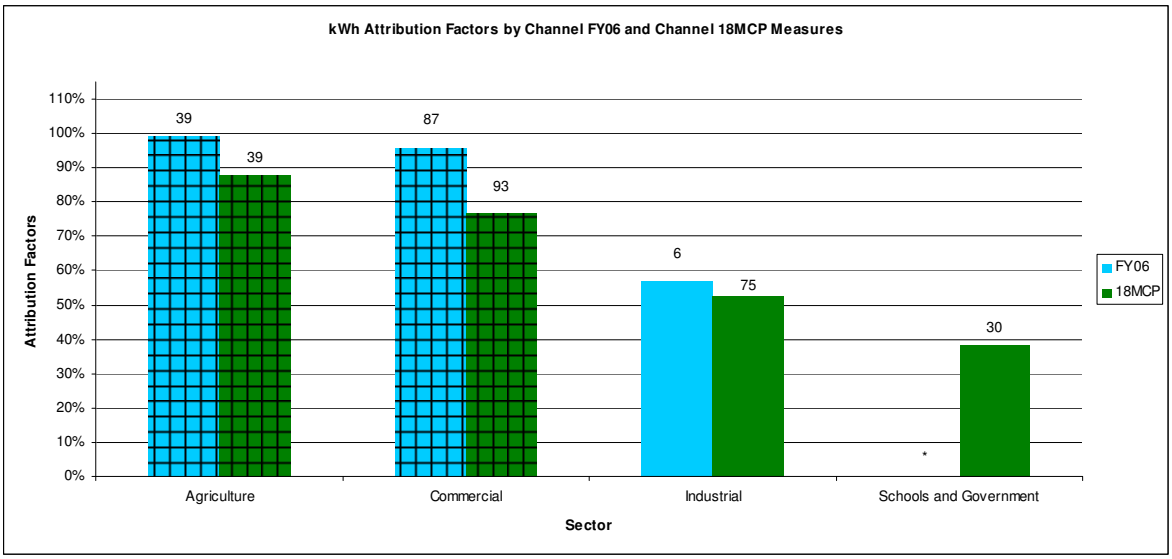
Figure 4-7 though Figure 4-9 compare Channel attribution factor results from the 18MCP to results from FY06, for each sector, for kWh, kW, and therms, respectively. All three figures show that Channel attribution results fell between FY06 and the 18MCP. This decline was statistically significant at the 95 percent confidence level for both kWh and kW in both Agriculture and Commercial sectors. In terms of therms, however, Figure 4-9 shows that Channel attribution factors in the Schools and Government sector were significantly lower in 18MCP than in FY06, although this finding is derived from a notably small sample size. A therm comparison for Agriculture was not possible due to small sample sizes. Only one

sampled customer in this sector reported Channel therm energy savings in the 18MCP. The one response was suppressed to protect respondent confidentiality.

In examining the changing attribution factors associated with the Channel initiatives over time, it is useful to recall the changes that the Channels themselves have undergone over this two-year interval. The Channel Initiatives are more developed, offer more measures and therefore represent larger fractions of savings in the 18MCP compared to FY06. As the Channels have evolved over time, additional deemed and prescriptive measures have been added for delivery via the Channels. The 18MCP impact evaluation reflected this increase, and was therefore the first impact evaluation to use a considerable number of deemed savings values. Prior impact evaluations (e.g., FY06) considered deemed energy savings for far fewer measures, on the order of a half dozen or so. This observation leads to the hypothesis that an increasing number of measures handled through the Channels (all of them characterized by deemed savings), serves to dilute the impact of the CFLs that previously constituted a high percentage of the Channel samples. Subsequent impact evaluations might directly test this hypothesis, by examining whether Channel attribution continues to decline as the number of deemed measures in the Channels increases.

Another possible explanation for the decreases in attribution rates is the recession that became apparent during the 18MCP. The US economy officially entered the recession in December 2007; thereby overlapping ten of the fifteen months covered by the evaluation fieldwork. During periods of economic recession, access to capital is limited. Companies may be inclined to limit their energy efficiency investments to the most cost effective and proven technologies. It is a reasonable supposition that the most cost effective and proven technologies are those that companies are more likely to implement without the assistance of the program and therefore have lower attribution associated with them. Alternatively, it is also reasonable to hypothesize the opposite supposition that energy efficiency investments that would have been approved in pre-recessionary times require the Focus assistance in the capital constrained recessionary period.

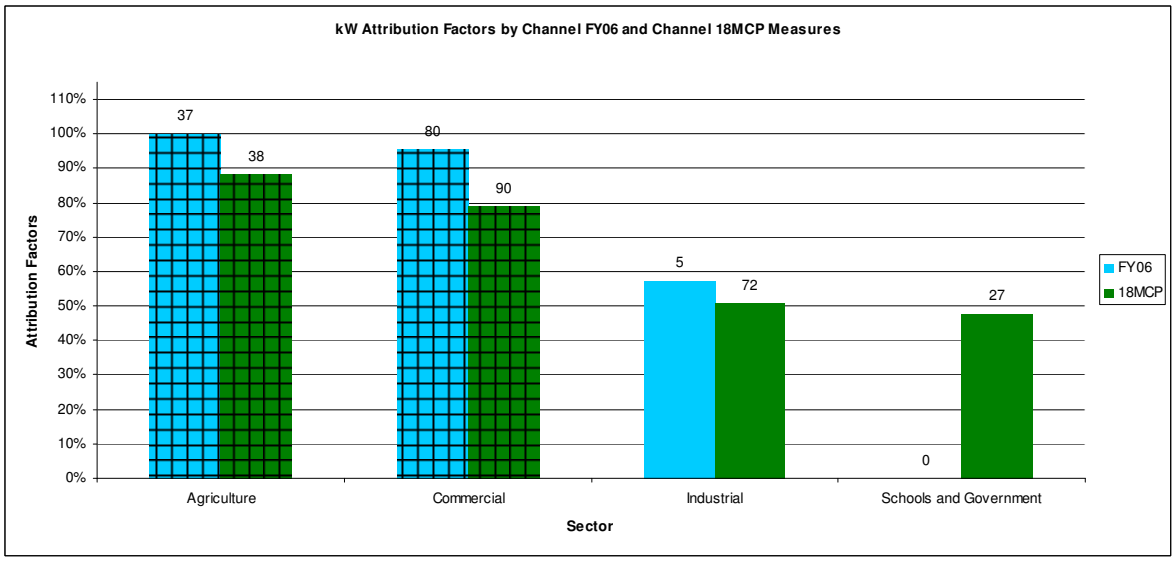
Figure 4-7. kWh Attribution Factors by Channel (FY06) and Channel (18MCP) Measures[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

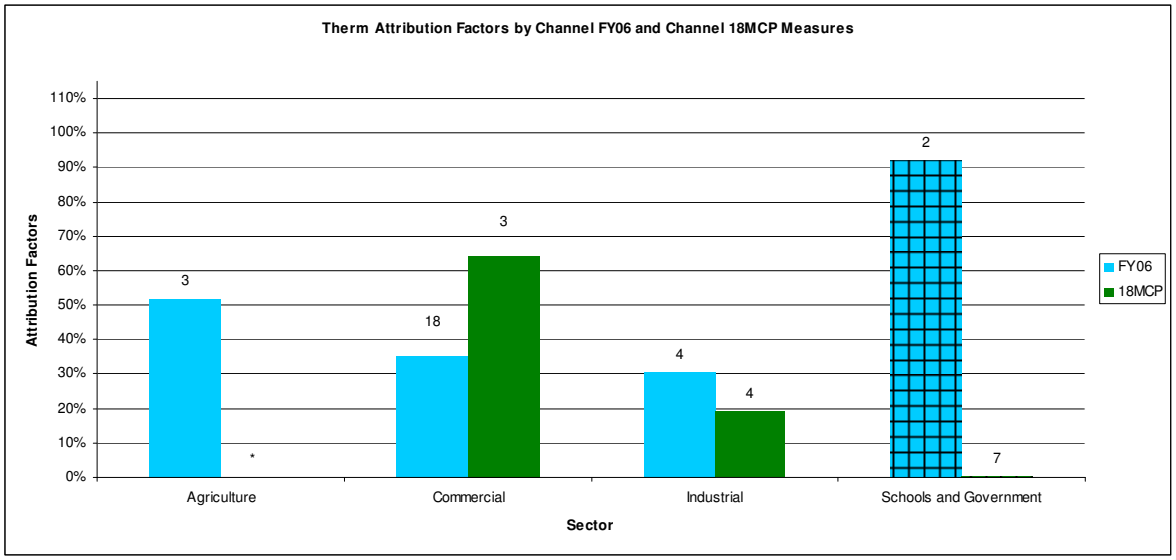
[*] The FY06 Schools and Government Channel kWh results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of this category was included in the sample. Two sample points are needed to protect respondent confidentiality.

Figure 4-8. kW Attribution Factors by Channel (FY06) and Channel (18MCP) Measures[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-9. Therm Attribution Factors by Channel (FY06) and Channel (18MCP) Measures[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

[*] The 18MCP Agriculture Channel therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of this category was included in the sample. Two sample points are needed to protect respondent confidentiality.

4.3.3 Non-Channel attribution over time

To follow the previous look at changes in attribution through the Channels over time, we turn next to examine whether program delivery outside of the Channels has had any effect on attribution factors. This section looks at patterns in Non-Channel attribution over time, as shown through comparison of FY06 Non-Channel results with the Non-Channel results from the 18MCP. summarizes the attribution factors for Non-Channel measures in the FY06 results.

Table 4-9. FY06 Attribution Factors for Non-Channel Initiatives

	kWh						kW						Therms					
			90 % Confidence Interval						90 % Confidence Interval						90 % Confidence Interval			
Segment	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture NCL	71	51%	9.7%	5.0%	45.8%	55.7%	65	45%	13.9%	6.2%	38.4%	50.7%	19	60%	27.3%	16.5%	43.8%	76.7%
Commercial NCL	45	60%	23.5%	14.1%	45.9%	74.2%	30	58%	25.1%	14.5%	43.3%	72.4%	39	51%	28.9%	14.7%	36.1%	65.4%
Industrial NCL	51	70%	21.8%	15.1%	54.4%	84.7%	46	66%	22.9%	15.0%	50.6%	80.7%	27	37%	41.0%	15.2%	21.9%	52.3%
Schools and Government NCL	36	65%	21.0%	13.7%	51.2%	78.5%	28	58%	15.9%	9.2%	48.6%	67.0%	51	58%	19.0%	11.1%	47.3%	69.4%

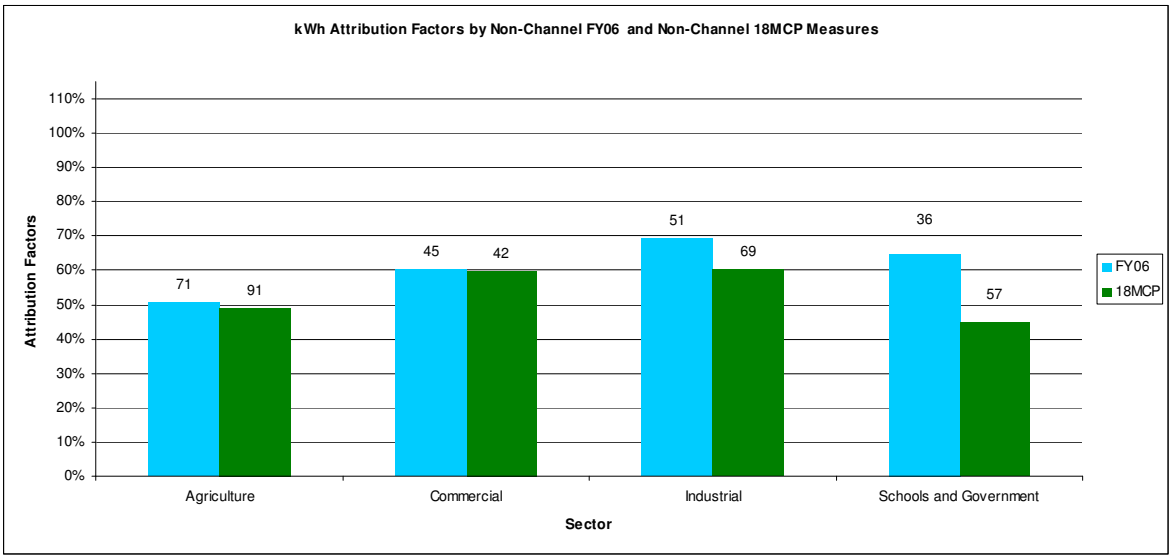
Figure 4-10 through Figure 4-12 compare Non-Channel attribution factors from the 18MCP to FY06, for each sector and for kWh, kW, and therms, respectively. In Figure 4-10, the results for kWh shows that Non-Channel attribution has stayed roughly consistent over the period in three of the four sectors (Agriculture, Industrial, and Commercial). Attribution stayed virtually level between the two periods in the Agricultural and Commercial sectors. In the Industrial sector, attribution dropped roughly 10 percentage points, a change not statistically significant. In the Schools and Government sector, however, attribution

dropped 20 percentage points between the two periods, a reduction that is not significant at the 95 percent confidence level[33]. This may well reflect the considerable financial pressure facing the public sector overall during the 18MCP time period, a factor that will be discussed more fully in Section 5.

In terms of therms, Figure 4-12 demonstrates that in three of the four sectors (Agriculture, Commercial, and Schools and Government) Non-Channel attribution factors were lower in the 18MCP compared to FY06; however only the change in Agriculture was significant at the 95 percent confidence level[34]. This observation is not inconsistent with the hypothesis expressed in the previous section, namely that, many measures that were Non-Channel in FY06 have been transitioned to the Channels in the 18MCP leaving behind a smaller and different mix of technologies that had lower attribution results in the 18MCP.

The Industrial sector, however, shows a contrasting pattern, as Non-Channel attribution factors for therms increased 27 percentage points in the 18MCP results (64 percent) compared to FY06 results (37 percent). This result, also statistically significant at the 95 percent confidence level, may reflect the highly customized nature of Industrial sector gas projects. Because of their complexity, these projects are likely ill-suited to Channel distribution and involve significant program involvement with the customer. As a result the Industrial sector is likely to continue to see its highest attribution factors through traditional Non-Channel delivery.

Figure 4-10. kWh Attribution Factors by Non-Channel (FY06) and Non-Channel (18MCP) Measures[a]

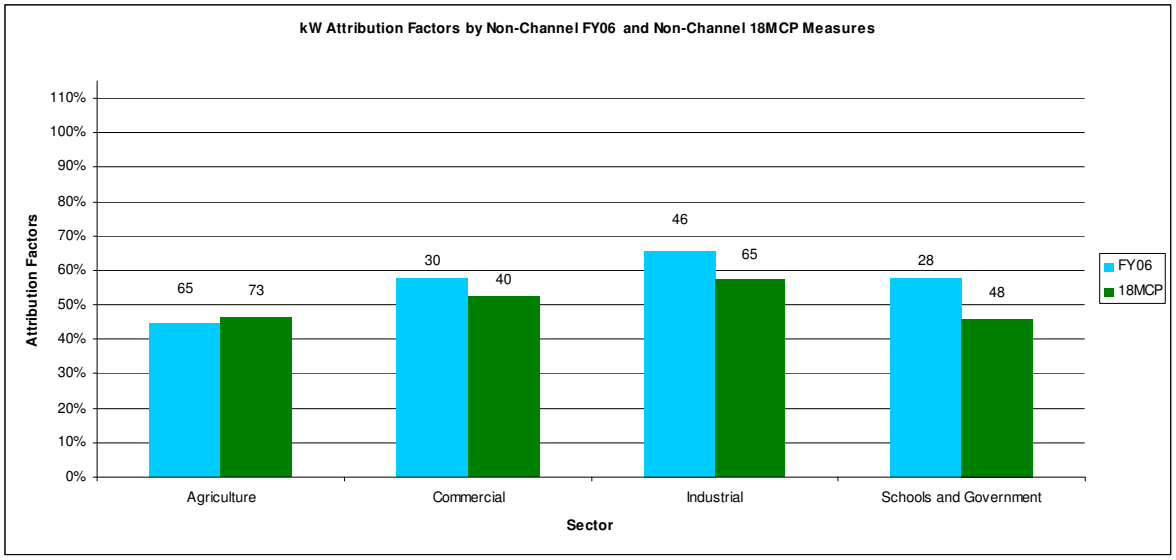


[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

[33] Although not significant at the threshold used through this document, this difference is significant at the 90 percent level.

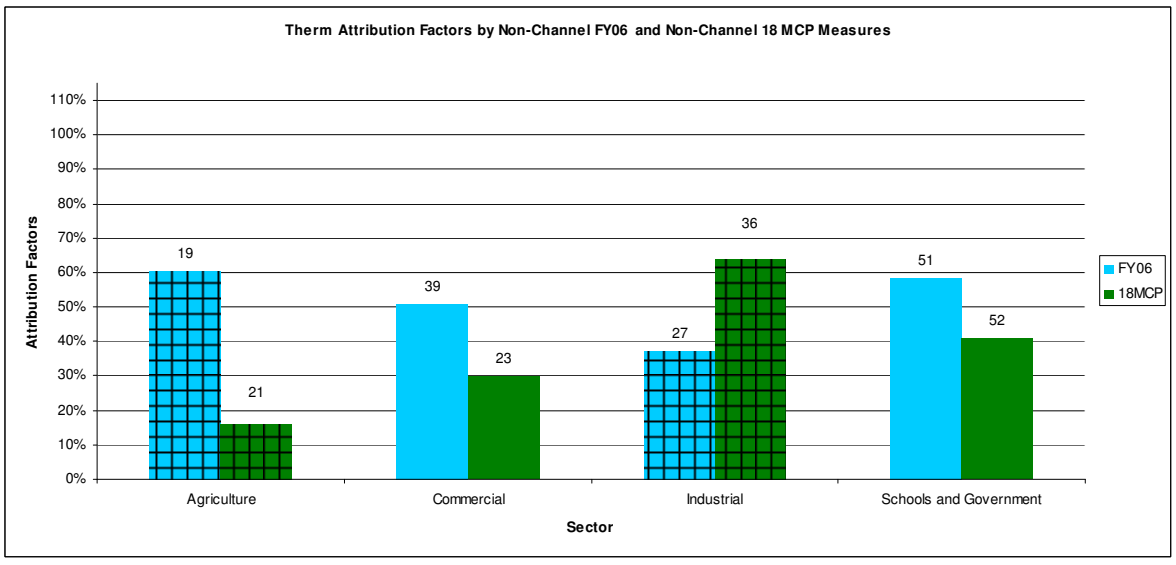
[34] Decreases for Commercial, and Schools and Government sectors were significant at the 90 percent level.

Figure 4-11. kW Attribution Factors by Non-Channel (FY06) and Non-Channel (18MCP) Measures[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-12. Therm Attribution Factors by Non-Channel (FY06) and Non-Channel (18MCP) Measures[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

4.3.4 Additional insights about channels

The foregoing discussion of the Channel initiatives leads to several points:

Significant differences characterize Channel and Non-Channel attribution rates for electric measures in both Agriculture and Commercial sectors. While this may suggest that Channel initiatives are exercising a positive effect on attribution levels in these sectors, it is

also possible that these changes reflect one or more distinct yet subtle mechanisms at work. For example:

- The ease of program delivery through the Channels may lead to increased program participation.
- The 18MCP impact evaluation noted the influence of CFLs in increasing attribution rates for both kW and kWh in the Agriculture and Commercial sectors[35]. We expect that the same influence visible in this Channel-Non-Channel Looks as well.
- The change in the number and types of measures that are delivered through the Channels versus outside of the Channels may have diluted the effect of high attribution of the CFLs in the Channel Looks.
- Differential program attribution levels may be attributable to differential impacts of the present economic downturn on the four primary sectors (see Section 5).

On the other hand, the charts in preceding sections also show a general downward trend in attribution factors over time for both Channel and non-Channel measures. Several explanations have been offered for this observation:

- Current recessionary economic conditions may have reduced business' access to capital. As a result, businesses may be more likely to limit energy efficiency investments to the most cost effective measures that would tend to be associated with lower attribution. Alternatively, it is also reasonable to hypothesize that energy efficiency investments are more dependent on the Focus incentives during a recessionary period.
- As mentioned is Section 3.3, revisions to the survey instrument and analysis likely results in a more conservative estimate of attribution (all respondents are now asked the efficiency, timing, and quantity questions).

4.4 FOUR SECTORS BY PROJECT SIZE

In this section, results for the four primary sectors are broken down to examine differences in attribution factors between large- and small-size projects. Project size categories are defined as follows in Table 4-10. Note: "Avoided cost" refers to avoided cost as calculated by customer for the sample design. Avoided cost was calculated from kWh, kW and therms energy savings as a common unit for size comparison.

Table 4-11 shows the percentage of each size category by sector, as represented in the sample and population.

[35] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* April 2, 2009, page 3-11.

Table 4-10. Definitions and Examples of Measures by Size Category

Size Category	Category Definition and Examples
Small	The energy savings from all measures implemented by the company, when aggregated, accounts for less than 0.08 percent of the Focus BP's total avoided cost.
Large	All other companies/projects.

Note: "Avoided cost" refers to avoided cost as calculated by customer for the sample design. Avoided cost was calculated from kWh, kW and therms energy savings as a common unit for size comparison.

Table 4-11. Percentage of the 18MCP Tracking Gross Savings by Size Category

Sector	Size Category	Percent of Population Tracking Gross Savings			Percent of Population Tracking Gross Savings in the Sample		
		kWh	kW	Therms	kWh	kW	Therms
Agriculture	Small	7%	9%	2%	1%	2%	1%
	Large	1%	1%	4%	0%	0%	2%
Commercial	Small	21%	24%	3%	4%	4%	1%
	Large	12%	13%	8%	3%	3%	4%
Industrial	Small	16%	15%	3%	4%	4%	1%
	Large	32%	23%	53%	9%	5%	29%
Schools & Government	Small	4%	6%	8%	1%	1%	3%
	Large	6%	9%	19%	1%	2%	8%
Total		**100%**	**100%**	**100%**	**24%**	**20%**	**50%**

The "size" classification reflects the total energy savings of the project(s), aggregated to the company-level relative to the total program savings (avoided costs) tracked by the program. BP measures run the gamut of size from small CFL replacement projects to very large relamping and/or major efficiency improvements in manufacturing settings. At the same time, many of these smaller projects may be characterized by prescriptive incentives and/or deemed savings. This look isolates those very small projects from the overall sample, thus revealing any differences in attribution factors.[36] A pair of cross-hatched bars in any chart indicates the difference between attribution factors for large versus small projects is statistically significant at the 95 percent level of confidence. The 18MCP attribution factors by primary sector and large versus small project size are provided in Table 4-12.

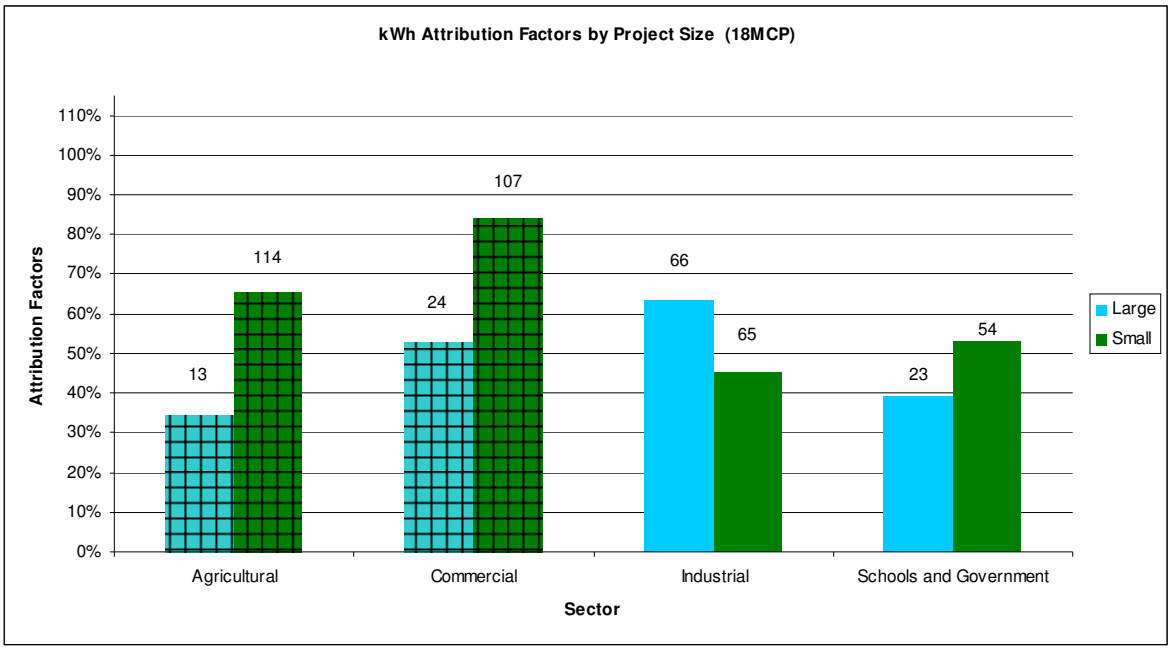
[36] We used two size groupings for consistency with the sample design and to keep the sample sizes as large as possible for this look. Further segmentation would have reduced the precision of the estimates.

Table 4-12. Attribution Factors by Size (18MCP)

Segment	kWh						kW						Therms					
			90 % Confidence Interval						90 % Confidence Interval						90 % Confidence Interval			
	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	N	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture, Small	114	65%	13.3%	8.7%	56.7%	74.1%	99	58%	20.2%	11.7%	46.2%	69.5%	15	31%	66.8%	20.4%	10.2%	51.0%
Agriculture, Large	13	34%	54.3%	18.7%	15.8%	53.1%	9	52%	58.0%	30.0%	21.7%	81.7%	7	8%	106.8%	8.5%	0.0%	16.5%
Commercial, Small	107	84%	11.3%	9.5%	74.4%	93.4%	102	82%	15.5%	12.7%	69.2%	94.7%	15	26%	98.7%	26.0%	0.3%	52.4%
Commercial, Large	24	53%	29.5%	15.6%	37.2%	68.4%	24	54%	31.9%	17.1%	36.7%	70.9%	11	34%	43.8%	15.0%	19.3%	49.3%
Industrial, Small	65	45%	36.1%	16.3%	28.9%	61.5%	63	45%	31.3%	14.1%	31.0%	59.2%	5	24%	27.8%	6.7%	17.5%	31.0%
Industrial, Large	66	63%	11.4%	7.2%	56.2%	70.6%	62	61%	12.8%	7.9%	53.4%	69.1%	34	65%	11.2%	7.3%	57.5%	72.1%
Schools &Govt, Small	54	53%	17.3%	9.2%	44.1%	62.5%	46	51%	23.8%	12.1%	38.9%	63.2%	36	28%	43.3%	12.3%	16.1%	40.8%
Schools &Govt, Large	23	39%	41.2%	16.2%	23.2%	55.6%	22	45%	41.1%	18.5%	26.4%	63.3%	23	45%	37.4%	16.8%	28.1%	61.8%

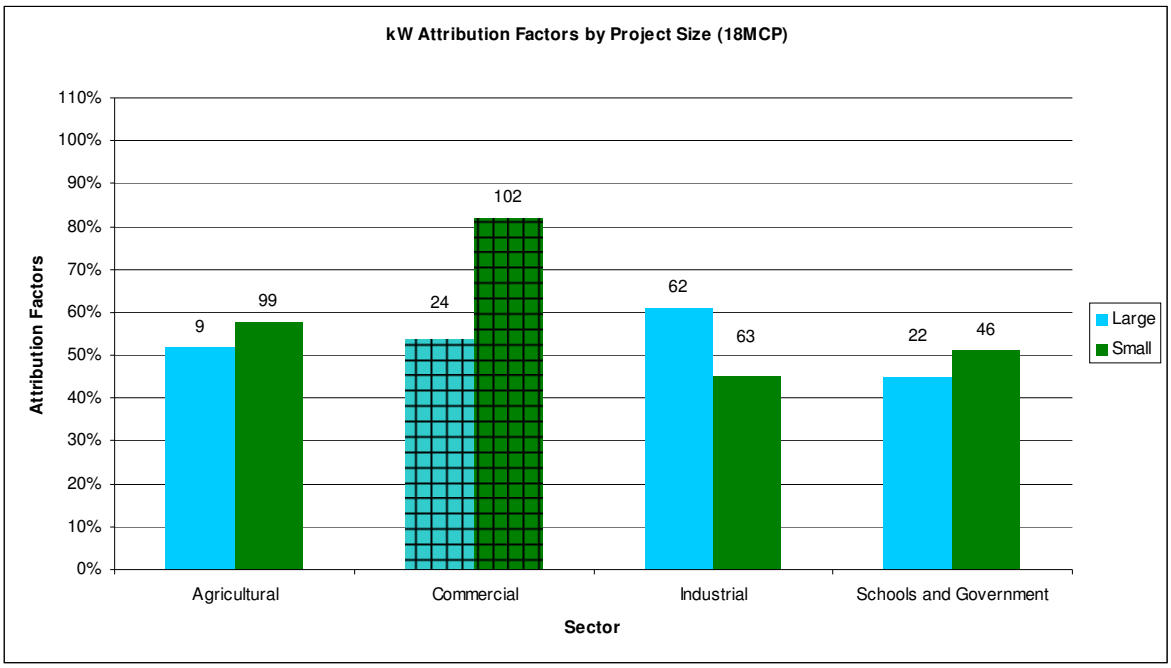
Figure 4-13 through Figure 4-15 compare 18MCP attribution factor results in terms of project size for each sector for kWh, kW, and therms, respectively. Figures 4-13 and 4-14 indicate that, for the Commercial sector, both kWh and kW attribution rates for small projects were significantly greater than rates for large projects, at the 95 percent level of confidence. Figure 4-13 also shows that kWh attribution rates for small Agriculture projects were significantly higher than rates for large Agriculture projects. In contrast, for the Industrial sector, therm attribution rates were significantly higher for large projects compared to small projects. Industrial showed a similar tendency for electric measures as well; although not significant at 95 percent level of confidence.

Figure 4-13. kWh Attribution Factors by Size (18MCP) [a]



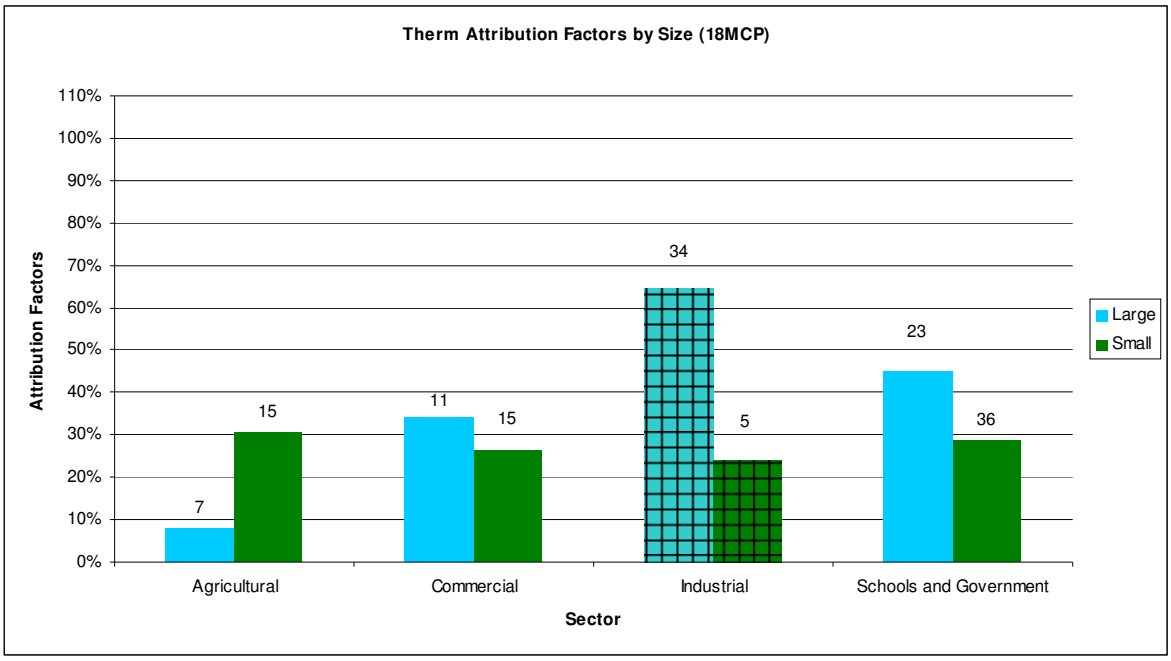
[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-14. kW Attribution Factors by Size (18MCP) [a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-15. Therm Attribution Factors by Size (18MCP) [a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Similar to the Channel versus Non-Channel look in Section 4.3.1, KEMA preformed a supplemental analysis with the removal of the CFLs to test the hypothesis that CFLs are driving the significant differences between Small and Large electric attribution rates for the

Agriculture and Commercial sectors. The analysis supports this hypothesis. Once the CFLs are removed the attribution rates decrease and the differences between attribution rates are no longer statistically different from each other at the 95 percent level of confidence. Table 4-13 shows the attribution factors with CFLs removed. Agriculture Small kWh dropped from 65 percent to 51 percent and Commercial Small kWh dropped from 84 percent to 59 percent.

Table 4-13. Attribution Factors by Size (18MCP) Excluding CFLs

Sector	Size	Attribution Adjustment Factors	
		kWh	kW
Agriculture	Small	51%	42%
	Large	34%	52%
Commercial	Small	59%	47%
	Large	46%	46%

The following points are suggested by a review of these findings:

- For electric measures in the Agriculture, Commercial, and Schools and Government sectors, small project attribution rates tend to be higher than large project attribution rates. For Agriculture and Commercial, this may well reflect the fact that CFL measures, with both small size and very high market-based attribution rates, are characterized as small measures.
- Attribution factors for kW and kWh measures in the Commercial sector, and for kWh measures in the Agriculture sector, are significantly higher for small projects compared to large projects. This may reflect in part the fact that larger projects require greater total investment, commitment, and customer involvement (the "hassle factor"). As these variables grow in importance, at a certain point they are likely to eclipse program incentives in the decision-making calculus. Therefore, compared to small projects, large projects in these sectors hinge less on the availability of incentives, and attribution rates are likely to decline relative to those for smaller projects.
- The Industrial sector stands out for reversing the correlation between higher attribution and smaller projects. Industrial sector kWh attribution rates for large projects are 18 percentage points higher than those for small projects, while large therm attribution rates are 41 percentage points higher. Rebates for small projects are likely small relative to most Industrial sector companies' operating budgets and therefore may play a less influential role in the decision to implement the project. The higher attribution for these large-scale projects may also highlight the role that other forms of BP involvement and services take in supporting large Industrial projects: technical & specification assistance, cost /economic analysis and operations support, as well as the incentives themselves. These services are available to all Business Programs customers, but they may prove particularly influential with respect to the largest projects.
- BP's largest projects are undertaken in the Industrial sector. At some point likely to be reached with very large, industrial-scale projects, the project may be so big that incentives again become critical to it financial viability. The threshold at which

incentives again becomes critical to the projects financial viability is also likely to be a function of the size of the company.

4.5 FOUR SECTORS BY MEASURE TYPE

In this section, results for the four primary sectors are broken down to examine differences in attribution factors between deemed measures and custom measures. For the purposes of this look, custom is defined as all measures that are not deemed. Table 4-14 provides the definitions of the measures in each category, while Table 4-16 provides a breakdown of the percentages of each category in the sample and the overall population.

Table 4-16. Attribution Factors by Measure Type (Deemed vs. Custom)

	kWh						kW						Therms					
			90% Confidence Interval						90% Confidence Interval						90% Confidence Interval			
Segment	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture Deemed	51	86%	4.6%	4.0%	82.4%	90.3%	50	87%	4.4%	3.8%	82.8%	90.4%	1	*	*	*	*	*
Agriculture Custom	84	47%	29.4%	13.7%	33.0%	60.4%	65	44%	34.3%	15.1%	28.9%	59.2%	21	16%	53.1%	8.6%	7.6%	24.8%
Commercial Deemed	94	79%	14.0%	11.1%	68.0%	90.2%	94	81%	12.7%	10.4%	71.0%	91.8%	5	61%	53.1%	32.2%	28.5%	92.9%
Commercial Custom	45	59%	22.6%	13.4%	45.9%	72.7%	39	51%	35.8%	18.4%	33.0%	69.9%	21	29%	43.2%	12.5%	16.4%	41.3%
Industrial Deemed	72	60%	19.8%	11.8%	47.8%	71.4%	71	57%	21.6%	12.3%	44.7%	69.3%	4	94%	12.9%	12.1%	81.4%	105.7%
Industrial Custom	77	57%	16.1%	9.1%	47.6%	65.9%	68	52%	16.7%	8.7%	43.6%	61.1%	36	59%	11.2%	6.6%	52.4%	65.7%
Schools & Govt, Deemed	44	68%	29.4%	20.0%	48.1%	88.2%	42	71%	29.6%	21.0%	49.9%	91.9%	9	16%	75.3%	11.8%	3.9%	27.4%
Schools & Govt, Custom	46	30%	29.3%	8.8%	21.3%	38.9%	37	39%	43.7%	16.9%	21.8%	55.6%	51	40%	30.4%	12.2%	28.0%	52.4%

* The adjustment factor or measures of precision was not calculated due to insufficient sample points. The Agriculture Deemed therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of this category was included in the sample. Two sample points are needed to protect respondent confidentiality.

As described in previous sections, deemed measures are more likely to be small and more frequently supported by the Channel initiatives. Custom measures, on the other hand, are more likely to be supported by the full array of BP technical assistance services (equipment specifications, technical assistance) as well as customized incentives. This look helps examine differences in attribution between the relative procedural simplicity of deemed measures and the high touch approach needed for custom measures.

Table 4-14. Definitions and Examples of Measure Type Category

Type Category	Category Definition and Examples
Deemed	Measures with deemed energy savings. These measures have fixed energy savings values per measure or agreed upon energy savings algorithms. Measures receive the deemed classification through a collaborative process between evaluation and the program. Examples of deemed measures include: CFLs, LED Exit Lighting, RTUs, Steam Traps, and T8 1L-4 ft Low Watt with CEE Ballast - 28 Watts[37].
Custom	All non-deemed measures.

Table 4-15 below shows the representation of these measures types by sector, in the 18MCP impact evaluation sample and the population.

Table 4-15. Percentage of the 18MCP Tracking Gross Savings by Measure Type

Sector	Measure Type Category	Percent of Population Tracking Gross Savings			Percent of Population Tracking Gross Savings in the Sample		
		kWh	kW	Therms	kWh	kW	Therms
Agriculture	Deemed	3%	4%	0%	1%	1%	0%
	Custom	6%	7%	6%	1%	1%	3%
Commercial	Deemed	21%	26%	2%	4%	4%	1%
	Custom	11%	10%	9%	3%	2%	4%
Industrial	Deemed	20%	18%	5%	4%	3%	4%
	Custom	29%	20%	51%	9%	5%	26%
Schools & Government	Deemed	5%	5%	7%	1%	1%	1%
	Custom	6%	10%	20%	1%	2%	11%
Total		**100%**	**100%**	**100%**	**24%**	**20%**	**50%**

The 18MCP attribution factors by primary sector and deemed versus custom incentives are provided in Table 4-16.

[37] The complete list of deemed measures is provided as Appendix H of the 18MCP Impact Evaluation Report: The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period,* April 2, 2009.

Table 4-16. Attribution Factors by Measure Type (Deemed vs. Custom)

Segment	kWh						kW						Therms					
			90 % Confidence Interval						90 % Confidence Interval						90 % Confidence Interval			
	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Agriculture Deemed	51	86%	4.6%	4.0%	82.4%	90.3%	50	87%	4.4%	3.8%	82.8%	90.4%	1	*	*	*	*	*
Agriculture Custom	84	47%	29.4%	13.7%	33.0%	60.4%	65	44%	34.3%	15.1%	28.9%	59.2%	21	16%	53.1%	8.6%	7.6%	24.8%
Commercial Deemed	94	79%	14.0%	11.1%	68.0%	90.2%	94	81%	12.7%	10.4%	71.0%	91.8%	5	61%	53.1%	32.2%	28.5%	92.9%
Commercial Custom	45	59%	22.6%	13.4%	45.9%	72.7%	39	51%	35.8%	18.4%	33.0%	69.9%	21	29%	43.2%	12.5%	16.4%	41.3%
Industrial Deemed	72	60%	19.8%	11.8%	47.8%	71.4%	71	57%	21.6%	12.3%	44.7%	69.3%	4	94%	12.9%	12.1%	81.4%	105.7%
Industrial Custom	77	57%	16.1%	9.1%	47.6%	65.9%	68	52%	16.7%	8.7%	43.6%	61.1%	36	59%	11.2%	6.6%	52.4%	65.7%
Schools & Govt, Deemed	44	68%	29.4%	20.0%	48.1%	88.2%	42	71%	29.6%	21.0%	49.9%	91.9%	9	16%	75.3%	11.8%	3.9%	27.4%
Schools & Govt, Custom	46	30%	29.3%	8.8%	21.3%	38.9%	37	39%	43.7%	16.9%	21.8%	55.6%	51	40%	30.4%	12.2%	28.0%	52.4%

* The adjustment factor or measures of precision was not calculated due to insufficient sample points. The Agriculture Deemed therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of this category was included in the sample. Two sample points are needed to protect respondent confidentiality.

The charts that follow (Figure 4-16 to Figure 4-18) compare the 18MCP attribution factor results in terms of measure type for each sector for kWh, kW, and therms, respectively. Figure 4-16 shows that, for both the Agriculture and the Schools and Government sectors, deemed measure type attribution factors for kWh measures were higher than custom attribution factors, at the 95 percent level of confidence. kW attribution factors, shown in Figure 4-17, again highlight the Agriculture and Commercial sectors for showing a statistically significant increase in attribution for deemed measures than custom, again significant at the 95 percent level of confidence. The difference for Schools and Government just misses the 95 percent threshold.

Similar to the Channel versus Non-Channel look in Section 4.3.1 and the project size look in Section 4.4, KEMA preformed a supplemental analysis with the removal of the CFLs to test the hypothesis that CFLs are driving the significant differences between Deemed and Custom electric attribution rates for the Agriculture and Commercial sectors. This analysis supports this hypothesis. Once the CFLs are removed[38] the attribution rates decrease and the difference between attribution rates are no longer statistically different from each other at the 95 percent level of confidence. Table 4-17 shows the attribution factors with CFLs removed. Agriculture Deemed kWh dropped from 86 percent to 48 percent and Commercial Deemed kWh dropped from 79 percent to 40 percent.

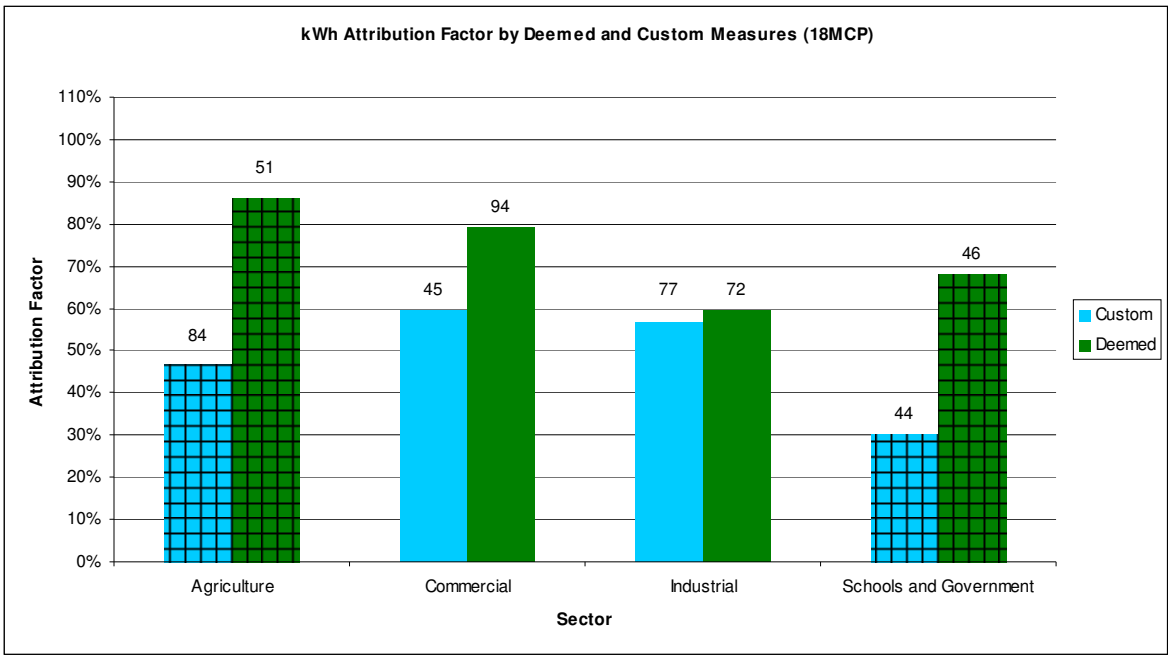
[38] CFLs were removed from both the Deemed and Custom categories because not all CFLs reported in the program tracking database were identified as Deemed measures.

Table 4-17. Attribution Factors by Measure Type (18MCP) Excluding CFLs

Sector	Size	Attribution Adjustment Factors	
		kWh	kW
Agriculture	Deemed	48%	48%
	Custom	47%	44%
Commercial	Deemed	40%	40%
	Custom	59%	51%

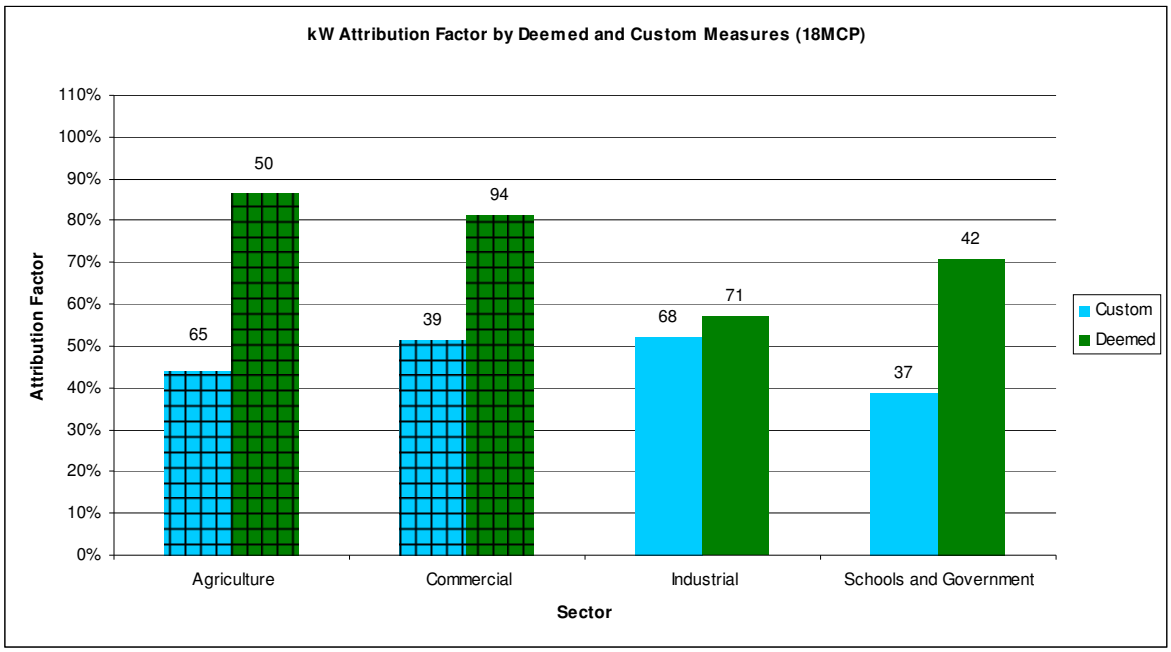
On the gas side, Figure 4-18 shows that in the Industrial sector attribution factors for deemed measures are significantly higher than for custom measures, at the 95 percent confidence level. It should be noted that this result is based on only four Industrial therm deemed measures. In the Schools and Government sector, however, attribution factors for custom measures are higher, again at the 95 percent confidence level. This is the reverse trend from what we saw in the Schools and Government sector's electric results.

Figure 4-16. kWh Attribution by Measure Type (Deemed vs. Custom)[a]



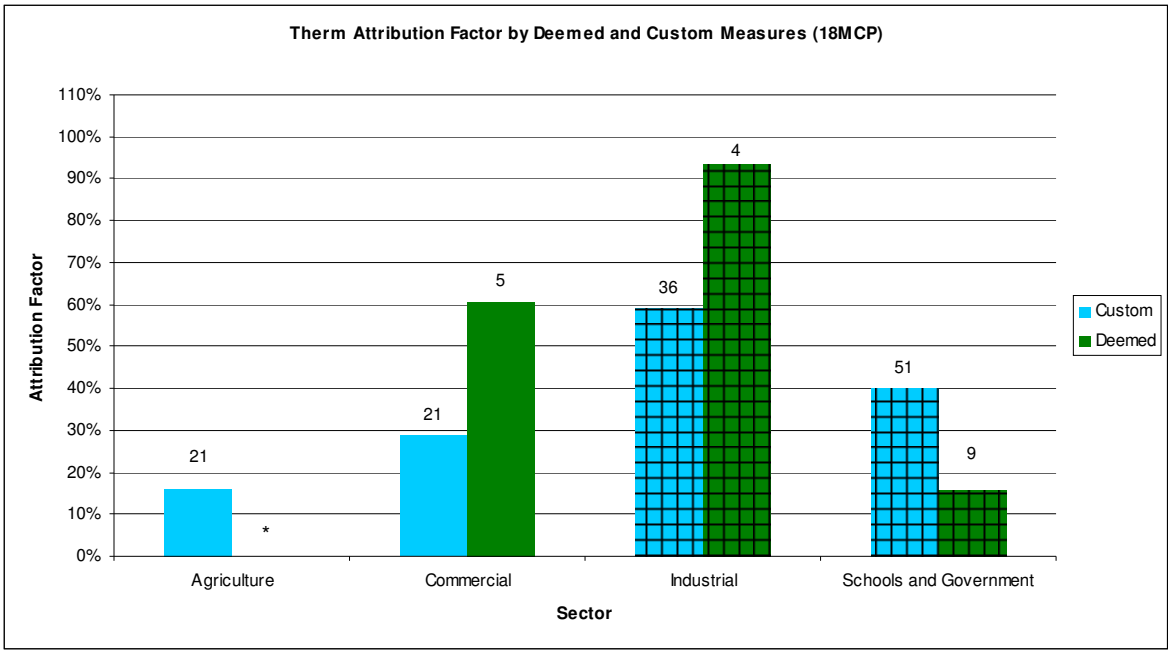
[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-17. kW Attribution Factors by Measure Type (Deemed vs. Custom)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

Figure 4-18. Therm Attribution Factors by Measure Type (Deemed vs. Custom)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the charts indicates the difference in the adjustment factors represented by the paired bars is statistically significant at the 95 percent level of confidence.

[*] The Agriculture Deemed therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of these categories was included in the sample. Two sample points are needed to protect respondent confidentiality.

There is a strong tendency for attribution rates of deemed measures to have higher attribution values compared with custom measures. This observation correlates with the similar finding of attribution rates in the size look (Section 4.4), showing that higher attribution tends to accompany smaller projects (one notable exception mentioned was the large industrial projects).

One possible reason may be that custom projects necessarily entail greater levels of planning and effort on the part of businesses. Implementing custom projects is less likely to depend on the presence or absence of rebates, and more likely to depend on a multiplicity of other variables, including the array of technical and financial/economic support services provided by Focus and support services received from sources other than Focus. The increase in the support services and market actors involved in the installation of the energy efficiency measure may cause the program participant to deemphasize the influence the program had on the decision to install. That is, there are more variables involved to share the credit for moving the project to completion.[39]

An exception to this trend is Schools and Government sector therm measures, where attribution of custom measures significantly exceeds attribution of the deemed measures. This statistically significant difference may reflect unique characteristics of this sector.

- Schools and Governments have decision-making processes likely to be more complex than many Commercial or even Industrial entities, with the timing, red tape and other decision requirements typical of school boards, town councils, planning committees, etc. Schools and Government entities are less likely than other entities to have energy managers, often leaving building maintenance staff to equipment decisions. For these entities, the additional assistance provided along with the custom measures (e.g., objective third-party endorsement of the efficiency step at the school board meeting) could be as significant as the incentive itself in bringing the project to fruition.
- Another possibility is that many of the deemed therm measures being promoted by Schools and Governments are susceptible to low attribution, for example boilers, boiler service buy-downs, stream trap repairs, control systems, and building shell measures. It is possible these technologies are further along the adoption curve and therefore susceptible to higher levels of free ridership compared to the custom measures offered by the Schools and Government sector.

4.6 FOUR SECTORS BY MEASURE TYPE AND PROJECT SIZE

This section disaggregates primary sector attribution factor results by both measure type and project size. To recap insights from previous sections, in Section 4.4, we saw that small projects tend to exhibit higher attribution rates than large projects (with the opposite trend for Industrial). Section 4.5 discussed how deemed measures generally have higher attribution levels than custom measures. Examining both dimensions simultaneously affords the opportunity to assess whether project size or measure type is more closely associated with variations in program attribution.

[39] A notable exception, the large industrial projects, was identified and discussed in Section 4.4 Four Sectors by Project Size.

The 18MCP primary sector attribution factors by project size and measure type are provided in Table 4-18. As the same sample has now been cut along three dimensions (sector, measure type and size), in many cases sample sizes are small. Attribution rates determined with small sample sizes should be regarded cautiously.

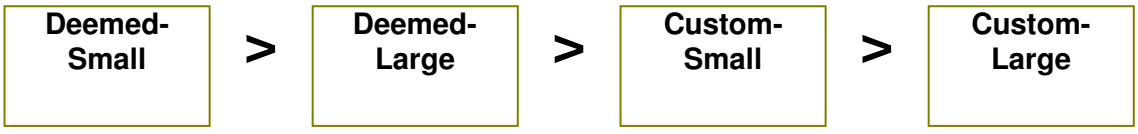
Table 4-18. Attribution Factors by Measure Type and Size (18MCP)

	kWh						kW						Therms					
			90% Confidence Interval						90% Confidence Interval						90% Confidence Interval			
Segment	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
Ag Deemed, Small	49	86%	4.8%	4.2%	82.1%	90.4%	48	86%	4.6%	4.0%	82.5%	90.4%	1	*	*	*	*	*
Ag Deemed, Large	2	89%	46.7%	41.4%	47.3%	130.1%	2	88%	48.3%	42.7%	45.6%	131.0%	0	*	*	*	*	*
Ag Custom, Small	71	53%	31.8%	16.7%	35.9%	69.4%	56	43%	42.7%	18.3%	24.5%	61.1%	14	30%	80.0%	23.6%	5.9%	53.2%
Ag Custom, Large	13	29%	76.9%	22.4%	6.7%	51.6%	9	48%	85.9%	41.4%	6.8%	89.7%	7	8%	170.1%	13.6%	0.0%	21.6%
Com Deemed, Small	82	91%	12.1%	11.0%	80.2%	102.3%	82	92%	11.1%	10.2%	82.1%	102.6%	3	58%	187.1%	108.6%	0.0%	166.7%
Com Deemed, Large	12	43%	70.2%	30.5%	12.9%	73.8%	12	47%	67.5%	31.5%	15.2%	78.1%	2	100%	0.0%	0.0%	100.0%	100.0%
Com Custom, Small	29	62%	27.5%	17.1%	45.1%	79.4%	23	36%	69.9%	25.0%	10.8%	60.7%	12	17%	110.6%	18.7%	0.0%	35.6%
Com Custom, Large	16	58%	40.6%	23.5%	34.3%	81.3%	16	58%	44.0%	25.6%	32.5%	83.6%	9	31%	58.6%	17.9%	12.7%	48.6%
Ind Deemed, Small	48	59%	35.4%	21.0%	38.3%	80.3%	48	56%	38.1%	21.2%	34.5%	76.9%	1	*	*	*	*	*
Ind Deemed, Large	24	60%	28.4%	17.0%	42.9%	76.9%	23	58%	29.8%	17.3%	40.9%	75.6%	3	93%	18.9%	17.7%	75.8%	111.2%
Ind Custom, Small	20	32%	66.1%	21.2%	10.9%	53.2%	17	34%	50.0%	16.8%	16.8%	50.3%	4	22%	34.9%	7.6%	14.3%	29.5%
Ind Custom, Large	57	65%	15.2%	9.8%	54.9%	74.5%	51	63%	16.1%	10.2%	53.0%	73.4%	32	61%	14.6%	8.9%	51.7%	69.4%
S&G, Deemed, Small	33	61%	18.1%	11.1%	50.1%	72.2%	31	66%	17.4%	11.5%	54.2%	77.1%	7	27%	130.2%	35.5%	0.0%	62.8%
S&G Deemed, Large	11	73%	49.2%	35.7%	36.8%	108.3%	11	75%	52.0%	38.8%	35.8%	113.4%	2	9%	0.0%	0.0%	9.5%	9.5%
S&G, Custom, Small	25	46%	33.5%	15.4%	30.5%	61.3%	18	39%	39.1%	15.4%	24.0%	54.9%	29	29%	48.8%	13.9%	14.6%	42.4%
S&G, Custom, Large	21	26%	64.1%	16.4%	9.2%	42.0%	19	39%	62.2%	23.9%	14.6%	62.4%	22	47%	43.4%	20.2%	26.4%	66.7%

* The adjustment factor or measures of precision was not calculated due to insufficient sample points. The Agriculture Deemed-Small therm and Industrial Deemed-Small therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of these categories was included in the sample. Two sample points are needed to protect respondent confidentiality.

While there is much variation in the data, careful examination reveals that measure type (deemed vs. custom) has a slight edge over size as an influence on attribution rates. A close examination of the results shows that deemed small projects (e.g., CFLs, cited previously for their influence in other looks) tend to have the highest attribution rates, followed by deemed large projects, then custom small projects, and finally custom large projects. This general pattern is illustrated in Figure 4-19. This pattern is less pronounced when CFLs are excluded from consideration and may vary by sector and other measure attributes. The intent of the figure is to provide a high-level overview of the 48 attribution factors provided in the above table.

Figure 4-19. Measure Type – Size Attribution Tendencies – CFLs Included



This pattern is not universal, but it is the most typical across sectors and supports the view that measure type is more decisive than project size in affecting program attribution. In the Agriculture sector, for example, kWh attribution factors are 86 percent for small projects featuring deemed measures, 53 percent for small projects with custom measures, and 29 percent for large projects with custom measures (no large projects with deemed measures were sampled). This pattern is largely characteristic of Agriculture sector kW attribution levels, Commercial sector kW attribution levels, and Schools and Government sector kWh and kW attribution levels as well, particularly when segments with low sampling rates are discarded (viz., Agriculture custom measure-large projects for kW, and Schools and Government deemed measure-large projects for both electric measures).

This finding is strengthened when significance tests are performed on attribution rates within each primary sector. For each sector, significant differences in attribution factors were investigated for the following four measure/size combinations:

- Deemed-small versus deemed-large
- Deemed-small versus custom-small
- Custom-small versus custom-large
- Deemed-large versus custom-large.

We limited the statistical testing to the combinations that shared at least one measure type and size attribute. That is, we did not report the testing for Deemed-small versus custom-large, or Deemed-large versus custom-small. This provides a more focus analysis and comparisons of less disparate groupings.

The results of these tests are shown Figure 4-20 through Figure 4-22 for kWh, kW, and therms, respectively. Labels under each category clarify the specific tests that showed statistically significant results, at the 95 percent confidence level. The key for these results and accompanying chart labels is provided in Table 4-19.

Finally, a caveat: the finding of a statistically significant relationship between two dimensions does not suggest any causal relationship between them. It suggests only that the two dimensions appear to be different more often than would be the case by chance alone.

Table 4-19. Statistical Significance Tests for Measure Type and Size

Chart Label	Test Found Statistical Significance (95% Confidence Level)
a	Deemed, Small vs. Deemed, Large
b	Deemed, Small vs. Custom, Small
c	Custom, Small vs. Custom, Large
d	Deemed, Large vs. Custom, Large

In general, the differences in attribution rates which were found to be statistically significant at the 95 percent level of confidence appear to confirm the hypothesis that measure type is a stronger influence over program attribution than project size. By the transitive property, the following results corroborate the measure/size-attribution factor hierarchy already discussed.

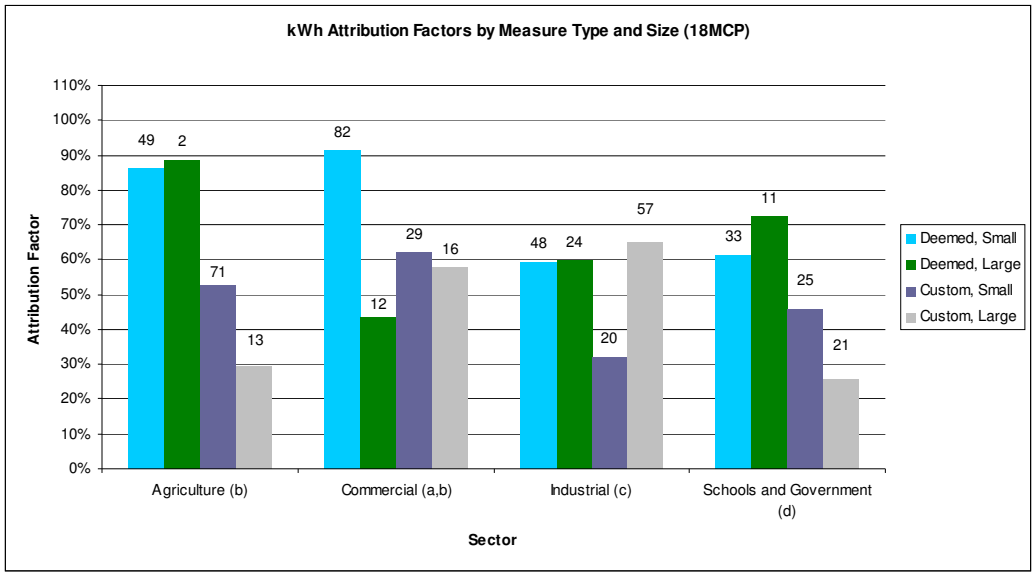
- Attribution rates for deemed small projects were significantly higher than rates for deemed large projects for Commercial sector electric measures. CFLs are a driving force behind the higher attribution rates for deemed small projects in the Commercial sector.
- Rates for deemed small projects were significantly higher than those for custom small projects for all Commercial and Agriculture sector electric measures. Again, CFLs are contributing to the higher attribution rates for deemed small projects in the Commercial and Agriculture sectors.
- Custom small projects exhibited higher attribution factors than custom large projects for kWh in the Agriculture[40] and Schools and Government sectors[41], while deemed large project attribution factors were higher than those for custom large projects in the Schools and Government sector.

An exception to this trend is presented by results from the Industrial sector. Specifically, for kWh, kW, and therms, attribution factors for custom large industrial projects are significantly higher than factors for custom small projects. This same exception was noted above in the project size results (Section 4.4). We hypothesized that very large projects, particularly in the Industrial sector, can be highly dependent on program incentives and associated program services, and therefore exhibit higher program attribution rates. The largest projects are typically custom projects, which would account for the sharp differentials between custom-large and custom-small measures indicated by the data.

[40] Barely missed threshold for significance at 90 percent level of confidence (p-value = 0.1001).

[41] Barely missed threshold for significance at 95 percent level of confidence (p-value = 0.0659).

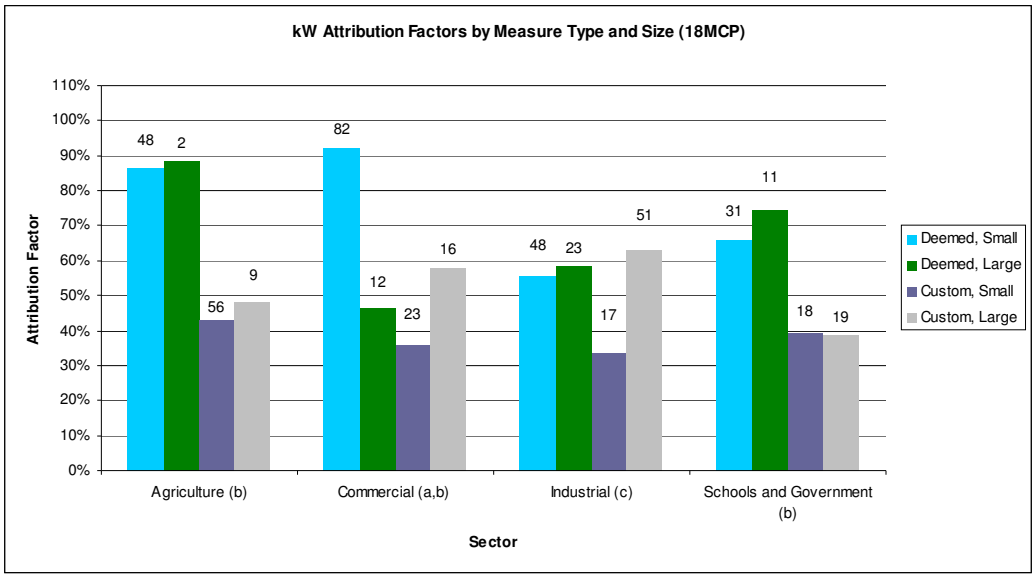
Figure 4-20. kWh Attribution Factors by Measure Type and Size (18MCP)[a]



[a] The number above the bar is the sample size. Differences in the adjustment factors within each sector were tested at the 95 percent level of confidence. If applicable, statistical differences are identified by the following codes under each sector name:

a = Deemed, Small vs. Deemed, Large
b = Deemed, Small vs. Custom, Small
c = Custom, Small vs. Custom, Large
d = Deemed, Large vs. Custom, Large

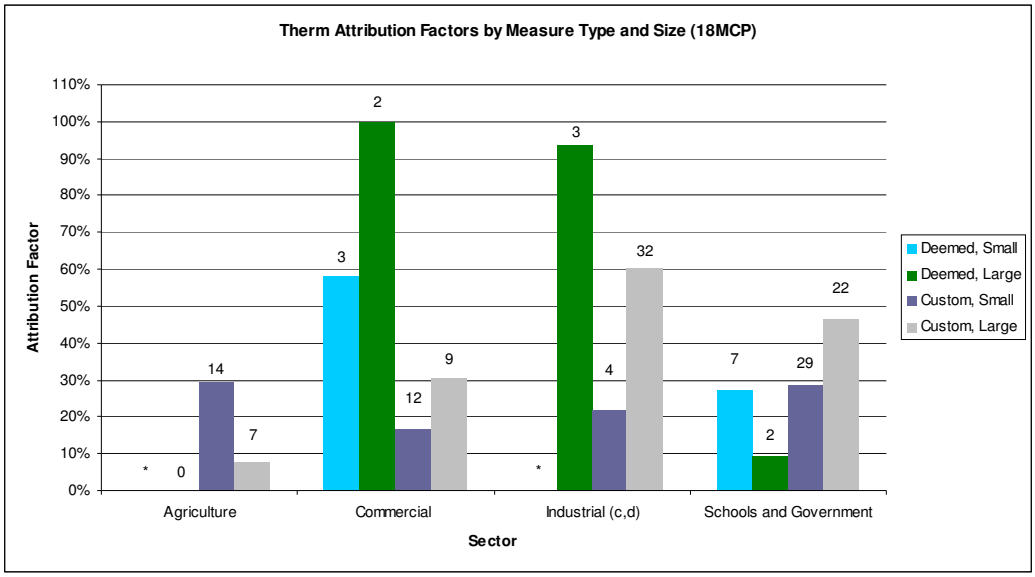
Figure 4-21. kW Attribution Factors by Measure Type and Size (18MCP)[a]



[a] The number above the bar is the sample size. Differences in the adjustment factors within each sector were tested at the 95 percent level of confidence. If applicable, statistical differences are identified by the following codes under each sector name:

a = Deemed, Small vs. Deemed, Large
b = Deemed, Small vs. Custom, Small
c = Custom, Small vs. Custom, Large
d = Deemed, Large vs. Custom, Large

Figure 4-22. Therm Attribution Factors by Measure Type and Size (18MCP)[a]



[a] The number above the bar is the sample size. Differences in the adjustment factors within each sector were tested at the 95 percent level of confidence. If applicable, statistical differences are identified by the following codes under each sector name:

a = Deemed, Small vs. Deemed, Large
b = Deemed, Small vs. Custom, Small
c = Custom, Small vs. Custom, Large
d = Deemed, Large vs. Custom, Large

[*] The Agriculture Deemed-Small and Industrial Deemed-Small therm results were not reported to protect respondent confidentiality. Only one respondent meeting the criteria of these categories was included in the sample. Two sample points are needed to protect respondent confidentiality.

Similar to the Channel versus Non-Channel look in Section 4.3.1, the project size look in Section 4.4, and the measure type look in the previous section KEMA preformed a supplemental analysis with the removal of the CFLs to test the hypothesis that CFLs are driving the significant differences between the combined measure type and size categories for electric attribution rates of the Agriculture and Commercial sectors. This analysis supports this hypothesis; however, the results are less definitive due to smaller sample sizes resulting from the further segmentation of the sample. As would be expected the greatest changes are with regards to the Deemed-Small category. The removal of CFLs had no effect on the Agriculture custom rates and very minor reductions to the Commercial custom rates.

Once the CFLs are removed, the attribution rates for the Deemed-Small dropped substantially for both sectors. Deemed-Large also decreased for the Commercial sector.[42] Agriculture Deemed-Small kWh dropped from 86 percent to 12 percent[43] and Commercial Deemed-Small kWh dropped from 91 percent to 56 percent. As a result of these decreases, the difference between both sectors' Deemed-Small and Custom-Small attribution rates (kWh and kW) are no longer statistically different from each other at the 95

[42] There were no CFLs in the sample classified as Agriculture Deemed-Large.

[43] n = 8 with the removal of the CFLs.

percent level of confidence. However, the decrease for Agriculture Deemed-Small was so great that Custom-Small becomes greater than Deemed-Small and just misses the threshold for statistical significance at the 95 percent level. Again, it should be noted that there are only eight sample points in the Agriculture Deemed-Small category with the removal of CFLs.

There were five Commercial CFL customers in the sample classified as Deemed Large. Upon there removal from the analysis, the Commercial Deemed-Large rates dropped by roughly 30 percentage points. Consequently, the Custom-Large rates became significantly greater than Deemed-Large, at the 95 percent level of confidence.

In summary, the removal of CFLs moves the Deemed-Small category from the highest Agriculture attribution category to the lowest; for Commercial the Deemed-Large category drops to the lowest spot and Deemed-Small drops in-line with the custom categories.

Table 4-20. Attribution Factors by Measure Type and Size (18MCP) Excluding CFLs

Sector	Measure Type –Size Category	Attribution Adjustment Factors	
		kWh	kW
Agriculture	Deemed, Small	12%	11%
	Deemed, Large	89%	88%
	Custom, Small	53%	43%
	Custom, Large	29%	48%
Commercial	Deemed, Small	57%	56%
	Deemed, Large	15%	14%
	Custom, Small	61%	33%
	Custom, Large	58%	58%

The following points emerge from the measure type and size look:

- In general, these results demonstrate that measure type tends to outweigh project size as a determinant of program attribution levels. Specifically, whether a project is deemed or custom plays a greater role in influencing the level of free ridership than whether a project is large or small. This applies to the Agriculture, Commercial and Schools and Governments sectors. Regardless of project size, attribution tends to be higher for deemed projects than it is for custom projects. This suggests deemed measures are more dependent on program rebates and services, regardless of project size, compared with custom measures. A major caveat to this conclusion is that Deemed-Small attribution rates drop significantly for Agriculture and to a slightly lesser degree Commercial, with the removal of CFLs.
- The Industrial sector stands as an exception to the rule that small projects evince higher attribution rates than large projects. The significantly greater program attribution associated with custom large projects compared to custom small projects is at odds with findings regarding project size presented above. This may be due to the essential role played by program incentives in securing the viability of especially large, industrial-scale projects, the fate of which rests on the availability of generous, offsetting financial assistance.

4.7 VARIATIONS IN INCENTIVE LEVELS

Over the course of the 18MCP, the program raised incentive levels for selected measures with the expectation that the increased incentives would result in increased program attribution. The majority of the incentive level increases took effect at the beginning of the 18MCP. The portfolio level attribution values for kWh, kW and therms did not increase or decrease between FY06 and the 18MCP. That is, at the 95 percent level of confidence there is no difference in the attribution results reported in FY06 and the 18MCP impact evaluation reports. It is important to note the comparison of reported attribution presented in this section does not consider what the 18MCP values might have been if the incentive levels were not raised. It is likely the dramatic changes in the economic environment (i.e., worldwide recession) since FY06 have had a profound effect on the efforts of the program.

This section provides an examination of attribution factors associated with new, higher incentive levels compared to attribution rates that characterized measures and incentives from previous periods. The following sections place this effort into context, define the sample, and explain the methods used, as a preface to summarizing the results of this look.

4.7.1 Background and context

The topic of incentive levels, their role in the BP programs and the levels at which such incentives should be set, has long been a matter for program consideration and evaluation. A review of prior BP reports reveals three instances in which the evaluation team made explicit recommendations to raise incentive levels as a way to increase attribution.

In the *Business Programs: Measure Review* published February 3, 2006, the authors suggested "Increasing incentive levels where these are low compared to the market and other programs."[44] The evaluation team recommended that higher incentives be accompanied by three additional steps: distinguish replacement and retrofit contexts; add other distinctions; and, in certain instances, eliminate the incentive. The report emphasized that program modifications must be undertaken in a holistic manner: "these changes would need to be considered in an overall context of offering fewer different kinds of incentives and potentially offering a smaller number of larger incentives for greater savings."

In *Business Programs: Delivery Review*, released April 4, 2006, the evaluation team offered an identical suggestion regarding incentive levels, including specifying those conditions under which incentive increases would be most effective.[45] Two more recommendations were added to the list of changes recommended to accompany increases in incentive levels: limit incentives to "first timers," and use a tiered incentive structure. The authors also recognized the importance of delivery mechanisms: "measure screening, rebate structures, and delivery processes can be mutually reinforcing."

---

[44] The Focus on Energy Evaluation Team. *State of Wisconsin Department of Administration Division of Energy, Focus on Energy Evaluation, Business Programs: Measure Review*, February 3, 2006.

[45] The Focus on Energy Evaluation Team. *State of Wisconsin Department of Administration Division of Energy, Focus on Energy Evaluation, Business Programs: Delivery Review*, April 4, 2006.

In *Business Programs: A Behind-the-Scenes Look at Attribution*, June 21, 2006, the evaluation team returned again to the issue of incentive levels. This report recommended that "The financial assistance provided by the program should be sufficiently high to encourage rebated measures to be installed by those other than early adopters."[46] Once again, however, the evaluation team stressed that other steps be taken in parallel with rebate increases in order to improve attribution. These included adopting aggressive efficiency levels, and increasing the vigilance and scope of Energy Advisors. In particular, the authors stated that, "If without the program's help a potential participant is very likely to install a measure anyway, the program's resources are better spent elsewhere… Restricting financial assistance to measures a customer has not installed before is one approach that can help with this effort in some contexts."

We recognize the programs disappointment that attribution values did not increase since FY06 despite increases in incentives for several measures. However, it is not clear that this should be viewed as a failure given the current economic climate. To complement the results data presented in this section, below we also reexamine previous recommendations for program improvement in order to assess the soundness of the suggestions as well as propose adjustments that might be made going forward.

4.7.2 Incentives methodology

Table 4-21 below summarizes the manner in which the changes in incentive levels were categorized for the purposes of this analysis. The incentive level data contained too few data points to permit analysis at the sector level. Instead, results from all sectors were pooled, and then categorized in terms of the magnitude of incentives increases. Specifically, new incentive levels were divided into two groups: new incentives that increased by up to 25 percent over previous levels and new incentives that increased by more than 25 percent.

We developed a method to classify custom measures into the aforementioned percent change categories. If a custom measure in the database received less than the new custom incentive rate (custom incentives are based on a $/kW, $/kWh, $/therms formulae), then that measure was categorized as having an "old" incentive. If a custom measure was awarded an incentive equal to or above the new custom incentive rate, we considered that the incentive rate had changed and therefore categorized the measure according to the amount of that change.

Table 4-22 describes the representation of the incentive change categories in the 18MCP sample and population.

[46] The Focus on Energy Evaluation Team. *State of Wisconsin Department of Administration Division of Energy, Focus on Energy Evaluation, Business Programs: A Behind-the-Scenes Look at Attribution,* June 21, 2006.

Table 4-21. Definitions and Examples of Measures by Incentive Category

Incentive Change Category	Category Definition and Examples
1%–25% change	These measures were incentivized in/prior to FY06 and incentive levels were increased between 1 percent and 25 percent after July 1, 2007.
Over 25% change	These measures were incentivized in/prior to FY06 and incentives levels were increased more than 25 percent after July 1, 2007.
0% change	These measures were incentivized in/prior to July 1, 2007; however, there was no change in the incentive level during the 18MCP.
Rebates	These measures were tracked in the Rebates Database. The majority of the measures in the rebates database are CFLs with deemed attributions near 100 percent, including them as either new or old incentive would skew the results of the incentives analysis, masking the affect of incentives changes. Therefore, we included them in a separate category.
New measure	These measures were introduced after July 1, 2007, and therefore incentives cannot be compared to any prior incentive levels.
Unknown	Incentive and/or measure could not be categorized with available data.

Table 4-22. Percentage of the 18MCP Tracking Gross Savings by Incentive Change Category

Incentive Change Category	Percent of Population Tracking Gross Savings			Percent of Population Tracking Gross Savings in the Sample		
	kWh	KW	Therms	kWh	kW	Therms
1%–25% Change	7%	7%	6%	1%	1%	3%
>25% Change	34%	31%	46%	9%	7%	26%
0% Change	6%	4%	27%	1%	1%	12%
Rebates	9%	11%	0%	2%	2%	0%
New Measure	4%	4%	0%	1%	1%	0%
Unknown	41%	43%	20%	10%	9%	8%
Total	**100%**	**100%**	**100%**	**24%**	**20%**	**50%**

Finally, in performing the significance tests for these results, we focused on the three categories that describe changes in incentive amounts: 1 percent to 25 percent change, over 25 percent change, and zero percent change. The reasons for this reflect the nature of the other three categories. “New Measure” signifies a measure that was newly introduced and therefore had no prior incentive level with which to compare. “Rebates” (measures from the rebates database, primarily CFLs) are known to have high attribution and therefore would have skewed the underlying results in which we have more interest. “Unknown” measures are not possible to associate with any incentive level. Furthermore, minimizing the number of comparisons produces a more focused analysis.

Unfortunately, a major limitation of this analysis was that we were not able to directly compare the attribution rates for each of the 18MCP incentive change categories with the same measures in the previous evaluation. This was not feasible for two primary reasons. First, due to limitation in the database structure we could not sufficiently link the measures in the 18MCP data to the corresponding pairings in the FY06 data. Second, even if we were able to successfully link the two databases, the measures would need to be the same

in both samples for the comparison to be meaningful. In most cases, they would not be the same. In light of these limitations, the incentive analysis compares the attribution rates for the 18MCP incentive change categories to the overall FY06 attribution results.

4.7.3 Analysis

Table 4-23 presents attribution rates for these categories. A comparison of attribution factors is also provided, showing attribution factors from both the FY06 impact evaluation and the 18MCP period. Again, it should be noted that there was no statistical difference (95 percent level of confidence) in the FY06 and the 18MCP attribution rates at the portfolio level. These results are depicted in the three charts below and discussed further in Section 4.7.4.

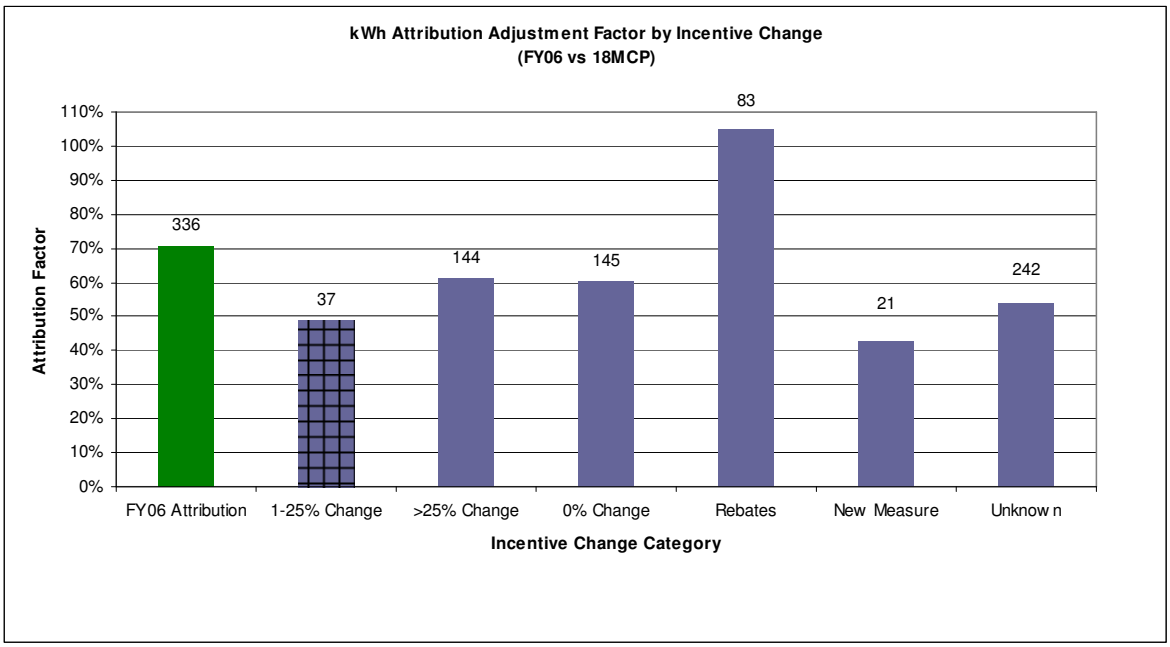
Table 4-23. Attribution Factors by Incentive Change Level (FY06 and 18MCP)

	kWh						kW						Therms					
			90 % Confidence Interval						90 % Confidence Interval						90 % Confidence Interval			
Segment	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound	n	Attribution Adjustment Factor	Relative Error (%)	±	Lower Bound	Upper Bound
FY06 Attribution	336	71%	10.6%	7.5%	63.2%	78.3%	291	70%	10.4%	7.2%	62.3%	76.8%	163	53%	22.2%	11.7%	40.9%	64.2%
1-25% Change	37	49%	32.3%	15.7%	33.0%	64.4%	26	37%	48.1%	18.0%	19.4%	55.3%	21	55%	43.4%	23.7%	30.9%	78.4%
>25% Change	144	61%	14.1%	8.6%	52.7%	70.0%	131	58%	16.0%	9.3%	48.9%	67.5%	57	46%	18.7%	8.5%	37.0%	54.1%
0% Change	145	60%	22.9%	13.7%	46.3%	73.8%	23	50%	47.8%	24.0%	26.2%	74.2%	39	64%	17.8%	11.4%	52.6%	75.5%
Rebates	83	105%	1.7%	1.8%	103.3%	107.0%	82	106%	1.6%	1.7%	104.0%	107.5%	0	.	.	.	.	.
New Measure	21	43%	71.5%	30.7%	12.2%	73.6%	19	32%	74.6%	24.2%	8.2%	56.6%	3	39%	86.2%	33.9%	5.4%	73.2%
Unknown	242	54%	14.4%	7.8%	46.3%	61.9%	222	54%	14.7%	7.9%	45.7%	61.4%	41	61%	40.1%	24.6%	36.8%	86.0%

*The adjustment factor or measures of precision was not calculated due to insufficient sample points.

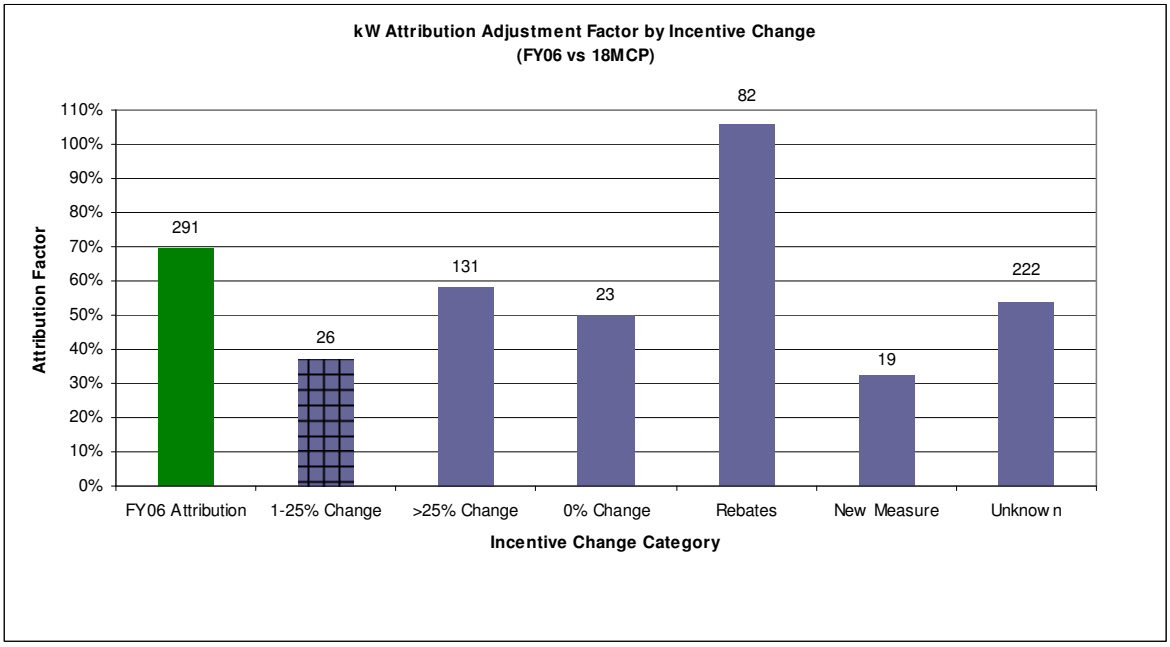
Figure 4-23, Figure 4-24, and Figure 4-25 present the results by energy unit. These figures demonstrate the similarity of incentive level results for both types of electric measure. The incentive increases of greater than 25 percent were similar to the FY06 results, but the 1 percent to 25 percent categories were statistically lower than FY06 at the 95 percent level of confidence. The opposite pattern was found for therms.

Figure 4-23. kWh Attribution Factors by Incentive Change (FY06 vs. 18MCP)[a]



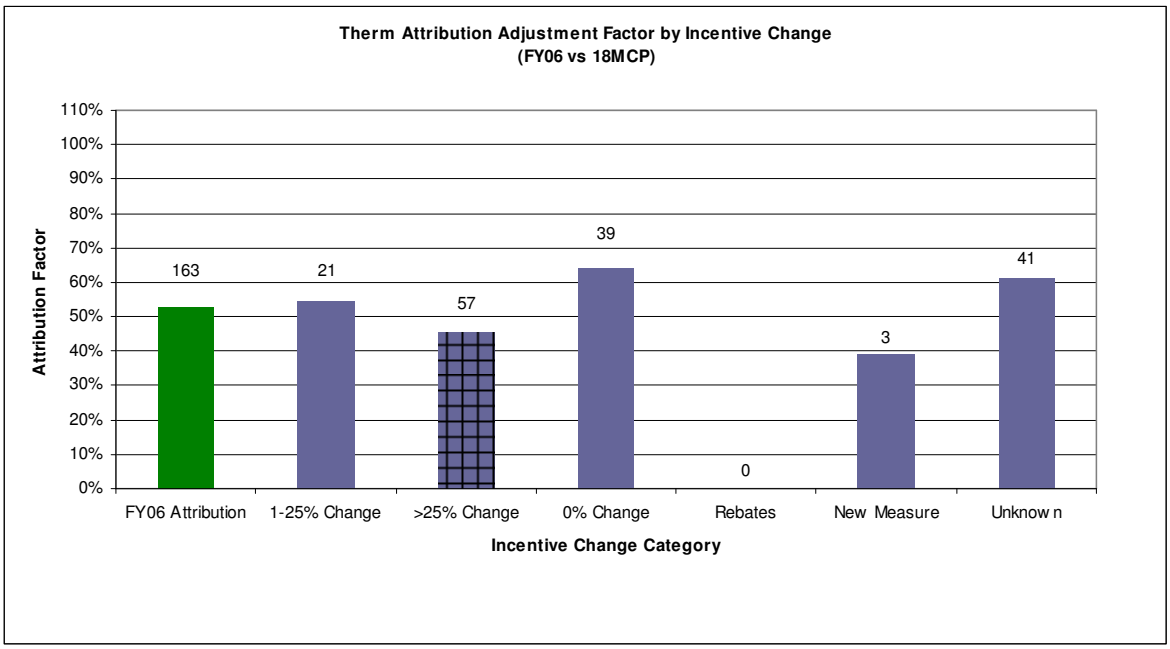
[a] The number above the bar is the sample size. A cross-hatched bar in the chart indicates the difference in the adjustment factor from the FY06 result is statistically significant at the 95 percent level of confidence.

Figure 4-24. kW Attribution Factors by Incentive Change (FY06 vs. 18MCP)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the chart indicates the difference in the adjustment factor from the FY06 result is statistically significant at the 95 percent level of confidence.

Figure 4-25. Therm Attribution Factors by Incentive Change (FY06 vs. 18MCP)[a]



[a] The number above the bar is the sample size. A cross-hatched bar in the chart indicates the difference in the adjustment factor from the FY06 result is statistically significant at the 95 percent level of confidence.

It is important to note that the changes in attribution levels that occurred over this period do not generally reach a level of statistical significance. For each of the three energy types (kWh, kW and therms), only one of the changes was statistically significant for each. For electric measures (both kWh and kW), changes in incentive levels 1- 25 percent were statistically significant at a 95 percent level of confidence. For therm measures, incentive increases above 25 percent were the only statistically significant change.

With that caveat in mind, additional insights may still be realized through a comparison of the inventive change results. For kWh measures, attribution levels of the three categories of incentive change are within 12 percentage points of each other; ranging from 49 percent to 61 percent. The new measure category had the lowest attribution results at 43 percent. A similar pattern characterized kW measures, where incentives change categories ranged from 38 percent to 52 percent; and again the new measure category had the lowest attribution score at 32 percent.

Changes in incentive levels had different effects for gas measures. Where incentives were raised by more than 25 percent, attribution fell by 9 percentage points compared to FY06 levels. Where incentives were changed by smaller amounts, there was little variation in attribution. Where incentives were unchanged, attribution actually increased by 9 percentage points. Once again, however, it is important to keep in mind that the only one of these changes that was statistically significant at the 95 percent level of confidence was the decline in attribution associated with the increase in incentives by more than 25 percent.

Three main trends are evident in the data:

- For electric measures, although attribution declined for every incentive category between FY06 and the 18MCP, incentives raised by more than 25 percent outperformed measures that were increased by 1 percent to 25 percent and incentives that were unchanged. This evidence suggests that substantial increases in rebate levels may have dampened the effects of a general decline in program attribution over this period. In the absence of sizeable rebate increases, it is possible that attribution levels for these measures would have fallen even further. Testing of this hypothesis is beyond the scope of this study.
- The lowest attribution rates were associated with entirely new measures adopted during the 18MCP. This may reflect "growing pains" related to the introduction of new technologies. The implementation of completely new rebates requires both a sustained marketing effort and acceptance by market participants. Free ridership may be amplified during this transitional period if the rebates levels were set too low or the selected technologies are already accepted in the marketplace. Yet another plausible explanation for higher free ridership with new incentives is the prevalence of early adopters.
- Attribution factors for therms were lower as the percentage increase in incentive change increased. One explanation may be that those therm measures selected for the largest incentive increases were precisely those measures that exhibited low program attribution in previous years. Boosting rebate levels may have been insufficient to overcome inherent technological or market attributes that encourage free ridership.

4.7.4 Discussion

It is understandable that the BP program implementer increased incentive levels with the expectation that overall rates of program attribution would result. At the portfolio level, the results did not change between FY06 and the 18MCP at the 95 percent level of confidence. Results from this section show that, between FY06 and the 18MCP, attribution rates declined for the 1 percent to 25 percent incentive increase (electric only) and greater than 25 percent (gas only) incentive increase categories. In this section, we explore both some of the nuances and insights in these findings, as well as suggest other factors that might have contributed to these results. Contributing factors associated with the wider context around Focus will be addressed in the following section.

This analysis was not able to evaluate the response to increases in incentives for individual measure groups or end-uses. Another limitation of this analysis is that it did not investigate the extent to which the prior evaluation incentive increase recommendations were implemented in the prescribed holistic manner. In short, as is clear from this analysis, the affect of changing incentive levels cannot be predicted, assessed or understood in isolation. Significant factors in the context around the incentive changes were not available to the evaluation team and cannot therefore be assessed to explain the changes in attribution. Lastly, the comparison of reported attribution presented in this section does not consider what the 18MCP values might have been if the incentive levels were not raised.

That said we cannot determine with any degree of reliability whether increasing incentive levels had the desired effect. Nonetheless, this look by incentive change category does provide insights that might be worthy of fuller exploration. For example:

- Electric measures in which incentives were raised by more than 25 percent outperformed incentives that remained unchanged. This finding supports the intuitive expectation that higher incentives will bring greater program volume and therefore higher attribution.
- Electric measures on which incentives were raised by less than 25 percent registered lower attribution factors than did measures under previous incentive levels. What this analysis cannot reveal is the make-up of these two groups of measures. It is possible that modest incentive increases were applied to measures typified by lower attribution to start, in which case we might hypothesize that the modest increase was insufficient to capture customer attention and bolster attribution. It is also possible that some measures that received minor increases no longer merit program support via rebates.
- For therm measures, where incentives were increased by less than 25 percent, attribution factors remained steady. Incentives increased by larger amounts displayed the greatest decline in program attribution; this was the only change that reached the level of statistical significance.

A number of factors may account for lower than expected (by the program) attribution factors in the context of increased incentive levels. The macro-economic factors at play in Wisconsin, throughout the US, and indeed globally, undoubtedly played a considerable part. These will be discussed further in the following section.

Other program-related factors that might be at play in the incentive results described:

- As mentioned is Section 3.3, revisions to the survey instrument and analysis likely results in a more conservative estimate of attribution (all respondents are now asked the efficiency, timing, and quantity Direct Attribution questions).
- Another explanation for the decreases in attribution rates is the recession that became apparent during the 18MCP. The US economy officially entered the recession in December 2007; thereby overlapping ten of the fifteen months covered by the evaluation fieldwork. During periods of economic recession access to capital is limited. Companies may be inclined to limit their energy efficiency investments to the most cost effective and proven technologies. It is a reasonable supposition that the most cost effective and proven technologies are those that companies are more likely to implement without the assistance of the program and therefore have lower attribution associated with them. Alternatively, it is also reasonable to hypothesize the opposite supposition that energy efficiency investments that would have been approved in pre-recessionary times require the Focus assistance in the capital constrained recessionary period. Furthermore, the Focus Program targeted market segments that were less negatively impacted by the economy such as food processing, fast food, and health care.
- It is also reasonable to hypothesize the increased awareness of energy efficiency and its benefits caused by the 2008 presidential election may have played an influential role in the manner customers recalled their decision making process.

The participant interviews are structure to minimize such occurrences, however, it is worthy of listing as an alternative hypothesis.

- It is also probable that there are many high attribution customers who have not been able to implement energy efficiency improvements due to the economic crisis. These may well be companies for which Focus assistance and incentives to implement energy efficiency improvements would be decisive, with the result that, during tough economic times, these energy efficiency improvements would be the first investments postponed with this group.

5. CONCLUSIONS

5.1 WISCONSIN IN 2008: THE MACROECONOMIC CONTEXT

One likely external contributor to attribution levels is the economic recession that has occurred over the period encompassed by the 18MCP. The recession overlapped ten of the fifteen months covered by the evaluation fieldwork. Furthermore, negative economic growth is normally preceded by decelerating economic growth, which affects investment decisions even before a recession is formally announced. National economic growth began to stagnate in the fourth quarter of 2007, and the economy entered a recession in the third quarter of 2008 as Gross Domestic Product (GDP) started to shrink.[47] The present economic downturn is now considered the most serious economic decline since the Great Depression.

Nationally, the recession has been marked by negative growth and rising unemployment. In the fourth quarter of 2008, GDP contracted by 5.4 percent, and the first quarter of 2009 witnessed a further annualized decline of 6.4 percent.[48] More specifically, from 2007 to 2008, agriculture declined by 0.01 percent, retail trade by 0.03 percent, and durable goods manufacturing by 0.08 percent, while government grew by 0.23 percent.[49] Since the beginning of the recession, 7.4 million jobs have been lost.[50] Currently, the national unemployment rate is 9.7 percent. Broken down by industry, unemployment is 13.1 percent in agriculture, 8.8 percent in wholesale and retail trade, 13.0 percent in durable goods, and 5.1 percent in government.[51]

In Wisconsin, GDP grew by only 1.0 percent in 2007 and by a mere 0.8 percent in 2008.[52] Between 2007 and 2008, agriculture in the state declined by 0.08 percent, durable goods manufacturing by 0.06 percent and government by 0.08 percent. Retail trade in Wisconsin grew by a mere 0.02 percent. Wisconsin's unemployment rate currently stands at 8.8 percent.[53] This period of economic stagnation and retreat has overlapped precisely with

---

[47] Bureau of Economic Analysis, http://www.bea.gov/national/xls/gdpchg.xls

[48] Ibid.

[49] BEA breaks down GDP by NAICS code rather than primary sector. These four NAICS "industries" correspond roughly to the primary sector categories used by Focus on Energy. See Bureau of Economic Analysis, http://www.bea.gov/newsreleases/regional/gdp_state/2009/pdf/gsp0609.pdf.

[50] Bureau of Labor Statistics, http://www.bls.gov/news.release/empsit.nr0.htm.

[51] Bureau of Labor Statistics, http://www.bls.gov/news.release/empsit.t11.htm.

[52] Bureau of Economic Analysis
http://www.bea.gov/newsreleases/regional/gdp_state/2009/pdf/gsp0609.pdf.

[53] Bureau of Labor Statistics.
http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?data_tool=latest_numbers&series_id=LASST55000003.

the 18MCP (July 1, 2007–December 31, 2008) and has unquestionably altered the economic backdrop against which the BP boosted incentive levels.

As hypothesized above, in a recessionary climate, access to capital is limited and consumer spending is down. Companies may be inclined to limit their energy efficiency investments to the lowest cost, most cost effective and proven technologies. These are likely to be the projects that companies would tend to implement without the assistance of the program and therefore have lower attribution associated with them. On the other hand, it's plausible the opposite supposition that energy efficiency investments that would have been approved in pre-recessionary times require the Focus assistance in the capital constrained recessionary period.

It is also probable that many probable BP customers are simply not able to implement energy efficiency measures during this climate no matter what the incentive. These customers, those for which any "discretionary" investment (i.e., energy efficiency) is the first cancelled during economic stress, could be the ones that most need Focus assistance to move forward.

Testing of the above hypotheses is beyond the scope of this study; however, the development and framing of hypotheses is a meaningful and legitimate role of this evaluation.

5.2 CONCLUSIONS AND RECOMMENDATIONS

This final section of the report brings together the principal findings generated by the adjustment factor analyses, with the goal of assessing trends and drawing conclusions. This section probes further into the analytical results described in previous sections and elaborates hypotheses about the key drivers of program attribution.

The previous sections demonstrate that attribution rates vary considerably according to end-use, project size, measure type, Channel initiative coverage, and incentive level. Based on the one-dimensional Looks we identified several general patterns and associations. These general associations should not be interpreted as recommendations for programmatic changes, such as eliminate custom projects and focus exclusively on deemed/prescriptive projects. Rather, the results highlight general association at the overall Business Programs level that may be quite different by sector, technology, or market. In addition, the one-dimensional looks control for only one dimension within a highly complex relationship. The uncontrolled-for-dimensions should be considered when interpreting the Additional Look results. The authors encourage the reader to explore the general associations further beyond this report.

Several key observations emerge from the empirical findings. Results show that a number of factors are closely associated with high attribution rates, including:

- **CFLs.** Attribution rates for the CFL end-use segment were over 100 percent for both electric units. CFL attribution rates increased by a statistically significant margin between FY06 and the 18MCP for both kWh and kW. Program attribution results for CFLs, calculated with market-based methods, were 100 percent in FY06, and 111 percent and 91 percent in the 18MCP for Agriculture and Commercial, respectively. The influence of the CFLs on the Agriculture and Commercial sector Looks was a reoccurring theme in this report. For these two

sectors, we provided additional breakouts by Channel, Size, Measure Type, and Measure Type-Size, with the exclusion of CFLs. Attribution rates tended to be lower with the removal of the CFLs thereby altering the general associations observed with CFLs. More specifically, Agriculture Deemed-Small measures that were associated with high attribution became associated with low attribution with the removal of CFLs; a similar drop in attribution occurred for the Commercial Deemed-Large measures; and Deemed-Small Commercial measures decreased, though to a lesser degree. These findings support the thought that CFLs are key drivers for Agriculture and Commercial sector electric attribution rates.

- **Channel initiative coverage[54].** Within the Agriculture and Commercial sectors, attribution factors for those electric measures supported by the Channel initiatives averaged 88 percent. These attribution rates were significantly higher than comparable Non-Channel rates. Channel rates were also significantly higher in the 18MCP than in FY06. High CFL attribution rates contributed to high Channel attribution rates.

- **Project size.** Program attribution was generally higher for small-size projects. In the Commercial sector, for example, attribution rates for small projects measured 84 percent for kWh and 82 percent for kW.[55] Differences between these rates and those for large projects were statistically significant. However, evidence suggests that program attribution was high for some of the largest projects as well. In the Industrial sector, for instance, large project attribution levels were significantly greater than small project attribution levels for both kWh and therms, by margins of 18 percentage points and 41 percentage points, respectively.

- **Deemed measures.** For virtually all measure types in all primary sectors, deemed incentives outperformed custom incentives. These differences were statistically significant for electric measures in the Agriculture sector, for kWh in the Schools and Government sector, for kW measures in the Commercial sector, and for gas measures in the Industrial sector. In addition, a comparison of incentive type to project size indicates that deemed measures are a better predictor of high program attribution than small size.

- **New incentive levels.** For electric measures, incentives raised 1-25 percent declined in attribution over FY06, by a statistically significant amount. Incentives raised more than 25 percent were not statistically different from the FY06 results. The opposite pattern was true for gas; measures with incentives raised more than 25 percent declined while incentive raised by 1-25 percent experience no change in attribution rates at the 95 percent level of confidence.

---

[54] While interpreting these data it is important to recognize that the efforts of the sectors and Channels are not mutually exclusive. Measures rebated through the Channel initiatives may have received Energy Advisor involvement and similarly the program has reported custom project leads developed through the Channel efforts.

[55] CFLs are key drivers of high attribution rates for small projects and deemed projects (next bullet) in the Agriculture and Commercial Sectors.

The empirical results also show a number of program features accompany low attribution rates. These features include:

- **Building shell measures.** The therm attribution factor of 32 percent was low relative to other gas end-use categories. The building shell results for electric measures were derived using small sample sizes, but the sample size for therms measures was large enough (n = 24) to produce results worthy of consideration. Attribution levels for these measures have also declined over time, suggesting the possibility that the program may be providing incentives for measures that have reached a degree of market acceptance.
- **Non-Channel initiative coverage[56].** Within the Agriculture and Commercial sectors, attribution factors for electric measures not supported by the Channel Initiatives were between 47 percent and 52 percent. These levels were significantly lower than those for Channel measures, which benefit significantly from the inclusion of CFLs in the Channels.
- **Large projects.** Program attribution was generally lower for large-size projects. Attribution factors for large Commercial projects were 53 percent for kWh and 54 percent for kW. These levels were significantly lower than those for small Commercial projects. Results also show a closer link between custom incentives and low attribution, than between large project size and low attribution. In the Industrial segment, however, small projects correlate more strongly with low attribution than large projects.
- **Custom measures.** Attribution rates for custom measures were less than those for deemed measures. This observation holds across nearly all combinations of measure type and sector. Differences are statistically significant in multiple cases.
- **New measure incentives.** For electric measures, attribution levels for entirely new measures registered the lowest rates of any incentive category. These levels were below those measured for older incentive levels that remained unchanged.

Taken together, the evidence presented in these looks suggests that measure type and project size may be influential in driving project attribution rates. Both measure type and project size tends to be associated with specific end-uses. Specifically, program incentives for CFL and Lighting end-uses are typically deemed measures, and project size for these end-uses is typically small. Projects within the HVAC and Manufacturing Process segments are larger and comprise a mix of measure types (although HVAC end-uses are more likely to receive deemed measures). Lastly, custom measures and large size characterize Building Shell end-use measures.

Conceptually, then, it is possible to cluster end-use segments into three groups, based on this discussion of measure characteristics and program attribution levels. In one cluster, CFL and Lighting segments (typified by small size, deemed incentives) exhibit high

[56] While interpreting these data it is important to recognize that the efforts of the sectors and Channels are not mutually exclusive. Measures rebated through the Channel initiatives may have received Energy Advisor involvement and similarly the program has reported custom project leads developed through the Channel efforts.

attribution, while in a second cluster HVAC and Manufacturing Process segments exhibit medium attribution. Building Shell measures, characterized by custom measures and larger project size, tend to correlate with low attribution factors.[57] Very large projects, particularly Industrial sector undertakings that are characterized by a high degree of customization, also exhibit high attribution.

These findings suggest that the attribution factor of a given end-use segment is a product of project size and especially measure type. Small projects receiving deemed incentives, such as CFLs and Lighting, are likely to display high levels of program attribution. High attribution is also typical of very large, industrial-scale projects. By contrast, large, custom projects, such as Building Shell measures, are likely to register low program attribution. Market segments that fall between these two extremities are likely to register moderate levels of attribution.

There are a number of possible reasons why deemed measures and smaller projects have higher program attribution. Among the potential hypotheses, Channel initiatives, typically associated with deemed measures, also focus attention on upstream market actors, thereby strengthening ties between those measures and the supply side. The ease and convenience associated with deemed incentives might attract a larger number of participants who would not purchase energy efficient technology in the absence of the program. A prescribed rebate amount might figure as a more influential marketing feature for customers otherwise unlikely to participate in the BPs. The complexity of custom projects may diminish the motive force of incentives in relation to other project considerations, such as the BP's technical assistance services and receipt of custom incentives, may represent more an instance of opportunistic behavior than program success.

With respect to project size, smaller projects may be regarded as less important and relatively inconsequential by businesses, and incentives may be necessary to make them compelling investments. Rebates may represent a greater portion of project costs for smaller measures compared to larger measures, thereby exercising greater leverage over purchase decisions. Small measures may be easier to implement relative to large measures, and so attract greater participation and fewer freeriders. For large projects, incentives might be overshadowed by multiple, competing variables, resulting in higher levels of freeridership among program participants. The results for large Industrial Sector projects represent a notable exception to this pattern.

The general patterns of program attribution discussed in this section have not been rigorously tested and remain to be investigated by further empirical analysis. In particular, the numerous hypotheses regarding links between measure type and project size, on the one hand, and program attribution, on the other, must be subjected to systematic evaluation. Testing of the hypotheses developed in this report is beyond the scope of this study. However, the authors believe there is value in the development of hypotheses.

[57] The Building Shell results were derived using small sample sizes, kWh: n = 8; kW n = 2; and therms: n = 24. Building shell measures account for <1 percent of tracked electric savings and 7 percent of tracked therms savings. The therms result of 32 percent attribution merits further considerations.

The conclusions reached in this section offer guidance to program managers seeking to enhance program attribution. The empirical evidence provided by the Additional Looks give program managers additional data points on which to base program decision-making. The empirical results show that deemed measures, as defined in this report, had a tendency to have higher attribution levels compared with custom incentives, with the exception of the industrial sector. A similar result was found for project size. By taking greater account of measure type and project size as correlates of attribution, program managers might be able to leverage program funds in the most effective manner possible, thereby maximizing the societal benefits produced by the BP. We are not recommending the program shift all resources more toward small, deemed measures at the expense of the considerable energy savings afforded by many large, custom projects. Rather, we are recommending a closer look by program managers at the measure groups identified in this report with tendencies toward low and high attribution.

Changes to the program should also consider the current and future economic climate. As stated in this report, the 18MCP and the empirical results of this report were likely impacted by the recession. Future changes in economic climate are likely to have a similar effect on drivers to attribution.

Finally, as mentioned elsewhere, it is important that all such future program changes be thoroughly evaluated prior to implementation, in the manner of recommendations made in Section 4.7.4 and the *Measure Review*, *Delivery Review* and *Behind the Scenes Look at Attribution* reports. Program changes so identified may either better reflect current program logic or build upon revisions in program logic. In all cases, implementation of program changes, when it occurs, should be accompanied by a clear, empirically supported program rationale.