PA Consulting Group

State of Wisconsin Public Service Commission of Wisconsin

Focus on Energy Evaluation

Semiannual Report (Second Half of 2009)

April 23, 2010

Evaluation Contractor: PA Consulting Group

Prepared by the Focus evaluation team

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1. INTRODUCTION

The purpose of this document is to present an overview of all Focus on Energy (Focus) impacts achieved for the previous six months and the program to date. Focus on Energy has had a number of impacts on the state of Wisconsin. The most important are energy impacts—the energy savings realized through the implementation of energy conservation measures. Other impacts that result from the program are (1) environmental benefits (with emphasis on quantification of displaced generation emissions); (2) other non-energy benefits following from increased health, safety, and comfort; and (3) the economic benefits realized as a result of savings on energy bills, stimulation of economic development, and the creation of jobs. Another significant benefit provided by Focus, beyond the implementation of energy efficiency measures, is encouragement to various members of the marketplace—manufacturers, distributors, retailers, building contractors, trade allies, and consumers—to "raise the bar" for practices and standards related to energy efficiency technologies.

1.1 TRACKED ENERGY IMPACTS

The numbers in the tracked energy impacts tables presented in this report are annual energy savings—the energy saved by an installed conservation measure over 12 months. The annual energy impacts reported for a given time period are the sum of the annual energy savings for all of the energy conservation measures installed in that period. See the introduction to *Section 2, Focus Impacts,* for additional explanation of the date references that will be used in this report.

The program administrators for Focus must maintain a program tracking database—or access a state-sponsored tracking database—that includes all of the energy efficiency measures and actions taken within the program. The term "tracked" is used to signify that these savings result from program efforts directly counted (or tracked) by program administrators. This is the fundamental foundation for a program-based evaluation of energy impacts.

1.1.1 Reporting of tracked energy impacts: annual first year vs. lifecycle

Focus includes many long-term initiatives directed toward lasting changes in the state's energy efficiency markets. As a result, any meaningful assessment of the benefits (and costs) of Focus must consider a multi-year timeframe. Thus, as in the formal benefit-cost analysis conducted for Focus, in order to appropriately value Focus energy impacts, the energy savings must be estimated as a *projected stream* based on the program-area evaluations.[1] These energy savings are counted as benefits over the measure lifetime, or the 25-year horizon of the benefit-cost analysis, whichever is shorter.

Table 1-1 below provides definitions for each of the various tracked savings impacts incorporated in the Focus impact evaluation system. As introduced in a previous semiannual report (*First Half of 2008.* Final: October 22, 2008), the types of reported impacts have been

[1] Documentable energy savings, projected net verified savings based on documented impacts, are the foundation of Focus benefits included in the benefit-cost analysis (see *Interim Benefit-cost Analysis: FY07 Evaluation Report*, February 26, 2007). In this analysis, the projected new implementation of energy efficient measures includes both direct effects (in-program) and projected market effects.

expanded for this semiannual report corresponding to three added impact types which are now included in Table 1-1 (definitions), and also shown in Table 1-2 (with Appendix D providing a complete listing of tables and figures in the report linked to the type of impacts reported).

These additional reported impact types are necessitated by the need to report more accurately what were previously referred to as "cumulative" savings (simple summing of annual first year savings), as well as to conform to the impacts as used in the benefit-cost analysis. As the energy impacts of Focus are increasingly seen as resources in the state's long-term planning, these impacts must be as realistically reported as we can. While it is important to know the cumulative energy impacts from Focus on Energy, simply summing the savings is an oversimplification and can be misleading because some savings have reached the end of their effective lifetime. For this reason, we have redefined the program-to-date (PTD) savings numbers to represent lifecycle savings.

Why is a "lifecycle" approach needed? The energy efficiency measures installed typically last for a number of years and the cease operation. Their lifetime energy impacts are calculated by multiplying the annual energy savings by the number of years that the energy efficiency measure is expected to be in operation. Measure life is interpreted as the median number of years of expected operation. Each installed measure produces energy savings for its lifetime, after which savings cease. These are now termed in this report *lifecycle* energy impacts. An additional new concept embodied in the energy impacts presented in this semiannual report is *persistent* savings. These are lifecycle impacts that also include an exponential decay rate, such that half the savings remains after the measure life. (See additional discussion in *Section 2.1 and Section 2.8*.).

The term "tracked" is used to signify that these savings result from Focus efforts directly counted (or tracked) by program administrators. Table 1-1 below provides definitions for each of the various tracked savings impacts referred to throughout this report.

Table 1-1. Tracked Energy Impacts

Gross reported savings	Energy savings as reported by the program administrator, unverified by an independent evaluation (inputs to the evaluation impact analyses).
Verified gross savings	Energy savings verified by an independent evaluation based on reviews of the number and types of implemented improvements and the engineering calculations used to estimate the energy saved.
Verified net savings	Energy savings that can confidently be attributed to Focus efforts. Evaluators make adjustments for participants who were not influenced by Focus (Program Administrator contract performance targets currently use these savings).
Lifecycle savings	Energy savings, expressed either as *verified gross* or *verified net*, that explicitly incorporate measure life (lifecycle verified gross savings are shown in the tables that accompany maps depicting the geographic distribution of Focus energy impacts—see Appendix A).
Persistent savings	Energy savings, expressed as *verified net*, that are lifecycle impacts that also include an exponential decay rate, such that half the savings remains after the measure life (used in the Economic and Benefit-cost analyses, and also reflected in the Appendix A maps).

Table 1-2 presents a matrix of the energy impact reporting types that shows the different types as a product of level of evaluation (gross reported, verified gross, and verified net) and how the duration of impacts is approached (first year, lifecycle, and persistent). The table also identifies the impact types that are included in this report, denoted as "Reported," and those that are "Not Reported."

Table 1-2. Tracked Energy Impacts and Approach to Impact Duration

	First Year	Lifecycle	Persistent
Gross	Reported	Not Reported	Not Reported
Verified gross	Reported	Reported	Not Reported
Verified net	Reported	Reported	Reported

Note: See Appendix D for a complete listing of tables and figures in the report linked to the type of impacts noted in this table as "Reported."

1.2 NONTRACKED ENERGY IMPACTS

For purposes of clarity, *nontracked energy savings* can be distinguished from *tracked energy savings* in that they are not directly counted (tracked) by program administrators. Nontracked energy savings are likely to consist of a combination of savings resulting from:

- Participant spillover (e.g., participants who, after an initial program experience, go on to adopt more energy saving products or practices without program assistance)
- Market effects (e.g., changes in "marketplace" practices, services, and promotional efforts which induce businesses and consumers to buy energy saving products and services without direct program assistance)
- Unclaimed rewards (e.g., people who intend to submit the paperwork in order to claim Focus rewards but fail to do so).

Nontracked energy savings are attributed to the program if these impacts were demonstrably the result of program initiatives or that program initiatives were at least a key driver.

Quantifying nontracked energy savings is important when program initiatives are designed to create impacts beyond what the program can capture in a tracking database. The savings can be, for example, a direct extension of steps toward verification of *net* energy savings via the gathering of data that document the effects of a program on a specific market. An example from Focus is the use of CFL sales tracking data to estimate changes in product market share that can be confidently attributed to the presence of a program explicitly seeking to influence the CFL market in a specific geography.

As the Focus on Energy programs have evolved, the evaluation has attempted to reflect an additional variation on nontracked energy impacts: *untracked attributable savings*. In the previous 18-month contract period (18 MCP) additional research on nontracked energy impacts was completed for the Education & Training program in the business programs. The primary purpose of the Focus on Energy Business Programs Education and Training (E&T) Program Untracked Savings Study was to estimate untracked attributable savings (UAS) resulting from the E&T program. These UAS are the E&T-attributable portion of energy savings from projects that do not appear in the Focus WATTS or WISeerts databases and were implemented at the building or facilities of the trainees' companies. We estimated the E&T UAS that occurred in the recent past and used these past energy savings to project 2008 E&T Program UAS. For the CY09 period, the E&T UAS annual estimates are included here.

It is important to note that these untracked attributable savings are different from participant spillover savings that we estimated in previous studies. When we estimated participant spillover effects from the Focus on Energy Business Programs in 2005, we were estimating

the level of untracked energy savings that had "spilled over" due to the influence of tracked projects. To credit a project with participant spillover energy savings, we had to find a causal link between the older tracked project and the newer untracked project. For example, a program participant might have had a positive experience with a tracked energy-savings project and decided to implement similar projects in their other facilities. Although in most cases such program participants would have also sought Focus financial incentives for these new projects (therefore making them "tracked projects"), sometimes they did not and these were generally the types of projects that produced participant spillover energy savings. Section 2.2 of this semiannual report provides additional delineation between untracked attributable savings and participant spillover savings.

1.3 SUPPORTING INFORMATION

Because this document is an overview, significant amounts of supporting information are not provided here. This makes it incumbent on the reader to seek out supporting information if they would like to better understand specific aspects of this report. An effort has been made to reference the appropriate evaluation reports in the relevant places throughout this report. Supporting information can be found in the various reports named in Appendix E, which provides a list of all of the evaluation reports (and other deliverables) submitted during the second half of 2009.

2. FOCUS IMPACTS

This chapter describes various Focus estimated impacts and associated evaluation analyses.

- Tracked energy impacts
- Non-tracked energy impacts
- Market effects
- Economic impacts
- Environmental impacts
- Non-energy benefits
- Benefit-cost analysis.

The energy impacts tables throughout this report derive from data downloaded from WECC's tracking databases on January 18 and January 19, 2010, with an update for rebate data on February 5, 2010. Data were extracted for the dates of January 1, 2008, through December 31, 2009. Data for the period prior to January 1, 2008, is now considered static and is not updated. The WISeerts database was downloaded on January 16, 2010. Table 2-1 shows the time periods referred to in this report and their abbreviations.

Table 2-1. Date References Used in this Report

FY02 Mar 02 – June 02	FY03 Jul 02 – Jun 03	FY04 Jul 03 – Jun 04	FY05 Jul 04 – Jun 05	FY06 Jul 05 – Jun 06	FY07 Jul 06 – Jun 07	The 18 MCP Jul 07 – Dec 08	CY09 Jan – Dec 09	Program To Date[2]

2.1 VERIFIED TRACKED ENERGY IMPACTS

2.1.1 Lifecycle savings

This section reports energy impacts of all measures installed through Focus from July 2001 through December 2009. These are termed *lifecycle verified gross* impacts (Figures 2-1 through 2-3 for energy, demand, and gas savings respectively), and *persistent verified net* impacts (Figures 2-4 through 2-6, again corresponding to energy, demand, and gas savings). As of December 2009, the persistent verified net energy savings from all measures installed since Focus began in July 2001 that are still in operation is 1,263 GWh, 225 MW of demand reductions, and 57 million therms. (Figure 2-4. Persistent Verified Net Electricity Savings, Figure 2-5. Persistent Verified Net Electricity Demand Reductions, and Figure 2-6. Persistent Verified Net Gas Savings graph Focus net savings from fiscal year 2002 through fiscal year 2021.)

[2] Note that we have changed the meaning of program-to-date (PTD) savings numbers. These originally were simple sums of the savings of installed measures. Focus has now completed its ninth year of operation and some measures installed in the first years of the program have reached the end of their useful life. We now incorporate measure life into PTD savings numbers, ending the stream of savings at the end of the measure life.

The energy savings impacts for each year are the total impacts of all measures implemented as a result of the program up through that year. Thus, the documentable energy savings for Year 1 would be the annual energy savings due to measures implemented through the programs and attributable to them (first-year net savings). The documentable savings shown for Year 10 are the net (i.e., program-attributable) annual energy savings due to all measures implemented through the program in Years 1 through 10 *and persisting until Year 10*.

The development of the stream of energy savings impacts involves discounting according to an assumed discount rate, or decay curve, to account for measure persistence over a theoretical measure life. This decay curve is an exponential decay, with median measure lifetime equal to the savings-weighted average measure life for each program area (calculated at the level of major end-uses for each program area—see Section 2.8 for further discussion). Thus, the savings implemented in each program year are extended into the future, using the exponential decay rate, such that half the savings remains after the measure life.[3]

With this interpretation and an assumed exponential rate of decay, the fraction "f" of savings that survives from one year to the next is given by

$$f = 2^{-(1/L)}$$

where L is the measure life. For example, if the measure life is 15 years, the surviving fraction each year is

$$f = 2^{-1/15} = 95.5\%.$$

The decay rate is

$$d = 1-f = 4.5\%.$$

Thus, in this example, the surviving savings from the prior year is calculated as 95.5 percent of the prior year's amount; 4.5 percent of the prior year's savings is lost.

Future considerations. Another factor that can have a significant impact on the stream of energy savings from installed measures occurs when Focus on Energy is successful in getting participants to purchase energy efficient equipment before their existing inefficient equipment fails. This results in a higher energy savings in the early years of the equipment life which then drops to a lower level of savings at the time that the equipment was expected to have failed or been replaced (had there been no program intervention). Both first-year savings tables (for each fiscal year) and the stream of energy savings that is shown in this section do not presently account for this. However, the evaluation team has developed a "white-paper" that discusses this issue and presents possible methods for addressing it. After receiving review comments from interested stakeholders (including WECC), this paper was submitted to the PSCW for their review, and the PSCW has subsequently directed the evaluation team to incorporate in our impact measurement approaches the capability of

[3] That is, we interpret the measure life as the time until half the units would be expected to have failed or been removed. This interpretation is consistent with the persistence study framework used in California and elsewhere. Under those rules, the "expected useful life" is the median survival time, where "surviving" means remaining in place and operable.

estimating separately the energy savings from "accelerated" and "efficiency" savings.[4] As future Focus research and reporting incorporates these separate estimates, they will be integrated in the stream of energy savings.

2.1.2 Energy impacts summaries

In preparing the Focus evaluation semiannual reports, we reconcile program gross energy impacts reported in WECC's monthly performance reports with the summary of the detailed data downloaded from the tracking system(s). For the Focus Business Program, this is done with data from the Wisconsin Energy Efficiency and Renewables Tracking System (WISeerts). In past years, there have been some minor differences in the gross Business Program numbers between WECC's monthly report and the gross impacts included in this report (e.g., evaluation estimates of overall gross savings in 2008 were a little over one percent higher than WECC's final December 2008 numbers). In an effort to identify and minimize this type of discrepancy, we have worked with staff at WECC, the PSCW, and others on the evaluation team to ensure we are all using the same criteria for extracting and reporting on data from the various databases. For this report, discrepancies for any program larger than one percent of savings were investigated and reconciled.

WISeerts does not track ENERGY STAR® rebate measures. This data is still maintained at WECC.

The 2008 and 2009 participant counts include a large number of records representing "buydowns" for CFLs. Residential programs in 2009 have 25,464 records representing 1,336,689 promoted lamps and business programs have 9,033 records for 117,915 lamps.[5] These records represent claims made by retailers for CFLs sold at a reduced price to consumers. Program administrators take steps to allocate these sales appropriately to business and residential programs areas; however, no record is made of the number of consumers tied to each retailer claim. In CY09, forty-two percent of retailer claims are for three or fewer CFLs—suggesting the likelihood of a single consumer—but 2,859 claims are for more than 100 CFLs. Prior to this semiannual report, our approach has been to count each non-zero claim as a "participant," recognizing that this undercounts the number of consumers who received CFLs under the buydown program. For this report, because buydowns have become such a significant mechanism for promoting CFLs, we have estimated the average number of CFLs purchased per customer, per sector, and applied this to get an estimate of the number of customers benefiting. Using 2007 rebate numbers, we calculated that each customer participating in mail-in and instant rebate promotions received rebates on 4.23 CFLs for residential programs and 7.44 CFLs for business programs. To estimate the number of customers receiving buydown promotions, in each sector we divided the total CFLs promoted by the average lamps per customer. Because of this new, more accurate way of counting participants, there is a significant increase in the reported numbers of participants compared to previous semiannual reports. The net effect of this change in CY09, compared to the previous approach is 290,777 additional residential program

[4] Mimi Goldberg, Rick Winch, Tom Talerico, Ralph Prahl, and Bryan Ward. *Focus on Energy Evaluation: Treatment of Accelerated Savings*, July 2, 2008.

[5] Counting non-zero records only.

participants and 6,816 additional business program participants.[6] This increase affects all years where buydowns were in effect (i.e., 2008 to the present).

Table 2-1a presents a summary by program area of lifetime kWh, kW, and therm impacts including also the dollar value of energy saved and the number of participants. These are ***lifetime*** *verified gross* impacts, reflecting a sum of the savings that will be realized over the lifetime of the measures installed in CY09.

Table 2-1b presents a summary by program area of the annual kWh, kW, and therm impacts including also the dollar value of energy saved and the number of participants. These are ***lifecycle*** *verified gross* impacts, reflecting a stream of savings that incorporates measure life assumptions.

Table 2-1a. All Programs: Tracked Energy Impacts—Lifetime[7] Verified Gross (July 1, 2001–December 31, 2009)

Program Area	Lifetime kWh	Lifetime kW	Lifetime Therms	Dollar Value of Energy Saved	Number of Participants
Total	**6,231,184,184**	**1,246,379**	**351,005,985**	**$930,190,671**	**431,410**
Business	4,995,231,179	1,080,573	200,452,125	$619,538,675	23,551
Renewables	261,625,808	44,915	107,146,793	$143,640,402	442
Residential	974,327,197	120,891	43,407,067	$167,011,594	407,417

Table 2-1b. All Programs: Tracked Energy Impacts—Lifecycle Verified Gross (July 1, 2001–December 31, 2009)

Program Area	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Dollar Value of Energy Saved	Number of Participants
Total Saved	**2,191,607,052**	**408,855**	**110,296,793**	**319,957,263**	
Business	1,499,486,305	314,254	85,374,535	212,019,709	91,875
Residential	620,509,582	82,856	14,053,264	89,183,979	1,743,307
Renewables	71,611,165	11,745	10,868,994	18,753,575	1,174

Table 2-1c shows a summary by program area of the annual kWh, kW, and therm impacts including also the dollar value of energy saved and the number of participants. These are *first year* annual impacts for verified gross—i.e., they are not *lifecycle* values. This reflects energy efficiency measures implemented from July 1, 2001, through December 31, 2009, as documented in their respective tracking systems (Tracked Energy Impacts).

[6] Total lamps divided by lamps per participant: 1,337,698/4.23 = 316,241 residential; 117,915/7.44 = 15,849 business. Participants calculated in the current way minus participants counted in the previous way: 316,241– 25,464 = 290,777 residential; 15,849 – 9,033 = 6,816 business.

[7] Please see Appendix H for further explanation.

Table 2-1c. All Programs: Tracked Energy Impacts—Annual First Year Verified Gross (July 1, 2001–December 31, 2009)

	Annual Verified kWh Saved	Annual Verified kW Saved	Annual Verified Therms Saved	Annual Dollar Value of Energy Saved	Number of Participants
CY09 (January 1, 2009–December 31, 2009)					
Total Saved	**639,819,059**	**129,366**	**30,548,376**	**$89,801,329**	
Business	505,826,242	111,984	21,595,276	$64,243,317	25,086
Residential	117,059,805	14,658	3,595,277	$18,018,014	414,335
Renewables	16,933,010	2,722	5,357,821	$7,539,997	462
The 18MCP (July 1, 2007–December 31, 2008)					
Total Saved	**599,065,140**	**105,623**	**26,622,538**	**$83,682,847**	
Business	412,282,803	87,835	20,247,680	$54,616,641	30,479
Residential	179,794,188	16,597	4,145,352	$25,934,036	558,811
Renewables	6,988,148	1,190	2,229,505	$3,132,169	426
FY07 (July 1, 2006–June 30, 2007)					
Total Saved	**238,189,767**	**41,008**	**13,694,194**	**$37,176,174**	
Business	151,014,313	32,282	11,513,742	$24,677,173	12,874
Residential	78,656,906	6,855	1,506,976	$10,958,228	203,725
Renewables	8,518,546	1,870	673,474	$1,540,772	117
FY06 (July 1, 2005–June 30, 2006)					
Total Saved	**218,883,777**	**41,469**	**13,042,576**	**$35,302,670**	
Business	131,863,070	28,308	9,418,597	$21,304,737	13,125
Residential	73,961,454	11,286	1,573,063	$10,501,316	205,162
Renewables	13,059,251	1,874	2,050,914	$3,496,617	88
FY05 (July 1, 2004–June 30, 2005)					
Total Saved	**214,892,987**	**35,913**	**9,175,217**	**$30,509,077**	
Business	110,718,465	20,905	7,106,161	$16,443,377	13,138
Residential	82,266,120	11,745	1,725,612	$11,650,004	194,116
Renewables	21,908,400	3,262	343,443	$2,415,695	65
FY04 (July 1, 2003–June 30, 2004)					
Total Saved	**228,323,107**	**37,696**	**14,467,224**	**$37,049,989**	
Business	137,364,603	23,543	12,613,286	$24,280,155	1,131
Residential	90,474,549	13,931	1,640,104	$12,486,713	202,243
Renewables	483,953	220	213,833	$283,121	53
FY03 (July 1, 2002–June 30, 2003)					
Total Saved	**221,681,741**	**35,777**	**8,086,332**	**$29,724,698**	
Business	128,323,628	21,384	6,196,248	$16,673,067	998
Residential	89,638,259	13,787	1,890,083	$12,706,429	142,945
Renewables	3,719,852	604	0	$345,202	32
FY02 (July 1, 2001–June 30, 2002)					
Total Saved	**56,484,523**	**11,705**	**2,652,791**	**$8,415,533**	
Business	30,532,158	7,036	1,740,728	$4,275,569	918
Residential	25,952,364	4,668	912,062	$4,139,964	51,175

Table 2-1d compares verified gross to verified net values, by sector for all measures installed through a Focus program in CY09. This reflects, once again, the *lifecycle* approach to estimating energy impacts. Table 2-1e shows the same comparison for program to date.

Table 2-1d presents a summary by program area of lifetime kWh, kW, and therm impacts. These are ***lifetime*** verified gross and verified net impacts, reflecting a sum of the savings that will be realized over the lifetime of the measures installed in CY09.

Table 2-1d. All Programs: Tracked Energy Impacts - Lifetime[8] Verified Gross and Lifetime Verified Net CY09 (January 1, 2009–December 31, 2009)

Program Area	Lifetime kWh Saved			Lifetime kW Reduction			Lifetime Therms Saved		
	Verified Gross	Verified Net	NTG	Verified Gross	Verified Net	NTG	Verified Gross	Verified Net	NTG
Total	**6,231,184,184**	**4,007,256,868**	**64.3%**	**1,246,379**	**683,269**	**54.8%**	**351,005,985**	**186,833,459**	**53.2%**
Business	4,995,231,179	3,234,168,873	64.7%	1,080,573	600,262	55.6%	200,452,125	126,506,274	63.1%
Renewables	261,625,808	117,426,747	44.9%	44,915	22,403	49.9%	107,146,793	27,934,589	26.1%
Residential	974,327,197	655,661,248	67.3%	120,891	60,604	50.1%	43,407,067	32,392,597	74.6%

Table 2-1e presents a summary by program area of lifecycle kWh, kW, and therm impacts. These are ***lifecycle*** verified gross and verified net impacts, reflecting the savings that were realized in CY09 from all measures installed since program inception that are still in operation.

Table 2-1e. All Programs: Tracked Energy Impacts - Lifecycle Verified Gross and Lifecycle Verified Net Program to Date (July 1, 2001–December 31, 2009)

	kWh Saved			kW Reduction			Therms Saved		
	Verified Gross	Verified Net	NTG	Verified Gross	Verified Net	NTG	Verified Gross	Verified Net	NTG
Total Saved	**2,191,607,052**	**1,475,329,612**	**67%**	**408,855**	**257,498**	**63%**	**110,296,793**	**65,604,279**	**59%**
Business	1,499,486,305	923,065,413	62%	314,254	182,793	58%	85,374,535	50,496,281	59%
Residential	620,509,582	530,649,400	86%	82,856	70,334	85%	14,053,264	11,966,913	85%
Renewables	71,611,165	21,614,799	30%	11,745	4,371	37%	10,868,994	3,141,085	29%

Table 2-1f presents *first year* (not *lifecycle*) summary values for gross, verified gross, and verified net energy impacts by year and by program area. These numbers do not include untracked attributable savings (UAS) that stem from activities related to education and training programs or supply-side impacts. These also do not include the shared savings from Focus on Energy and Alliant Energy Shared Savings program. These are discussed in sections 2.2, 3.3.5, and 3.8, below. If these savings are added to the tracked Focus impacts, the annual first year savings in CY09 are 497,425,048 kWh, 89,195 kW, and 21,621,321 therms. In the next SAR, we will revise how UAS and shared savings are handled so they can be incorporated into in a single table.

[8] Please see Appendix H for further explanation.

Table 2-1f. All Programs: Tracked Energy Impacts - Annual First Year Program to Date (July 1, 2001–December 31, 2009)

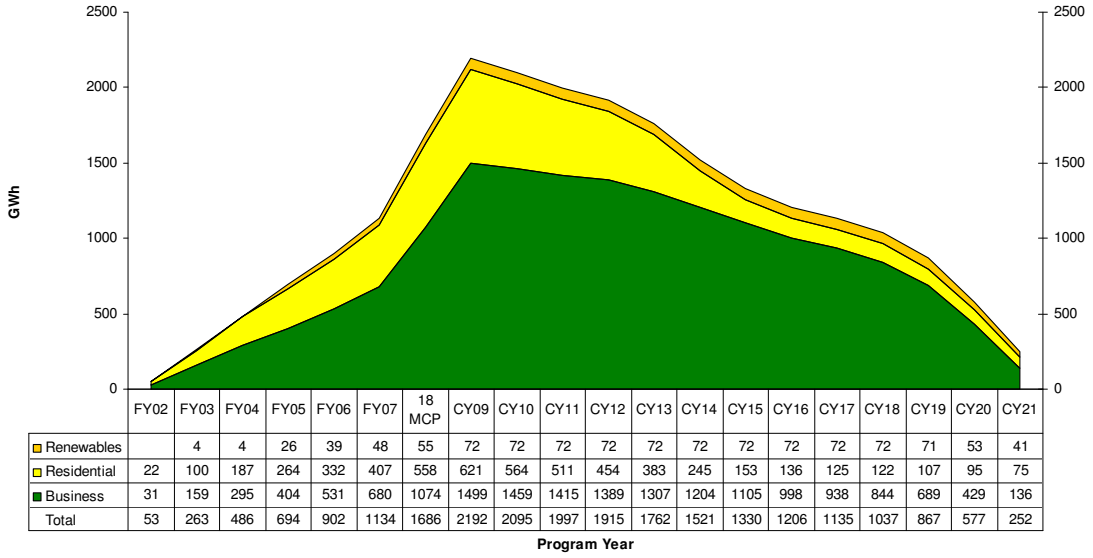
	Annual kWh Saved			kW Reduction			Annual Therms Saved		
	Gross	Verified Gross	Verified Net	Gross	Verified Gross	Verified Net	Gross	Verified Gross	Verified Net
CY09 (January 1, 2009–December 31, 2009)									
Total Saved	**644,337,013**	**639,819,059**	**412,780,046**	**121,223**	**129,366**	**72,291**	**28,962,953**	**30,548,376**	**16,634,135**
Business	494,454,384	505,826,243	329,993,298	106,598	111,985	62,739	20,513,036	21,595,276	12,734,677
Residential	129,872,139	117,059,806	75,602,325	11,925	14,659	8,277	3,526,415	3,595,277	2,502,247
Renewables	20,010,491	16,933,011	7,184,424	2,700	2,723	1,275	4,923,502	5,357,822	1,397,212
The 18MCP (July 1, 2007–December 31, 2008)									
Total Saved	**634,165,623**	**599,065,140**	**398,745,053**	**112,182**	**105,623**	**66,500**	**28,697,716**	**26,622,538**	**14,757,762**
Business	442,854,779	412,282,803	246,399,148	93,853	87,836	51,982	22,145,197	20,247,680	10,796,591
Residential	179,493,395	179,794,188	148,395,934	16,584	16,597	13,814	4,143,395	4,145,352	3,278,130
Renewables	11,817,448	6,988,149	3,949,971	1,746	1,190	703	2,409,124	2,229,506	683,041
FY07 (July 1, 2006–June 30, 2007)									
Total Saved	**260,254,357**	**238,189,767**	**162,763,097**	**43,911**	**41,008**	**27,979**	**15,914,328**	**13,694,194**	**8,520,818**
Business	157,130,223	151,014,314	98,462,584	33,460	32,282	21,776	13,658,924	11,513,743	6,809,760
Residential	94,250,649	78,656,907	63,883,459	8,913	6,855	5,852	1,566,780	1,506,977	1,394,290
Renewables	8,873,486	8,518,546	417,054	1,538	1,871	351	688,625	673,475	316,767
FY06 (July 1, 2005–June 30, 2006)									
Total Saved	**234,862,916**	**218,883,777**	**166,124,214**	**44,348**	**41,469**	**30,494**	**13,606,641**	**13,042,576**	**6,311,815**
Business	131,911,853	131,863,071	91,697,275	28,366	28,309	19,042	9,674,445	9,418,597	4,365,774
Residential	90,185,421	73,961,454	72,078,061	14,066	11,286	11,066	1,858,471	1,573,064	1,489,822
Renewables	12,765,642	13,059,252	2,348,878	1,916	1,874	385	2,073,725	2,050,914	456,220
FY05 (July 1, 2004–June 30, 2005)									
Total Saved	**276,013,670**	**214,892,987**	**152,928,433**	**41,103**	**35,913**	**22,850**	**9,615,956**	**9,175,217**	**5,232,659**
Business	143,707,711	110,718,465	55,861,214	27,083	20,906	9,972	7,045,122	7,106,161	3,463,969
Residential	112,935,136	82,266,121	92,805,638	11,027	11,745	11,893	2,123,643	1,725,612	1,680,593
Renewables	19,370,823	21,908,401	4,261,581	2,993	3,262	985	447,192	343,443	88,097
FY04 (July 1, 2003–June 30, 2004)									
Total Saved	**282,836,318**	**228,323,107**	**168,974,239**	**44,697**	**37,696**	**26,986**	**13,556,180**	**14,467,224**	**12,436,908**
Business	156,470,715	137,364,604	79,935,444	28,607	23,544	13,187	11,639,771	12,613,286	10,614,752
Residential	125,867,708	90,474,549	88,589,694	15,890	13,932	13,604	1,824,949	1,640,105	1,622,408
Renewables	497,895	483,954	449,101	199	220	195	91,460	213,833	199,749
FY03 (July 1, 2002–June 30, 2003)									
Total Saved	**230,845,735**	**221,681,741**	**145,617,986**	**38,144**	**35,777**	**23,213**	**7,935,747**	**8,086,332**	**5,523,996**
Business	129,814,716	128,323,629	62,483,249	23,353	21,385	10,551	6,258,454	6,196,249	3,642,577
Residential	97,358,904	89,638,260	80,130,947	14,066	13,788	12,184	1,677,293	1,890,084	1,881,419
Renewables	3,672,115	3,719,852	3,003,790	725	604	478	0	0	0
FY02 (July 1, 2001–June 30, 2002)									
Total Saved	**54,507,968**	**56,484,523**	**39,048,723**	**10,935**	**11,705**	**8,163**	**3,673,296**	**2,652,791**	**1,616,168**
Business	30,559,935	30,532,158	18,764,493	6,966	7,036	4,397	2,760,541	1,740,729	785,725
Residential	23,948,033	25,952,365	20,284,229	3,969	4,668	3,766	912,755	912,062	830,443

Figures 2-1, 2-2, and 2-3 show graphically the *lifecycle verified gross* stream of energy savings from program inception in fiscal year 2002 for twenty years, through calendar year 2021. These graphs are based on the verified gross savings shown in Table 2-1e, above. The savings implemented each fiscal year continue over the effective useful life of the measures installed to realize the savings. The charts show that lifecycle savings peak at about 2,192

GWh and 110 million therms at the end of December 2009 (the current reporting period) and then begin to decline. The decline reflects a gradual reduction in energy savings once no new measures are being installed, after December 2009. Note that we do not account for future purchases of a like measure that may have been affected by participation in the program.

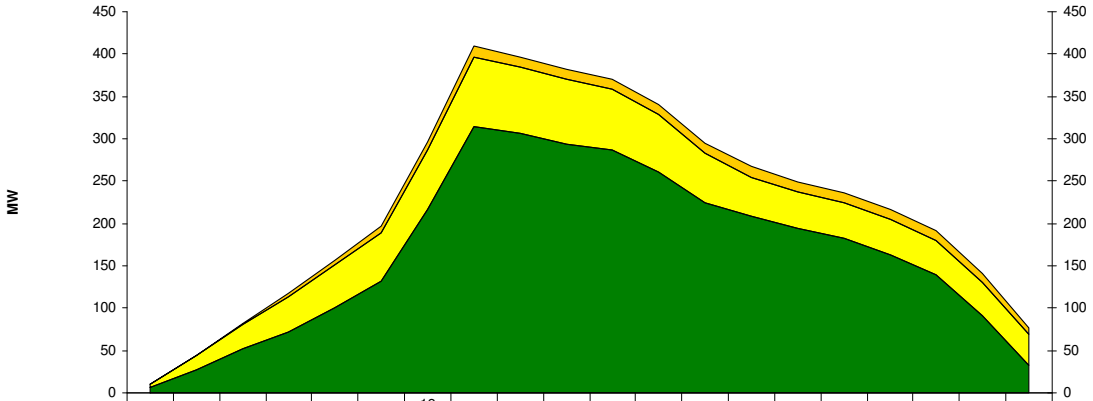
The electricity savings for the residential programs decline more rapidly that the electricity savings for the business programs because CFLs make up a significant proportion of the residential programs electricity savings and CFLs have an expected measure life of six years. For example, the High Bay Fluorescent Lighting measure category that accounts for approximately 24.7 percent of the business programs savings (see Figure 2-7) has an expected measure life of fifteen years. There are measures for both programs that have expected measure lives of more than fifteen years.

Figure 2-1. Lifecycle Verified Gross Electricity Savings (GWh)



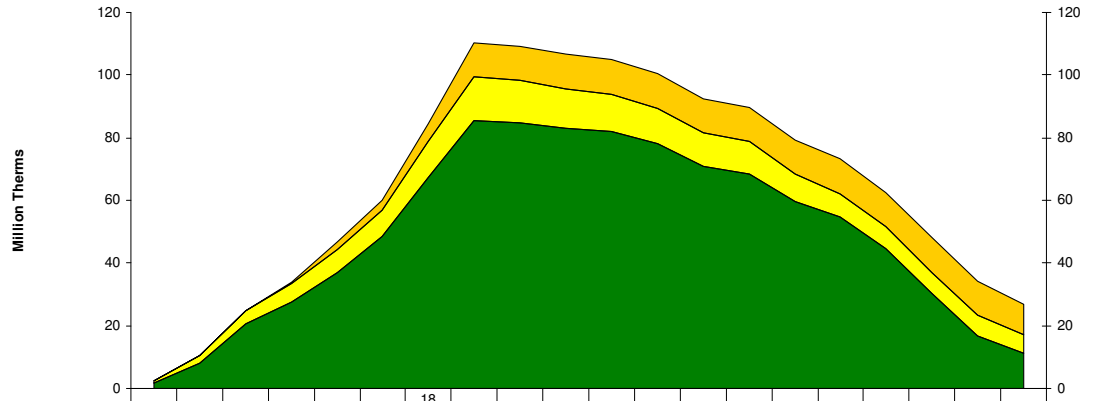
	FY02	FY03	FY04	FY05	FY06	FY07	18 MCP	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21
Renewables		4	4	26	39	48	55	72	72	72	72	72	72	72	72	72	72	71	53	41
Residential	22	100	187	264	332	407	558	621	564	511	454	383	245	153	136	125	122	107	95	75
Business	31	159	295	404	531	680	1074	1499	1459	1415	1389	1307	1204	1105	998	938	844	689	429	136
Total	53	263	486	694	902	1134	1686	2192	2095	1997	1915	1762	1521	1330	1206	1135	1037	867	577	252

Figure 2-2. Lifecycle Verified Gross Electricity Demand Reductions (MW)



	FY02	FY03	FY04	FY05	FY06	FY07	18 MCP	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21
Renewables		1	1	4	6	8	9	12	12	12	12	12	12	12	12	12	12	12	10	8
Residential	4	16	29	41	51	57	71	83	79	76	72	68	58	46	43	42	42	41	40	36
Business	7	28	52	72	100	132	216	314	306	294	287	261	225	209	194	182	163	139	91	33
Total	11	45	82	117	157	197	296	409	397	381	371	340	294	267	248	236	217	191	141	77

Figure 2-3. Lifecycle Verified Gross Gas Savings (Million Therms)

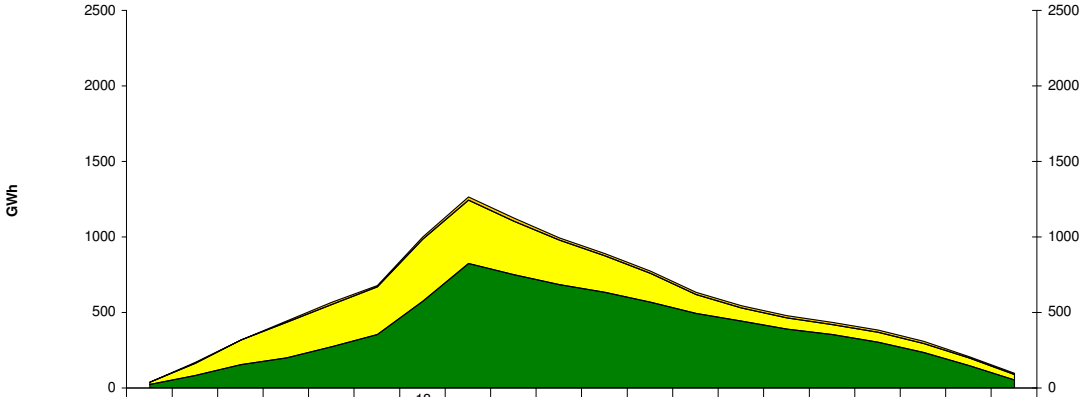


	FY02	FY03	FY04	FY05	FY06	FY07	18 MCP	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21
Renewables		0	0.2	0.6	2.6	3.3	5.5	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	9.7
Residential	0.8	2.5	4.1	5.8	7.1	8.4	11.3	14.1	13.7	12.7	12.1	11.4	10.9	10.3	8.6	7.3	7.2	6.8	6.4	5.8
Business	1.7	7.9	20.5	27.6	37.1	48.4	67.5	85.4	84.6	83	81.9	78	70.7	68.4	59.7	54.9	44.5	30.3	16.9	11.3
Total	2.6	10.5	24.9	34	46.8	60.1	84.4	110.3	109.3	106.5	104.9	100.2	92.5	89.6	79.1	73.1	62.5	47.9	34.1	26.8

Figures 2-4, 2-5, and 2-6 reflect the stream of *persistent verified net* savings—thus applying a rate of decay factor to the lifecycle savings—and indicate that the savings stream peaks at about 1,268 GWh and 57 million therms at the end of December 2009 (the current reporting period). It also declines, again because it only reflects those measures that have been installed through December 2009. We do not account for future purchase behavior for the same measure that may have been affected by participation in the program.

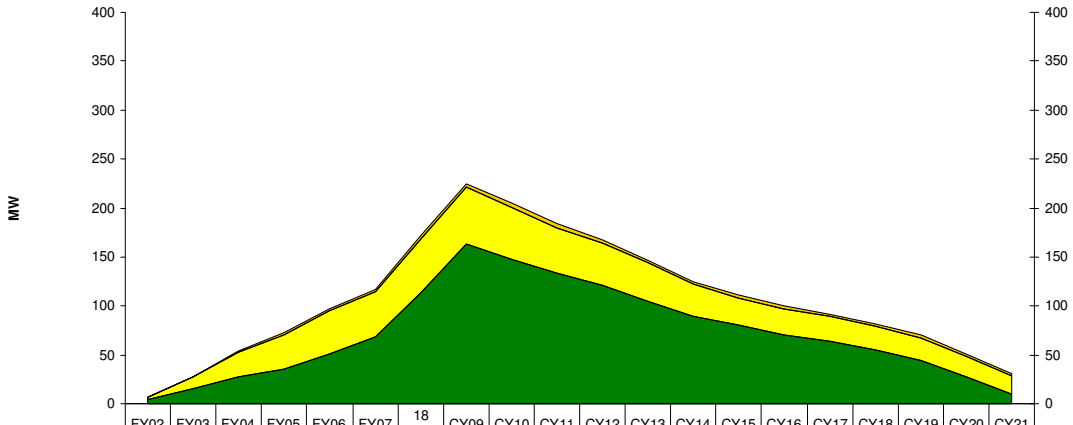
The measure life is interpreted as the median measure life. Measure lives for all program measures included in this analysis are provided in Appendix C. The savings implemented in each program year are extended into the future with an exponential decay rate, such that half the savings remains after the measure life. That is, we interpret the measure life identified from the literature as the time until half the units would be expected to have failed or been removed. This interpretation is consistent with the persistence study framework used in California and elsewhere. Under those rules, the "expected useful life" is the median survival time, where "surviving" means remaining in place and operable. (See section 2.8 for additional discussion of these computations.)

Figure 2-4. Persistent Verified Net Electricity Savings (GWh)



	FY02	FY03	FY04	FY05	FY06	FY07	18 MCP	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21
Renewables		3	3	7	10	10	13	20	19	18	17	17	16	15	15	14	13	13	11	9
Residential	18	85	162	235	280	315	415	422	356	293	240	191	123	88	78	71	67	59	51	39
Business	19	80	154	199	274	352	570	821	750	685	632	566	496	444	388	350	300	237	147	50
Total	36	168	319	441	563	677	997	1263	1125	996	890	774	634	547	481	435	380	308	208	98

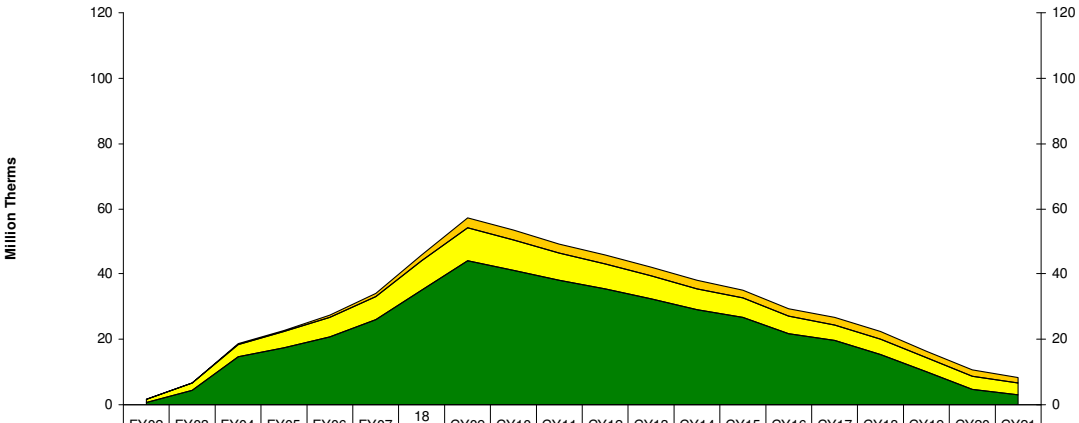
Figure 2-5. Persistent Verified Net Electricity Demand Reductions (MW)



	FY02	FY03	FY04	FY05	FY06	FY07	18 MCP	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21
Renewables		0	1	2	2	2	3	4	4	4	4	3	3	3	3	3	3	3	2	2
Residential	3	13	26	36	44	47	55	58	53	47	43	39	33	28	26	25	24	23	21	19
Business	4	15	27	35	51	68	114	163	148	133	121	105	89	80	71	64	55	44	28	10
Total	7	28	53	72	97	117	172	225	205	184	168	147	125	111	100	92	81	69	52	31

Program Year

Figure 2-6. Persistent Verified Net Gas Savings (Million Therms)



	FY02	FY03	FY04	FY05	FY06	FY07	18 MCP	CY09	CY10	CY11	CY12	CY13	CY14	CY15	CY16	CY17	CY18	CY19	CY20	CY21
Renewables		0	0.2	0.3	0.7	1	1.7	3	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.1	2	1.8
Residential	0.8	2.4	3.8	5.2	6.2	7.1	8.9	10.1	9.5	8.4	7.8	7.1	6.5	6	5.3	4.8	4.6	4.3	4	3.6
Business	0.8	4.4	14.7	17.3	20.6	26.1	35.1	44	41	38	35.4	32.5	29	26.6	21.8	19.6	15.5	10	4.7	3.1
Total	1.5	6.8	18.8	22.8	27.5	34.2	45.6	57.1	53.4	49.3	45.9	42.1	38	35	29.4	26.7	22.3	16.4	10.7	8.6

Program Year

Additional explanation of the cumulative stream of demand reduction impacts for Focus on Energy may aid in the interpretation of Figure 2-2 and Figure 2-5. In particular, guidance for calculating demand impacts for Focus is found in the Focus Business Programs Operations Manual (see page 57). It specifies that the demand (kW) impacts for Focus measures should be calculated for non-weather dependent equipment based on the "average kW savings over the period from 1:00 pm to 4:00 pm, Monday through Friday, during the months of June through August. Average kW is the kWh savings realized over the three-hour peak period (1:00 pm to 4:00 pm), divided by these same three hours per day for weather dependent

measures, such as air conditioning they will be calculated based on state-wide average design-day conditions as defined by the latest version of ASHRAE Fundamentals."

The manual provides further guidance in the calculation of demand impacts, and this guidance has evolved over the life of the Focus program. The current level of specificity can be especially important because in many cases the incentives paid to participants explicitly consider the demand impacts of equipment.

The changes over time in the guidance regarding the calculation of demand impacts for Focus measures means that cumulative demand impacts across program years (reflected in Figure 2-2 and Figure 2-5) are not based on exactly the same definition (since changes in the calculation guidance are not applied retroactively).

Figures 2-7 through 2-14 summarize the distribution of energy impacts by measure category and fuel type for Business Programs and Residential program areas. The accompanying tables present corresponding verified gross impact values.

Figure 2-7. Verified Gross Electric Energy Impacts by Measure Category, Business Programs CY09 (January 1–December 31, 2009)

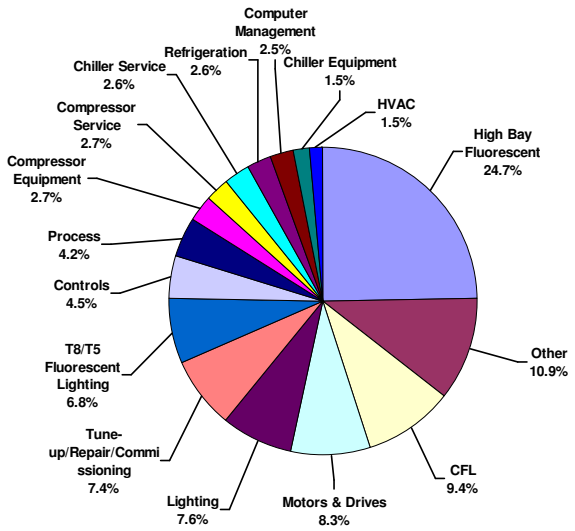


Figure 2-8. Verified Gross Electric Energy Impacts by Measure Category, Business Programs Program to Date (July 1, 2001– December 31, 2009)

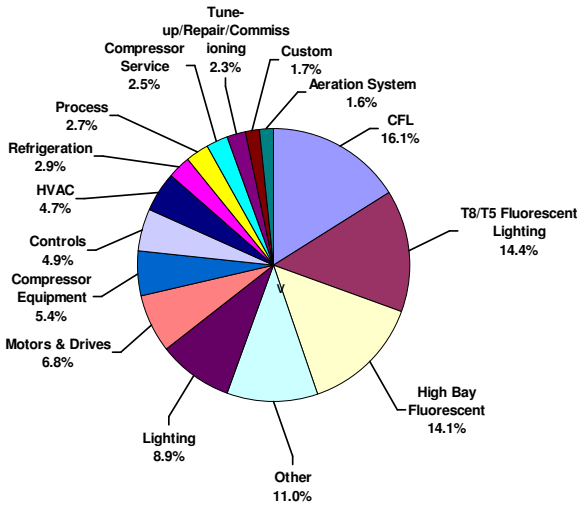


Table 2-2. Verified Gross Electric Energy Impacts by Measure Category, Business Programs CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	Percent of Total
High Bay Fluorescent	125,136,890	24.7%
Other	55,244,510	10.9%
CFL	47,495,796	9.4%
Motors & Drives	42,137,462	8.3%
Lighting	38,433,604	7.6%
Tune-up/Repair/Commissioning	37,647,346	7.4%
T8/T5 Fluorescent Lighting	34,227,592	6.8%
Controls	22,843,123	4.5%
Process	21,347,734	4.2%
Compressor Equipment	13,750,752	2.7%
Compressor Service	13,683,127	2.7%
Chiller Service	13,099,487	2.6%
Refrigeration	12,939,486	2.6%
Computer Management	12,592,993	2.5%
Chiller Equipment	7,820,225	1.5%
HVAC	7,426,118	1.5%

Table 2-3. Verified Gross Electric Energy Impacts by Measure Category, Business Programs Program to Date (July 1, 2001– December 31, 2009)

Measure Category	Verified Gross kWh	Percent of Total
CFL	259,120,666	16.1%
T8/T5 Fluorescent Lighting	230,968,028	14.4%
High Bay Fluorescent	227,119,626	14.1%
Other	177,450,441	11.0%
Lighting	142,545,441	8.9%
Motors & Drives	108,748,992	6.8%
Compressor Equipment	87,265,457	5.4%
Controls	78,976,829	4.9%
HVAC	75,181,354	4.7%
Refrigeration	47,219,623	2.9%
Process	43,150,987	2.7%
Compressor Service	39,494,057	2.5%
Tune-up/Repair/Commissioning	37,647,346	2.3%
Custom	27,532,945	1.7%
Aeration System	25,503,496	1.6%

Figure 2-9. Verified Gross Gas Energy Impacts by Measure Category, Business Programs CY09 (January 1–December 31, 2009)

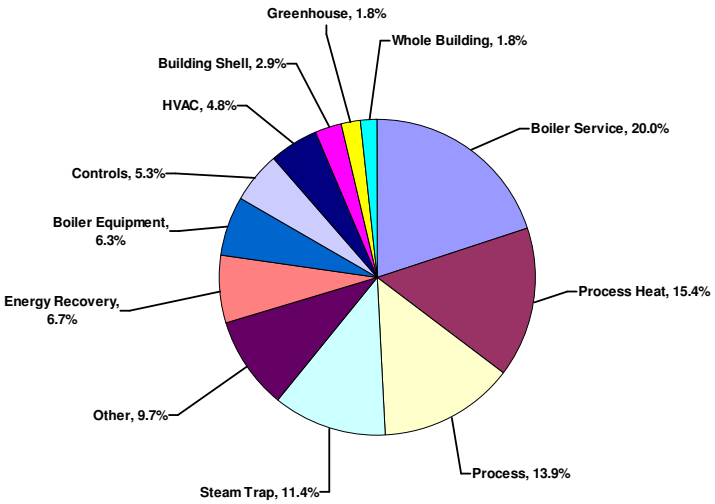


Figure 2-10. Verified Gross Gas Energy Impacts by Measure Category, Business Programs Program to Date (July 1, 2001–December 31, 2009)

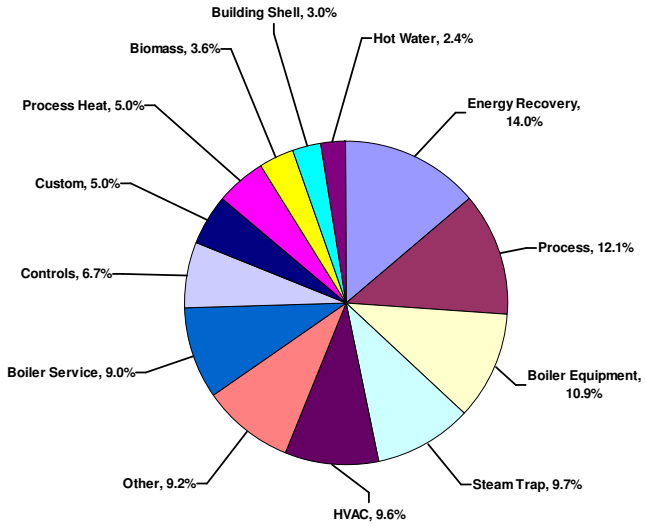


Table 2-4. Verified Gross Gas Energy Impacts by Measure Category, Business Programs CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross Therms	Percent of Total
Boiler Service	4,309,845	20.0%
Process Heat	3,315,839	15.4%
Process	3,002,506	13.9%
Steam Trap	2,467,332	11.4%
Other	2,103,682	9.7%
Energy Recovery	1,443,332	6.7%
Boiler Equipment	1,359,583	6.3%
Controls	1,148,249	5.3%
HVAC	1,034,461	4.8%
Building Shell	636,603	2.9%
Greenhouse	394,979	1.8%
Whole Building	378,865	1.8%

Table 2-5. Verified Gross Gas Energy Impacts by Measure Category, Business Programs Program to Date (July 1, 2001–December 31, 2009)

Measure Category	Verified Gross Therms	Percent of Total
Energy Recovery	12,661,566	14.0%
Process	10,963,729	12.1%
Boiler Equipment	9,898,346	10.9%
Steam Trap	8,745,568	9.7%
HVAC	8,652,763	9.6%
Other	8,316,507	9.2%
Boiler Service	8,095,072	9.0%
Controls	6,015,621	6.7%
Custom	4,504,209	5.0%
Process Heat	4,481,498	5.0%
Biomass	3,277,426	3.6%
Building Shell	2,681,026	3.0%
Hot Water	2,138,391	2.4%

Figure 2-11. Verified Gross Electric Energy Impacts by Measure Category, Residential Programs CY09 (January 1–December 31, 2009)

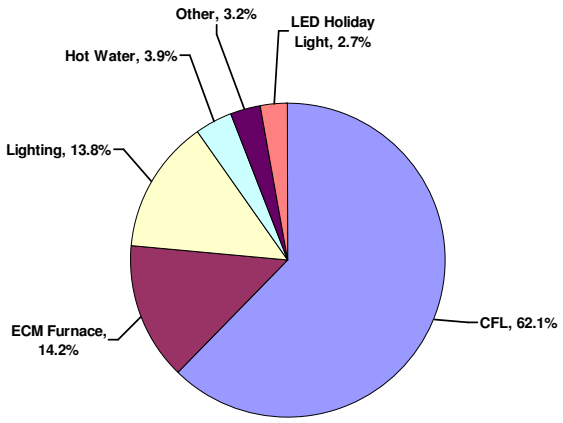


Figure 2-12. Verified Gross Electric Energy Impacts by Measure Category, Residential Programs Program to Date (July 1, 2001–December 31, 2009)

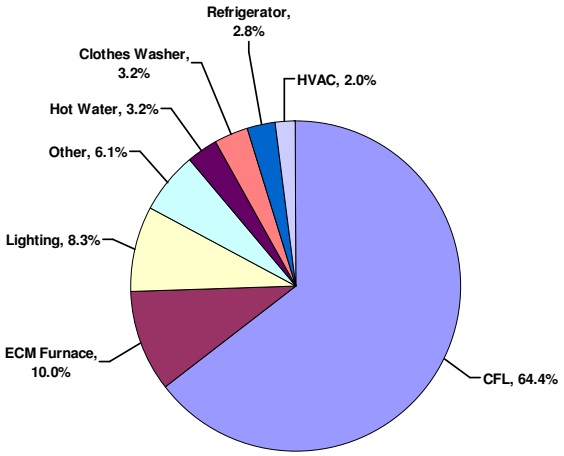


Table 2-6. Verified Gross Electric Energy Impacts by Measure Category, Residential Programs CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	Percent of Total
CFL	72,682,838	62.1%
ECM Furnace	16,672,961	14.2%
Lighting	16,112,856	13.8%
Hot Water	4,590,305	3.9%
Other	3,787,542	3.2%
LED Holiday Light	3,213,304	2.7%

Table 2-7. Verified Gross Electric Energy Impacts by Measure Category, Residential Programs Program to Date (July 1, 2001–December 31, 2009)

Measure Category	Verified Gross kWh	Percent of Total
CFL	475,218,350	64.4%
ECM Furnace	73,777,159	10.0%
Lighting	61,093,978	8.3%
Other	45,107,802	6.1%
Hot Water	23,685,378	3.2%
Clothes Washer	23,506,324	3.2%
Refrigerator	20,942,508	2.8%
HVAC	14,472,151	2.0%

Figure 2-13. Verified Gross Gas Energy Impacts by Measure Category, Residential Programs CY09 (January 1–December 31, 2009)

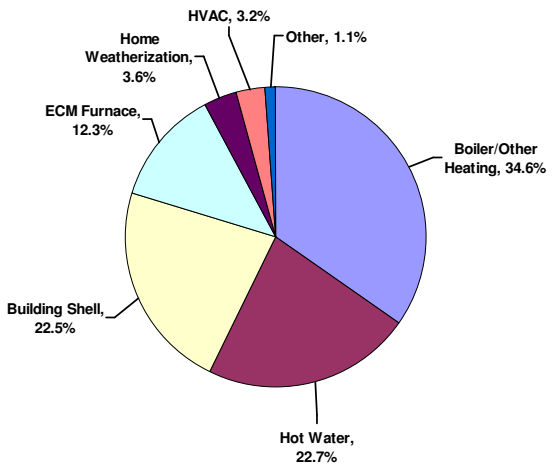


Figure 2-14. Verified Gross Gas Energy Impacts by Measure Category, Residential Programs Program to Date (July 1, 2001–December 31, 2009)

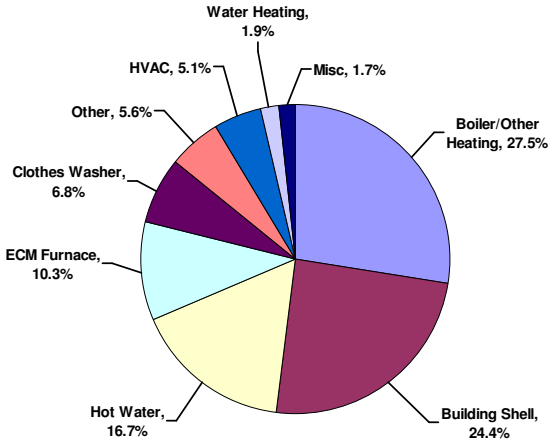


Table 2-8. Verified Gross Gas Energy Impacts by Measure Category, Residential Programs CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross Therms	Percent of Total
Boiler/Other Heating	1,242,910	34.6%
Hot Water	815,890	22.7%
Building Shell	810,212	22.5%
ECM Furnace	443,143	12.3%
Home Weatherization	129,996	3.6%
HVAC	113,437	3.2%
Other	39,690	1.1%

Table 2-9. Verified Gross Gas Energy Impacts by Measure Category, Residential Programs Program to Date (July 1, 2001–December 31, 2009)

Measure Category	Verified Gross Therms	Percent of Total
Boiler/Other Heating	4,676,628	27.5%
Building Shell	4,145,848	24.4%
Hot Water	2,829,958	16.7%
ECM Furnace	1,757,863	10.3%
Clothes Washer	1,146,806	6.8%
Other	947,394	5.6%
HVAC	863,227	5.1%
Water Heating	325,671	1.9%
Misc	295,138	1.7%

2.2 UNTRACKED ATTRIBUTABLE SAVINGS

Untracked attributable savings (UAS) are defined as savings motivated by a program but not included in program tracking data. The *Impact Evaluation of the Education and Training Program*[9] provides the basis for calculating the untracked attributable savings.

The evaluation counted energy savings in the year in which a measure was implemented ("first-year savings"). For the one-time measures, we counted the first-year savings in that program year because we knew what year the measure was completed. To be considered attributable, one-time measures must have been completed in the first four years after the training course.

We assumed that the operation and maintenance (O&M) measures were implemented first in the year after the training because we did not know what year they were first implemented[10]. The Education and Training (E&T) impact evaluation made no assumptions about measure life for either the one-time or the O&M measures because we were only measuring first-year savings.

The analysis methodology reported UAS resulting in year X as the result of cumulative influences of E&T program training in prior years. For example, new measure implementation in 2008 due to E&T program training was the sum of 2004 training influence on adoption four years out, 2005 training influence on adoption three years, 2006 training influence on adoption two years out, and 2007 training influence on adoption one year. This savings estimation approach is analogous to counting tracked energy savings implemented in the current year that were the result of multiple years of the program working with the customer on a measure.

The evaluators were asked to use this methodology and the E&T program trainee counts from 2008 to estimate Untracked Attributable Savings for calendar year 2009. Table 2-10 shows Untracked Attributable Savings (UAS) estimates for year 2009 by measure type (one-time vs. O&M measures) and savings type.

Table 2-10. Untracked Attributable Savings (UAS) Estimates for 2009 by Measure Type and Savings Type

Measure Type	Savings Type		
	kWh	kW	Therms
One-time	8,069,926	982	4,178,533
O&M	4,372,090	2,648	858,104
All	**12,442,016**	**3,630**	**5,036,638**

Table 2-11 shows that the E&T program UAS estimates for 2009 were 32–48 percent higher than those for 2008. Most of this increase was due to an increase in the number of trainees

[9] Christopher Dyson, Ken Agnew, Miriam Goldberg, Claire Palmgren, KEMA Inc. *Impact Evaluation of the Education and Training Program,* Final Report November 20, 2008.

[10] An alternative approach would have been to assume that the O&M projects were initiated at lags varying from one to four years after training. Using this approach, we would have the same total (first-year) O&M savings as the adopted approach, but it would simply be spread out over four years.

from 436 in 2007 to 681 in 2008—a 56 percent increase. Since UAS estimates are calculated on a per-trainee basis, an increase in the number of trainees will increase the level of savings. The increase in the UAS estimates from 2008 to 2009 was smaller for the one-time measures because this estimation method relies on a four-year average of trainee counts and savings estimates. Therefore, in this case the effect of the sharp rise in trainees from 2007 to 2008 was blended in with results from previous years.

Table 2-11. Untracked Attributable Savings (UAS) Estimates 2008 vs. 2009 by Measure Type and Savings Type

Measure Type	Savings Type	2008	2009	% Increase
One-time	kWh	6,149,181	8,069,926	31%
	kW	751	982	31%
	Therms	3,268,883	4,178,533	28%
O&M	kWh	2,799,165	4,372,090	56%
	kW	1,695	2,648	56%
	Therms	549,388	858,104	56%
All	**kWh**	**8,948,346**	**12,442,016**	**39%**
	kW	**2,447**	**3,630**	**48%**
	Therms	**3,818,271**	**5,036,638**	**32%**

To calculate these 2009 UAS estimates we first obtained the E&T program database of 2008 trainees. A total of 44 individual course sessions were listed in this database, comprising all of the in-person sessions of courses that were held in the 2008 calendar year. We did not incorporate registration information for web courses into the counts since course name and date were missing.

To insure that the 2008 E&T program trainees were counted in the same manner as we had counted the 2004–2007 trainees for our 2008 evaluation, we took the following steps:

- We excluded from our trainee counts all registrants from participating utilities that were flagged in the database as staff.
- We excluded all registrants who had cancelled or were no-shows.
- We also removed attendees from one course that WECC had indicated should be removed because the course had been offered as a courtesy for WPS.
- We assigned individuals who had taken multiple courses, which accounted for 10 percent of the 2008 trainees, to a single course stratum. We used the same rules as we had used in the 2008 evaluation to assign them to a stratum.

This filtering process reduced the number of trainees from the 824 that the E&T program originally sent us to 681. These 681 trainees were used to calculate the 2009 UAS estimates that appear in Table 2-10. For the savings from the one-time measures, we multiplied these trainee counts by the "stream" of measured energy savings (kWh, kW, therms) from the 2005, 2006, 2007, and 2008 trainee groups.

Because the 2009 UAS estimates for one-time measures are based on a model that utilizes survey results from four different trainee classes, these estimates are much more robust (e.g., drawn from a bigger pool of trainees) and are less subject to the effects of year-to-year course variability. However, this is not the case for the 2009 UAS estimates for O&M measures. As noted above, in the 2008 *Impact Evaluation of Education and Training Program*

report we assumed that O&M measures were implemented the year after training was received. Therefore the 2008 UAS estimates for O&M measures were based only on what the 2007 E&T program trainees had reported. Since we did not survey the 2008 E&T Program trainees, we had no comparable way to calculate the 2009 UAS estimates for O&M measures. Therefore, we had to make the simplifying assumption that the per-trainee savings from O&M measures for the 2008 trainees were very similar to the per-trainee savings from O&M measures for the 2007 trainees.

To the test the validity of this assumption, we compared the course distribution of the 2007 E&T program trainees with the course distribution of the 2008 E&T Program trainees.[11] If the course distribution was fairly similar then we would have more confidence in assuming that the per-trainee savings from O&M measures for the 2008 trainees were very similar to the per-trainee savings from O&M measures for the 2007 trainees. Table 2-12 presents this comparison.

The table shows that the biggest differences in trainee distributions were:

- In 2008 the following courses were added that had not been offered in 2007:
  - Preventative Operations and Maintenance - Schools and Government courses (142 trainees)
  - Preventative Operations and Maintenance - Schools courses (117 trainees)
  - Energy Efficient Swimming Pool Operation and Maintenance courses (55 trainees).
- In 2008 the following courses experienced significant drops in attendance from their 2007 levels:
  - The number of trainees in the Practical Energy Management- Commercial courses dropped from 91 in 2007 to 35 in 2008
  - The number of trainees in the Ventilation Systems dropped from 76 in 2007 to 23 in 2008.

Besides these bigger differences, there were other course additions and changes in course attendance from 2007 to 2008.

[11] For both 2007 and 2008, we used the same filtering process (described above) to come up with the trainee counts. For both years, we also used the same criteria for assigning multiple-course-takers to a single course stratum (these criteria are described in the 2008 *Impact Evaluation of Education and Training Program* report).

Table 2-12. Comparing the Course Distribution of 2007 E&T Program Trainees with 2008 E&T Program Trainees

Strata Category	2007 Trainees		2008 Trainees	
	Number	Percent	Number	Percent
Building Operator Certification	60	14%	54	8%
Compressed Air Energy Management	70	16%	61	9%
Energy Efficient Swimming Pool Operation and Maintenance	-	-	55	8%
Ventilation Systems	76	17%	23	3%
Hotel Energy Management	16	4%	16	2%
Practical Energy Management - Commercial	91	21%	35	5%
Practical Energy Management - Industrial	51	12%	62	9%
Practical Energy Management - Implementation	7	2%	-	-
Practical Energy Management - Schools			117	17%
Pumping System Energy Management	33	8%	28	4%
Steam System Energy Management	32	7%	45	7%
Preventative Operations and Maintenance - Schools and Government	-	-	142	21%
Retrocommissioning for Large Commercial Buildings	-	-	17	2%
Smart Strategies for Grocery	-	-	7	1%
Smart Strategies for Healthcare	-	-	19	3%
Total	**436**	**100%**	**681**	**100%**

Because the three largest courses that were added in 2008 all focused on O&M, it is likely that the 2008 trainees will have a higher proportion of O&M UAS (vs. one-time measure UAS) than their 2007 counterparts. Therefore, using per-trainee O&M savings from the 2007 trainees for the 2008 trainees may be understating the actual level of per-trainee O&M savings for the 2008 trainees. However, this likely underestimation of O&M savings on the per-trainee level may be offset by the fact that the UAS estimation methodology for O&M measures depends on trainee counts for a single year—rather than trainee counts from multiple years, as is the case for the one-time measures. Relying on a single year means that when trainee counts jump significantly from one year to the next—such as the 56 percent jump from 2007 to 2008—then this jump is directly reflected in the UAS estimates for the O&M measures (see Table 2-11). In summary, the components of our methodology for estimating O&M UAS for 2009 likely introduce biases that work in opposite directions—one likely understating the actual O&M UAS and the other likely overstating it. However, it is impossible to tell relative magnitude of these biases.

2.3 MARKET EFFECTS

One of the objectives of Focus is to be able to translate market effects into energy impacts attributable to program activities or specific market interventions by the programs. Translation into energy impacts is important to allow inclusion of impacts of program-induced market effects into long-term energy resource planning and for appropriate evaluation of the benefit-cost ratio of market transformation-oriented programs or programs with significant market transformation components. While a relatively high level of uncertainty is inherent in estimating the energy impacts of market transformation-oriented programs, the uncertainty can be managed. For example, consistent measurement of key market effects and/or their indicators over time will allow for significant reduction of the uncertainty.

Ultimately, for the concept of market transformation to be proven and the potential significant benefits realized, it is critical for policy makers to provide consistent and sound policy objectives, administrators to use discipline in designing their programs with clear program logic models, and evaluators to consistently provide appropriate feedback through implementation of sound research. Then, policy makers and administrators can use the evaluation feedback (along with other sources of information) to inform policy changes and refine their program logic models.

Both market indicators and market effects can be translated into energy impacts attributable to a program. Market indicators (for example, Point-of-Sale (POS) data) provide value because changes in indicators can typically be measured earlier after an intervention than can changes in market effects. Also, indicators can provide insights into drivers of changes in market effects. Finally, because indicators that are typical pre-cursors to actual purchase behavior represent important stages in program logic—and therefore facilitate assigning appropriate attribution to the program.

The length of time it takes before measurable changes can be observed in either market indicators or market effects metrics can vary dramatically. The time period depends on the market actors targeted by the intervention (e.g., changes at the manufacturer level can have a dramatic impact sooner), the size of the intervention, the size of the market, the readiness of the market for a product, et cetera. Typically, market indicators are more likely to be measurable in the short term, but can evaporate after a year of program activity. Market effects (for example, manufacturer sales data), involve a much longer time span and are unlikely to be measurable until after at least a year of program activity. Market effects that are sizable enough to be translated into energy impacts should not typically be expected until at least three to five years of program activity.

Much of the Focus evaluation efforts to date have been focused on the review of market indicators, including (but not limited to) those market indicators that have been included as contract metrics each year for the program administrators. However, in FY07, the residential evaluation team—in coordination with the business program evaluation team—established a comprehensive system for collecting retail-based CFL sales information that addresses the limitations of the former POS approach. Given the rapidly changing retail markets for ENERGY STAR lighting, for CY09 a different approach is being used to: (1) determine the extent to which market effects are occurring in the Wisconsin markets (e.g., for CFLs) and (2) estimate net CFLs currently installed (attributable to the Focus program).

2.4 ECONOMIC IMPACTS

One of the goals of Wisconsin Focus on Energy programs is to support economic development. In general, economic development is a process of enhancing the state's economy by supporting the growth, retention, and attraction of business activity in the state. By strengthening and diversifying the state's economic base, Wisconsin residents can enjoy better job opportunities, higher incomes, and higher living standards. Economic prosperity can also increase revenue for state and local government. In an era of global economic change and uncertainty, it is particularly important to understand the extent to which programs such as Focus are addressing these economic development goals.

Focus directly affects Wisconsin's economy—and thus, the income and jobs of Wisconsin residents—in four primary ways:

- **Enhanced business competitiveness.** Decreasing energy costs through increased efficiency, conservation, and lower emission compliance costs can make business operations more profitable. By lowering costs of doing business, it also makes Wisconsin a more competitive location for additional business attraction, investment, and expansion. There is also a benefit (unmeasured to date and not part of this analysis) for Wisconsin firms that sell energy efficient products or include them in their services (as with construction contractors).
- **Improved cost of living.** Decreasing electric and gas energy costs for residential customers, through increased efficiency, conservation, and reduced emission compliance costs, can also leave more money in families' pockets. This is money that can be spent on other discretionary purchases. Lowering the cost of living means that Wisconsin offers higher potential "real" income. This is not only attractive to the state's current residents but also makes Wisconsin a more attractive place to live and work to people who offer skills the state economy needs in order to grow and expand.
- **Import substitution.** Focus also encourages more spending dollars to stay within Wisconsin. Wisconsin businesses are major manufacturers of heating and air conditioning equipment, motors, and controls. Focus stimulates sales for these industries in Wisconsin, as well as the development of solar, wind, and biomass energy production within the state. At the same time, the program has the effect of stopping *economic leakage* that occurs when money flows out of the state to purchase coal and natural gas. These effects combine to stimulate job creation, increase personal income, and to make the Wisconsin economy more efficient and competitive.
- **Spin-off spending changes.** There are also various indirect and induced impacts that cause both positive and negative changes in spending. Suppliers to businesses that are directly affected by the program, either as participants or as manufacturers, retailers, or installers of energy-efficient equipment, can realize increased orders for their products and services. Additional jobs and their associated worker income can mean more re-spending of that income on consumer purchases. On the other hand, reductions in the growth of demand for traditional energy sources can mean less growth or actual reductions in business sales and jobs associated with construction and operation of coal-fired power plants and retail sales from those plants.

The sum of all of the above-cited effects are termed *economic development* impacts because they reflect changes in the growth and development of the state's economy (i.e., the flow of money into, out of, and within the state affecting jobs and income for Wisconsin residents).

2.4.1 Steps in the analysis process

There are three steps in the process of analyzing the economic development impacts of the Focus program portfolio. These steps are briefly summarized below.[12]

Step 1. Document direct effects. The first step is to track the net *direct effects* of the program. These are net changes in:

1. Program operations spending—in this case "ratepayer" dollars are spent in operating the program and paying incentives to business and household participants.
2. Household and business savings—these are dollar savings to businesses and households (resulting from reductions in energy and electric demand), realized because of the existence of the program.
3. Household and business cost—these are the additional household and business expenditures associated with the incremental cost of purchasing energy-efficient equipment. Incremental defines the cost difference when compared to purchasing a traditional energy-consuming component (the baseline assumption). Incentive dollars from (1) program operations spending work to defray these incremental costs.
4. Other spending shifts—shifts in patterns of spending and business sales among sectors of the state economy—affecting the flow of dollars into, out of, and within the state.
5. We rely on other program evaluation reports to obtain the basic information for these four types of direct economic impacts. A key element of this process is careful attention to establishing the net change in spending and costs incurred by government, households, and businesses compared to what would otherwise be expected to occur without the program. In general, the representation of program cost, participation, and energy impacts in this report builds upon program evaluation studies that are described in more detail in other reports.

Step 2. Apply the economic model. The second step is to apply a Regional Economic Models, Inc. (REMI) economic model of the state of Wisconsin. The model is a tool used to trace how the direct Focus program effects create changes in household and business costs, spending, and sales patterns throughout the state's economy. We apply the inputs from Step 1 to the REMI economic model to track a series of shifts in the state economy, including:

1. Lower business operating costs related to energy consumption (increased competitiveness for business attraction)
2. Lower household living costs (increased attraction as a place to live)
3. Import-substitution (Wisconsin-made products substitute for purchases of out-of-state equipment and fuels)
4. Increased orders for firms supplying goods and services to equipment manufacturers and installers in Wisconsin (indirect effect)

[12] For a more detailed discussion, see Lisa Petraglia, Tyler Comings, and Glen Weisbrod, Economic Development Research Group, Inc., *Focus on Energy Evaluation. Economic Development Benefits: CY09 Economic Impacts*, March 2, 2010.

5. Re-spending of additional worker income within Wisconsin (induced effect).

The results of the REMI model represent changes in the economy of the state, on a year-by-year basis. The key indicators of change in the state's economy are:

1. Total volume of business sales—by type of business
2. Total number of jobs associated with the change in business sales—by type of business and occupation category
3. Total *real* disposable income associated with (1) the program-generated savings experienced by households and (2) more people working in Wisconsin due to the program's business competitiveness benefits
4. Total gross regional product—the change in "value added" that is generated in Wisconsin, which is essentially the sum of personal income and corporate income (profit).

Step 3. Analyze economic development implications. The third and final step in the analysis process is to apply results of the economic model (Step 2) to assess how the forecast program impacts translate into economic development changes. These include:

1. Changes in the growth and mix of jobs for Wisconsin residents in terms of industries and occupations. These can lead to increased diversification of the economy, increased opportunities for job skills, and higher income levels for Wisconsin workers.
2. Changes in the incidence of economic impacts, in terms of urban and rural locations.
3. Shifts in the nature and size of impacts occurring over time.
4. Shifts in the economic competitiveness and attractiveness of Wisconsin as a place to live and to locate a business.

2.4.2 Summary of economic analysis results

The model results reflect estimates developed on a new version of the statewide economic model and an updated procedure for measuring job impacts. Two scenarios condition our economic benefit impact assessment:

1. The historic scenario assumes that Focus will fund and manage the programs for ten years beginning in 2001. The total impact of the programs is measured for an additional 15 years after funding ends (2026).
2. A forward-looking scenario, assumes that the future Focus programs follow the savings trends projected in the ECW Potential Report.[13] In this scenario, the programs are funded for ten years beginning in 2012. The total impact of the programs is measured for an additional 15 years after funding ends (2036).

[13] As described in the *Benefit-cost Analysis CY09 Evaluation Report* Final: November 24, 2009, on page 5-2 "ECW based the program costs on net savings values. Since the program incurs costs for all participants, this approach underestimates both administrative and incentive costs. For this…analysis, we adjusted the ECW program costs to account for program attribution."

The results are presented in terms of (1) the number of job years created for Wisconsin residents, (2) the sales generated for Wisconsin businesses, (3) the value added portion of those sales, and (4) disposable income generated for Wisconsin residents.

Tables 2-13a and 2-13b show the projected annual economic impacts from Focus programs in aggregate for selected years and periods. The tables also summarize impacts when both the Residential and Business programs include expected market effects beyond what the program instigates. These market effects include increases in household and business purchases of energy efficient products, adoption of energy efficient practices, and the ensuing energy savings. These are effects in the economy realized without formal program participation. A similar set of economic impact results are shown for the *forward-looking* funding stance for Focus starting in 2012 and those effects were stated as *net effects* presumably inclusive of free-ridership adjustments and a market effect component—though not explicitly broken out.

Tables 2-13a and 2-13b. Economic Development Impacts for all Focus Programs, Historic and Forward-looking Funding Scenarios

Historic Trend Scenario* (mil $2009)	Year 1	Year 5	Year 10	Sum 10 Years	Sum 25 Years
Impact without Market Effects					
Jobs (job years for sums)	542	1,774	5,194	24,679	91,741
Sales generated	$29	$120	$466	$1,907	$12,209
GRP (value-added)	$25	$91	$343	$1,428	$8,577
Disposable income	$18	$72	$258	$1,090	$5,658
Impact with Market Effects					
Jobs (job years for sums)	545	1,782	5,204	24,897	100,356
Sales generated	$29	$121	$472	$1,915	$13,522
GRP (value-added)	$25	$91	$346	$1,435	$9,450
Disposable income	$18	$72	$262	$1,096	$6,234

Forward-looking Scenario* (mil $2009)	Year FL1	Year FL5	Year FL10	Sum 10 Years	Sum 25 Years
Impact with Market Effects					
Jobs (job years for sums)	11,813	22,610	33,304	232,826	555,357
Sales generated	$923	$2,306	$4,018	$24,746	$75,384
GRP (value-added)	$637	$1,547	$2,669	$16,559	$50,442
Disposable income	$522	$1,163	$1,932	$12,355	$35,949

*FL1 = 2012, FL5 = 2016, FL10 = 2021

Source: REMI model runs by Economic Development Research Group

Altogether, the analysis confirms that Focus leads to significant economic development benefits for Wisconsin's economy. Even without counting market effects, the first year of program operation causes a variety of household and business cost savings and spending changes that altogether support 542 jobs in the state. The impact grows to an estimated 1,774 jobs by the fifth year of program operation. The personal income generated in Wisconsin from this additional business activity represents $18 million in the first year and grows to $72 million by the fifth year of program operation. The market effects also grow over time, adding a small impact in the first five years but then adding roughly 9.4 percent to jobs and income respectively over the projects' assumed 25-year analysis interval.

2.4.3 Impact by industry

Focus programs provide widespread benefits among all sectors of the economy. There are several reasons for this result. While many of the business portfolio participants are manufacturing and commercial businesses, all of the portfolios create additional economic benefits by supporting manufacturers, wholesalers, retailers, engineering and installation services, and construction services associated with the energy-saving materials, equipment, and buildings. Secondly, the growth of participating firms also leads to "indirect" growth impacts on other firms that supply goods and services to them. The growth of workers at both the directly affected businesses and the indirectly affected businesses leads to further "induced effects" as the additional worker income supports more household consumption.

Table 2-14 shows how the mix of impact among major sectors of the economy can be viewed differently in terms of business output (dollars of total sales) or in terms of jobs.

Table 2-14. Focus' Impacts on the Economy by Major Industry
(Tenth Year, Historic Scenario without Market Effects, Output in Constant 2009 Dollars)

Major Industry	Output Impacts (mil.)	Percentage of Output	Job Impact	Percentage of Jobs	
				Private Sector	All Jobs
Natural Resources/Mining/ Utilities/Construction	$43	9%	1,292	28%	25%
Manufacturing	$137	29%	366	8%	7%
Wholesale	$32	7%	124	3%	2%
Retail	$49	11%	542	12%	10%
Transportation/Info./Finance	$64	14%	291	6%	6%
Other services	$141	30%	1,937	43%	37%
Total private sector	**$466**	**100%**	**4,557**	**100%**	**88%**
Total all sectors			**5,194**		

Note: Job impacts show account for less than 100 percent of the total employment changes since state/local government job changes are not shown as major industry.

Source: REMI model runs by Economic Development Research Group

Table 2-14 shows that the *overall impact* of Focus is to make Wisconsin's total business output $466 million/year higher in the tenth year than would have occurred without the program. This growth involves an additional 4,557 private sector jobs and 5,194 total jobs. Manufacturing accounts for the largest share of the total state-wide impact on output—29 percent, though only eight percent of the total private-sector job impact. The high impact on manufacturing output reflects the program impact on increasing the "cost competitiveness" of this sector as well as the redirection of some business and household purchases towards energy-efficient electrical equipment and machinery manufactured in Wisconsin. The smaller job impact is due to the fact that Wisconsin manufacturing has a high value of output per worker, known as high labor productivity.

Retail accounts for 11 percent of the output impact and 12 percent of the private-sector employment impact. The effect on output is attributable to the large residential program, which causes participating households to experience an increase in their disposable income, which they then spending on retail, entertainment, and personal services, and to the fact that many of the residential programs direct households through retail channel to purchase

energy-efficient appliances and lighting. The larger job impact is due to the high labor-intensity of retailing.

The Services sector accounts for 30 percent of the output impact and 43 percent of the employment impact. This classification includes energy-related services, which are supported by the business program's marketing and incentive features. The higher share of employment impact is due to the labor-intensive nature of most services.

The pronounced percentage of job impacts occurring in the *Natural Resource/Mining/Utilities/ Construction* category is primarily attributable to program-related installation demand for contractors to retrofit or install new equipment and systems.

The additional impacts for the remaining sectors such as *Transportation*, *Construction*, *Finance,* and *Wholesale* is attributable to increased spending by both households (due to disposable income growth) and businesses (due to expansion of activity) and to the fact that firms from within these industries are participating in Focus' Business programs.

2.5 ENVIRONMENTAL IMPACTS

The Focus evaluation team uses emission factors to estimate environmental impacts, in the form of displaced power plant emissions, from Focus on Energy net energy savings. Emission factors are used to convert energy inputs (i.e., the fuels combusted to generate electricity) and generation of pollutants (i.e., CO_2, NO_x, SO_2, and mercury). Factors are reported in pounds of pollutant per megawatt hour of generation.

The Focus team has aligned its method for estimating emission rates with recommendations of the Greenhouse Gas Protocol Initiative (GHG Protocols). This protocol, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), has become the most broadly accepted accounting standard for understanding, quantifying, and managing greenhouse gas emissions.[14] One implication of adherence to the GHG Protocol is that emission factor calculations are based on generation data specific to the geography of the Focus energy efficiency programs. Secondly, emission factors are estimated for plants operating on the margin—plants most likely to remain off-line as a result of a reduction in demand/consumption resulting from Focus programs. Emission factors derive from the Environmental Protection Agency's (EPA) Office of Air and Radiation's "Acid Rain Hourly Emissions Data," which is produced from actual stack monitoring. Appropriate allowance prices for displaced emissions are then used for the benefit-cost and economic impact analyses, including a forecast of future prices to the year 2026.

Marginal plants are identified by their *rate of use*; that is, the average length of time in hours that a generating unit remains on once it is brought online. Peaking units, which are brought on for only a short time, have a short rate of use; base-load plants that remain on for hundreds of hours or more have a long rate of use. We divide the population of generating units into five groups, averaging less than six hours, six to twelve hours, twelve to twenty-four hours, twenty-four to ninety-six hours, and more than ninety-six hours, each time they are dispatched. We define marginal emissions in each hour as those produced by the set of generating units in the group with the shortest rate of use.

[14] World Resources Institute and the World Business Council for Sustainable Development. *Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects.* 2007.

In 2009, evaluators calculated emission factors in a new way, based on the apportionment of program energy savings over each hour of the year. Thus, we associate an emission rate for each hour with energy savings estimated for that hour. The energy savings are based on energy savings load shapes developed by Focus. With this approach, the annual emission factor is properly weighted by the timing of the savings. We call these *time-of-savings* (TOS) emission factors. Emission factors for each load shape are reported in Table 2-15.

Table 2-15. Emission Factors by Load Shape

Load Shape	Pollutant (Lbs/MWh)			
	CO_2	NO_x	SO_2	Mercury
AG_HVAC	1,803	2.7	3.9	0.0000137
AG_LGHT	1,795	2.6	3.9	0.0000136
AG_TOTL	1,797	2.7	3.9	0.0000139
COM_FLAT	1,817	2.7	4.1	0.0000147
COM_HVAC	1,808	2.6	3.9	0.0000136
COM_LGHT	1,796	2.6	3.8	0.0000134
COM_TOTL	1,780	2.6	3.9	0.0000132
IND_HVAC	1,833	2.7	4.1	0.0000146
IND_LGHT	1,802	2.6	3.9	0.0000138
IND_TOTL	1,795	2.6	3.9	0.0000137
RES_COOL	1,641	2.7	4.5	0.0000109
RES_FLAT	1,817	2.7	4.1	0.0000147
RES_HEAT	1,908	2.6	3.6	0.0000158
RES_HVAC	1,783	2.6	3.9	0.0000134
RES_LGHT	1,801	2.6	3.8	0.0000135
RES_SOLAR	1,662	2.5	3.3	0.0000092
RES_TOTL	1,783	2.6	3.9	0.0000134
SCH_HVAC	1,808	2.6	3.9	0.0000134
SCH_LGHT	1,794	2.6	3.8	0.0000133
SCH_TOTL	1,775	2.6	3.8	0.0000130
TOTL_TOTL	**1,801**	**2.6**	**3.8**	**0.0000136**

Emission factors for NO_x vary relatively little from one load shape to another—only about a tenth of a pound per MWh around the mean. This pollutant is less sensitive to the fuel that is predominant on the margin. The values for CO_2, SO_2, and mercury vary somewhat more by load shape, on the order of three percent to four percent around the mean for SO_2 and five percent or more for mercury. Emission rates for CO_2 are quite consistent except for residential heating and cooling and solar. We expect that business sector heating and cooling would also show significant CO_2 variation if heating and cooling were separated into separate load shapes rather than collapsed into a single HVAC load shape. These pollutants vary according to the predominant fuel on the margin. In particular, coal generation produces more pollutants than natural gas, oil, wood, and other fuels. When coal-powered generation is on the margin, emission rates are higher.

The TOTAL load shape (i.e., "TOTL_TOTL", above) represents an aggregate of avoided emissions across all programs, divided by the aggregated energy savings. This is an intrinsically more precise way to represent the emission factor than the other approach, which averages across all units and all hours.

The summary emissions rates for electric generation provided in Table 2-16 reflect the TOTAL load shape in Table 2-15. Emissions factors from reduced use of natural gas at the customer site—the "On-site Therms" column in Table 2-16—were also taken from EPA data.[15]

Table 2-16. Summary Emission Rates

Emissions	Generation lbs/MWh	On-site Therms lbs/Therms
NO_x	2.63	0.009804
SO_2	3.83	0.0000588
Mercury	0.0000136	0.00000002549
CO_2	1,801	11.76

Therm factors from EPA data (EPA's *E-Grid 2000 database* with data for the MAIN and MAPP NERC regions from 1998). Update based on memo from Eric Rambo and Bryan Ward dated January 5, 2007.

Using the marginal emission rates and evaluation-verified *gross* electricity savings estimates,[16] the Focus programs together potentially displaced 6,850,728 pounds of NO_x; 8,422,548 pounds of SO_2; over 5,251 million pounds of CO_2; and 32 pounds of mercury from Focus inception to December 31, 2009 (Table 2-18). *[Note: We are reporting emissions based on verified gross impacts to be consistent with the policy of publicly reporting based on verified gross energy impacts. However, the reader should be aware that the economic and benefit-cost analyses used by Focus calculate avoided emissions based on persistent net energy impacts. Furthermore, markets for greenhouse gases (GHG), and the protocols for quantifying and reporting GHG effects, stringently require net emissions impacts.]*

Table 2-17. Verified Gross Emissions Displaced (lbs) Annually CY09 (January 1–December 31, 2009)

Program Area	Verified Gross MWh	Verified Gross Therms	NO_x	SO_2	CO_2	Mercury
Business	455,419	19,353,647	1,386,208	1,746,478	1,047,772,291	6.69
Renewables	16,933	5,357,822	97,014	65,208	93,503,019	0.37
Residential	99,982	2,714,951	289,289	383,331	211,988,446	1.43
Total	**572,334**	**27,426,420**	**1,772,512**	**2,195,018**	**1,353,263,757**	**8.49**

[15] EPA's *E-Grid 2000 database.*

[16] The Renewable Energy Program savings are evaluation-verified gross, not net.

Table 2-18. Lifecycle Verified Gross Emissions Displaced (lbs) Annually Cumulative in Current Year (July 1, 2001–December 31, 2009)

Program Area	Lifecycle Verified Gross MWh	Lifecycle Verified Gross Therms	NO_x	SO_2	CO_2	Mercury
Business	1,499,486	85,374,535	4,776,429	5,751,633	3,704,462,561	22.58
Renewables	71,611	10,868,994	294,694	275,080	256,785,493	1.25
Residential	613,648	14,053,264	1,749,940	2,352,562	1,270,398,373	8.71
Total	**2,184,745**	**110,296,793**	**6,821,064**	**8,379,277**	**5,231,646,428**	**32.54**

Emission reductions are calculated using marginal emission rates.

Wisconsin's investor-owned utilities are included in the federal SO_2 regulatory structure of the Clean Air Act (acid rain provisions). In this cap-and-trade system SO_2 emissions cannot be considered reduced or avoided unless EPA lowers the SO_2 cap.

The *GHG Protocol for Project Accounting* (World Resources Institute and World Business Council for Sustainable Development, 2005), recognizes biomass and biogas projects as a source of "upstream" secondary emission effects. For these projects, the reduction in energy emissions from one source, electricity or natural gas, are replaced by another: these projects use bio fuels to generate electricity or heat and thereby release of CO_2, NO_x, and SO_2. For Focus renewables projects that are biomass projects, the predominant substitute fuel is wood. For biogas projects, the predominant substitute fuel derives from anaerobic digesters, from which the primary energy source is methane. Table 2-19 shows emission factors for combustion related to renewables projects. This information comes from a variety of sources, noted below the table. We did not locate a source for SO_2 deriving from biogas. We expect it to be similar to the value for natural gas, however, hence quite low. Nor could we locate a value for mercury emissions. For the current analysis, we treat these values as zero.

Table 2-19. Emission Factors for Renewable Energy Combustion, by Fuel Type (lbs/MWh)

Fuel	Energy Use	CO_2	NO_x	SO_2	Mercury
Wood[1]	Electricity (lbs/MWh)	1,419	4.58	1.45	nd
Wood[2]	Heat (lbs/therm)	26	.049	.002	nd
Biogas	Electricity (lbs/MWh)	1,234[3]	0.09[4]	0.23[4]	nd
Biogas	Heat (lbs/therm)	13[3]	0.0001[3]	nd	nd

Sources:
1. EPA Acid Rain Data
2. EPA AP 42
3. IPCC
4. California Energy Commission

Table 2-20 shows estimated emissions, program to date, that are due to renewables biomass and biogas combustion projects. These offset part of the emission reductions indicated Table 2-18.

Table 2-20. Lifecycle Verified Gross Emissions (lbs) Produced Annually Cumulative in Current Year (July 1, 2001–December 31, 2009)

Project Type	Lifecycle Verified Gross MWh	Lifecycle Verified Gross Therms	CO_2	NO_x	SO_2
Biogas	50,574	1,177,123	15,365,004	122	12
Biomass-Combustion	-	4,248,697	110,466,122	208,186	8,497

It should be noted, however, that bio fuels release CO_2 that more recently has been sequestered from the atmosphere than are the emissions from fossil fuels. Bio fuel emissions

are, in other words, part of a much shallower and more rapid CO_2 cycle than fossil fuels, comprising years or decades instead of millions of years. For this reason, bio fuels are sometimes viewed as being essentially carbon neutral. This, too, is an oversimplification, especially in the case of wood as a fuel, where the cutting of forests more quickly than they can regenerate creates a net increase in atmospheric CO_2. Insofar as biomass projects derive fuel from waste wood such as sawdust or derived fuels—which would in any case release methane and CO_2 as they decay—we believe it is incorrect to net out the emission reductions from energy savings due to biomass projects. This is even more questionable in the case of biogas derived from dairy waste. Thus, going forward there is need for an even more careful accounting of the fuel sources of Focus renewables projects in order to disentangle their emissions effects.

Prior to 2005, the reporting of emissions reductions associated with Focus program energy impacts was the basis for the Division of Energy's entries to the Department of Natural Resources' (DNR) *Voluntary Emissions Reduction Registry*.[17] For purposes of this Registry, the Focus evaluator served as the independent third-party verification organization for a residential program offered through Wisconsin's Focus on Energy. With the passage of 2005 Wisconsin Act 141, administration of the funds for Wisconsin Focus on Energy was transferred from the Division of Energy Wisconsin's utilities with oversight by the Public Service Commission of Wisconsin. Following that transfer, no emissions were registered under the Voluntary Emissions Reduction Registry, which was discontinued in 2008. In that same year, the Governor's Task Force on Global Warming published recommended targets for reductions in greenhouse gasses.[18] These recommendations have been incorporated into pending legislation, the Clean Energy Jobs Act. This legislation also includes targets for reducing energy consumption through energy efficiency initiatives, which is a relatively low cost mechanism for mitigating air pollution.

2.6 NON-ENERGY BENEFITS

Benefit-cost (b/c) reports for Focus on Energy estimate non-energy benefits (NEBs) for an expanded test of the program portfolio's effectiveness.[19] NEBs represent an array of valued attributes deriving from energy efficient measures that are in addition to energy savings, such as increased property value or reduced water usage. Focus evaluation does not include employment effects or emissions reduction as NEBs, though these are factored into b/c analysis as separate categories of program effects.

[17] http://dnr.wi.gov/air/vol/registry/ (Last accessed 20 April 2010).

[18] Governor's Task Force on Global Warming. *Wisconsin's Strategy for Reducing Global Warming, Final Report to Governor Jim Doyle*. July 2008. http://dnr.wi.gov/environmentprotect/gtfgw/documents/Final_Report.pdf (Last accessed 20 April 2010.)

[19] Goldberg, Miriam L., Chris Clark, Sander Cohan, KEMA Inc. (2007). *Focus on Energy Statewide Evaluation: Interim Benefit-Cost Analysis: FY07 Evaluation Report.* February 26, 2007.

Examples of NEBs applying to Business Programs include benefits related to:

- Maintenance
- Employee morale
- Equipment life
- Productivity
- Waste generation
- Defects and errors
- Sales
- Non-energy costs
- Personnel needs
- Injuries and illnesses.

Examples of NEBs applying to Residential Programs include:

- Reduced maintenance costs associated with CFL installation (apartments only)
- Reduced water consumption costs related to installation of low-flow showerheads and aerators
- An increase in property value associated with improved insulation
- Increased property values resulting from installation of new equipment or home certification.

Examples of NEBs applying to Renewables Programs include:

- Greater diversity of primary in-state energy supplies
- Use of wastes as a fuel instead of disposal
- Increased ability to handle energy emergencies or generation short-falls
- Increased sales of renewable energy by-products.

For Focus evaluations, NEBs are added to the benefit side of program effects in one of two ways. NEBS typically are factored as a dollar amount per measure installed. Alternatively, they are factored as a multiplier of the first-year energy savings.

Table 2-21 shows the total value of NEBs for each program area. The NEBs reported are based on the reports that were completed for each program area.[20] NEBs values are calculated using the same approach utilized by the recently completed benefit cost analysis. However, they are a combination of one-time savings and ongoing savings, so it is not straightforward to turn these values into lifetime benefits.

[20] Ujjwal Bhattacharjee, Steven Drake, Eric Rambo, and Bryan Ward, PA Consulting Group. *A Review and Update of NEBS Values for Residential Programs.* February 19, 2010.

Nick Hall, TecMarket Works. *A Qualitative Program Effects Status Study,* January 17, 2005.

Nick Hall and Johna Roth, TecMarket Works. *Non-energy Benefits to Implementing Partners from the Wisconsin Focus on Energy Program.* October 20, 2003.

Riggert, Jeff, Nick Hall, and Tom Talerico, TecMRKT Works, *Non-energy Benefits Cross-cutting Report. Year 1 Efforts, December* 4, 2002.

Table 2-21. Value of Non-Energy Benefits by Program Area

Program Area	CY09 (January 1–December 31, 2009)	Program to Date (July 1, 2001–December 31, 2009)
Business	$10,077,212	$31,303,589
Renewables	$577,758	$1,478,073
Residential	$745,407	$5,323,971
Total	**$11,400,377**	**$38,105,633**

2.7 HISTORICAL SIMPLE B/C AND COST OF CONSERVED ENERGY (CCE)

This section of the *Semiannual Report* presents a simple benefit-cost (b/c) test and cost of conserved energy results for CY09 and for the period July 1, 2001, to December 31, 2009, along with information on the key input assumptions for the analysis.

The simple benefit-cost test is based on the Total Resource Cost (TRC) test, a commonly used test of program cost effectiveness. The test compares program and participant costs against the avoided costs of supplying the conserved energy. The methodology and inputs used for this test are consistent with the recently completed benefit cost report.

The cost of conserved energy calculation is based on a methodology outlined in a memo report issued by the evaluation team (*Cost of Conserved Energy (CCE): Potential Calculations for Focus on Energy*, October 31, 2005). The specification and calculation of CCE originated with the desire to compare energy conservation measures, specific technologies, energy efficiency (EE) programs, or entire program portfolio to the relative cost of achieving a specific unit of energy savings (i.e., $/kWh). A key potential benefit of the CCE approach is to give equal weight to both energy *supply* and energy *demand* options. Thus, cost of conserved energy curves were developed about two decades ago to place energy efficiency cost estimates at a level comparable to that for supply-side options (Meier, 1982). Much of the early development of CCE curves was conducted at the Lawrence Berkeley National Lab. Recent development work has been sponsored by the California Energy Commission (CEC)[21]. Based on reporting by ACEEE, CCE results have also been calculated and reported by six other public benefits states. They are California, Connecticut, Massachusetts, New Jersey, New York, and Vermont.

It should be noted that one of the key assumptions for calculating the cost of conserved energy for programs that result in both electric and gas savings is the allocation of program costs to the attributed savings. A portion of the program costs must be allocated to electric savings and a portion to gas savings. In Tables 2-22 and 2-23 below, the allocation of program costs is indicated in the column “Elec %.” The methodology for attributing program costs is based on the value of incentive dollars paid to realize the energy savings, where this is known. A number of incentives, however, are related to measures that realize both electric and gas savings; moreover, other incentives are paid for measures/activities for which no energy savings is directly related. For these, the program cost allocation is based on the value of the energy savings realized by the program.

[21] Jayant Sathaye and Scott Murtishaw. 2004. *Market Failures, Consumer Preferences, and Transaction Costs in Energy Efficiency Purchase Decisions.* Lawrence Berkeley National Laboratory for the California Energy Commission, PIER Energy-Related Environmental Research. CEC-500-2005-202.

2.7.1 B/C inputs

The model to calculate the b/c values for the semiannual reports was based on the 2007 benefit-cost report and subsequent published evaluation reports.[22] The inputs, their values, and the most relevant information about the model are reported in Section 2 and Appendix C of this semiannual report.

The calculation we use for the simple b/c ratio is:

> Simple b/c = (Value of Saved Energy + Value of Avoided Emissions) / ((Program Spending (excluding incentives) + (Incremental Costs × Attribution Rate for Costs))

We note that our b/c estimate for the SAR differs from more expansive benefit-cost reporting that has been part of a separate report published every three years. The simple b/c values published twice each year are based only on documented performance of past costs and program-attributed measure installations. We do not estimate future market effects, for instance, or future program impacts. At the same time, we do not cut off the stream of savings from installed measures in 2026 but rather run benefits out through the life of each installed measure. We believe a look at program performance exclusively *ex post* is an important supplement to the more elaborate, but necessarily more conjectural modelling, found in the full benefit-cost reports.

We discuss each of the inputs to our b/c estimate more fully below.

Value of energy saved. The value of energy saved is the net present value of the persistent net savings for program installed measures, denominated in dollars of utility avoided cost. The value of energy savings is calculated from the agreed-upon avoided costs (see Appendix C, which have a one percent growth rate over time. The value of the stream of avoided costs is netted back to the current year based on a discount rate of five percent. An eight percent line loss factor is added to the energy savings. Net energy savings are degraded over time by a function described in the SAR, to account for energy savings reductions from factors such as poor maintenance or removal of the efficient measure.

The value of energy saved for a given reporting period can be affected by updated evaluation results. Since the previous SAR we have updated the value of utility avoided costs (UAC),

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[22] Miriam L. Goldberg, Chris Clark, Sander Cohan, KEMA Inc. *Interim Benefit-Cost Analysis: FY07 Evaluation Report.* February 26, 2007.

Miriam L. Goldberg, J. Ryan Barry, Brian Dunn, Mary Ackley, Darcy DeAngelo-Woolsey, KEMA Inc. *Focus on Energy Evaluation Business Programs: Measure Life Study.* August 25, 2009.

Miriam L. Goldberg, J. Ryan Barry, Brian Dunn, Matt Petit, KEMA, Inc. *Focus on Energy Evaluation: Business Programs Incremental Cost Study,* October 28, 2009.

Lisa Wilson-Wright, Chris Russell and Lynn Hoefgen. *Focus on Energy Evaluations: Residential Programs Results of the Multi-State Modeling Effort.* March 7, 2010.

Ron Swager, Patrick Engineering, Inc. *Focus on Energy Statewide Evaluation, Residential Deemed Savings Review*. February 2, 2009.

Steven Drake, Eric Rambo, Bryan Ward, PA Consulting Group. *Focus on Energy Evaluation: Residential Technologies Incremental Cost Review.* November 6, 2009.

calculating a UAC for each measure category based on the timing of energy savings and the cost of energy at different times of day and year. We have also updated all net-to-gross ratios.

Value of avoided emissions. The team estimates an emission factor for energy savings, which represents the amount of pollutants avoided for each unit of energy saved. The stream of persistent net savings is multiplied by the emission factors to estimate a volume of avoided emissions for a given year. The volume of avoided emissions is multiplied by an estimate of the dollar value of those avoided emissions in the marketplace in that year. Currently, only values for NO_x and SO_x are included in the value of avoided emissions because these values can be established on the basis of a real, not hypothetical, market.

Emissions factors have been updated since the 2007 benefit-cost report. Updated values are used as they become available. This results in changes to the value of avoided emissions, which carries through to the b/c ratio. The emission factors have tended to decline over the period that the evaluation team has developed these numbers, thus decreasing the value of avoided emissions.

Program spending. Program spending represents the cost of running programs. In the b/c formula, however, it excludes the value of incentives paid to program participants. These are transfer payments, i.e., a cost to the program but an offsetting benefit to the energy consumer.

The source for program spending data is a summary statement for the reporting period from the fiscal agent for Focus (Wipfli), which is produced for us by the PSCW. Originally, we drew upon invoices submitted to DOA. In the transition of Focus to the PSCW, the format of the invoices did not easily support the level of reporting details that were needed as inputs to the model.

Historically, we have assumed invoice costs reflect a small amount of spending from the prior reporting period, where savings have been credited but some costs not yet invoiced. Over time this small asynchrony of savings and costs would be expected to level out, with no penalty to programs and no significant effect on the b/c ratio. After the draft of the most recent SAR was posted, some concerns were raised by WECC regarding a possible mismatch in the timing of savings and cost credit. We have worked with the PSCW to evaluate the basis of those concerns. Although no significant timing issues were uncovered, it was determined that the spending amounts for CY09 used initially were too low. Those were corrected. For the current SAR the PSCW has again provided program-level spending values from Wipfli. For the next SAR, evaluators will review the approach used to obtain spending values.

Program spending is updated for every SAR. Typically, spending figures for past reporting periods do not change.

Incremental costs. These are the additional costs incurred by energy consumers for installing efficient rather than baseline equipment. Values used in the 2007 benefit-cost report are the basis for incremental costs. These values, and how they are developed, are documented in Appendix C of this semiannual report. After posting the semiannual report for the first half of CY09, WECC observed that our estimation approach yielded incremental costs for the renewables program that were substantially higher than the actual project costs. A review of our data indicated that underlying changes in the projects had rendered inaccurate the estimation approach we had been using. For the renewables portfolio,

incremental costs are now represented by implementer-reported project costs instead of using the normal estimation approach. This has been an exceptional deviation from a policy against making ad hoc changes in calculations, which was done because for renewables an unacceptable level of error had intruded into the estimation approach.

Incremental costs are reviewed and updated for every benefit-cost report. They were last updated in 2009.

Attribution rate for incremental costs. Just as savings are netted to account for free-ridership and other effects, incremental costs are netted to account only for the portion of measure costs that produced program-attributed energy savings. We multiply incremental costs by an attribution factor that is an avoided-cost-weighted average of electricity and gas attribution rates. In other words, because these attribution rates typically vary across electric and gas savings measures, the attribution rate applied to costs is weighted based on the allocation of program costs to achieve electric savings versus gas savings.

Changes in the attribution rate for costs follow from evaluation impact reporting where attribution rates are updated. That is, incremental costs are allocated to the b/c equation based on how much of the energy savings from implemented measures are attributed to the program.

Table 2-22 shows the inputs to the simple b/c ratio reported in the SAR, along with the constituent components of the inputs and the sources for them. It also indicates the frequency with which all elements are updated.

Table 2-22. Inputs and Sources for the B/C Calculations

	Components	Source	Updated
Value of Energy Saved	Annual gross energy savings	Program tracking database	Semi-annually
	Net-to-gross ratio by energy type	Evaluation research	When updated evaluation research reports are finalized.
	Degradation rate of savings	It is the rate that results in half of the first year savings remains at the end of the measure life (as an estimated useful life)	No change has been made to this rate to date. However, it is significantly affected by changes in measure lifetime.
	Measure lifetime	Evaluation research	As research reports updating the values are finalized.
	Discount rate	Determined by stakeholders based on available data	As needed to support b/c reports.
	Avoided cost of energy	Determined by stakeholders based on available data	As needed to support b/c reports.
Value of Avoided Emissions	Persistent net lifetime savings	It is based on the same energy impact data as the "Value of Energy Saved" immediately above.	When updated evaluation research reports are finalized.
	Emission factor by energy type	Evaluation reports based on analysis of EPA Acid Rain database	When updated evaluation research reports are finalized.
	Emission price by pollutant	PA Consulting Group's Multi-pollutant optimization model (M-POM for NO_x, SO_x)	As needed to support b/c reports.
Program Spending	Invoiced expenses	Through FY07, the source was invoices submitted by program administrators. Since then it has been reports obtained from Wipfli via the PSCW.	Program spending for the current period are updated every six months to support SAR reporting.
	Incentives paid	Invoices/reports	Semi-annually
Incremental Costs	First year avoided costs	Verified gross savings × avoided cost of energy	Semi-annually
	Number of measures installed	Program tracking database	Semi-annually
	Unit of analysis (NIC unit)	Evaluation research	As needed to support b/c reports.
	Incremental cost multiplier	Evaluation research	As needed to support b/c reports.
Attribution Rate for Costs	Attribution rate by energy type	Evaluation research	Semi-annually
	Proportion of program spending by energy type	WECC measures	Semi-annually

2.7.2 Program years affected by data updates

Program impact data, which is the main input to the benefit-cost analysis, is also used for reporting program impacts in the SAR. The reported b/c values are governed by the same policies that have been established for applying updates to impacts for the SAR. Changes to inputs such as emission factors and avoided costs, however, are applied universally across all program years when new data are available.

2.7.3 A note on documentable savings, measure life, and persistence

Documentable savings for the earlier program years are taken from the prior evaluation reports, in particular the most recent year-end report. In addition, the energy efficiency measures installed typically last for a number of years, so their lifetime energy impacts would be calculated by multiplying the annual energy savings by the number of years that the energy efficiency measure is expected to be in operation. These lifetime energy impacts—explicitly considering measure life interpreted as the median number of years of expected operation—are now termed in Focus evaluation impact reporting *lifecycle* energy impacts. An additional new concept embodied in the energy impacts used in this Benefit-cost Report is *persistent* savings. These are *lifecycle* impacts that also include an exponential decay rate, such that half the savings remains after the measure life.

Measure life was assessed for each program component by the program area evaluators, primarily based on secondary sources. This measure life is interpreted as the median measure life. (Measure lives for all program measures included in this analysis are provided in Appendix D of the *Interim Benefit-cost Analysis: FY07 Evaluation Report*.) The savings implemented in each program year is extended into the future with an exponential decay rate, such that half the savings remains after the measure life.

That is, we interpret the measure life identified from the literature as the time until half the units would be expected to have failed or been removed. This interpretation is consistent with the persistence study framework used in California and elsewhere. Under those rules, the "expected useful life" is the median survival time, where "surviving" means remaining in place and operable.

With this interpretation and an assumed exponential decay, the fraction "f" of savings that survives from one year to the next is given by

$$f = 2^{-(1/L)}$$

where L is the measure life. For example, if the measure life is 15 years, the surviving fraction each year is

$$f = 2^{-1/15} = 95.5\%.$$

The decay rate is

$$d = 1-f = 4.5\%.$$

Thus, in this example, the surviving savings from the prior year is calculated as 95.5 percent of the prior year's amount; 4.5 percent of the prior year's savings is lost. Associated non-energy and environmental benefits decay at the same rate.

The exponential decay formula implies a constant failure rate over time. This assumption is not necessarily realistic for many measures. Experience from numerous persistence studies conducted in California indicates that the failure process is often a mixture of two phenomena—in the short term, removal due to defect or dissatisfaction, and in the longer term, more or less steady wear-out patterns. This mixture suggests a "hazard rate" that is

high in the early years, then declines, becoming stable (exponential) or eventually rising again in much later years.[23]

2.7.4 Benefit-cost findings

Tables 2-23 and 2-24 show results of the simple benefit-cost analysis. Additional details about the inputs to these tables can be found in Appendix C. The columns of Tables 2-23 and 2-24 are defined as follows:

- **Value of Energy Savings.** The present value of the utility avoided costs over the life of the measures installed through the program. This is comparable to the "documentable savings" referred to in the next section.
- **Value of Avoided Emissions.** The present value of the utility avoided costs associated with pollutants displaced by the program over the life of the measures. This is comparable to the "externalities" referred to in the next section.
- **Program Costs.** Program spending including administrative costs directly related to program implementation, but excluding incentives and other Focus administrative costs (e.g., evaluation, compliance).
- **Incentives.** Financial payments by the program to encourage the adoption of energy efficient measures.
- **Incremental Costs.** The costs of a measure over and above a standard efficiency measure. For the renewables program area, it is the full project costs. The attribution ratio is applied to these costs to obtain the value to be included in the simple b/c formula.
- **Simple B/C.** The simple benefit-cost ratio is the sum of Value of Energy Savings and the Value of Avoided Emissions divided by the sum of Program Costs and net Incremental Costs.
- **CCE kWh.** The cost of conserved energy for each kilowatt-hour saved.
- **CCE Therms.** The cost of conserved energy for each therm saved.
- **Elec %.** The proportion of the program cost that are allocated to electricity savings.
- **NTG kWh.** The net-to-gross ratio for the electric energy savings.
- **NTG Therms.** The net-to-gross ratio for the gas energy savings.

[23] The Weibull function is commonly used for survival analysis—applicable here as the survival of efficient measures, once installed. The form of this function can give either an increasing or decreasing hazard rate, but not one that starts high, drops, then stabilizes or climbs. For a fixed median measure life, we considered a Weibull function with shape parameter 1/2 (decreasing hazard) and one with shape parameter 2 (increasing hazard). The first gives a five to ten percent lower NPV and the second gives a five to ten percent higher NPV compared to the exponential function. A mixture of the two distributions, representing a combination of the two contributing phenomena, would give NPV somewhere between, or close to the form of the exponential itself. Thus, the exponential assumption, which is computationally convenient, appears to yield appropriate results for purposes of this analysis.

Table 2-23. Simple Benefit-cost and Cost of Conserved Energy CY09 (January 1– December 31, 2009)

Program Area	Value of Energy Savings	Value of Avoided Emissions	Program Costs	Incentives	Incremental Costs	Simple B/C	CCE kWh	CCE Therms	Elec %	NTG kWh	NTG Therms
Business	$223,074	$13,300	$20,709	$35,398	$106,759	2.7	$0.042	$0.194	85%	66%	60%
Renewables	$18,479	$751	$2,114	$6,423	$21,564	1.1	$0.258	$0.203	85%	42%	26%
Residential	$42,106	$3,323	$11,004	$15,693	$35,519	1.5	$0.059	$0.666	70%	72%	63%
Total	**$283,660**	**$17,374**	**$33,828**	**$57,515**	**$163,842**	**2.2**	**$0.050**	**$0.274**	**81%**	**66%**	**54%**

"Program Costs" do not include incentives. Dollar values are denominated in thousands (000).

Table 2-24. Simple Benefit-cost and Cost of Conserved Energy Program to Date (July 1, 2001–December 31, 2009)

Program Area	Value of Energy Savings	Value of Avoided Emissions	Program Costs	Incentives	Incremental Costs	Simple B/C	CCE kWh	CCE Therms	Elec %	NTG kWh	NTG Therms
Business	$813,954	$42,774	$103,693	$99,302	$398,619	2.5	$0.044	$0.241	76%	61%	59%
Renewables	$45,414	$2,101	$13,181	$15,692	$66,352	1.1	$0.223	$0.173	89%	30%	29%
Residential	$349,996	$22,764	$80,048	$86,229	$237,136	1.3	$0.060	$0.868	66%	88%	85%
Total	$1,209,364	$67,639	$196,922	$201,223	$702,106	1.9	$0.053	$0.373	73%	68%	59%

"Program Costs" do not include incentives. Dollar values are denominated in thousands (000).

2.8 DETAILED BENEFIT-COST ANALYSIS

Evaluators have recently completed a full-scale, detailed benefit-cost analysis that includes not only historical program effects but also a fifteen-year forward-looking horizon.[24] This report also includes an expanded b/c test that incorporates:

- Quantified non-energy benefits
- Avoided emissions' externality costs for expected future emissions offset markets.
- Benefits that are valued in terms of their net impact on the economy, as determined from the economic impact analysis. The economic impacts take into account the ripple effects on the Wisconsin economy of energy savings and associated non-energy and emissions effects.

This detailed b/c report has not yet been released by the PSCW. Once it is released, its findings will be incorporated into the upcoming semiannual reports.

2.9 COMPARISONS OF FOCUS ENERGY IMPACTS AND ACHIEVABLE POTENTIAL

In order to assist in the identification of measure categories where the potential for additional energy savings is strong, evaluators compared program-to-date savings with the savings potential findings of the report, prepared by the Energy Center of Wisconsin (ECW), *Energy Efficiency and Customer-Sited Renewable Resource Potential in Wisconsin: for the years*

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

2012 and 2018 ("the Potential Study"). We compared the market potential in 2012 with what had been achieved between January 1 and December 31, 2009.

We note that the frame of reference of our evaluation is much narrower than the perspective of the ECW Potential Study. The authors of that study consider their findings most accurate at the program portfolio level.[25] At the measure category level there is more uncertainty: potential savings for some measures might be overstated and for others might be understated. Across many technologies, however, those errors are expected to cancel out. This renders the aggregate savings estimate more accurate than its composite parts. With this caveat in mind, it is prudent for the reader to give credence only to the relatively strong signals and discount weaker ones.

We first assigned measures installed through Focus to markets identified in the Potential Study. Assignments were based on feedback provided by ECW about the specific measures comprised within each market and end-use category. We aligned each program to its market segment. For instance, the ACES program was aligned with the "Rental, Large" (RL) market segment in the potential study, which includes rental properties with five or more units. Each segment is further disaggregated into markets (e.g., New Construction, Retrofit, Replace on Burnout), and end-uses (e.g., space heating, water heating, space cooling, lighting, home appliance, and other). Each end-use comprises one or more specific measure categories. Not all measure categories tracked by Focus can be linked to a market/end-use/measure in the Potential Study, and some market/end-use/measure combinations have no current corollary in Focus Programming.

In a separate communication, supplementing findings of the published report, ECW provided annual 2012 energy saving values for each measure category. We summed program savings for each measure category tracked by Focus and compared that value to its market potential for the year 2012. For measures where current annual savings are low relative to the 2012 potential there may be an opportunity for programs to increase their efforts. It should be understood that not every apparent opportunity will easily be realized. There are sometimes good reasons why annual savings for a given measure are low relative to potential. For example, a measure may not have been in the market long enough to gain acceptance, or there may be substantial measure-specific market barriers.

Table 2-25 shows a comparison of residential program electric savings (kWh) with estimated 2012 potential. In this table, only the five market/end-use/measure combinations with the highest additional savings potential are shown. (Appendix G contains the complete table.) The two right-hand columns show the percentage of 2012 potential that was achieved from January to December 2009 and the additional annual potential that is estimated to exist. The table is sorted from highest to lowest estimated potential relative to current savings, grouped by program. Totals at the bottom of the table are for the program as a whole.

[25] Personal communication with Steven Kihm, ECW, February 11, 2010.

Table 2-25. Comparison of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent 2012 Potential Achieved	Potential Additional Savings (MWh)
ACES	Common Area Lighting Improvements in Multifamily	6,266	2.9%	489	0.6%	7.8%	5,777
ACES	Wx - Direct Install	2,770	1.3%	45	0.1%	1.6%	2,726
ACES	CFL Bulbs, purchased replacement (2012)	5,276	2.4%	4,646	6.1%	88.1%	630
ACES	ECM Furnace	356	0.2%	12	0.0%	3.3%	344
ACES	Water Heater Blanket	263	0.1%	0	0.0%	0.0%	263
Residential	Weatherization - Direct Install	33,254	15.2%	1,295	1.7%	3.9%	31,960
Residential	Whole-house Electricity-Use Feedback Display Retrofit	74,276	34.0%	44,360	58.7%	59.7%	29,916
Residential	ECM Furnace	23,478	10.7%	0	0.0%	0.0%	23,478
Residential	Common Area Lighting Improvements in Multifamily	19,237	8.8%	6,329	8.4%	32.9%	12,908
Residential	CFL Bulbs, purchased replacement (2012)	7,595	3.5%	0	0.0%	0.0%	7,595
Total	**Total**	**218,714**	**100.0%**	**75,602**	**100.0%**	**34.6%**	**143,112**

For ACES, common area lighting and weatherization have the largest difference between current savings and savings potential, with approximately 5,800 and 2,700 MWh additional annual energy savings potential, respectively. On the other end of the spectrum, the market for CFLs seems to be almost at its peaks and for low flow showerheads to be in steep decline, suggesting continued effort on these may not result in significant savings.

Table 2-26 corresponds to Table 2-25—a comparison of residential program savings with estimated 2012 potential—but for gas (1,000 therms) energy savings. Once again, it only shows only five market/end use/measure combinations with the highest savings potential. Note that the total potential is actually lower than the sum of the included measure category potentials. This is because some measures not in the top five categories have negative therm savings, offset by electric savings. The total reflects the negative values that are not included in the table.

Table 2-26. Comparison of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets

Program	Measure Category	2012 Therms Potential	Percent Total Therms Potential	Focus CY09 Therms Saved	Percent Total Therms Saved	Percent 2012 Potential Achieved	Potential Additional Savings (Therms)
ACES	Boiler Controls-Gas	172	4.9%	9	0.4%	5.2%	163
ACES	Drainwater heat recovery	152	4.3%	0	0.0%	0.0%	152
ACES	Weatherization - Direct Install	113	3.2%	19	0.8%	17.3%	93
ACES	Mainline Air vent (MF) - gas	25	0.7%	0	0.0%	0.0%	25
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Elec. Dryer)	11	0.3%	0	0.0%	0.0%	11
Residential	Weatherization - Direct Install	3,291	93.5%	591	23.6%	18.0%	2,700
Residential	Low Flow Showerhead (w/ Gas DHW)	1,011	28.7%	0	0.0%	0.0%	1,011
Residential	Drainwater heat recovery	379	10.8%	0	0.0%	0.0%	379
Residential	Setback Thermostats	324	9.2%	0	0.0%	0.0%	324
Residential	High Efficiency Boiler w/ indirect DHW	146	4.1%	0	0.0%	0.0%	146
Total	**Total**	**3,521**	**100.0%**	**2,502**	**100.0%**	**71.1%**	**1,018**

Table 2-27 continues the series with business program electricity savings.

Table 2-27. Comparisons of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent 2012 Potential Achieved	Potential Additional Savings (MWh)
Agriculture	Dairy/Livestock Operation - Milking Parlor	19,234	2.3%	9,330	3.1%	48.5%	9,904
Agriculture	Dairy/Livestock Operation - Ventilation	657	0.1%	0	0.0%	0.0%	657
Commercial	Lighting controls / design	78,281	9.3%	1,758	0.6%	2.2%	76,523
Commercial	Refrig - RCx / controls	56,305	6.7%	1,929	0.6%	3.4%	54,376
Commercial	Lighting equipment	87,756	10.4%	56,519	18.8%	64.4%	31,236
Commercial	Data / computing / office equip	28,142	3.3%	3,079	1.0%	10.9%	25,064

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent 2012 Potential Achieved	Potential Additional Savings (MWh)
Commercial	Cooling Equipment	27,139	3.2%	4,271	1.4%	15.7%	22,867
Industrial	Motors - VSD, Motor Optimization and Efficient Motors	97,522	11.5%	429	0.1%	0.4%	97,093
Industrial	Motors - System Component Improvement and Replacement	61,695	7.3%	0	0.0%	0.0%	61,695
Industrial	Lighting - Efficient System Design and Controls	55,665	6.6%	7,479	2.5%	13.4%	48,185
Industrial	HVAC - Efficient System Design and Controls	21,099	2.5%	0	0.0%	0.0%	21,099
Industrial	Motors - Improved Controls and Sensors	19,357	2.3%	0	0.0%	0.0%	19,357
Total	**Total**	**844,829**	**100.0%**	**301,103**	**100.0%**	**35.6%**	**543,726**

Table 2-28 completes the series with business program gas savings.

Table 2-28. Comparisons of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets

Program	Measure Category	2012 Therms Potential	Percent Total Therms Potential	Focus CY09 Therms Saved	Percent Total Therms Saved	Percent 2012 Potential Achieved	Potential Additional Savings (Therms)
Agriculture	Grain Drying Operations - Process Improvements	169	0.5%	20	0.2%	12.1%	149
Agriculture	Greenhouses - Space Heating	121	0.4%	27	0.3%	22.6%	94
Commercial	HVAC RCx / Controls	5,020	14.6%	794	7.3%	15.8%	4,226
Commercial	DHW System improvements	2,825	8.2%	11	0.1%	0.4%	2,814
Commercial	Faucets / Nozzles	746	2.2%	43	0.4%	5.8%	703
Commercial	Shell improvement	681	2.0%	38	0.4%	5.6%	643
Commercial	Gas Heating Equip	656	1.9%	40	0.4%	6.2%	615
Industrial	Steam Production - Improved Operations and Maintenance	6,006	17.5%	142	1.3%	2.4%	5,865
Industrial	Process Heating (G) - Improved Operations and Maintenance	4,690	13.7%	0	0.0%	0.0%	4,690

Program	Measure Category	2012 Therms Potential	Percent Total Therms Potential	Focus CY09 Therms Saved	Percent Total Therms Saved	Percent 2012 Potential Achieved	Potential Additional Savings (Therms)
Industrial	Steam Production - Improved System Design and Controls	4,597	13.4%	0	0.0%	0.0%	4,597
Industrial	Process Heating (G) - Insulation and Sealing of System Components	2,464	7.2%	0	0.0%	0.0%	2,464
Industrial	Steam Production - Waste and/or Process Heat Recovery	1,560	4.5%	0	0.0%	0.0%	1,560
Total	**Total**	**34,292**	**100.0%**	**10,897**	**100.0%**	**31.8%**	**23,395**

3. BUSINESS PROGRAMS EVALUATION

3.1 OVERVIEW OF KEY ACTIVITIES

This chapter describes our evaluation of Focus Business Programs program activity during the second half of 2009. The CY09 evaluation covers program year 2009 (January 1, 2009, through December 31, 2009). This chapter summarizes the following:

- Reports delivered in contract year 2009
- Energy impacts
- Deemed savings review
- Deemed savings parameter development
- Additional looks at attribution
- Life cycle net savings (LCNS) methods analysis
- Supply-side research
- Review of load shapes
- Measure life study
- Incremental cost study
- Further Business Programs reading.[26]

3.2 REPORTS DELIVERED IN THE SECOND HALF OF 2009

- Semiannual reports
  - 2009 Contract Period, First Half of 2001 – Final Revised Report: October 19, 2009
- Business Programs Measure Life Study, Final Report: August 25, 2009
- Review of Business Programs Load Shapes – Final Memo: October 15, 2009
- Business Programs Incremental Cost Study, Final Report: October 28, 2009
- Business Programs Deemed Savings Parameter Development, Final Report: November 13, 2009
- Business Programs Deemed Savings Review, Final Memo: November 30, 2009
- Business Programs Additional Looks at Attribution, Final Report: February 26, 2010
- Business Programs Acceleration Treatment and Life Cycle Net Savings, Final Report: March 10, 2010

[26] The supply-side research report is not included in this draft semiannual report. The evaluation team will submit the draft supply-side report for review on March 23, 2010.

- Business Programs Impact Evaluation Report: Last Quarter of the 18-month Contract Period and First Three Quarters of Calendar Year 2009, Final: March 31, 2010
- Business Programs Deemed Savings Manual, V1.0: March 22, 2010
- CY10 Detailed Evaluation Plans, Final: April 1, 2010
- Business Programs Supply-side Evaluation, Final: April 22, 2010.

3.3 ENERGY IMPACTS

The evaluation team has implemented twelve rounds of data collection and document review to estimate net energy savings for Business Programs. The CY09 impact evaluation included one round of data collection and document review. It covered measures implemented during the last quarter of the 18-month Contract Period[27] (October 1, 2008, through December 31, 2008) and the first three quarters of Calendar Year 2009[28] (January 1, 2009, through September 30, 2009). KEMA reported the CY09 impact evaluation results in the *Business Programs Impact Evaluation Report: Last Quarter of the 18 MCP and First Three Quarters of CY09* (March 31, 2010).[29]

Following the impact evaluation summary, we also provide estimates of tracked and evaluation verified savings for the program to date.

3.3.1 General approach

The impact analysis determines three adjustment factors to the savings reported by the program:

- **Gross savings adjustment factor.** This factor adjusts tracking gross savings for installation and changes based on 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.)

The definitions of these factors and the general methods for producing them have essentially remained the same for each round of impact evaluation for this program area.

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

[28] "Calendar Year 2009" refers to program implementation between January 1, 2009, and December 31, 2009.

[29] This is a draft report. KEMA has received reviewer comments. The report will be finalized prior to the submission of the final semiannual report.

3.3.2 CY09 impact evaluation

The final CY09 impact evaluation included measures implemented between October 1, 2008, and September 2009. Data collection and document review to estimate net energy savings for Business Programs used similar procedures and protocols that have been used in the past. One notable change this year was the transition from sector-level reporting to measure group reporting. Under the direction of the PSCW, and with input from the program, KEMA changed from a customer-level sampling design to a measure-level sampling design that allowed for measure-level reporting of results.

The adjustment factors are calculated separately for each energy unit (kWh, kW, and therms) in combination with each measure group and for the Business Programs, overall. The calculation of the adjustment factors uses appropriate weights corresponding to the sampling rate within each stratum. The main objective in designing the sample drawn was to provide the best possible estimates for the sampling measure groups and for Business Programs, overall. For some sampling measure groups the precision achieved was insufficient to report as a stand-alone estimate. Measure groups with relative errors greater than 40 percent for their primary savings type were allocated into other measure groups. The final reporting measure groups include Non-Small CFL Lighting, HVAC, Expanded Process, Boilers and Burners, Small CFLs, Refrigeration, and Other.

A. RESULTS

This section provides the results of the CY09 impact evaluation. The results are provided by the overall program and each sector for kWh, kW, and therms in the following order:

- Gross savings adjustment factor
- Attribution factor
- Realization rate.

Table 3-1 shows the CY09 gross savings adjustment factors by reporting measure group. The gross savings adjustment factor combines the installation rate and the engineering verification factor to adjust the tracking estimate of gross savings. The gross savings adjustment factor is greater than 100 percent for all three energy units, indicating that the program is doing an effective job of estimating gross energy savings and may be slightly underestimating savings. All of the measure-group-level gross savings adjustment factors are above 90 percent.

The CY09 program overall gross savings adjustment factors are greater than the previous program year for all energy units at the 95 percent confidence level.

Table 3-1. CY09 Gross Savings Adjustment Factors by Reporting Measure Group

Measure Group	kWh				kW				Therms			
	min n	Gross Savings Adjustment Factor	90% CI ±	% Pop Savings	min n	Gross Savings Adjustment Factor	90% CI ±	% Pop Savings	min n	Gross Savings Adjustment Factor	90% CI ±	% Pop Savings
Boilers & Burners	7	99.1%	2.3%	0.5%	1	100.0%	<0.1%	0.2%	164	99.1%	0.8%	38.1%
Non-Small CFL Lighting	283	101.0%	1.6%	42.5%	259	101.5%	1.9%	36.5%	-	-	-	-
Refrigeration	47	96.3%	9.0%	5.5%	46	95.2%	9.6%	3.6%	3	94.1%	24.8%	0.3%
HVAC	90	101.8%	39.2%	14.5%	71	95.6%	9.9%	30.0%	76	105.9%	7.5%	19.1%
Expanded Process	51	109.9%	25.2%	17.0%	44	145.1%	37.8%	9.4%	31	117.7%	16.5%	35.7%
Small CFLs	52	98.8%	1.5%	12.0%	52	98.9%	1.4%	14.7%	-	-	-	-
Other	89	106.2%	15.4%	8.1%	75	112.5%	15.8%	5.7%	38	91.3%	8.7%	6.8%
Business Programs Overall	**619**	**102.3%**	**6.5%**	**100.0%**	**549**	**102.8%**	**4.2%**	**100.0%**	**312**	**105.8%**	**5.3%**	**100.0%**

Table 3-2 shows the attribution adjustment factors by reporting measure group. The CY09 attribution factors for the program overall are 66 percent, 58 percent, and 60 percent for kWh, kW, and therms, respectively. The CY09 adjustment factor for kWh is greater than for the 18 MCP and is statistically significant at the 95 percent level of confidence. The kW and therms estimates are statistically consistent with the 18 MCP.

For the kWh energy unit, the attribution adjustment factors at the measure group level are above 50 percent for all but the 'Other' measure group, which accounts for 8.1 percent of the overall kWh tracking savings. For the kW energy unit, the attribution adjustment factors are above 50 percent for all but the HVAC measure group, which accounts for 30 percent of the overall kW tracking savings. For the therms energy unit, the attribution adjustment factors are above 50 percent for all but the Boilers and Burners (38.1 percent of overall therm tracking savings) and HVAC (19.1 percent of overall therm tracking savings) measure groups.

The low attribution for the Boilers and Burners measure group is primarily a function of boiler service buydowns, which make up a significant portion of the therm savings in this group and generally received poor attribution.

Table 3-2. CY09 Attribution Factors by Reporting Measure Group[30]

Measure Group	kWh				kW				Therms			
	n	Attribution Adjustment Factor	90% CI ±	% Pop Savings	n	Attribution Adjustment Factor	90% CI ±	% Pop Savings	n	Attribution Adjustment Factor	90% CI ±	% Pop Savings
Boilers & Burners	7	89.3%	14.6%	0.5%	-	-	-	-	159	33.3%	13.0%	38.1%
Non-Small CFL Lighting	267	59.6%	8.2%	42.5%	244	60.8%	8.7%	36.5%	-	-	-	-
Refrigeration	44	75.6%	10.2%	5.5%	43	72.4%	12.4%	3.6%	3	77.4%	43.5%	0.3%
HVAC	84	77.1%	27.0%	14.5%	64	37.9%	18.8%	30.0%	72	44.0%	19.5%	19.1%
Expanded Process	50	66.2%	17.8%	17.0%	43	58.3%	20.2%	9.4%	31	89.6%	6.7%	35.7%
Small CFLs	52	84.1%	<0.1%	12.0%	52	84.1%	<0.1%	14.7%	-	-	-	-
Other	85	48.3%	16.3%	8.1%	71	53.9%	20.4%	5.7%	37	79.1%	14.5%	6.8%
Business Programs Overall	**589**	**65.7%**	**5.7%**	**100.0%**	**518**	**58.1%**	**7.2%**	**100.0%**	**302**	**59.5%**	**8.1%**	**100.0%**

Table 3-3 shows the CY09 realization rates by sector. The realization rates combine the effect of the gross savings adjustment factors and the attribution factors. For the Business Programs overall, the CY09 kWh and therms adjustment factors are greater than the 18 MCP factors and statistically significant at the 95 percent level of confidence. The kW estimate is statistically consistent with the 18 MCP.

The kWh realization rate is greater than 50 percent for all measure groups, with the 'Other' group the lowest at 51.3 percent representing 8.1 percent of program tracking kWh savings. The kW realization rate is greater than 50 percent for all measure groups except HVAC, with a realization rate of 36.3 percent, representing 30.0 percent of program tracking kW savings. The therms realization rate is greater than 50 percent for all measure groups except Boilers and Burners (33.0 percent realization rate; 38.1 percent of tracking savings) and HVAC (46.6 percent realization rate; 19.1 percent of tracking savings).

Table 3-3. CY09 Realization Rates by Reporting Measure Group

Measure Group	kWh				kW				Therms			
	min n	Realization Rate	90% CI ±	% Pop Savings	min n	Realization Rate	90% CI ±	% Pop Savings	min n	Realization Rate	90% CI ±	% Pop Savings
Boilers & Burners	7	88.6%	14.6%	0.5%	-	-	-	-	159	33.0%	12.9%	38.1%
Non-Small CFL Lighting	267	60.2%	8.3%	42.5%	244	61.7%	8.9%	36.5%	-	-	-	-
Refrigeration	44	72.8%	12.0%	5.5%	43	68.9%	13.7%	3.6%	3	72.8%	45.2%	0.3%
HVAC	84	78.5%	40.8%	14.5%	64	36.3%	18.3%	30.0%	72	46.6%	20.9%	19.1%
Expanded Process	50	72.8%	25.7%	17.0%	43	84.6%	36.7%	9.4%	31	105.5%	16.7%	35.7%
Small CFLs	52	83.1%	1.3%	12.0%	52	83.2%	1.1%	14.7%	-	-	-	-
Other	85	51.3%	18.8%	8.1%	71	60.6%	24.5%	5.7%	37	72.3%	14.9%	6.8%
Business Programs Overall	**589**	**67.2%**	**7.2%**	**100.0%**	**518**	**59.7%**	**7.8%**	**100.0%**	**302**	**62.9%**	**9.1%**	**100.0%**

[30] The attribution factor for "Small CFLs" was updated using the new BP CFL NTG ratios reported in the *2008 Sector-based CFL Net-to-Gross Analysis* memo of April 16, 2010.

3.3.3 Verified tracked energy impacts

The estimates of the adjustment factors by sector are used to calculate verified gross savings and net savings. Multiplying tracking gross savings by the gross savings adjustment factor (which is the product of the installation rate and the engineering verification factor) alone yields verified gross savings.

For the contract year 2009 (January 1, 2009, through December 31, 2009), Table 3-4a gives tracking and verified gross savings and net savings by sector and for Business Programs overall. These estimates are based on the savings tracked for this period with the CY09 adjustment factors. That is, the estimates of the adjustment factors by reporting measure group reported in the *Business Programs Impact Evaluation Report: Last Quarter of the 18 MCP and First Three Quarters of CY09* (March 31, 2010).

Figure 3-1. Verified Gross Electric Energy Impacts by Program, Business Programs CY09 (January 1–December 31, 2009)

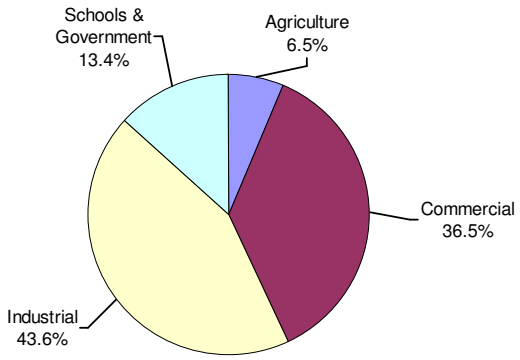

Figure 3-2. Verified Gross Electric Energy Impacts by Program, Business Programs, Program to Date (July 1, 2001–December 31, 2009)

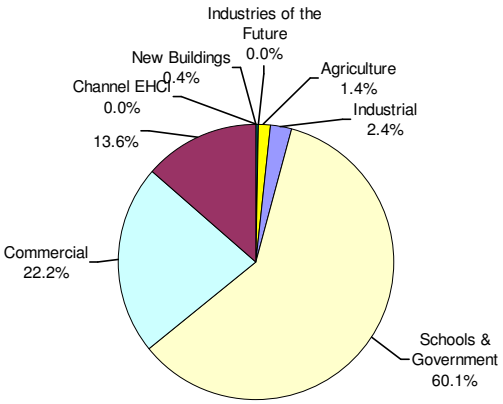

Figure 3-3. Verified Gross Gas Energy Impacts by Program, Business Programs CY09 (January 1–December 31, 2009)

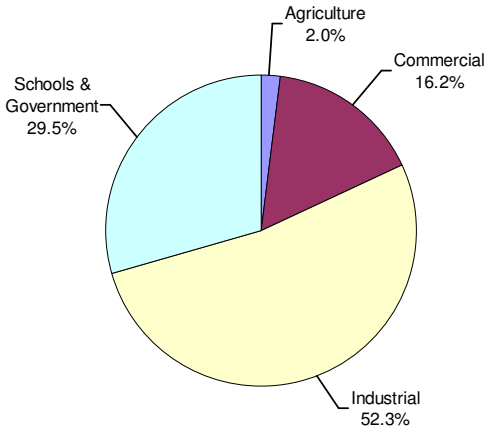

Figure 3-4. Verified Gross Gas Energy Impacts by Program, Business Programs, Program to Date (July 1, 2001–December 31, 2009)

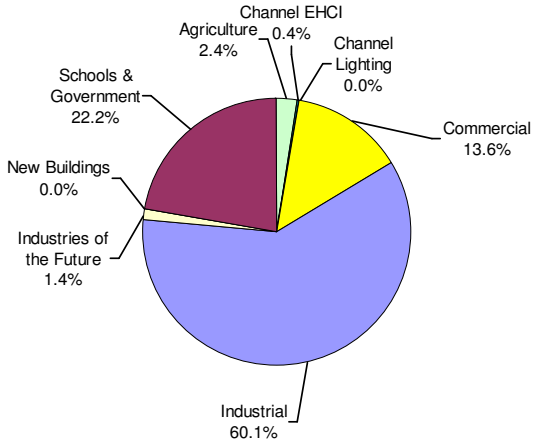

Table 3-4a. All Business Programs: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	31,703,140	7,115	472,039	32,663,698	7,499	431,632	20,385,716	4,360	338,414
Commercial	183,990,925	43,627	3,466,631	184,784,610	44,081	3,492,998	127,257,436	25,934	1,587,383
Industrial	212,526,580	36,008	10,231,074	220,741,895	40,136	11,296,428	139,066,573	22,870	8,209,707
Schools & Government	66,233,739	19,848	6,343,293	67,636,040	20,268	6,374,218	43,283,573	9,575	2,599,172
Total	**494,454,384**	**106,598**	**20,513,036**	**505,826,243**	**111,985**	**21,595,276**	**329,993,298**	**62,739**	**12,734,677**

Tables 3-4b through 3-4h provide tracking and verified gross savings and net savings by program and for Business Programs overall for 18 MCP through FY02 (program start through June 30, 2002), respectively. Adjustment factors determined from the earlier rounds of similar data collection and analysis are used to calculate the savings for each of these program years. Estimates of the adjustment factors used to calculate verified gross savings and net savings for the earlier years are provided in the following reports:

- FY02: Volume III, Impact Evaluation of the Business Programs Comprehensive Report, December 23, 2002
- FY03: Business Programs Impact Evaluation Report—Contract Year 2 Complete, January 14, 2004
- FY04: Business Programs Impact Evaluation Report—Year 3, Round 1, June 17, 2004

- FY05: Business Programs Impact Evaluation Report—FY05, Round 1, September 9, 2005
- FY06: Business Programs Impact Evaluation Report—FY06, March 2, 2007
- FY07: Abbreviated FY07 Business Programs Impact Evaluation—Final memo, February 18, 2008
- 18 MCP: Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period–Final Report (April 2, 2009).

Table 3-4b. All Business Programs: Tracked Annual Energy Impacts
The 18-month Contract Period (July 1, 2007–December 31, 2008)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	38,061,160	9,469	743,242	36,158,668	9,185	572,464	21,319,235	5,208	96,806
Commercial	149,701,631	36,946	2,220,233	136,228,940	35,099	2,286,848	94,313,902	24,385	755,002
Industrial	210,764,565	34,274	13,967,554	196,011,045	31,189	13,269,176	111,705,219	16,794	8,380,532
Schools & Government	44,327,423	13,164	5,214,168	43,884,149	12,362	4,119,193	19,060,792	5,596	1,564,250
Total	**442,854,779**	**93,853**	**22,145,197**	**412,282,803**	**87,836**	**20,247,680**	**246,399,148**	**51,982**	**10,796,591**

Table 3-4c. All Business Programs: Tracked Annual Energy Impacts
FY07 (July 1, 2006–June 30, 2007)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	19,695,023	5,304	756,579	16,346,869	4,349	597,698	10,044,462	2,387	272,369
Commercial	51,718,124	11,740	1,489,990	51,200,942	11,740	1,266,491	37,237,049	8,923	566,196
Industrial	62,493,680	10,529	7,828,273	61,868,743	10,423	7,749,990	35,621,398	5,580	4,931,812
Schools & Government	23,223,397	5,887	3,584,081	21,597,759	5,769	1,899,563	15,559,676	4,886	1,039,384
Total	**157,130,223**	**33,460**	**13,658,924**	**151,014,314**	**32,282**	**11,513,743**	**98,462,584**	**21,776**	**6,809,760**

Table 3-4d. All Business Programs: Tracked Annual Energy Impacts
FY06 (July 1, 2005–June 30, 2006)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	10,369,653	2,556	169,600	10,784,342	2,377	162,816	5,495,867	1,048	98,368
Channel EHCI	720,371	650	363,389	719,198	671	336,265	266,434	291	284,833
Channel Lighting	44,213,387	10,825	2,572	40,419,017	10,361	2,526	29,282,846	7,778	1,589
Commercial	25,077,211	3,442	1,400,525	24,973,534	3,523	1,367,959	14,995,143	2,038	694,238
Industrial	36,665,838	6,497	5,203,226	40,408,104	7,000	5,261,531	32,213,745	5,358	1,951,784
Schools & Government	14,865,393	4,397	2,535,132	14,558,875	4,376	2,287,500	9,443,240	2,530	1,334,962
Total	**131,911,853**	**28,366**	**9,674,445**	**131,863,071**	**28,309**	**9,418,597**	**91,697,275**	**19,042**	**4,365,774**

Table 3-4e. All Business Programs: Tracked Annual Energy Impacts
FY05 (July 1, 2004–June 30, 2005)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	15,305,374	3,661	263,585	9,701,733	2,195	262,224	5,629,513	1,059	96,640
Commercial	44,218,407	9,810	1,018,331	30,703,691	6,532	920,120	18,924,532	3,872	275,075
Industrial	67,588,254	9,543	3,982,640	54,234,559	8,270	4,228,658	23,555,437	3,162	2,140,696
Schools & Government	16,595,676	4,068	1,780,566	16,078,481	3,908	1,695,159	7,751,733	1,879	951,559
Total	**143,707,711**	**27,083**	**7,045,122**	**110,718,465**	**20,906**	**7,106,161**	**55,861,214**	**9,972**	**3,463,969**

Table 3-4f. All Business Programs: Tracked Annual Energy Impacts
FY04 (July 1, 2003–June 30, 2004)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	16,000,309	3,541	81,250	11,105,756	2,876	63,415	5,889,700	1,551	53,368
Commercial	42,261,364	9,348	589,867	37,837,194	9,631	589,498	19,906,541	5,516	509,922
Industrial	80,264,260	11,793	8,611,077	69,713,833	7,524	10,127,720	40,260,298	4,114	8,828,403
Schools & Government	17,944,782	3,925	2,357,577	18,707,821	3,513	1,832,653	13,878,904	2,007	1,223,059
Total	**156,470,715**	**28,607**	**11,639,771**	**137,364,604**	**23,544**	**12,613,286**	**79,935,444**	**13,187**	**10,614,752**

Table 3-4g. All Business Programs: Tracked Annual Energy Impacts
FY03 (July 1, 2002–June 30, 2003)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	7,129,148	1,805	61,754	6,716,282	1,722	58,897	3,905,035	1,134	51,166
Commercial	39,232,419	9,479	1,869,698	36,381,429	7,868	1,875,705	17,650,457	4,634	1,550,456
Industrial	54,297,607	7,855	1,686,471	56,649,270	7,697	1,759,518	21,358,513	2,956	915,699
Industries of the Future	15,295,186	1,638	1,190,100	14,262,206	1,628	1,235,975	9,899,931	0	833,046
Schools & Government	13,860,356	2,576	1,450,431	14,314,442	2,470	1,266,154	9,669,313	1,826	292,211
Total	**129,814,716**	**23,353**	**6,258,454**	**128,323,629**	**21,385**	**6,196,249**	**62,483,249**	**10,551**	**3,642,577**

Table 3-4h. All Business Programs: Tracked Annual Energy Impacts
FY02 (July 1, 2001–June 30, 2002)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
Agriculture	931,679	278	1,319	957,662	249	1,316	438,982	91	466
Commercial	7,989,934	1,947	1,359,460	7,929,764	1,287	491,392	3,949,903	613	173,848
Industrial	16,115,405	2,525	866,495	16,618,938	4,083	631,758	11,800,434	3,027	399,772
New Buildings	143,000	113	18,049	143,000	113	18,049	143,000	46	0
Schools & Government	5,379,917	2,102	515,218	4,882,794	1,304	598,213	2,432,174	621	211,640
Total	**30,559,935**	**6,966**	**2,760,541**	**30,532,158**	**7,036**	**1,740,729**	**18,764,493**	**4,397**	**785,725**

3.3.4 Verified tracked energy impacts by technology/end-use categories and business programs sector (verified gross)

The following tables present the verified gross energy impacts for Business Programs by sector (agricultural, commercial, industrial, and schools/government) for January 1 through December 31, 2009. The tables also include a column that displays the percentage of total kWh, kW, or therm savings that come from each technology or end-use category. The tables for each sector break out the savings for that sector by measure category and indicate the percent of savings that measure category accounts for in that sector. Please note that the measure analysis group adjustment factors, and not sector level factors, are applied to derive the verified gross and verified net values.

A. AGRICULTURAL

Table 3-5. Agricultural
CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Ag Specialty	2,084,131	6.4%	633	8.4%	24,268	5.6%
Appliance-Other	19,152	0.1%	0		492	0.1%
Boiler Equipment	0		0		1,006	0.2%
Boiler Service	0		0		5,375	1.2%
CFL	6,752,534	20.7%	1,762	23.5%	0	
Compressor Equipment	317,781	1.0%	121	1.6%	0	
Controls	194,015	0.6%	36	0.5%	0	
Dishwasher	15,168	0.0%	2	0.0%	0	
Energy Recovery	3,384,744	10.4%	730	9.7%	14,517	3.4%
Fan	5,257,125	16.1%	1,465	19.5%	0	
Furnace	822	0.0%	0		264	0.1%
Greenhouse	42,182	0.1%	11	0.1%	394,633	91.4%
High Bay Fluorescent	2,684,678	8.2%	556	7.4%	0	
High Intensity Discharge (HID)	119,951	0.4%	22	0.3%	0	
Hot Water	4,253,666	13.0%	427	5.7%	-20,426	-4.7%
HVAC	223,947	0.7%	50	0.7%	1,339	0.3%
Lighting	1,793,860	5.5%	326	4.3%	0	
Motors & Drives	2,946,621	9.0%	522	7.0%	0	
Other	477,164	1.5%	128	1.7%	10,164	2.4%
Refrigeration	77,885	0.2%	17	0.2%	0	
T8/T5 Fluorescent Lighting	241,147	0.7%	51	0.7%	0	
Tune-up/Repair/Commissioning	395,508	1.2%	205	2.7%	0	
Variable Speed Drive	1,381,616	4.2%	433	5.8%	0	
Total	**32,663,698**	**100.0%**	**7,499**	**100.0%**	**431,632**	**100.0%**

B. COMMERCIAL

Table 3-6. Commercial
CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Aeration	0		0		26,416	0.8%
Appliance-Other	324	0.0%	0		2,440	0.1%
Boiler Equipment	-449	0.0%	0		187,238	5.4%
Boiler Service	0		0		945,122	27.1%
Building Shell	55,286	0%	3	0%	66,024	2%
CFL	34,652,816	19%	9,886	22%	0	
Chiller Equipment	3,805,386	2%	1,658	4%	0	
Chiller Service	6,748,471	4%	5,399	12%	0	
Compressor Equipment	89,837	0%	19	0%	0	
Computer Management	6,133,110	3.3%	0		0	
Controls	14,375,879	7.8%	1,058	2.4%	242,983	7.0%
Dehumidifier	218,277	0.1%	59	0.1%	103,840	3.0%
Dishwasher	153,983	0.1%	19	0.0%	2,568	0.1%
Economizer	51,875	0.0%	-3	0.0%	0	
Energy Recovery	1,247,762	0.7%	433	1.0%	236,689	6.8%
Fan	-30,432	0.0%	0		15,792	0.5%
Food Service	1,598,073	0.9%	272	0.6%	27,235	0.8%
Fuel Switching	493,973	0.3%	0		-19,489	-0.6%
Furnace	113,492	0.1%	0		36,349	1.0%
Geothermal	393,055	0.2%	19	0.0%	-15,059	-0.4%
High Bay Fluorescent	35,586,001	19.3%	8,747	19.8%	0	
High Intensity Discharge (HID)	168,889	0.1%	15	0.0%	0	
Hot Water	188,860	0.1%	40	0.1%	62,780	1.8%
HVAC	6,025,687	3.3%	2,339	5.3%	416,037	11.9%
Infrared Heater	0		0		14,744	0.4%
LED Holiday Light	395,849	0.2%	0		0	
Lighting	19,478,940	10.5%	2,807	6.4%	0	
Motors & Drives	8,177,011	4.4%	548	1.2%	0	
Other	725,733	0.4%	345	0.8%	63,809	1.8%
Oven	0		0		1,888	0.1%
Process	1,373,148	0.7%	189	0.4%	80,744	2.3%
Process Cooling	210,235	0.1%	17	0.0%	0	
Reconfigure Equipment	109,498	0.1%	20	0.0%	0	
Refrigerated Case Door	1,108,209	0.6%	119	0.3%	0	
Refrigeration	3,878,313	2.1%	469	1.1%	0	
Refrigerator/Freezer	97,633	0.1%	12	0.0%	0	
Rooftop Unit/Split System AC	46,948	0.0%	65	0.1%	0	
Server Virtualization	245,990	0.1%	30	0.1%	0	
Steam Trap	60,223	0.0%	11	0.0%	443,861	12.7%
Steamer	57,306	0.0%	11	0.0%	0	
T8/T5 Fluorescent Lighting	13,169,896	7.1%	3,127	7.1%	0	
Tune-up/Repair/Commissioning	21,247,128	11.5%	5,408	12.3%	289,558	8.3%
Variable Speed Drive	160,582	0.1%	3	0.0%	0	

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Vending Machine	184,442	0.1%	0		0	
Vending, Plug Loads	48,594	0.0%	0		0	
Whole Building	1,938,774	1.0%	938	2.1%	261,430	7.5%
Total	**184,784,610**	**100.0%**	**44,081**	**100.0%**	**3,492,998**	**100.0%**

C. INDUSTRIAL

Table 3-7. Industrial
CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Aeration System	3,624,206	1.6%	386	1.0%	0	
Boiler Equipment	1,851,307	0.8%	243	0.6%	321,957	2.9%
Boiler Service	0		0		679,873	6.0%
Building Shell	-7,539	0.0%	-2	0.0%	201,822	1.8%
Burner	0		0		6,181	0.1%
CFL	599,033	0.3%	109	0.3%	0	
Chiller Equipment	1,449,791	0.7%	236	0.6%	0	
Chiller Service	2,605,876	1.2%	2,085	5.2%	0	
Compressor Equipment	13,116,709	5.9%	2,530	6.3%	41,757	0.4%
Compressor Service	13,683,127	6%	2,528	6%	0	
Controls	5,229,741	2%	289	1%	705,915	6%
Direct Fired Heating	596,882	0%	3	0%	223,446	2%
Dishwasher	7,605	0.0%	1	0.0%	383	0.0%
Door	0		0		8,788	0.1%
Economizer	550,466	0.2%	6	0.0%	0	
Energy Recovery	-325,216	-0.1%	115	0.3%	998,491	8.8%
Fan	-60,629	0.0%	-5	0.0%	17,542	0.2%
Filtration	597,451	0.3%	275	0.7%	164,132	1.5%
Food Service	8,859	0.0%	1	0.0%	0	
Furnace	340,176	0.2%	154	0.4%	2,175	0.0%
Heat Recovery	0		0		161,111	1.4%
High Bay Fluorescent	75,807,024	34.3%	15,010	37.4%	0	
Hot Water	-159	0.0%	0		23,506	0.2%
HVAC	843,782	0.4%	174	0.4%	504,831	4.5%
Information Technology	3,084,663	1.4%	4	0.0%	0	
Infrared Heater	0		0		10,643	0.1%
Lighting	10,951,707	5.0%	436	1.1%	0	
Motors & Drives	24,587,876	11.1%	3,180	7.9%	0	
Other	3,280,950	1.5%	357	0.9%	258,665	2.3%
Process	19,964,212	9.0%	2,847	7.1%	2,921,762	25.9%
Process Cooling	2,011,696	0.9%	236	0.6%	0	
Process Heat	-2,453,379	-1.1%	-400	-1.0%	3,315,839	29.4%
Pump	2,177,001	1.0%	371	0.9%	0	
Reconfigure Equipment	221,025	0.1%	31	0.1%	0	
Refrigerated Case Door	131,526	0.1%	32	0.1%	0	
Refrigeration	8,581,540	3.9%	1,590	4.0%	287,918	2.5%
Refrigerator/Freezer	2,338,420	1.1%	548	1.4%	0	

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Rooftop Unit/Split System AC	15,091	0.0%	21	0.1%	0	
Specialty Pulp & Paper	2,865,298	1.3%	575	1.4%	0	
Steam Trap	0		0		394,184	3.5%
T8/T5 Fluorescent Lighting	11,214,973	5.1%	2,049	5.1%	0	
Tune-up/Repair/Commissioning	8,431,031	3.8%	3,570	8.9%	0	
Variable Speed Drive	67,221	0.0%	17	0.0%	0	
Vending, Plug Loads	1,863	0.0%	0		0	
Whole Building	2,750,691	1.2%	533	1.3%	45,507	0.4%
Total	**220,741,895**	**100.0%**	**40,136**	**100.0%**	**11,296,428**	**100.0%**

D. SCHOOLS/GOVERNMENT

Table 3-8. Schools/Government
CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Air Curtain	11,822	0.0%	0		25,676	0.4%
Appliance-Other	117,214	0.2%	62	0.3%	-438	0.0%
Boiler Equipment	1,076	0.0%	0		849,382	13.3%
Boiler Service	0		0		2,679,475	42.0%
Building Shell	325,085	0.5%	0		368,756	5.8%
CFL	5,491,413	8.1%	1,294	6.4%	0	
Chiller Equipment	2,565,048	3.8%	2,362	11.7%	0	
Chiller Service	3,745,139	5.5%	2,996	14.8%	0	
Compressor Equipment	226,425	0.3%	96	0.5%	0	
Computer Management	6,459,883	10%	0		0	
Controls	3,043,487	4%	60	0%	199,351	3%
Dampers/Shutters	17,106	0%	0		13,368	0%
Direct Fired Heating	0		0		6,386	0%
Dishwasher	393,939	1%	48	0%	2,850	0%
Door	0		0		120	0%
Economizer	45,242	0%	-2	0%	0	
Energy Recovery	119,258	0%	486	2%	193,636	3%
Fluorescent, Other	40,831	0%	12	0%	0	
Food Service	204,183	0%	29	0%	17,087	0%
Fuel Switching	189,112	0%	23	0%	-785	0%
Furnace	26,117	0%	0		8,362	0%
Geothermal	-44,794	0%	32	0%	30,049	0%
Greenhouse	0		0		346	0%
High Bay Fluorescent	11,059,188	16%	2,466	12%	0	
High Intensity Discharge (HID)	227,067	0%	51	0%	0	
Hot Water	86,334	0%	59	0%	48,501	1%
HVAC	332,702	0%	128	1%	112,255	2%
Induction	7,825	0%	2	0%	0	
Information Technology	654,623	1%	7	0%	0	
Infrared Heater	0		0		1,218	0%
Lighting	6,209,098	9%	1,020	5%	0	
Motors & Drives	6,425,954	10%	444	2%	0	

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Other	313,085	0%	75	0%	6,586	0%
Process	10,374	0%	0		0	
Reconfigure Equipment	24,806	0%	7	0%	0	
Refrigeration	401,747	1%	40	0%	0	
Refrigerator/Freezer	38,357	0%	5	0%	0	
Rooftop Unit/Split System AC	2,416	0%	3	0%	0	
Scheduling	791,734	1%	6	0%	94,353	1%
Steam Trap	48,340	0%	8	0%	1,629,287	26%
Steamer	82,531	0%	17	0%	0	
T8/T5 Fluorescent Lighting	9,601,577	14%	2,162	11%	0	
Tune-up/Repair/Commissioning	7,573,679	11%	5,859	29%	16,471	0%
Variable Speed Drive	117,240	0%	0		0	
Vending, Plug Loads	11,112	0%	0		0	
Whole Building	627,910	1%	413	2%	71,929	1%
Zoning	10,754	0%	0		0	
Total	**67,636,040**	**100%**	**20,268**	**100%**	**6,374,218**	**100%**

3.3.5 Shared savings

At the behest of the Public Service Commission of Wisconsin (PSCW), Focus on Energy and Alliant's Shared Savings programs began implementing a joint energy efficiency program on May 1, 2009. Under the joint program rules, customers interested in implementing energy efficiency projects in the Alliant service territory receive a presentation on both the Shared Savings financing offer and the Focus on Energy incentive that would pertain to their project. The savings credit for joint program projects are added to the Focus program savings regardless of whether the project was identified or initiated by a Focus Energy Advisor or an Alliant Account Manager. Projects that received the Focus incentive are already included in the WISeerts database and are evaluated and adjusted for as a part of the Focus impact evaluation. Projects that received Alliant Shared Savings financing are included in the Alliant iAvenue database, are evaluated and adjusted as part of the Alliant impact evaluation, and must be added to the Focus savings external to the established adjustment factor methodology.

Projects that received Shared Savings financing and were implemented under the joint program need to be identified and their savings adjusted for inclusion in the annual Focus on Energy CY09 savings. The evaluator reviewed the Alliant Shared Savings database and identified projects that were completed in CY09 and received the joint program offer.[31] There were only 30 joint program measures implemented in CY09. This is likely a result of the long lead-time associated with implementing custom measures.

Adjustment factors from the impact evaluation are to the tracking savings to produce the net savings attributable to the joint program. However, the Alliant Shared Savings impact evaluation is ongoing and the adjustment factor results are not final. The evaluator used the finalized adjustment factors for the Focus on Energy program to estimate the net savings

[31] Projects were identified using the "notes" and "comments" fields in the iAvenue database. Fields that referred to Focus, FOE, or a rebate in relation to the measure were included in the joint program.

resulting from the joint program projects in the Alliant Shared Savings database. Once the Alliant evaluation has been finalized, the resulting net savings estimates will be updated to reflect the actual Alliant results. Table 3-9 shows the Focus on Energy realization rate and joint program net savings that should be added to the Focus on Energy CY09 savings.

Table 3-9. Savings from CY09 Joint Program Measures in iAvenue Database

	kWh	kW	Therms
Tracking savings	526,058	80.88	16,131
Realization rate	67.2%	59.7%	62.9%
Net savings	353,511	48.29	10,146

3.3.6 Program targets and accomplishments

Net program savings as verified by evaluation are shown in Table 3-10, along with the program goals and percentage of the goals that was achieved. The savings shown are for CY09. The presentation of verified net savings in this table includes the untracked attributable savings resulting from the Impact Evaluation of the Education and Training program (see Section 2.2) as well as supply-side effects.[32] The program savings also include savings from Focus on Energy and Alliant Energy's Shared Savings program. Please note that the measure analysis group adjustment factors, and not sector-level factors, are applied to derive the verified net values.

Table 3-10. Net Business Program Savings versus Business Program Portfolio Targets CY09 (January 1–December 31, 2009)

	kWh			kW			Therms		
Program	Target	Net	% of 2009 Target	Target	Net	% of 2009 Target	Target	Net	% of 2009 Target
Agriculture	22,240,000	20,385,716	92%	4,862	4,360	90%	470,833	338,414	72%
Commercial	64,000,000	127,257,436	199%	12,800	25,934	203%	799,750	1,587,383	198%
Industrial	95,126,529	139,066,573	146%	15,378	22,870	149%	4,487,083	8,209,707	183%
Schools & Government	20,800,000	43,283,573	208%	5,720	9,575	167%	1,982,833	2,599,172	131%
Shared Savings		353,511			48			10,146	
UAS One-time		8,069,926			982			4,178,533	
UAS O&M		4,372,090			2,648			858,104	
UAS Supply Side		51,348,597			11,551			326	
Total Business Programs	**202,166,529**	**394,137,422**	**194%**	**38,760**	**77,968**	**201%**	**7,740,499**	**17,781,785**	**230%**

3.4 DEEMED SAVINGS

The deemed savings work is an ongoing collaborative effort between the Focus Program and KEMA. In 2006, the evaluation teams[33] developed a database of deemed kW and kWh values

[32] The values for supply side UAS represent the recommendations of the evaluator. See Christopher Dyson, Shawn Bodmann, Karen Rothkin, Maggie Pinckard, Erika Morgan, Ryan Barry, and Miriam Goldberg, KEMA Inc Focus Evaluation: Business Programs Supply Side Evaluation for a discussion of alternative estimates.

[33] In 2006, KEMA and WECC also collaborated with the evaluation team for the We Energies' Nonresidential Prescriptive Rebate and Comprehensive Agriculture programs.

for prescriptive measures that were part of the statewide programs and We Energies' Nonresidential Prescriptive Rebate and Comprehensive Agriculture programs. After the initial effort, KEMA took the lead in reviewing measures with therm savings and, with the conclusion of the We Energies 55 MW program, KEMA became the sole evaluation team participating in the process.

In each round of deemed savings review, the implementers and evaluators propose new deemed measures or changes to the savings for existing deemed measures. The evaluators and implementers then work to reach consensus on the savings for the reviewed measures using an iterative process. The Public Service Commission of Wisconsin (PSCW) approves the final database of deemed values.

The CY09 DEP included one round of deemed savings review. The deemed savings evaluation was completed in November of 2009. The PSCW approved the new deemed values, which took effect on January 1, 2010. Table 3-11 provides a summary of the 56 measures[34] included in the review and approved by the PSCW.

Table 3-11. Measure Categories Reviewed and Approved by the PSCW

Measure Group	Measure Category	Number of WISeerts Tech Codes
Boilers & Burners	Outside air temperature boiler reset/cut-out control	1
Food Service	Convection oven	2
	Griddle	2
	Freezer	8
	Refrigerator	8
	Ice machine	8
Plug Loads	Vending machine controls	3
	Beverage cooler controls	1
	Engine block heater timer	1
Refrigeration	Commercial refrigeration tune-up	4
	ECM motors installed on walk-in coolers or freezers	6
HVAC	High efficiency ventilation fans	1
Lighting	CFLs	4
	Recessed high performance T8 fixtures	1
	T12 bounty	6
Total		**56**

3.5 DEEMED SAVINGS PARAMETER DEVELOPMENT

The Focus on Energy program has transitioned from prescriptive energy savings estimates that are evaluated post-installation to deemed energy savings estimates that are evaluated pre-installation for a significant portion of program energy savings. The new deemed savings measures and initial estimates are proposed by the program, reviewed by the evaluation team, and finalized through a consensus process (refer to Section 3.4 Deemed Savings). The

[34] A measure is defined at the WISeerts tech code level. WISeerts is the statewide energy efficiency tracking database developed and managed by the PSCW.

@@resulting estimates do not receive a gross savings adjustment on a per-unit basis; only the non-deemed portion of the savings calculation is reviewed during the impact evaluation.

The *Evaluation Calendar Year 2009 Detailed Evaluation Plan* outlined a Deemed Savings Parameter Development task with two primary deliverables: a Deemed Savings Parameter Development report and a Deemed Savings Manual. The Deemed Savings Parameter Development Report, finalized in November 2009, focuses on improving the energy savings estimates for existing deemed savings measures. The Deemed Savings Manual, finalized in March 2010, was created to clearly outline the assumptions, sources, and calculations used to develop each savings estimate for all currently deemed measures.

As part of the Deemed Savings Parameter Development task, KEMA performed a review of the WISeerts database to find the deemed savings measures that contribute the most toward program and sector energy savings. We examined the list and identified the measures that would benefit from additional or updated reviews. We also identified a few parameters that are used for a number of deemed measures and had limited source information. We then performed a comprehensive review of each measure and parameter that included a review of the calculation method, a literature review, conversations with manufacturers and service providers, and application of general engineering practice. In the Deemed Savings Parameter Development report, we recommended changes to the deemed savings values or parameters based on our review. Table 3-12 shows the measures and parameters that were selected for review.

Table 3-12. Parameters and Measure Bins Reviewed in the DSPD Report

Measure Bin Description	Tech Code	Measure Description
Lighting Hours	N/A	Lighting hours assumptions for all sectors
Lighting Coincidence Factors	N/A	Lighting coincidence factor assumptions for all sectors
T8 or T5HO replacing HID	2.5170	T8 4 lamp or T5HO 2 lamp Replacing 250-399 Watts HID
	2.5180	T8 6 lamp or T5HO 4 lamp Replacing 400-999 Watts HID
	2.5182	T8 8 lamp or T5HO 6 lamp Replacing 400-999 Watts HID
	2.5185	T8 or T5HO <= 500W, Replacing >=1000 W HID
	2.5186	T8 or T5HO <= 800W, Replacing >=1000 W HID
CFL < 30W replacing incandescent	2.0300	CFL <= 30 Watts - Replaces Incandescent
Occupancy Sensors on High Bay Fluorescents	2.5192	Occupancy sensor for high bay fluorescent fixtures, per fixture controlled
T8 replacing T12	2.0810	T8 4L-4ft High Performance - Replaces T12 2L-8ft
	2.0811	T8 4L-4ft High Performance Replacing T12HO/VHO 2L-8 ft
CFL Floods	2.0307	CFL Reflector Flood Lamps - Replaces incandescent reflector flood lamps
HE Ventilation Fans	4.0736	Ventilation Fans, High Efficiency - 36"
	4.0742	Ventilation Fans, High Efficiency - 42"
	4.0748	Ventilation Fans, High Efficiency - 48"
	4.0750	Ventilation Fans, High Efficiency - 50"
	4.0751	Ventilation Fans, High Efficiency - 51"
	4.0752	Ventilation Fans, High Efficiency - 52"
	4.0754	Ventilation Fans, High Efficiency - 54"
	4.0755	Ventilation Fans, High Efficiency - 55"
	4.0760	Ventilation Fans, High Efficiency - 60"

Measure Bin Description	Tech Code	Measure Description
Boiler Tune-ups	1.1300	Boiler Tune-up - Service Buy Down
Steam Traps, Low Pressure HVAC	4.1000	Repair leaking steam trap, building space conditioning system
Boiler Controls	1.0710	Boiler oxygen trim controls, per output hp
	1.0711	Linkageless Boiler Control, per output hp

3.6 ADDITIONAL LOOKS AT ATTRIBUTION

The purpose of the Additional Looks at Attribution report[35] was 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 completed in April 2009. The analysis examines the effect of the channel initiatives, project size, measure types, and variations in incentive levels on program attribution.

3.6.1 Overview of approach

On April 2, 2009, the *Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period*[36] 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 (18 MCP).[37] The main objective in designing the sample for the 18 MCP 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.

The statistical precision for the Additional Looks provided in this report may not be as high as reported in the 18 MCP 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

[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.

[36] 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.

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

Programs overall and each of the four primary sectors, rather than for the breakouts reported in this document. If the purpose of the 18 MCP 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.**[38] The influence of the Channel initiatives on the sectors is examined through three different looks:
  - **Channel versus non-channel measures (18 MCP).** In this look, we examine the 18 MCP 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. 18 MCP).** 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. 18 MCP).** 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 18 MCP 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.

[38] 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)).

- **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 reports 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 each category accounts for. 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.

3.6.2 Key findings, insights, 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. For example, although we generally found higher attribution associated with deemed/prescriptive projects relative to custom projects we do not recommend the program 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 Looks 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 18 MCP for both kWh and kW. Program attribution results for CFLs, calculated with market-based methods[39], were 100 percent in FY06, and 111 percent and 91 percent in the 18 MCP 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

[39] The market based methods used for CFLs include spillover effects.

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 but 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.**[40] 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 18 MCP 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.[41] 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 with incentives increased between one and twenty-five percent, attribution declined over FY06, by a statistically significant amount. For electric measures with incentives raised by more than 25 percent, attribution was not statistically different from the FY06 results. The opposite pattern was true for gas—measures with incentives raised by more than 25 percent had attribution decline while measures with incentive increases by one and twenty-five

[40] 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.

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

percent experienced no change in attribution rates at the 95 percent level of confidence.

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.**[42] 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

[42] 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.

Lighting segments (typified by small size, deemed incentives) exhibit high 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.[43] 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.

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 18 MCP and the empirical results of this report were likely impacted by the recession that overlapped ten of the 15 months covered by the impact evaluation. Future changes in economic climate are likely to have similar effects on drivers to attribution.

The report 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 (e.g., measure type, size, incentives) should not be undertaken without a holistic re-examination 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.[44]

[43] 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.

[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.

- 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.[45]
- 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.[46]

3.7 LIFE CYCLE NET SAVINGS (LCNS) METHODS ANALYSIS

This report expands upon 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[47] (18 MCP).[48]

The principal objective of the impact evaluation was to determine the energy and demand savings attributable to the program. The analysis calculates a set of adjustment factors that are used to determine evaluation verified gross and net energy savings for the statewide Focus on Energy Business Program. The Focus Business Program impact evaluation calculates net savings on a first-year net savings (Y1NS)[49] basis. During the 18 MCP, the evaluation, under the direction of the PSCW, developed the life cycle net savings (LCNS) method as an exploratory exercise at producing lifetime net savings rather than first-year net savings.

This report has two primary objectives. First, the Focus evaluation has always included acceleration as a component of overall attribution. However, not all jurisdictions include acceleration and those that do employ a variety of approaches. We researched the current methods utilized by other jurisdictions and investigated the effect of acceleration on Focus attribution results by employing other methods. In this report, we refer to this research as the Effects of Acceleration Treatment.

For the second objective, we investigated the effects of using LCNS assumptions (e.g., measure life, verified gross savings during the acceleration period for accelerated custom measures in the CATI) on the 18 MCP attribution results. This analysis is an update on Focus evaluation team's December 2, 2008, memo *Business Programs Life Cycle Attribution*

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[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.

[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.

[47] The "18-month contract period" refers to program implementation between July 1, 2007, and December 31, 2008.

[48] Miriam L. Goldberg, J. Ryan Barry, Ben Jones, Paulo Tanimoto, Jeremiah Robinson, and Tammy Kuiken; KEMA Inc. *Focus on Energy Evaluation, Business Programs Impact Evaluation Report: First Five Quarters of the 18-month Contract Period, Final.* April 2, 2009.

[49] Throughout the report the Focus evaluation team's first-year net savings method (Y1NS) is referred to as the "current Focus evaluation method." We abbreviate this term as "Focus Y1NS" in selected tables and charts.

Analysis Results. The results presented here incorporate updated measure life values from the Focus measure life study[50] and additional data collected from the second round of the 18 MCP data collection (April 1 through September 30, 2008). In this report, we refer to this research as the LCNS Analysis.

3.7.1 Effects of acceleration treatment

A. OVERVIEW OF OBJECTIVES

The Focus evaluation has always included acceleration as a component of overall attribution. Program attribution is determined based on the program's effect on the timing, efficiency, and quantity of equipment installed. For non-CFLs, these three parameters are based on responses to the direct attribution questions in the impact evaluation survey. A few jurisdictions are beginning to require consideration of the life cycle net savings stream similar to that produced by our new LCNS method. However, this is far from the norm.

Not all jurisdictions include acceleration and those that do employ a variety of approaches. The LCNS method and even the current Focus evaluation Y1NS method are complete and appropriate representations of the program's effect and provide a sound basis for program decision-making. However, the differences in analytic approach between Focus and other jurisdictions may confound comparisons between Focus and other energy efficiency programs.

For these reasons, we have prepared a comparison of attribution results using different treatments of acceleration based on the data collected for the 18 MCP impact evaluation. In addition, we investigated the relative effects of acceleration and efficiency on the attribution ratios to better gauge its influence of the current first-year methods (Y1NS).

B. OVERVIEW OF APPROACH

KEMA reviewed the attribution methodologies of well-established, large-scale, non-residential programs in California, Massachusetts, New York, Oregon, and Vermont. Though we focused primarily on the treatment of acceleration, we also reviewed and summarized the general attribution methods used by these jurisdictions.

Based on the findings of our literature review, we created alternative attribution factors based on the different treatments of acceleration used in other jurisdictions. For a wider comparison, we also tested the effect on attribution of entirely removing the acceleration factor. Similarly, we separately tested the effect efficiency on attribution by removing the efficiency factor.

The intent of this analysis is to clarify how much of the difference between Focus and other programs' NTG ratios may be due to differences in the treatment of acceleration when determining program attribution.

[50] Miriam L. Goldberg, J. Ryan Barry, Brian Dunn, Mary Ackley, Darcy Deangelo-Woolsey, KEMA Inc. *Focus on Energy Evaluation Business Programs: Measure Life Study.* August 25, 2009.

C. LITERATURE REVIEW

For the purposes of this report, KEMA reviewed documents, reports, and manuals detailing the attribution methodologies used in the non-residential energy efficiency program evaluations of the following five states[51]:

1. California
2. Massachusetts
3. New York
4. Oregon
5. Vermont.

All of the states that assess net savings use self-report participant survey data as all or part of their program attribution calculations for their evaluations of large-scale commercial and industrial programs.[52] Most of these states used acceleration either implicitly or explicitly in their attribution methodology. Table 3-13 below shows the states researched, their primary methodologies for acceleration, and the primary data collection method used for determining attribution.

Table 3-13. Comparison of Acceleration Methods

State	Primary Treatment of Acceleration	Primary Data Collection Technique
Focus Y1NS	Acceleration less than 48 months receives partial credit towards attribution. Acceleration 48 months or more receives full attribution.	Self report participant surveys
California[53]	Acceleration less than 6 months receives no acceleration credit. Acceleration more than 6 months, but less than 48 months receives partial credit towards attribution. Acceleration 48 months or more receives full attribution.	Self report participant surveys
Massachusetts[54]	Acceleration more than 12 months receives full attribution. No partial acceleration credit given for less than 12 months.	Self report participant surveys
New York[55]	Acceleration less than 60 months receives partial credit toward attribution. Acceleration 60 months or more receives full attribution.	Self report participant surveys

[51] The methodologies included in the literature review have been widely used in each jurisdiction, but are not necessarily uniformly required in all cases.

[52] Vermont does not evaluate free-ridership or spillover, but does apply an attribution assumption to estimate net impacts.

[53] Nonresidential Net-to-Gross Working Group. *Methodological Framework for Using the Self-report Approach to Estimating Net-to-Gross Ratios for Nonresidential Customers.* February 9, 2009.

[54] Sponsor utilities included National Grid, NSTAR Electric, Northeast Utilities, Unitil, and Cape Light Compact.

[55] NYSERDA. *Annual Report for 2008 – Program Evaluation and Status Report – Issued March 2009*, Section 2.3 Largest Savers Impact Evaluation. December 31, 2008. http://www.nyserda.org/publications/default.asp.

State	Primary Treatment of Acceleration	Primary Data Collection Technique
Oregon[56,57]	The evaluation uses the program's effect on timing (yes/no) in developing the scores used to determine attribution. The length of the acceleration period is not considered.	Self report participant surveys
Vermont[58]	The most recent Efficiency Vermont Program C&I impact evaluation did not attempt to assess attribution.	N/A

D. COMPARISON OF ACCELERATION METHODS

Acceleration is only one component of a broader methodological framework. There are likely interactions between each state's specific acceleration approach and the approach the state takes to other issues. However, it is not possible to adapt the entire methodological frameworks of the other states to the data collected for the Focus evaluation. This limits our ability to fully compare Focus attribution results to those of other states and it is beyond the scope of this research to assess the magnitude of this limitation.

Our approach to comparing acceleration methods focuses exclusively on acceleration methods employed by the other states. We adapted the basic logic of other jurisdictions' approach to acceleration to the Focus evaluation framework and compared those results.

Table 3-14 through Table 3-16 provide comparisons of the current Focus evaluation method with five other methods using the impact evaluation data collection and basic attribution framework for the 18 MCP. The five other attribution methods are:

1. California method: The California treatment of acceleration.
2. Massachusetts method: The Massachusetts treatment of acceleration.
3. New York method: The New York treatment of acceleration.
4. No acceleration: No partial acceleration credit is given. Acceleration of 48 months or more receives full attribution, otherwise, acceleration credit is zero.
5. No efficiency: No partial efficiency credit is given. Responses of "would have installed standard efficiency" receive full attribution, otherwise, efficiency credit is zero.

As discussed in Table 3-13, Oregon does not incorporate acceleration into its attribution calculation in a way that is compatible with the Focus data, and Vermont does not currently determine attribution in its evaluations, so neither state was included in the comparisons of acceleration methods.

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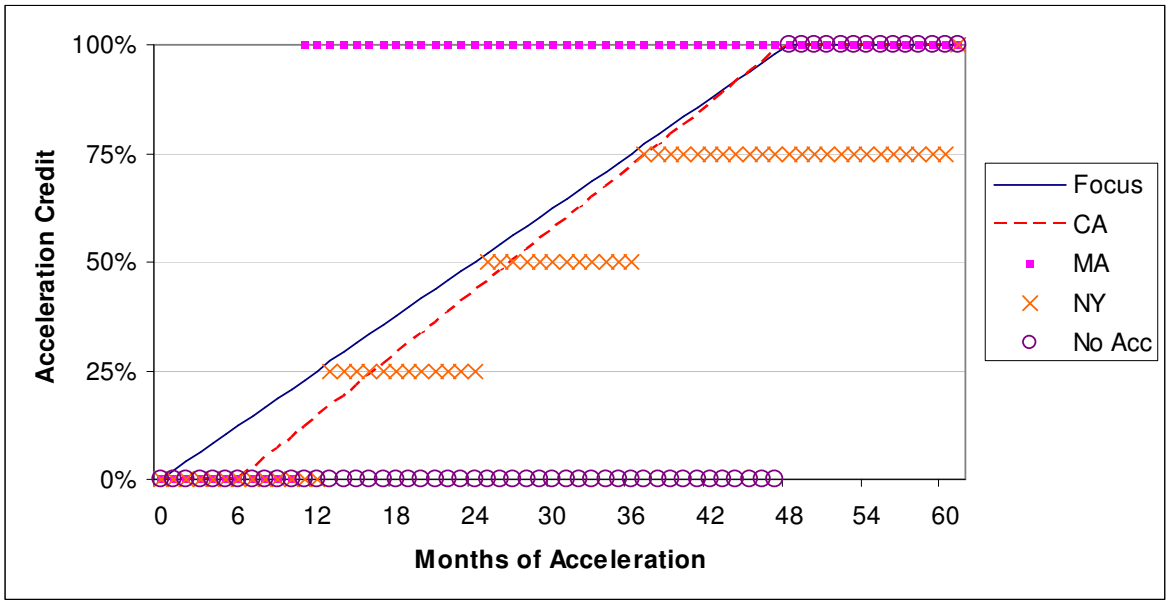
[56] Energy Trust of Oregon, Inc. *Evaluation Committee Report.* May 11, 2007. http://www.energytrust.org/meetings/board/2007/070808/04a_EvalMay.pdf.

[57] ADM Associates, Inc. *Impact Evaluation of New Building Efficiency Program for 2004 and 2005, Final Report.* February 2008.

[58] KEMA, Inc. and RLW Analytics. *Final Report: Phase 2 Evaluation of the Efficiency Vermont Business Program.* February 2006. http://publicservice.vermont.gov/pub/other/evaluationoftheefficiencyvtbusprogfinalreportphase2.pdf.

Figure 3-5 shows the amount of acceleration credit by month for each acceleration method. Massachusetts gives zero acceleration credit for the first year and then jumps directly to 100 percent attribution after one year. The current Focus evaluation methodology gives more credit than both California and New York for any acceleration period less than 46 months. After 46 months, the difference between the current Focus evaluation method and California is less than one percent or equal, and the current Focus evaluation method continues to give more credit than New York's treatment through 60 months. After 60 months, each state method gives full attribution credit.

Figure 3-5. Acceleration Credit by Month



The results produced with the acceleration treatments used by the Focus evaluation and other jurisdictions indicate that the current Focus evaluation treatment of acceleration provides attribution results comparable to those in other jurisdictions. Final attribution scores are not highly dependent on the acceleration calculation methodology.

The Massachusetts method's treatment of acceleration provides slightly higher attribution estimates, however not as high as might have been expected given that Massachusetts gives full attribution credit after one year. California and New York result in lower attributions than the current Focus evaluation method. This is consistent with the information provided in Figure 3-5. The effects of efficiency and acceleration on attribution are relatively equal—removing partial credit for either causes attribution to decline by roughly ten percent versus the current Focus evaluation method.

Table 3-14. Comparison of Acceleration Methods
kWh Attribution Factors by Sector

Sector	Focus Y1NS Method	California Method	Massachusetts Method	New York Method	No Acceleration	No Efficiency
Agriculture	60%	59%	61%	58%	57%	46%
Commercial	70%	68%	71%	65%	65%	61%
Industrial	57%	55%	64%	50%	46%	50%
Schools and Government	43%	40%	43%	36%	33%	37%
Business Programs Overall	60%	57%	64%	54%	51%	51%

Table 3-15. Comparison of Acceleration Methods
kW Attribution Factors by Sector

Sector	Focus Y1NS Method	California Method	Massachusetts Method	New York Method	No Acceleration	No Efficiency
Agriculture	57%	56%	58%	56%	55%	45%
Commercial	69%	68%	70%	66%	66%	61%
Industrial	54%	52%	61%	46%	43%	45%
Schools and Government	46%	44%	47%	41%	37%	39%
Business Programs Overall	58%	57%	62%	53%	51%	50%

Table 3-16. Comparison of Acceleration Methods
Therm Attribution Factors by Sector

Sector	Focus Y1NS Method	California Method	Massachusetts Method	New York Method	No Acceleration	No Efficiency
Agriculture	17%	16%	18%	15%	14%	12%
Commercial	33%	29%	33%	24%	21%	25%
Industrial	63%	60%	71%	57%	44%	49%
Schools and Government	38%	36%	37%	34%	33%	27%
Business Programs Overall	52%	49%	57%	46%	38%	40%

E. EXPLAINING THE LIMITED EFFECTS OF ACCELERATION TREATMENT

To clarify why varying the acceleration treatment had such a limited effect upon attribution, KEMA first looked into the proportion of savings in the 18 MCP sample that received different levels attribution. We grouped the attribution scores into the following categories:

- **None.** An attribution score of zero
- **Partial.** An attribution score between zero and one
- **Full.** An attribution score of one
- **Market-based.** An attribution score determined by a market study. In the 18 MCP, CFLs less than 30 watts were the only measures with market-based attribution.

Changing the acceleration treatment only affects the net savings of measures that received partial attribution scores under the current Focus evaluation method. Those with no attribution

and market-based attribution are unaffected by acceleration treatment. The majority of measures with full attribution under the current Focus evaluation method would be unaffected by the treatment of acceleration. The only exception is the few measures that received full attribution under the current Focus evaluation method due to an acceleration period between 48 and 60 months. These would have lower attribution scores under the NY treatment of acceleration, but would have full attribution with any of the other acceleration treatments.

As Table 3-17 shows, roughly half of each savings type receives partial attribution in Business Programs overall, though there is great variation among the sectors. The savings with partial attribution are greater for therms than kWh or kW in the two largest sectors, Commercial and Industrial, and the Business Programs overall. One reason the Commercial sector's large difference in partial attribution for electric and therm savings is because the market-based attribution for CFLs does not affect therms. The difference for Industrial is not great.

Table 3-17. Percentage of Savings by Attribution Category

Sector	Amount of Attribution	kWh	KW	Therm
Agriculture	No attribution	22%	29%	76%
	Partial attribution	26%	19%	15%
	Full attribution	22%	25%	10%
	Market-based attribution	30%	28%	0%
Commercial	No attribution	15%	18%	30%
	Partial Attribution	36%	29%	62%
	Full attribution	18%	17%	8%
	Market-based attribution	28%	33%	0%
Industrial	No attribution	12%	15%	6%
	Partial attribution	58%	59%	65%
	Full attribution	28%	25%	30%
	Market-based attribution	0%	0%	0%
Schools & Government	No attribution	31%	29%	42%
	Partial attribution	47%	45%	32%
	Full attribution	13%	19%	24%
	Market-based attribution	9%	6%	0%
Business Programs Overall	No attribution	16%	19%	19%
	Partial attribution	49%	43%	56%
	Full attribution	23%	21%	25%
	Market-based attribution	11%	15%	0%

Next, we took a closer look at the measures with partial attribution. These are the only measures that are eligible for acceleration credit. As reported in Table 3-17 these measures account for 49 percent, 43 percent, and 56 percent of Business Programs' overall kWh, kW, and therms savings, respectively. Table 3-18 shows that 19 percent of overall kWh savings and 24 percent of overall therms received both partial attribution and had an acceleration period of greater than one year in the current Focus evaluation method. In these cases, the Massachusetts treatment granted full attribution where the current Focus evaluation method granted partial credit that is greater than both California and New York. On the other hand, 29 percent of kWh and 34 percent of therms received partial attribution and had less than one year of acceleration. For these measures, Massachusetts granted no additional attribution for acceleration effects, while California and New York both granted slightly less acceleration credit than the current Focus evaluation method.

Another interesting finding was that no acceleration credit was given for the "Three to Four Years" acceleration period category. That is, no respondents indicated they would have installed the measure on their own between three and four years. For data collected for the 18 MCP, a change in the current Focus evaluation method's acceleration period threshold from 48 months to 36 months would have a limited effect on attribution results. Roughly half of savings do not have partial attribution and would be unaffected by this change. This change has a maximum potential effect of a 25 percent difference in attribution for a measure with no other attribution credit and a 36-month acceleration period. The majority of accelerated measures have less than 36 months of acceleration and have partial attribution from efficiency and quantity. Therefore, a 36-month threshold would increase the attribution by far less than the 25 percent. To take this one-step further, we could assert that we found little variation in acceleration effects on attribution results by varying the full attribution threshold from 36 to 60 months.

Table 3-18. Acceleration Periods of Measures with Partial Attribution

Sector	Length of Acceleration Period	kWh	kW	Therm
Agriculture	No acceleration	11%	10%	6%
	Less than one year	6%	4%	5%
	One to two years	5%	1%	3%
	Two to three years	3%	4%	1%
	Three to four years	0%	0%	0%
Commercial	No acceleration	8%	10%	13%
	Less than one year	16%	13%	36%
	One to two years	9%	5%	12%
	Two to three years	2%	1%	0%
	Three to four years	0%	0%	0%
Industrial	No Acceleration	19%	25%	10%
	Less than one year	14%	11%	22%
	One to two years	16%	17%	4%
	Two to three years	9%	6%	29%
	Three to four years	0%	0%	0%
Schools & Government	No acceleration	7%	12%	4%
	Less than one year	25%	18%	20%
	One to two years	6%	4%	7%
	Two to three years	9%	11%	1%
	Three to four years	0%	0%	0%
Business Programs Overall	No acceleration	14%	17%	9%
	Less than one year	15%	12%	22%
	One to two years	13%	9%	5%
	Two to three years	6%	5%	19%
	Three to four years	0%	0%	0%

Changing the treatment of acceleration only affects measures with partial attribution, which limits the maximum amount of effect it has on the ratio to roughly 50 percent. The amount of measures that receive partial attribution, but are not accelerated by the program further reduces this effect. In addition, because the acceleration grants credit for a percent of the savings that was otherwise not attributable to the program, the effects of acceleration on the attribution ratio are further reduced by the positive effects of quantity and efficiency attribution credit. In sum, the treatment of acceleration plays a small role in the overall assessment of attribution.

F. CONCLUSIONS

Our literature review shows that the current Focus evaluation framework is in the mainstream with its attribution methodology. Though each of the states in our study group that evaluate attribution has a different methodology, all use self-report participant surveys as the primary data source for determining program attribution. Most of these states include acceleration in their attribution methodology either explicitly or implicitly. The Massachusetts method differs greatly from the Focus method and gives full attribution credit for measures accelerated by more than one year and no acceleration credit for measures accelerated by less than one year. The MA acceleration treatment results in a slightly higher attribution compared with the Focus method. The Focus evaluation's acceleration treatment is similar to that used in both California and New York. Of the three, the Focus methodology gives the most attribution credit for acceleration.

Though differences exist in each jurisdiction's exact treatment of acceleration, when we applied these different treatments to the Focus 18 MCP data within the Focus evaluation's attribution framework, the resulting attributions did not change significantly. Only about half of the gross savings in Focus receive any partial attribution. The remainder is either fully attributable, not attributable, or receives a market-based attribution. For the portion that does have partial attribution, some of this is determined by partial efficiency or quantity adjustments, not acceleration. Thus, there is a limit to the effect that any changes to the Focus acceleration methodology will have on the results.

3.7.2 Life cycle net savings (LCNS) assumption analysis

Most energy efficiency programs across the country, including Focus, have evaluated energy savings impacts based on first–year savings rather than a full lifetime savings stream. The lifetime savings stream is the annual energy savings of an installed measure for each year of the measure's life. The annual energy savings may vary across years in the stream of savings. A primary contributor to this variation is acceleration; defined in this context as advancing the time when an energy efficiency measure is installed, compared to when it would have been installed in the absence of the program. For the Focus evaluation it is appropriate to use a lower efficiency baseline (i.e., the efficiency of the existing equipment) during the acceleration period compared with the higher "standard" baseline for natural replacement measures and during the post-acceleration period. Accounting for the effects of acceleration within a stream of lifetime savings is a more accurate and complete representation of program accomplishments than more traditional first-year savings methods.

The Focus Evaluation Team's framework paper, *Treatment of Accelerated Savings,*[59] discusses the acceleration effect on the lifetime savings stream approach and the key considerations for a lifetime approaches with regards to:

- Assessing program goal achievement
- Periodic reporting of program accomplishments
- Resource planning

[59] Miriam Goldberg, Rick Winch, Tom Talerico, Ralph Prahl, Bryan Ward. *Focus on Energy Evaluation: Treatment of Accelerated Savings.* July 2, 2008.

- Cost-effectiveness testing
- Program planning.

Under the direction of the PSCW, the evaluation team developed an alternative attribution analysis method called the life cycle net savings (LCNS) method. The life cycle method provides for a different treatment of accelerated projects and produces lifetime net savings instead of the first-year net savings produced by the current Focus evaluation method (Y1NS).

A. OVERVIEW OF OBJECTIVES

The purpose of this analysis is to explore the viability of the life cycle method as an alternative net savings methodology that takes a more nuanced approach to program attribution. This effort is part of the evaluation team's continued effort to adapt, adjust, and refine the life cycle method analysis assumptions. To that end, we:

- Update the life cycle method results reported in the December 2008 LCNS memo with:
  - Additional data collected in the second round of the 18 MCP impact evaluation data collection (projects implemented between April 1 and September 30, 2008)
  - The new measure lives developed for the Business Programs' measure life study[60]
- Compare the life cycle method and results with those of the first-year method
- Investigate the effects of assumptions used in the life cycle method, including the effects of the updated measure lives.

B. OVERVIEW OF APPROACH

The December 2008 LCNS memo used data from the first nine months of the 18 MCP. This analysis was able to take advantage of data from an additional six months of the 18 MCP. In addition, the release of the Focus Business Programs measure life study offered us the opportunity to update the measure lives used in the life cycle method.

The primary goal of the new methodology, LCNS, is to produce life cycle net savings as opposed to the first-year net savings. Because savings in the life cycle method are based in part on length of time that the equipment operates, measure lives are a key input to the life cycle method analysis. All else being equal, in the life cycle method a measure with a lifetime of ten years will be twice as important in the final analysis as a measure with a five-year lifetime. (Like a simple payback analysis, the life cycle method does not incorporate a discount rate such as would be included in a full-scale benefit/cost analysis.) The updated measure lives for Focus rebated equipment and services range from two to 19 years depending on the equipment and application. Some of the new measure lives varied significantly from those used in the December 2008 LCNS analysis as shown in Table 3-19.

[60] Miriam L. Goldberg, J. Ryan Barry, Brian Dunn, Mary Ackley, Darcy Deangelo-Woolsey, KEMA Inc. *Focus on Energy Evaluation Business Programs: Measure Life Study.* August 25, 2009.

KEMA ran results using both the new and the old measure lives to investigate the effect of changing the measure lives.

Table 3-19. Measure Life in Years

End-use Category	Measure Type	Sector							
		Agriculture		Commercial		Industrial		Schools and Government	
		New	Old	New	Old	New	Old	New	Old
Building Shell	Equip or Tech	19	10	19	10	19	10	19	10
HVAC	Equip or Tech	15	15	15	15	15	15	15	15
	Service	5	15	5	15	5	15	5	15
Lighting	Equip or Tech	12	15	12	15	12	15	12	15
Manufacturing Process	Equip or Tech	11	12	11	12	11	12	11	12
	Service	2	12	2	12	2	12	2	12
Other	Equip or Tech	12	17	12	19	12	28	12	10
CFL	Equip or Tech	7	6	5	6	4	6	5	6
Motors	Equip or Tech	16	16	16	16	16	16	16	16

Like the first-year method, the life cycle method calculates attribution as a ratio of net savings to a ratio of verified gross savings and the realization rate as a ratio of net savings to tracked savings; however, the life cycle approach has two significant differences in its estimation of verified gross savings and net savings for the measure. First, the life cycle method looks at the total lifetime savings of the equipment. Second, it increases the annual verified gross savings in the acceleration period for custom measures where the existing equipment had lower than standard efficiency. In the post-acceleration period and for non-accelerated measures the annual verified gross savings are the same as those used in the first-year method.

The annual gross savings in the acceleration period was estimated for some measures because the input data needed to calculate annual gross savings for these measures is not currently available. The 18 MCP impact evaluation used two surveys, one conducted by KEMA engineers, referred to as "the engineering survey" and one CATI survey. The CATI survey did not result in verified gross savings estimations. For all measures in the CATI, the ratio of verified gross savings to installed savings was assumed to be one for the purposes of the first-year method. This assumption is continued in the life cycle method analysis for the annual verified gross savings of non-accelerated measures and post-acceleration periods of accelerated measures. As described above, accelerated custom measures often have annual verified savings in the acceleration period that are greater than the annual verified savings in the post-acceleration period. The ratio of these two savings is referred to throughout this report as the A/P ratio.[61] The life cycle method assumes an A/P ratio of two for custom measure in the CATI. That is, the energy savings in the acceleration period is twice that of the post-acceleration period.

To investigate the uncertainty introduced by our assumed A/P ratio and confirm the robustness of our results, KEMA ran life cycle method results with the aforementioned

[61] The A/P ratio is the ratio of Acceleration Period to Post-Acceleration Period savings (VGI). For more details on the LCNS method, please review the *Business Programs Life Cycle Attribution Analysis Results* memo released on December 2, 2008.

assumptions and an alternative set of assumptions. LCNS Method A is official life cycle method result which uses an assumed an A/P ratio of two for custom measures in the CATI; and LCNS Method B used the observed sector level A/P ratios from the engineering survey for the custom CATI measures. Table 3-20 shows the differences in methodology among the first-year method and the two life cycle methods.

Table 3-20. Methodological Differences between Y1NS Method and LCNS Methods

Assumption	Y1NS	LCNS Method A	LCNS Method B
Type of savings	First year savings	Lifetime savings	
Annual acceleration period verified gross savings	The difference between the energy use of the rebated equipment and the energy use of its standard efficiency replacement.	The difference between the energy use of the rebated equipment and the energy use of the equipment replaced.	
Annual post-acceleration period verified gross savings		The difference between the energy use of the rebated equipment and the energy use of its standard efficiency replacement.	
Acceleration period net savings	n/a	Acceleration period verified gross savings multiplied by the acceleration period.	
Post-acceleration period net savings	n/a	Post-acceleration period verified gross savings times the simple program attribution (SPA).	
A/P ratio assumed for custom CATI	n/a (implied 1)	2	Based on sector level A/P ratios observed in the engineering survey
Net savings calculation	Verified gross savings times [SPA + (Acc/48)(1-SPA)]	Acceleration period net savings plus post-acceleration period net savings	

C. SUMMARY OF RESULTS

As can be seen in Table 3-21 and Table 3-22, both life cycle methods result in attribution factors and realization rates that are lower than those found using the current, first-year method. To a large extent, this difference is less about acceleration treatment per se than it is the difference between weighting measure attribution by first-year versus lifetime savings. The lower attribution for life cycle method indicates that the program is receiving higher attribution under the current, first-year method on shorter-lived measures than on measures with longer lifetimes. While each sector has lower attribution using the life cycle method, we see the greatest difference in the Agriculture and Commercial sectors. Each of these sectors has a significant amount of savings from CFLs, which receive high market-based attribution scores. CFL attribution brings the sector level attributions up, but the short measure lives of CFLs mutes this effect in the life cycle method. A shorter measure life results in less lifetime savings than measures of similar annual savings with a longer lifetime.

Table 3-21. Attribution Factors by Method

Sector	kWh			kW			Therms		
	Y1NS	LCNS A	LCNS B	Y1NS	LCNS A	LCNS B	Y1NS	LCNS A	LCNS B
Agriculture	60%	51%	51%	57%	48%	48%	17%	13%	13%
Commercial	70%	57%	57%	69%	55%	55%	33%	24%	24%
Industrial	57%	51%	51%	54%	47%	47%	63%	50%	49%
Schools & Government	43%	39%	39%	46%	47%	47%	38%	30%	29%
Business Programs Overall	60%	52%	52%	58%	50%	50%	52%	40%	40%

Table 3-22. Realization Rates by Method

Sector	kWh			kW			Therms		
	Y1NS	LCNS A	LCNS B	Y1NS	LCNS A	LCNS B	Y1NS	LCNS A	LCNS B
Agriculture	56%	47%	47%	55%	47%	47%	13%	11%	11%
Commercial	63%	54%	54%	66%	55%	55%	34%	25%	25%
Industrial	53%	47%	47%	49%	42%	42%	60%	42%	42%
Schools & Government	43%	35%	35%	43%	43%	43%	30%	22%	22%
Business Programs Overall	55%	48%	48%	54%	46%	46%	48%	34%	34%

The difference in the life cycle attributions from Method A to Method B is very slight; when rounded to the nearest percent, none of the overall attributions appears to be different. Life cycle Method A and B differ only in the assumed A/P ratio that was applied to custom measures from the CATI survey. Because the majority of CATI measures were deemed measures, custom CATI measures only make up a small portion of savings in each sector, so the A/P ratio has a limited ability to affect the results. Table 3-23 shows the percent of savings in each sector that use an assumed A/P ratio. Table 3-24 displays the A/P ratios used in Method B, which are all less than Method A's assumption of 2.

Table 3-23. Proportion of Gross Savings Affected by the Acceleration-to-Post-Acceleration Savings A/P Ratio Assumption

Sector	kWh	kW	Therms
Agriculture	20%	16%	3%
Commercial	10%	5%	1%
Industrial	3%	3%	5%
Schools & Government	6%	5%	5%
Business Programs Overall	7%	5%	5%

Table 3-24. Average Acceleration-to-Post-Acceleration Savings A/P Ratio for Custom Measures in the Engineering Review

Sector	kWh	kW	Therms
Agriculture	1.6	1.1	0.8*
Commercial	1.0	1.0	1.0
Industrial	1.1	1.1	1.3
Schools & Government	1.5	1.1	1.5

*Agriculture therms had an A/P ratio of less than one due to a large fuel switching measure with negative therm savings.

KEMA also investigated the effect of the new measure lives on the ratios. The new measure lives are generally shorter than the old measure lives. However, the expected effect on the ratios is ambiguous because the ratios depend of the mix of measures and attributions. For example, if the measure life for a measure with low attribution were shorter, this would tend to increase the ratio, as would having a longer measure life for a measure with high attribution.

When we compared the life cycle method realization rates using the updated measure lives to the life cycle method realization rates with the old measure lives, we found that the overall electric ratios had not changed, while the overall therm ratios decreased. The realization rates for schools and government improved, while they fell in other sectors. Whether a ratio

increased or declined depended on the mix of measures and attributions in the sector for each particular savings types.

Table 3-25. Effect of New Measure Lives on LCNS Method A Realization Rates

Sector	KWh			kW			Therms		
	New Measure Life	Old Measure Life	Diff.	New Measure Life	Old Measure Life	Diff.	New Measure Life	Old Measure Life	Diff.
Agriculture	47%	49%	-2%	47%	49%	-2%	11%	13%	-2%
Commercial	54%	54%	0%	55%	55%	0%	25%	27%	-2%
Industrial	47%	48%	-1%	42%	43%	-1%	42%	45%	-3%
Schools & Government	35%	34%	2%	43%	37%	6%	22%	21%	1%
Business Programs Overall	48%	48%	0%	46%	46%	0%	34%	36%	-3%

D. CONCLUSIONS

The life cycle method provides a more realistic estimate of the lifetime savings attributable to the program than simply projecting the first-year results forward. We recommend the PSCW consider continued development and refinement of this method in addition to the current Focus (first-year) methods in future evaluations.

Conceptually, there are two key differences between the approaches:

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

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

The most current input data, such as measure lives, should be incorporated into the life cycle analysis as they become available. This research indicates the acceleration-to-post-acceleration savings A/P ratio assumption of two for custom measures in the CATI is slightly more generous compared to an A/P assumption based on custom projects in the engineering sample. However, KEMA recommends continued use of this assumption for the following reasons:

- The results of this analysis exhibited no meaningful differences in sector-level attribution estimates using the A/P ratio from reviewed custom projects rather than assuming a ratio of two.
- A small fraction of overall energy savings is affected by this assumption.

- The PSCW has directed the evaluation team to transition impact evaluation reporting from sector-level analysis to technology based analysis. This change merits further investigation into A/P ratios by the technology groupings to be used for impact reporting.
- This assumption may become moot in further evaluations if custom measures are excluded from the CATI, as was the case with the CY09 impact evaluation sample design.

3.8 SUPPLY-SIDE RESEARCH

3.8.1 Introduction

This Supply-side Study builds upon findings from the 2008 Focus Business Programs Channel Study. The 2008 Channel Study, which was also conducted by KEMA, provided baseline estimates for the Focus on Energy Business Programs market effect contract metrics and investigated other potential indicators of program market effects. The 2008 Channel Study found some evidence that Focus Business Programs might have sizable additional program effects on the market that were not already captured by the program tracking and current evaluation activities. The authors of the 2008 Channel Study concluded that these and other findings "support the existence of market effects and therefore KEMA advises the PSCW to pursue supplemental supply-side research." This Supply-side Study expands the scope of the 2008 Channel Study in a number of ways, as discussed below.

- Identifying the causes of differences between Wisconsin and Illinois energy efficiency activities
- Quantifying untracked attributable savings (UAS)
- Expanding the number of energy-efficient measures
- Expanding the range of market actors
- Expanding the data sources.

Key sources of information for this Supply-side Study included:

- Review of the program theory that Focus Business Programs implementers developed in August 2009
- In-depth interviews with Focus Business Programs implementers and PSCW staff
- Interviews with lighting and HVAC market actors in Wisconsin and Illinois
- An analysis of the Focus Business Programs tracking data
- The 2008 Focus Business Programs Channel Study.

3.8.2 Comparing the hypothesized HVAC market effects with the evidence

In the in-depth interviews, the Focus Business Programs implementers mentioned a number of possible market effects that the evaluators should look for in the HVAC market. The following tables compare these hypothesized market effects for high-efficiency boilers, boiler controls, boiler tune-ups, high-efficiency roof-top units (RTUs), and many other HVAC

measures with the evidence from the market actor surveys as well as other sources such as the in-depth interviews and the Focus Business Programs tracking database.[62]

Table 3-26. Comparing the Hypothesized Market Effects for the Wisconsin Market Penetration of High-efficiency Modulating Boilers with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high market penetration of high-efficiency modulating boilers in Wisconsin	**Evidence of market effects** The fully-weighted Wisconsin estimate of the percentage of high-EE modulating boilers (88 percent) was statistically different than the Illinois estimate (66 percent) at the 90 percent confidence level. The trend lines (current period vs. three years ago) for the market penetration of high-EE modulating boilers showed companies from both states reporting their market penetration increasing over time with a similar margin of difference between Wisconsin and Illinois being maintained over both time periods.
A high market penetration of high-efficiency modulating boilers in Wisconsin	**Evidence of attribution of market effects to Focus** **Causes of high-EE boiler market penetration.** Rebate programs were the most-cited factors for both the Wisconsin and Illinois respondents. Yet a number of other factors were also cited by multiple respondents from both states including increased interest in energy efficiency, energy costs, and improvements in boiler technology/quality. The presence of these non-rebate-program factors may help explain why the Illinois trend line went up over time even though the Illinois rebate programs have only been in effect for a year and a half. **High-EE boiler market penetration in the absence of Focus.** When asked for their best estimate of what their percentage of high-EE boilers would have been if the FOE program had not existed, the fully-weighted percentage of high efficiency dropped from 88 percent to 54 percent. **Relatively low program rebate activity.** In calendar year 2009, there were only 47,238 therms in Focus Business Programs tracked gross energy savings for modulating hot water boilers. This was much lower than claimed savings for boiler controls (875,860) and boiler tune-ups (7,154,384). However, the cumulative effects of past years of Focus boiler rebates and interventions with boiler companies may also be influencing market effects for the modulating boilers.

[62] The Supply-side Study report also contains additional comparisons (not summarized here) between the Wisconsin and Illinois lighting and HVAC markets that are less directly related to the hypothesized market effects. These include comparisons on company size, services, equipment; the HVAC and lighting specification processes; cross-state market activity; awareness, involvement with rebate programs; and barriers to energy efficiency.

Table 3-27. Comparing the Hypothesized Market Effects for Condensing Boilers, Boiler Controls, and Boiler Tune-ups with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high market penetration of: - Condensing boilers - Boiler controls - Boiler tune-ups A high percentage of vendors offering boiler controls A great availability of high-efficiency boilers in stock.	**Evidence of market effects** **Condensing boilers.** 75–84 percent (depending on weighting) of Wisconsin HVAC companies said that they install condensing boilers compared to 86–92 percent of Illinois HVAC contractors. None of the Wisconsin vs. Illinois differences were statistically significant. **Boiler controls.** Wisconsin HVAC companies said that 73–81 percent (depending on weighting) of their boiler installations included boiler controls, compared to 32–37 percent of Illinois HVAC companies. **Boiler tune-ups.** 47–71 percent (depending on weighting) of Wisconsin HVAC companies said that they offer boiler tune-up services compared to just 20–27 percent of Illinois HVAC companies. **Stocking of high EE boilers.** 45–62 percent of Illinois HVAC companies said that they currently have high-EE boilers in stock compared to only 18–27 percent of Wisconsin HVAC companies.
A high market penetration of: - Condensing boilers - Boiler controls - Boiler tune-ups A high percentage of vendors offering boiler controls A great availability of high-efficiency boilers in stock.	**Evidence of attribution of market effects to Focus** **Causes of boiler control penetration.** 14 Wisconsin and Illinois HVAC companies commented on some of the factors that were driving boiler control installations. Seven of the companies mentioned concerns over energy costs as drivers of boiler controls. Four of the companies reported that increasingly new boilers are coming out with controls already installed. Other drivers mentioned by multiple respondents included reductions in boiler control prices and increased customer interest. **Relatively high program rebate activity.** In calendar year 2009, Focus claimed gross savings of 7,154,384 therms for boiler tune-ups and 875,860 therms for boiler controls. This compared to only 47,238 therms claimed for modulating hot water boilers.

Table 3-28. Comparing the Hypothesized Market Effects for High-Efficiency RTUs with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high Wisconsin market penetration of high-efficiency RTUs	**Evidence of market effects** The Wisconsin HVAC companies reported a statistically significant higher percentage of high-efficiency sales/installations for all RTU size classes except the largest one (240 MBh or higher). However, in this case the Illinois estimate is less reliable because of the very small sample size. In 2010, the percentages of RTUs sold/installed that were reported to be high-EE were about the same or lower as those reported in the 2008 Channel Study for all RTU classes but one. This was true for both Wisconsin and Illinois.
A high Wisconsin market penetration of high-efficiency RTUs	**Evidence of attribution of market effects to Focus** **Possible causes of high-EE RTU trends:** **The tripling of the Focus RTU rebate followed by the increase in the minimum efficiency for Focus rebate qualification.** In FY 2008, Focus tripled the size of the RTU rebate. Then in 2008 a change in the Wisconsin building code raised the baseline energy efficiency for RTUs. Once the baseline efficiency was increased, Focus had to increase the minimum EE needed to qualify for its RTU rebates. According to some interviewees, this made the qualifying equipment more expensive and harder to obtain. This could help explain why the percentage of high EE RTUs in Wisconsin stagnated or dropped between 2008 and 2010. Yet some Focus program implementers questioned whether the Focus RTU incentives were large enough to influence purchaser behavior even after they had been tripled. **The Wisconsin building code change.** Some interviewees thought the Wisconsin building code change has reduced the availability and increased the costs of RTUs. **Perspectives from the market actors.** Over half of the Wisconsin respondents mentioned rebate programs as an explanatory factor for changes in their percentage of high-EE RTUs. Yet when responses were fully weighted “increased interest in energy efficiency” and “energy costs” became more important factors for the Wisconsin respondents. The Illinois respondents were much more likely to point to changes in the economy.

Table 3-29. Comparing the Hypothesized Market Effects for HVAC Controls and RTUs with VFDs with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high Wisconsin market penetration of HVAC controls A high percentage of Wisconsin vendors offering HVAC equipment with variable frequency drives (VFDs).	**Evidence of market effects** Sixty-four to eighty-three percent (depending on weighting) of Wisconsin HVAC companies reported designing or installing C&I HVAC control systems compared to 20–48 percent of Illinois HVAC companies. Wisconsin HVAC contractors reported, on average, that 79 percent of the RTUs they sold/installed had dual enthalpy economizers fitted with them. This was up from 55 percent in 2008. The Illinois HVAC companies only reported fitting these economizers on 38 percent of their RTUs, down from 41 percent in 2008. Wisconsin HVAC contractors reported, on average, that 33 percent of the RTUs they sold/installed had CO_2 sensors and demand control ventilation systems. The Illinois HVAC companies only reported selling/installing these systems in 15 percent of their RTUs. On average Wisconsin HVAC companies said that 13–20 percent (depending on weighting) of the RTUs they sold/installed in the past year had VFDs already specified for system motors. In contrast, on average Illinois HVAC companies only reported two to three percent of their RTU sales had these specified.
A high Wisconsin market penetration of HVAC controls A high percentage of Wisconsin vendors offering HVAC equipment with variable frequency drives (VFDs).	**Evidence of attribution of market effects to Focus** **The 2008 Wisconsin building code.** This code requires economizers on all split cooling systems and groundwater source cooling systems greater than 54,000 Btu/h and all other cooling systems greater than 33,000 Btu/h. Although the building code does not require these economizers to be dual enthalpy economizers, we would expect the dual enthalpy systems to gain a certain percentage of this new business, especially with Focus rebates available. **Causes of HVAC control market trends.** Only six Wisconsin HVAC companies provided comments on what factors might be driving the market penetration of HVAC controls. Two of the six mentioned Focus rebates as a driving factor. Two others reported the economic downturn as hurting sales. Other factors mentioned included “market growth” and working with new contractors. Focus has been offering rebates for HVAC controls and HVAC systems with VFDs for many years.

Table 3-30. Comparing the Hypothesized Market Effects for Energy Recovery Ventilators (ERVs), Steam Traps, and Infrared Heaters with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high percentage of Wisconsin vendors offering newer or less-common HVAC technologies such as: - Energy recovery ventilator (ERV) systems - Steam traps - Infrared heaters.	**Evidence of market effects** **ERVs.** The difference between the percentage of Wisconsin HVAC companies reporting that they sell ERVs systems (69 percent) and the percentage of Illinois HVAC companies reporting this (53 percent) was not statistically significant at the 90 percent confidence level. **Steam traps.** 45–67 percent (depending on weighting) of Wisconsin HVAC contractors reported selling/installing these compared to 21–30 percent of Illinois HVAC contractors. **Infrared heaters.** 63–84 percent of Wisconsin HVAC contractors and 65–76 percent of Illinois HVAC contractors reported selling these. There were no statistically significant differences between the Wisconsin and Illinois estimates.
A high percentage of Wisconsin vendors offering newer or less-common HVAC technologies such as: - Energy recovery ventilator (ERV) systems - Steam traps - Infrared heaters.	**Evidence of attribution of market effects to Focus** Focus has been offering rebates on these measures for many years while the Illinois rebate programs have not offered rebates for these measures.

Table 3-31. Comparing the Hypothesized Market Effects That Wisconsin HVAC Companies Have Increased Awareness of the Benefits of EE with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
Increased Wisconsin HVAC awareness of the availability and benefits of high-efficiency HVAC products in general More Wisconsin distributors mentioning EE products in their promotional materials.	**Evidence of market effects** **Importance of EE for promotions.** When asked how important the promotion of EE for their companies, Wisconsin respondents gave a slightly higher rating than their Illinois counterparts but this went away when the data was fully weighted. Yet when Wisconsin and Illinois companies were asked how their current importance ratings compared to what they were three years ago, Wisconsin reported a larger increase. Seventy-five of Wisconsin HVAC companies said that they featured Focus on Energy in their promotions compared to only 25 percent of Illinois HVAC companies featuring their native rebate programs. **Important HVAC characteristics for their C&I customers.** Wisconsin and Illinois HVAC companies were asked to rate how important various characteristics of HVAC equipment were for their C&I customers. For the equipment characteristics that were most closely associated with EE—operating costs and life-cycle costs—there were no statistically significant differences between the Wisconsin and Illinois ratings.
Increased Wisconsin HVAC awareness of the availability and benefits of high-efficiency HVAC products in general More Wisconsin distributors mentioning EE products in their promotional materials.	**Evidence of attribution of market effects to Focus** **Why EE became more important for HVAC companies.** When asked why EE had become more important over time, 45 percent of the Wisconsin respondents and 32 percent of the Illinois respondents cited rebate programs. About a third of each also mentioned increased interest in energy efficiency. **Differences between Wisconsin and Illinois HVAC customers.** HVAC contractors who served both the Wisconsin and Illinois markets were asked whether there were differences between their Wisconsin contractors or customers and their Illinois contractors or customers in terms of how frequently they specified or asked for EE HVAC systems and products. None of the Wisconsin HVAC companies said that there were differences and only a small percentage of the Illinois companies said that there were.

3.8.3 Comparing the hypothesized lighting market effects with the evidence

In the in-depth interviews, the Focus Business Programs implementers also mentioned a number of possible market effects that the evaluators should look for in the lighting market. The following tables compare these hypothesized market effects for high-bay fluorescents, high-performance T8s, and lighting controls with the evidence from the market actor surveys as well as other sources.

Table 3-32. Comparing the Hypothesized Market Effects of Increased Market Penetration of High-bay Fluorescent Lighting with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high Wisconsin market share of high-efficiency lighting products including high-bay fluorescents, high-performance T8s; and lighting controls Higher distributor and retailer inventory levels of energy-efficient lighting products in Wisconsin than in neighboring states	**Evidence of market effects** **High-bay fluorescent sales.** Wisconsin lighting companies reported that 74–80 percent (depending on weighting) of their high-bay sales/installations were fluorescents compared to 38–58 percent reported by Illinois lighting companies. Reported sales/installations of the high-bay fluorescents have increased in both Wisconsin and Illinois over the past year and a half with the gap between the two states remaining of similar size. **High-bay fluorescents in stock.** A slightly higher percentage of the Wisconsin respondents reported having high-bay fluorescents in stock than Illinois companies did, but this difference widened considerably when the response data was fully weighted.
A high Wisconsin market share of high-efficiency lighting products including high-bay fluorescents, high-performance T8s, and lighting controls Higher distributor and retailer inventory levels of energy-efficient lighting products in Wisconsin than in neighboring states	**Evidence of attribution of market effects to Focus** **Sales in the absence of Focus.** Wisconsin lighting companies estimated, on average, that the share of their high-bay lighting that was fluorescent would decline from 74–80 percent to 35–38 percent in the absence of the Focus program. **Factors that drove changes in mix of high-bay lighting.** Companies reporting changes in their mix of high-bay lighting specifications were asked what factors caused these changes. While rebate programs were one of the more important factors for the Wisconsin respondents, they cited improvements in product quality/performance even more often. For the Illinois lighting companies this was the most-cited factor. Many lighting companies said that the ability of high-bay fluorescents to turn on instantly and their greater compatibility with occupancy sensors made them preferable to metal halides. Other pointed to better color rendering and light quality.

Table 3-33. Comparing the Hypothesized Market Effects of Increased Market Penetration of High Performance T8s with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high Wisconsin market share of high-efficiency lighting products including high-bay fluorescents, high-performance T8s, and lighting controls Higher distributor and retailer inventory levels of energy-efficient lighting products in Wisconsin than in neighboring states	**Evidence of market effects** **High performance T8 sales.** Wisconsin lighting companies reported that 63–82 percent (depending on weighting) of their linear fluorescent sales/installations were high performance T8s compared to 34–46 percent reported by Illinois lighting companies. Reported sales/installations of high-performance T8s have increased since 2008 for the Wisconsin lighting companies although they have actually declined for the Illinois companies. **High performance T8s in stock.** A nearly equal percentage of Wisconsin (61 percent) and Illinois (62 percent) respondents said that they have high-performance T8s in stock, but these percentages changed significantly (72 percent Wisconsin, 23 percent Illinois) when the data was fully weighted.
A high Wisconsin market share of high-efficiency lighting products including high-bay fluorescents, high-performance T8s, and lighting controls Higher distributor and retailer inventory levels of energy-efficient lighting products in Wisconsin than in neighboring states	**Evidence of attribution of market effects to Focus** **Sales in the absence of Focus.** Wisconsin lighting companies estimated, on average, that the share of their linear fluorescents sales/installations that were high performance T8s would decline from 63–82 percent to 42–58 percent in the absence of the Focus program. **Factors that drove changes in their mix of linear fluorescents.** Companies reporting changes in their mix of linear fluorescents were asked what factors caused these changes. While rebate programs were one of the more important factors for the Wisconsin respondents (29 percent), they cited lower first cost for high performance T8s (43 percent) increased interest in energy efficiency (36 percent), and customer education (21 percent) as other important factors. Of course some of these other factors cited besides the Focus on Energy program—such as customer education/awareness, increased interest in energy efficiency, and even the lower first cost for the high-performance T8s—could be effects of Focus.

Table 3-34. Comparing the Hypothesized Market Effects of Increased Market Penetration of Lighting Controls with the Evidence

Hypothesized Market Effects	Evidence from the Market Actor Surveys
A high Wisconsin market share of high-efficiency lighting products including high-bay fluorescents, high-performance T8s; and lighting controls.	**Evidence of market effects** **Lighting control sales and specifications.** Wisconsin lighting companies reported that 50–63 percent (depending on weighting) of their orders/jobs included lighting controls compared to 36–38 percent reported by Illinois lighting companies. Wisconsin companies also reported that 72–79 percent of their job where they are specifying the lighting have lighting controls. This compares to 32–43 percent of lighting specifications reported by Illinois companies. Yet the average percentage of lighting jobs with lighting controls reported by Wisconsin companies (63 percent) was down from 68 percent in 2008.
A high Wisconsin market share of high-efficiency lighting products including high-bay fluorescents, high-performance T8s; and lighting controls.	**Evidence of attribution of market effects to Focus.** **Sales in the absence of Focus.** Wisconsin lighting companies estimated, on average, that the share of their lighting jobs that would include lighting controls would decline from 50–63 percent to 40–47 percent in the absence of the Focus program.

3.8.4 Estimating untracked attributable savings

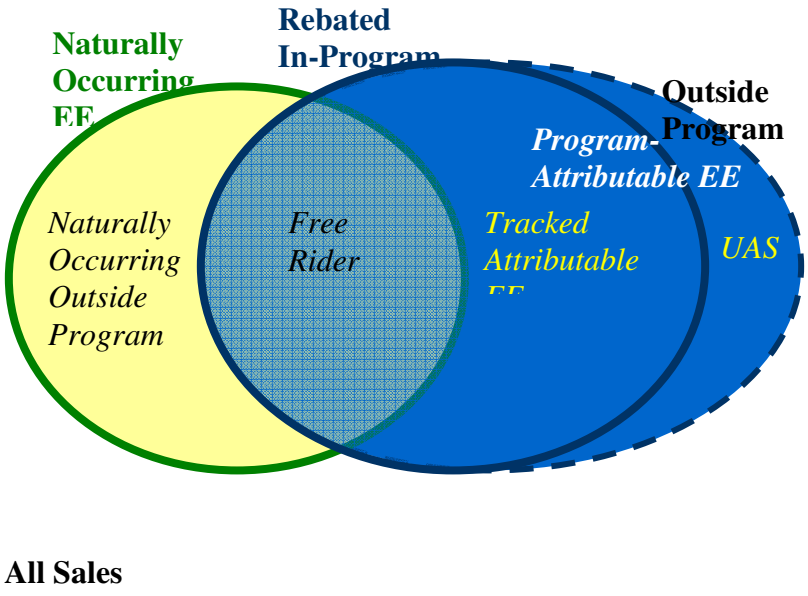
One of the major objectives of this Supply-side Study was to produce an estimate of untracked attributable savings (UAS)—energy savings that were attributable to Focus Business Programs, but which were not currently being tracked and claimed by the program. The UAS includes both participant and nonparticipant spillover (sometimes referred to as "freeridership").

The net savings reported in the most recent impact report is the portion of tracked or in-program savings that is attributable to Focus. The tracked attributable savings is the gross tracked savings adjusted for free riders. Combining the tracked attributable savings with the untracked attributable savings gives total program-attributable savings. The ratio of total program-attributable savings to total gross tracked savings is the overall net-to-gross (NTG) ratio. This overall NTG ratio accounts for free ridership, participant spillover, and nonparticipant spillover.

A. METHODOLOGY BASED ON SALES SHARE

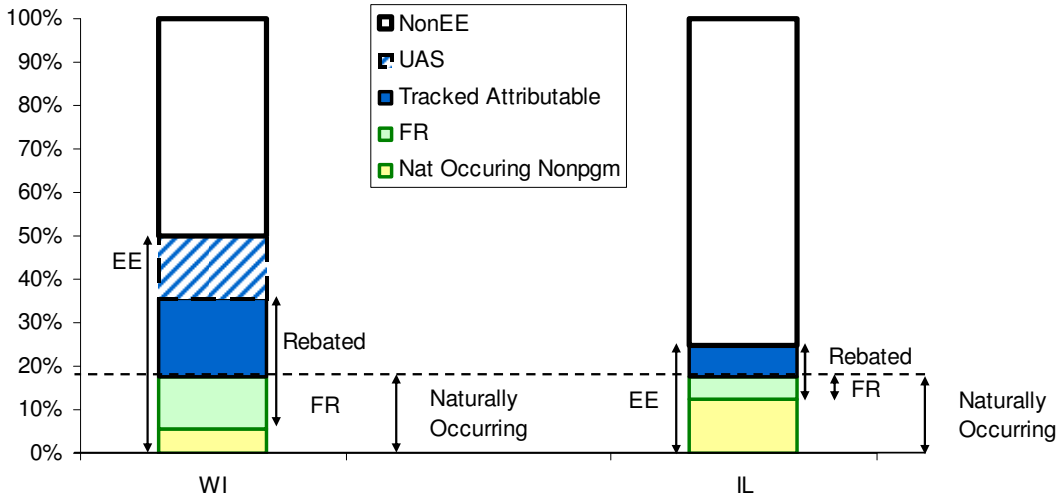
The relationship between the components of in-program and non-program sales of energy-efficient (EE) equipment is illustrated in Figure 3-6 below. The baseline of interest is the naturally occurring EE sales. Naturally occurring sales that receive rebates are free riders. The remainder are naturally-occurring sales outside the program. The portion of rebated- or in-program EE sales that are not free riders are program-attributable. Additional program-attributable EE sales occur outside the program. These are the untracked attributable savings (UAS).

Figure 3-6. Market Components of Energy-efficient Sales



This classification is the basis for the baseline and UAS estimation, illustrated in Figure 3-7.

Figure 3-7. Illustration of UAS Estimation



From the supplier interviews, we obtained estimates for each state (Wisconsin, Illinois) of:

- The fraction of sales that are energy-efficient, F_{EE}
- The fraction P of energy-efficient sales that are rebated by the program.

We made two key assumptions:

- For Illinois, given the early stage of the program, untracked attributable EE sales are negligible
- The naturally occurring EE sales share in Illinois is the same as the naturally occurring sales share in Wisconsin.

With these assumptions, we were able to estimate baseline sales that would have occurred without the program. Some of the estimates used in our methodology, such as the estimates of total market size for a given measure would likely be improved by obtaining actual sales data. As the Illinois program matures and the assumption of negligible effects outside the program becomes less justified, the methods used here will no longer be applicable.

We performed this calculation with three assumptions or models for the currently unknown freeridership levels for Illinois.

1. **That there is no free ridership in the Illinois rebate program: everyone who got a rebated piece of energy-efficient equipment would not otherwise have bought that energy-efficient equipment**. In this scenario, the "natural" energy efficiency penetration is all the energy efficiency equipment that did not receive rebates. This is the most generous baseline for Wisconsin as far as calculating UAS.
2. **That there is 100 percent free ridership in Illinois rebate program: everyone who got a rebated piece of EE equipment would have bought it anyway.** In this case, the "natural" energy efficiency penetration is the rebated energy-efficient equipment plus the non-rebated energy-efficient equipment. This is the least generous baseline for Wisconsin in terms of calculating UAS.
3. **That the free ridership rate in Illinois is similar to what it is in Wisconsin.** In this case, the "natural" energy efficiency penetration is the non-rebated energy-efficient equipment and the quantity of rebated energy-efficient equipment multiplied by the free ridership rates from the recent Focus Business Programs Impact Analysis report[63]. We used the Wisconsin free ridership rates as proxies for the Illinois free ridership rates because the latter are currently not available. We would be willing to revise or revisit our calculations using the actual Illinois free ridership rates once they become available.

The first two assumptions provide outer bounds on possible estimates. We do not consider either to be likely.

Before showing our estimates of UAS for Calendar Year 2009, it is important to explain why we calculated UAS for some energy-efficient measures that Focus Business Programs promotes and not for others. As explained in the methodology subsection, the measures that we chose to focus on in the market actor surveys were measures that were identified by the Focus Business Programs implementers as having the potential for market effects.

[63] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission of Wisconsin, Focus on Energy Evaluation, Business Programs Impact Evaluation Report, Last Three Quarters of the 18-month Contract Period and First Three Quarters of Calendar Year 2009.* March 31, 2010.

Table 3-35 shows the outputs from the models described above. As noted, Model A and Model B are not realistic scenarios but are essentially the ceiling (Model A) and the floor (Model B) for defining the range of potential UAS. Model C and the Binary Method produce the UAS estimates that we believe are appropriate for Focus Business Programs for CY09.[64]

Table 3-35. Outputs from the UAS Models

Energy Type (Measure)	Gross Tracked Energy/Demand Savings from CY09 Focus BP Tracking Database	Total Untracked Attributable Savings			
		Model A	Model B	Model C	
		Using 0% Free-ridership in Illinois (Ceiling)	Using 100% Free-ridership in Illinois (Floor)	Using Wisconsin Estimate of Free-ridership for Illinois	Binary Method
kWh					
Boiler Tuneups	0				
High Performance T8	10,625,229	4,296,919	761,928	2,868,783	
High bay fluorescents	141,126,197	63,586,871	24,483,082	47,788,940	
Modulating HW Boilers	0	0	0	0	
Rooftop AC	346,844	694,629	678,232	690,874	
kW					
Boiler Tuneups	0				
High Performance T8	2,274	892	136	596	
High-bay fluorescents	29,554	12,962	4,773	9,751	
Modulating HW Boilers	0	0	0	0	
Rooftop AC	509	1,218	1,194	1,204	
Therms					
Boiler Tuneups	7,154,384				-931,192
High Performance T8	0	0	0	0	
High-bay fluorescents	0	0	0	0	
Modulating HW Boilers	47,238	3,937	-1,476	326	
Rooftop AC	0	0	0	0	

These UAS models can also be used to calculate the net-to-gross (NTG) ratios for a given measure. Table 3-36 combines the UAS estimates and NTG estimates from Model C and the binary method into a single table. The shaded cells indicate the estimates that we believe are most reliable.

[64] The UAS estimation methodology described above is applicable only to equipment for which there are standard and energy-efficiency technologies with equivalent function, within a larger measure category. Examples include fluorescent lamps in high-bay applications that might otherwise use less efficient technologies or RTUs with a certain EER rating. For such equipment, it is meaningful to assess the level of market adoption in terms of the shares of the category sales that are the energy-efficient technology. Yet some energy efficiency measures, such as boiler or air-conditioner tune-ups, involve an addition or adjustments to existing equipment, rather than a high-efficiency versus standard efficiency choice within a particular category of new equipment. We refer to such measures as "binary." That is, rather than choose an efficiency level within a category, a customer chooses whether or not to apply this measure. For such measures, the sales share approach above does not apply. For these measures we used an alternative "binary method."

Table 3-36. Summary Estimates of Untracked Attributable Savings and Net-to-Gross Ratios from the Supply-side Study

Energy Type (EE Measure)	Untracked Attributable Savings (UAS) from this Supply-side Study*	Net-to-Gross (NTG) Estimates from this Supply-side Study*
kWh		
Boiler Tuneups	0	
High Performance T8	2,868,783	87%
High-bay fluorescents	47,788,940	93%
Modulating HW Boilers	0	-
Rooftop AC	690,874	276%
kW		
Boiler Tuneups	0	
High Performance T8	596	87%
High-bay fluorescents	9,751	94%
Modulating HW Boilers	0	-
Rooftop AC	1,204	274%
Therms		
Boiler Tuneups	-931,192	
High Performance T8	0	-
High-bay fluorescents	0	-
Modulating HW Boilers	326	34%
Rooftop AC	0	-

Note: *As discussed above, all the UAS estimates are based on Model C except boiler tune-ups, which is based on the binary method.

To test the reasonableness of our NTG estimates from the Supply-side Study, we also compared them to:

- NTG ratios derived from our 2010 Impact Analysis study
- NTG ratios derived from responses to the 2009/2010 HVAC/lighting market actor surveys where we had asked the companies what percentage of their measures sold/installed would have been energy-efficient in the absence of Focus on Energy.

Table 3-37 shows this comparison for high-performance T8s and high-bay fluorescents. It shows that the Model C NTG estimates (third column) are higher than the NTG estimates derived from the 2010 Focus Business Programs Impact Analysis report (second column). Since the NTG estimates from the Focus Business Programs Impact Analysis report account for free ridership but not spillover, we would expect the Model C results to be somewhat higher, which is the case. However, the NTG estimates from the supplier-reported estimates, which in theory should include spillover, were lower. The reason for this is unclear.

Table 3-37. NTG Based on Comparison with Illinois and Based on Wisconsin Supplier Reported Sales without Focus

Energy Type (Measure)	NTG as (1- FR) from 2010 Focus BP Impact Analysis Report	NTG Based on Comparison with Illinois: NTG Using Wisconsin Estimate of FR for Illinois Model C	NTG based on Wisconsin Supplier-reported Decline in Absence of Focus
High Performance T8	60%	87%	36%
High-bay fluorescents	60%	93%	61%

3.8.5 Summary

We believe the preponderance of the evidence supports the estimates for Calendar Year 2009 UAS presented in this report. Our reasons for believing the UAS estimates include:

1. **The UAS estimates are for market effects that were predicted and explained by the Focus Business Programs program theory and the in-depth interviews with program implementers.** Before we began our market actor surveys, we examined the Focus Business Programs' program theory and interviewed implementers so they could elaborate on the program interventions (e.g., the HVAC and Lighting Channel Initiatives) and discuss for which types of energy-efficient measures they thought we might find evidence of market effects. As shown in this report, we were not able to find evidence for all the market effects they suggested might exist. However, all of the measures for which we provided UAS estimates were measures which the Focus Business Programs made a credible case for significant market intervention whether by supply-side initiatives (e.g., the Lighting Channel Initiative) or by the sheer volume of rebates (e.g., the high-bay fluorescents).

2. **The measures for which we provided UAS estimates were measures for which there was strong evidence for program attribution.** We asked the Wisconsin HVAC and lighting market actors who had estimated the market penetration of certain energy-efficient measures what that penetration would have been in the absence of the Focus on Energy program. For all the measures for which we provided UAS estimates the market actors predicted a significant drop in market penetration absent Focus. [65] Now when we asked market actors for causes of change in the mix of their HVAC or lighting products, they often mentioned other factors besides rebate programs—such as increased interest in energy efficiency, building codes, product quality improvements, and declines in product prices. However, some of these other factors—such as increased interest in energy efficiency, increases in consumer education, and even declines in product prices, could be direct or indirect effects of the Focus on Energy program. A number of lighting and HVAC market actor talked about how the changes in their use of energy-efficient measures was due to a "synergy" of different factors such as the rebates, changes of building codes, reductions in product prices, and more educated consumers.

3. **The predicted UAS numbers seem reasonable when compared to the end-user self-reported NTG ratios.** Most of the NTG estimates derived from the UAS models

[65] Although as explained in the following paragraph, the implied NTG ratios from these predicted drops was lower than the NTG ratios calculated from the UAS estimates.

seemed reasonable when compared to the NTG ratios calculated from the end-user self-reported free ridership rates from the most recent Focus Business Programs impact analysis.[66] Their magnitudes are in line with what one would expect from the boost in program attribution that would occur when spillover effects are added in. However, when we calculated the implied NTG ratios from the market actor's predicted declines in the market penetration of the energy-efficient measure in the absence of the program we come out with lower NTG ratios then was predicted by the UAS model.

4. **There was evidence that the "contamination" of the Illinois baseline by the Illinois rebate programs was very limited.** Only 54 percent of the Illinois HVAC companies claimed awareness of the Illinois HVAC rebate programs and of the aware companies only 16–18 percent of them said that they had participated in a project rebated by the Illinois programs. Awareness of the Illinois lighting rebates was higher but only about half of the aware Illinois lighting companies had participated in a rebated project. Only 25 percent of Illinois lighting companies featured lighting rebates in their promotions compared to 75 percent of Wisconsin lighting companies. In addition, the size of the gaps between Wisconsin-reported market penetration of energy-efficient measures and the Illinois-reported levels of market penetration remained similar to what we had found in the 2008 Channel Study. If the Illinois rebate programs had achieved real traction then we would have expected these gaps to have narrowed.

5. **Possible exogenous (non-program) influences on the differences in energy efficiency market penetration between Wisconsin and Illinois.** While the influence of the Illinois rebate programs on the Illinois markets appear limited, it is possible that other—non-program—factors might explain the differences in energy efficiency between the Wisconsin and Illinois HVAC and lighting markets. This report discusses how the 2008 changes in the Wisconsin building code may have influenced trends in the sales of high-efficiency RTUs, dual-enthalpy economizers, and energy-recovery ventilators. The report also notes that in August 2009 Illinois also adopted more energy-efficient building codes.

   In terms of energy prices, there were differences between Wisconsin and Illinois in terms of average prices for a given sector (e.g., commercial, industrial) but the mid-point price for the commercial and industrial sector were similar. For example, the average December 2009 electricity price for Wisconsin commercial customers was 9.1 cents/kWh and the average electricity price for Wisconsin industrial customers

[66] The two measures we thought produced less reliable estimates were for RTUs and boiler tune-ups. In the former case, we think the issue is the difficulty of market actors making estimates of energy efficiency penetration that may be a small percentage of their overall business. In addition, the HVAC free-ridership estimates that were taken from the Focus BP impact analysis to serve as a proxy for Illinois free-ridership rates for RTUs were for a greater variety of measures (e.g., booster coils, chiller optimization controls, furnaces, ventilation projects) than just RTUs. In the latter case, this may be due to the different "binary model" used to estimate UAS for this measures which uses a scaling mechanism (the estimated number of boilers in Wisconsin vs. Illinois) that may not be as reliable as scaling mechanism used for the other measures.

was 6.4 cents/kWh for a commercial/industrial mid-point of 7.8 cents per kWh.[67] In comparison, the average December 2009 electricity price for Illinois commercial customers was 7.9 cents/kWh and the average electricity price for Illinois industrial customers was 7.0 cents/kWh for a commercial/industrial mid-point of 7.5 cents per kWh.

Another possible source of exogenous influences on energy efficiency would be underlying differences between the Wisconsin and Illinois HVAC/lighting market actors and end users in terms of firmographics or attitudes towards energy efficiency. Here the evidence of differences is more problematic because in theory the best way to determine whether Illinois is an appropriate proxy for the natural energy efficiency penetration in Wisconsin would be to compare Illinois to a Wisconsin that had not seen the effects of Focus on Energy. While we did ask the Wisconsin HVAC/lighting market actors to hypothesize what the energy-efficiency of their sales and services would have been in the absence of the Focus program, we did not ask similar questions how their firmographics or attitudes towards energy efficiency might have changed without Focus.

Therefore, when we discuss differences between Wisconsin and Illinois in terms of contractor/distributor firmographics or market actor or end user attitudes towards energy efficiency, it is difficult to determine whether these differences were or were not effects of Focus on Energy. For example, the report observes how the Wisconsin HVAC and lighting market actors offered a greater diversity of services than their Illinois counterparts and were more likely to name the customer as an influential participant in the HVAC/lighting specification process. Similarly, the Wisconsin lighting companies were more than twice as likely as the Illinois lighting companies to say that their end users and contractors do not raise concerns about energy-efficient lighting. Are these differences evidence that Illinois is not an appropriate baseline? Or are these differences simply evidence that the Focus on Energy program has had transformative effects on the Wisconsin HVAC and lighting markets? The answer is not entirely clear.[68]

3.9 REVIEW OF LOAD SHAPES

KEMA reviewed the load shapes used by the Focus on Energy Program (Focus) for Contract Year 2009 (CY09) program planning. As part of this review KEMA assessed the appropriateness of incorporating these data into the current benefit-cost (b/c) analysis, updated the b/c analysis method to incorporate time-differentiated avoided costs based largely on the Focus provided load shape data, and provided recommendations for further load research.

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[67] U.S. Energy Information Administration, *Electric Power Monthly*, http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html.

[68] For example, it could be argued that the fact that the Wisconsin companies reported a greater diversity of services might be simply be an effect that, on average, they are more likely to be serving rural customers than their Illinois counterparts. Areas of greater population density such as Chicago are more likely to be able to support HVAC or lighting companies that have more limited or specialized services. In contrast, such specialization would be less economically viable in rural areas.

3.9.1 Research objectives

The two benefit-cost (b/c) analyses that have been completed for Focus to date use a single avoided cost per kWh, kW, or therm saved within a sector. However, the avoided kWh costs and associated avoided emissions vary by time of day. Accordingly, measures with savings that coincide with higher cost intra-day periods have greater benefit per avoided kWh.

Focus' recent planning efforts have taken these differences into account. The detailed evaluation plan for the Focus b/c analysis currently underway did not stipulate the use of time-differentiated avoided costs. However, the evaluation team believes it is worthwhile to move to time-differentiated costs for both planning and evaluation purposes. The Focus-provided load shapes allowed the evaluation to take an initial step in this direction with the current b/c analysis. To accomplish the new approach, the program and evaluation teams need to agree on load impact shapes or measure savings allocation factors that assign savings into costing periods or cost levels. The review of load shapes research allowed KEMA to update the b/c analysis method to incorporate time-differentiated avoided costs. That is, the results of this study are used in the current Focus b/c analysis.

As a continuation of the 18 MCP work, KEMA reviewed load shapes provided by Focus. The review was to determine the applicability of the Focus-provided load shapes. The intent of this review is not to develop definitive, accurate load shapes. Rather, the goal is to identify load shapes, for at least some categories of savings measures, which improve the accuracy of avoided cost assignment in the benefit-cost analysis, compared to the prior assumption of a fixed average cost per kWh by sector.

The load shapes that we reviewed apply to broad categories of measures. Specifically, the load shapes for five general end-use categories in each of the four primary customer sectors were reviewed.

3.9.2 Review of provided data

The reviewed load shapes were generated by Focus and provided to the evaluation team. The load shapes provided "end-use" data for five sectors for four end-use categories. These sectors and end-uses are shown in Table 3-38. The characteristics of this data are:

1. Hourly (24) *nominal* values by
2. Weekday and weekend day types, for
3. Each month of the year, for
4. The pre-program and the assumed post-program periods.

Table 3-38. Sector and End-use Categories Provided by Focus

	Default	Lighting	Heating	Cooling	All Space Conditioning
Commercial	x	x	x	x	
School and Government	x	x	x	x	
Industrial	x	x	x	x	
Agriculture	x	x	x	x	

The load shapes in the Focus analysis were generated by Focus for the initial economic screening of Focus. This analysis was based on the manipulation of default sector level load shapes using the Integral Analytic's (IA) software package DSMore™. According to IA, DSMore's end-use load shapes may come from various sources, including old DSManager runs, DOE2 simulations, or M&V reports.[69] In a typical Application, some of the load shapes may be provided by the user, while other load shapes may be based on the IA default library. For Focus, IA provided load shapes based on modeling of available whole-premise data from Midwest and near-Midwest states, adjusted to Wisconsin weather. Details on the age, location, or origin of the underlying data were not provided. The vintage of the data was not provided and the list of states the data were taken from did not include Wisconsin. When proxy data is used there may be a general loss of precision. At this time, it is not clear the extent of the loss of precision, or if this loss is significant to the ultimate Focus analysis.

For the initial program screening of the Focus Program, Focus developed the applicable end-use load shapes. Based on our review, these shapes are now being incorporated for use in the b/c analysis, as described below. To develop the "end-use" load shapes, Focus initially adjusted the DSMore default class level load shapes for service territory weather and projected price. Focus then selected a portion of the load applicable to the technology. For example, Focus chose a portion of the base load for lighting or temperature sensitive load for HVAC.

KEMA considers the applied process to develop end-use load shapes for screening and evaluation a reasonable high-level, low-cost approach. The approach adapts quantitatively developed load shapes and adjusts them to the service territory by adjusting two critical values, price and weather. Given that no indigenous end-use load shape data is known to exist, the disaggregation of the class level load shape into end-use load shapes through professional judgment seems to be a reasonable technique.

However, KEMA also recognizes that the current approach is highly dependent on the analyst's expertise and the specific software (DSMore). Focus staff cautioned against using simple load shapes that were developed without the DSMore software. Focus staff noted that the complexity of covariance of load with weather variations simply cannot be shown on a simple graph.[70] Accordingly, this implies that the use of load shapes adjusted using software other than DSMore will not likely produce the same weather sensitive savings as using load shapes generated by DSMore. KEMA interprets this caveat as an indication that the savings estimated by the end-use load shapes would be difficult to replicate outside the DSMore platform. What is not clear is whether the differences in the current approach and an approach independent of the DSMore software would produce significantly different results.

As noted, the load shapes are based on "Midwest models", and adjusted for Wisconsin weather (i.e., the Focus load shapes are not directly based on indigenous Wisconsin hourly load data). While the basis of the load shapes may be a passable proxy, KEMA also agrees with the vendor's assessment that, "using actual whole building load data from the actual

[69] Ken Skinner. "RE: Wisconsin DSMore Directory of Load Shapes." Email to Tim Hennessy. August 6, 2009.

[70] Wayne De Forest. "Integral Contact info & Gas Valuation in DSMore." Email to the author. June 4, 2009 (provided as Appendix B of *Review of Business Programs Load Shapes – Final, October 15, 2009*).

region of study is the preferred approach. Focus has been encouraged to obtain raw load data directly from Wisconsin utilities…,"[71] KEMA believes that the acquisition of indigenous Wisconsin data would lower the uncertainty associated with the load shapes. Furthermore, KEMA encourages Focus and the PSCW to request raw load data from Wisconsin utilities. KEMA could participate in this process if requested to do so.

In addition, the ultimate efficacy of the program's benefit-cost calculation is based on one major assumption. The load shape of the savings associated with a specific measure is assumed to be consistent with that measure's end-use load shape. In cases where the savings load shape differs significantly from the end-use load shape, this could lead to the savings not being assigned the correct marginal cost. For most measures, which involve replacement of equipment with a higher-efficiency equivalent, the savings shape is similar enough to the end-use shape, within the accuracy of these shapes, to accept this simplifying assumption. For control-related measures, including occupancy sensors, economizers, and VFDs, the savings shape is substantially different from and may even be opposite in pattern to that of the end-use shape.

In summary, KEMA believes that the development of the end-use load shapes was reasonable, and appropriate for this application. However, KEMA also recognizes that the end-use load shapes used in this evaluation do have a high degree of unquantifiable uncertainty. The level of uncertainty may affect the ultimate ability to determine the value of the various program components. The uncertainty associated with the results could be reduced substantially through the development of indigenous load shape data.

Lastly, it is clear that the development of specific load shapes is highly dependent on the DSMore software and methodology. While KEMA recognizes that DSMore in conjunction with a skilled analyst produces reasonable load shapes, the dependence solely on DSMore, and its attendant default load shapes raises issues of transparency and independent reproducibility.

3.9.3 Application of load shapes to end-use categories

Focus provided the evaluation team with a spreadsheet of DSMore output. The source data contained load shapes for the four Focus non-residential sectors (Commercial, Schools and Government, Industrial, and Agriculture). For each sector, Focus provided four end-use load shapes: default (whole-premise), lighting, heating, and cooling. For each end-use load shape category, 24 hourly nominal demand values were provided for the pre-program period, by month, by day type (i.e., weekday vs. weekend).

KEMA examined the load shapes and determined which load shapes would apply to the measure groups for the evaluation (Heating, Cooling, Lighting, Building Shell, Motors, Process, and Other) as well as what portion of the load shape would apply to each measure. For each sector, in addition to the four load shapes provided by Focus, we constructed an additional composite space conditioning shape for evaluating building shell measures and Commercial and Schools and Government sectors' motors. The composite space conditioning shape was derived from the saturation-weighted combination of the Heating and

[71] Ken Skinner. "RE: Wisconsin DSMore Directory of Load Shapes." Email to Tim Hennessy. August 6, 2009 (provided as Appendix A of *Review of Business Programs Load Shapes – Final, October 15, 2009*).

Cooling shapes. For the Industrial sector, a flat load shape was adopted, based on the assumption of two shift operational schedule of 20 hours 6 days/week. This was based on typical operating hours derived from program tracking data. Thus, we had a total of five (or six) possible shapes for each sector:

- Heating: Focus provided
- Cooling: Focus provided
- Lighting: Focus provided
- Default: Focus provided
- Space Conditioning: Composite of Focus Heating and Cooling
- Flat: Assumed (industrial only).

Table 3-39. End Use Load Shapes Used for Benefit-Cost Analysis by Sector and End-use Category

	Heating	Cooling	Lighting	Building Shell	Motors	Process	Other
Commercial	Heating	Cooling	Lighting	Space Cond	Space Cond	Default	Default
School and Government	Heating	Cooling	Lighting	Space Cond	Space Cond	Default	Default
Industrial	Heating	Cooling	Lighting	Space Cond	Flat	Default	Default
Agriculture	Heating	Cooling	Lighting	Space Cond	Default	Default	Default

Table 3-39 presents the adaptation of the Focus end-use data to the specific evaluation measure groups. This table shows that for the heating, cooling, and lighting measures, the evaluation uses the Focus developed load shapes. For the building shell load measures, the evaluation uses a weighted combination of the heating and cooling load shapes. The weights were determined by the saturation of electric heating and cooling space conditioning for each specific sector. For motors, the Focus tracking database showed that for the Commercial and Schools and Government sectors, the measures were primarily related to space conditioning. Also from the Focus tracking database, it was determined that a flat load shape would be the most appropriate for the Industrial sector, and the default (i.e., class level load shape) load shape would be most appropriate for the Agricultural load shape. It was assumed that the process and other measure load shapes would be similar to the default load shape.

It should be noted that while evaluation has accepted the Focus end-use load shapes for our use in the evaluation, evaluation applications of the shapes might be different from Focus applications for particular measures. For example, for the evaluation KEMA used the Focus "Space Conditioning" end-use load shape for the Commercial sector "Motors" end-use load shape. This may or may not be consistent with the Focus assumption of the load shape for this measure group.

3.9.4 Costing periods

The purpose of the load shape assignment is for development of avoided energy costs, combining the load shape with marginal costs. To establish the costs, marginal cost periods, based on Midwest ISO's (MISO) day ahead prices were analyzed. From this analysis, four distinct marginal cost periods were identified. The definitions of the marginal cost periods are

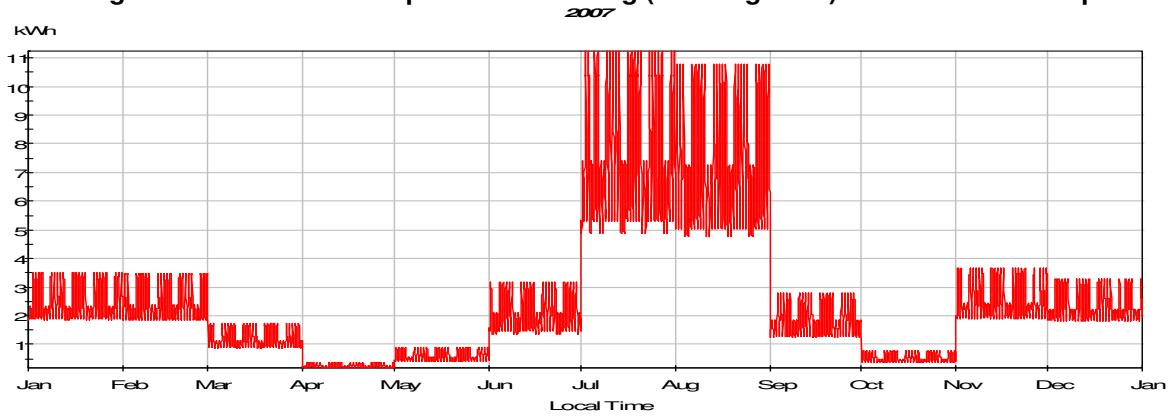
presented in Table 3-40. Accordingly, for Focus benefit-cost analysis, KEMA allocated the annual energy savings for specific measures based on the applicable end-use load shape.

Table 3-40. Marginal Cost Periods

Period	Day Type	Hours[72]
Summer On Peak	All Days	HE10 to HE21
Winter On Peak	Weekdays	HE8 to HE12N
Winter On Peak	Weekdays	HE19 to HE21
Off Peak	All Others	All Others

For the evaluation, it was assumed that the measure savings would follow the assigned end-use load shape. Accordingly, the first step was to construct 8,760 hour end-use load shapes for each measure category. Based on the end-use load shape specification (see Table 3-40), load shapes based on month and day type were applied to a 2007 calendar to construct an annual load shape. Figure 3-8 shows an example of an annual load shape for the Commercial space conditioning load shape.

Figure 3-8. Commercial Space Conditioning (Building shell) End-Use Load Shape



Using the constructed end-use load shape, the energy was summarized into the specified marginal cost periods. Table 3-41 presents an example using the Commercial space conditioning load. For the evaluation, the annual savings for a specific space conditioning measure (e.g., building shell), would be allocated to the periods based on the relative distribution of energy for the end-use shown in this table.

[72] "HE" is an acronym for "Hour Ending."

Table 3-41. Commercial Space Conditioning End-use Energy Distribution

Period	Hours	Total kWh	Pct kWh
Summer On Peak	1,104	7,454	32%
Winter On Peak	420	1,145	5%
Winter On Peak	252	549	2%
Off Peak	6,984	13,868	60%
Total	**8,760**	**23,016**	**100%**

3.10 MEASURE LIFE STUDY

The principal objective of this study was to update the current measure life estimates used by the Focus Evaluation Team and the Focus Program. The evaluation team's approach to this study consisted entirely of secondary research; the team did not conduct primary research, fieldwork, or produce a savings persistence study.

Measure life is an estimate of the median length of time an energy efficiency measure is installed before it is replaced or upgraded. It is an important component of the benefit-cost analysis and the life cycle net savings (LCNS) alternative attribution analysis methodology[73]. The energy savings benefits obtained as a result of a given program are limited by the length of time an energy efficiency measure is installed and operating. Measure life estimates currently being used by the Business Program (BP) portion of the benefit-cost analysis are potentially outdated, lacking source documentation, and could be defined at a more detailed level for some technologies or groups of technologies. Given the importance of measure life as an input to the benefit-cost analysis and LCNS method, KEMA updated the current measure life estimates to contribute to improved accuracy of these analyses and appropriate representation of program benefits.

As a secondary objective, KEMA outlined the quality of information that could potentially be gathered through an exploratory phone survey with past Focus on Energy participants. This outline included the recommended measure groups for further study, information that could be gathered, and the potential increase in the quality of the final result.

3.10.1 Updates to measure life estimates

The primary objective of the study was to update the measure life estimates. Measure life estimates currently being used by the Business Program portion of the benefit-cost analysis are based on a previous Energy Center of Wisconsin (ECW) technical potential study[74] and information collected during the FY07 program year from the California Database for Energy Efficient Resources (DEER). For this study, we reviewed existing studies, databases, and other sources to estimate measure life for equipment by end-use and when possible by

[73] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Evaluation Calendar Year 2009, Detailed Evaluation Plan.* April 21, 2009.

[74] Energy Center of Wisconsin. *Energy Efficiency and Customer-Sited Renewable Energy: Achievable Potential in Wisconsin 2006–2015.* November 2005.

WISeerts group description and tech code level. The estimates currently being used vary by end-use and by program sector. Table 3-42 summarizes the current measure life estimates.

Table 3-42. Current Measure Life Estimates[75]

End-use Category	Sector			
	Agricultural	Commercial	Industrial	Schools and Government
Building Shell	10	10	10	10
HVAC	15	15	15	15
Lighting	15	15	15	15
Manufacturing Process	12	12	12	12
Other	17	19	28	10
CFL	6	6	6	6
Motors	16	16	16	16

The current measure life estimates do not differentiate between life for equipment or technology measure and life of service measures. Savings for equipment or technology measure are related to the design or implementation of a device, control, or system. In contrast, savings for service measures are obtained through tuning equipment for optimal performance. Service measures generally need to be performed several times over the life of the equipment to maintain the savings. These could include boiler tune-ups, chiller tune-ups, compressed air leakage repair, and steam trap maintenance. As a result, equipment or technology measure life tends to be much longer than service measure life. If a weighted average measure life estimate is calculated based on the current mix of measure savings, bias will be introduced into life cycle net savings and benefit cost analysis if the mix of measure savings changes in the future. To minimize this potential, we found measure life estimates for both types of measures.

A. METHODS

To update the measure life estimates, a team of KEMA engineers reviewed secondary sources to find current data on measure life. We reviewed existing studies, workpapers, and technical guides to obtain relevant data. To find as many relevant sources as possible, we encouraged the Public Service Commission of Wisconsin (PSCW) and the Focus Program to provide sources or leads to sources. When possible, we also reviewed the underlying sources and empirical data to understand the strength of the source.

KEMA gathered data at the technology code level then aggregated the data into end-use categories and WISeerts group descriptions.[76] Some sources (e.g., DEER) provide data for very specific measures. The aggregation into WISeerts group descriptions and end-use categories was done using the historical program savings from the period of January 2008 to

[75] The Focus on Energy Evaluation Team. *State of Wisconsin Public Service Commission, Focus on Energy Evaluation, Semiannual Report (18-month Contract Period).* April 8, 2009.

[76] Focus on Energy measures are tracked in the WISeerts database at a technology code level. There are over 700 technology codes currently in use. These technology codes are further classified by end-use categories and WISeerts group descriptions. Appendix B lists the measures by technology code and indicates the associated WISeerts group description.

September 2008 as weights for individual measures. The end-use categories and WISeerts group descriptions are used by the Focus Program for program planning and by the evaluation team for analyses such as impact evaluation, benefit cost, and LCNS.

The measure life estimates reported in the secondary sources were determined through a number of methods such as field research, secondary research based on field research, lab study, and professional collaboration and estimation. KEMA assessed the validity and applicability of each measure life estimate by reviewing the underlying sources or supporting research. Where a measure life estimate was not applicable to Focus on Energy measures, we excluded the finding from our results. For measure life estimates that were applicable to Focus measures, KEMA assigned a rating to define the basis of the estimate. The rating shows if the source of the estimate was primary research, secondary research, or professional judgment. The rating helped to determine which estimate(s) would provide the most value to updating the existing Business Programs measure life estimate.

Following the assessment of the secondary sources, KEMA estimated a measure life for each measure based on the sources with the best ratings. We looked for estimates that were consistent between sources. When estimates from different sources were substantially different, we used the estimate with the best source rating. When there were multiple sources with the same best rating, we used the average of the associated ratings. The measure level estimates of measure life were then aggregated to end-use and WISeerts group description. The end-use and WISeerts group description measure life estimates were calculated separately for service measures and technology/equipment measures. The service measures include, but are not limited to, boiler tune-ups, chiller tune-ups, compressed air leakage repair and steam trap maintenance. The aggregated estimates are weighted averages of the measure life by individual tech code. The weights are based on avoided cost of generation of the savings from January 1, 2008, to September 30, 2008, of the 18-month Contract Period (18 MCP).

B. RESULTS

The secondary research showed a lack of primary research on measure life for many technologies. In addition, the primary research supporting measure life estimates is generally limited to a few studies. The challenges and costs of performing primary research on measure life relative to the quality of the potential results limited the scope of this research effort. The findings of this study are based on the best available measure life data currently available. If future primary research finds substantial differences in measure life estimates, the findings of this study should be re-evaluated.

Table 3-43 shows our recommendations for measure life by WISeerts group description. These estimates provide a more focused perspective than the estimates by end-use previously used. We separated the equipment or technology measures from the service measures. Several group description categories do not currently have service measures. However, we have included a service category in the table for each group description and indicate the category as not applicable (i.e., “NA”). We believe this will provide clarity if future service measures are added to these categories.

Table 3-43. Recommended Measure Life by WISeerts Group Description

Group Description	Measure Type	Sector				Weighted Average Source Rating*
		Agricultural	Commercial	Industrial	Schools and Government	
Boilers & Burners	Equip or Tech	18	18	18	18	2
	Service	1	1	1	1	2
Lighting	Equip or Tech	11	10	10	10	2
	Service	NA	NA	NA	NA	NA
Refrigeration	Equip or Tech	9	9	9	9	3
	Service	NA	NA	NA	NA	NA
HVAC	Equip or Tech	15	15	15	15	2
	Service	5	5	5	5	3
Process	Equip or Tech	10	10	10	10	2
	Service	NA	NA	NA	NA	NA
Domestic Hot Water	Equip or Tech	15	15	15	15	3
	Service	NA	NA	NA	NA	NA
Building Shell	Equip or Tech	20	20	20	20	3
	Service	NA	NA	NA	NA	NA
Laundry	Equip or Tech	12	12	12	12	3
	Service	NA	NA	NA	NA	NA
Compressed Air, Vacuum Pumps	Equip or Tech	13	13	13	13	3
	Service	2	2	2	2	1
Agriculture	Equip or Tech	13	13	13	13	2
	Service	NA	NA	NA	NA	NA
Wastewater Treatment	Equip or Tech	11	11	11	11	2
	Service	NA	NA	NA	NA	NA
Industrial Ovens & Furnaces	Equip or Tech	13	13	13	13	3
	Service	NA	NA	NA	NA	NA
Pools	Equip or Tech	5	5	5	5	3
	Service	NA	NA	NA	NA	NA
Food Service	Equip or Tech	11	11	11	11	2
	Service	NA	NA	NA	NA	NA
Information Technology	Equip or Tech	2	2	2	2	2
	Service	NA	NA	NA	NA	NA
Plug Loads	Equip or Tech	10	10	10	10	3
	Service	NA	NA	NA	NA	NA
Motors	Equip or Tech	16	16	16	16	2
	Service	NA	NA	NA	NA	NA
New Construction	Equip or Tech	18	18	18	18	NA
	Service	NA	NA	NA	NA	NA

* A “1” indicates the source used primary research; a “2” indicates the source researched reports that were originally based on primary research; and a “3” indicates the basis of the measure life is an opinion, manufacturer design specification, or unknown.

Table 3-44 shows KEMA's recommended measure life estimates by end-use.

Table 3-44. Recommended Measure Life by End-use

End-use Category	Measure Type	Sector				Weighted Average Source Rating*
		Agricultural	Commercial	Industrial	Schools and Government	
Building Shell	Equip or Tech	19	19	19	19	3
	Service	NA	NA	NA	NA	NA
HVAC	Equip or Tech	15	15	15	15	2
	Service	5	5	5	5	3
Lighting	Equip or Tech	12	12	12	12	2
	Service	NA	NA	NA	NA	NA
Manufacturing Process	Equip or Tech	11	11	11	11	2
	Service	2	2	2	2	1
Other	Equip or Tech	12	12	12	12	3
	Service	NA	NA	NA	NA	NA
CFL	Equip or Tech	7	5	4	5	2
	Service	NA	NA	NA	NA	NA
Motors	Equip or Tech	16	16	16	16	2
	Service	NA	NA	NA	NA	NA

* A "1" indicates the source used primary research; a "2" indicates the source researched reports that were originally based on primary research; and a "3" indicates the basis of the measure life is an opinion, manufacturer design specification, or unknown.

C. RECOMMENDATIONS

Based on the research findings, KEMA makes the following recommendations for the PSCW to consider:

- Use the measure life estimates based on WISeerts group description categories for program analysis whenever possible. These categories are more focused and can provide a clearer understanding of the impact specific equipment has on potential lifetime savings.
- Use the updated measure life estimates based on end-use categories for program analysis when the data do not allow for disaggregating to the WISeerts group description level.
- We recommend aggregating measure life data into group description or end-use categories for the purpose of program planning and evaluation (recommendations 1 and 2). However, there are situations where the use of a measure specific life estimate may be more appropriate; for example, when the Program is considering additions or revisions to specific measures.
- Use of separate service measure life estimates in both the end-use and group description categorizations. We could calculate a weighted average measure life estimate based on the current mix of measure savings. However, bias will be introduced into life cycle net savings and benefit cost analysis if the mix of measure savings changes in the future. To minimize this potential, we recommend separate measure life estimates for service and equipment or technology measures.

3.10.2 Measure life phone survey scoping study

As a secondary objective, KEMA conducted a scoping study to investigate the quality of data that could potentially be gathered from an exploratory phone survey with past Focus participants. The purpose of the scoping study was to discern whether or not this is a viable method for Focus on Energy and for which measures or groups of measures. KEMA's previous experience suggested that this type of survey may not provide enough data for a broad-based savings persistence study and that there are challenges for data collection. However, focused efforts have the potential to inform the estimate provided as part of the *Updates to Measure Life Estimates* task of this study.

The exploratory phone survey is not intended to collect data for a statistically based persistence study. Savings persistence studies are very expensive, require large samples, and still result in high levels of uncertainty. KEMA's proposed survey would collect Wisconsin specific information that would enable KEMA engineers to improve the quality of the existing measure life estimates. Such an effort could prove to be particularly valuable for measure life estimates that are not based on primary research.

KEMA assessed the results of the *Updates to Measure Life Estimates* task and determined which measure life estimates could benefit from additional data. We evaluated the likelihood of obtaining additional data through phone interviews based on our experience and interviews with Focus on Energy advisors.

A. METHODS

To determine the viability of the phone survey, we reviewed historical savings and available measure life data at a technology code level. We then interviewed Focus on Energy energy advisors. Based on this information and our experience we estimated the quality of the data that could be collected and the potential increase these data could have on the quality of the measure life estimates calculated as part of the *Updates to Measure Life Estimates* task.

To determine the possible quality of data available by phone, we asked the Focus on Energy energy advisors general questions such as:

- What percentage of participants would be able to answer questions about efficiency of equipment when it was installed and the current efficiency of equipment?
- What percentage of participants would know about equipment installed through the program five years ago (specifically is it still installed, what was the efficiency at installation, and what is the current efficiency)?

Using the opinions provided by the Focus advisors and our experience, we estimated the quality of measure life data that we could obtain through phone interviews. We estimated the possible quality of data based on the percentage of participants who are likely to be able to answer a question on the measure. The ability of participants to answer questions accurately is further dependent on finding a person within the company who has technical knowledge of the system in question.

B. FINDINGS

Table 3-45 summarizes the assessment (by end-use) of possible increases in measure life data quality through a phone survey. The greatest potential for improvements to the quality of

the measure life estimates via a phone survey with past program participant was found with building shell and HVAC service end-uses. We believe there would be a reasonable increase in measure life data quality for these end-uses.

Table 3-45. Assessment of Data Quality Increase through Phone Survey by End-use

End-use Category	Measure Type	Weighted Average Source Rating*	Possible Quality of Data by Phone	Possible Increase in Quality of Data	Include in Phone Survey?
Building Shell	Equip or Tech	3	Medium	Some	Yes
	Service	NA			
HVAC	Equip or Tech	2	Medium	Minimal	No
	Service	3	Medium	Some	Yes
Lighting	Equip or Tech	2	High	Some	No
	Service	NA			
Manufacturing Process	Equip or Tech	2	Medium	Minimal	No
	Service	1	Medium	Minimal	No
Other	Equip or Tech	3	Low	Minimal	No
	Service	NA			
CFL	Equip or Tech	2	High	Some	No
	Service	NA			
Motors	Equip or Tech	2	Low	Minimal	No
	Service	NA			

* The "weighted average source rating" is from the *Updates to Measure Life Estimates* task. A "1" indicates the source used primary research; a "2" indicates the source researched reports that were originally based on primary research; and a "3" indicates the basis of the measure life is an opinion, manufacturer design specification, or unknown.

Table 3-46 summarizes the assessment (by WISeerts group descriptions) of possible increases in measure life data quality through a phone survey. Based on the scoping study, we recommend a phone survey with past Focus participants that installed measures classified in the HVAC service, building shell, compressed air, and new construction WISeerts group descriptions. We believe there would be a reasonable increase in measure life data quality for these WISeerts group descriptions.

Table 3-46. Assessment of Data Quality Increase through Phone Survey by WISeerts Group Description

Group Description	Measure Type	Weighted Average Source Rating*	Possible Quality of Data by Phone	Possible Increase in Quality	Include in Phone Survey?
Boilers & Burners	Equip or Tech	2	Medium	Minimal	No
	Service	2	Medium	Minimal	No
Lighting	Equip or Tech	2	High	Some	No
	Service	NA			
Refrigeration	Equip or Tech	3	Low	Minimal	No
	Service	NA			
HVAC	Equip or Tech	2	Medium	Minimal	No
	Service	3	Medium	Some	Yes
Process	Equip or Tech	2	Medium	Minimal	No
	Service	NA			
Domestic Hot Water	Equip or Tech	3	Low	Minimal	No
	Service	NA			
Building Shell	Equip or Tech	3	Medium	Some	Yes
	Service	NA			
Laundry	Equip or Tech	3	Low	Minimal	No
	Service	NA			
Compressed Air, Vacuum Pumps	Equip or Tech	3	Medium	Some	Yes
	Service	1	Medium	Minimal	No
Agriculture	Equip or Tech	2	Low	Minimal	No
	Service	NA			
Wastewater Treatment	Equip or Tech	2	Medium	Minimal	No
	Service	NA			
Industrial Ovens & Furnaces	Equip or Tech	3	Low	Minimal	No
	Service	NA			
Pools	Equip or Tech	3	Low	Minimal	No
	Service	NA			
Food Service	Equip or Tech	2	Low	Minimal	No
	Service	NA			

Group Description	Measure Type	Weighted Average Source Rating*	Possible Quality of Data by Phone	Possible Increase in Quality	Include in Phone Survey?
Information Technology	Equip or Tech	2	Low	Minimal	No
	Service	NA			
Plug Loads	Equip or Tech	3	Low	Minimal	No
	Service	NA			
Motors	Equip or Tech	2	Low	Minimal	No
	Service	NA			
New Construction	Equip or Tech	NA	Medium	Some	Yes
	Service	NA			

* The "weighted average source rating" is from the *Updates to Measure Life Estimates* task. A "1" indicates the source used primary research; a "2" indicates the source researched reports that were originally based on primary research; and a "3" indicates the basis of the measure life is an opinion, manufacturer design specification, or unknown.

In either the end-use or group description categorization, lighting measures show a high possibility of quality data by phone, but we do not recommend including these in the phone surveys. This is because the measure life estimates for lighting measures are generally based on secondary research of actual field studies. The phone survey is unlikely to provide a reasonable increase in the data quality relative to the cost of the research effort.

C. RECOMMENDATIONS

KEMA recommends the PSCW consider a phone survey with past Focus participants that installed measures classified in the HVAC service, building shell, compressed air, and new construction WISeerts group descriptions. KEMA did not find empirical research during the *Updates to Measure Life Estimates* task for these WISeerts group descriptions; however based on the scoping study we believe the existing estimates can be improved with information that could be collected from past Focus participants.

We are not recommending a statistically based savings persistence study. A savings persistence study would be very expensive, require large samples, and still result in high levels of uncertainty. KEMA's proposed exploratory survey would collect Wisconsin specific information that would enable KEMA engineers to improve the quality of the existing measure life estimates. Such an effort could prove to be particularly valuable for measure life estimates that are not based on primary research. If the PSCW decides to pursue the additional research, KEMA recommends the research plan and budget is included in the next detailed evaluation plan.

3.11 INCREMENTAL COST STUDY

Focus on Energy program tracking and evaluation place substantial emphasis on the energy and demand savings achieved. At the same time, program planning and benefit cost analysis also require solid estimates of the incremental costs associated with implementing the savings measures. While the difference in energy use with versus without the measure is tracked by the program, the incremental cost is not.

The purpose of this study was to provide incremental cost estimates for Focus Business Programs. This information will be used in the upcoming benefit cost analysis as well as for use in future program design. The work was led by KEMA, Inc. as the evaluator of the Business Program, with assistance from WECC, as program implementer, on study design and data collection.

Over time, WECC had collected some cost data for CFLs, boiler service, ventilation, and HVLS fans. The sources of these data are not cited in the spreadsheets provided. In addition, costs for some projects were captured in the WATTS and WISEERTS databases. Some of these cost data have high variability with standard deviations three or four times the mean cost. Given the high variability in cost data and the lack of specific sources for data, WECC wanted to find incremental costs that were more defensible. In addition, the need for better incremental cost estimates was demonstrated during the FY08 program planning process. Through this study, we hoped to improve upon this existing base of cost information.

We surveyed market players on pricing for various measures, and analyzed the costs of past custom engineering projects. The market players included distributors, supply houses, and contractors. We also research secondary sources to find pricing data to supplement the survey data. In addition, we looked for areas of strength and weakness within the Focus on Energy program from the perspective of market players.

The primary goal of this study was to estimate incremental costs for deemed measures. The secondary goal was to estimate incremental costs for custom measures to the extent practical. Deemed measures are defined as measures with prescriptive incentives and deemed savings. Custom measures are defined as measures with custom incentives and custom savings calculations. The program also includes hybrid measure types. Hybrid measures are defined as measures with prescriptive incentives and custom savings calculations. We provide estimation approaches for hybrid measures based on the custom and prescriptive findings.

3.11.1 Incremental costs for deemed measures

The primary goal of this study was to estimate incremental costs for currently deemed measures. It was not practical to address every individual measure. We successfully estimated incremental costs for currently deemed measures accounting for the large majority of deemed savings.

To obtain Wisconsin specific incremental cost data, we surveyed market players in the state. We attempted to collect pricing data for measures in the following technology categories: lighting, HVAC, boilers, motors and drives, vending machines and controls, food service equipment, refrigeration equipment, and agricultural ventilation fans.

The survey responses provided adequate data for analysis for most lighting measures. The survey also provided adequate data for analysis for steam traps for pressures less than 50 psig.[77]

[77] To estimate incremental costs for all steam traps under 125 psig, we supplemented the survey data with data from Grainger.

The survey responses provided inadequate data for analysis in the remaining categories. We gathered additional pricing data from secondary sources for HVAC, boilers, vending machines and controls, food service equipment and some lighting equipment.

From the available survey and secondary data, we estimated incremental pricing, simple paybacks (based on avoided cost of generation), and incremental cost per unit savings. The simple paybacks and incremental cost per unit savings results can be used to estimate incremental costs for similar measures currently lacking incremental costs. Table 3-47 shows a summary of which incremental costs (IC) we estimated through this study and the associated percent of deemed savings magnitude, by technology category.

Table 3-47. Summary of Deemed Measure Categories with Incremental Costs Estimated

Technology Category	Percent of Deemed Savings			IC Estimate
	kW	kWh	therm	
Ag Fans	1.5%	1.4%	0.0%	None
Boilers & Burners (Total of Included Measures)	0.0%	0.0%	96.8%	**Some**
Boilers	0.0%	0.0%	4.2%	None
Steam Traps	0.0%	0.0%	50.1%	**All < 125 psig**
Tune up	0.0%	0.0%	42.6%	None
Food Service	0.2%	0.3%	1.7%	**Some**
HVAC (Total of Included Measures)	3.3%	0.9%	1.3%	**Some**
Furnace	0.0%	0.0%	0.2%	**Most**
PTAC	0.1%	0.0%	0.0%	**All**
PTHP	0.1%	0.4%	0.0%	**All**
RTU	2.9%	0.4%	1.0%	None
Split System	0.2%	0.0%	0.0%	None
Lighting	94.3%	95.8%	0.0%	**Most**
Motors	0.4%	0.6%	0.0%	None
Refrigeration	0.0%	0.5%	0.0%	None
Vending, Plug Loads	0.1%	0.3%	0.0%	**Some**
Total	**99.9%**	**99.8%**	**99.8%**	
Total with Incremental Costs Estimated	**94.8%**	**96.9%**	**52.0%**	

Note: In this study, we did not try to estimate incremental costs for all possible measures. Measures not included in the study are associated with 0.1 to 0.2 percent of deemed savings.

As illustrated in the table, we estimated incremental costs at the technology code level for measures associated with over 94 percent of deemed kW and kWh savings and over 50 percent of deemed therm savings. Tables providing these incremental costs are included in the main report. Conversely, we were unable to estimate incremental costs for three of the technology categories (ag fans, motors, and refrigeration) and for several other subcategories.

Budget and other considerations limited the scope of this project. Additionally, some cost data were unavailable for some deemed measures (e.g., LED Reach-In Refrigerator Case Lighting). We calculated ratios of mean incremental cost to unit of savings[78] (i.e., kW and kWh) based on measures for which we had estimated incremental costs. These ratios can be

[78] Savings used for these calculations are from the 18 MCP program database.

used as a check against the program's existing incremental costs for measures that were not verified through this study. A low ratio can indicate low incremental cost or high savings. Table 3-48 shows ratios for lighting end use, some specific subcategories of lighting end use and CFL end use. Table 3-49 shows ratios for non-lighting end uses.

Table 3-48. Lighting Incremental Cost per Unit Savings Ratios

End use	Agriculture		Commercial		Industrial		Schools & Government	
	Mean IC per kW ($/kW)	Mean IC per kWh ($/kWh)	Mean IC per kW ($/kW)	Mean IC per kWh ($/kWh)	Mean IC per kW ($/kW)	Mean IC per kWh ($/kWh)	Mean IC per kW ($/kW)	Mean IC per kWh ($/kWh)
3 - All Lighting*	906.88	0.19	1191.39	0.29	975.01	0.19	1130.74	0.23
3.1 - Linear Fluorescents	1266.95	0.26	1340.02	0.33	1183.29	0.23	816.28	0.18
3.2 - High Intensity Discharge replacing Incandescents	581.00	0.12	2221.14	0.54	581.00	0.11		
3.3 - Occupancy Sensors		0.15		0.10		0.08		0.11
3.4 - High Bay Lighting	1024.21	0.21	1151.46	0.28	961.97	0.19	1332.78	0.29
7 - CFL	12.66	0.00	35.38	0.01	45.55	0.01	47.76	0.01

*Based on all lighting technologies reported in this study

Lighting incremental cost per unit savings ratios are shown by sector. Each sector has its own operating characteristics with operating hours and load coincident with peak specific to the sector. Even though the incremental costs are consistent across sectors, savings ratios vary by sector due to the different operating hours and load coincident with peak.

Table 3-49. Non-lighting Natural Replacement Incremental Cost per Unit Savings Ratios

End Use	Mean IC per kW ($/kW)	Mean IC per kWh ($/kWh)	Mean IC per therm ($/therm)
2 - HVAC*	551	0.12	0.96
2.1 - Furnaces	NA	0.38	1.24
2.2 - Steam Trap Repair	NA	NA	0.47
2.3 - PTAC	494	0.57	NA
2.4 - PTHP	672	0.03	NA
5 - Other			
5.1 - Food Service	2556	0.33	2.73

*All HVAC technologies reported in this study

3.11.2 Incremental costs for custom measures

In this portion of the study, we tried to estimate the incremental costs for 15 custom measures that were installed with assistance from the Program. These 15 projects were selected based on the magnitude of their overall savings and included the six largest custom projects for kW, kWh, and therm savings. With available information, we estimated the incremental costs and simple paybacks for 11 of these projects.

The typical custom project reviewed had a three to four year payback prior to incentives. Since the sample size was small, we did not calculate simple paybacks by end use for the

custom measures. Table 3-50 provides illustrative examples, not definitive values, of custom measure simple paybacks and incremental costs.

Table 3-50. Illustrative Custom Project Simple Paybacks and Incremental Costs

End Use	Project Description	Simple Payback (years)	Incremental Cost (Equipment & Install)	Incremental Equipment Cost	Incremental Installation Cost	Units	Notes
2-HVAC	Municipality – Chiller System	3.62	$142.00	Insufficient Data	Insufficient Data	per ton of cooling	
	Paper manufacturer – Custom Boiler	5.14	$16.41	$6.59	$9.82	per lb of steam capacity	
	Food processing company – Flue gas heat recovery on boilers	4.88	$4.23	$2.82	$1.41	per therm of heat recovery	
	Paper manufacturer – Steam trap service buy-down	0.24	$1,001.00	$481.00	$520.00	per trap	Equipment cost is substantially higher than Trade Ally survey but consistent with Grainger pricing for some traps.
3-Lighting	Municipality – LED traffic lights	21.45	$3.62	$6.49	$(2.87)	per unit	Includes life cycle costs
	Health care – Reconfigure Lighting	1.92	$63.00	Insufficient Data	Insufficient Data	per light fixture	
4-Mnfg Process	Mill – Custom Compressed Air	2.14	$1,220.00	$782.00	$437.00	per compressor hp	
	Sealant manufacturer – Compressed air leak detection	0.02	$16.26	Insufficient Data	Insufficient Data	per leak	Survey cost only, repair cost unknown.
	Glass manufacturer – VFD on fan/blower	-	Insufficient Data	$8,143.00	Insufficient Data	per VFD	Equipment cost is consistent with Trade Ally survey results for 101 to 200hp VFDs. Installation by in-house labor
	Pipeline company – VFD on pump	-	Insufficient Data	$298,355.00	Insufficient Data	per VFD	VFD size exceeds online survey categories so no comparison is possible. Installation by in-house labor
	Tool and die company – VFD on fan/blower	-	Insufficient Data	$1,000.00	Insufficient Data	per VFD	Equipment cost is consistent with Trade Ally survey results for 1 to 20hp VFDs. Installation by in-house labor
	Plumbing fixtures manufacturer – Regenerative Thermal Oxidizer	4.77	$4.03	$3.67	$0.35	per therm saved	System cost
	Steel manufacturer – Recuperative Burners	NA	Insufficient Data	Insufficient Data	Insufficient Data		
	Food processing company – Process heat recovery	2.31	$2.01	$1.54	$0.47	per therm of heat recovery	
5-Other	School district – Demand Limiting Controls	0.61	$24,623.00	Insufficient Data	Insufficient Data	Total	Control System cost.

3.11.3 Conclusions and recommendations

This study produced incremental costs per unit saved for individual deemed technologies accounting for nearly all deemed electric savings and about half the deemed therm savings. Estimates for deemed measures using the results of this study are expected to be more accurate than estimates used in the previous benefit-cost analysis. In most cases, these estimates will also be more accurate for planning purposes than the costs in the Program's ad hoc cost database.

The study did not produce specific incremental cost values for custom and hybrid measures. Our review determined that incremental costs per unit saved can be higher or lower for these measures compared to deemed measures, depending on the custom factors. As a result, we recommend continuing to estimate incremental cost factors for these measures based on aggregate incremental costs of sampled custom and hybrid measures. This is the method that was used for the last benefit-cost analysis.

Thus, the study identifies three methods to estimate incremental costs for future benefit-cost studies and for program planning:

- Apply incremental costs per unit saved by individual technology code. This study provides results at this level for selected lighting, HVAC, and other deemed technologies.
- Apply incremental costs per unit saved by end-use category. This study provides results at this level for the lighting equipment and HVAC service end-uses.
- Calculate simple payback for each end use category as the ratio of average incremental cost to average first-year avoided cost, based on a sample of projects. The resulting ratios may not be accurate for individual projects or technologies, but should be meaningful in aggregate. This is the procedure that was used in the previous benefit-cost analysis. A similar procedure is being used as part of the current benefit-cost analysis.

3.11.4 Recommendations

- Use the incremental cost by technology code from this study (method one) for deemed measures for lighting and HVAC service measures with the technology codes covered here.
- If the incremental cost for a deemed lighting or HVAC service measure is unavailable at a technology code level, use the incremental cost by end use if available from this study (method two).
- For all other deemed measures, and for custom and hybrid measures, use the sample-based simple payback by end use (method three).

These recommendations identify three different approaches for estimating incremental costs. Method one can be used to analyze individual measures. Methods two and three can be applied to aggregated measures for analysis of the Program. Available incremental costs and recommended aggregate estimation methods are summarized in Table 3-51. The recommended aggregated estimation method applies to program wide analysis such as a benefit-cost study. Specific measures can be analyzed at the tech code level when data is available.

Table 3-51. Incremental Cost Estimation Method Summary by End Use

End Use	Available Incremental Costs			Recommended Aggregated Estimation Method
	Tech Code (Method 1)	End Use (Method 2)	Simple Payback (Method 3)	
Building Shell	NA	NA	Available	Method 3
HVAC Equipment	Some furnace, some PTAC, and some PTHP measures	NA	Available	Method 3
HVAC Service	Some steam trap measures	Available	Available	Method 2
Lighting	Most measures	Available	Available	Method 2
Manufacturing Process Equipment	NA	NA	Available	Method 3
Manufacturing Process Service	NA	NA	Available	Method 3
Other	Some vending machine control and some food service equipment measures	NA	Available	Method 3
CFL	Most measures	Available	Available	Method 2
Motors	NA	NA	Available	Method 3

3.12 FURTHER BUSINESS PROGRAMS READING

For further information, including recommended program improvements, the reader is referred to the following evaluation reports.

Table 3-52. Further Business Programs Reading

Time Period	Date	Title
CY09	3/22/2010	*Business Programs Deemed Savings Manual V1.0*
	3/3/2010	*Business Programs Impact Evaluation Report: Last Quarter of the 18-month Contract Period and First Three Quarters of Calendar Year 2009*
	3/10/2010	*Business Programs: Acceleration Treatment and Life Cycle Net Savings*
	2/26/2010	*Business Programs: Additional Looks at Attribution*
	11/30/2009	*Final Deemed Savings for CY09*
	11/13/2009	*Business Programs Deemed Savings Parameter Development*
	10/28/2009	*Business Programs: Incremental Cost Study*
	10/15/2009	*Review of Business Programs Load Shapes – Final*
	08/25/2009	*Business Programs: Measure Life Study*
18 MCP	11/20/2008	*Business Programs: Education & Training Participant Spillover Report – Impact*
	11/20/2008	*Business Programs: Education & Training Participant Spillover Report – Process*
	1/17/2009	*Business Programs: Channel Studies Report*
	4/2/2009	*Business Programs: Impact Evaluation Report – 1st 5 Qtrs 18 MCP*
	1/17/2009	*Business Programs: Impact Evaluation Report – 1st 3 Qtrs 18 MCP*
	10/24/2008	*Final Deemed Savings for 18 MCP (Fall 2008)*
	5/21/2008	*Final Deemed Savings for 18 MCP (Spring 2008)*
	11/4/2007	*Final Deemed Savings for 18 MCP (Fall 2007)*
	2/18/2008	*Abbreviated FY07 Business Programs Impact Evaluation*

Time Period	Date	Title
FY07	4/20/2007	*Business Programs: End-use Specific Attribution Factors - FY06*
	4/13/2007	*Final Deemed Savings for FY08 (Spring 2007)*
	3/2/2007	*Business Programs: Impact Evaluation Report - FY06*
	11/10/2006	*Business Programs: Lighting and Motor/Drive Channel Market Effects Contract Metrics Assessment*
	10/27/2006	*Deemed Savings Resolution (Fall 2006)*
FY06	6/21/2006	*Business Programs: A Behind-the-Scenes Look at Attribution*
	6/12/2006	*Business Programs: Targeted Market Study: HVLS Fans on Wisconsin Dairy Farms*
	4/5/2006	*Business Programs: Recent Customer Experience*
	4/4/2006	*Business Programs: Delivery Review*
	3/16/2006	*Net-to-Gross Method Selection Framework for Evaluating Focus on Energy Programs*
	2/3/2006	*Business Programs: Measure Review*
	12/30/2005	*Focus on Energy Public Benefits Evaluation BP Motors Metric Preliminary Assessment*
	12/22/2005	*Business Programs: Participant Spillover Savings Study*
	10/28/2005	*Business Programs: End-use Specific Adjustment Factors*
	9/9/2005	*Business Programs: Impact Evaluation Report—FY05, Round 1*

4. RESIDENTIAL PROGRAMS EVALUATION

This chapter describes the residential program evaluation activities finalized during the second half of 2009 (July 1–December 31, 2009), overall and by individual program area.

- ENERGY STAR®
  - Lighting
  - Appliances[79]
- Wisconsin ENERGY STAR Homes (WESH)
- Home Performance with ENERGY STAR (HPWES)
- Apartment and Condominium Efficiency Services (ACES)
- Targeted Home Performance with ENERGY STAR (Targeted HPWES)
- Efficient Heating and Cooling (EHCI)
- Head Start CFL
- Together We Save Pilot.

4.1 OVERALL

The following tables present the gross, verified gross, and net energy savings summary by Residential program area for:

- CY09: January 1 through December 31, 2009
- The 18-month Contract Period: July 1, 2007, through December 31, 2008
- FY07: July 1, 2006, through June 30, 2007
- FY06: July 1, 2005, through June 30, 2006
- FY05: July 1, 2004, through June 30, 2005
- FY04: July 1, 2003, through June 30, 2004
- FY03: July 1, 2002, through June 30, 2003
- FY02: June 1, 2001, through June 30, 2002, (although FY02 of the program covered a 15-month period, significant energy savings were not recognized in the first two months of that period).

The discussion of each individual program includes tables on the energy savings totals and any new research to modify verified gross energy savings or net energy savings numbers.

[79] Many of the measures eligible through the Appliances initiative exceed ENERGY STAR standards.

Figure 4-1. Verified Gross Electric Energy Impacts by Program, Residential Programs CY09 (January 1–December 31, 2009)

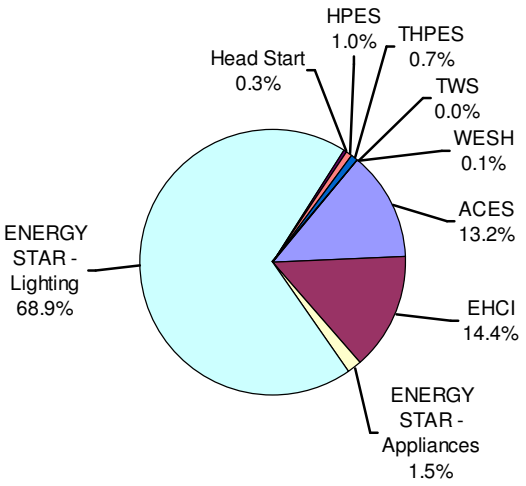


Figure 4-2. Verified Gross Electric Energy Impacts by Program, Residential Programs, Program to Date (July 1, 2001–December 31, 2009[80])

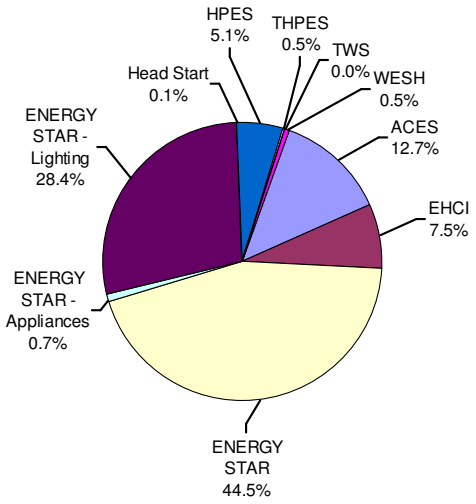


Figure 4-3. Verified Gross Gas Energy Impacts by Program, Residential Programs The First Half of 2009 (January 1–December 31, 2009)

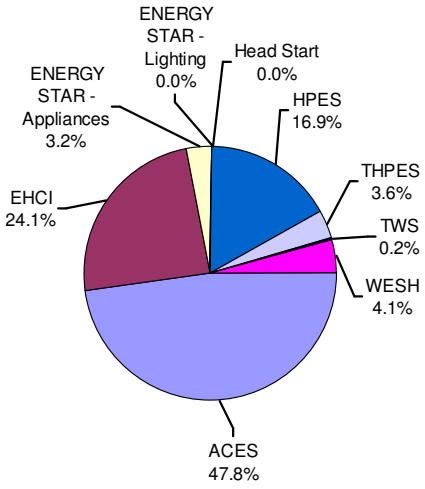
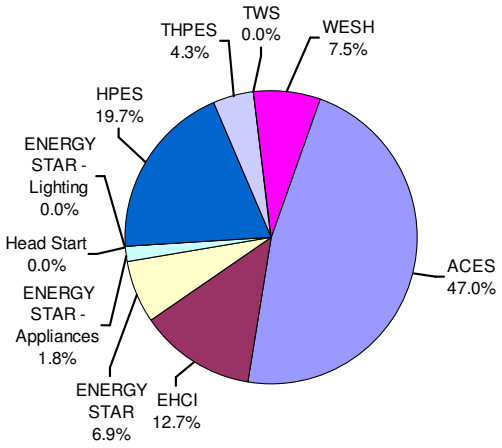


Figure 4-4. Verified Gross Gas Energy Impacts by Program, Residential Programs, Program to Date (July 1, 2001–December 31, 2009)



[80] Prior to July 1, 2008, the ENERGY STAR-Appliances and ENERGY STAR-Lighting programs were operated as one program. The impacts shown for ENERGY STAR are the impacts prior to July 1, 2008. While it would be relatively simple to break the historical impacts out and assign them to the current program designations for this chart, (1) the current allocation more accurately reflects historical program structure and (2) a change would also create other difficulties, such as mapping program costs, which make this change impractical for this report.

Table 4-1a. All Residential Programs: Tracked Annual Energy Impacts
CY09 (January 1–December 31, 2009)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	18,031,896	2,041	1,653,708	15,457,408	1,771	1,719,794	11,448,834	1,267	983,002
EHCI	16,344,018	4,276	866,309	16,879,560	4,274	866,289	6,628,066	1,449	625,380
ENERGY STAR - Appliances	1,730,083	126	116,293	1,729,883	126	115,978	1,729,883	126	115,978
ENERGY STAR - Lighting	91,383,916	4,856	-85	80,609,059	7,871	-85	53,688,992	4,952	-85
Head Start	322,764	13	0	322,764	13	0	322,764	13	0
HPWES	1,168,789	469	606,402	1,170,133	470	606,402	966,423	338	493,495
Targeted HPWES	770,556	136	126,699	770,556	127	129,996	770,556	127	129,996
Together We Save	12,147	8	7,950	12,473	8	8,175	9,016	5	5,752
WESH	107,969	0	149,138	107,969	0	148,728	37,791	0	148,728
Total	**129,872,139**	**11,925**	**3,526,415**	**117,059,806**	**14,659**	**3,595,277**	**75,602,325**	**8,277**	**2,502,247**

Table 4-1b. All Residential Programs: Tracked Annual Energy Impacts
The 18-month Contract Period (July 1, 2007–December 31, 2008)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	26,175,716	3,102	2,377,692	26,259,528	3,113	2,377,633	19,057,866	2,034	1,532,127
EHCI	18,943,338	5,403	746,241	18,909,943	5,396	745,721	18,909,943	5,396	745,721
ENERGY STAR - Appliances	3,801,592	91	181,384	3,800,348	91	188,077	3,800,348	91	188,077
ENERGY STAR - Lighting	128,769,686	7,484	0	128,748,135	7,486	0	104,588,139	5,806	0
Head Start	402,388	17	0	402,388	17	0	402,388	17	0
HPWES	697,882	333	414,564	707,761	334	416,130	671,165	311	394,413
Targeted HPWES	706,856	152	165,220	970,148	160	159,517	970,148	160	159,517
WESH	-4,062	0	258,295	-4,062	0	258,274	-4,062	0	258,274
Total	**179,493,395**	**16,584**	**4,143,395**	**179,794,188**	**16,597**	**4,145,352**	**148,395,934**	**13,814**	**3,278,130**

Table 4-1c. All Residential Programs: Tracked Annual Energy Impacts
FY07 (July 1, 2006–June 30, 2007)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	1,467,617	413	400,607	1,465,272	413	400,607	1,465,272	413	400,607
EHCI	9,269,479	2,984	274,826	8,901,254	2,189	275,126	7,207,259	1,970	231,410
ENERGY STAR	82,661,232	5,292	283,996	67,459,724	3,946	271,332	54,405,419	3,178	218,254
HPWES	392,348	223	345,909	371,121	230	298,510	346,397	214	282,629
Targeted HPWES	435,080	0	107,675	435,080	77	107,675	435,080	77	107,675
WESH	24,892	1	153,767	24,456	0	153,727	24,032	0	153,715
Total	**94,250,649**	**8,913**	**1,566,780**	**78,656,907**	**6,855**	**1,506,977**	**63,883,459**	**5,852**	**1,394,290**

Table 4-1d. All Residential Programs: Tracked Annual Energy Impacts
FY06 (July 1, 2005–June 30, 2006)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	5,848,481	471	537,436	5,848,481	471	537,436	5,848,481	471	537,436
EHCI	11,430,586	8,388	258,196	10,980,716	7,122	274,194	9,467,141	6,927	235,134
ENERGY STAR	71,461,850	4,816	337,821	55,951,807	3,250	147,449	55,615,488	3,252	120,253
HPWES	995,068	377	484,986	734,891	366	374,559	708,195	347	357,685
Targeted HPWES	371,904	0	92,366	371,904	66	92,040	371,904	66	92,040
WESH	77,532	14	147,666	73,655	12	147,386	66,852	5	147,274
Total	**90,185,421**	**14,066**	**1,858,471**	**73,961,454**	**11,286**	**1,573,064**	**72,078,061**	**11,066**	**1,489,822**

Table 4-1e. All Residential Programs: Tracked Annual Energy Impacts
FY05 (July 1, 2004–June 30, 2005)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	16,663,485	852	790,191	16,663,485	852	790,191	16,663,485	852	790,191
ENERGY STAR	85,086,975	2,485	361,989	55,273,975	3,230	156,529	66,068,342	3,928	126,923
HPWES	9,084,502	6,905	582,559	8,804,317	6,948	491,823	8,586,575	6,457	476,796
Targeted HPWES	593,164	116	167,477	288,278	44	69,503	288,278	44	69,503
WESH	1,507,010	669	221,426	1,236,066	671	217,566	1,198,958	612	217,180
Total	**112,935,136**	**11,027**	**2,123,643**	**82,266,121**	**11,745**	**1,725,612**	**92,805,638**	**11,893**	**1,680,593**

Table 4-1f. All Residential Programs: Tracked Annual Energy Impacts
FY04 (July 1, 2003–June 30, 2004)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	10,794,278	562	510,518	10,636,826	556	512,678	10,636,826	556	512,678
ENERGY STAR	99,142,936	6,510	354,420	64,238,584	4,619	354,516	62,400,894	4,310	354,516
HPWES	13,606,210	8,042	554,150	13,557,990	8,063	481,219	13,510,885	8,044	463,522
Targeted HPWES	708,508	149	220,606	418,020	62	107,214	418,020	62	107,214
WESH	1,615,776	628	185,255	1,623,130	631	184,477	1,623,070	631	184,477
Total	**125,867,708**	**15,890**	**1,824,949**	**90,474,549**	**13,932**	**1,640,105**	**88,589,694**	**13,604**	**1,622,408**

Table 4-1g. All Residential Programs: Tracked Annual Energy Impacts
FY03 (July 1, 2002–June 30, 2003)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	10,460,653	2,279	973,592	14,727,645	2,314	1,268,730	14,727,645	2,314	1,268,730
ENERGY STAR	76,054,781	5,738	180,783	64,996,046	5,429	180,783	55,519,818	3,834	180,783
HPWES	9,385,086	5,919	334,938	9,469,824	5,914	288,290	9,446,776	5,905	279,625
Targeted HPWES	183,949	59	85,943	130,604	42	61,020	130,604	42	61,020
WESH	1,274,434	71	102,037	314,141	89	91,261	306,104	89	91,261
Total	**97,358,904**	**14,066**	**1,677,293**	**89,638,260**	**13,788**	**1,890,084**	**80,130,947**	**12,184**	**1,881,419**

Table 4-1h. All Residential Programs: Tracked Annual Energy Impacts
FY02 (June 1, 2001–June 30, 2002)

Program	Gross kWh	Gross kW	Gross Therms	Verified Gross kWh	Verified Gross kW	Verified Gross Therms	Verified Net kWh	Verified Net kW	Verified Net Therms
ACES	2,577,687	515	382,451	2,437,663	479	382,451	2,437,663	479	382,451
ENERGY STAR	18,295,376	1,806	55,519	20,239,649	2,542	55,519	14,916,810	1,649	55,519
HPWES	3,059,372	1,644	404,564	3,059,354	1,644	396,942	2,714,057	1,635	315,322
Targeted HPWES	15,598	5	6,971	11,075	3	4,949	11,075	3	4,949
WESH	0	0	63,249	204,624	0	72,201	204,624	0	72,201
Total	**23,948,033**	**3,969**	**912,755**	**25,952,365**	**4,668**	**912,062**	**20,284,229**	**3,766**	**830,443**

Gross program savings unadjusted by evaluation results are shown in the following table along with the program targets and percentage of target achieved. Savings shown are for the first half of 2009.

Table 4-2. Net Residential Program Savings versus Residential Program Portfolio Targets
CY09 (January 1–December 31, 2009)

Program	kWh			kW			Therms		
	Target	Net	% of 2009 Target	Target	Net	% of 2009 Target	Target	Net	% of 2009 Target
ACES	11,059,000	11,448,834	104%	1,194	1,267	106%	894,000	983,002	110%
EHCI	4,154,621	6,628,066	160%	940	1,449	154%	497,974	625,380	126%
ENERGY STAR - Appliances	712,240	1,729,883	243%	52	126	242%	71,200	115,978	163%
ENERGY STAR - Lighting	56,322,000	53,688,992	95%	3,796	4,952	130%	0	-85	0%
HeadStart	1,058,666	322,764	30%	50	13	26%	0	0	0%
HPWES	439,848	966,423	220%	202	338	167%	201,454	493,495	245%
Targeted HPWES	601,960	770,556	128%	96	127	132%	148,975	129,996	87%
Together We Save	0	9,016	0%	0	5	0%	0	5,752	0%
WESH	287,608	37,791	13%	35	0	0%	158,539	148,728	94%
Total Residential Programs	**74,635,943**	**75,602,325**	**101%**	**6,365**	**8,277**	**130%**	**1,972,142**	**2,502,247**	**127%**

4.2 ENERGY STAR-LIGHTING

Evaluation efforts conducted during this reporting period focused on the ENERGY STAR lighting program and included the following:

- CFL telephone surveys in Wisconsin and Indiana
- On-site CFL inspections in Wisconsin and Indiana
- Modeling of baseline CFL sales and saturation using multi-state data
- Analysis of CFL savings and sales data.

The status of the evaluation efforts conducted during this reporting period are presented below for each of the following four areas:

- Process findings and issues
- Verified energy impacts
- Market effects
- Program metrics and goals.

4.2.1 Process findings and issues

We did not formally include process related evaluation tasks as part of our evaluation plan. The evaluation team, however, stayed abreast of process related issues through monitoring of program changes and issues based on regular communications with the relevant program managers.

4.2.2 Verified energy impacts

The following formulas detail our approach for estimating gross energy savings, net-to-gross ratio, net energy savings, and demand savings for the ENERGY STAR lighting program.

Annual gross energy savings is defined as:

- Gross energy savings (kWh) = ((Delta Watts x average daily hours of use x 365) × Installation rate × Program-supported CFL sales)/1000

The net-to-gross ratio is calculated as sales (adjusted for population, such as CFLs per household) in the program area minus baseline sales, all divided by program-supported sales. The formula is as follows:

- Net-to-gross ratio = (Market-level sales – Baseline sales)/Program-supported CFL sales

To translate net sales into net energy savings, the formula is as follows:

- Net energy savings = Gross energy savings × Net-to-gross ratio

Net demand savings is defined as:

- Net Summer peak demand savings = Potential Gross demand savings × peak summer coincidence factor × Net-to-gross ratio

Table 4-6 presents the parameters assumed for calculating energy and demand savings for CFLs.[81] The installation rates and delta watts values were determined from previous Focus evaluation reports.[82,83] CFLs were assumed to be in use an average of 2.77 hours per day,

[81] Tom Mauldin, Zack Tyler, and Lynn Hoefgen, NMR Group. *Focus on Energy Evaluation*: *2009 CFL Savings Analysis.* April 22, 2010.

[82] Rick Winch and Tom Talerico, Glacier Consulting, Group, LLC. *Compact Fluorescent Lighting Installation Rate Study*. December 27, 2007.

according to an evaluation conducted in New England.[84] CFLs were assumed to have an on-peak coincidence factor of 0.108 in the summer.[85] Finally, the net-to-gross ratio is derived from the multistate modeling task, as discussed in section 4.3.2.[86]

Table 4-3. Parameters for CFL Energy Impact Calculations

	Buydown	Instant	Mail-in
Installation rate	81%	81%	88%
Delta watts	53.3	53.3	55
Daily hours of use	2.77	2.77	2.77
Gross annual kWh savings per CFL	43.7	43.7	48.9
Summer on-peak coincidence factor	0.108	0.108	0.108
Gross summer peak kW savings per CFL	0.0047	0.0047	0.0052
Net-to-gross ratio	0.62	0.62	0.62
Net annual kWh savings per CFL	27.1	27.1	30.3
Net summer peak kW savings per CFL	0.0029	0.0029	0.0032

The CFL telephone surveys and on-site visits also yielded two additional reports, one which estimated the household penetration, socket saturation, and remaining potential for CFLs by bulb shape and feature. [87] The second report assessed the presence and energy consumption of consumer electronics in Wisconsin homes.[88]

4.2.3 Market effects

The evaluation team took part in a multistate effort to statistically model CFL use, sales, and saturation in Wisconsin and fifteen other areas of the United States. The principal goals of the statistical analyses were to identify and examine factors associated with 2008 CFL purchases generally and the effect of CFL programs on those purchases specifically in a rapidly changing CFL market. The evaluation team used the modeling results to estimate NTG for each study Sponsor.[89] The team based these estimates on the models that we believed best

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[83] Rick Winch and Tom Talerico, Glacier Consulting, Group, LLC. *Analysis of Delta Watts Values for CFLs Rewarded through the Residential Lighting Program during FY07*. March 6, 2008.

[84] Nexus Market Research, Inc. and RLW, Inc. *Residential Lighting Markdown Impact Evaluation.* Markdown and Buydown Program Sponsors in Connecticut, Massachusetts, Rhode Island, and Vermont. January 20, 2009.

[85] Ibid.

[86] Lisa Wilson-Wright, Chris Russell, and Lynn Hoefgen, NMR Group. *Results of the Multistate CFL Modeling Effort (Revised Draft Report).* February 16, 2010.

[87] Tom Mauldin, Greg Clendenning, and Lynn Hoefgen, NMR Group. *Focus on Energy Evaluation: The Market for CFLs in Wisconsin, Final Report.* February 1, 2010

[88] Tom Mauldin, Zack Tyler, and Lynn Hoefgen, NMR Group. *Focus on Energy Evaluation: Analysis of Consumer Electronics in Homes, Final Report.* February 19, 2010.

[89] Sponsors included the PSCW, along with the California Public Utilities Commission, New York State Energy Research and Development Authority, Consumers Energy in Michigan, the Connecticut Energy Conservation Management Board, Connecticut Light and Power, Northeast Utilities, The United Illuminating Company, the Cape Light Compact, NSTAR, National Grid, Unitil, Western Massachusetts

described CFL purchases in 2008. The key result emerging from the analysis of the models is that the estimated NTG for Wisconsin (WI) for 2008 was 0.62, with a confidence interval ranging from 0.52 to 0.76.[90]

The multistate modeling effort represented a methodological response to the challenges of estimating NTG in the rapidly changing CFL market in Wisconsin and nationwide. Methods of estimating the net impact of CFL programs have evolved over time to account for free ridership and spillover, adoption of upstream programs, and changes in the CFL market. Recently, Sponsors in various areas, including Wisconsin, have turned to a "non-program comparison state" approach to estimate NTG, but rapid expansion of CFL programs and recent changes in the CFL market have hindered the ability of this approach to provide a reliable NTG estimate. More specifically for the Focus ENERGY STAR Lighting program, previous evaluations relied on CFL sales data (program and non-program) collected from individual retailers in Wisconsin and the non-program comparison state of Michigan, coupled with in-store shelf-inventories, collection of pricing data, and interviews with store managers in both participating and non-participating retail stores in Wisconsin.[91] Despite the strength of the prior methodology, two related factors limited its usefulness for continued NTG estimation. First, Michigan began to implement substantial programs in 2009, precluding it as a non-program state. Second, although the previous team had taken great care to find a comparison state with similar demographic and economic characteristics to Wisconsin, the method could not fully control for state or household level variability that may affect CFL use and purchases. In light of the fact that CFL sales had been rising nationally in both program and non-program states, the current evaluation team sought a method that would allow for the control of state and household level variation that may affect CFL use and purchases, thereby isolating the program effect and allowing for estimation of NTG without reliance on one single comparison state. In short, the team chose to use the multistate modeling approach because we believed the simple comparison state approach was becoming increasingly problematic in the face of the rapidly changing CFL market.

A. MODELING PROCEDURES

The primary independent variable of interest summarized CFL program activity in each of the areas included in the current analysis. To develop this important variable, the team began by reviewing CFL program plans and documents, prior evaluation reports, and program summaries compiled by the Consortium for Energy Efficiency (CEE), the US Department of Energy (DOE), and ENERGY STAR in order to locate CFL programs in each state and gather information on each program through 2008. We supplemented this document review with direct inquiries to energy efficiency and CFL program managers and through searches of the

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Electric, and Xcel Energy in Colorado. These Sponsors also funded data collection in the District of Columbia, Georgia, Houston, Indiana, Kansas, Maryland, Ohio, and Pennsylvania.

[90] Lisa Wilson-Wright, Chris Russell, and Lynn Hoefgen, NMR Group. *Results of the Multistate CFL Modeling Effort (Revised Draft Report).* February 16, 2010.

[91] Rick Winch and Tom Talerico, Glacier Consulting, Group, LLC. *Second Annual Comprehensive CFL Market Effects Study – Final Report.* September 30, 2008. In fact, members of the current evaluation team used the data collection from Wisconsin and Michigan to help estimate NTG in Massachusetts. Nexus Market Research, RLW Analytics, and Dorothy Conant. *Market Progress Evaluation Report (MPER) for the 2007 Massachusetts ENERGY STAR® Lighting Program*. Prepared for Cape Light Compact, National Grid, NSTAR Electric, Unitil and, Western Massachusetts Electric Company, July 1, 2008.

websites of utilities, public service agencies, and energy service organizations. Experts on CFL programs across the nation also collectively assessed the cumulative strength of each program through 2007 in an effort to capture the effect of prior activity on current levels of saturation and recent purchases.[92]

The team combined the information on programs within states or areas into three different program variables: cumulative program strength, 2008 program activity, and overall composite program activity. We performed statistical transformations necessitated by the nature of the data, and created three individual, state-level variables. The cumulative strength variable represented the average rating provided by the experts and required no transformations for inclusion in the model. The 2008 program activity variable represented a statistically transformed and combined measure that included data on the per-household CFL program budget and number of CFLs incented by programs in the state. Finally, the composite program variable combined the cumulative strength and 2008 program activity variables.

Because this and other evaluations have found the data collected in onsite surveys to be more accurate than those in RDD surveys, the onsite surveys provided counts of CFL purchases, use, and storage as well as CFL saturation. While we converted the counts of total sockets and CFLs installed into a percentage representing CFL saturation, the count data for purchases, storage, and use did not have the so-called normal curve assumed by the most common statistical modeling procedure, ordinary least square regression (OLS); instead they were right skewed. The team modeled the count data using a statistical procedure known as the negative binomial regression model (NBRM). The data on CFL saturation—measured as the percentage of all sockets in the home filled with CFLs—were percentage data and not count data, so the team relied on the more familiar OLS method to model saturation.

B. 2008 PURCHASES AND NTG ESTIMATES

Table 4-4 includes the best 2008 purchase model derived from onsite data (best as determined by the ability of the model to predict purchases accurately), while Table 4-5 displays an alternative model that includes saturation at the beginning of 2008.[93] The team developed the alternative model because analyses presented in the full body of the report suggest that 2008 purchases were lower in states with relatively high saturation rates at the beginning of 2008. The models are derived from NBRM; to see the impact of any individual variable on purchases, one would multiply the variable by the impact score, not by the coefficient as in OLS regression. The team calculated NTG estimates based on both of these models, with the NTG estimate developed from the "best" model equaling 0.62 and that for the alternative modeling equalling 0.36 (Table 4-6). The team recommends that the PSCW use the NTG estimate of 0.62 (with a 90 percent confidence interval ranging from 0.56 to 0.76) because the model presented in Table 4-4 more accurately predicts the observed 2008 purchase data than does the model in Table 4-5 as explained more fully in the body of the report.

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[92] The experts were instructed to provide ratings on a zero to ten scale on the historic budget, marketing, CFLs incented, and overall impression of strength of programs in each state in order to account for how prior program activity may be affecting current program-induced sales of CFLs.

[93] The full report includes additional analyses on what drives CFL use, purchases, and saturation.

Table 4-4. Best Fit 2008 Purchase Model

Variables	Coefficient	90% Confidence Interval		Impact Score
		Low	High	
Composite Program	0.11	0.06	0.16	0.11
Years using CFL	0.10	0.06	0.14	0.10
Number of Sockets in Home	0.01	0.00	0.01	0.01
Number of Persons in Household	0.10	0.02	0.18	0.10
Self Reported as White	0.42	0.09	0.74	0.52
Conducted During Fall Season	0.60	0.33	0.86	0.82
Constant	-0.79	-1.21	-0.38	n/a

* Sample size = 1,034 and pseudo R^2 = 1%. Excludes CPUC states as 2008 purchase data were not collected onsite.

Table 4-5. Alternative 2008 Purchase Model with Saturation

Variables	Coefficient	90% Confidence Interval		Impact Score
		Low	High	
Composite Program	0.06	0.01	0.11	0.07
Years using CFL	0.13	0.08	0.18	0.14
Number of Sockets in Home	0.01	0.00	0.01	0.01
Saturation at the Beginning 2008	-0.03	-0.04	-0.01	-0.03
Self Reported as White	0.43	0.04	0.81	0.53
Partisan Voting Index 2008	-0.01	-0.01	0.00	-0.01
Constant	-0.17	-0.53	0.20	n/a

* Sample size = 950 and pseudo R^2 = 1%. Excludes CPUC states as 2008 purchase data were not collected onsite and all cases for which 2008 saturation could not be determined.

Table 4-6 compares the NTG estimates developed for Wisconsin to the range of values calculated for other areas in the study based on model-predicted with and without program scenarios. The NTG estimates for the model without saturation ranged from 0.23 to 1.67 across all states while those for the saturation model ranged from 0.23 to 0.98 across all states. For each model, the NTG ratio for Wisconsin fell in the middle of all those developed.

Table 4-6. Range of NTG Estimates Calculated for All Areas Included in Study

	Without Saturation	With Saturation
Wisconsin NTG estimate	0.62	0.36
90% confidence interval	0.56 to 0.76	0.30 to 0.50
Minimum NTG estimated for any area	0.23	0.23
Maximum NTG estimated for any area	1.60	0.98

C. CONCLUSIONS AND RECOMMENDATIONS FROM THE MULTISTATE MODELING EFFORT

The multistate CFL modeling effort represents an attempt by numerous program sponsors to pool their resources in an effort to explain what drives CFL purchases, use, and saturation in the rapidly changing CFL market. To that end, the results presented in this report have demonstrated that CFL programs are still having a positive effect on CFL purchases and leading to positive NTG ratios. In some areas, those ratios are rather small, but in others they point to strong program effects. The NTG estimate of 0.62 points to the likelihood that the Focus on Energy CFL program had a moderate positive impact on CFL purchases in 2008. The team recognizes that the model suffers from reliability concerns and has not fully

explained what drives CFL purchases, but we believe that it has furthered our understanding of the role that programs—and other demographic and economic factors—play in inducing CFL purchases. The modeling approach, with appropriate improvements, can serve as an important addition to the suite of possible methods that the CFL program community can draw on to estimate NTG, a task that proves increasingly difficult and elusive in the rapidly changing CFL market.

In response to the findings here, the evaluation team recommends that the PSCW continue to monitor CFL saturation and NTG. Likewise, WECC should continue such strategies as providing greater, but not exclusive, support to specialty CFLs, targeting retailers that serve hard-to-reach populations, and encouraging committed CFL users to install CFLs in the remaining sockets in their homes.

D. CFL NET-TO-GROSS SALES ANALYSIS

This section presents estimates of the 2008 Net-to-Gross (NTG) ratio developed from the analysis of CFL sales data provided by participating retailers. [94] This analysis presents the sole NTG estimates for the commercial, multifamily, and agricultural sectors as well as a secondary NTG estimate for the residential sector, where the primary estimate was developed through the multistate modeling task. In conducting this analysis of NTG using CFL sales data, we are following an approach utilized in past evaluations.[95] One difference in the evaluation method this year is that we did not attempt to estimate CFL sales for non-participating retailers in Wisconsin. This was done because the "lift," or additional sales attributable to the program in previous years, came almost entirely from participating stores. Therefore, we believe it is reasonable to rely solely on sales data from participating stores in order to assess the program NTG.

Compared to the 2007 results, the 2008 NTG estimates are substantially lower for the hardware and drug/mass merchandise channels, as might be expected given the increase in CFL sales nationwide (Table 4-7). The NTG is higher for the home improvement channel, primarily because of a shift in participation away from retailers with lower NTG and towards retailers with higher NTG. Because no retailers from the grocery/other channel provided sales data, we estimated a NTG value based on the 2007 Wisconsin analysis and the results of a study recently completed in California.[96]

Table 4-7. NTG Estimates by Retail Channel from the Sales Data Analysis, 2007 and 2008

Retail Channel	2007	2008
Hardware	1.53	1.04
Home improvement	0.27	0.46
Grocery and other	0.97	0.66
Drug and mass merchandise	1.00	0.51

[94] Tom Mauldin, Zack Tyler, and Lynn Hoefgen, NMR Group. *Focus on Energy Evaluation: Sector-Based CFL Net-to-Gross Analysis).* April 16, 2010.

[95] Rick Winch and Tom Talerico, Glacier Consulting, Group, LLC. *Second Annual Comprehensive CFL Market Effects Study – Final Report.* September 30, 2008.

[96] KEMA, Cadmus, Itron, PA Consulting, and J. J. Analytics. *Final Evaluation Report: Upstream Lighting Program, Volume 1.* Prepared for the California Public Utilities Commission, Energy Division. February 8, 2010.

Table 4-8 presents the 2007 and 2008 CFL NTG estimates derived from the sales data analysis for each of the four customer sectors and the program overall. The NTG estimates decline in each of the sectors, continuing a trend seen in past evaluations.

Table 4-8. NTG Estimates by Customer Sector from the Sales Data Analysis, 2007 and 2008

Customer Sector	2007	2008
Residential	0.75	0.67
Commercial	1.11	0.84
Multifamily (ACES)	0.78	0.64
Agricultural	0.91	0.85
Overall	**0.76**	**0.69**

There is some evidence of channel shifting between the retail channels. In 2007, home improvement stores represented 57 percent of CFL rewards in 2007, but declined to 35 percent in 2008.[97] Because the program has shifted away from home improvement stores, which had the lowest NTG in 2007 (and again in 2008), the program has maintained a reasonable NTG in the face of a substantial decline in NTG for the hardware and drug/mass merchandise channels.

While the sales data analysis worked well in 2007 and appears to work reasonably well again in 2008, the approach becomes increasingly problematic in 2009 and beyond. First, as the program shifts away from mail-in and instant coupon rewards and toward buydowns, we are reliant on increasingly dated information regarding past coupon purchases in order to identify the type of customer who purchased buydown CFLs. Therefore, the estimation of NTG by customer sector becomes less reliable. In addition, an even larger issue is the lack of a suitable non-program comparison state for estimating baseline sales. While we did adjust for the presence of CFL programs in Michigan in 2008, the programs expanded substantially in 2009, making such an adjustment less valid in the future. Using Indiana as the new baseline state would be preferable; however, the analysis is, as always, contingent upon the sales data provided by participating retailers, and their level of cooperation may be declining.

For the residential sector, the NTG estimate of 0.67 is similar to the 0.62 value estimated through the multistate modeling. While the sales data analysis was not intended to provide the primary NTG estimate for the residential sector, the similarity of the two values does suggest that the multistate modeling NTG estimate for the residential sector is reasonable. We prefer the multistate modeling estimate for the residential sector for several reasons. First, the 2008 sales data allowed state-to-state comparisons for only four retailers, requiring assumptions about other retailers based on past trends and other research; given the rapid changes in the CFL market over the past few years, those assumptions may not be appropriate. In addition, the modeling approach has the following advantages:

- Modeling avoids reliance on one or two comparison states, one of which has launched CFL programs
- It has the ability to isolate the effects of the program on CFL use and purchases, controlling for household-level variation that may influence CFL-related behavior

[97] Rick Winch and Tom Talerico, Glacier Consulting, Group, LLC. *Second Annual Comprehensive CFL Market Effects Study – Final Report.* September 30, 2008.

- It draws on a large sample size of households and a diversity of states with varying histories of supporting CFLs through marketing, rebate, and upstream approaches.
- It focuses on market-level effects taking into account both freeridership and spillover that may affect sales not only at participating retailers but at non-participating retailers as well
- It accounts for a number of non-program factors that appear to be key drivers of CFL use, including, but not limited to, duration of CFL use, size of home, and the demographic characteristics of the household
- It documented a relationship between CFL saturation with both CFL use and CFL purchases, though further exploration is needed to document the likely complex and reinforcing ways in which these three variables affect each other.

The multi state modeling approach also has issues with reliability and validity, as discussed in the report.[98] However, the evaluation team believes that those issues are considerably less problematic than the issues surrounding the 2008 sales data approach. For the non-residential sectors, the sales data approach is the only option available. Given the similarity of the residential NTG estimates from the multi state modeling and the sales data approach, the team believes that it is reasonable to rely on these non-residential NTG estimates.

Table 4-9. ENERGY STAR - Lighting Products Program: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Adjustment	0		0		-85	100.0%
Ceiling Fan	12,250	0.0%	0		0	
CFL	71,042,668	88.1%	7,627	96.9%	0	
LED Holiday Light	3,213,304	4.0%	0		0	
Lighting	6,290,232	7.8%	242	3.1%	0	
Torchiere	50,605	0.1%	1	0.0%	0	
Total	**80,609,059**	**100%**	**7,871**	**100%**	**-85**	**100%**

4.2.4 Program metrics and goals

No program metrics were measured for the ENERGY STAR-Lighting program in 2009.

[98] Lisa Wilson-Wright, Chris Russell, and Lynn Hoefgen, NMR Group. *Focus on Energy Evaluation, Residential Programs: Results of the Multistate CFL Modeling Effort (Revised Draft Report).* February 16, 2010.

4.3 APPLIANCES AND PLUG LOAD

The status of the evaluation efforts conducted during this reporting period are presented below for each of the following four areas:

- Process findings and issues
- Verified energy impacts
- Market effects
- Program metrics and goals.

4.3.1 Process findings and issues

We did not formally include process related evaluation tasks as part of our evaluation plan. The evaluation team, however, stayed abreast of process related issues through monitoring of program changes and issues based on regular communications with the relevant program managers.

4.3.2 Verified energy impacts

For the Appliances program, Table 4-10 provides the tracked verified energy impacts (kWh, kW, and therms) by measure category and total for 2009.

Table 4-10. ENERGY STAR - Appliances Products Program: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Clothes Washer	413	0.0%	0		14	0.0%
Hot Water	1,729,470	100.0%	126	100.0%	115,964	100.0%
Total	**1,729,883**	**100%**	**126**	**100%**	**115,978**	**100%**

4.3.3 Market effects

This section presents the findings of research conducted to understand the saturation and electricity usage of consumer electronics in Wisconsin homes. [99] As part of the impact evaluation of the Focus on Energy ENERGY STAR® lighting program[100] and the analysis of the market for compact fluorescent light bulbs (CFL) in Wisconsin[101], on-site inventories of lighting products and consumer electronics were conducted. This section primarily draws upon these on-site inventories of consumer electronics at 75 homes in Wisconsin and 86 homes in Indiana, in addition to a review of published reports.

[99] Tom Mauldin, Zack Tyler, and Lynn Hoefgen, NMR Group. *Focus on Energy Evaluation: Analysis of Consumer Electronics in Homes, Final Report.* February 19, 2010.

[100] Lisa Wilson-Wright, Chris Russell, and Lynn Hoefgen, NMR Group. *Residential Programs: Results of the Multistate CFL Modeling Effort.* Revised Draft Report. February 16, 2010.

[101] Tom Mauldin, Greg Clendenning, and Lynn Hoefgen, NMR Group. *The Market for CFLs in Wisconsin: Final Report.* February 1, 2010.

Table 4-11 summarizes the household penetration of consumer electronics in Wisconsin, the average number of products in each home, the estimated annual electricity usage[102], and the proportion of annual household electricity usage represented by each product. We assume that each household uses 7,560 kWh per year based on Energy Information Administration data. [103] Overall, the seventeen types of consumer electronics examined represent an estimated 12.1 percent of annual household electricity usage in Wisconsin. This figure is similar to an estimate from a recently completed Energy Center of Wisconsin (ECW) study of home plug-in devices in Minnesota which found that electronics represent about 12 percent of residential electricity usage. [104]

The three products with the highest usage include cathode ray tube (CRT) televisions (2.6 percent), followed by cable set-top boxes (2.3 percent) and desktop computer hard-drives (1.9 percent). The remaining products each represent less than one percent of annual household consumption.

Twenty percent of Wisconsin homes have at least one each of the three products that use the most electricity (CRT television, desktop computer, and cable box). Twelve percent of Wisconsin homes have at least two CRT televisions, one desktop computer, and one cable box. These homes may provide a good opportunity for potential electricity savings with consumer electronics.

[102] *Final Field Research Report.* Prepared by Ecos Consulting for the California Energy Commission. October 31, 2006.

[103] Energy Information Administration. *Residential Energy Consumption Survey*. 2005. Washington, DC. Government Printing Office.

[104] The ECW study estimated that plug-in devices account for 20 percent of home electricity usage and that consumer electronics represent 60 percent of that figure, or 12 percent overall. However, the ECW study assumed a typical home uses 11,000 kWh per year, while we asssumed 7,560 kWh based on 2005 EIA data. Overall, ECW estimates that home electronics use about 1,320 kWh, while we estimate about 915 kWh. Scott Pigg and Ingo Bensch, Energy Center of Wisconsin. *Scouting for Residential Electricity Savings.* http://ecw.org/project.php?workid=3&resultid=410.

Table 4-11. Household Penetration and Electricity Usage of Consumer Electronics in Wisconsin (Base: All on-site respondents)

Product	Percent of Homes with Product	Average Number of Products per Home (among all homes)	Annual Electricity usage per Home[105] (kWh)	Percent of Annual Household Electricity Usage
Television				
CRT	77%	1.57	193	2.6%
LCD	56%	0.68	53	0.7%
Plasma	1%	0.01	6	0.1%
TV accessories				
Cable set-top box	48%	0.77	174	2.3%
Satellite set-top box	41%	0.45	56	0.7%
DVD player	47%	0.57	8	0.1%
VCR	32%	0.34	12	0.2%
Combination DVD/VCR	35%	0.38	11	0.2%
Game console	20%	0.23	4	0.1%
TiVo®/DVR	13%	0.18	65	0.9%
Computer				
Desktop	39%	0.59	146	1.9%
Laptop	39%	0.58	48	0.6%
CRT monitor	35%	0.38	31	0.4%
LCD monitor	40%	0.50	35	0.5%
Audio electronics				
Stereo set	30%	0.34	21	0.3%
Receiver/amplifier	22%	0.31	47	0.6%
CD player	21%	0.29	5	0.1%

Below we present a few suggestions to consider regarding potential energy-saving strategies for home electronics in Wisconsin.

- Encourage the replacement of CRT models with LCD models for both televisions and computer monitors. According to the California Energy Commission (CEC) study[106], LCD televisions use about 37 percent less electricity than CRT televisions, while LCD monitors consume about 15 percent less electricity than CRT models. While the market has already begun shifting towards LCD technology, there are over twice as many CRT televisions as LCD televisions in each Wisconsin home (1.6 vs. 0.7 on average), while CRT and LCD monitors have a similar saturation, each about 0.5 per home. However, consumers tend to "trade up" smaller CRT televisions for larger LCD models, as evidenced by the fact that, in the on-sites, LCD televisions comprise a higher proportion of larger TVs than CRT models; this trend may negate some or all of the potential energy savings. [107] In addition, customers may simply move their old CRT TV to another room in their home after purchasing a new LCD model. One strategy may be to educate consumers about the energy usage of both large TVs

[105] *Final Field Research Report.* Prepared by Ecos Consulting for the California Energy Commission. October 31, 2006.

[106] *Final Field Research Report.* Prepared by Ecos Consulting for the California Energy Commission. October 31, 2006.

[107] The CEC study did not include data on energy usage of televisions by screen size. Therefore, we cannot compare the energy usage of larger LCD models versus smaller CRT models.

and old CRT TVs and also encourage the purchase of ENERGY STAR-qualified TVs and monitors. Compared to a standard model, an ENERGY STAR television is estimated to save 52 kWh per year and an ENERGY STAR LCD monitor is estimated to save 35 kWh per year. [108]

- Encourage the replacement of desktop computers with laptop computers. [109] According to the CEC study, laptops use about two-thirds less electricity than desktop hard-drive towers. A similar education message concerning the energy consumption of desktop vs. laptops may be an effective strategy, as well as promoting ENERGY STAR-qualified models. Compared to a standard model, an ENERGY STAR desktop computer is estimated to save 76 kWh per year and an ENERGY STAR laptop is estimated to save 11 kWh per year. [110] In addition, educating consumers about the energy savings from the appropriate power management settings for computers may be beneficial.[111]
- Consider working with local cable and satellite television providers to offer ENERGY STAR-qualified set-top boxes. ENERGY STAR-qualified set-top boxes are at least 30 percent more efficient than standard models, but do not appear to be available in Wisconsin yet, according to the ENERGY STAR website.[112]
- Educate the population about standby power loss (aka phantom load) and the benefits of smart power strips, which were not found in any homes in Wisconsin. Many consumer electronics draw standby power when turned off, and smart strips shut off power when products are not in use.

4.3.4 Program metrics and goals

No program metrics were measured for the APL program in 2009.

4.4 WISCONSIN ENERGY STAR HOMES

4.4.1 Process findings and issues

No formal process evaluation activities for the WESH program were included in the evaluation plan for 2009.

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[108] Ron Swager, Patrick Engineering, Inc. *Focus on Energy, Residential Deemed Savings Review*. February 2, 2009.

[109] The on-site visits did not collect data regarding auxiliary devices that may be associated with laptop computers, such as wireless routers. The addition of wireless routers might reduce the savings from switching to a laptop computer.

[110] Ron Swager, Patrick Engineering, Inc. *Focus on Energy, Residential Deemed Savings Review*. February 2, 2009.

[111] We did not check the power management settings of computers during the on-site visits. However, the recent ECW study in Minnesota found that 20 percent of 42 desktop computers were always on, 40 percent had long idle periods, 25 percent were turned off when not in use, and 15 percent were not used much.

[112] http://www.energystar.gov/index.cfm?c=settop_boxes.settop_boxes.

4.4.2 Verified energy impacts

No impact evaluation efforts for the WESH program were included in the evaluation plan for 2009. Verified impact reported is based on prior evaluation findings.

Table 4-12. Wisconsin ENERGY STAR Homes: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Building Shell	-5,221	-4.8%	0		148,189	99.6%
ECM Furnace	113,190	104.8%	0		0	
Hot Water	0		0		539	0.4%
Total	**107,969**	**100%**	**0**		**148,728**	**100%**

4.4.3 Market effects

No market effects evaluation activities for the WESH program were included in the evaluation plan for 2009.

4.4.4 Program metrics and goals

No program metrics were set for the WESH program in 2009.

4.5 HOME PERFORMANCE WITH ENERGY STAR

Evaluation efforts conducted during this reporting period focused on developing a research plan for estimating supply-side effects of the program on participating insulation contractors and re-evaluating the program attribution for sidewall and attic insulation based on participant and supply-side research. Three stated objectives drove the evaluation activities:

- Identify any program-induced demand-side and/or supply-side effects on the participating customers and vendors through customer and vendor surveys.
  - Propose a method for determining whether and how to integrate participant and program partner self-reports as a basis for attribution.
  - Establish a two-staged process for collecting data and performing the integrated analysis to produce defensible results.

Evaluation efforts are discussed below for each of the following four areas:

- Process findings and issues
- Verified energy impacts
- Market effects
- Program metrics and goals.

4.5.1 Process findings and issues

We did not formally include process related evaluation tasks as part of our *Evaluation Calendar Year 2009 Detailed Evaluation Plans*. The key findings in the verified energy impacts section highlight some differences in participants' perceptions.

Impact evaluation activities focused on the integration of supply side and demand side research in the development net-to-gross estimates for attic and sidewall insulation. This section summarizes the methodology, key findings, and recommendations for this research.

A. EVALUATION METHODOLOGY

The participant research was conducted first to assess participants' experiences and program influence on their decisions to install sidewall and attic insulation. The research also informed the design of the supply-side research. The findings discussed within this section were finalized on February 4, 2010, in the memorandum *Home Performance with ENERGY STAR Participant Survey Analysis and Recommended Supply-side Research Approach.*[113]

The sample frame for the participant survey consisted of CY09 participating households through June 2009. CY09 participants were selected to minimize recall bias. The sample was segmented by insulation type (sidewall and attic).

The sample was also segmented by delivery method. There are two paths a customer can go through for an audit process: (1) the consultant path and (2) the qualified contractor path. Based on discussions with the program manager, there was reason to believe there may be a difference in customers' awareness and decision-making processes by partner type. Evaluators hypothesized that customers that work with qualified contractors may be further along in their decision-making process than those working with consultants, thereby potentially increasing the free-ridership rate amongst that group. Therefore, we incorporated the partner path stratification into the sampling strategy.

These segments were randomly sampled by delivery method. The survey, which was fielded in October 2009, resulted in 149 completes which represented 142 attic insulation recipients and 98 wall insulation recipients. In addition to these participant surveys, we conducted follow-up interviews with 15 participating customers to clarify program influence data. The participating customers were divided by those that claimed program influence in the initial participant survey (10) and those who said the program was not influential (5).

The next phase of the study was to develop an approach and collect the data that would allow evaluators to integrate supply-side views with participant net-to-gross results. Because the consultants and qualified contractors were identified by program participants as the primary point of influence, they served as the subject for the supply-side research.

PA developed a supply-side guide to capture the perceptions of both of these groups of individuals, focusing on specific projects for less active consultants/qualified contractors and asking more active consultants/qualified contractors to generalize about their experiences. The sample frame consisted of consultants and qualified contractors associated with the surveyed program participants. In total, 34 consultants and qualified contractors were included in the study sample. Twenty of these companies were interviewed as part of this effort, which represents approximately 85 percent of the participant projects surveyed.

Ideally, the contractors and consultants would provide customer-specific responses. Unfortunately, these participating market actors could serve many households which and

[113] Laura Schauer, PA Consulting Group. *Home Performance with ENERGY STAR Participant Survey Analysis and Recommended Supply-side Research Approach.* February 4, 2010.

asking this level of detail would create significant respondent burden and potentially questionable results. Therefore, market actors that provided audit services to fewer than five households were asked to think specifically about households surveyed whereas those with five or more projects were asked to respond to questions taking into account all projects completed through the program.

There were several approaches to integration that evaluators considered which are enumerated below. Each of these approaches was considered when determining how to integrate supply side and participant responses to specific net-to-gross questions.

1. Over-ride the participant results if they said the consultant/qualified contractor was influential in their decision to install the equipment *(influential participant/supply-side selection approach)*.
2. Select the score or rating that assumes the greatest program influence when have both participant and supply-side responses *(highest influence indicator approach)*.
3. Average the participant and supply-side results *(average approach)*.

B. KEY FINDINGS AND RECOMMENDATIONS

Below we detail high-level findings based on the program evaluation. These findings are followed by program recommendations. Please see the final report, *Home Performance with ENERGY STAR Insulation Supply-side Study Results and Integration with Participant Findings*[114] for more background and detail around these findings and recommendations.

The evaluation identified program-induced demand-side and/or supply-side effects on the participating customers and vendors through customer and vendor surveys. The program is clearly influencing participants' decision-making processes as well as consultants' and qualified contractors' recommendation practices. The two groups are fairly consistent in their perception of the program's influence in the installation, although the supply-side interviews provide consistently higher attribution results than the participant interviews.

The program-induced effects vary somewhat when the results are reviewed by delivery method. Participants that use qualified contractors claim relatively low program influence on their decision-making processes.

The program theory is centralized around education and training. The participant and supply-side survey results indicate that the information and training is the primary driver of the energy efficiency improvements.

The majority of program participants surveyed (76 percent) received both attic and sidewall insulation. One could hypothesize that participants' net-to-gross ratios would vary by number of measures received. Taking into consideration the customer education component of the program's theory, the net-to-gross ratio for could be higher for those participants that received more measures as the program's information encourages them to install measures they otherwise would not have installed. The analysis does not provide any evidence that the net-to-gross ratio is higher when the program installs multiple insulation measures. However,

[114] Laura Schauer, PA Consulting Group. *Home Performance with ENERGY STAR Insulation Supply-side Study Results and Integration with Participant Findings (Final).* April 16, 2010.

there is evidence taking into account the contractor's perspective that households that receive air sealing are more influenced by the program than those that did not receive air sealing.

There is the potential for integrating participant and program self-reports as a basis for attribution, which are documented in this report. The evaluation established a two-staged process for collecting data and performing the integrated analysis to produce defensible results. We believe the methodology included in this study was effective in its approach to integrating supply-side and demand side self-report results. Additionally, this study developed a methodology that we believe could be duplicated for other studies, albeit with some potential modifications based on the program and population being reviewed.

Most importantly, the study design included the ability to directly link contractor results with program participant results. Although doing this on a project-by-project basis was not feasible in all cases for reasons discussed later in this report, the ability to at a minimum link contractor's general perceptions with customers they served provided a basis for some level of integration.

Three integration approaches were considered when conducting the analysis. The study found that there is no one approach that is right for all analysis. In thinking through the optimal approach for integrating the results, one must consider the benefits and limitations of each approach as well as the approach that makes the most rational sense, lends itself to the most accurate reporting, and mitigates any potential response bias as best as possible.

i. Recommendations

Integrate supply-side research with participant self-reports where it makes sense. The two-staged impact analysis approach documented within the report illustrates the need to continue to rigorously design net-to-gross studies to integrate supply-side, as well as participant results. Designing a study to ensure that the perspectives of all parties potentially influenced by the program as well as the primary decision-makers are adequately represented provides a well-rounded perspective of program attribution, particularly for programs that have significant supply-side influence.

Continue to develop the methods systematically, but avoid a strict 'one size fits all' approach. It is oftentimes our first inclination to create a standardized approach for developing impact methodologies, particularly for net-to-gross studies. However, programs and the populations they serve can vary significantly, which will require customization of approaches and questions. Additionally, while this study outlined a variety of integration approaches for program and PSCW consideration in determining net-to-gross estimates, other programs evaluations may require additional approaches or refinements to these approaches as they make sense for that study.

Revise the current net-to-gross estimate to reflect this research. The net-to-gross estimate using the recommended integration approach in determining program influence is 65 percent for attic insulation and 73 percent for sidewall insulation. The recommended attic net-to-gross ratio of 69 percent is only slightly higher than that currently used by the program (62 percent). The difference in current to recommended rates is more significant for sidewall insulation (50 percent currently used versus 73 percent recommended). There could be a variety of explanations for the significant difference in sidewall insulation. The most likely explanation for the significant difference in the sidewall estimate is that the study method and survey questions are significantly different between these studies.

Do not distinguish estimates by delivery method, but recognize there is a distinction in participants that are served by these groups. The participant study analysis revealed that participants' decision-making processes differed by delivery method. The preliminary report provided a preliminary recommendation to distinguish net-to-gross ratios by delivery method. However, whereas the participant survey produced significantly different results by delivery method, the integrated approach upon which the recommended net-to-gross estimates are developed did not yield results that were so strikingly disparate between the two groups. Additionally, discussions with program staff revealed that assigning different estimates by delivery method could have its limitations due to the way the tracking system currently records the data. Therefore, we do not recommend that the program distinguish net-to-gross estimates by delivery method.

C. TRACKED ANNUAL ENERGY IMPACTS.

The table below shows energy impacts for HPWES program activity for the second half of 2009.

Table 4-13. Home Performance with ENERGY STAR: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Building Shell	693,678	59.3%	431	91.7%	568,178	93.7%
Hot Water	84,468	7.2%	6	1.3%	12,669	2.1%
HVAC	292,680	25.0%	27	5.7%	22,260	3.7%
Lighting	57,728	4.9%	6	1.3%	0	
Other	0		0		1,620	0.3%
Water Heating	41,580	3.6%	0		1,675	0.3%
Total	**1,170,133**	**100%**	**470**	**100%**	**606,402**	**100%**

4.5.2 Market effects

There are two potential areas for market effects research for future consideration. The first is a review of non-tracked actions taken by recipients of an audit who do not take any action through the Focus program. The second is a review of education and training related efforts to determine if there is enough tracked activity to allow research for the determination of the level of non-tracked savings resulting from these activities. No budget was allocated to these efforts.

4.5.3 Program metrics and goals

Two metrics were identified for review: (1) increase the number of measures implemented per project completion and (2) increase the number of completions between FY08 and CY09. The data used to address these metrics were HPWES program data from July 1, 2007, to December 31, 2008 (FY08), and January 1 to December 31, 2009 (CY09).[115]

CY09 Metric #1 – Increase number of measures implemented per project completion. This specific contract metric's goal states the following: "Increase the number of measures

[115] The analysis presented below is pending verification from the program administrator.

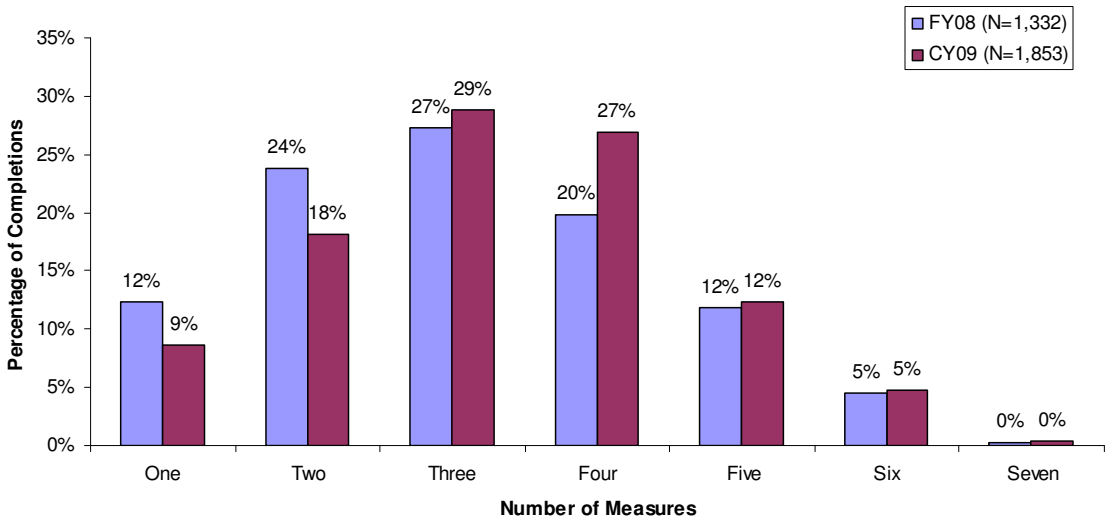
implemented per project completion compared to 18 MCP." The evaluation team measured this metric by analyzing the program database to assess the number of measures installed per project completion in FY08 and CY09.

The analysis established a count of individual measures installed per customer (PKCustomerID) per program year. The result of the analysis is the number of unique measures installed for each customer.

All measures with related energy savings were included in this analysis: air sealing, attic insulation, chimney liner, floor Insulation, foundation insulation, sidewall insulation, sill box Insulation, and water heater replacement and corrections for poor drafts. Although insulation could be grouped as one category, they are counted separate for this analysis.

The average number of measures installed per customer with completed jobs increased somewhat between FY08 and CY09. An average of 3.1[116] measures was installed for each customer in FY08 compared with 3.3[117] measures in CY09. Figure 4-5 illustrates this trend. A higher percentage of FY08 participants received one or two measures than CY09 participants. A higher percentage of CY09 participants received three or four measures than FY08 participants. There is no one measure that stands out as significantly increasing in installation frequency between these two years.

Figure 4-5. Number of Measures per Project Completion



CY09 Metric #2 – Increase the number of completions. The specific contract metric critical goal states the following: "Increase the number of completions compared to 18 MCP." The evaluation team measured this metric by analyzing the program database to assess the percentage of projects completed in FY08 and CY09. If a customer received a pre-assessment/pre-rating and post-assessment/post-rating the customer was identified as a

[116] Standard deviation 1.36.

[117] Standard deviation 1.3.

completion. Additionally, if the database indicated that a customer received a post-assessment/post-rating as well as measures with associate savings, that case was identified as a completion even if a pre-assessment/pre-rating was not explicitly detailed.

The number of customer completions increased significantly[118] from FY08 to CY09. Thirty percent of projects were completed in FY08 compared with 46 percent of projects in CY09 (N=4,417 and 4,201 respectively).

4.6 APARTMENT AND CONDOMINIUM EFFICIENCY SERVICES

From July 1, 2009, to March 31, 2010, two evaluation activities related to the ACES program took place. First was the primary data collection conducted in 2009 with participants of the New Construction, Whole Building, and Direct Install components of the ACES program. The research objective was to assess the level of program impacts for each of the program components using a self-report approach. Detailed information on the results can be found in the report *Residential Programs: ACES CY09 Impact Attribution Report*[119]. The second evaluation effort was the supply-side research conducted with contractors associated with participating Whole Building projects. This research effort was targeted to contractors providing services to customers participating in the ACES Whole Building initiative. The objective was to capture information regarding the program's influence on contractors, and to find out whether, and if so, how, Focus has impacted their business practices. Energy impacts resulting from changes in business practices that are not being captured in the program tracking system were quantified. This research was also designed to uncover program influence that customers might not have considered during the 2009 impact research. Full details of this research can be found in *Apartment and Condominium Efficiency Services Program: Whole Building Supply-side Impacts (Final)*[120].

Key findings of these research efforts are presented below for each of the following four areas:

- Process findings and issues
- Verified energy impacts
- Market effects
- Program metrics.

4.6.1 Process findings and issues

We did not formally include process related evaluation tasks in the 2009 evaluation plan, although some process related questions were included in the participant impact surveys as well as the supply-side surveys with contractors.

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[118] Significance is at the 95 percent confidence level.

[119] Jeremy Kraft, Laura Schauer, Kimberly Bakalars, Bryan Ward, and Pam Rathbun, PA Consulting Group. *Residential Programs: ACES CY09 Impact Attribution Report.* December 3, 2009.

[120] Jeremy Kraft, Kimberly Bakalars, Bryan Ward, PA Consulting Group. *Apartment and Condominium Efficiency Services Program: Whole Building Supply-side Impacts (Final),* March 19, 2010.

A. PARTICIPANT IMPACT EVALUATION FINDINGS

Participants were most likely to hear of the program through ACES or Focus staff. Participants also mentioned other property owners, contractors and vendors, mailings, and contact with the utility as other sources of information.

The primary program benefit cited by participants was reduced energy costs. Increased tenant comfort, increased lighting levels, increased tenant savings, and being able to market themselves as "green" were other benefits mentioned frequently.

Over 95 percent of the new construction participants said they would participate in the program again.[121] Additionally, a majority of participants said they have already recommended the program to other owners and building managers.

Respondents provided several areas of improvement for the program and discussed barriers to program participation. Improvements mentioned were incentives for additional measures, reduced paperwork, better advertising, and more input and guidance from Focus staff. The barriers participants reported most often when considering or seeking approval for new projects were budget and return on investment. New Construction participants also mentioned their own lack of knowledge about new products and uncertainty of equipment reliability as barriers.

B. SUPPLY-SIDE EVALUATION FINDINGS

Contractors associated with Whole Building component projects vary widely in their size and focus. They range from large commercial contractors to small residential contractors. Likewise, their involvement with the multifamily market also varies widely with some contractors only completing a single multifamily project in a year while others complete up to 100 projects.

Messages directly from the source promote a more consistent and controllable message. Half of the contractors learned about the ACES program through Focus on Energy sources, either personal contact or print materials. However, just over half of the contractors reported they have not received any training or assistance through the ACES program. Although this is not a surprising finding, since training is not part of the program model for ACES, 56 percent of the contractors are reporting that they received no assistance from the program, outside of the incentive paid to the property owner. A resulting recommendation from the supply-side research was for the program to develop a more defined contractor support strategy.[122]

Contractors appear to be leveraging multiple programs. When asked about other Focus on Energy programs they are involved with, only 23 percent said that ACES was their only involvement with Focus on Energy programs. Forty-three percent of contractors said they are

[121] Whole Building and Direct Install participants were not asked this process question.

[122] For more detail on recommendations provided as a result of the supply-side research, please see Jeremy Kraft, Kimberly Bakalars, Bryan Ward, PA Consulting Group. *Apartment and Condominium Efficiency Services Program: Whole Building Supply-side Impacts (Final),* March 19, 2010.

also active with the ENERGY STAR products program and another 23 percent participate in Business programs.

Eighty percent of contractors are registered as a Market Provider. They get assistance with general program information and rebates and realize benefits from working with the Energy Advisors. Some of the benefits contractors believe the Energy Advisors provide are suggesting the most appropriate equipment and incentives, connecting them with other consultants, assisting with forms, and recommending how to sell high efficiency equipment.

Customers come to contractors in varying stages of the decision-making process and with varying degrees of knowledge about energy efficiency. Contractors believe that about 60 percent of customers who come to them understand the efficiency options available to them when they first talk with a contractor. Just under half (48 percent) of the customers know they want to install high efficiency equipment when they first talk with the contractor. When making decisions about purchasing high efficiency equipment or services, contractors feel that the initial cost of equipment (34 percent), payback (29 percent), and energy savings (12 percent) are the primary considerations for customers. On average, 39 percent of the contractors' multifamily customers already know about ACES incentives before they speak with a contractor and 67 percent of the contractors' multifamily customers receive an incentive through the ACES program. Seventy-eight percent of contractors report that they "always" offer customers who have not already selected their equipment the high efficiency option. Contractors feel that 57 percent of customers who were not initially planning on purchasing high efficiency equipment end up doing so based on a conversation with the contractor.

Participation is expected to increase. Despite the lagging economy, almost half (46 percent) of the contractors anticipate their level of participation in the program will increase in the next 12 months, due to increased program awareness and greater customer interest in energy efficient equipment.

4.6.2 Verified energy impacts

The verified tracked annual energy impacts by program initiative and measure category for first half of 2009 are shown in Table 4-14.

Table 4-14. Apartment and Condominium Efficiency Services: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Appliance-Other	3,564	0.0%	0		629	0.0%
Boiler/Other Heating	352,138	2.3%	123	6.9%	846,537	49.2%
Building Shell	273,855	1.8%	105	5.9%	85,934	5.0%
CFL	1,317,406	8.5%	133	7.5%	0	
Clothes Washer	176,642	1.1%	0		6,358	0.4%
Dehumidifier	50	0.0%	0		0	
Dishwasher	198,750	1.3%	2	0.1%	10,410	0.6%
ECM Furnace	25,103	0.2%	5	0.3%	66,723	3.9%
Freezer	849	0.0%	0		0	
Hot Water	2,776,617	18.0%	9	0.5%	686,632	39.9%
HVAC	255,768	1.7%	368	20.8%	11,617	0.7%

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Laundry	72,280	0.5%	8	0.5%	-1,156	-0.1%
Lighting	9,764,896	63.2%	998	56.4%	0	
Motors & Drives	128,827	0.8%	1	0.1%	0	
Other	17,182	0.1%	3	0.2%	6,110	0.4%
Refrigerator/Freezer	93,482	0.6%	15	0.8%	0	
Total	**15,457,408**	**100%**	**1,771**	**100%**	**1,719,794**	**100%**

For the CY09 impact research and analysis, we again used self-reported methods based on the criteria agreed upon for attribution method selection[123]. This approach was similar to that used in the 18-month Contract Period (18 MCP) and the survey developed for the 18 MCP evaluation was based on the NTG whitepaper prepared by the evaluation team. Minor modifications were made to the survey based on experience from implementation of the survey for the 18 MCP. Especially for the New Construction program component, these modifications resulted in more detailed questions on existing plans and the timing and extent of program staff involvement in the project.

Participant surveys were completed with ACES program participants from April 2008, through March 2009. Surveys with New Construction participants were conducted by senior consulting staff, as opposed to being conducted by interviewers, in an effort to gain more qualitative insight on the programs influence on implementation of energy efficient measures in new construction projects. For New Construction, all participants were sampled, while for the Whole Building program a random sample was taken of participants. For Direct Install participants, the top ten percent of savers were sampled, as well as a random sample from the remaining participants.

Table 4-15. Attribution Rate for ACES by Program Component

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

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

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

As a result of the supply-side research, the replacement of the customer attribution rates with the contractor attribution has a limited effect on the Whole Building component attribution. The contractor replacement increases the kWh attribution by six percentage points. A gain in the lighting attribution is the primary driver of this increase. The contractor replacement also increases the therm attribution rate by two percentage points. This increase is mainly the result of increases in attribution for the boiler clean and tune-up services. There were also attribution increases in building shell improvements and water-heating equipment, though these measures have less of an overall effect due to smaller associated savings values.

4.6.3 Market effects

Information on participant spillover is being captured as part of the participant surveys. In the event that significant spillover is identified, additional information will be gathered to allow an estimate of the energy impacts resulting from it.

A. PARTICIPANT IMPACT EVALUATION FINDINGS

In 2009, the participant self-report series of questions was revised to attempt to gather more information on the installed equipment in order to estimate savings for those cases where customers are able to provide enough information about the equipment. Based on these revisions, we were able to estimate spillover savings as part of the CY09 impact research.

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

The majority of the kWh spillover savings were attributed to water heaters and lighting and a majority of the therms spillover savings were attributed to shell measures and boiler clean and tunes. It is unclear why participants did not apply for incentives for these measures.

B. SUPPLY-SIDE EVALUATION FINDINGS

Contractors reported implementing additional program-eligible measures outside of the program that were estimated to result in nonparticipant spillover savings of approximately 232,776 kWh and 378,342 therms. These spillover savings represent 3.6 percent of the gross Whole Building kWh savings and 39 percent of the gross Whole Building therms savings. Most contractors (81 percent) did not report any nonparticipant spillover as all the program-eligible equipment they implemented received program incentives. The few contractors that did report implementation of program-eligible equipment to nonparticipating customers felt that their involvement with the ACES program was influential in increasing their sales and installation of energy efficiency equipment. Therefore, these sales outside of the program are considered nonparticipant spillover as the contractor would have been less likely to make these sales in absence of the program.

Although we have quantified nonparticipant spillover savings, we do not recommend that the ACES program is credited with it at this time. Given that a small sample of contractors is driving large savings values (one contractor out of 108 represents 70 percent of the spillover savings), we feel the casual link between the program and these savings values requires

more investigation. Future evaluation efforts should further develop the spillover methodology for contractors and investigate program influence on contractors.

However, changes in contractor recommendation, installation, and inventory practices, which they attribute to the program, provide evidence of supply-side effects. Changes in recommendation and installation practices are especially important in affecting lasting change in a market. Stocking practices are important in overcoming barriers related to availability of efficient measures, but are much more easily changed. Contractors providing services related to heating equipment were the most influenced by the program. Over 40 percent of contractors providing services related to heating equipment indicated that they had changed their practices and just fewer than 40 percent indicated that these changes were influenced by ACES.

The percent of contractors reporting that ACES had influenced changes in their practices was between ten and 20 percent for all of the measure categories for which a minimal number of contractors responded. Contractors providing building shell services were the least likely to report changing their practices due to ACES, with only one out of eight contractors (13 percent) indicating a change.

4.6.4 Program metrics and targets

No program metrics were specified for the ACES project for 2009.

In 2009, ACES accounted for 38 percent of the total net therm savings for all of the residential programs combined, 17 percent of the net kW, and 12 percent of the net kWh savings. In terms of ACES program targets for the 2009 calendar year, ACES had achieved 113 percent of its program target for kWh, 95 percent of its kW target, and 111 percent of its therms target.

4.7 TARGETED HOME PERFORMANCE WITH ENERGY STAR

Targeted Home Performance with ENERGY STAR (Targeted HPWES) provides weatherization services to eligible households served by participating natural gas and electric providers. The objective of the Targeted HPWES program is to provide Wisconsin residents who have limited incomes and resources with an effective opportunity to increase the energy efficiency, affordability, safety, durability, and comfort of their homes.

Targeted HPWES set a goal of completing 505 whole house jobs for the CY09 program year. Eligible households have incomes just over the income eligibility requirements for the state Weatherization Assistance Program (WAP). In past years, Targeted HPWES income eligibility requirements were between 150 percent and 200 percent of the federal poverty level (FPL). During 2009, income eligibility changed as follows: 150 percent to 250 percent from January to March 2009, 200 percent to 250 percent from March to July 2009, then changed to between 60 percent and 80 percent of state median income[124] in response to the increase in income eligibility for WAP.

[124] Income eligibility is determined by applicants' prior three months of income.

PA conducted interviews with program service providers along with a thorough review and update of energy savings in 2008. Evaluation efforts since July 1, 2009, focused on a customer-centered process evaluation to complement the previous year's evaluation research. The evaluation team had not conducted primary data collection with Targeted HPWES customers since the baseline and longitudinal evaluation surveys conducted from 2002 through 2004. In addition, the evaluation has never conducted research with the slightly higher income group of 200 percent to 250 percent of FPL, emphasizing the importance of conducting customer surveys this contract year.

Key efforts are presented below for each of the following four areas:

- Process findings and issues
- Verified energy impacts
- Market effects
- Program metrics.

4.7.1 Process findings and issues

The evaluation team investigated process related issues through three primary research tasks centered on customers: a nonparticipant survey, participant database review, and a participant survey.

In July and August of 2009, PA conducted interviews with 66 households who were sent Targeted HPWES marketing materials but had not participated in the program. Objectives of the nonparticipant survey included assessing household, energy use and demographic characteristics and how these compare to the baseline survey, interest in the program, reasons for not participating, and ways the program could increase participation. The reader is referred to the memorandum *Targeted Home Performance with ENERGY STAR Nonparticipant Survey Results* dated November 20, 2009, for key findings and detailed results of this survey.

The evaluation team also conducted a review and analysis of program tracking data to help characterize the Targeted HPWES participant population and how they are being served. PA analyzed program tracking data provided by WECC, which included 435 jobs completed through the program from January 1 through December 31, 2009.[125] This analysis sought to summarize the household and demographic characteristics of CY09 participants provided by WECC and to identify information gaps in the tracking database that could be addressed through the participant survey. The reader is referred to the memorandum *Targeted Home Performance with ENERGY STAR: Participant Characterization* dated January 22, 2010, for a detailed discussion and results of this analysis.

Finally, in January and February of 2010, the evaluation team conducted interviews with 200 households who participated in Targeted HPWES in 2009. The participant interviews sought to investigate reasons for participating, program benefits and impacts, program satisfaction, effective outreach channels, barriers to participation, and how participants overcame these

[125] Number of completed jobs based on the file "THPESEvaluation01052010.mdb" received on 01/05/2010.

barriers. In addition, the participant survey aimed to address information gaps from the participant characterization analysis. The reader is referred to *Targeted Home Performance with ENERGY STAR Participant Survey Results* dated April 12, 2010, for key findings and detailed results of this survey.

4.7.2 Verified energy impacts

The evaluation team has not conducted any activities since July 1, 2009, affecting verified energy impact estimates. The evaluation team conducted a thorough review of per-home savings in the previous evaluation cycle and provided recommendations of 1,636 kWh savings and 276 therms.[126]

Table 4-16. Targeted Home Performance with ENERGY STAR: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Home Weatherization	770,556	100.0%	127	100.0%	129,996	100.0%
Total	**770,556**	**100%**	**127**	**100%**	**129,996**	**100%**

4.7.3 Market effects

The evaluation is not quantifying market effects from the program.

4.7.4 Program metrics

Targeted HPWES does not have contract metrics.

4.8 EFFICIENT HEATING AND COOLING

No evaluation efforts for the program were included in the evaluation plan for 2009.

4.8.1 Verified energy impacts

Table 4-17. Efficient Heating and Cooling: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Adjustment	-1,460	0.0%	-0.34	0.0%	716	0.0%
Boiler/Other Heating	0	0.0%	0	0.0%	409,593	47.3%
ECM Furnace	16,000,540	97.9%	3,659.52	85.6%	376,640	43.5%
Central A/C	346,506	2.1%	616.92	14.4%	79,380	9.2%
Total	**16,345,586**	**100%**	**4,276.10**	**100%**	**866,329**	**100%**

4.8.2 Program metrics and goals

No program metrics were measured for the program in 2009.

[126] Bryan Ward, Lark Lee, and Sandra Duerst, PA Consulting Group. *Recommendations for Targeted Home Performance with ENERGY STAR Impacts*, June 2009.

4.9 HEAD START CFL

Table 4-18. Head Start CFL: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
CFL	322,764	100.0%	13	100.0%	0	
Total	**322,764**	**100%**	**13**	**100%**	**0**	

4.10 TOGETHER WE SAVE PILOT

The Together We Save program, a pilot program in the city of Milwaukee, is designed with the objective of providing deep energy savings to households with moderate to low income. Per the Program Implementation Plan[127], the objectives of the program are to:

- Utilize the community by forming partnerships with neighborhood leaders, neighborhood groups, and city/utility/government agencies
- Test various outreach, marketing, and ongoing communication techniques to maximize participation and inform homeowners
- Deliver optimal building science practices and products based on experience with weatherization and home performance programs to assure energy efficiency standards are met
- Guide and redirect home energy efficiency attitudes and behaviors toward sustainability.

The program consists of four main components that are designed to work in concert to achieve long-lasting energy savings in the targeted neighborhoods. These components include community-based Energy Advocates, technical assessments, incentives and payment-plan options for recommended energy efficient equipment, and pre-selected contractors that implement recommendations.

Evaluation efforts are discussed below for each of the following four areas:

- Process findings and issues
- Verified energy impacts
- Market effects
- Program metrics and goals.

4.10.1 Process findings and issues

The evaluation for this program focused on process issues. Two reports were delivered in this reporting period that addressed these issues. The first was a memorandum report, *Key Findings from In-depth Interviews with Together We Save Program Staff and Database*

[127] The Milwaukee Neighborhood Efficiency Project Program Implementation Plan dated February 2009.

Analysis, which was finalized February 26, 2010. The second report, *Together We Save Process Evaluation Report,* was submitted as a draft March 19, 2010 and finalized April 21, 2010. The report presents the results of PA Consulting Group's process evaluation of the Together We Save program pilot.

This section provides the evaluation methodology and key findings and recommendations as outlined in the final report.

A. EVALUATION METHODOLOGY

Evaluators, the PSCW, and WECC identified 21 researchable issues to be addressed as part of this process evaluation. The researchable issues fall into four categories: program operations, outreach and marketing, target market and participants, and program design and delivery. PA completed both primary and secondary research to address these researchable issues.

First, PA conducted nine in-depth interviews between December 18, 2009, and January 21, 2010, with staff involved with the program. PA interviewed two WECC staff responsible for overall program management, four Energy Advocates, two technical consultants and the project coordinator.

Prior to the interviews, PA developed topic guides that were reviewed by both the PSCW and WECC. Topics covered in the interviews included:

- Role in program implementation
- Interaction among program stakeholders
- Customer outreach and interaction
- The walk-through audit
- The technical assessment
- Pre-selected contractors
- Communications with WECC
- Overall program effectiveness.

Second, PA conducted telephone interviews with 74 program participants between January 26 and February 8, 2010. WECC provided data for 119 customers that had completed the walk-through audit on January 6, 2010. We included a census of these customers in the telephone survey. The survey covered a representative sample of customers in different stages of the program.

Third, PA completed database analysis to characterize the participants and services received by the participants. Last, secondary research was conducted to compare and contract the Together We Save Pilot to other residential program offerings in the state.

B. KEY FINDINGS AND RECOMMENDATIONS

The localities chosen by COWS and the City of Milwaukee for program services were selected based on a perceived financial need as they were determined to be low to moderate-

income areas. The distribution of households within specified federal poverty levels confirm that the residents within these neighborhoods that participate in the program are within the low to moderate income levels.

However, while the program is serving an intended lower income population, a significantly higher percentage of households than initially anticipated have a low enough income to participate in other social service programs, including the Weatherization Assistance Program. Although it was not initially the intention of the program to serve this group of households, WECC and weatherization staff, with approval from the PSCW, jointly agreed that it would be beneficial for the program to serve these customers to ensure they receive energy efficiency services in a timelier manner than the weatherization program expected they could provide. And the comparative analysis shows that this is the case; Together We Save pilot participants are receiving services quicker than those that apply for WAP.

Serving this income classification, while from a social perspective is beneficial to the community and program, increases the cost to the program. Additionally, devoting resources to the lower income households means the program is not serving the number of moderate-income households it could be.

All program staff interviewed identified the Energy Advocate as a differentiating program element that is particularly beneficial for the program. Another differentiating programmatic component—the turnkey service offering—received less enthusiastic response.

The most significant process issue identified in this evaluation relates to the amount of time between the pre-assessment and recommendations reporting, an area of dissatisfaction reported by both program staff and participants. There are various areas where breakdowns could be occurring. The first is the fact that one individual is responsible for reviewing and approving all reports compiled by program consultants. This single individual is time constrained as he works with multiple programs. Another potential reason for delays is the need for additional program training.

In considering expanding the pilot, the program needs to consider the program management infrastructure and whether it will be able to maintain the positive, unique outcomes resulting from this program as outlined in Chapter 4. For example, the positive outcome of being able to service customers time-effectively when compared with other programs may be limited by the resources available to continue moving projects forward effectively should the pilot continue to serve higher need households such as those with lower incomes.

The following recommendations were made for WECC and PSCW consideration.

Continue to include the role of an Energy Advocate in future program designs. Interviews with both program staff and customers strongly suggest that the Energy Advocate is a key role in the program, providing a high level of customer service throughout the entire process.

Consider providing more staffing resources to the project coordinator position. Increasing the level of effort from the program coordinator role or adding additional staff to this role could allow the coordinators to address Consultant reports in a timelier manner and reducing the delay in project work.

Consider the indirect program costs of including the turnkey contractor program offering in future program designs balanced against the benefits realized by customers. As about half of customers said they may not have participated in the program without the turnkey offering. Additionally, it is an administrative cost to program staff that need to manage the process. This may be one programmatic element the program could consider revising by including a list of pre-selected contractors or program allies

Revisit incentive structure as there is some evidence that incentives may be too high. A majority of customers across all income levels said they would have participated in the program if they had been asked to pay a larger percent of the total project cost. Reducing the incentive values could increase the cost-effectiveness of the programs. Please note, however, that this recommendation is based on few observations and further research with the full population of program participants once work is complete may provide more substantive data on this topic.

Consider the cost-effectiveness and program overlap of including the lowest income category and/or targeted neighborhoods in future program design. Nearly half of participants are within the lowest income category and eligible for the Weatherization Assistance Program and incur the highest project costs for the program. The positive outcomes of the Together We Save pilot compared with the weatherization program is that it is able to serve customers more quickly than the state program. The program should consider whether it is cost-effective to continue to serve this population. Additionally, because the program was initially intended to reach moderate income households that are not eligible for low income programs, this program should identify whether the served population is optimal for this program.

Include site visits in future program evaluations. Including site visits as part of evaluation activities would allow evaluators a better understanding of the role of the Energy Advocate and the walk-through audit.

Encourage Energy Advocates to install low-cost measures during all audits. If feasible, have the Energy Advocate direct install CFLs and low-flow water devices for all homes they visit to minimize lost opportunities.

Reinforce the need for leave-behind materials to be a larger part of the walk-through audit experience. Per conversations with WECC, the program currently provides a triplex audit form for the Energy Advocate's completion, a copy of which can be left with the program participant after the walk-through audit.

Continue to provide formal training for the Energy Advocates, consultants, and project coordinator. While training is provided to program staff, the evaluation indicated a need for additional training or reinforcement of the issues covered in the training. The training should be completed with the objective of providing customers with consistent services and moving projects through the program more efficiently and effectively.

4.10.2 Verified energy impacts

The table below shows energy impacts for Together We Save program activity for the second half of 2009. The evaluation did not include any impact-related tasks for this program.

Table 4-19. Together We Save: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)

Measure Category	Verified Gross kWh	kWh %	Verified Gross kW	kW %	Verified Gross Therms	Therm %
Audit	143	1.1%	0		0	
Boiler	0		0		98	1.2%
Building Shell	9,660	77.4%	7	87.5%	7,911	96.8%
Furnace	2,920	23.4%	1	12.5%	80	1.0%
Hot Water	-250	-2.0%	0		86	1.1%
Total	**12,473**	**100%**	**8**	**100%**	**8,175**	**100%**

4.10.3 Market effects

Market effects were not a component of this study.

4.10.4 Program metrics and goals

No program metrics were defined for this program. As detailed in the process evaluation results above, the program is on target to reach its goals in terms of number of households served through the program.

5. RENEWABLE ENERGY PROGRAM EVALUATION

5.1 OVERVIEW/KEY ACTIVITIES

This chapter describes the evaluation activities for the Renewable Energy Program conducted between January 1, 2009, and March 2010. This chapter summarizes the following:

- Reports
- Gross energy impacts
- Net energy impacts.

5.1.1 Reports delivered January 2009 through April 2010

During CY09, the Renewable Energy evaluation team submitted the following reports:

- Semiannual report: First Half of 2009 – Revised Final Report: October 19, 2009
- Renewables: Impact Evaluation January through September CY09 – Final: March 22, 2010
- Renewable Energy Program: Biogas Supply-side Study, Phase 1 – Draft: January 8, 2010
- Renewable Energy Program: Biogas Supply-side Study – Final: April 22, 2010
- Renewable Energy Standard Calculation Recommendations – Revised: October 9, 2009
- CY10 Detailed Evaluation Plans – Final: April 1, 2010.

5.2 REPORTS

5.2.1 Impact evaluation

Results of the most recent impact evaluation report, *Renewables: Impact Evaluation January through September CY09* – Final: March 22, 2010, are used in determining net impacts discussed in Section 5.4 below.

5.2.2 Biogas supply-side study

We completed the combined Phase 1 and Phase 2 reports for the Biogas Supply-side Study. These are reported in Section 5.5 below.

5.2.3 Revised standardized calculation recommendations

The Standard Calculation report outlines standardized approaches for estimating project generation (kW and kWh) and therms for all renewable energy technologies included in the program.

The evaluation revised the standard calculation recommendations in CY09. We revised the recommendations or corrected items for all technologies. The changes were not substantial, and included providing additional look up tables, copy-editing equations, and clarifications. In the case of wind energy, we modified the wind speed estimation approach based on recommendations from the Program. Additionally, we modified some sections to address questions raised in the past year.

5.3 GROSS ENERGY IMPACTS

5.3.1 Program activities

In this section, we discuss the projects implemented in CY09, the period from January 1 to December 31, 2009. During that period, the Program funded a total of 475 renewable energy projects consisting of 159 nonresidential and 316 residential installations. For CY09, the program increased the annual number of renewable energy system installations for the seventh consecutive year (see Table 5-1). The Program installed more total systems in 2009 than in the 18 MCP (which was six months longer) in both the nonresidential and residential sector. Based on number of projects, photovoltaic (PV) systems predominate and comprise almost two thirds of the projects in the nonresidential sector. PV systems are also the most common system type for residential, with solar thermal systems a close second.

Table 5-1. Projects Implemented by Type and Year

Technology	Completed Projects							
	FY02/FY03 Mar 02–Jun 03	FY04 Jul 03–Jun 04	FY05 Jul 04–Jun 05	FY06 Jul 05–Jun 06	FY07 Jul 06–Jun 07	The 18 MCP Jul 07–Dec 08	CY09 Jan 09–Dec 09	Program To Date
Nonresidential Projects								
Biogas	0	1	4	7	2	6	8	28
Biomass	0	3	7	16	14	18	6	64
Solar Electric	3	3	9	9	18	78	96	216
Solar Water Heating	0	0	4	5	6	38	43	96
Wind Machine	2	2	5	1	1	4	6	21
Other	1	0	2	1	2	0	0	6
All Nonresidential	**6**	**9**	**31**	**39**	**43**	**144**	**159**	**431**
Residential Projects								
Solar Electric (PV)	20	40	35	48	74	133	171	521
Solar Water Heating[a]	-	-	-	-	-	160	121	281
Wind Machine	1	8	2	5	5	13	24	58
Other	0	0	1	1	0	0	0	2
All Residential	**21**	**48**	**38**	**54**	**79**	**306**	**316**	**862**
All Projects	**27**	**57**	**69**	**93**	**122**	**450**	**475**	**1,293**

[a] Residential Solar Water Heating was included and tracked in the Focus on Energy Residential program through FY07. This table includes only those projects completed through the Focus Renewable Energy program.

5.3.2 Program-reported gross energy impacts

The program tracks gross energy savings (generation) for all projects completed that receive a cash-back reward or a grant that has associated energy impacts. We provide the program-reported gross impacts in Table 5-2, by technology and segment for the program to-date, and individually for FY07, the 18 MCP, and CY09.

For CY09, the program-reported impacts surpassed the total electric and therm savings for the full 18 MCP. Program-reported kW and kWh savings for this period are each more than double the annual totals from the 18 MCP. Therm savings are approximately triple the annualized 18 MCP total. The installation of eight biogas systems in 2009 is responsible for the substantial kW and kWh tracked savings. The therm savings for the 2009 are mostly from one large biomass project that itself represents over 40 percent of the program's total tracked savings to date.

Table 5-2. Renewable Energy Program-reported Gross Impacts[128] by Segment and Technology

Segment	Technology	Energy Impacts	Completed			
			FY07 Jul 06– Jun 07	The 18 MCP Jul 07– Dec 08	CY09 Jan 09– Dec 09	Program To Date
Nonresidential	Biogas	Kilowatts	1,045	1,180	1,871	7,982
		Annual kilowatt-hours	8,238,780	10,159,791	17,507,821	67,200,557
		Annual therms	0	138,637	1,929	249,219
	Biomass[129]	Kilowatts	0	-66	-98	-164
		Annual kilowatt-hours	0	-329,413	-498,735	-828,148
		Annual therms	684,448	2,213,364	4,873,677	10,249,723
	Solar Electric	Kilowatts	124	307	444	963
		Annual kilowatt-hours	153,422	778,759	1,214,814	2,259,675
		Annual therms	0	0	0	1,283
	Solar Water Heating	Kilowatts	0	-13	-1	-14
		Annual kilowatt-hours	0	-19,107	-7,864	-26,971
		Annual therms	2,697	48,752	39,299	124,937
	Wind Machine	Kilowatts	90	17	26	524
		Annual kilowatt-hours	109,560	127,249	227,017	1,026,440
		Annual therms	0	0	0	0
	Other	Kilowatts	14	0	0	14
		Annual kilowatt-hours	29,973	0	0	29,973
		Annual therms	1,480	0	0	2,638
	All Nonresidential	**Kilowatts**	**1,273**	**1,425**	**2,241**	**10,605**
		Annual kilowatt-hours	**8,531,735**	**10,717,278**	**18,443,053**	**76,135,126**
		Annual therms	**688,625**	**2,400,753**	**4,914,905**	**10,627,800**

[128] Gross energy impacts are those reported in the program tracking system maintained by WECC.

[129] Negative biomass kW and kWh in 18 MCP and CY09 are due to parasitic loads.

Segment	Technology	Energy Impacts	Completed			
			FY07 Jul 06– Jun 07	18 MCP Jul 07– Dec 08	CY09 Jan 09– Jun 09	Program To Date
Residential	Solar-PV and Thermal[130]	Kilowatts	224	263	399	1,176
		Annual kilowatt-hours	290,398	681,074	1,011,677	2,369,949
		Annual therms	0	0	0	3,776
	Solar Water Heating[131]	Kilowatts	0	28	13	41
		Annual kilowatt-hours	0	140,187	129,583	269,770
		Annual therms	0	8,371	8,739	17,110
	Wind Machine	Kilowatts	40	27	47	344
		Annual kilowatt-hours	51,353	278,909	426,178	1,075,461
		Annual therms	0	0	0	0
	Other[132]	Kilowatts	0	0	0	0
		Annual kilowatt-hours	0	0	0	-15,545
		Annual therms	0	0	0	2,253
	All Residential	**Kilowatts**	**264**	**319**	**459**	**1,562**
		Annual kilowatt-hours	**341,751**	**1,100,170**	**1,567,438**	**3,699,634**
		Annual therms	**0**	**8,371**	**8,739**	**23,139**
TOTAL	**All Projects**	**Kilowatts**	**1,537**	**1,743**	**2,700**	**12,166**
		Annual kilowatt-hours	**8,873,486**	**11,817,448**	**20,010,491**	**79,834,760**
		Annual therms	**688,625**	**2,409,124**	**4,923,644**	**10,650,938**

5.4 NET ENERGY IMPACTS

5.4.1 Approach

The evaluation team estimates net energy savings for the Renewable Energy Program on an annual basis. The most recent round of data collection to determine net energy savings included renewable energy projects installed between January 1 and September 30, 2009 (the first nine months of CY09).

The impact analysis determines three adjustment factors to the gross savings reported by the program:

- **Gross savings adjustment factor.** This factor adjusts tracked gross savings for installation and changes based on engineering review. Applying the gross savings

[130] Prior to July 2007, "Solar PV and Thermal" included residential PV installations and projects that combine PV with solar thermal technologies. The therm savings are from both the combined projects and PV installations that were off-grid and displacing fossil fuel generators on-site.

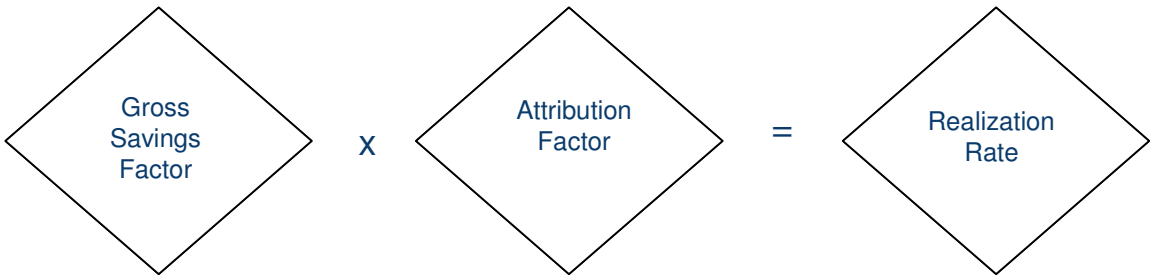
[131] Solar water heating projects switched from the Residential to the Renewable Program beginning in FY07.

[132] Residential "Other" savings are from a geo-thermal heat pump system that replaced a combustion type heating system in FY06. The negative electric savings result from an increase in electric usage associated with the system.

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 tracked gross savings.)

Figure 5-1. Realization Rate Calculation



The definitions of these factors and the methods for producing them are the same as in all previous Renewable Impact Evaluations. The reporting of the results in this semiannual report includes results previously reported in the CY09 impact evaluation[133] as well as impacts for projects completed in the period from January 1 to December 31, 2009, based on CY09 adjustment factors.

5.4.2 Overall findings

We calculated final CY09 adjustment factors based on all projects completed from January 1 through September 30, 2009. KEMA calculated these based on engineering reviews and surveys with a sample of program participants. The engineering review assessed the algorithms and input assumptions used to estimate impacts and calculated a revised estimate of impacts. The survey confirms installation and equipment details, as well as obtaining participant self-reports of program attribution. Program attribution is the percent of tracked impacts that occurred as a direct result of the program.

This report also includes net energy impacts for projects completed in the period from January 1 to December 31, 2009. KEMA calculated these net energy impacts based on the final CY09 adjustment factors, which were reported in the first quarter of 2010. In this report, we present the final CY09 adjustment factors, and estimated energy impacts for the period from January 1 to December 31, 2009, using the final CY09 adjustment factors.

Table 5-3 reports the overall results of this analysis. In section 5.3.3, we discuss the development of the realization rate for the first nine months of CY09. In section 5.3.4, we discuss the application of the CY09 adjustment factors to projects completed between January 1 and December 31, 2009.

[133] Miriam L. Goldberg, Bobbi Tannenbaum, Ben Jones, and Brian Bak, KEMA, Inc. *Renewables: Impact Evaluation January through September CY09*. March 22, 2010.

Table 5-3. Renewable Energy Program-Reported Gross, Evaluation-Verified Gross, and Verified Net Impacts

Time Period	kWh			kW			Therms		
	Program Reported Gross	Evaluation Verified Gross	Evaluation Verified Net	Program Reported Gross	Evaluation Verified Gross	Evaluation Verified Net	Program Reported Gross	Evaluation Verified Gross	Evaluation Verified Net
CY09[a]: Jan 09-Dec 09	20,010,491	16,882,709	7,254,211	2,700	2,711	1,288	4,923,644	5,361,930	1,373,838
The 18 MCP[a]: Jul 07-Dec 08	11,817,448	6,998,114	3,914,269	1,743	1,190	702	2,409,124	2,219,576	684,193
FY07: Jul 06-Jun 07	8,873,486	8,515,648	420,003	1,539	1,871	350	688,625	673,425	315,121
FY06: Jul 05-Jun 06	12,765,642	13,042,016	2,350,819	1,916	1,874	386	2,073,725	2,066,494	459,285
FY05: Jul 04-Jun 05	22,191,543	21,909,710	4,256,338	3,343	3,261	984	447,192	343,622	88,276
FY04: Jul 03-Jun 04	516,495	484,151	448,980	217	220	195	106,943	213,834	199,754
FY03: Jul 02-Jun 03	3,659,120	3,718,437	3,005,052	707	604	478	1,686	1,713	1,385
FY02: Mar 02-Jun 02	536	545	440	0.48	0.41	0.32	0	0	0
Total	**79,834,761**	**71,551,330**	**21,650,112**	**12,167**	**11,731**	**4,385**	**10,650,938**	**10,880,595**	**3,121,851**

[a] Technology specific verified gross and net adjustment factors were applied.

5.4.3 Final CY09 net energy impacts

This section presents the results of the CY09 impact evaluation.

The objective of this analysis was two-fold. The first objective was to verify the data that had been entered into the program tracking database to produce *gross savings adjustment factors*. Gross savings factors are based on verification of installation (installation rate) and an engineering review (resulting in an engineering verification factor) of the reported savings for projects installed between January 1 and December 31, 2009.

The second objective was to determine the *realization rate* for the program. Free-ridership calculations used in the calculation of the realization rate are based on participant reports of program effect on their decision to install a renewable energy system. For instance, the program could have:

- Been the main factor in the decision to install
- Accelerated the timing of the installation
- Changed the size of the system installed
- Had no impact on a pre-existing intention to install the measure.

Data used in the net impact analysis came from several sources.

- Program-reported savings for each measure were obtained directly from the Renewable Energy Program tracking database.
- The evaluation team requested additional information from program staff for each completed measure. This included detailed paperwork associated with the project application and some conversations clarifying the status of some projects. This information was used as a basis for the engineering verification.
- We conducted telephone interviews with participants completing 95 percent of tracked kWh offset and more than 99 percent of therms. These are very high proportions of savings. The completed interviews included all eligible biogas[134] and biomass projects, 26 percent of solar electric, 21 percent of solar hot water, and 88 percent of wind projects. The interviews verified installation details, assessed the extent to which the project implementation was attributable to the Focus Renewable Energy Program, and covered some general issues associated with participating in the program and installing a renewable energy measure.
- We verified the information provided in the program documentation (measure, size, and other key variables) and then reviewed the engineering calculations for reasonableness and consistency. We discuss the engineering calculations in more detail below.

A. INSTALLATION RATE

We confirmed the installation of 100 percent of the equipment for the sampled participants.

B. ENGINEERING VERIFICATION FACTOR

The overall engineering verification factors are improved for the Renewables program electric savings. Program level engineering verification resulted in 84 percent for kWh, 101 percent for kW, and 109 percent for therms. In Table 5-4 below, we provide the engineering verification factors for each of the technology categories.

[134] One biogas project had no tracked savings (it saved LPG), so it was ineligible for a survey.

Table 5-4. Engineering Verification Factors by Technology

Technology	Gross Savings Adjustment Factor		
	kWh	Peak kW	Therm
Biogas	**88%**	**102%**	**100%**
Biomass[a]	**265%**[a]	**100%**[a]	**109%**
Solar Electric	**103%**	**101%**	
Solar Electric - Nonresidential	102%	100%	
Solar Electric - Residential	105%	101%	
Solar Hot Water	**96%**	**95%**	**91%**
Solar Hot Water - Nonresidential	79%	68%	91%
Solar Hot Water - Residential	94%	91%	97%
Wind	**67%**	**69%**	
Wind - Nonresidential	71%	74%	
Wind - Residential	66%	69%	
Overall Renew	**84%**	**101%**	**109%**

[a] Electric (kWh and kW) gross savings for biomass are primarily parasitic load (which decreases program savings.) Values greater than 100 percent indicate that the evaluation found greater parasitic load than tracked by the program.

The program's tracked savings for Solar Electric were consistent with KEMA verified savings as calculated based in the 2009 revised standard calculation recommendations.[135] KEMA's verification of tracked savings for other technologies identified some generic issues with savings calculations, as well as some issues associated with specific technologies. Below we summarize these issues.

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

- **Reliance on program application materials.** For most technologies, the program relies on the estimates submitted with the application materials to estimate incentives (when based on production), and for program tracking.

  Program applications do not require reporting of parasitic loads for motors under 1 HP. This has resulted in under-estimation of parasitic loads, which can be very high. Many small motors associated with biomass (and other systems) can sum to large electrical energy consumption and should not be ignored when assessing a project.

- **Unsupported assumptions.** Some projects included assumptions without a citation for the basis of this assumption.

- **Unsupported calculations.** For some projects, calculation methods and constants were not explained or supported with reference material. For these projects, we calculated savings using the *Standard Calculations* document referenced earlier.

- **Missing data.** Some projects did not include data necessary for a complete evaluation of the project. This was most common for parasitic electrical loads. We used purchasing records to obtain model numbers for parasitic pumps and motors.

[135] Bobbi Tannenbaum, Doug Kneale, Brian Dunn, KEMA, Inc. *Renewable Energy Standard Calculation Recommendations – Revised.* October 9, 2009.

The Program's calculation of energy production from wind systems is improving, but continues to result in overestimation of offsets. The 7th Wind calculator includes updated manufacturer data, in addition to a built-in function to derate for inverter losses. The updated manufacturer information appears to bring the estimates closer to measured performance. The Program (and the wind industry in general) continues to improve estimation approaches for calculating site-specific wind resources.

Accurate tracking of parasitic load is becoming more important to the program. In CY09, the verified gross parasitic kWh load from biomass projects (primarily fans and motors) was equivalent to all of the verified gross kWh savings from the solar electric program.

The applicants (either contractors or end-users) may not be familiar with the standard calculation requirements or may be motivated to overestimate generation (offset). The Focus Renewable Energy program has a responsibility to review these calculations, especially for large or complicated projects, for two reasons. First, by providing financial assistance for the installation of the renewable energy project, as indicated in the application, the program is tacitly approving the savings estimates. The program participants can reasonably assume that an independent third party has verified these estimates and finds them to be accurate. Second, the program itself is responsible for accurately estimating and tracking program savings consistent with the *Standard Calculations* manual. Finally, the incentives paid to participants in some cases are higher than they should be, given actual production of the systems.

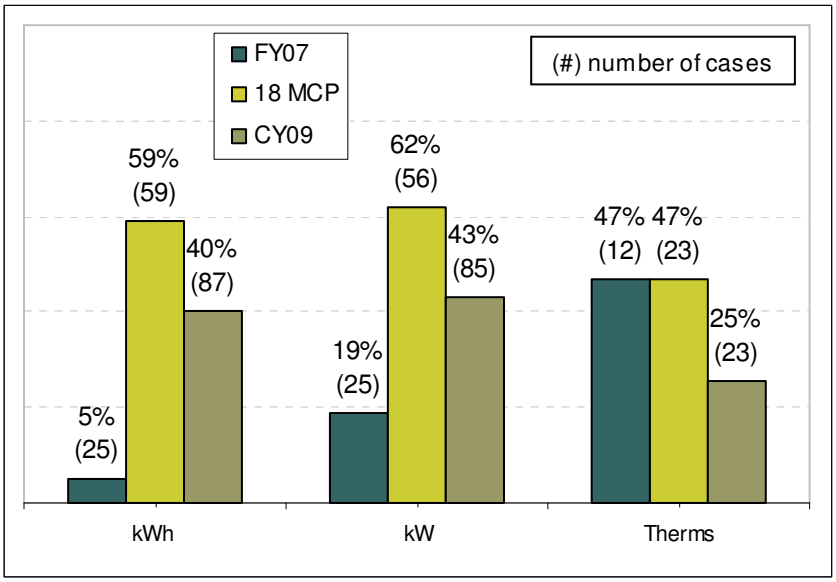
Finally, several sampled solar thermal projects included space heating in their design. Focus on Energy does not cover space heating and should not track space heat savings in the database. In CY09, the program accurately estimated the water heating savings for these projects and did not include savings from space heating in the database. This is an improvement over the 18 MCP approach.

The overall engineering verification factor incorporates KEMA's verification of the calculations used for program-tracked savings and the verification of installation. Additional detail about engineering verification is available in *Renewables: Impact Evaluation Report January through September CY09*.

C. PROGRAM ATTRIBUTION

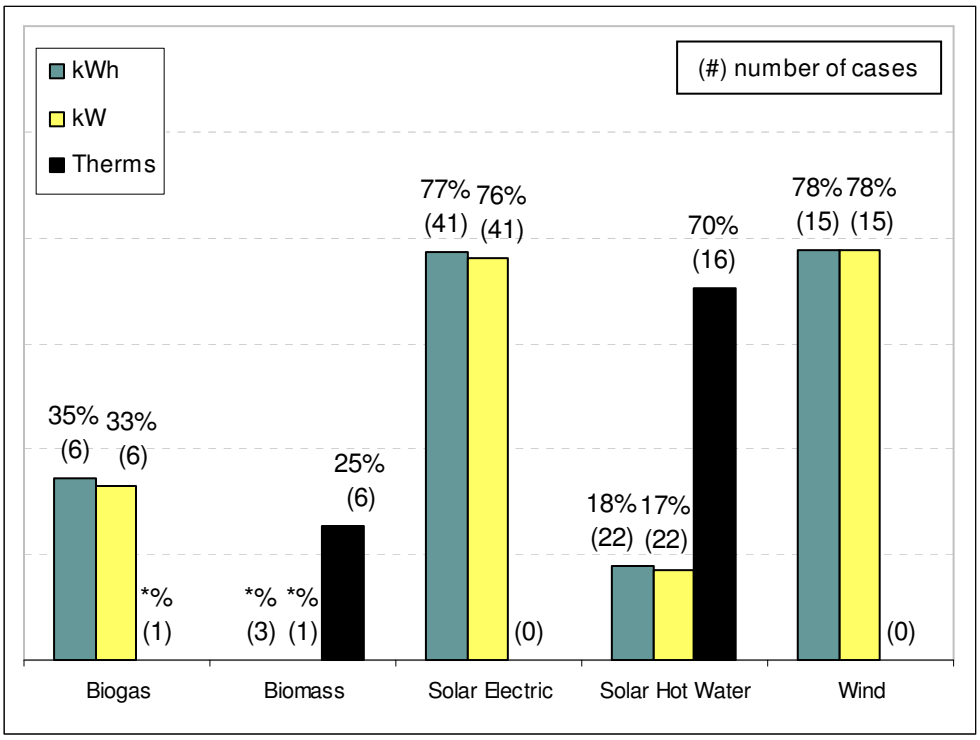
Attribution is the percent of tracked savings that is directly attributable to the program. Participant and vendor self-report surveys were used to estimate attribution. The CY09 attribution factors for the program overall are 40, 43, and 25 percent for kWh, kW, and therms, respectively, as shown in Figure 5-2, with a comparison to 18 MCP attribution values. This represents a substantial decrease in attribution. While the majority of the projects displacing therms are solar hot water, the majority of the tracked therm savings are from biomass projects. We discuss the attribution results by technology below.

Figure 5-2. Overall Program Attribution
FY07, 18 MCP, and CY09



Attribution varied substantially by technology and in the case of solar hot water, by the type of energy offset. Solar electric, wind, and solar hot water offsetting therms have high attribution rates relative to biogas, biomass, and solar hot water offsetting electricity (see Figure 5-3). In general, the technologies that are the least cost effective to the end-user tend to have the higher attribution rates. Solar hot water projects clearly demonstrate this. They had much lower attribution (17 percent for kWh) when they offset electricity than the relatively high attribution (70 percent) when they offset therms. Solar hot water systems have a faster payback when offsetting more expensive electric water heating.

Figure 5-3. Program Attribution by Technology

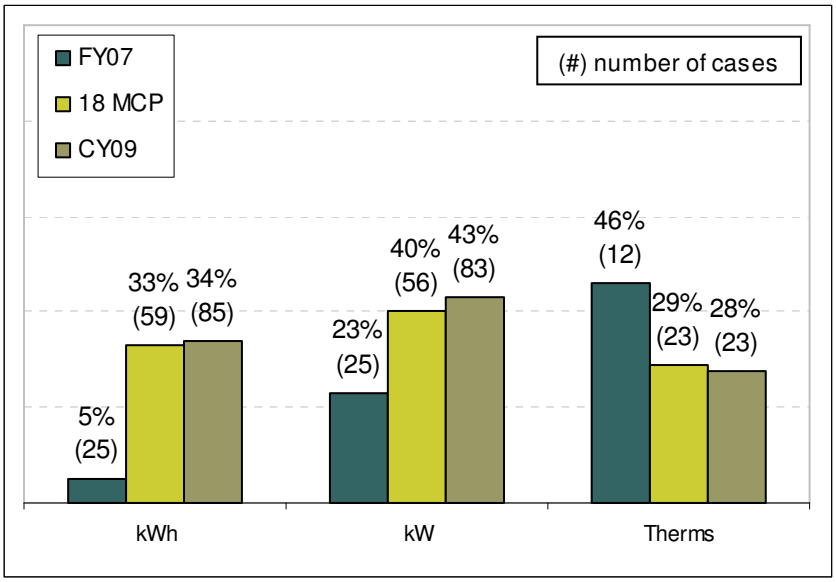


*Ratio not reported to protect respondent confidentiality.

D. REALIZATION RATE

The realization rates combine the effect of the gross savings adjustment factors and the attribution factors. The CY09 factors are based on a sample of projects completed between January 1 and September 30, 2009. CY09 Realization rates for the program overall are 34 percent, 43 percent, and 28 percent for kWh, kW, and therms, respectively, as shown in Figure 5-4. Realization rates for electric measures increased slightly in CY09 compared to the 18 MCP and therm measures decreased slightly in CY09 compared to the 18 MCP, as shown in Figure 5-4.

Figure 5-4. Final Realization Rates
FY07, 18 MCP, and CY09



Realization rates vary by technology. The reasons for realization rates below 100 percent vary by technology. Solar electric has the highest realization rate, roughly equal to the attribution, because verified gross savings are close to the energy and demand savings. Biomass and biogas have low realization rates mostly due to low attribution rates. Wind has mid-range realization rates due to the combined effects of verified gross adjustment (~ 68 percent) and attribution (78 percent). Solar hot water (SHW) has low realization on kWh and kW for two reasons. First, there is low attribution for SHW projects offsetting electricity. Second, there is high attribution for SHW projects offsetting therms that have parasitic electric loads. Solar hot water realization rates for therms are mid-range, due mostly to attribution.

Table 5-5. Realization Rates by Technology
CY09

	kWh				kW				Therms			
			Margin of Error (90% confidence)				Margin of Error (90% confidence)				Margin of Error (90% confidence)	
Technology	n[a]	CY09	CY09	Extra-polated	n[a]	CY09	CY09	Extra-polated	n[a]	CY09	CY09	Extra-polated
Overall Renew	**85**	**34%**	**± 0.7%**	**± 29.9%**	**83**	**43%**	**± 1.9%**	**± 28.2%**	**23**	**28%**	**± 0.1%**	**± 1.0%**
Biogas	6	30%	± 0.0%	± 31.7%	6	33%	± 0.0%	± 34.4%	1	[b] %	± 0.0%	± 0.0%
Biomass	2	[b] %	± 0.0%	± 82.6%	1	[b] %	± 0.0%	± 0.0%	6	28%	± 0.0%	± 0.6%
Solar Electric	40	80%	± 8.4%	± 10.4%	40	76%	± 8.5%	± 10.6%				
Solar Hot Water	22	17%	± 22.2%	± 24.5%	22	16%	± 22.4%	± 24.8%	16	64%	± 11.9%	± 16.2%
Wind	14	52%	± 3.5%	± 10.2%	14	54%	± 3.6%	± 10.8%				

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

[b] Ratio not reported to protect respondent confidentiality.

Table 5-6 below reports the overall final adjustment factors for CY09. The evaluation team calculated the final adjustment factors for each technology based on a sample of projects completed in the first nine months of CY09 (January 1–September 30, 2009). We weighted the calculation of the technology and overall program factors by the size of the project, so projects (and technologies) that account for a large amount of savings count more than projects that have small savings.[136] Finally, we applied the resulting net adjustment factors to all projects completed in CY09. These adjustments resulted in the final net energy impacts of the Focus Renewable Energy Program for CY09.

Table 5-6. Final Net Adjustment Factors for CY09

Adjustment Factor	kWh				kW				Therms			
			Margin of Error (90% confidence)				Margin of Error (90% confidence)				Margin of Error (90% confidence)	
	n[a]	Estimate	CY09	Extra-polated	n[a]	Estimate	CY09	Extra-polated	n[a]	Estimate	CY09	Extra-polated
Installation Rate	86	100%	± 0.0%	± 0.0%	85	100%	± 0.0%	± 0.0%	23	100%	± 0.0%	± 0.0%
Engineering Verification Factor	85	84%	± 0.2%	± 16.6%	83	101%	± 0.5%	± 12.8%	23	109%	± 0.0%	± 0.3%
Gross Savings Adjustment Factor	85	84%	± 0.2%	± 16.6%	83	101%	± 0.5%	± 12.8%	23	109%	± 0.0%	± 0.3%
Attribution Factor	87	40%	± 0.8%	± 34.9%	85	43%	± 1.9%	± 27.5%	23	25%	± 0.0%	± 0.9%
Realization Rate	85	34%	± 0.7%	± 30.0%	83	43%	± 1.9%	± 28.3%	23	28%	± 0.1%	± 1.0%

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

For all energy types, the installation rate was 100 percent. The engineering verification factor was significantly higher than in previous years for overall electrical measures, and remained close to 100 percent for therm measures. Free-ridership rates for Wind and Solar projects are generally low; however, free ridership on large projects, primarily biomass and biogas, remain high. Free-ridership is estimated at 59 percent for kWh (energy), 56 percent for kW (demand), and 75 percent for therms. That is, the analysis indicates that 59 percent of the electric energy savings, 56 percent of the demand savings, and 75 percent of the therm savings would have occurred without the program.

5.4.4 Recommendations

We recommend that the program consider requiring calculation and documentation of all parasitic loads in the application form. We also recommend taking into consideration parasitic load when determining whether to fund a project. The program may want to consider the

[136] For a more complete description of the data collection methodology and analysis algorithms refer to Bobbi Tannenbaum and Ryan Barry, KEMA Consulting and Adam Serchuk, Serchuk and Associates. *Renewable Energy Program: Spring 2004 Impact and Linkage Evaluation*. July 19, 2004.

overall impacts of a project (not just addressing a single fuel) so that parasitic loads for biomass projects do not create substantial electric loads.

Finally, we also recommend that the program institute a calculation review process prior to approval of large biogas and biomass projects.[137] The program should institute an internal calculation review process for all projects above a certain pre-determined limit. A second set of eyes should eliminate most calculation errors, as well as missing documentation and parasitic load calculations. More accurate production estimates will improve program realization rates.

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

5.4.5 Estimated energy impacts (January 1–December 31, 2009)

We estimated CY09 evaluation-verified gross and net energy impacts by applying the final technology specific CY09 adjustment factors to the CY09 (January 1 to December 31, 2009) program-reported gross energy savings. Table 5-3 shows the final CY09 impacts and the impacts for the previous program years.

For all years in the table prior to the 18 MCP, evaluation-verified gross is the product of the overall program-reported gross savings and the overall program gross savings adjustment factor. Similarly, evaluation-verified net savings is the product of the overall program-reported gross savings and the overall realization rate. We do this for each of the three energy units (kWh, kW, and therms). In the case of the 18 MCP and CY09 energy savings, we apply the adjustment factors at the technology level and sum the resulting savings to calculate the overall program savings. Applying the ratios at the technology level provides results that are more accurate. We report the overall factors in Table 5-5.

Net program savings as verified by evaluation are shown in the following table along with the program goals and percentage of goal achieved. Savings shown are January 1 through December 31, 2009, the entirety of CY09.

[137] In response to a draft version of the CY09 impact report, Focus staff indicates that this will be a part of the process for nonresidential projects, due to the integration of renewable energy projects into Business Programs.

Table 5-7. Net Renewable Program Savings versus Renewable Program Portfolio Targets CY09 (January 1–December 31, 2009)

Program	kWh			kW			Therms		
	Target	Net	Percent of 2009 Target	Target	Net	Percent of 2009 Target	Target	Net	Percent of 2009 Target
Biogas	7,408,464	5,252,346	71%	914	617	68%	273,750	1,929	1%
Biomass	0	-209,469	0%	0	-25	0%	955,500	1,364,630	143%
Solar Electric	576,923	1,781,193	309%	226	640	283%	0	0	0%
Solar Water Heating	54,000	20,692	38%	12	2	17%	17,360	30,653	177%
Wind	131,479	339,661	258%	15	39	260%	0	0	0%
Total Renewables Programs	**8,170,866**	**7,184,424**	**88%**	**1,167**	**1,275**	**109%**	**1,246,610**	**1,397,212**	**112%**

5.5 BIOGAS SUPPLY-SIDE STUDY

The Focus Renewable Energy program supports biogas project development in Wisconsin through financial incentives, networking, education, and informational resources to dairy farmers. Biogas energy and demand savings represent the single largest proportion of Renewable Energy program kW and kWh savings. The Program posits that Wisconsin has more biogas activity than any other comparable state and that this is due to the program.

Historically, biogas systems have had low (consistently lower than 50 percent) self-reported attribution rates. The program may have had market effects not recognized by participants, that a market-based research approach would identify. This study seeks to identify those program impacts that may have an effect on a farmer's adoption of biogas digesters, but that the farmers themselves may not recognize. We conducted the study in two phases:

- Phase 1: The evaluation team established metrics for measuring biogas activity to determine if Wisconsin has more biogas activity than other states. We also identified Minnesota and Pennsylvania as complementary states for comparative analysis of the factors, programmatic and otherwise, affecting biogas activity.
- Phase 2: The evaluation team conducted qualitative research to determine the factors that defined market activities in Wisconsin, Pennsylvania, and Minnesota and to assess whether it is reasonable to conclude that the Focus on Energy Renewable Program contributed to biogas activity in Wisconsin beyond what self-reports of direct impacts capture.

5.5.1 Phase 1

In Phase 1, we established metrics that demonstrate Wisconsin has higher levels of biogas activity than other leading dairy states.

Among leading dairy states, Wisconsin has the highest number of biogas digesters installed. Wisconsin differs from some other top dairy states in that it has small farms. To draw accurate conclusions about overall biogas activity across the states we established evaluation metrics that adjust for differing herd (farm) sizes for comparison across the various dairy states.

Among other leading dairy states, Minnesota and Idaho have very little biogas activity. California contains large farms making relatively small investments in biogas. New York and

Pennsylvania have similar farm sizes to Wisconsin, but less overall capacity and fewer installations than Wisconsin, respectively. Thus, using balanced accounting for both how many farms have digesters and installed capacity, we determined that Wisconsin has a higher level of biogas activity than other states.

Next, we identified Minnesota and Pennsylvania as comparison states for Phase 2 of this study. Both Minnesota and Pennsylvania have farm sizes comparable to Wisconsin. They do differ from Wisconsin (and each other) on key farm characteristics, program activity, and biogas adoption. The combination of the two states in comparison to Wisconsin provides a natural quasi-experimental qualitative comparison from which to draw conclusions about Focus program impacts in Wisconsin.

5.5.2 Phase 2

KEMA conducted qualitative research in Phase 2 based on nineteen in-depth interviews with individuals from a wide-array of viewpoints and expertise. Interview topics focused on drivers for digester implementation, risks and barriers of implementation, and the effects of different utility policies, and state programs on biogas adoption. KEMA designed the questions to provide a complete picture of the biogas market in Wisconsin and the two comparison states. We also completed additional secondary research to determine the status of interconnection standards, buy back rates and other factors that may increase or hinder the adoption of on-farm biogas systems. The responses provided the evaluation team with a basis on which to determine whether Focus on Energy was contributing to biogas adoption in the state of Wisconsin.

We identified financial and non-financial drivers for the adoption of on farm biogas systems. In general, these drivers varied little across regions or states. Among financial drivers, producing electricity allows farmers to receive ancillary revenue and electricity sales provide a cash flow stream that can be important for cash strapped farms. That revenue stream is dependent on buy-back rates. Digesters also output digested solids that farmers use for cow bedding, which can reduce bedding costs or provide revenue when sold off farm. Farmers need the marginal revenue from electricity and digester bedding to make the investment financially viable.

A large majority of respondents identified odor control as a top motivator. Farmers increasingly recognize digesters as a tool to mitigate community pressure and improve relations with neighbors. Manure management is a secondary driver to odor control.

Financial and non-financial barriers also affect the decision to install digesters. Digester systems are capital intensive. Respondents generally cited construction costs of between $1 and $5 million. Gaining access to capital for an expenditure of this magnitude is difficult in private capital markets, especially since lending agencies may view digesters as an uncertain investment. Many respondents point to public financing of biogas digester systems as helping to reduce the front-end costs and providing legitimacy to the project, which in turn provides access to private financing. Without funding, capital requirements are often too high and buy-back rates too low to pay back the investment in a suitable amount of time, generally seven to ten years.

Connecting an anaerobic digester system to the grid involves a number of challenges, including utilities that charge high fees for interconnection or offer unfavorable buy-back rates. Some respondents identify low buy-back rates as one of the most important barriers to

digester implementation. Lower interconnection costs reduce the upfront burden, while buy-back rates improve cash flow.

Myriad non-financial barriers also drive project decisions. These include steep learning curves to learn sophisticated operating techniques, technical challenges, maintenance, and market confusion.

5.5.3 Conclusions

The Focus on Energy program differs from the programs in the two comparison states in two key ways. First, Focus on Energy is a consistently funded program that has continuously provided incentives and services for a decade. This consistency increases awareness, knowledge, and acceptance of biogas digesters as a viable on-farm option. The consistency of grants to farmers provides certainty in the marketplace. Minnesota, with its inconsistent program, provides a contrast.

The program's expansiveness—going beyond financial incentives to offer technical assistance, market development, outreach, and case studies appear to be important to the development of the biogas market in Wisconsin. Through this outreach, Focus leveraged federal grant money to make a number of digester projects economically viable. Focus assisted some farmers in completing USDA applications. Focus' grants, providing incentives for feasibility studies, as well as providing technical information on digester engineering, operation, and maintenance, helped mature the marketplace.

The education, outreach, and market development activities are likely program impacts on participants not recognized by respondents when self-reporting attribution. Information about dairy biogas digesters is ubiquitous in Wisconsin at forums for farmers. Wisconsin farmers may take this for granted and not give Focus credit for it in their responses to survey questions.

Favorable buy back rates are also key to the adoption of biogas systems. They have a long-term impact on the economic viability of the project. Standard interconnection agreements regularize the process and provide farmers the certainty needed for the large capital expense of the digester. Wisconsin has both reasonable buy back rates and standard interconnection rules and costs. Focus on Energy promoted these efforts. We have not identified a link between their activities and changes in Wisconsin buyback rates or interconnection standards.

The Focus on Energy biogas program has received some attribution based on participant and vendor self-reports that address the direct effect on participants. However, we conclude that Focus on Energy has likely had impacts on the Wisconsin biogas market not reflected in participant self-reports of program attribution. This qualitative study does not provide sufficient data with which to make a quantitative based assessment of these effects. We recommended that the PSCW provide some additional credit for these market effects.

At a minimum:

- Focus education and outreach (including case studies) have increased the awareness, knowledge, and comfort with biogas technology in Wisconsin. Each of the individual activities may appear non-consequential to a program participant, but

the ubiquitousness of biogas information for Wisconsin farmers is likely to increase the adoption of biogas digesters on Wisconsin farms.

- Focus incentives have legitimized the projects that received Focus-only funding[138] and likely increased the probability or the speed with which farmers received financing.

These market effects are unlikely to be recognized by participants (or vendor) self-reports of attribution, but indirectly affect a participant's decision to install a biogas digester.

[138] The direct impacts of the incentive on the participant's decision to install are reflected in the self-reported attribution. Vendor surveys capture the market development activities.

APPENDIX A: GEOGRAPHIC DISTRIBUTION OF DIRECT ENERGY IMPACTS

This appendix presents the geographic distribution of direct energy impacts. Also note that information on participant avoided costs, used to value the energy savings in these maps, may be found in Table A-17.

A.1 INTRODUCTION

The following appendix sections provide tables and maps that show annual energy savings achieved through resource acquisition activities of Focus on Energy programs. This version of the report does not provide observations, comments, or analysis of the data—which is largely the domain of the respective program evaluation leads. It is expected that evaluation team leads may integrate some of this information in the relevant evaluation reports and make the relevant analysis integrating it with other evaluation results and analysis.

Note: A change in the type of energy impacts data used for the maps. The data reported in all of the maps in this report are *lifecycle verified gross* energy impacts—a recently introduced (for Focus) type of reported energy impacts. As in the past, these are impact estimates based on evaluation work done to establish verified gross for specific programs and/or program areas. However, as discussed in Section 1.1, *lifecycle verified gross* is defined as:

> Energy savings, expressed as *verified gross*, that explicitly incorporate measure life.

The reader should be aware of this shift since it has the effect of diminishing the levels of reported savings (compared to verified gross savings). This is because verified gross savings do not consider the lifecycle effects (i.e., the median operating life of energy efficiency measures, such as CFLs) that may cause energy savings to end.

In order to provide some continuity in this transition in the basis for the mapped energy impacts, the tables that accompany the maps include a column for verified gross impacts—as in past reports—though these are *lifecycle* verified gross impacts, and will therefore show some differences from past reports. Additional discussion of lifecycle and persistent savings is provided above in Section 2.1.

Normalizing data for the maps. As in the past, the maps that represent impacts by "*County*" and *"Utility Territory*" have been normalized, while the maps that represent impacts by *"Senate District*" and "*Assembly District*" show total energy impacts. The primary reason the Senate District and Assembly District data has not been normalized is because of difficulty in estimating the number of eligible participants in those regions due to issues with the nonparticipating utility territories. Some options are being considered for establishing those estimates for use in future reports.

For the county maps, an effort was made to estimate the number of eligible participants (excluding the relevant customers of nonparticipating utilities). For the utility maps, this was not an issue—since by definition their customers are eligible to participate in the program, therefore the number of customers reported by the utilities was used. Although, it should be noted there are likely some differences in the definition of rate classes from utility to utility that may cause anomalies in the *"per capita"* values. This will be most notable in the Industrial Sector. There are some differences in the numbers of eligible customers using these two

methods. These differences are primarily due to the definition of a *"customer,"* since the utilities define customers by *service addresses or meters*; the method used for the county maps defined eligible customers as *households* (using U.S. Census data) for the residential segment *and business addresses* for the business segment (using Dun & Bradstreet data).

The maps are based on the "Dollars Saved per Customer" column in the tables for the county and utility territory maps. This represents the annuals dollars in energy bill savings realized by program participants divided by the total number of customers in the county or utility territory. The senate and assembly district maps present the information shown in the "Annual Dollars Saved" column of the tables. This represents the annual dollars in energy bill savings realized by program participants. The energy bill savings are calculated using the average retail price of energy for the state of Wisconsin for each rate class (commercial, industrial, and residential). Comparisons cannot be made between maps, because both the definition of per capita and energy savings scales vary by program.

A.2 BUSINESS PROGRAMS

This section presents tables and maps that show energy savings achieved through participation in Focus on Energy Business Programs. These impacts are broken out for the Commercial and Industrial sectors.

Note: A change in the type of energy impacts data used for the Business Programs maps. As explained in the Introduction to this Appendix (above), the data reported in all of the maps in this report are *lifecycle verified gross* energy impacts—a recently introduced (for Focus) type of reported energy impacts. As in the past, these are impact estimates based on evaluation work done to establish verified gross for specific programs and/or program areas. However, as discussed in Section 1.1, *lifecycle verified gross* is defined as:

> Energy savings, expressed as *verified gross*, that explicitly incorporate measure life.

The reader should be aware of this shift since it has the effect of diminishing the levels of reported savings (compared to verified gross savings). This is because verified gross savings do not consider the lifecycle effects (i.e., the median operating life of energy efficiency measures, such as CFLs) that may cause energy savings to end.

In order to provide some continuity in this transition in the basis for the mapped energy impacts, the tables that accompany the maps include a column for verified gross impacts—as in past reports—though these are *lifecycle* verified gross impacts, and will therefore show some differences from past reports. Additional discussion of lifecycle and persistent savings is provided above in Section 2.1.

The *"Number of Customers"* presented for each of the counties in Table A-1 ("eligible participants") and Table A-5 are based on the number of customers in industries targeted by the program administrator in the respective programs who are in participating utility territories in that county. The number businesses in participating utility territories in each county were estimated by determining the proportion of businesses in the State of Wisconsin Department of Workforce Development Standard Name and Address Program (SNAP) covered by Wisconsin's Unemployment Insurance Law. It was determined, based on geographic location, whether each business was in a utility territory of a utility participating in the Focus on Energy program. Then for each industry (at the two-digit SIC level) in each county, the proportion of the businesses that were in a participating utility territory was determined. Because the SNAP

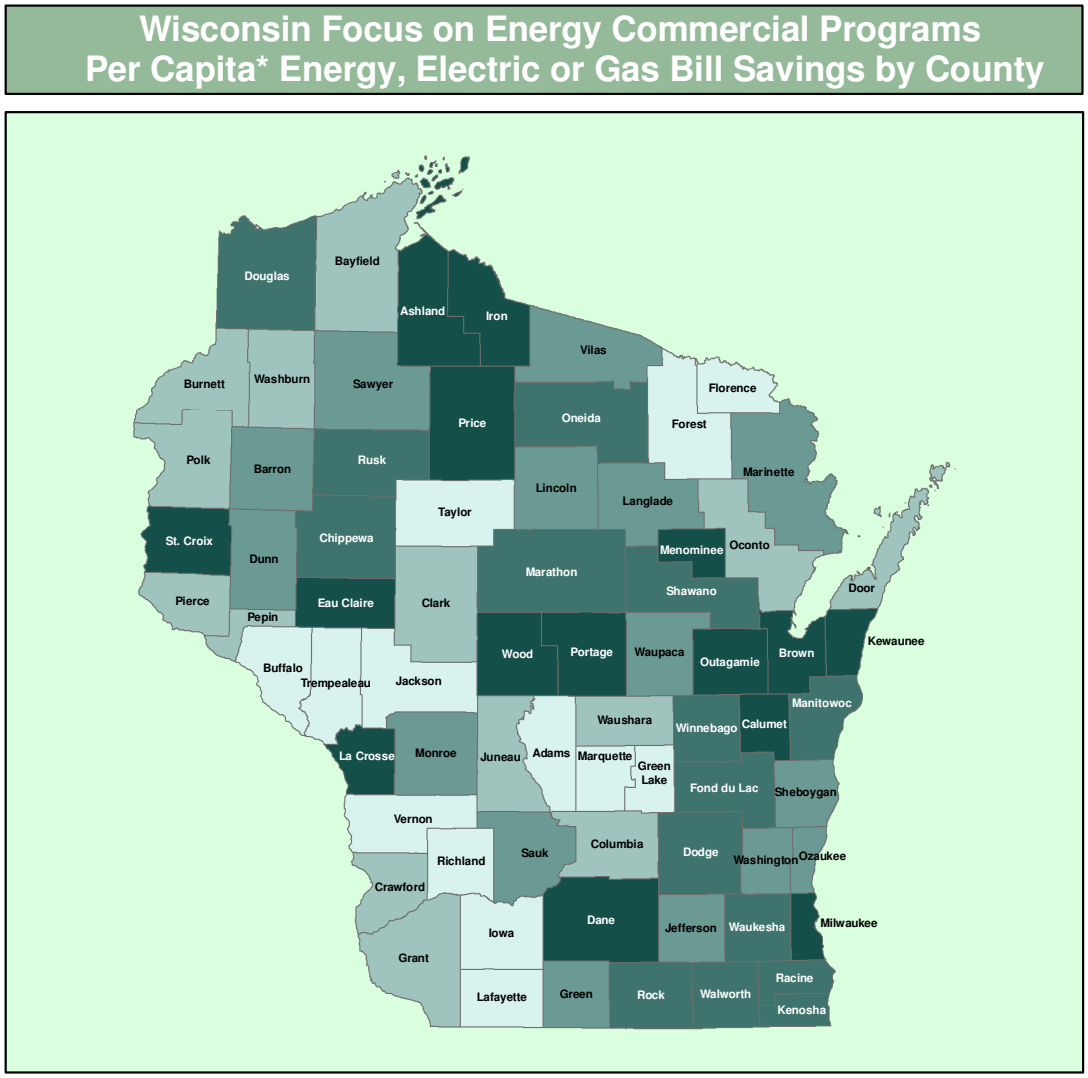
database is not fully representative of all of the businesses in the state, this ratio was applied to the number of businesses in that industry in that county reported by Dun and Bradstreet.

An analysis of the industries of the businesses that have had energy savings potential identified by the program administrator was conducted to determine which of the industries were being targeted by the program administrator. This analysis resulted in the identification of 23 of the 82 two-digit SIC codes as being targeted by the industrial programs and 28 of the 82 two-digit SIC codes as being targeted by the commercial programs, with eight industries (as identified by the two-digit SIC code) being targeted by both the industrial and commercial programs. The 23 codes identified as being targeted by the industrial programs account for about 33 percent of Wisconsin businesses, while the 28 codes identified as being targeted by the commercial programs account for about 79 percent of Wisconsin businesses.

The *"Number of Customers"* presented for each of the participating utilities in Table A-4 and Table A-9 are based on the number of customers reported by the utilities in 2005 and 2006, respectively.

A.2.1 Commercial Programs

Figure A-1.
Commercial Programs
Per Capita Energy, Electric or Gas Bill Savings by County
(July 1, 2001–December 31, 2009)



The map above portrays the annual energy, electric or gas bill savings realized in 2009 from projects implemented in commercial sector businesses from July 1, 2001, through December 31, 2009. Electric and gas savings have been valued at the average cost of gas and electricity for commercial businesses in Wisconsin and summed for all projects within each county and divided by the number of eligible commercial businesses in that county.

* The unit of population is commercial customers in industries targeted by the agricultural and commercial business programs in participating utility territories.

Map Produced by: PA Consulting Group and Patrick Engineering Inc.
of The Focus on Energy Evaluation Team. April, 2010.

Table A-1. Commercial Program Energy Impacts
(by County)
(July 1, 2001–December 31, 2009)

County	Eligible Participants	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
Adams	786	$203	1,260,379	283	38,248	648,696	135	15,677
Ashland	655	$1,502	4,646,073	1,197	495,878	2,543,587	635	164,886
Barron	2,729	$383	4,873,864	1,052	532,757	2,710,209	543	292,710
Bayfield	877	$235	1,440,873	402	64,721	768,968	210	24,537
Brown	5,546	$2,478	52,444,856	14,866	7,968,375	31,763,737	8,116	2,531,498
Buffalo	1,799	$78	662,481	168	70,959	368,967	89	30,445
Burnett	971	$238	1,345,513	199	95,199	770,014	118	39,729
Calumet	1,407	$1,162	15,686,604	2,840	161,162	4,825,479	1,047	58,126
Chippewa	2,910	$610	10,750,891	2,286	698,194	6,366,206	1,275	308,464
Clark	3,053	$298	5,792,080	1,398	335,187	3,166,224	763	148,102
Columbia	3,088	$329	5,985,185	1,454	412,937	3,511,160	742	178,940
Crawford	2,104	$308	6,010,091	1,039	80,231	2,509,873	516	43,155
Dane	13,486	$1,013	105,222,640	22,900	3,494,908	53,458,407	11,823	1,433,985
Dodge	3,677	$588	15,950,367	3,515	611,494	8,272,791	1,746	221,476
Door	2,043	$346	6,330,571	1,749	107,403	3,706,250	1,001	43,458
Douglas	1,245	$755	4,855,061	1,425	439,501	2,616,543	756	186,812
Dunn	2,913	$364	6,451,146	1,557	414,820	3,760,897	885	169,449
Eau Claire	3,350	$937	21,354,635	6,126	1,037,669	12,480,395	3,188	449,816
Florence	241	$37	81,620	13	1,108	36,833	6	554
Fond du Lac	3,749	$731	22,566,215	4,581	581,358	9,337,283	2,026	209,791
Forest	441	$186	683,727	146	16,830	395,795	84	6,084
Grant	4,449	$292	5,227,054	1,438	730,225	2,885,046	726	310,413
Green	2,599	$373	8,198,581	1,973	188,249	4,468,388	1,022	72,814
Green Lake	2,599	$110	2,051,561	494	86,387	1,123,106	265	35,074
Iowa	2,945	$151	3,817,425	808	80,171	2,048,133	412	30,513
Iron	239	$3,414	591,520	191	683,258	542,557	110	207,077
Jackson	1,530	$173	1,040,707	309	150,297	566,641	167	58,382
Jefferson	3,174	$411	8,093,429	2,139	495,585	4,480,320	1,068	181,291
Juneau	1,432	$304	2,577,145	558	175,488	1,531,425	279	66,279
Kenosha	2,766	$789	17,440,475	4,082	507,189	10,719,614	2,307	190,029
Kewaunee	1,518	$950	10,815,934	2,084	394,033	5,817,628	1,030	199,179
La Crosse	3,106	$851	19,718,174	6,058	729,530	11,307,785	3,201	264,655
Lafayette	1,919	$184	2,591,101	674	100,677	1,462,414	330	52,477
Langlade	1,010	$468	3,934,694	1,221	96,696	2,136,980	608	37,184
Lincoln	1,348	$418	3,249,284	842	235,052	1,866,842	458	82,020
Manitowoc	3,091	$777	15,752,015	3,460	842,453	8,466,758	1,767	354,053
Marathon	5,348	$614	21,986,769	5,600	1,114,530	12,747,396	2,993	370,831
Marinette	1,718	$368	4,851,936	1,249	163,311	2,627,869	656	69,988
Marquette	1,115	$151	732,508	150	90,255	372,580	79	30,745
Menominee	24	$2,716	476,575	112	18,813	255,692	69	6,359
Milwaukee	14,572	$1,039	106,030,855	25,504	4,755,549	59,778,920	12,976	1,929,690

County	Eligible Participants	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
Monroe	3,325	$414	6,556,082	1,539	689,611	4,129,394	905	374,871
Oconto	2,140	$284	5,522,462	1,340	84,951	2,119,160	600	35,827
Oneida	1,204	$622	4,898,725	1,247	264,165	2,705,927	651	101,991
Outagamie	5,027	$855	34,436,684	7,570	989,645	17,725,014	3,724	390,251
Ozaukee	2,601	$424	7,311,760	1,823	380,487	4,091,238	1,002	145,598
Pepin	814	$259	1,467,341	451	66,942	812,547	225	28,113
Pierce	2,631	$250	4,637,321	1,382	205,250	2,854,635	642	77,099
Polk	2,971	$262	5,469,619	1,341	244,334	2,757,389	652	101,410
Portage	2,438	$998	18,636,334	4,237	631,048	10,763,642	2,160	248,255
Price	1,088	$1,448	2,002,126	346	1,247,236	913,548	185	361,923
Racine	3,791	$526	15,472,159	2,913	499,548	8,674,637	1,476	205,069
Richland	2,406	$106	2,346,937	618	34,058	1,329,124	320	15,774
Rock	4,383	$636	18,224,157	4,696	983,356	9,588,705	2,384	433,009
Rusk	1,011	$641	4,986,918	1,224	166,468	2,800,578	675	58,761
Sauk	3,693	$472	13,351,878	3,340	451,747	7,349,889	1,741	168,681
Sawyer	775	$408	2,548,870	559	71,190	1,426,013	291	27,679
Shawano	2,450	$519	11,153,544	1,915	211,687	4,298,932	797	62,637
Sheboygan	3,129	$427	8,353,849	2,185	504,228	4,683,065	1,163	185,297
St. Croix	1,457	$866	6,018,991	1,430	630,668	3,619,655	820	224,079
Taylor	1,807	$174	2,005,334	471	115,659	1,100,851	239	50,126
Trempealeau	2,868	$102	1,710,487	549	120,933	1,002,117	284	47,404
Vernon	3,554	$94	2,679,196	745	77,625	1,407,565	363	31,015
Vilas	790	$375	2,397,804	694	66,108	1,384,273	352	31,124
Walworth	3,118	$524	12,913,436	3,539	389,622	7,081,392	1,864	170,207
Washburn	1,198	$240	1,633,881	270	121,890	850,453	153	39,683
Washington	3,257	$508	13,235,566	2,988	383,416	7,060,136	1,500	162,301
Waukesha	9,382	$600	46,107,495	11,293	1,212,423	27,340,211	6,100	509,714
Waupaca	2,633	$430	10,282,849	2,237	158,563	4,477,349	1,036	50,913
Waushara	1,219	$268	2,480,064	697	86,238	1,335,308	359	38,028
Winnebago	3,796	$779	23,064,660	6,092	734,709	12,904,711	3,213	303,502
Wood	2,656	$1,026	7,968,340	2,103	1,782,970	4,453,626	1,060	470,503
Not mapped*			46,306,965	12,158	70,219	30,560,935	8,298	20,490

* *Unknown County*: The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-2.
Commercial Programs
Implemented Energy, Electric or Gas Bill Savings by Senate District
(July 1, 2001–December 31, 2009)

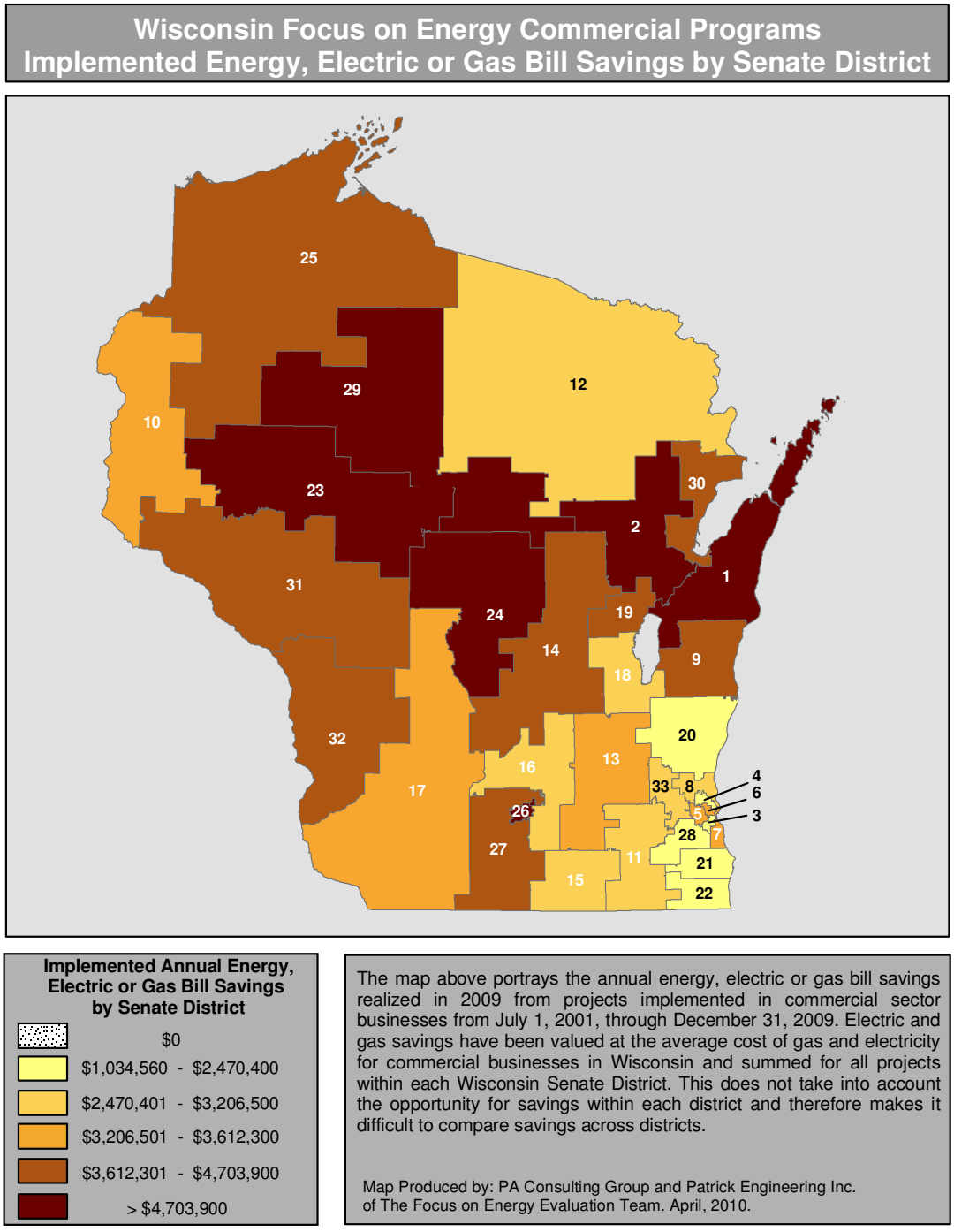


Table A-2. Commercial Program Energy Impacts
(by Senate District)
(July 1, 2001–December 31, 2009)

Senate District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
1	$4,836,003	41,551,754	9,449	879,713	22,289,373	4,815	399,562
2	$10,948,830	38,175,507	9,070	6,648,243	19,814,138	4,540	1,843,602
3	$1,907,276	12,006,127	2,871	711,946	7,618,988	1,559	274,877
4	$1,034,564	7,829,502	1,904	276,469	4,529,131	975	113,811
5	$3,497,803	21,131,922	4,925	1,379,498	11,802,195	2,575	526,392
6	$3,212,339	22,847,874	5,424	980,302	11,783,934	2,530	456,936
7	$3,550,167	28,979,766	7,098	772,751	16,840,552	3,706	313,902
8	$2,653,437	18,831,548	4,676	813,169	10,731,670	2,512	322,340
9	$4,703,843	36,015,230	6,859	1,222,289	13,915,458	2,944	486,132
10	$3,369,567	19,697,292	4,811	1,383,894	11,438,430	2,538	518,433
11	$2,933,487	22,606,019	6,192	750,134	13,082,465	3,318	324,998
12	$2,712,663	18,800,994	5,218	868,879	10,363,466	2,708	312,279
13	$3,422,822	24,832,895	5,524	1,003,886	13,440,907	2,824	368,150
14	$3,762,510	28,706,847	6,687	986,099	14,282,028	3,338	373,306
15	$2,982,055	19,931,172	5,187	1,016,555	10,503,912	2,602	447,621
16	$3,191,368	23,162,721	4,800	935,249	13,371,948	2,569	376,827
17	$3,304,685	20,399,342	5,105	1,267,168	11,366,740	2,584	523,178
18	$3,206,401	24,738,585	6,719	817,469	13,520,237	3,485	313,182
19	$4,204,692	31,304,057	6,844	1,166,674	17,260,755	3,562	469,807
20	$2,298,807	17,326,908	3,954	620,170	8,426,747	1,908	253,722
21	$1,649,988	13,816,584	2,413	330,170	7,709,189	1,228	133,475
22	$2,470,397	18,532,584	4,394	673,764	11,358,543	2,457	260,018
23	$5,357,974	33,581,658	8,361	2,012,205	19,451,430	4,463	890,746
24	$5,332,834	27,870,578	6,641	2,465,390	15,843,246	3,359	741,137
25	$4,480,704	19,794,959	4,923	2,373,188	10,986,778	2,607	930,522
26	$7,862,051	60,383,051	12,423	2,027,382	27,247,988	6,052	839,650
27	$3,998,207	31,882,564	8,102	933,128	18,481,268	4,428	375,974
28	$1,904,402	16,484,662	3,828	336,289	9,374,597	1,937	138,599
29	$5,391,510	28,078,405	6,997	2,500,749	16,111,008	3,777	776,681
30	$4,447,150	28,923,135	8,448	1,582,660	17,004,240	4,599	796,816
31	$3,612,239	21,383,839	5,803	1,461,238	12,457,122	3,123	689,060
32	$3,706,749	29,340,279	8,072	883,278	15,699,386	4,195	336,810
33	$2,587,869	20,590,564	5,235	607,778	11,786,284	2,768	240,958
Not mapped*	$4,978,501	50,215,525	13,182	285,907	32,932,275	8,872	108,579

* *Unknown District*: The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-3.
Commercial Programs
Implemented Energy, Electric or Gas Bill Savings by Assembly District
(July 1, 2001–December 31, 2009)

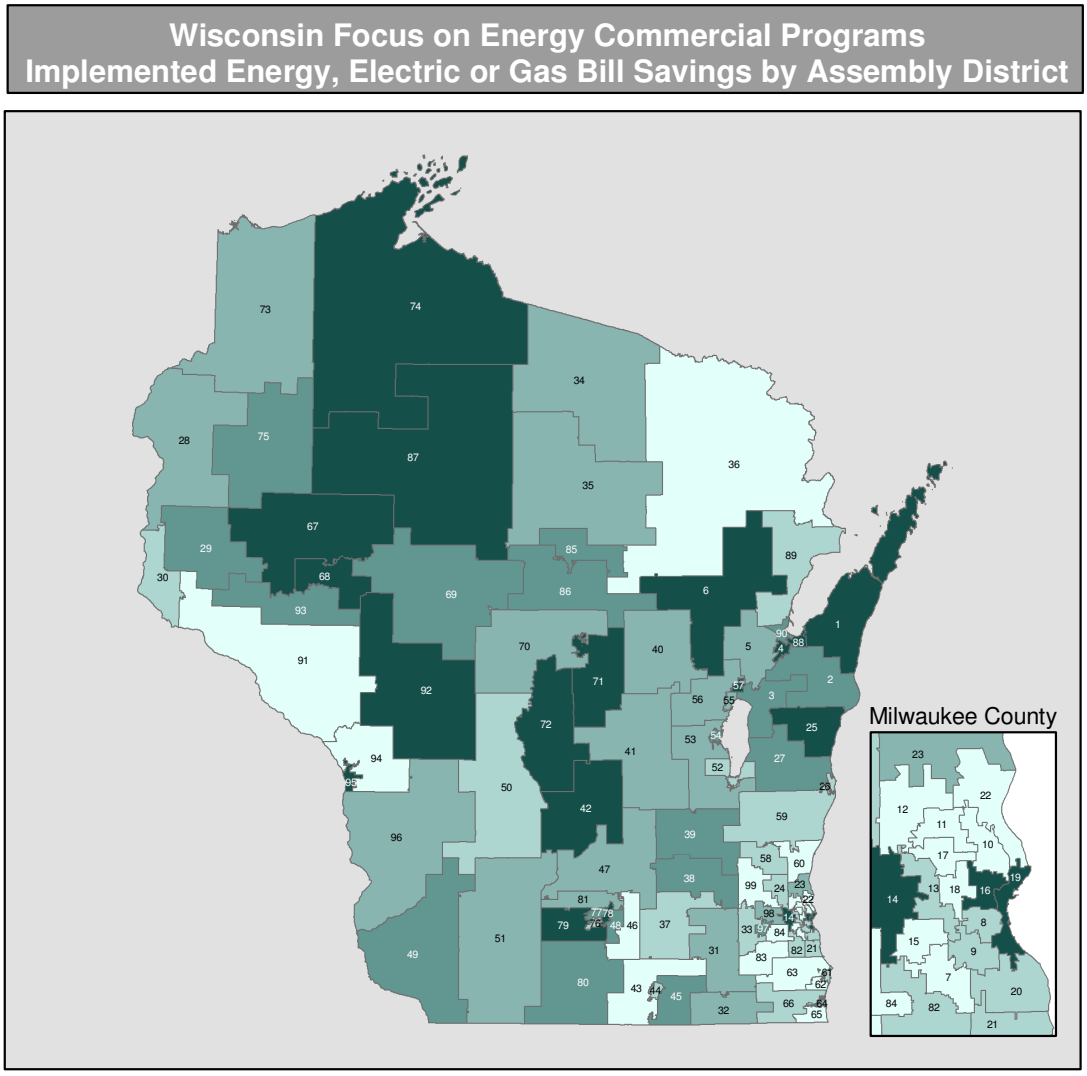


Table A-3. Commercial Program Energy Impacts
(by Assembly District)
(July 1, 2001–December 31, 2009)

Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
1	$1,866,749	17,053,211	3,818	255,127	9,373,242	2,022	94,262
2	$1,431,343	9,708,794	2,595	476,093	5,599,587	1,376	248,353
3	$1,537,910	14,789,749	3,037	148,494	7,316,545	1,417	56,947
4	$8,369,589	14,548,136	3,997	6,301,186	9,662,143	2,250	1,695,691
5	$1,026,225	8,675,536	2,390	198,505	4,659,983	1,202	87,473
6	$1,553,017	14,951,835	2,683	148,551	5,492,012	1,088	60,437
7	$196,220	1,260,195	324	71,161	672,069	178	31,492
8	$876,917	7,491,896	1,579	163,078	5,002,960	939	63,972
9	$834,140	3,254,036	967	477,707	1,943,959	442	179,413
10	$517,550	3,028,380	811	212,313	1,705,896	449	87,168
11	$172,138	1,678,242	337	14,719	909,775	187	5,727
12	$344,876	3,122,881	756	49,437	1,913,459	339	20,915
13	$859,622	4,104,906	1,066	429,700	2,180,407	572	159,764
14	$1,956,984	14,478,922	3,133	550,575	8,197,570	1,658	213,000
15	$681,197	2,548,095	726	399,223	1,424,218	345	153,628
16	$2,438,665	18,697,595	4,433	631,533	9,780,816	2,040	300,170
17	$481,763	3,292,799	754	158,160	1,556,627	367	67,149
18	$291,912	857,480	238	190,608	446,491	123	89,617
19	$1,877,773	16,129,730	4,268	341,951	9,318,618	2,203	140,672
20	$877,332	6,419,466	1,624	252,787	3,653,296	841	96,044
21	$795,062	6,430,570	1,205	178,012	3,868,639	661	77,185
22	$691,798	3,430,554	921	335,227	1,953,523	508	117,033
23	$1,000,584	7,544,155	2,017	269,736	4,079,682	1,037	114,480
24	$961,056	7,856,839	1,738	208,206	4,698,465	967	90,827
25	$2,777,135	21,369,451	3,872	712,792	7,638,763	1,565	298,173
26	$752,139	4,433,589	1,069	305,837	2,472,031	593	106,643
27	$1,174,569	10,212,191	1,917	203,661	3,804,664	786	81,315
28	$992,021	6,790,158	1,604	324,860	3,508,349	803	131,688
29	$1,438,857	6,104,578	1,338	783,081	3,723,730	793	278,864
30	$938,689	6,802,556	1,869	275,953	4,206,351	942	107,880
31	$980,197	7,361,920	1,949	266,616	4,390,038	1,031	105,989
32	$1,092,623	9,434,926	2,563	194,849	5,248,899	1,409	90,464
33	$860,668	5,809,174	1,680	288,668	3,443,528	879	128,546
34	$1,025,634	7,144,328	1,903	325,530	4,006,354	983	131,839
35	$1,063,776	7,375,676	2,126	340,496	4,062,401	1,088	121,961
36	$623,076	4,279,079	1,188	202,853	2,293,560	637	58,480
37	$868,308	5,266,720	1,360	340,715	2,847,775	702	123,481
38	$1,207,922	9,617,108	1,582	283,173	5,083,488	790	116,793
39	$1,346,592	9,949,068	2,582	379,999	5,509,645	1,332	127,876
40	$1,134,326	10,361,218	2,287	155,121	4,574,881	1,059	50,471
41	$1,006,164	6,825,470	1,575	334,614	3,302,443	791	121,492
42	$1,622,020	11,520,159	2,825	496,364	6,404,705	1,489	201,343

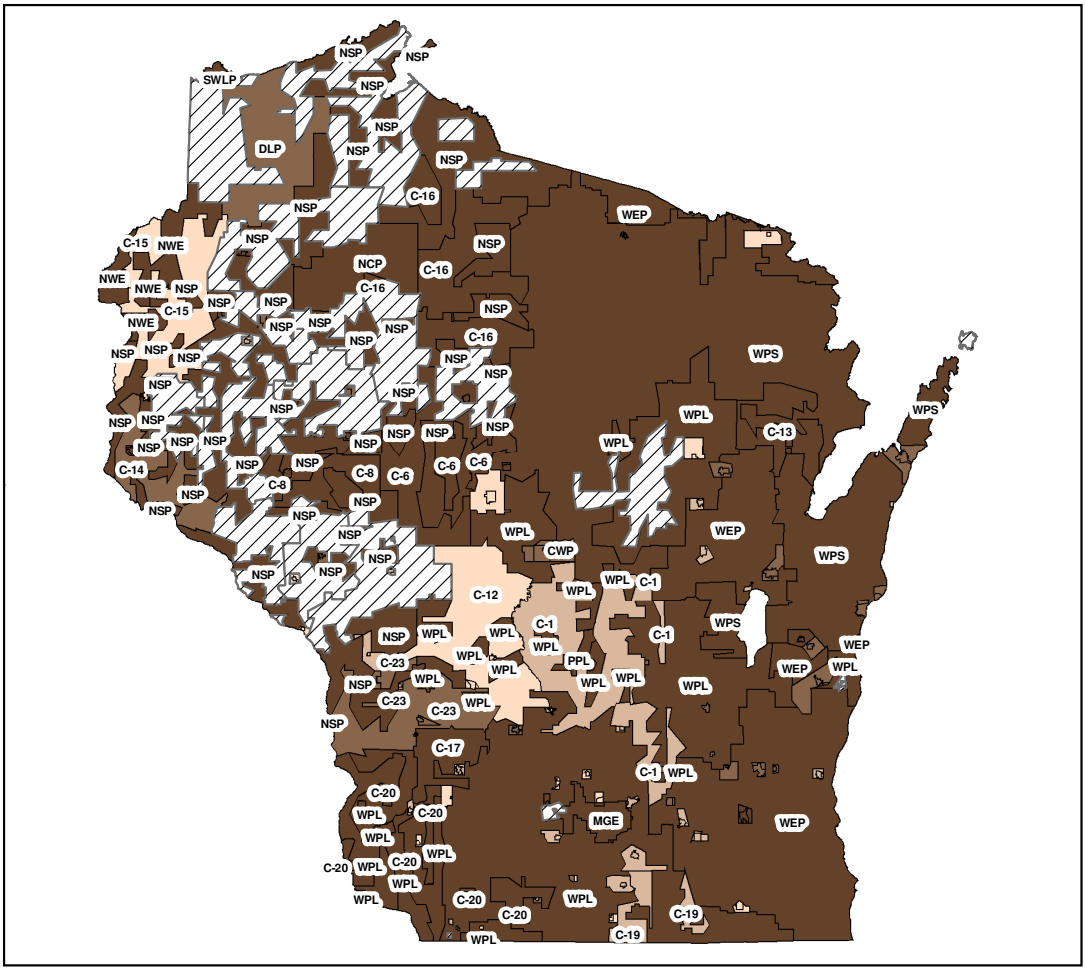
Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
43	$648,805	5,290,849	1,553	141,665	2,890,032	755	57,026
44	$782,390	5,630,240	1,490	233,307	2,890,187	742	90,729
45	$1,550,859	9,010,083	2,143	641,583	4,723,693	1,105	299,865
46	$628,562	3,726,367	1,069	253,820	2,073,470	557	111,350
47	$1,079,699	8,010,372	1,814	301,918	4,617,304	928	131,096
48	$1,483,106	11,425,982	1,917	379,511	6,681,174	1,085	134,381
49	$1,385,490	6,103,916	1,630	735,230	3,352,732	820	312,335
50	$831,756	5,454,812	1,431	292,235	3,172,990	730	104,803
51	$1,087,438	8,840,613	2,044	239,703	4,841,018	1,034	106,039
52	$932,222	6,945,351	1,928	258,253	4,021,507	995	97,683
53	$1,087,278	8,950,517	1,846	230,404	4,603,089	917	87,361
54	$1,186,900	8,842,717	2,944	328,812	4,895,641	1,573	128,138
55	$1,124,836	8,018,197	1,663	341,784	4,742,436	910	144,295
56	$1,095,865	10,549,065	2,142	104,948	5,755,976	1,148	40,536
57	$1,983,990	12,736,795	3,039	719,942	6,762,343	1,505	284,976
58	$857,670	6,355,245	1,501	240,488	3,493,606	731	105,206
59	$786,018	7,192,275	1,520	106,440	2,821,820	658	45,186
60	$655,118	3,779,388	933	273,242	2,111,321	518	103,330
61	$773,603	7,728,833	926	50,599	4,113,198	467	22,723
62	$576,382	3,598,527	860	217,629	2,189,935	447	82,115
63	$300,004	2,489,224	627	61,943	1,406,056	314	28,638
64	$1,114,220	8,452,189	1,860	296,101	5,137,607	1,033	114,760
65	$664,092	5,899,472	1,320	104,687	3,669,565	780	39,818
66	$692,085	4,180,923	1,213	272,976	2,551,370	645	105,440
67	$1,582,976	9,408,824	2,212	637,197	5,526,781	1,210	265,918
68	$2,235,001	14,684,840	4,010	782,988	8,861,458	2,123	366,739
69	$1,540,093	9,489,033	2,140	592,020	5,064,064	1,130	258,089
70	$1,114,443	6,549,951	1,920	454,765	3,578,375	957	174,663
71	$2,260,626	16,834,884	3,846	626,884	9,810,164	1,948	250,265
72	$1,957,765	4,485,744	875	1,383,741	2,454,706	454	316,208
73	$1,004,337	5,122,505	1,479	474,838	2,767,053	787	195,823
74	$2,266,838	8,640,916	2,238	1,315,046	4,920,584	1,184	424,179
75	$1,209,528	6,031,539	1,205	583,305	3,299,142	636	310,519
76	$848,261	6,134,370	1,171	250,441	3,536,537	632	91,199
77	$1,447,724	7,821,493	1,939	648,016	3,993,297	983	292,094
78	$5,566,065	46,427,187	9,313	1,128,925	19,718,154	4,437	456,357
79	$1,624,274	13,044,188	3,208	371,431	7,894,537	1,873	143,653
80	$1,227,721	10,368,339	2,576	238,365	5,684,809	1,339	93,461
81	$1,146,212	8,470,037	2,319	323,332	4,901,921	1,217	138,860
82	$872,818	7,436,199	1,723	164,038	4,062,517	848	64,513
83	$500,581	4,137,069	943	104,723	2,370,313	479	46,056
84	$531,003	4,911,394	1,162	67,528	2,941,767	610	28,029
85	$1,381,250	10,625,199	2,741	354,786	6,421,445	1,450	131,482
86	$1,418,313	7,881,695	2,090	616,599	4,557,658	1,168	174,389
87	$2,592,028	9,572,383	2,166	1,529,363	5,132,183	1,159	470,810
88	$2,382,670	12,262,913	4,145	1,117,300	7,127,936	2,260	607,594

Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
89	$769,270	5,161,473	1,562	260,579	2,770,127	803	107,365
90	$1,295,209	11,498,750	2,741	204,781	7,106,177	1,536	81,857
91	$688,063	4,276,134	1,237	261,434	2,415,716	644	107,789
92	$1,604,911	7,234,730	1,757	837,996	4,550,191	1,026	431,298
93	$1,319,265	9,872,975	2,809	361,807	5,491,216	1,454	149,973
94	$661,118	6,307,590	1,727	68,020	3,594,524	933	22,344
95	$1,991,359	13,587,549	4,340	655,687	7,785,106	2,271	239,707
96	$1,054,271	9,445,140	2,005	159,571	4,319,757	991	74,759
97	$1,166,038	8,862,631	2,126	308,425	5,055,558	1,117	123,865
98	$989,491	8,639,054	2,176	168,570	5,077,054	1,176	65,249
99	$432,340	3,088,879	933	130,783	1,653,672	476	51,845
Not mapped*	$4,978,501	50,215,525	13,182	285,907	32,932,275	8,872	108,579

* *Unknown District*: The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-4.
Commercial Programs
Per Capita Energy, Electric Bill Savings by Electric Utility Territory
(July 1, 2001–December 31, 2009)

Wisconsin Focus on Energy Commercial Programs
Per Capita* Energy, Electric Bill Savings by Utility Territory



Per Capita Annual Energy Electric Bill Savings by Utility Territory

- $0
- $0.80 - $25.90
- $25.91 - $68.40
- $68.41 - $150.00
- > $150.00
- Non Participating Utility Territories

The map above portrays the annual energy, electric bill savings realized in 2009 from projects implemented in commercial sector businesses from July 1, 2001, through December 31, 2009. Electric savings has been valued at the average cost of electricity for commercial businesses in Wisconsin and summed for all projects within each utility territory and divided by the number of commercial business customers in that utility territory.

* The unit of population is commercial customers as reported by the utilities in 2007.

Map Produced by: PA Consulting Group and Patrick Engineering Inc. of The Focus on Energy Evaluation Team. April, 2010.

Table A-4. Commercial Program Electric Impacts
(by Participating Electric Utility)
(July 1, 2001–December 31, 2009)

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
Adams-Columbia Electric Coop	2009	C-1	$48,042	1,719	$28	517,699	128	249,342	62
Algoma Utility Comm	2008	W2	$12,090	362	$33	130,285	29	81,337	18
Alliant Energy (Wisconsin Power & Light)	2001	WPL	$12,703,585	55,701	$228	136,892,077	32,300	73,298,546	16,778
Bloomer Electric & Water Co	2001	W1	$95,592	373	$256	1,030,084	127	607,207	71
Brodhead Water & Lighting Comm	2008	W1	$5,180	305	$17	55,814	13	31,657	8
Cedarburg Light & Water Comm	2008	W1	$40,760	847	$48	439,222	103	236,445	56
City of Arcadia	2009	W1	$1,011	239	$4	10,895	3	6,943	2
City of Argyle	2001	W1	$1,551	88	$18	16,718	4	8,108	2
City of Bangor	2008	W2	$15,349	454	$34	165,398	53	95,003	27
City of Barron	2009	W1	$21,599	316	$68	232,749	64	151,758	35
City of Black River Falls	2008	W1	$21,657	511	$42	233,378	88	134,969	46
City of Boscobel	2008	W1	$15,023	314	$48	161,881	23	104,739	13
City of Clintonville	2008	W1	$23,331	420	$56	251,411	66	129,807	32
City of Columbus	2008	W2	$31,318	411	$76	337,484	63	214,787	34
City of Cornell	2001	W1	$15,222	138	$110	164,029	51	78,241	23
City of Cuba City	2008	W2	$7,763	141	$55	83,649	20	49,797	12
City of Cumberland	2001	W1	$69,409	221	$314	747,939	202	427,058	111
City of Eagle River	2008	W2	$38,461	531	$72	414,455	175	250,529	85
City of Elkhorn	2009	W2	$578	721	$1	6,232	2	2,981	1
City of Elroy	2007	W2	$2,615	143	$18	28,176	8	11,830	4
City of Evansville	2008	W2	$29,672	556	$53	319,737	74	190,193	43

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
City of Fennimore	2008	W2	$1,435	242	$6	15,468	4	8,154	2
City of Kaukauna	2008	W2	$141,941	1,593	$89	1,529,540	402	876,885	214
City of Kiel	2007	W2	$29,596	362	$82	318,920	89	182,107	50
City of Lodi	2008	W2	$6,110	290	$21	65,842	18	39,203	11
City of Marshfield	2008	W2	$31,743	1,862	$17	342,057	93	162,088	45
City of Medford	2007	W2	$105,986	552	$192	1,142,094	271	669,760	141
City of Menasha	2008	W2	$48,140	854	$56	518,755	186	284,700	86
City of Muscoda	2008	W2	$3,806	201	$19	41,016	11	22,934	6
City of New Holstein	2008	W2	$58,928	324	$182	635,003	103	327,914	57
City of New Lisbon	2009	W2	$205	163	$1	2,211	1	958	0
City of New Richmond	2008	W2	$13,029	588	$22	140,395	40	95,104	27
City of Plymouth	2008	W2	$72,181	947	$76	777,814	214	438,587	116
City of Princeton	2001	W2	$13,160	153	$86	141,806	32	78,182	19
City of Richland Center	2008	W2	$16,396	623	$26	176,676	65	110,318	33
City of River Falls	2008	W2	$192,972	675	$286	2,079,443	788	1,459,108	332
City of Shullsburg	2007	W2	$3,732	203	$18	40,213	11	20,750	6
City of Spooner	2001	W1	$71,320	347	$206	768,538	134	391,901	75
City of Stoughton	2008	W1	$56,113	827	$68	604,670	189	314,367	90
City of Sturgeon Bay	2008	W1	$136,516	1,509	$90	1,471,078	400	866,297	203
City of Westby	2008	W2	$3,631	189	$19	39,132	11	17,514	5
Clark Electric Coop	2009	C-6	$79,198	74	$1,070	853,430	233	462,872	125
Consolidated Water Power Co	2001	CWP	$6,285	189	$33	67,722	19	33,566	9
Dahlberg Light & Power Co	2001	DLP	$78,487	1,107	$71	845,762	207	466,081	104
Eau Claire Electric Coop	2007	C-8	$137,387	561	$245	1,480,463	342	971,740	188
Florence Utility Comm	2008	W1	$4,214	178	$24	45,409	9	24,178	5

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
Hartford Electric	2008	W1	$71,327	796	$90	768,615	225	435,895	119
Hustisford Utilities	2008	W1	$26,372	194	$136	284,181	70	165,900	42
Jefferson Utilities	2008	W1	$18,640	521	$36	200,863	61	103,591	32
Juneau Utility Comm	2008	W2	$20,876	184	$113	224,959	149	163,430	58
La Farge Municipal Electric Co	2001	W2	$10,367	113	$92	111,717	32	65,288	15
Lake Mills Light & Water	2008	W2	$25,766	441	$58	277,650	54	161,441	29
Madison Gas & Electric Co	2001	MGE	$7,793,765	18,553	$420	83,984,536	17,122	40,655,905	8,629
Manitowoc Public Utilities	2007	W1	$276,499	2,121	$130	2,979,512	755	2,027,863	435
New London Electric & Water	2008	W2	$17,663	499	$35	190,335	39	95,589	19
North Central Power Co, Inc	2001	NCP	$92,595	427	$217	997,794	176	525,393	85
Northwestern Wisconsin Elec Co	2001	NWE	$242,685	1,470	$165	2,615,136	603	1,332,869	298
Oakdale Electric Coop	2008	C-12	$27,588	1,227	$22	297,286	83	163,252	46
Oconomowoc Utilities	2008	W1	$405,585	1,103	$368	4,370,533	879	2,884,497	544
Oconto Electric Coop	2009	C-13	$39,847	233	$171	429,387	98	221,080	49
Oconto Falls Water & Light Comm	2008	W2	$51,857	267	$194	558,808	153	338,852	87
Pierce-Pepin Coop Services	2009	C-14	$38,111	320	$119	410,681	108	238,885	63
Pioneer Power & Light Co	2001	PPL	$25,767	129	$200	277,663	18	137,027	10
Polk-Burnett Electric Coop	2010	C-15	$26,212	1,015	$26	282,452	78	122,330	34
Price Electric Coop, Inc	2007	C-16	$56,908	235	$242	613,235	143	357,397	86
Reedsburg Utility Comm	2008	W1	$74,824	667	$112	806,298	249	497,927	126
Rice Lake Utilities	2007	W1	$121,635	876	$139	1,310,726	282	779,600	140
Richland Electric Coop	2006	C-17	$117,785	184	$640	1,269,236	349	713,748	179

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
Rock Energy Coop	2009	C-19	$20,715	511	$41	223,226	60	110,300	28
Scenic Rivers Energy Coop	2007	C-20	$305,768	741	$413	3,294,913	914	1,938,499	473
Shawano Municipal Utilities	2007	W1	$120,169	1,280	$94	1,294,927	323	764,474	178
Slinger Utilities	2008	W1	$46,120	327	$141	496,983	219	286,178	99
Sun Prairie Water & Light Comm	2008	W1	$91,672	1,740	$53	987,848	292	632,269	141
Superior Water, Light & Power Co	2001	SWLP	$378,028	1,930	$196	4,073,582	1,233	2,212,427	665
Two Rivers Water & Light	2008	W1	$72,904	592	$123	785,604	234	537,305	143
Vernon Electric Coop	2009	C-23	$35,816	500	$72	385,943	122	216,404	71
Village of Belmont	2007	W2	$171	131	$1	1,841	1	1,072	0
Village of Benton	2001	W2	$3,259	82	$40	35,115	7	13,425	3
Village of Cadott	2001	W2	$18,956	18	$1,053	204,268	52	120,939	27
Village of Cashton	2001	W2	$6,328	116	$55	68,195	18	33,642	9
Village of Centuria	2001	W2	$950	71	$13	10,238	1	6,310	1
Village of Gresham	2001	W2	$3,079	168	$18	33,177	10	15,053	4
Village of Mazomanie	2007	W2	$32,071	114	$281	345,597	87	203,899	53
Village of Mt Horeb	2008	W2	$25,886	491	$53	278,940	70	173,895	44
Village of New Glarus	2008	W2	$15,548	197	$79	167,547	45	92,075	25
Village of Pardeeville	2001	W2	$4,892	140	$35	52,717	15	30,296	9
Village of Prairie Du Sac	2008	W2	$4,689	254	$18	50,532	14	27,387	8
Village of Sauk City	2009	W2	$4,676	242	$19	50,393	14	21,825	6
Village of Stratford	2001	W2	$22,727	155	$147	244,898	62	120,075	29
Village of Trempealeau	2009	W2	$578	157	$4	6,226	2	2,697	1
Village of Viola	2001	W2	$4,617	88	$52	49,754	12	23,756	6
Village of Waunakee	2008	W2	$9,510	556	$17	102,483	29	55,069	16

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
Waterloo Light & Water Comm	2008	W2	$23,662	295	$80	254,983	59	149,330	33
Waupun Utilities	2008	W2	$74,531	524	$142	803,140	190	452,059	104
Whitehall Electric Utility	2008	W2	$15,412	199	$77	166,079	62	111,740	26
Wisconsin Dells Electric Utility	2007	W2	$41,484	681	$61	447,029	114	258,455	59
Wisconsin Electric Power Co (We Energies)	2001	WEP	$25,133,372	106,693	$236	270,833,745	62,277	148,651,235	31,688
Wisconsin Public Service Corp	2001	WPS	$15,143,798	53,383	$284	163,187,479	41,616	88,437,040	21,585
Wisconsin Rapids Water Works & Lighting Comm	2008	W2	$215,327	1,857	$116	2,320,331	414	1,302,488	209
Wonewoc Electric & Water Utility	2001	W2	$519	91	$6	5,591	1	3,243	1
Xcel Energy (Northern States Power Co)	2001	NSP	$8,690,110	39,918	$218	93,643,425	24,689	53,608,034	13,229
Not mapped*			$6,978,869			75,203,331	19,684	45,339,233	11,953

* *Unknown Utility:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-5.
Commercial Programs
Per Capita Energy, Gas Bill Savings by Gas Utility
(July 1, 2001–December 31, 2009)

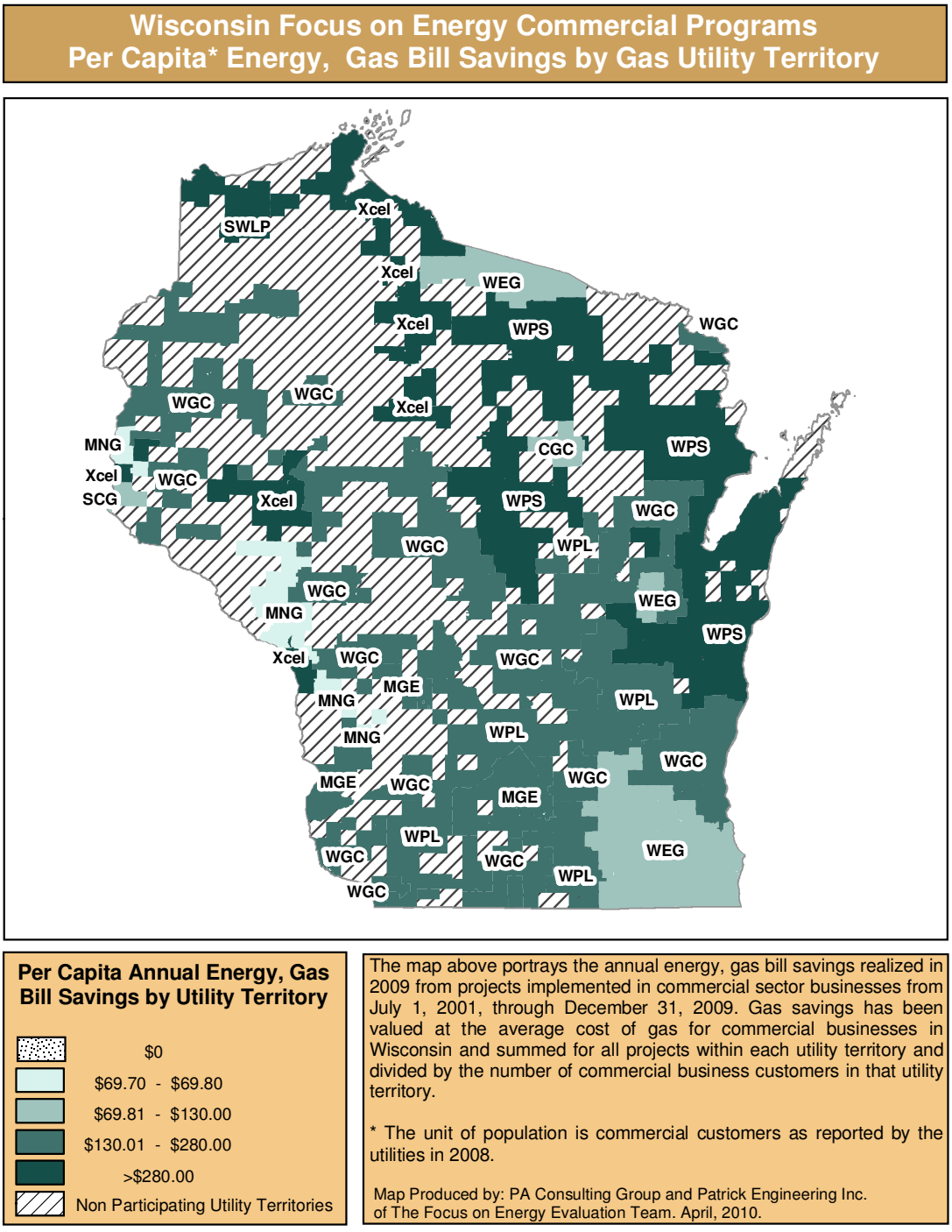


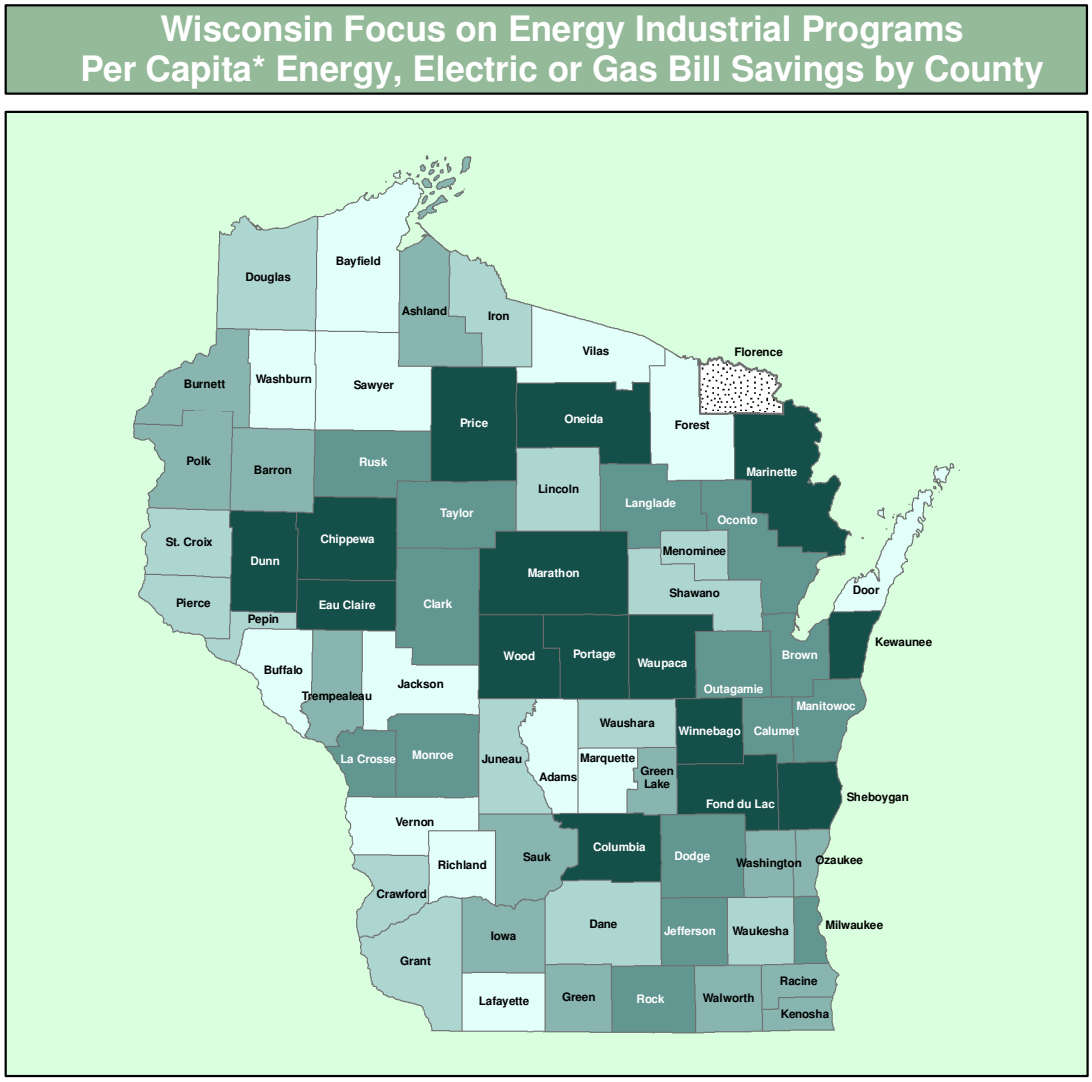
Table A-5. Commercial Program Gas Impacts
(by Participating Gas Utility)
(July 1, 2001–December 31, 2009)

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross Therms	Persistent Net Therms
Alliant Energy (Wisconsin Power & Light)	2001	WPL	$3,988,114	18,725	$213	3,579,995	1,418,965
City Gas Co	2007	CGC	$59,443	591	$101	53,360	17,865
Madison Gas and Electric	2001	MGE	$3,767,711	14,025	$269	3,382,146	1,388,806
Midwest Natural Gas Inc.	2007	MNG	$106,289	1,524	$70	95,412	35,735
St. Croix Gas	2007	SCG	$64,068	593	$108	57,512	19,100
Superior Water Light And Power Co	2001	SWLP	$489,605	1,143	$428	439,502	186,812
Wisconsin Electric Gas Operations (We Energies)	2001	WEG	$4,583,382	36,308	$126	4,114,346	1,665,854
Wisconsin Gas LLC (We Energies)	2001	WGC	$13,965,037	51,053	$274	12,535,940	4,887,458
Wisconsin Public Service Corp	2001	WPS	$8,138,082	26,229	$310	7,305,280	2,940,973
Xcel Energy (Northern States Power Co)	2001	Xcel	$5,426,440	11,561	$469	4,871,131	1,924,327
Not mapped*			$7,284,510			6,539,057	1,792,187

* *Unknown Utility:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

A.2.2 Industrial Programs

Figure A-6.
Industrial Programs
Per Capita Energy, Electric or Gas Bill Savings by County
(July 1, 2001–December 31, 2009)



Per Capita Annual Energy, Electric or Gas Bill Savings by County

	$0
	$0.01 - $220.00
	$220.01 - $470.00
	$470.01 - $780.00
	$780.01 - $1,790.00
	> $1,790.00

The map above portrays the annual energy, electric or gas bill savings realized in 2009 from projects implemented in industrial sector businesses from July 1, 2001, through December 31, 2009. Electric and gas savings have been valued at the average cost of gas and electricity for industrial businesses in Wisconsin and summed for all projects within each county and divided by the number of eligible industrial businesses in that county.

* The unit of population is industrial customers in industries targeted by the industrial programs in participating utility territories.

Map Produced by: PA Consulting Group and Patrick Engineering Inc.
of The Focus on Energy Evaluation Team. April, 2010.

Table A-6. Industrial Program Energy Impacts
(by County)
(July 1, 2001–December 31, 2009)

County	Eligible Participants	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
Adams	197	$75	226,571	46	0	124,499	26	0
Ashland	293	$528	2,014,208	360	22,357	971,272	158	9,631
Barron	739	$547	3,704,186	608	154,449	2,041,710	319	60,960
Bayfield	242	$92	165,512	27	10,992	85,265	13	3,853
Brown	3,759	$1,311	51,139,428	8,500	1,512,328	26,847,829	4,098	761,380
Buffalo	180	$11	31,769	5	0	18,943	3	0
Burnett	257	$539	1,953,242	189	10,848	897,915	88	3,616
Calumet	506	$989	5,559,925	927	131,378	2,870,874	459	62,224
Chippewa	811	$2,598	18,680,208	2,948	843,692	10,131,346	1,432	518,783
Clark	458	$1,129	4,289,542	693	225,049	2,296,116	356	77,340
Columbia	852	$2,219	10,007,956	1,504	1,173,431	5,905,633	831	980,247
Crawford	217	$287	911,937	130	2,799	564,380	78	1,122
Dane	7,926	$257	22,748,553	4,173	526,871	11,745,716	2,131	275,103
Dodge	1,138	$1,173	10,065,395	1,749	643,295	5,339,310	897	351,122
Door	708	$170	1,172,991	163	41,464	512,626	72	22,192
Douglas	568	$463	2,024,144	612	124,068	1,031,752	297	73,585
Dunn	492	$2,263	10,417,385	1,570	412,190	5,519,817	772	258,919
Eau Claire	1,406	$2,182	21,547,651	3,340	1,576,645	11,427,575	1,639	788,831
Fond du Lac	1,354	$2,330	33,960,837	5,552	893,355	13,975,285	2,170	368,122
Forest	162	$77	192,324	53	0	88,740	23	0
Grant	701	$449	2,291,797	306	156,595	1,338,503	165	73,411
Green	539	$775	5,850,371	1,027	34,663	3,381,073	555	20,058
Green Lake	539	$502	1,639,403	390	155,138	965,474	215	92,103
Iowa	336	$537	555,960	201	136,738	359,270	72	60,439
Iron	115	$246	434,687	28	0	181,436	14	0
Jackson	203	$215	671,750	114	0	404,538	62	0
Jefferson	1,121	$1,356	9,975,062	1,818	824,348	5,030,654	939	455,827
Juneau	317	$412	580,445	110	87,757	278,826	52	30,793
Kenosha	1,796	$539	10,555,284	1,914	266,838	5,799,795	1,010	138,107
Kewaunee	297	$1,885	3,449,071	653	317,481	2,036,542	361	156,696
La Crosse	1,668	$854	13,955,322	2,436	489,109	5,914,152	1,053	286,557
Lafayette	202	$169	398,313	76	7,856	234,800	42	6,216
Langlade	349	$1,167	2,546,296	395	228,564	1,462,372	216	171,848
Lincoln	456	$371	2,057,184	397	33,378	1,155,652	211	18,618
Manitowoc	1,038	$1,159	11,079,485	1,998	456,451	6,054,895	1,033	258,672
Marathon	1,941	$3,026	35,749,449	6,203	3,357,885	18,825,658	3,130	2,374,445
Marinette	615	$3,388	5,266,940	1,730	1,648,488	3,140,290	976	996,158
Marquette	201	$103	318,904	57	0	177,305	31	0
Menominee	12	$368	67,808	13	0	37,940	7	0
Milwaukee	12,404	$782	61,741,295	10,355	5,376,387	32,133,393	5,151	2,406,572
Monroe	508	$1,781	7,212,028	725	412,375	3,943,239	380	206,857

County	Eligible Participants	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
Oconto	439	$852	1,956,244	420	233,647	1,130,771	238	133,258
Oneida	770	$6,468	7,866,572	1,275	4,231,632	4,757,912	710	2,901,207
Outagamie	2,985	$1,775	43,171,143	6,415	2,354,890	20,810,246	2,319	1,608,548
Ozaukee	1,767	$760	9,909,702	1,306	660,271	4,403,763	553	316,186
Pepin	114	$332	407,778	74	10,715	215,046	37	5,911
Pierce	491	$368	1,794,927	289	60,650	868,337	130	24,255
Polk	711	$666	5,485,379	1,597	110,355	2,732,320	770	70,838
Portage	921	$6,288	24,012,649	2,792	4,003,552	12,690,988	1,397	1,831,651
Price	237	$28,600	14,757,669	2,071	5,508,862	7,095,776	969	3,345,109
Racine	2,529	$488	11,544,863	2,217	456,615	5,970,695	1,098	224,856
Richland	216	$122	405,207	81	0	239,780	47	0
Rock	1,939	$1,355	22,457,753	3,030	1,103,607	12,161,103	1,471	625,207
Rusk	168	$1,466	3,201,914	421	35,800	1,480,998	192	16,554
Sauk	993	$549	8,322,223	1,517	3,359	4,383,609	726	1,684
Sawyer	400	$0	1,805	0	0	967	0	0
Shawano	522	$329	2,284,404	403	21,771	1,330,452	218	11,884
Sheboygan	1,564	$4,248	27,950,422	3,716	4,568,169	13,955,715	1,775	2,679,226
St. Croix	1,308	$401	6,178,937	1,081	115,771	3,190,614	537	56,253
Taylor	251	$814	1,480,466	274	102,170	817,503	146	51,025
Trempealeau	388	$634	1,697,635	267	128,145	906,364	136	57,951
Vernon	364	$182	562,151	68	28,233	282,165	36	12,412
Vilas	532	$84	682,494	78	141	359,649	44	62
Walworth	1,571	$474	8,746,776	1,745	165,284	4,669,774	849	89,982
Washburn	350	$181	962,771	180	611	511,210	97	190
Washington	2,097	$478	9,992,735	1,931	333,756	5,417,957	1,000	161,838
Waukesha	8,052	$466	35,928,811	6,216	1,334,617	19,142,326	3,147	765,385
Waupaca	746	$2,236	5,664,211	1,076	1,230,530	3,186,839	568	742,142
Waushara	278	$375	884,286	217	44,160	469,170	103	18,586
Winnebago	2,136	$2,156	35,758,910	6,304	2,156,911	18,833,637	3,079	1,270,695
Wood	1,053	$2,782	16,929,231	2,319	1,730,213	9,201,347	1,170	1,177,734
Not mapped*			3,132,336	390	240,151	1,654,724	196	142,677

* *Unknown County:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-7.
Industrial Programs
Implemented Energy, Electric or Gas Bill Savings by Senate District
(July 1, 2001–December 31, 2009)

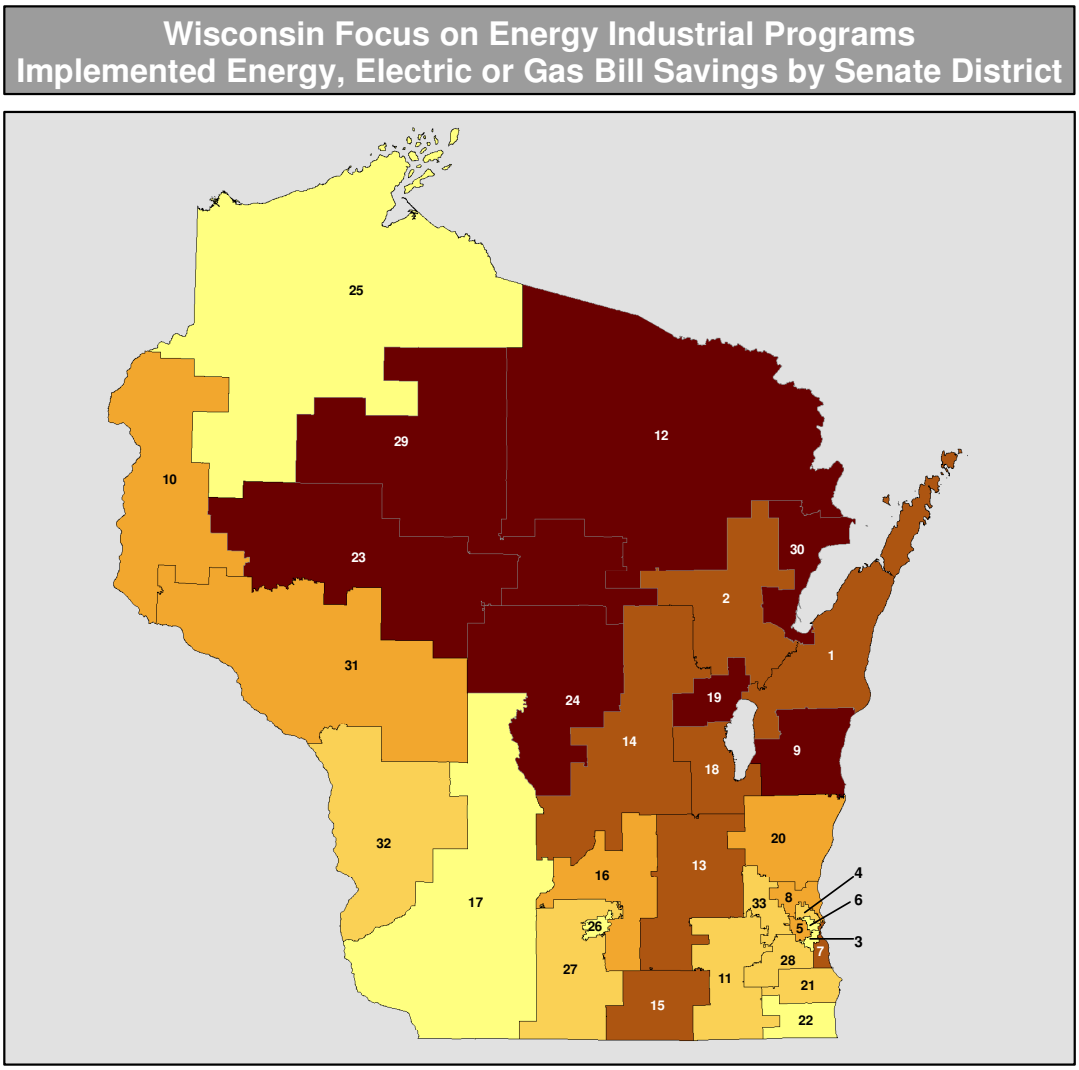


Table A-7. Industrial Program Energy Impacts
(by Senate District)
(July 1, 2001–December 31, 2009)

Senate District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
1	$3,264,099	28,051,705	4,078	1,361,679	13,545,210	1,947	708,226
2	$3,434,691	25,838,082	4,655	1,659,690	13,834,807	2,257	1,262,110
3	$256,394	2,938,796	576	61,627	1,649,090	293	20,524
4	$1,715,850	11,469,473	1,902	917,791	6,130,515	950	397,740
5	$2,558,750	18,569,462	2,518	1,278,294	8,324,373	1,155	572,248
6	$233,173	2,088,648	243	92,047	988,530	116	38,795
7	$3,606,818	13,784,095	2,725	2,565,789	8,359,698	1,523	1,105,211
8	$2,185,505	24,757,979	4,869	543,334	13,093,733	2,382	310,585
9	$7,311,770	37,472,145	5,494	4,613,952	19,402,634	2,722	2,741,233
10	$2,381,291	25,064,945	4,565	709,813	12,765,431	2,210	413,881
11	$1,585,102	10,905,683	2,170	828,733	5,888,293	1,074	474,696
12	$5,747,130	14,352,834	2,261	4,557,538	8,325,802	1,236	3,133,693
13	$2,740,323	19,308,849	3,417	1,404,656	9,899,241	1,745	799,043
14	$3,437,307	21,426,165	4,429	1,934,151	12,009,244	2,282	1,048,261
15	$2,688,731	23,399,730	3,279	1,103,607	12,624,710	1,577	625,207
16	$2,181,046	12,247,562	2,020	1,310,351	6,781,555	1,035	1,035,731
17	$899,647	8,692,683	1,320	316,054	4,666,628	596	147,059
18	$3,741,599	46,055,989	7,400	703,934	20,102,099	3,161	328,578
19	$5,225,606	43,753,149	7,377	2,251,209	22,432,337	2,829	1,320,568
20	$2,300,186	15,789,150	2,168	1,204,841	7,233,787	948	569,723
21	$1,159,112	10,691,773	2,047	438,520	5,498,099	1,011	218,703
22	$1,023,185	11,095,166	2,021	284,933	6,089,917	1,063	144,260
23	$5,124,433	39,690,319	6,468	2,405,865	21,299,998	3,159	1,246,531
24	$7,862,618	39,046,488	4,829	5,038,534	20,729,464	2,394	2,617,448
25	$967,632	9,795,034	1,893	312,476	5,099,767	940	148,219
26	$595,976	6,725,238	1,017	149,775	3,245,117	539	80,629
27	$1,271,820	15,154,732	2,936	270,120	8,407,855	1,535	157,526
28	$1,129,975	12,347,300	2,096	308,869	6,975,648	1,082	138,271
29	$12,692,278	53,258,944	8,604	8,735,910	27,137,682	4,244	5,624,031
30	$5,004,656	32,180,120	6,090	2,755,426	17,377,142	3,120	1,529,881
31	$1,919,892	16,266,875	1,999	815,264	8,806,290	1,038	422,575
32	$1,529,083	15,050,904	2,553	520,142	6,551,421	1,125	300,091
33	$1,509,196	15,617,444	2,429	466,383	7,980,095	1,244	282,382
Not mapped*	$1,974,517	8,455,560	1,413	1,348,542	4,867,952	764	750,055

* *Unknown District*: The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-8.
Industrial Programs
Implemented Energy, Electric or Gas Bill Savings by Assembly District
(July 1, 2001–December 31, 2009)

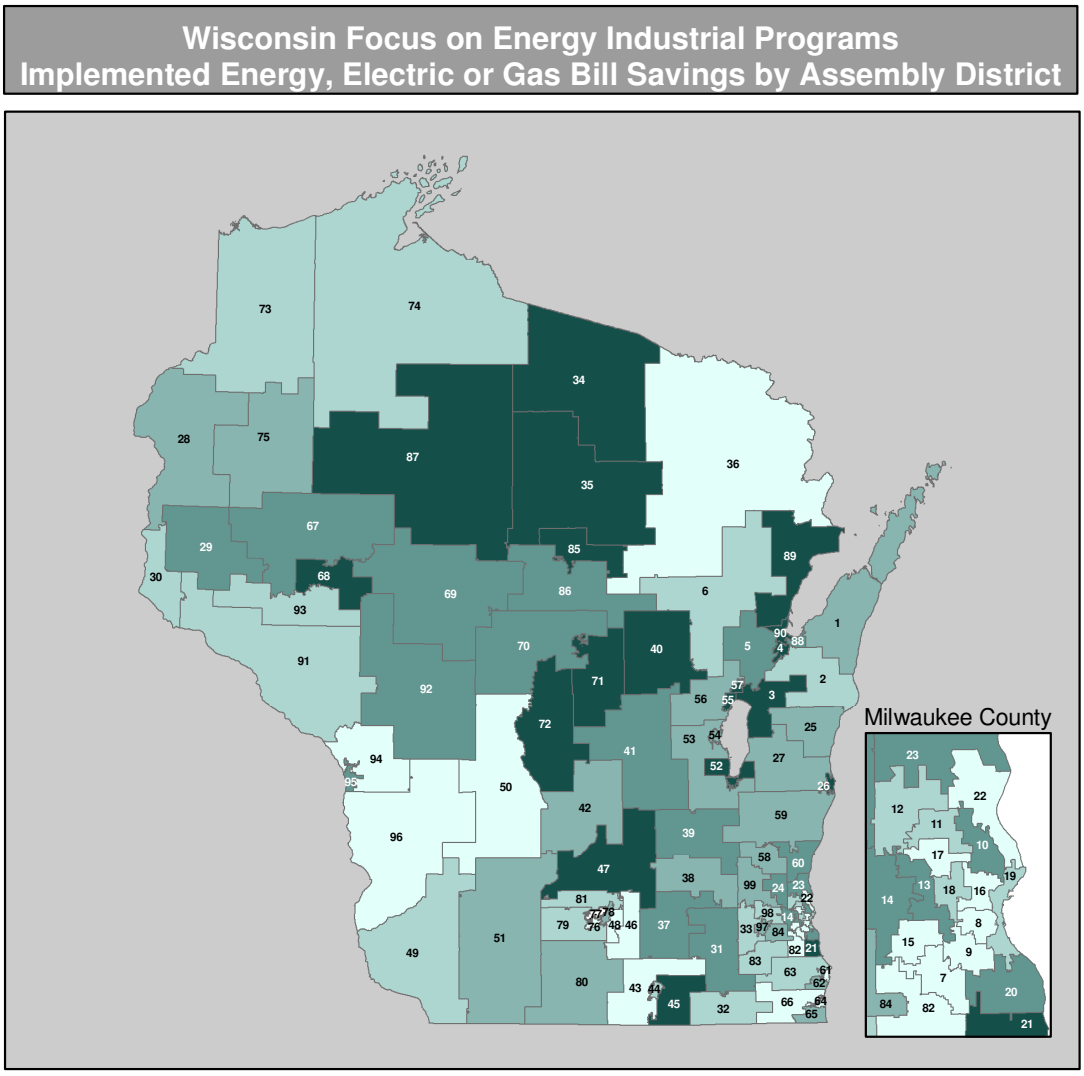


Table A-8. Industrial Program Energy Impacts
(by Assembly District)
(July 1, 2001–December 31, 2009)

Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
1	$689,035	4,774,388	842	358,165	2,630,886	446	178,426
2	$303,392	3,818,414	675	51,907	2,068,132	352	28,985
3	$2,271,672	19,458,903	2,561	951,607	8,846,191	1,148	500,815
4	$1,566,094	19,293,388	3,445	293,650	10,067,406	1,653	159,050
5	$1,396,684	3,232,512	661	1,123,340	1,871,157	311	962,416
6	$471,913	3,312,182	548	242,699	1,896,244	292	140,644
7	$1,804	27,710	5	0	13,802	2	0
8	$181,860	2,146,513	423	39,888	1,215,408	212	14,682
9	$72,731	764,573	148	21,740	419,881	79	5,842
10	$1,098,386	5,341,659	824	710,838	2,783,800	397	307,021
11	$363,220	2,723,021	402	176,090	1,440,998	206	72,354
12	$254,243	3,404,793	676	30,863	1,905,717	347	18,365
13	$1,438,908	4,793,896	532	1,067,069	2,159,426	237	438,442
14	$971,660	11,682,954	1,693	199,905	5,491,308	824	128,322
15	$148,182	2,092,612	294	11,319	673,639	94	5,483
16	$18,624	267,901	40	1,120	118,635	19	541
17	$12	188	0	0	102	0	0
18	$214,537	1,820,559	203	90,927	869,794	97	38,254
19	$227,852	2,327,931	526	72,257	1,295,865	289	41,207
20	$1,425,379	3,636,806	757	1,125,590	1,925,701	381	369,255
21	$1,953,587	7,819,359	1,441	1,367,942	5,138,133	854	694,749
22	$139,683	2,049,493	481	5,929	946,981	192	1,954
23	$1,130,939	9,682,926	1,634	474,034	5,064,841	793	278,968
24	$914,883	13,025,560	2,754	63,370	7,081,911	1,396	29,663
25	$896,767	7,727,260	1,478	372,843	4,311,233	750	221,640
26	$5,633,922	25,060,728	3,315	3,790,216	12,674,228	1,604	2,325,257
27	$781,082	4,684,157	701	450,893	2,417,173	368	194,337
28	$632,656	7,752,170	1,858	121,203	3,802,824	892	74,454
29	$1,398,811	13,573,266	2,083	487,871	7,048,965	1,018	300,086
30	$349,824	3,739,509	624	100,740	1,913,642	300	39,340
31	$922,693	2,596,367	548	713,703	1,422,623	287	406,533
32	$397,232	6,023,742	1,202	4,817	3,192,872	587	2,080
33	$265,177	2,285,574	420	110,214	1,272,798	200	66,083
34	$2,554,699	8,224,264	1,318	1,912,215	4,967,469	737	1,384,788
35	$3,039,662	4,817,179	811	2,581,500	2,706,817	435	1,706,947
36	$152,769	1,311,391	132	63,824	651,516	64	41,958
37	$986,811	6,393,550	1,019	540,333	2,990,453	501	297,679
38	$560,626	3,383,954	756	322,283	1,879,572	408	212,739
39	$1,192,885	9,531,345	1,642	542,041	5,029,217	835	288,625
40	$1,894,298	7,632,360	1,396	1,323,326	4,339,984	775	773,433
41	$1,058,266	6,371,266	1,478	609,371	3,409,799	662	274,275
42	$484,743	7,422,540	1,555	1,454	4,259,461	845	553

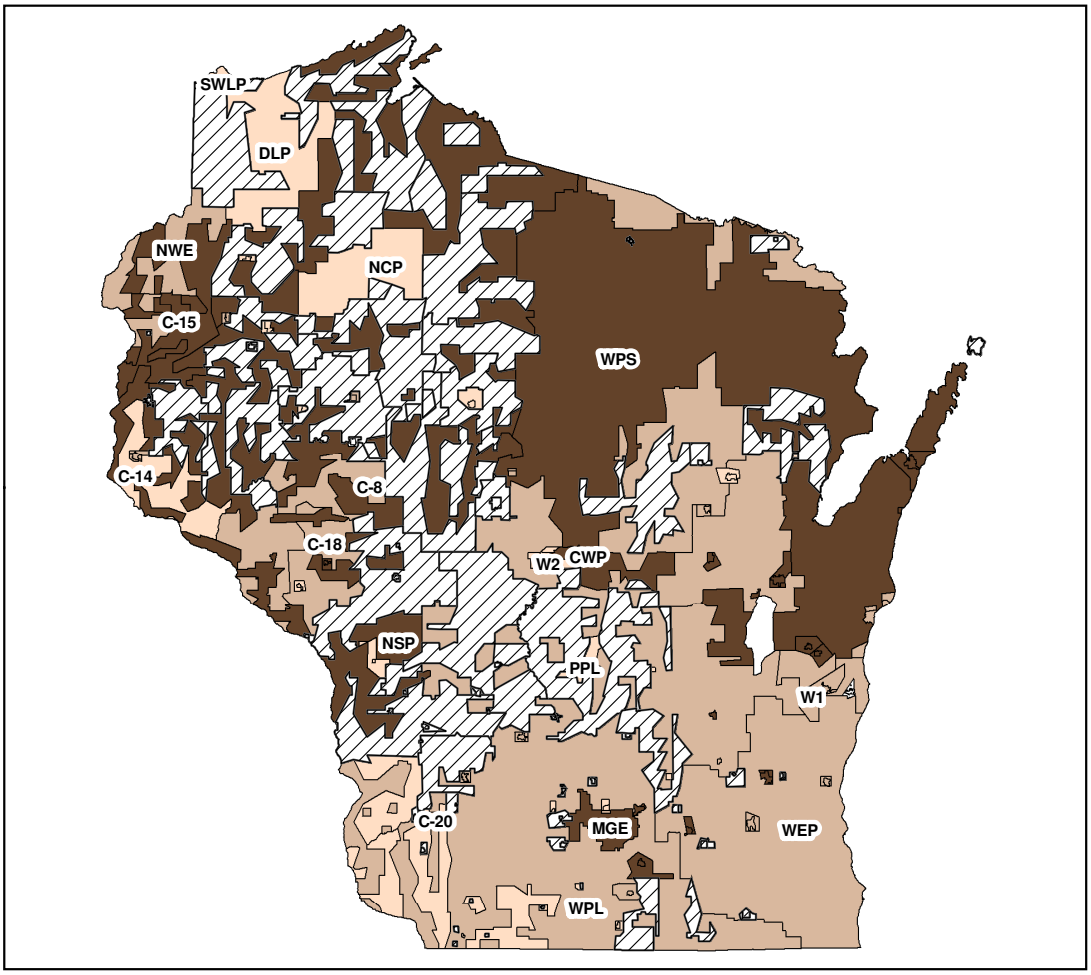
Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
43	$127,720	1,761,702	565	12,342	858,081	219	4,882
44	$275,674	2,853,386	546	85,150	1,562,861	279	27,610
45	$2,285,337	18,784,641	2,168	1,006,115	10,203,769	1,078	592,715
46	$198,709	1,994,472	465	65,217	1,183,731	247	29,203
47	$1,788,754	8,459,303	1,203	1,172,399	4,659,543	613	980,860
48	$193,583	1,793,787	352	72,734	938,282	175	25,668
49	$284,888	1,836,011	243	156,595	1,036,599	128	73,411
50	$127,846	1,722,713	333	14,865	963,319	183	6,993
51	$486,912	5,133,958	744	144,594	2,666,710	285	66,655
52	$2,385,982	28,955,153	4,471	474,433	11,327,614	1,708	200,057
53	$632,521	7,228,416	1,501	153,363	4,134,644	813	99,411
54	$723,097	9,872,420	1,428	76,138	4,639,841	639	29,110
55	$3,152,675	17,099,031	2,871	1,931,371	9,340,917	1,436	1,143,288
56	$577,647	7,981,209	1,596	54,991	3,931,608	727	24,014
57	$1,495,284	18,672,910	2,910	264,847	9,159,812	666	153,266
58	$551,268	4,731,031	781	230,377	2,373,749	371	99,297
59	$692,156	2,917,590	382	475,588	1,328,538	169	208,942
60	$1,056,761	8,140,529	1,005	498,875	3,531,500	408	261,484
61	$113,447	902,889	202	51,770	404,105	88	19,875
62	$689,281	6,955,968	1,254	223,909	3,855,617	665	119,270
63	$356,383	2,832,916	592	162,841	1,238,377	259	79,558
64	$189,576	2,630,698	528	17,346	1,385,652	259	7,347
65	$634,639	5,719,032	1,059	248,418	3,246,041	588	130,137
66	$198,970	2,745,436	434	19,169	1,458,223	216	6,775
67	$1,356,210	14,227,084	2,179	407,223	7,718,183	1,042	217,226
68	$2,796,948	17,096,253	2,865	1,594,680	9,015,676	1,379	845,385
69	$971,274	8,366,981	1,424	403,962	4,566,139	739	183,921
70	$1,176,635	3,292,692	514	911,250	1,601,141	254	724,723
71	$4,684,021	20,903,101	2,338	3,146,998	10,892,983	1,134	1,380,321
72	$2,001,962	14,850,695	1,977	980,286	8,235,340	1,005	512,404
73	$263,537	2,035,661	614	124,068	1,037,847	298	73,585
74	$204,980	2,607,739	414	33,348	1,234,402	185	13,484
75	$499,114	5,151,634	864	155,060	2,827,518	457	61,150
76	$88,226	1,355,241	197	0	659,682	100	0
78	$507,750	5,369,998	819	149,775	2,585,435	439	80,629
79	$351,182	2,738,233	747	163,753	1,426,813	370	93,329
80	$544,441	7,405,641	1,267	59,029	4,148,647	666	37,687
81	$376,197	5,010,858	922	47,339	2,832,395	499	26,510
82	$173,761	2,669,141	548	0	1,405,498	256	0
83	$256,114	3,804,486	611	7,995	2,193,998	338	4,797
84	$700,099	5,873,674	937	300,874	3,376,153	488	133,475
85	$4,512,886	23,857,913	3,936	2,802,780	12,483,460	1,961	2,078,648
86	$921,159	9,794,251	1,898	268,516	5,173,760	975	122,027
87	$7,258,234	19,606,780	2,770	5,664,614	9,480,463	1,309	3,423,356
88	$938,163	9,605,354	1,266	296,264	4,755,624	563	167,640
89	$2,163,986	5,824,940	2,089	1,690,135	3,601,051	1,188	999,298

Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
90	$1,902,507	16,749,826	2,735	769,027	9,020,467	1,368	362,942
91	$282,996	2,094,618	338	138,861	1,115,167	171	63,861
92	$1,206,602	8,045,364	863	646,637	4,425,087	453	341,042
93	$430,294	6,126,893	798	29,766	3,266,036	413	17,672
94	$121,907	734,274	173	70,176	389,470	95	39,884
95	$1,283,084	12,913,825	2,196	418,933	5,352,748	923	246,673
96	$124,093	1,402,805	184	31,032	809,204	108	13,534
97	$516,597	7,178,095	1,059	46,689	3,294,086	493	25,383
98	$276,815	4,006,992	796	15,114	2,362,199	439	12,491
99	$715,783	4,432,357	575	404,580	2,323,810	312	244,508
Not mapped*	$1,974,517	8,455,560	1,413	1,348,542	4,867,952	764	750,055

* *Unknown District*: The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-9.
Industrial Programs
Per Capita Energy, Electric Bill Savings by Electric Utility Territory
(July 1, 2001–December 31, 2009)

Wisconsin Focus on Energy Industrial Programs
Per Capita* Energy, Electric Bill Savings by Electric Utility Territory



Per Capita Annual Energy, Electric Bill Savings by Utility Territory

- $0
- $5.00 - $5.00
- $5.01 - $2,200
- > $2,200.00
- Non Participating Utility Territories

The map above portrays the annual energy, electric bill savings realized in 2009 from projects implemented in industrial sector businesses from July 1, 2001, through December 31, 2009. Electric savings has been valued at the average cost of electricity for industrial businesses in Wisconsin and summed for all projects within each utility territory and divided by the number of industrial business customers in that utility territory.

* The unit of population is industrial customers as reported by the utilities in 2007.

Map Produced by: PA Consulting Group and Patrick Engineering Inc. of The Focus on Energy Evaluation Team. April, 2010.

Table A-9. Industrial Program Electric Impacts
(by Participating Electric Utility)
(July 1, 2001–December 31, 2009)

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
Algoma Utility Comm	2008	W2	$54,266	1	$54,266	833,579	166	515,942	97
Alliant Energy (Wisconsin Power & Light)	2001	WPL	$8,957,892	1,001	$8,949	137,602,022	21,591	69,640,067	10,149
Bloomer Electric & Water Co	2001	W1	$50,574	55	$920	776,860	126	394,238	62
Cedarburg Light & Water Comm	2008	W1	$20,038	3	$6,679	307,800	60	175,763	34
City of Arcadia	2009	W1	$11,104	52	$214	170,572	30	109,206	18
City of Bangor	2008	W2	$3,169	9	$352	48,683	0	26,634	0
City of Black River Falls	2008	W1	$43,731			671,750	114	404,538	62
City of Boscobel	2008	W1	$3,897			59,866	12	35,695	7
City of Clintonville	2008	W1	$86,654	10	$8,665	1,331,085	274	785,485	156
City of Columbus	2008	W2	$2,199	1	$2,199	33,785	6	22,020	4
City of Cornell	2001	W1	$35,636	10	$3,564	547,401	77	314,070	43
City of Cumberland	2001	W1	$92,000	20	$4,600	1,413,215	171	792,225	84
City of Eagle River	2008	W2	$5,243			80,532	16	48,018	10
City of Kaukauna	2008	W2	$284,914	8	$35,614	4,376,562	739	2,613,526	387
City of Kiel	2007	W2	$203,482	17	$11,970	3,125,676	358	1,605,458	194
City of Medford	2007	W2	$81,859	70	$1,169	1,257,430	216	702,179	118
City of Menasha	2008	W2	$157,228	12	$13,102	2,415,177	458	1,385,954	223
City of New Holstein	2008	W2	$16,874	1	$16,874	259,199	55	150,393	30
City of Plymouth	2008	W2	$38,875	7	$5,554	597,163	117	330,155	62
City of Princeton	2001	W2	$3,614	14	$258	55,512	11	33,099	7
City of Richland Center	2008	W2	$21,806	4	$5,452	334,962	67	202,149	40
City of River Falls	2008	W2	$6,233	2	$3,116	95,742	19	51,337	10
City of Spooner	2001	W1	$8,855	16	$553	136,027	27	73,726	14
City of Stoughton	2008	W1	$72,058	3	$24,019	1,106,881	209	631,482	115

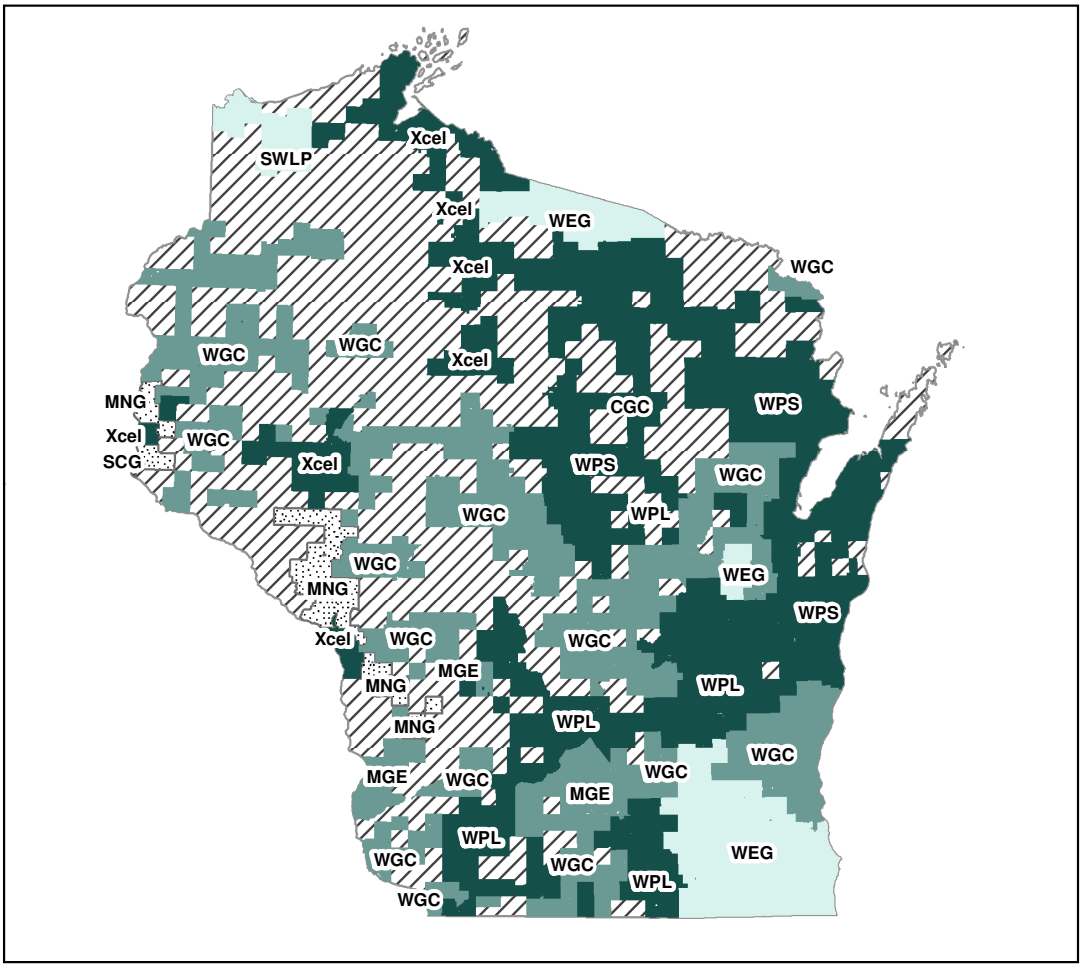
Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
City of Sturgeon Bay	2008	W1	$29,687	2	$14,844	456,024	92	255,218	49
Clark Electric Coop	2009	C-6	$6,218			95,513	31	60,815	18
Consolidated Water Power Co	2001	CWP	$669,176	1	$669,176	10,279,194	1,025	6,151,025	595
Dahlberg Light & Power Co	2001	DLP	$3,652	40	$91	56,094	42	29,119	22
Eau Claire Electric Coop	2007	C-8	$47,340	13	$3,642	727,184	157	428,003	92
Florence Utility Comm	2008	W1	$3,590			55,140	11	29,538	5
Hartford Electric	2008	W1	$82,688	7	$11,813	1,270,175	250	745,753	148
Hustisford Utilities	2008	W1	$23,058			354,194	68	208,595	41
Juneau Utility Comm	2008	W2	$6,408	2	$3,204	98,439	19	58,695	12
Lake Mills Light & Water	2008	W2	$18,029	1	$18,029	276,950	53	159,745	29
Madison Gas & Electric Co	2001	MGE	$885,763	49	$18,077	13,606,197	2,429	7,031,336	1,261
Manitowoc Public Utilities	2007	W1	$413,527	86	$4,808	6,352,183	1,193	3,594,086	602
New London Electric & Water	2008	W2	$121,339	6	$20,223	1,863,890	360	1,108,392	211
North Central Power Co	2001	NCP	$285	3	$95	4,379	1	2,346	0
Northwestern Wisconsin Elec Co	2001	NWE	$137,092	28	$4,896	2,105,866	216	973,709	101
Oconomowoc Utilities	2008	W1	$40,786	8	$5,098	626,510	147	360,571	74
Oconto Falls Water & Light Comm	2008	W2	$10,487			161,087	30	77,278	14
Pioneer Power & Light Co	2001	PPL	$479	20	$24	7,352	3	4,022	2
Reedsburg Utility Comm	2008	W1	$52,074	6	$8,679	799,913	150	476,659	88
Rice Lake Utilities	2007	W1	$70,167	166	$423	1,077,836	276	632,718	152
Richland Electric Coop	2006	C-17	$4,573			70,245	14	37,631	7
Scenic Rivers Energy Coop	2007	C-20	$921	18	$51	14,150	3	8,437	2
Shawano Municipal Utilities	2007	W1	$131,737	163	$808	2,023,612	350	1,194,353	192

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Persistent Net kWh	Persistent Net kW
Sun Prairie Water & Light Comm	2008	W1	$34,544	2	$17,272	530,626	108	311,673	60
Superior Water, Light & Power Co	2001	SWLP	$129,295	123	$1,051	1,986,097	573	1,012,301	276
Two Rivers Water & Light	2008	W1	$16,868	3	$5,623	259,109	63	149,288	34
Village of Benton	2001	W2	$2,870			44,083	5	29,169	3
Village of Cadott	2001	W2	$653	138	$5	10,025	2	5,371	1
Village of Mazomanie	2007	W2	$21,254	16	$1,328	326,475	68	198,793	36
Village of New Glarus	2008	W2	$1,135			17,434	3	9,339	2
Village of Stratford	2001	W2	$25,468	4	$6,367	391,218	78	201,454	37
Waterloo Light & Water Comm	2008	W2	$1,422			21,845	10	11,702	5
Waupun Utilities	2008	W2	$26,497	2	$13,249	407,024	85	243,901	50
Whitehall Electric Utility	2008	W2	$31,106	1	$31,106	477,815	81	267,488	43
Wisconsin Electric Power Co (We Energies)	2001	WEP	$12,983,106	2,982	$4,354	199,433,279	33,304	102,942,470	15,750
Wisconsin Public Service Corp	2001	WPS	$9,790,085	218	$44,909	150,385,334	26,006	80,104,510	13,118
Wisconsin Rapids Water Works & Lighting Comm	2008	W2	$5,804	41	$142	89,158	18	53,161	11
Xcel Energy (Northern States Power)	2001	NSP	$6,726,613	92	$73,115	103,327,384	16,985	52,257,787	8,115
Not mapped*			$2,188,435			33,616,510	4,636	15,654,356	2,107

* *Unknown Utility:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-10.
Industrial Programs
Per Capita Energy, Gas Bill Savings by Gas Utility
(July 1, 2001–December 31, 2009)

Wisconsin Focus on Energy Industrial Programs
Per Capita* Energy, Gas Bill Savings by Gas Utility Territory



Per Capita Annual Energy, Gas Bill Savings by Utility Territory

- $0
- $1,840 - $5,620
- $5,621 - $8,960
- > $8,960
- Non Participating Utility Territories

The map above portrays the annual energy, gas bill savings realized in 2009 from projects implemented in industrial sector businesses from July 1, 2001, through December 31, 2009. Gas savings has been valued at the average cost of gas for industrial businesses in Wisconsin and summed for all projects within each utility territory and divided by the number of industrial business customers in that utility territory.

* The unit of population is industrial customers as reported by the utilities in 2008.

Map Produced by: PA Consulting Group and Patrick Engineering Inc.
of The Focus on Energy Evaluation Team. April, 2010.

Table A-10. Industrial Program Gas Impacts
(by Participating Gas Utility)
(July 1, 2001–December 31, 2009)

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross Therms	Persistent Net Therms
Alliant Energy (Wisconsin Power & Light)	2001	WPL	$3,486,414	221	$15,776	3,301,528	2,012,895
City Gas Co	2007	CGC	$198,969	19	$10,472	188,418	154,851
Madison Gas and Electric	2001	MGE	$550,829	65	$8,474	521,619	290,714
Superior Water Light And Power Co	2001	SWLP	$131,016	71	$1,845	124,068	73,585
Wisconsin Electric Gas Operations (We Energies)	2001	WEG	$8,462,578	1,508	$5,612	8,013,805	4,176,033
Wisconsin Gas LLC (We Energies)	2001	WGC	$12,713,086	1,420	$8,953	12,038,907	6,781,805
Wisconsin Public Service Corp	2001	WPS	$21,397,336	1,340	$15,968	20,262,629	12,066,645
Xcel Energy (Northern States Power Co)	2001	Xcel	$8,985,231	20	$449,262	8,508,741	4,984,339
Not mapped*			$327,501			310,134	172,844

* *Unknown Utility:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

A.3 RESIDENTIAL PROGRAMS

In this section, we summarize the verified energy impacts across the Residential Programs through December 31. 2009. The tables and maps below provide energy savings that are based on the evaluators' review of participants, measures installed, and per-unit (measure) savings used by WECC program administrators.

Note: A change in the type of energy impacts data used for the Residential Programs maps. As explained in the Introduction to this Appendix (above), the data reported in all of the maps in this report are *lifecycle verified gross* energy impacts—a recently introduced (for Focus) type of reported energy impacts. As in the past, these are impact estimates based on evaluation work done to establish verified gross for specific programs and/or program areas. However, as discussed in Section 1.1, *lifecycle verified gross* is defined as:

> Energy savings, expressed as *verified gross*, that explicitly incorporate measure life.

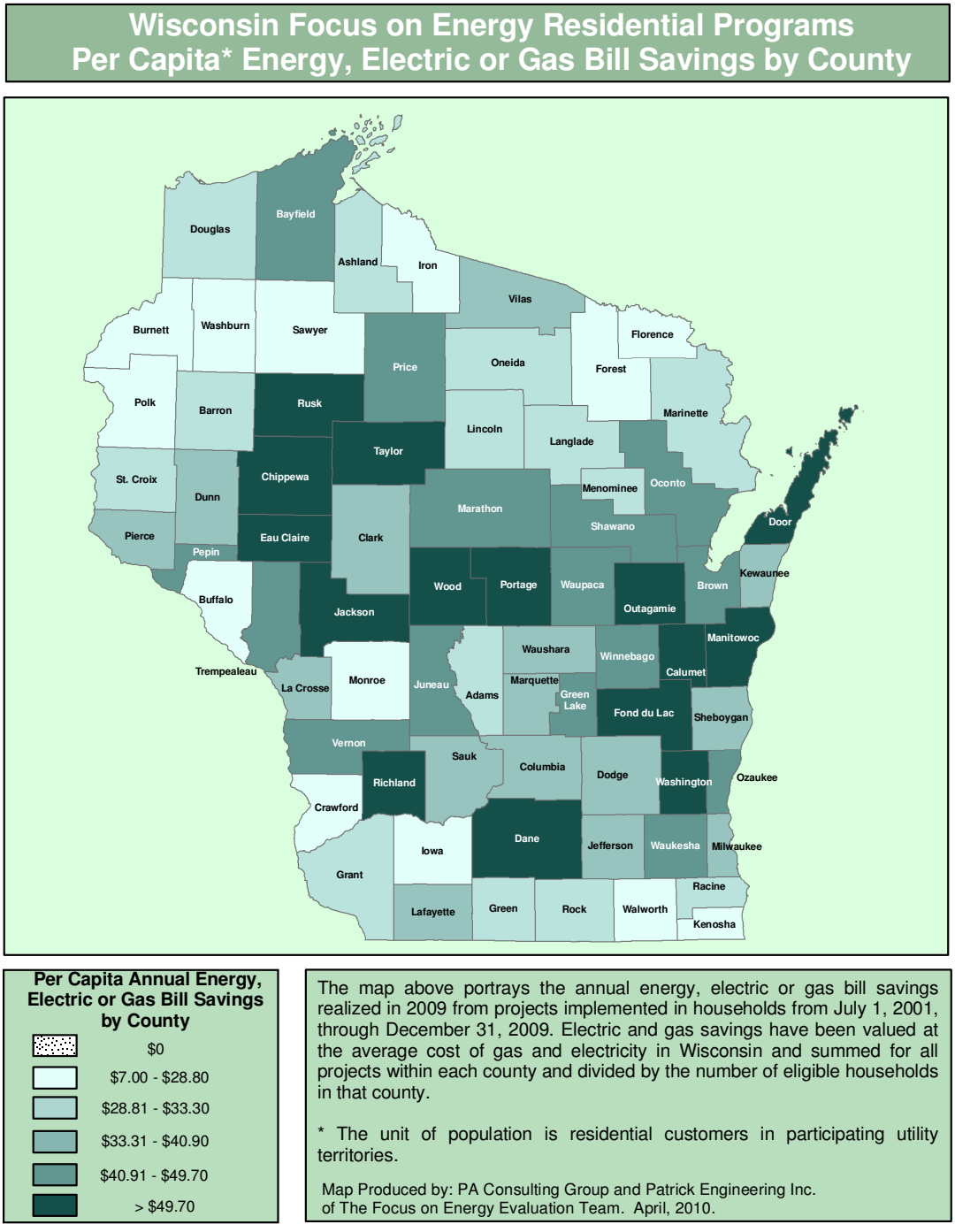
The reader should be aware of this shift since it has the effect of diminishing the levels of reported savings (compared to verified gross savings). This is because verified gross savings do not consider the lifecycle effects (i.e., the median operating life of energy efficiency measures, such as CFLs) that may cause energy savings to end.

In order to provide some continuity in this transition in the basis for the mapped energy impacts, the tables that accompany the maps include a column for verified gross impacts—as in past reports impacts—though these are *lifecycle* verified gross impacts, and will therefore show some differences from past reports. Additional discussion of lifecycle and persistent savings is provided above in Section 2.1.

The *"Number of Customers (Households)"* for each county was estimated by determining the proportion of the area of each census block group that was within the boundaries of a utility participating in the Focus on Energy. This proportion was then applied to the population of that census block group to estimate the number of participating households within the block group. These block group estimates were then aggregated to the county level.

The *"Number of Customers"* presented for each of the participating utilities in Table A-14 are based on the number of customers reported by the utilities in 2005. The *"Number of Customers"* presented for each of the participating utilities in Table A-15 are based on the number of customers reported by the utilities in 2006.

Figure A-11.
Residential Programs
Per Capita Energy, Electric or Gas Bill Savings by County
(July 1, 2001–December 31, 2009)



The map above portrays the annual energy, electric or gas bill savings realized in 2009 from projects implemented in households from July 1, 2001, through December 31, 2009. Electric and gas savings have been valued at the average cost of gas and electricity in Wisconsin and summed for all projects within each county and divided by the number of eligible households in that county.

* The unit of population is residential customers in participating utility territories.

Map Produced by: PA Consulting Group and Patrick Engineering Inc.
of The Focus on Energy Evaluation Team. April, 2010.

Table A-11. Residential Programs Energy Impacts
(by Participating County)
(July 1, 2001–December 31, 2009)

County	Eligible Participants	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
Adams	2,519	$29	564,372	52	7,232	375,673	33	5,696
Ashland	4,950	$29	977,132	117	25,549	647,448	77	20,831
Barron	9,114	$30	2,059,012	196	25,604	1,384,593	134	18,607
Bayfield	3,836	$49	1,269,536	105	34,024	821,470	69	29,718
Brown	87,295	$49	27,509,212	3,742	851,142	19,004,064	2,620	629,846
Buffalo	2,373	$26	365,527	63	16,268	240,468	47	13,832
Burnett	3,486	$15	417,967	36	3,310	275,310	24	2,796
Calumet	13,028	$60	5,434,997	850	122,413	3,739,680	599	95,874
Chippewa	13,563	$61	5,810,257	604	130,379	3,911,975	414	106,052
Clark	7,798	$35	2,100,530	191	24,107	1,381,102	125	18,757
Columbia	15,889	$34	3,962,662	473	71,830	2,608,439	315	54,615
Crawford	4,209	$29	953,315	91	8,946	651,459	62	6,398
Dane	154,704	$63	52,572,595	7,877	2,913,005	36,026,772	5,621	2,085,703
Dodge	27,767	$39	8,074,654	1,329	127,680	5,190,471	909	96,779
Door	6,178	$53	2,578,218	268	26,348	1,741,148	181	22,999
Douglas	14,885	$29	2,709,374	260	97,525	1,774,701	173	79,370
Dunn	8,903	$41	2,831,647	283	30,102	1,909,519	190	22,466
Eau Claire	30,944	$59	13,278,512	1,327	230,890	9,607,283	959	171,673
Florence	1,756	$7	101,774	12	470	65,580	8	373
Fond du Lac	36,540	$52	12,890,165	1,902	319,814	8,715,136	1,358	249,471
Forest	4,043	$26	851,745	82	5,932	584,440	54	4,769
Grant	10,565	$29	2,327,516	310	34,350	1,469,384	197	28,253
Green	11,716	$30	2,568,767	430	39,637	1,691,175	303	32,327
Green Lake	6,843	$48	2,474,876	302	34,234	1,597,794	203	28,151
Iowa	8,753	$27	1,772,957	198	26,226	1,111,691	117	21,544
Iron	2,384	$17	295,661	29	4,639	192,265	18	3,987
Jackson	981	$107	871,622	71	3,798	578,450	46	3,478
Jefferson	22,669	$35	5,727,526	838	97,997	3,789,284	580	79,648
Juneau	2,814	$44	902,367	105	15,643	609,842	72	12,165
Kenosha	56,057	$26	10,203,961	1,666	204,685	6,874,589	1,230	143,869
Kewaunee	7,163	$36	1,947,013	234	25,958	1,292,677	155	20,767
La Crosse	37,142	$38	9,981,049	1,678	206,180	6,858,118	1,267	144,671
Lafayette	3,563	$34	881,049	146	14,878	570,702	101	11,918
Langlade	8,452	$30	1,972,908	222	22,025	1,313,968	149	15,866
Lincoln	11,553	$30	2,390,708	332	56,363	1,634,935	238	39,957
Manitowoc	13,227	$64	6,123,781	959	109,369	4,133,346	661	92,114
Marathon	44,418	$45	13,794,313	2,053	320,040	9,488,389	1,495	234,745
Marinette	16,834	$29	3,779,372	497	44,048	2,531,116	347	36,554
Marquette	2,534	$38	780,760	78	5,981	522,520	53	4,542
Menominee	1,289	$33	246,741	38	10,769	169,532	30	9,355
Milwaukee	377,729	$34	79,394,694	12,580	2,915,570	53,511,436	8,981	1,930,118
Monroe	11,207	$21	1,808,401	238	25,346	1,195,490	160	21,371

County	Eligible Participants	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
Oconto	8,063	$46	2,789,455	309	38,804	1,923,398	214	32,989
Oneida	15,211	$32	3,539,433	463	58,126	2,362,794	310	47,772
Outagamie	46,720	$61	20,204,432	3,110	402,752	13,872,525	2,267	299,747
Ozaukee	25,245	$50	8,872,680	1,749	184,358	6,061,881	1,311	141,032
Pepin	1,916	$42	621,121	52	6,827	405,557	34	5,587
Pierce	3,977	$38	1,038,778	188	24,838	703,061	134	15,124
Polk	8,142	$27	1,576,857	156	32,547	1,036,605	98	23,129
Portage	23,159	$62	9,140,713	1,359	300,122	6,199,119	964	202,286
Price	2,801	$43	943,452	83	8,413	629,724	55	7,767
Racine	70,819	$30	16,119,903	2,666	205,881	10,951,320	1,986	145,075
Richland	2,099	$59	945,574	121	11,115	604,903	79	9,425
Rock	54,206	$33	12,454,147	1,491	292,062	8,198,465	987	200,034
Rusk	3,369	$55	1,423,273	120	16,494	918,073	77	11,152
Sauk	16,064	$36	4,297,171	616	71,938	2,837,381	401	52,276
Sawyer	4,683	$23	879,929	101	6,022	565,509	68	5,071
Shawano	9,375	$42	2,936,843	331	41,326	1,992,163	228	32,671
Sheboygan	34,842	$37	9,053,708	1,539	204,312	6,061,198	1,073	159,629
St. Croix	13,910	$31	2,985,302	442	64,793	2,052,517	330	47,691
Taylor	733	$245	1,292,699	94	24,447	873,472	61	15,248
Trempealeau	2,785	$47	954,467	106	17,327	629,795	71	11,361
Vernon	4,360	$46	1,482,781	149	24,458	999,371	103	17,084
Vilas	8,793	$37	2,497,132	294	33,393	1,688,279	203	28,161
Walworth	31,728	$26	6,074,887	945	97,896	4,112,089	702	70,273
Washburn	3,684	$24	690,749	58	6,311	446,543	38	4,191
Washington	38,827	$57	15,097,661	2,056	365,233	10,213,839	1,476	286,641
Waukesha	128,672	$43	40,651,106	6,970	692,758	27,691,130	5,099	524,793
Waupaca	14,439	$45	4,964,162	777	67,629	3,411,278	574	54,396
Waushara	6,153	$37	1,767,960	257	19,239	1,210,089	186	15,695
Winnebago	55,533	$48	18,302,694	2,670	447,725	12,606,513	1,927	341,541
Wood	9,378	$66	4,399,853	626	90,314	2,930,017	425	71,282
Not mapped*			124,951,415	10,094	905,503	85,896,747	6,568	585,883

* *Unknown County:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-12.
Residential Programs
Implemented Energy, Electric or Gas Bill Savings by Senate District
(July 1, 2001–December 31, 2009)

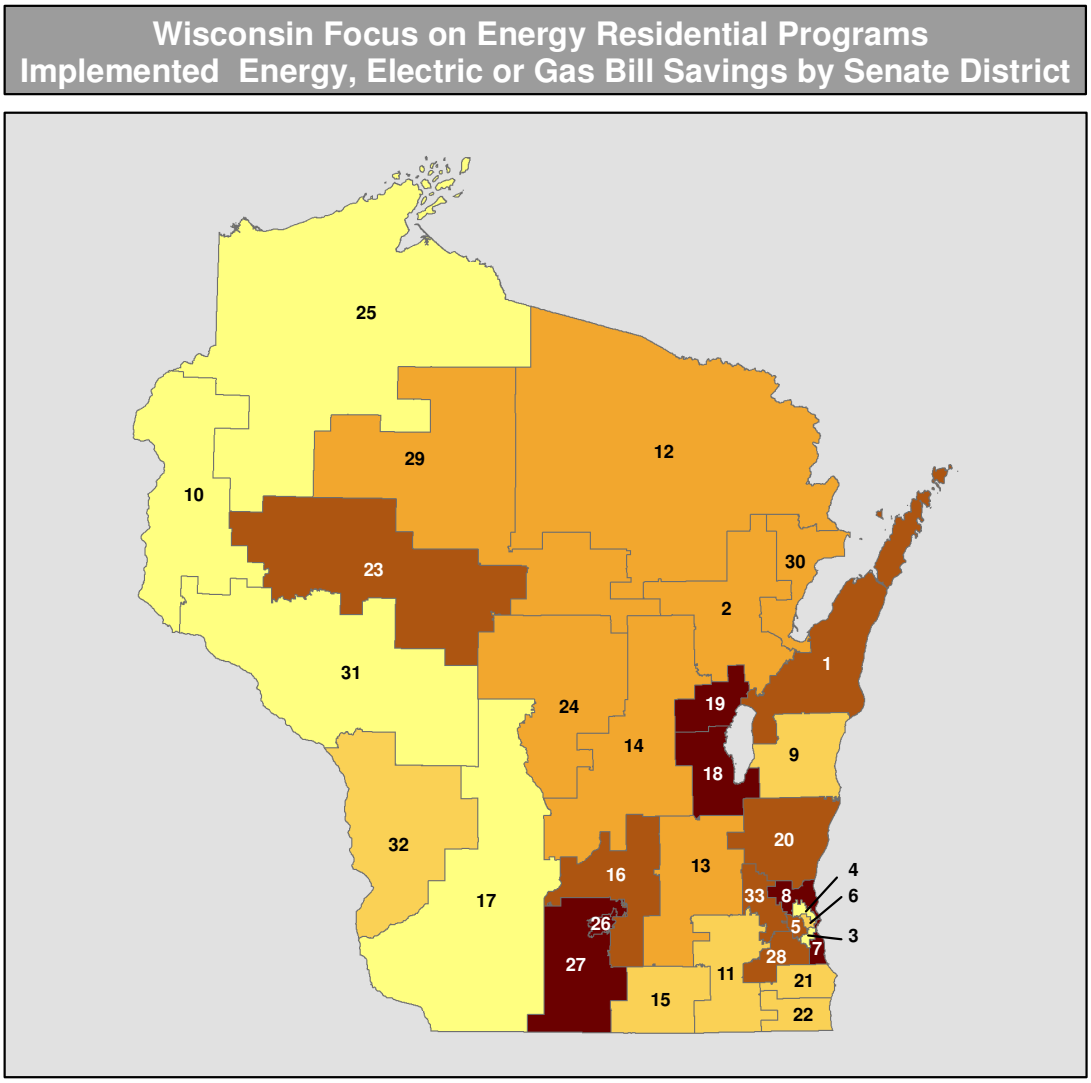


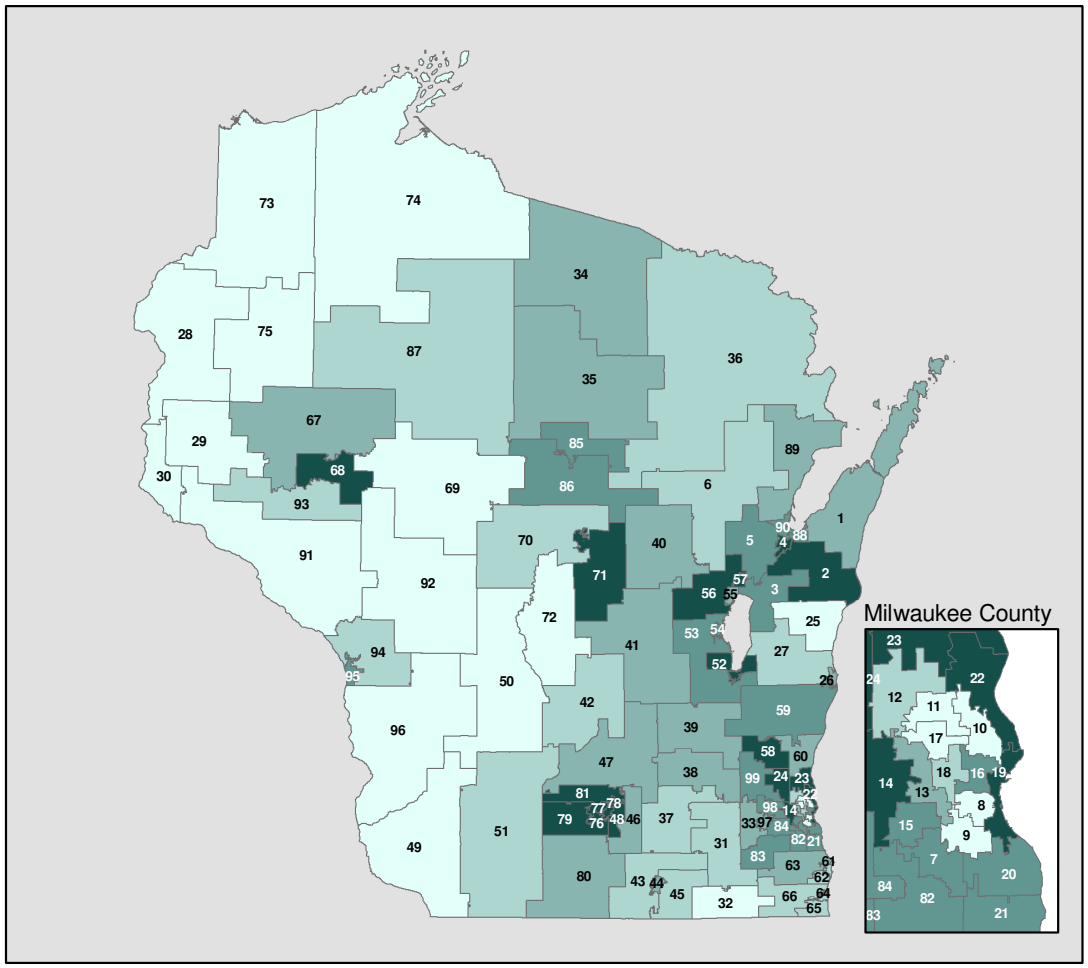
Table A-12. Residential Programs Energy Impacts
(by Senate District)
(July 1, 2001–December 31, 2009)

Senate District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
1	$2,602,318	18,357,649	2,580	387,146	12,489,202	1,796	303,201
2	$2,434,941	16,568,272	2,311	417,669	11,395,593	1,617	317,848
3	$1,590,424	10,208,971	1,524	328,617	6,886,390	1,072	202,973
4	$1,123,290	7,013,877	917	249,994	4,720,620	644	164,504
5	$2,583,285	18,022,112	3,310	402,643	12,298,723	2,418	297,746
6	$1,770,526	8,875,618	1,224	592,518	6,052,713	867	401,799
7	$3,573,615	20,965,733	3,191	918,085	13,856,831	2,195	573,138
8	$3,059,479	19,848,711	3,539	613,047	13,490,338	2,628	429,820
9	$1,708,702	11,897,664	2,026	268,419	8,009,879	1,412	211,488
10	$992,814	7,015,242	923	146,645	4,754,488	654	103,279
11	$1,886,929	13,714,260	2,230	244,001	9,218,876	1,634	185,396
12	$1,986,181	14,989,588	1,814	206,392	10,102,693	1,248	160,430
13	$1,967,986	14,159,863	2,183	267,552	9,243,646	1,498	208,946
14	$1,969,335	14,537,356	2,057	234,245	9,761,600	1,437	177,760
15	$1,878,790	13,058,791	1,587	297,250	8,609,002	1,062	200,858
16	$2,717,413	15,736,287	2,336	716,904	10,609,971	1,624	561,837
17	$1,243,112	9,293,769	1,197	137,183	5,993,232	782	110,871
18	$2,920,054	19,256,324	2,738	556,686	13,134,808	1,974	420,848
19	$3,305,740	23,530,220	3,644	472,636	16,237,604	2,675	353,526
20	$2,585,075	17,980,394	2,628	407,857	12,102,233	1,882	328,799
21	$1,790,048	13,656,695	2,227	172,597	9,268,994	1,649	121,673
22	$1,626,180	11,400,875	1,880	248,369	7,713,759	1,399	171,582
23	$2,620,438	19,329,849	1,867	312,953	13,566,003	1,310	240,191
24	$2,167,381	14,378,569	2,063	405,386	9,687,609	1,440	284,465
25	$1,285,007	8,927,686	867	203,663	5,865,291	579	164,493
26	$4,615,087	22,975,400	3,582	1,559,033	15,982,035	2,596	1,045,242
27	$3,094,991	18,502,459	2,617	763,733	12,443,140	1,850	569,756
28	$2,679,629	19,701,411	3,246	325,947	13,361,124	2,362	237,535
29	$2,319,236	16,246,606	2,219	355,420	11,104,555	1,602	257,109
30	$2,489,964	16,235,189	2,128	491,530	11,169,668	1,483	361,520
31	$1,260,704	9,068,515	1,028	171,612	6,106,600	706	134,245
32	$1,794,044	12,824,640	1,971	251,525	8,764,842	1,465	176,770
33	$2,511,694	18,060,920	3,108	342,470	12,355,734	2,290	252,109
Not mapped*	$15,029,568	124,170,066	10,095	583,539	85,520,999	6,572	385,271

* *Unknown district:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of state boundaries according to the GIS mapping application.

Figure A-13.
Residential Programs
Implemented Energy, Electric or Gas Bill Savings by Assembly District
(July 1, 2001–December 31, 2009)

Wisconsin Focus on Energy Residential Programs Implemented Energy, Electric or Gas Bill Savings by Assembly District



Implemented Annual Energy, Electric or Gas Bill Savings by Assembly District

	$0
	$258,690 - $508,900
	$508,901 - $619,300
	$619,301 - $789,700
	$789,701 - $968,100
	> $968,100

The map above portrays the annual energy, electric or gas bill savings realized in 2009 from projects implemented in households from July 1, 2001, through December 31, 2009. Electric and gas savings have been valued at the average cost of gas and electricity in Wisconsin and summed for all projects within each Wisconsin Assembly District. This does not take into account the opportunity for savings within each district and therefore makes it difficult to compare savings across districts.

Map Produced by: PA Consulting Group and Patrick Engineering Inc.
of The Focus on Energy Evaluation Team. April, 2010.

Table A-13. Residential Programs Energy Impacts
(by Assembly District)
(July 1, 2001–December 31, 2009)

Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
1	$692,759	5,275,215	600	67,707	3,554,591	406	56,233
2	$970,918	6,553,737	901	171,347	4,459,626	624	131,655
3	$938,691	6,529,133	1,079	148,092	4,475,229	766	115,313
4	$1,003,047	7,054,215	1,010	151,192	4,865,958	713	117,975
5	$915,884	5,603,483	817	214,338	3,874,505	568	158,547
6	$515,879	3,909,429	485	52,139	2,654,224	336	41,326
7	$893,733	5,551,377	912	201,558	3,752,587	648	118,546
8	$272,728	1,783,522	179	53,358	1,224,493	123	34,032
9	$424,118	2,875,192	434	73,721	1,909,827	302	50,401
10	$351,644	2,331,156	271	65,924	1,567,179	189	47,372
11	$261,813	1,641,146	228	57,688	1,096,633	159	40,534
12	$509,713	3,040,748	417	126,363	2,056,221	296	76,583
13	$732,030	5,006,075	923	123,284	3,376,970	665	96,298
14	$1,053,017	7,495,053	1,300	150,582	5,138,526	961	111,771
15	$798,119	5,520,160	1,087	128,756	3,782,890	792	89,670
16	$835,628	3,202,302	488	369,496	2,170,697	337	235,958
17	$375,711	2,717,875	356	49,750	1,816,719	252	38,524
18	$559,154	2,955,156	381	173,272	2,065,126	278	127,317
19	$1,824,631	8,894,202	1,267	633,630	5,806,752	845	386,020
20	$945,782	6,279,971	1,040	176,390	4,124,995	701	111,792
21	$803,203	5,791,560	884	108,065	3,925,085	649	75,325
22	$1,051,365	6,294,215	1,228	258,624	4,272,955	924	191,411
23	$1,034,233	6,664,466	1,383	211,355	4,581,961	1,052	137,297
24	$973,991	6,890,770	928	143,088	4,635,955	653	101,126
25	$464,968	3,314,615	565	66,026	2,231,994	385	55,345
26	$670,275	4,466,102	878	123,597	2,993,756	623	95,053
27	$573,483	4,117,162	583	78,796	2,784,320	403	61,091
28	$258,692	1,851,307	185	36,081	1,217,692	119	25,975
29	$442,038	3,081,758	384	69,088	2,090,332	264	46,580
30	$292,084	2,082,177	353	41,476	1,446,464	271	30,724
31	$619,254	4,582,275	724	72,653	3,049,249	522	59,074
32	$498,008	3,657,354	558	60,954	2,444,193	407	42,659
33	$769,669	5,474,646	949	110,393	3,725,450	704	83,663
34	$765,602	5,669,919	702	89,394	3,796,911	472	73,926
35	$647,349	4,708,417	601	83,394	3,201,258	425	59,494
36	$573,322	4,612,054	512	33,603	3,105,279	351	27,010
37	$550,101	3,990,422	556	71,838	2,637,820	383	59,117
38	$628,815	4,229,101	652	112,378	2,799,959	444	85,069
39	$789,160	5,941,123	975	83,336	3,806,299	671	64,760
40	$693,899	5,223,052	820	73,359	3,596,949	606	58,612
41	$741,186	5,612,413	734	75,314	3,704,137	505	60,657
42	$534,280	3,702,152	503	85,572	2,460,759	326	58,491

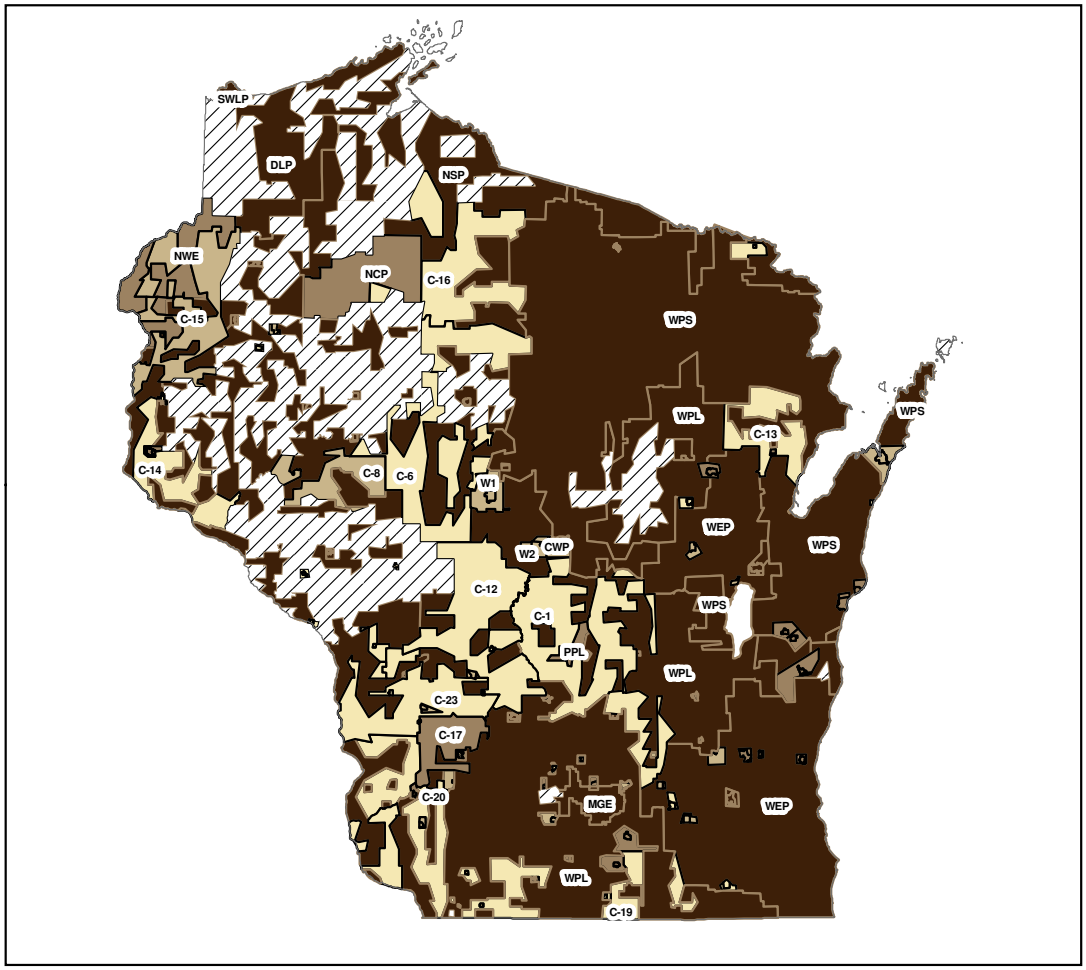
Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
43	$589,053	4,353,631	529	69,580	2,898,058	363	50,162
44	$710,926	4,750,172	587	129,890	3,103,076	390	87,941
45	$578,812	3,954,988	471	97,779	2,607,867	309	62,754
46	$667,408	3,717,618	472	189,486	2,513,662	318	148,857
47	$742,735	5,254,788	691	109,105	3,419,733	461	89,675
48	$1,307,200	6,763,272	1,174	418,312	4,676,265	844	323,304
49	$337,277	2,508,810	331	38,381	1,580,090	210	31,189
50	$349,946	2,633,482	339	37,051	1,770,172	233	29,577
51	$555,858	4,151,217	527	61,751	2,642,725	338	50,105
52	$1,127,999	7,387,492	1,159	219,698	5,083,312	852	165,476
53	$896,300	6,220,408	859	142,667	4,172,845	604	112,875
54	$895,755	5,648,423	720	194,320	3,878,651	518	142,496
55	$789,620	5,767,968	910	99,467	4,005,531	651	74,157
56	$1,405,200	9,829,285	1,420	216,653	6,690,974	1,048	170,651
57	$1,110,919	7,932,966	1,313	156,515	5,541,099	977	108,718
58	$1,028,409	6,879,966	967	187,124	4,688,229	700	147,706
59	$821,362	5,758,748	818	125,419	3,818,454	567	105,117
60	$735,280	5,341,465	843	95,314	3,595,359	615	75,975
61	$547,590	4,628,032	603	11,791	3,155,271	441	10,929
62	$573,757	4,002,879	788	89,419	2,725,900	592	58,308
63	$668,701	5,025,784	836	71,387	3,387,823	616	52,435
64	$512,791	3,244,517	510	110,243	2,198,864	374	68,850
65	$544,244	3,981,745	756	67,995	2,718,098	575	52,349
66	$569,144	4,174,613	615	70,132	2,796,796	451	50,384
67	$661,406	4,932,422	478	74,117	3,325,713	325	60,464
68	$1,450,201	10,788,641	1,040	164,896	7,857,347	756	121,656
69	$508,809	3,608,595	349	73,940	2,382,816	229	58,070
70	$559,987	4,116,299	553	68,197	2,720,290	371	54,557
71	$1,204,778	7,496,260	1,107	270,537	5,082,433	785	176,904
72	$402,616	2,766,010	403	66,652	1,884,886	284	53,005
73	$490,585	3,162,841	298	100,112	2,070,849	198	81,463
74	$472,073	3,326,660	342	70,550	2,164,804	226	59,754
75	$322,349	2,438,185	227	33,001	1,629,637	156	23,276
76	$1,502,665	7,239,549	1,306	529,583	4,950,257	953	367,138
77	$1,537,495	7,750,009	1,224	510,656	5,413,443	882	314,305
78	$1,574,881	7,985,451	1,052	518,794	5,618,028	761	363,800
79	$1,381,312	7,969,804	1,146	367,079	5,351,403	810	283,258
80	$662,177	4,785,770	706	88,081	3,156,358	493	71,030
81	$1,051,525	5,747,086	765	308,572	3,935,549	547	215,468
82	$955,762	6,812,240	1,102	135,818	4,622,017	805	92,594
83	$790,734	5,873,136	919	90,773	3,966,494	669	70,050
84	$933,142	7,016,114	1,225	99,357	4,772,657	888	74,891
85	$942,460	5,981,166	885	200,972	4,126,789	646	142,244
86	$862,745	6,359,516	1,016	103,453	4,396,504	749	79,587
87	$514,020	3,905,831	318	50,996	2,581,169	207	35,278
88	$849,579	5,222,892	713	196,538	3,604,303	498	133,747

Assembly District	Annual Dollars Saved	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms	Persistent Net kWh	Persistent Net kW	Persistent Net Therms
89	$706,463	5,011,689	646	102,546	3,404,184	450	86,967
90	$933,922	6,000,608	769	192,446	4,161,182	535	140,807
91	$311,130	2,224,972	252	43,541	1,466,030	173	33,237
92	$339,108	2,736,444	287	19,101	1,823,458	192	17,480
93	$610,487	4,107,290	490	108,970	2,817,238	341	83,528
94	$558,273	4,208,744	699	58,423	2,931,112	531	46,529
95	$867,519	5,841,833	986	154,371	3,970,544	740	102,322
96	$368,251	2,774,063	286	38,732	1,863,186	194	27,919
97	$708,298	4,668,024	970	135,292	3,194,004	721	91,053
98	$968,001	7,196,384	1,279	110,520	5,000,319	957	84,457
99	$835,395	6,196,513	860	96,658	4,161,411	612	76,600
Not mapped*	$15,029,568	124,170,066	10,095	583,539	85,520,999	6,572	385,271

* *Unknown District*: The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of state boundaries according to the GIS mapping application.

Figure A-14.
Residential Programs
Per Capita Energy, Electric Bill Savings by Electric Utility Territory
(July 1, 2001–December 31, 2009)

Wisconsin Focus on Energy Residential Programs
Per Capita* Energy, Electric Bill Savings by Electric Utility Territory



Per Capita Annual Energy, Electric Bill Savings by Utility Territory

- $0
- $0.10 - $2.70
- $2.71 - $4.80
- $4.81 - $8.20
- > $8.20
- Non Participating Utility Territories

The map above portrays the annual energy, electric bill savings realized in 2009 from projects implemented in households from July 1, 2001, through December 31, 2009. Electric savings has been valued at the average cost of electricity in Wisconsin and summed for all projects within each utility territory and divided by the number of residential customers in that utility territory.

* The unit of population is residential customers as reported by the utilities in 2007.

Map Produced by: PA Consulting Group and Patrick Engineering Inc. of The Focus on Energy Evaluation Team. April, 2010.

Table A-14. Residential Programs Electric Impacts
(by Participating Electric Utility)
(July 1, 2001–December 31, 2009)

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Peristent Net kWh	Persistent Net kW
Adams-Columbia Electric Coop	2009	C-1	7,301	33,670	$0	63,436	12	27,482	3
Algoma Utility Comm	2008	W2	1,404	1,644	$1	12,200	1	8,576	1
Alliant Energy (Wisconsin Power & Light)	2001	WPL	7,879,913	393,691	$20	68,461,452	9,638	48,009,389	7,173
Bloomer Electric & Water Co	2001	W1	26,195	1,575	$17	227,589	20	152,248	13
Brodhead Water & Lighting Comm	2008	W1	3,199	1,498	$2	27,790	3	18,696	2
Cedarburg Light & Water Comm	2008	W1	39,587	5,153	$8	343,932	46	236,575	27
City of Arcadia	2009	W1	366	1,143	$0	3,179	1	1,607	0
City of Argyle	2001	W1	8,287	394	$21	71,999	13	53,464	10
City of Bangor	2008	W2	2,622	1,366	$2	22,782	3	16,863	2
City of Barron	2009	W1	534	1,456	$0	4,642	1	2,373	1
City of Black River Falls	2008	W1	10,408	2,170	$5	90,430	9	60,416	6
City of Boscobel	2008	W1	8,127	1,423	$6	70,605	5	49,777	3
City of Clintonville	2008	W1	3,525	2,272	$2	30,621	3	22,594	2
City of Columbus	2008	W2	9,215	2,252	$4	80,060	8	55,635	5
City of Cornell	2001	W1	26,837	716	$37	233,159	11	179,241	8
City of Cuba City	2008	W2	1,046	934	$1	9,089	1	5,919	0
City of Cumberland	2001	W1	26,266	1,117	$24	228,199	25	158,637	18
City of Eagle River	2008	W2	7,402	847	$9	64,310	5	44,792	3
City of Elkhorn	2009	W2	1,363	3,937	$0	11,845	2	5,119	1
City of Elroy	2007	W2	2,350	755	$3	20,414	2	14,823	2
City of Evansville	2008	W2	24,306	3,058	$8	211,170	19	147,528	12

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Peristent Net kWh	Persistent Net kW
City of Fennimore	2008	W2	3,327	1,121	$3	28,905	4	20,008	3
City of Kaukauna	2008	W2	118,491	12,531	$9	1,029,460	127	709,492	76
City of Kiel	2007	W2	15,652	2,129	$7	135,983	13	99,436	9
City of Lodi	2008	W2	8,925	1,382	$6	77,538	7	57,087	4
City of Marshfield	2008	W2	35,229	11,216	$3	306,076	35	206,037	17
City of Medford	2007	W2	27,096	2,574	$11	235,412	18	165,945	11
City of Menasha	2008	W2	35,371	8,008	$4	307,305	34	214,675	21
City of Muscoda	2008	W2	3,132	933	$3	27,215	3	18,312	2
City of New Holstein	2008	W2	18,311	2,234	$8	159,084	15	116,420	9
City of New Lisbon	2009	W2	197	662	$0	1,709	0	735	0
City of New Richmond	2008	W2	9,273	3,525	$3	80,565	13	57,136	8
City of Plymouth	2008	W2	35,984	6,842	$5	312,629	37	209,388	19
City of Princeton	2001	W2	10,618	706	$15	92,253	9	65,453	6
City of Richland Center	2008	W2	10,394	2,438	$4	90,300	11	62,672	6
City of River Falls	2008	W2	30,593	5,162	$6	265,792	23	176,010	14
City of Shullsburg	2007	W2	1,903	639	$3	16,535	2	11,014	1
City of Spooner	2001	W1	11,522	1,254	$9	100,103	8	64,789	5
City of Stoughton	2008	W1	40,406	7,563	$5	351,051	44	238,338	24
City of Sturgeon Bay	2008	W1	25,536	7,361	$3	221,862	19	157,867	12
City of Westby	2008	W2	1,189	971	$1	10,334	1	6,304	1
Clark Electric Coop	2009	C-6	6,496	8,716	$1	56,434	7	33,865	3
Consolidated Water Power Co	2001	CWP	20,897	984	$21	181,556	28	130,024	21
Dahlberg Light & Power Co	2001	DLP	86,689	9,945	$9	753,166	57	495,613	38
Eau Claire Electric Coop	2007	C-8	33,281	9,773	$3	289,147	28	206,469	19
Florence Utility Comm	2008	W1	1,403	1,341	$1	12,186	1	8,612	1

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Peristent Net kWh	Persistent Net kW
Hartford Electric	2008	W1	35,145	5,670	$6	305,345	27	212,826	17
Hustisford Utilities	2008	W1	4,674	1,318	$4	40,609	5	28,003	3
Jefferson Utilities	2008	W1	14,729	3,448	$4	127,966	14	88,567	8
Juneau Utility Comm	2008	W2	3,204	940	$3	27,838	3	19,319	2
La Farge Municipal Electric Co	2001	W2	1,371	448	$3	11,913	1	8,103	1
Lake Mills Light & Water	2008	W2	7,994	3,368	$2	69,456	10	49,483	6
Madison Gas & Electric Co	2001	MGE	4,107,787	118,959	$35	35,688,853	5,487	25,025,129	4,013
Manitowoc Public Utilities	2007	W1	82,694	15,621	$5	718,455	81	506,409	47
New London Electric & Water	2008	W2	13,604	3,271	$4	118,195	15	85,792	10
North Central Power Co, Inc	2001	NCP	32,965	4,369	$8	286,399	25	187,402	17
Northwestern Wisconsin Elec Co	2001	NWE	59,183	11,557	$5	514,186	43	355,133	29
Oakdale Electric Coop	2008	C-12	22,060	14,441	$2	191,664	24	116,067	12
Oconomowoc Utilities	2008	W1	66,736	7,482	$9	579,805	62	395,766	37
Oconto Electric Coop	2009	C-13	11,558	9,294	$1	100,418	12	66,048	5
Oconto Falls Water & Light Comm	2008	W2	8,387	1,334	$6	72,868	6	51,126	4
Pierce-Pepin Coop Services	2009	C-14	7,274	6,964	$1	63,199	9	38,109	3
Pioneer Power & Light Co	2001	PPL	12,657	1,983	$6	109,968	9	73,266	6
Price Electric Coop, Inc	2007	C-16	20,791	8,663	$2	180,635	14	125,056	9
Reedsburg Utility Comm	2008	W1	34,188	4,149	$8	297,030	32	212,715	23
Rice Lake Utilities	2007	W1	15,213	4,422	$3	132,171	10	97,136	6
Richland Electric Coop	2006	C-17	17,773	3,489	$5	154,410	16	105,043	10
Rock Energy Coop	2009	C-19	1,025	6,304	$0	8,901	2	3,697	0

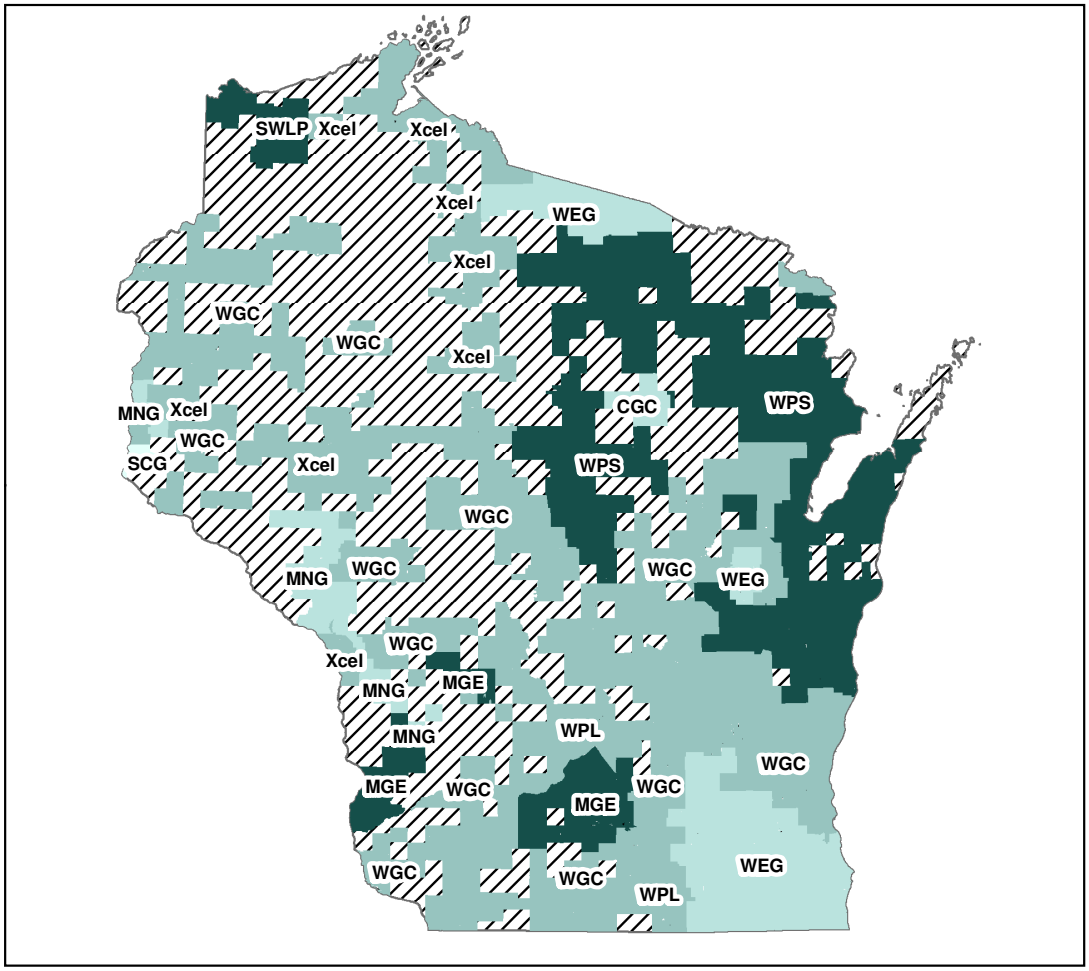
Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Peristent Net kWh	Persistent Net kW
Scenic Rivers Energy Coop	2007	C-20	29,789	12,429	$2	258,809	24	181,916	15
Shawano Municipal Utilities	2007	W1	32,038	4,151	$8	278,348	25	197,057	15
Slinger Utilities	2008	W1	10,406	1,718	$6	90,408	9	65,058	6
Sun Prairie Water & Light Comm	2008	W1	50,938	11,253	$5	442,554	57	301,789	30
Superior Water, Light & Power Co	2001	SWLP	215,889	12,526	$17	1,875,667	187	1,244,700	128
Two Rivers Water & Light	2008	W1	37,064	5,561	$7	322,018	41	199,238	22
Vernon Electric Coop	2009	C-23	5,082	10,265	$0	44,156	6	24,943	2
Village of Belmont	2007	W2	1,922	535	$4	16,703	2	10,821	1
Village of Benton	2001	W2	1,585	486	$3	13,774	3	9,445	2
Village of Cadott	2001	W2	19,635	641	$31	170,594	17	117,323	12
Village of Cashton	2001	W2	7,320	484	$15	63,600	13	44,111	10
Village of Centuria	2001	W2	3,269	289	$11	28,399	3	16,573	2
Village of Gresham	2001	W2	12,262	948	$13	106,536	8	71,308	5
Village of Mazomanie	2007	W2	5,167	802	$6	44,889	5	31,968	3
Village of Mt Horeb	2008	W2	14,631	3,068	$5	127,117	13	90,933	8
Village of New Glarus	2008	W2	6,342	1,002	$6	55,103	6	38,886	4
Village of Pardeeville	2001	W2	20,940	1,210	$17	181,927	18	126,991	13
Village of Prairie Du Sac	2008	W2	7,868	1,669	$5	68,355	7	44,620	4
Village of Sauk City	2009	W2	863	1,553	$1	7,500	2	3,274	1
Village of Stratford	2001	W2	22,517	679	$33	195,628	14	135,129	10
Village of Trempealeau	2009	W2	197	981	$0	1,708	0	701	0
Village of Viola	2001	W2	988	337	$3	8,581	0	6,186	0
Village of Waunakee	2008	W2	27,598	4,369	$6	239,778	30	167,176	17

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Peristent Net kWh	Persistent Net kW
Waterloo Light & Water Comm	2008	W2	5,694	1,505	$4	49,470	4	35,059	3
Waupun Utilities	2008	W2	22,558	3,707	$6	195,982	16	141,086	11
Whitehall Electric Utility	2008	W2	16,725	746	$22	145,313	24	108,146	17
Wisconsin Dells Electric Utility	2007	W2	4,169	1,279	$3	36,220	3	26,864	2
Wisconsin Electric Power Co (We Energies)	2001	WEP	23,127,449	968,454	$24	200,933,531	32,135	140,469,653	24,106
Wisconsin Public Service Corp	2001	WPS	9,137,853	370,222	$25	79,390,553	10,982	55,910,342	8,055
Wisconsin Rapids Water Works & Lighting Comm	2008	W2	50,309	10,867	$5	437,087	78	289,565	46
Wonewoc Electric & Water Utility	2001	W2	2,789	438	$6	24,230	3	16,949	2
Xcel Energy (Northern States Power Co)	2001	NSP	4,684,887	206,386	$23	40,702,757	5,000	28,609,877	3,705
Not mapped*			20,570,730			178,720,505	17,836	112,487,456	10,273

* *Unknown Utility:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

Figure A-15.
Residential Programs
Per Capita Energy, Gas Bill Savings by Gas Utility
(July 1, 2001–December 31, 2009)

Wisconsin Focus on Energy Residential Programs
Per Capita* Energy, Gas Bill Savings by Gas Utility Territory



Per Capita Annual Energy, Gas Bill Savings by Utility Territory

- $0
- $1.20 - $1.30
- $1.31 - $6.40
- $6.41 - $9.20
- > $9.20
- Non Participating Utility Territories

The map above portrays the annual energy, gas bill savings realized in 2009 from projects implemented in households from July 1, 2001, through December 31, 2009. Gas savings has been valued at the average cost of gas in Wisconsin and summed for all projects within each utility territory and divided by the number of residential customers in that utility territory.

* The unit of population is residential customers as reported by the utilities in 2008.

Map Produced by: PA Consulting Group and Patrick Engineering Inc. of The Focus on Energy Evaluation Team. April, 2010.

Table A-15. Residential Programs Gas Impacts
(by Participating Gas Utility)
(July 1, 2001–December 31, 2009)

Utility Name	Joined Focus	Map Code	Annual Dollars Saved	Number of Customers	Annual Dollars per Capita	Lifecycle Verified Gross Therms	Persistent Net Therms
Alliant Energy (Wisconsin Power & Light)	2001	WPL	$1,389,532	157,469	$9	1,099,313	824,731
City Gas Co	2007	CGC	$9,488	4,148	$2	7,506	5,576
Madison Gas and Electric	2001	MGE	$3,081,115	127,257	$24	2,437,591	1,795,097
Midwest Natural Gas Inc.	2007	MNG	$21,899	12,604	$2	17,325	12,534
St. Croix Gas	2007	SCG	$8,656	6,804	$1	6,848	4,601
Superior Water Light And Power Co	2001	SWLP	$131,333	10,943	$12	103,903	81,651
Wisconsin Electric Gas Operations (We Energies)	2001	WEG	$2,677,951	420,111	$6	2,118,632	1,534,076
Wisconsin Gas LLC (We Energies)	2001	WGC	$4,845,463	538,408	$9	3,833,436	2,768,365
Wisconsin Public Service Corp	2001	WPS	$2,825,055	280,852	$10	2,235,012	1,681,952
Xcel Energy (Northern States Power Co)	2001	Xcel	$798,896	86,912	$9	632,038	472,020
Not mapped*			$1,973,938			1,561,660	936,426

* *Unknown Utility:* The impacts for these participants are not mapped either because their address information is not complete or because their address falls out of the boundaries of participating utility territory according to the GIS mapping application.

A.4 RENEWABLE ENERGY PROGRAM

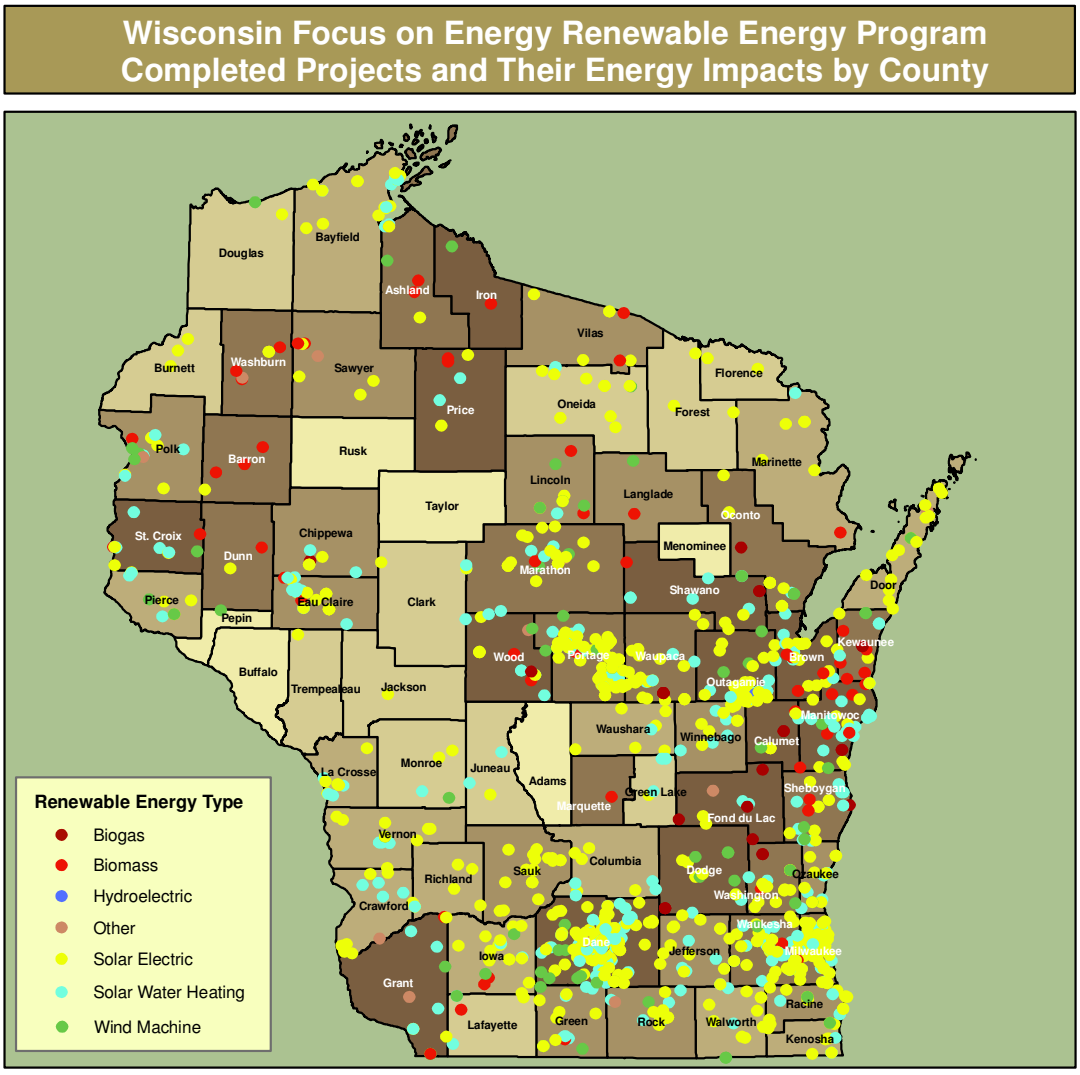
In this section, we summarize the verified energy impacts across the Renewable Energy Programs through December 31, 2009.

Note: A change in the type of energy impacts data used for the Renewable Energy Programs maps. As explained in the Introduction to this Appendix, the data reported in all of the maps in this report are *lifecycle verified gross* energy impacts—a recently introduced (for Focus) type of reported energy impacts. As in the past, these are impact estimates based on evaluation work done to establish verified gross for specific programs and/or program areas. However, as discussed in Section 1.1, *lifecycle verified gross* is defined as:

> Energy savings, expressed as *verified gross*, that explicitly incorporate measure life.

In order to provide some continuity in this transition in the basis for the mapped energy impacts, the tables that accompany the maps include a column for verified gross impacts—as in past reports impacts—though these are *lifecycle* verified gross impacts, and will therefore show some differences from past reports. Additional discussion of lifecycle and persistent savings is provided above in Section 2.1.

Figure A-16.
Renewable Energy Program
Completed Projects and Their Energy Impacts by County
(July 1, 2001–December 31, 2009)



Annual Value of Energy Impacts

	$0
	$0.01 - $2,500
	$2,501 - $11,300
	$11,301 - $36,300
	$36,301 - $325,800
	> $325,800

The map above portrays the annual retail value of the energy impacts realized in 2009 from renewable energy projects installed from July 1, 2001, through December 31, 2009. Electric and gas savings have been valued at the average cost of gas and electricity in Wisconsin and summed for all projects within each county. Location of Individual projects is also shown on the map.

Map Produced by: PA Consulting Group and Patrick Engineering Inc.
of The Focus on Energy Evaluation Team. April, 2010.

Table A-16. Renewable Programs Energy Impacts
(by County)
(July 1, 2001– December 31, 2009)

County	Annual Dollars	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms
Ashland	$278,874	20,881	15	248,596
Barron	$280,697	450	0	251,935
Bayfield	$6,585	44,183	19	2,231
Brown	$6,207,743	-1,632,860	-13	5,708,503
Buffalo	$0	0	0	0
Burnett	$959	10,333	4	0
Calumet	$779,114	8,165,881	1,275	19,138
Chippewa	$21,249	226,597	41	199
Clark	$1,905	19,336	6	100
Columbia	$5,343	44,688	25	1,074
Crawford	$5,373	57,893	17	0
Dane	$1,524,457	16,056,737	2,233	30,873
Dodge	$346,588	3,734,784	602	0
Door	$6,954	63,600	43	945
Douglas	$431	4,643	6	0
Dunn	$56,291	8,971	2	49,783
Eau Claire	$36,238	42,297	15	29,006
Florence	$135	1,455	1	0
Fond Du Lac	$691,933	7,343,190	996	9,412
Forest	$372	4,013	3	0
Grant	$731,755	273,915	207	634,054
Green	$15,550	64,331	25	8,600
Green Lake	$1,145	6,434	6	491
Iowa	$10,971	91,396	37	2,235
Iron	$678,106	-437,210	-41	645,134
Jackson	$895	9,643	3	0
Jefferson	$21,689	134,156	62	8,294
Juneau	$1,260	6,099	1	623
Kenosha	$11,279	119,258	44	190
Kewaunee	$302,093	3,174,836	365	6,704
La Crosse	$9,370	65,831	34	2,927
Lafayette	$1,674	13,418	4	385
Langlade	$17,162	72,747	64	9,346
Lincoln	$19,393	56,552	44	12,697
Manitowoc	$377,519	2,578,419	364	124,095
Marathon	$321,530	168,518	58	274,589
Marinette	$8,591	8,793	7	6,980
Marquette	$61,202	0	0	54,939
Milwaukee	$58,944	458,382	246	14,727
Monroe	$2,479	26,712	8	0
Oconto	$194,833	2,098,695	261	67
Oneida	$2,423	22,206	15	325
Outagamie	$659,352	7,055,390	1,333	4,139
Ozaukee	$14,661	154,504	52	290

County	Annual Dollars	Lifecycle Verified Gross kWh	Lifecycle Verified Gross kW	Lifecycle Verified Gross Therms
Pierce	$6,286	55,633	14	1,008
Polk	$21,407	145,641	42	7,084
Portage	$42,191	371,041	171	6,964
Price	$1,005,069	473,240	3	862,794
Racine	$19,794	210,374	117	243
Richland	$5,352	57,676	21	0
Rock	$34,017	363,242	61	277
Sauk	$15,863	170,932	64	0
Sawyer	$28,594	11,337	6	24,723
Shawano	$694,986	6,112,391	735	114,682
Sheboygan	$88,438	82,645	37	72,504
St. Croix	$330,807	-149,261	-38	309,389
Taylor	$0	0	0	0
Trempealeau	$876	9,444	4	0
Vernon	$5,118	54,592	21	47
Vilas	$22,703	17,281	8	18,940
Walworth	$10,541	111,167	41	201
Washburn	$72,389	6,986	5	64,400
Washington	$142,731	1,452,057	218	7,164
Waukesha	$62,992	198,383	108	40,019
Waupaca	$325,773	3,359,095	461	12,611
Waushara	$2,593	27,946	15	0
Winnebago	$13,830	100,015	45	4,083
Wood	$1,280,060	82,498	29	1,142,194
Not mapped*	$746,048	7,846,713	1,068	16,044

Table A-17. Participant Avoided Costs Used to Value Mapped Energy Savings

Rate Class	kWh Cost	Therm Cost	kWh Source	kWh Report Year	Therm Source	Therm Report Year
Commercial	$0.09	$1.11	http://www.eia.doe.gov/cneaf/electricity/epa/average_price_state.xls	2008	http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SWI_a.htm	2008
Residential	$0.12	$1.26	http://www.eia.doe.gov/cneaf/electricity/epa/average_price_state.xls	2008	http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SWI_a.htm	2008
Industrial	$0.07	$1.06	http://www.eia.doe.gov/cneaf/electricity/epa/average_price_state.xls	2008	http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SWI_a.htm	2008

APPENDIX B: RESIDENTIAL DEFAULT SAVINGS VALUES USED FOR CY09

The following table lists default/deemed energy savings by measure (used for CY09) for the Residential Programs.

Table B-1. Residential Programs: Default/Deemed Energy Savings By Measure (as of December 31, 2009)

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
ACES	Direct Install	CFL	DI-Post 5-1-08	43.5	37.2795	0.0042	0.0035994	0	0
ACES	Direct Install	Faucet Aerator - Bath - Electric	DI-Post 5-1-08	127.1	108.9247	0	0	0	0
ACES	Direct Install	Faucet Aerator - Bath - Gas	DI-Post 5-1-08	0	0	0	0	6.3	5.544
ACES	Direct Install	Faucet Aerator - Kitchen - Electric	DI-Post 5-1-08	223.1	191.1967	0	0	0	0
ACES	Direct Install	Faucet Aerator - Kitchen - Gas	DI-Post 5-1-08	0	0	0	0	11.1	9.768
ACES	Direct Install	Pre-Rinse Sprayer - Gas	DI	0	0	0	0	42	36.96
ACES	Direct Install	Showerhead 1.5 gpm - Electric	DI-Post 5-1-08	726.2	622.3534	0	0	0	0
ACES	Direct Install	Showerhead 1.5 gpm - Gas	DI-Post 5-1-08	0	0	0	0	36.2	31.856
ACES	Direct Install	Showerhead 1.75 gpm - Electric	DI-Post 5-1-08	544.8	466.8936	0	0	0	0
ACES	Direct Install	Showerhead 1.75 gpm - Gas	DI-Post 5-1-08	0	0	0	0	27.2	23.936
ACES	New Construction	Central Split AC - 15 SEER	N/A	154	82.082	0.37	0.19721	0	0
ACES	New Construction	Furnace 90%+ AFUE w/ECM	N/A	0	0	0	0	1773	762.39
ACES	RHP - Direct Install	CFL	N/A	43.5	37.2795	0.0042	0.0035994	0	0
ACES	RHP - Direct Install	Showerhead 1.5 gpm - Electric	N/A	726.2	622.3534	0	0	0	0

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
ACES	RHP - Whole Building	Foundation Insulation - Duplex Stack	Interior	172	172	0	0	140	140
ACES	Whole Building	Central Split AC - 15 SEER	N/A	154	82.082	0.37	0.19721	0	0
ACES	Whole Building	Central Split AC - 15 SEER	N/A	154	82.082	0.37	0.19721	0	0
ACES	Whole Building	Central Split AC - 16 SEER+	N/A	216	115.128	0.52	0.27716	0	0
ACES	Whole Building	Central Split AC - 16 SEER+	N/A	216	115.128	0.52	0.27716	0	0
ACES	Whole Building	CFL	N/A	43.5	23.1855	0.0031	0.0016523	0	0
ACES	Whole Building	CFL Fixtures	N/A	394	210.002	0.045	0.023985	0	0
ACES	Whole Building	CFL Reflector Lamps	Post 5-1-08	407	216.931	0.0415	0.0221195	0	0
ACES	Whole Building	ES Clothes Washer - Common Area	N/A	384	204.672	0	0	22	10.956
ACES	Whole Building	ES Clothes Washer - In Unit	N/A	163	86.879	0	0	5.5	2.739
ACES	Whole Building	ES Clothes Washer - In Unit	N/A	163	86.879	0	0	5.5	2.739
ACES	Whole Building	ES Dehumidifier	N/A	50	26.65	0.05	0.02665	0	0
ACES	Whole Building	ES Dehumidifier	N/A	50	26.65	0.05	0.02665	0	0
ACES	Whole Building	ES Dishwasher	N/A	90	47.97	0	0	5	2.49
ACES	Whole Building	ES Refrigerator	N/A	66	35.178	0.011	0.005863	0	0
ACES	Whole Building	ES Room Thru Wall AC	N/A	33	17.589	0.11	0.05863	0	0
ACES	Whole Building	ES Room Window AC	N/A	33	17.589	0.11	0.05863	0	0
ACES	Whole Building	ES Room Window AC	N/A	33	17.589	0.11	0.05863	0	0
ACES	Whole Building	Furnace 90%+ AFUE w/ECM	Retrofit Post 5-1-08	759	404.547	0.17	0.09061	20	9.96
ACES	Whole Building	HPT8 1 lamp 4ft	N/A	56	29.848	0.0064	0.0034112	0	0
ACES	Whole Building	HPT8 2 lamp 4ft	N/A	80	42.64	0.0091	0.0048503	0	0
ACES	Whole Building	HPT8 3 lamp 4ft	N/A	145	77.285	0.0166	0.0088478	0	0
ACES	Whole Building	HPT8 4 lamp 4ft	N/A	171	91.143	0.0195	0.0103935	0	0
ACES	Whole Building	LED Exit Fixture	Post 5-1-08	272	144.976	0.031	0.016523	0	0

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
ACES	Whole Building	Occupancy Sensor Ceiling	N/A	525	279.825	0	0	0	0
ACES	Whole Building	Occupancy Sensor Socket	N/A	189	100.737	0	0	0	0
ACES	Whole Building	Occupancy Sensor Wall	N/A	189	100.737	0	0	0	0
ACES	Whole Building	Steam Trap-All Other Traps-Replace or Repair	N/A	0	0	0	0	299	148.902
ACES	Whole Building Existing	LED Screw In	N/A	92	92	0.0105	0.0105	0	0
EHCI	EHCI	90+ AFUE with ECM	New Construction Post 5-1-08	1116	424.08	0.17	0.0646	20	7.2
EHCI	EHCI	90+ AFUE with ECM	Retrofit Post 5-1-08	759	288.42	0.17	0.038	20	7.2
EHCI	EHCI	90+AFUE with ECM	N/A	773	773	0.1	0.1	0	0
EHCI	EHCI	HVAC - Flue Closure	N/A	0	0	0	0	60	60
EHCI	EHCI	SEER 14	Post 5-1-08	54	54	0.1	0.1	0	0
EHCI	EHCI	SEER 14 w/ RCA	N/A	54	54	0.1	0.1	0	0
EHCI	EHCI	SEER 15	N/A	101	101	0.17	0.17	0	0
EHCI	EHCI	SEER 15	Post 5-1-08	101	101	0.17	0.17	0	0
EHCI	EHCI	SEER 15 w/ECM	N/A	54	54	0.1	0.1	0	0
EHCI	EHCI	SEER 16	Post 5-1-08	142	142	0.28	0.28	0	0
EHCI	EHCI	SEER 16 w/ECM	N/A	101	101	0.17	0.17	0	0
EHCI	EHCI	SEER 16 w/o RCA	N/A	142	142	0.28	0.28	0	0
EHCI	EHCI	SEER 17	Post 5-1-08	178	178	0.29	0.29	0	0
EHCI	EHCI	SEER 17 w/ ECM	N/A	142	142	0.28	0.28	0	0
EHCI	EHCI	SEER 17 w/ECM	N/A	142	142	0.28	0.28	0	0
EHCI	EHCI	SEER 18 w/ECM	N/A	178	178	0.29	0.29	0	0
EHCI	EHCI	SEER 19 w/ECM	N/A	211	211	0.37	0.37	0	0
EHCI	EHCI	SEER 20 w/ ECM	N/A	239	239	0.39	0.39	0	0
EHCI	EHCI	SEER 21 w/ ECM	N/A	265	265	0.41	0.41	0	0

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
ENERGY STAR - Appliances	Customer Rewards	Clothes Washers Tier 3	EE	393	393	0	0	0	0
ENERGY STAR - Appliances	Customer Rewards	Clothes Washers Tier 3	GG	20	20	0	0	14.3	14.3
ENERGY STAR - Appliances	Customer Rewards	Electric .93 EF +	N/A	260	260	0	0	0	0
ENERGY STAR - Appliances	Customer Rewards	Flue Closure	N/A	0	0	0	0	60	60
ENERGY STAR - Appliances	Customer Rewards	Fuel Conversion Electric to LP	N/A	3280	3280	0.25	0.25	0	0
ENERGY STAR - Appliances	Customer Rewards	Fuel Conversion Electric to Natural Gas	N/A	3280	3280	0.25	0.25	-78	-78
ENERGY STAR - Appliances	Customer Rewards	Power Vent with EF of .64 to .79	N/A	-50	-50	-0.005	-0.005	15	15
ENERGY STAR - Appliances	Customer Rewards	Power Vent with EF of .80 or Greater	N/A	-50	-50	-0.005	-0.005	45	45
ENERGY STAR - Appliances	Customer Rewards	Thermal (At least 80% AFUE)	N/A	0	0	0	0	85	85
ENERGY STAR - Lighting	Customer Rewards	Ceiling Fan	N/A	175	175	0	0	0	0
ENERGY STAR - Lighting	Customer Rewards	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Customer Rewards	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
ENERGY STAR - Lighting	Customer Rewards	CFL	Instant	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Customer Rewards	CFL	Instant Post 5-1-08	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Customer Rewards	CFL	KEEP	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Customer Rewards	CFL	Mail In Post 5-1-08	48.9	30.3	0.0052	0.0032	0	0
ENERGY STAR - Lighting	Customer Rewards	CFL	Mail-in	48.9	30.3	0.0052	0.0032	0	0
ENERGY STAR - Lighting	Customer Rewards	Lighting Fixture	N/A	104	104	0.004	0.004	0	0
ENERGY STAR - Lighting	Customer Rewards	Lighting Fixture-LED	N/A	104	104	0.004	0.004	0	0
ENERGY STAR - Lighting	Customer Rewards	Torchiere	N/A	349	349	0.01	0.01	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	CFL	Buydown	43.7	27.1	0.0047	0.0029	0	0
ENERGY STAR - Lighting	Lighting	LED Holiday Light	N/A	15.6	15.6	0	0	0	0
ENERGY STAR - Lighting	Lighting	LED Holiday Light	N/A	15.6	15.6	0	0	0	0
ENERGY STAR - Lighting	Lighting	LED Holiday Light	N/A	15.6	15.6	0	0	0	0
ENERGY STAR - Lighting	Lighting	LED Holiday Light	N/A	15.6	15.6	0	0	0	0
ENERGY STAR - Lighting	Lighting	LED Holiday Light	N/A	15.6	15.6	0	0	0	0
ENERGY STAR - Lighting	Lighting	Lighting Fixture	N/A	104	104	0.004	0.004	0	0
ENERGY STAR - Lighting	Lighting	Lighting Fixture	N/A	104	104	0.004	0.004	0	0
ENERGY STAR - Lighting	Lighting	Lighting Fixture LED	N/A	104	104	0.004	0.004	0	0
HPWES	Mobile Home	CFL	N/A	43.7	27.1	0.0047	0.0029	0	0

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
HPWES	Mobile Home	DI-Aerator Bath-Ele	N/A	127.1	108.9247	0	0	0	0
HPWES	Mobile Home	DI-Aerator Bath-Gas	N/A	0	0	0	0	6.3	5.544
HPWES	Mobile Home	DI-Aerator Kitchen-Ele	N/A	223.1	191.1967	0	0	0	0
HPWES	Mobile Home	DI-Aerator Kitchen-Gas	N/A	0	0	0	0	11.1	9.768
HPWES	Mobile Home	DI-Showerhead-1.5-Gas	N/A	0	0	0	0	36.2	31.856
HPWES	Mobile Home	DI-Showerhead-1.5-Gas	N/A	0	0	0	0	36.2	31.856
HPWES	Mobile Home	DI-Showerhead-1.75-Ele	N/A	544.8	466.8936	0	0	0	0
HPWES	Mobile Home	DI-Showerhead-1.75-Gas	N/A	0	0	0	0	27.2	23.936
HPWES	SW Pilot	Attic Insulation	Open Floor	160	104	0.118	0.0754	100	65
HPWES	SW Pilot	Duct Sealing	N/A	1080	1080	0.1	0.1	84	84
HPWES	SW Pilot	Floor Insulation	N/A	126	107	0.093	0.079	79	67
HPWES	SW Pilot	Foundation Insulation	Interior	172	172	0	0	140	140
HPWES	SW Pilot	Sidewall Insulation	Cavity	326	237.98	0.264	0.19272	225	164.25
HPWES	SW Pilot	Sill Box Insulation	N/A	53	45	0	0	39	33
HPWES	SW Pilot	Water Heater - Fuel Switch	N/A	3280	3280	0.25	0.25	-78	-78
HPWES	Whole House	Attic Insulation	Cathedral	160	104	0.118	0.0715	100	65
HPWES	Whole House	Attic Insulation	Open Floor	160	104	0.118	0.0754	100	65
HPWES	Whole House	Chimney Liner	N/A	0	0	0	0	81	81
HPWES	Whole House	Duct Sealing	N/A	1080	1080	0.1	0.1	84	84
HPWES	Whole House	Floor Insulation	N/A	126	107	0.093	0.079	79	67
HPWES	Whole House	Foundation Insulation	Exterior	59	51	0	0	49	41
HPWES	Whole House	Foundation Insulation	Interior	172	172	0	0	140	140
HPWES	Whole House	Sidewall Insulation	1 inch Foam Continuous	60	43.8	0.049	0.03577	41	29.93
HPWES	Whole House	Sidewall Insulation	1/2 inch Foam Continuous	36	26.28	0.029	0.02117	25	18.25
HPWES	Whole House	Sidewall Insulation	Cavity	326	237.98	0.264	0.19272	225	164.25
HPWES	Whole House	Sill Box Insulation	N/A	53	45	0	0	39	33

Program	Program Initiative	Measure	Qualifier	Deemed Verified kWh	Deemed Net kWh	Deemed Verified kW	Deemed Net kW	Deemed Verified Therms	Deemed Net Therms
HPWES	Whole House	Water Heater - Fuel Switch	N/A	3280	3280	0.25	0.25	-78	-78
HPWES	Whole House	Water Heater - Poor Draft	N/A	0.5	0.5	-0.005	-0.005	75	75
Targeted HPWES	Whole House	Home Weatherization	N/A	1636	1636	0.269	0.269	276	276
Together We Save	Together We Save	Attic Insulation	Cathedral	160	136	0.118	0.1	100	85
Together We Save	Together We Save	Faucet Aerator - Kitchen - Gas	N/A	0	0	0	0	11.1	9.768
Together We Save	Together We Save	Sidewall Insulation	1 inch Foam Continuous	60	60	0.049	0.049	41	41
Together We Save	Together We Save	Sidewall Insulation	Cavity	326	163	0.264	0.132	225	112.5
Together We Save	Together We Save	Sill Box Insulation	N/A	53	45	0	0	39	33
WESH	Reward Items	Drain Water	N/A	0	0	0	0	49	49
WESH	Reward Items	Low Solar Heat Gain Windows	N/A	104.87	104.87	0	0	-10.27	-10.27
WESH	Whole House	Certified Home	N/A	0	0	0	0	100	100

APPENDIX C: MEASURE LIFETIME AND NET INCREMENTAL COSTS BY PROGRAM BY BENEFIT-COST MEASURE CATEGORY

Table C-1. Measure Lifetime and Net Incremental Costs by Program by Benefit-cost Measure Category

Program	B/C Category	Measure Life	NIC Value	NIC Unit	NEBS Value	NEBS Unit	Utility Avoided Cost - kWh	Utility Avoided Cost - kW	Utility Avoided Cost - Therms
Agriculture	CFL	7	0.006	avoided cost	0.3	avoided cost	0.042	127	1.005
Agriculture	Building Shell	19	0.276	avoided cost	0.3	avoided cost	0.046	127	1.005
Agriculture	HVAC Equipment	15	0.219	avoided cost	0.3	avoided cost	0.046	127	1.005
Agriculture	HVAC Service	5	0.169	avoided cost	0.3	avoided cost	0.046	127	1.005
Agriculture	Lighting	12	0.249	avoided cost	0.3	avoided cost	0.042	127	1.005
Agriculture	Process Equipment	11	0.227	avoided cost	0.3	avoided cost	0.045	127	1.005
Agriculture	Process Service	2	0.342	avoided cost	0.3	avoided cost	0.045	127	1.005
Agriculture	Other	12	0.225	avoided cost	0.3	avoided cost	0.045	127	1.005
Agriculture	Motors	16	0.097	avoided cost	0.3	avoided cost	0.045	127	1.005
Commercial	CFL	5	0.008	avoided cost	0.3	avoided cost	0.047	127	1.005
Commercial	Building Shell	19	0.211	avoided cost	0.3	avoided cost	0.05	127	1.005
Commercial	HVAC Equipment	15	0.209	avoided cost	0.3	avoided cost	0.05	127	1.005
Commercial	HVAC Service	5	0.131	avoided cost	0.3	avoided cost	0.05	127	1.005
Commercial	Lighting	12	0.247	avoided cost	0.3	avoided cost	0.047	127	1.005
Commercial	Process Equipment	11	0.203	avoided cost	0.3	avoided cost	0.045	127	1.005
Commercial	Process Service	2	0.339	avoided cost	0.3	avoided cost	0.045	127	1.005
Commercial	Other	12	0.225	avoided cost	0.3	avoided cost	0.045	127	1.005
Commercial	Motors	16	0.099	avoided cost	0.3	avoided cost	0.05	127	1.005
Industrial	CFL	4	0.010	avoided cost	0.3	avoided cost	0.046	127	0.871
Industrial	Building Shell	19	0.229	avoided cost	0.3	avoided cost	0.049	127	0.871
Industrial	HVAC Equipment	15	0.217	avoided cost	0.3	avoided cost	0.049	127	0.871
Industrial	HVAC Service	5	0.137	avoided cost	0.3	avoided cost	0.049	127	0.871
Industrial	Lighting	12	0.251	avoided cost	0.3	avoided cost	0.046	127	0.871
Industrial	Process Equipment	11	0.212	avoided cost	0.3	avoided cost	0.044	127	0.871
Industrial	Process Service	2	0.353	avoided cost	0.3	avoided cost	0.044	127	0.871
Industrial	Other	12	0.229	avoided cost	0.3	avoided cost	0.044	127	0.871
Industrial	Motors	16	0.100	avoided cost	0.3	avoided cost	0.044	127	0.871
Schools and Government	CFL	5	0.008	avoided cost	0.3	avoided cost	0.047	127	0.9
Schools and Government	Building Shell	19	0.272	avoided cost	0.3	avoided cost	0.051	127	0.9
Schools and Government	HVAC Equipment	15	0.246	avoided cost	0.3	avoided cost	0.051	127	0.9
Schools and Government	HVAC Service	5	0.161	avoided cost	0.3	avoided cost	0.051	127	0.9
Schools and Government	Lighting	12	0.244	avoided cost	0.3	avoided cost	0.047	127	0.9
Schools and Government	Process Equipment	11	0.227	avoided cost	0.3	avoided cost	0.044	127	0.9
Schools and Government	Process Service	2	0.336	avoided cost	0.3	avoided cost	0.044	127	0.9
Schools and Government	Other	12	0.247	avoided cost	0.3	avoided cost	0.044	127	0.9
Schools and Government	Motors	16	0.095	avoided cost	0.3	avoided cost	0.051	127	0.9
Channel EHCI	HVAC Equipment	15	3.13	avoided cost	0.3	avoided cost	0.05	127	1.005
Channel EHCI	HVAC Service	5	0.65	avoided cost	0.3	avoided cost	0.05	127	1.005

Program	B/C Category	Measure Life	NIC Value	NIC Unit	NEBS Value	NEBS Unit	Utility Avoided Cost - kWh	Utility Avoided Cost - kW	Utility Avoided Cost - Therms
Channel Lighting	CFL	5	0.04	avoided cost	0.3	avoided cost	0.047	127	1.005
Channel Lighting	Lighting	12	2.89	avoided cost	0.3	avoided cost	0.047	127	1.005
New Buildings	Other	12	2.57	avoided cost	0.3	avoided cost	0.045	127	1.005
ACES	Other	8	0.052	kWh	0.0052	kWh	0.04555	127	1.087
EHCI	Other	20	1.162	kWh	0	kWh	0.0445	127	1.087
EHCI	ECM Furnace	13	850	unit	0	unit	0.04117	127	1.087
EHCI	SEER 12	20	350	unit	0	unit	0.05667	127	1.087
EHCI	SEER 13	20	700	unit	0	unit	0.05667	127	1.087
EHCI	SEER 14+	20	350	unit	0	unit	0.05667	127	1.087
ENERGY STAR	CFL	6	4	unit	0	unit	0.04333	127	1.087
ENERGY STAR	Other Lighting	25	0.067	kWh	0	kWh	0.04333	127	1.087
ENERGY STAR	Other	12	0.752	kWh	0	kWh	0.04382	127	1.087
ENERGY STAR	Clothes Washers	12	200	unit	1.48	unit	0.04594	127	1.087
HPWES	Other	25	6.416	therm	0.535	therm	0.04555	127	1.087
HPWES	ECM Furnace	23	850	unit	0	unit	0.04117	127	1.087
HPWES	SEER 12	20	350	unit	0	unit	0.05667	127	1.087
HPWES	SEER 13	20	700	unit	0	unit	0.05667	127	1.087
HPWES	SEER 14+	20	1050	unit	0	unit	0.05667	127	1.087
HPWES	Air Sealing	25	375	home	31.25	home	0.0445	127	1.087
HPWES	Attic Insulation	25	900	home	75	home	0.0445	127	1.087
HPWES	Sidewall Insulation	25	1800	home	150	home	0.0445	127	1.087
Targeted HPWES	Other	25	6100	home	0	home	0.04555	127	1.087
WESH	Other	12	0	unit	0	unit	0.04555	127	1.087
WESH	ECM Furnace	23	0	unit	0	unit	0.04117	127	1.087
WESH	SEER 12	20	0	unit	0	unit	0.05667	127	1.087
WESH	SEER 13	20	0	unit	0	unit	0.05667	127	1.087
WESH	SEER 14+	20	0	unit	0	unit	0.05667	127	1.087
WESH	Home Certification	50	2445	home	305.63	home	0.04555	127	1.087
Head Start	CFL	6	4	unit	0	unit	0.04333	127	1.087
Affordable Housing	Other	8	0.052	kwh	0.052	kwh	0.04555	127	1.087
Together We Save	Other	8	0.052	kwh	0.052	kwh	0.04555	127	1.087
Renewables	Solar Electric	20	6.8	kWh	0	kWh	0.048	127	1.062
Renewables	Wind	20	1.37	kWh	0	kWh	0.042	127	0
Renewables	Solar Water Heating	20	16.1	therm	0	therm	0.048	127	0.868
Renewables	Biogas	15	3.06	kWh	0.11	kWh	0.043	127	0.868
Renewables	Biomass-Combustion	20	1.92	therm	0	therm	0.044	127	0.893
Renewables	Other	20	0.2	kWh	0	kWh	0.043	127	0

APPENDIX D: TABLES AND FIGURES LINKED TO THE TYPE OF IMPACTS

Reference Number	Title	Gross	Verified	Net
Table 2-1a	All Programs: Tracked Energy Impacts—Lifetime Verified Gross (July 1, 2001–December 31, 2009)		Lifetime	
Table 2-1b	All Programs: Tracked Energy Impacts - Lifecycle Verified Gross Program to Date (July 1, 2001–December 31, 2009)		Lifecycle	
Table 2-1c	All Programs: Tracked Energy Impacts - Annual First Year Verified Gross (July 1, 2001–December 31, 2009)		First - Year	
Table 2-1d	All Programs: Tracked Energy Impacts - Lifetime Verified Gross and Lifetime Verified Net CY09 (January 1, 2009–December 31, 2009)		Lifetime	Lifetime
Table 2-1e	All Programs: Tracked Energy Impacts - Lifecycle Verified Gross and Lifecycle Verified Net (Program to Date (July 1, 2001–December 31, 2009))		Lifecycle	Lifecycle
Table 2-1f	All Programs: Tracked Energy Impacts - Annual First Year Program to Date (July 1, 2001–December 31, 2009)	First - Year	First - Year	First - Year
Figure 2-1	Lifecycle Verified Gross Electricity Savings (GWh)		Lifecycle	
Figure 2-2	Lifecycle Verified Gross Electricity Demand Reductions (MW)		Lifecycle	
Figure 2-3	Lifecycle Verified Gross Gas Savings (Million Therms)		Lifecycle	
Figure 2-4	Persistent Verified Net Electricity Savings (GWh)			Persistent
Figure 2-5	Persistent Verified Net Electricity Demand Reductions (MW)			Persistent
Figure 2-6	Persistent Verified Net Gas Savings (Million Therms)			Persistent
Figure 2-7	Electric Energy Impacts by Measure Category - Business Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 2-8	Electric Energy Impacts by Measure Category - Business Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Figure 2-9	Gas Energy Impacts by Measure Category - Business Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 2-10	Gas Energy Impacts by Measure Category - Business Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Figure 2-11	Electric Energy Impacts by Measure Category - Residential Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 2-12	Electric Energy Impacts by Measure Category - Residential Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Figure 2-13	Gas Energy Impacts by Measure Category - Residential Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 2-14	Gas Energy Impacts by Measure Category - Residential Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Table 2-2	Electric Energy Impacts by Measure Category - Business Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 2-3	Electric Energy Impacts by Measure Category - Business Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	

Reference Number	Title	Gross	Verified	Net
Table 2-4	Gas Energy Impacts by Measure Category - Business Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 2-5	Gas Energy Impacts by Measure Category - Business Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Table 2-6	Electric Energy Impacts by Measure Category - Residential Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 2-7	Electric Energy Impacts by Measure Category - Residential Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Table 2-8	Gas Energy Impacts by Measure Category - Residential Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 2-9	Gas Energy Impacts by Measure Category - Residential Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Table 2-17	Verified Gross Emissions Displaced (lbs) Annually (CY09 (January 1, 2009–December 31, 2009))			First - Year
Table 2-18	Verified Gross Emissions Displaced (lbs) Annually Cumulative in Current Year (July 1, 2001–December 31, 2009)			Persistent
Table 2-20	Lifecycle Verified Gross Emissions (lbs) Produced Annually Cumulative in Current Year (July 1, 2001–December 31, 2009)		Lifecycle	
Table 2-21	Value of Non-Energy Benefits by Program Area Program to Date (July 1, 2001–December 31, 2009)			Persistent
Table 2-23	Simple Benefit-Cost and Cost of Conserved Energy (CY09 (January 1, 2009–December 31, 2009))			Persistent
Table 2-24	Simple Benefit-Cost and Cost of Conserved Energy Program to Date (July 1, 2001–December 31, 2009)			Persistent
Table 2-25	Comparison of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets			First - Year
Table 2-26	Comparison of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets			First - Year
Table 2-27	Comparisons of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets			First - Year
Table 2-28	Comparisons of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets			First - Year
Figure 3-1	Electric Energy Impacts by Program - Business Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 3-2	Electric Energy Impacts by Program - Business Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Figure 3-3	Gas Energy Impacts by Program - Business Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 3-4	Gas Energy Impacts by Program - Business Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Table 3-4a	All Business Programs: Tracked Energy Impacts (The 18MCP (July 1, 2007–December 31, 2008))	First - Year	First - Year	First - Year
Table 3-4b	All Business Programs: Tracked Energy Impacts FY07 (July 1, 2006–June 30, 2007)	First - Year	First - Year	First - Year

Reference Number	Title	Gross	Verified	Net
Table 3-4c	All Business Programs: Tracked Energy Impacts FY06 (July 1, 2005–June 30, 2006)	First - Year	First - Year	First - Year
Table 3-4d	All Business Programs: Tracked Energy Impacts FY05 (July 1, 2004–June 30, 2005)	First - Year	First - Year	First - Year
Table 3-4e	All Business Programs: Tracked Energy Impacts FY04 (July 1, 2003–June 30, 2004)	First - Year	First - Year	First - Year
Table 3-4f	All Business Programs: Tracked Energy Impacts FY03 (July 1, 2002–June 30, 2003)	First - Year	First - Year	First - Year
Table 3-4g	All Business Programs: Tracked Energy Impacts FY02 (July 1, 2001–June 30, 2002)	First - Year	First - Year	First - Year
Table 3-5	Agriculture CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 3-6	Commercial CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 3-7	Industrial CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 3-8	Schools & Government CY09 (January 1, 2009–December 31, 2009)		First - Year	
Table 3-10	Net Business Program Savings versus Business Program Portfolio Targets CY09 (January 1, 2009–December 31, 2009)			First - Year
Figure 4-1	Electric Energy Impacts by Program - Residential Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 4-2	Electric Energy Impacts by Program - Residential Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Figure 4-3	Gas Energy Impacts by Program - Residential Programs CY09 (January 1, 2009–December 31, 2009)		First - Year	
Figure 4-4	Gas Energy Impacts by Program - Residential Programs Program to Date (July 1, 2001–December 31, 2009)		First - Year	
Table 4-1a	Comparisons of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets	First - Year	First - Year	First - Year
Table 4-1b	All Residential Programs: Tracked Energy Impacts The 18MCP (July 1, 2007–December 31, 2008)	First - Year	First - Year	First - Year
Table 4-1c	All Residential Programs: Tracked Energy Impacts FY07 (July 1, 2006–June 30, 2007)	First - Year	First - Year	First - Year
Table 4-1d	All Residential Programs: Tracked Energy Impacts FY06 (July 1, 2005–June 30, 2006)	First - Year	First - Year	First - Year
Table 4-1e	All Residential Programs: Tracked Energy Impacts FY05 (July 1, 2004–June 30, 2005)	First - Year	First - Year	First - Year
Table 4-1f	All Residential Programs: Tracked Energy Impacts FY04 (July 1, 2003–June 30, 2004)	First - Year	First - Year	First - Year
Table 4-1g	All Residential Programs: Tracked Energy Impacts FY03 (July 1, 2002–June 30, 2003)	First - Year	First - Year	First - Year
Table 4-1h	All Residential Programs: Tracked Energy Impacts FY02 (July 1, 2001–June 30, 2002)	First - Year	First - Year	First - Year
Table 4-2	Net Residential Program Savings versus Residential Program Portfolio Targets CY09 (January 1, 2009–December 31, 2009)			First - Year
Table 4-9	ENERGY STAR - Lighting Products Program: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table 4-10	ENERGY STAR - Appliances Products Program: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	

Reference Number	Title	Gross	Verified	Net
Table 4-12	Wisconsin ENERGY STAR Homes: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table 4-13	Home Performance with ENERGY STAR: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table 4-14	Apartment and Condominium Efficiency Services: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table 4-16	Targeted Home Performance with ENERGY STAR: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table 4-17	Efficient Heating and Cooling: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table 4-18	Table 4-18. Head Start CFL: Tracked Annual Energy Impacts CY09 (January 1–December 31, 2009)		First - Year	
Table A-1	Commercial Program Energy Impacts (By County) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-2	Commercial Program Energy Impacts (By Senate District) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-3	Commercial Program Energy Impacts (By Assembly District) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-4	Commercial Program Electric Impacts (By Participating Electric Utility) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-5	Commercial Program Gas Impacts (By Participating Gas Utility) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-6	Industrial Program Energy Impacts (By County) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-7	Industrial Program Energy Impacts (By Senate District) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-8	Industrial Program Energy Impacts (By Assembly District) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-9	Industrial Program Electric Impacts (By Participating Electric Utility) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-10	Industrial Program Gas Impacts (By Participating Gas Utility) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-11	Residential Program Energy Impacts (By County) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-12	Residential Program Energy Impacts (By Senate District) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-13	Residential Program Energy Impacts (By Assembly District) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-14	Residential Program Electric Impacts (By Participating Electric Utility) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-15	Residential Program Gas Impacts (By Participating Gas Utility) (January 1, 2009–December 31, 2009)		Lifecycle	Persistent
Table A-16	Renewable Energy Program Completed Projects and Their Energy Impacts (by County) (January 1, 2009–December 31, 2009)		Lifecycle	

APPENDIX E: EVALUATION REPORTS AND OTHER DELIVERABLES

Table E-1. Evaluation Reports and Other Deliverables
The Second Half of 2009 (July 1–December 31, 2009)

Program Area	Program	Document Title	Draft Report Date	Final Report Date
Business Programs	Business Programs - General	Measure Life Study	20-Jul-09	25-Aug-09
Business Programs	Business Programs - General	Deemed Savings Parameter Development	04-Aug-09	13-Nov-09
Business Programs	Business Programs - General	Review of Business Programs Load Shapes - Final	26-Aug-09	15-Oct-09
Business Programs	Business Programs - General	BP Incremental Cost Study - Final	14-Sep-09	29-Oct-09
Business Programs	Business Programs - General	Business Programs Final Sample Design	16-Oct-09	04-Nov-09
Business Programs	Business Programs - General	Additional Looks at Attribution	11-Dec-09	26-Feb-10
Business Programs	Business Programs - General	Acceleration Treatment and Life Cycle Net Savings	10-Feb-10	10-Mar-10
Business Programs	Business Programs - General	Business Programs Impact Evaluation Report: Last Quarter of the 18-month Contract Period and First Three Quarters of Calendar Year 2009	03-Mar-10	31-Mar-10
Business Programs	Business Programs - General	Deemed Savings Manual V1.0	21-Mar-10	21-Mar-10
Crosscutting	Crosscutting - General	Semiannual Report (18-month Contract Period)	25-Feb-09	14-Aug-09
Crosscutting	Crosscutting - General	Semiannual Report First Half of 2009	21-Aug-09	23-Sep-09
Crosscutting	Crosscutting - General	Calculation of BC Ratios and Reasons for Recent Changes in Values for the Renewables Program	19-Oct-09	17-Nov-09
Crosscutting	Crosscutting - General	Emission Factors Update	30-Nov-09	22-Dec-09
Crosscutting	Crosscutting - General	A Review and Update of NEBS Values for Residential Programs	22-Jan-10	19-Feb-10
Crosscutting	Crosscutting - General	Updating Industry Classification for Participants in Business Programs	12-Feb-10	12-Mar-10
Crosscutting	Crosscutting - General	Evaluation Contract Year 2010 Detailed Evaluation Plans	04-Mar-10	01-Apr-10
Crosscutting	Crosscutting - General	Semiannual Report Second Half of 2009	26-Mar-10	23-Apr-10
Renewables	Renewables	Renewable Energy Standard Calculation Recommendations - Revised	01-Sep-09	09-Oct-09
Renewables	Renewables	Renewable Energy Standard Calculation Recommendations - Revised - Memo	01-Sep-09	09-Oct-09
Renewables	Renewables	Biogas Supply-side Study, Phase 1 (Draft)	08-Jan-10	N/A[139]

[139] Phase 1 draft was included in the *Biogas Supply-side Study*.

Program Area	Program	Document Title	Draft Report Date	Final Report Date
Renewables	Renewables	Renewables Impact Evaluation January through September CY09	22-Feb-10	22-Mar-10
Renewables	Renewables	Biogas Supply-side Study	24-Mar-10	22-Apr-10
Residential	ACES	ACES CY09 Impact Attribution Report	05-Nov-09	03-Dec-09
Residential	ACES	ACES Supply-side Research Plan	13-Nov-09	13-Mar-10
Residential	ACES	ACES Market Actor Database Analysis	10-Dec-09	10-Dec-09
Residential	ACES	ACES Supply-side Sampling Plan & Survey	22-Dec-09	
Residential	ACES	Apartment and Condominium Efficiency Services Market Potential	11-Feb-10	12-Mar-10
Residential	ACES	Apartment and Condominium Efficiency Services Program: Whole Building Supply-side Impacts	19-Feb-10	19-Mar-10
Residential	ACES	Residential Programs: CY09 Deemed Savings Review	26-Feb-10	26-Mar-10
Residential	ACES	ACES New Construction Baseline Review	25-Mar-10	15-Apr-10
Residential	Home Performance with ENERGY STAR	Responses to Review Comments HPWES Research Plan		28-Sep-09
Residential	Home Performance with ENERGY STAR	HPWES Sampling, Data Collection, and Analysis Plan Memo	14-Aug-09	28-Sep-09
Residential	Home Performance with ENERGY STAR	Home Performance with ENERGY STAR Participant Survey Analysis and Recommended Supply-side Research Approach	15-Jan-10	04-Feb-10
Residential	Home Performance with ENERGY STAR	Home Performance with ENERGY STAR: Insulation Supply-side Study Results and Integration with Participant Findings	12-Mar-10	16-Apr-10
Residential	Residential - General	Residential Technologies Incremental Cost Review	08-Oct-09	06-Nov-09
Residential	Residential - General	Analysis of Consumer Electronics in Homes	25-Jan-10	19-Feb-10
Residential	Residential - General	Results of the Multistate CFL Modeling Effort	16-Feb-10	07-Mar-10
Residential	Residential ES Lighting	2008 Sector-based CFL Net-to-Gross Analysis	07-Mar-10	16-Apr-10
Residential	Residential Lighting	The Market for CFLs in Wisconsin	31-Dec-09	01-Feb-10
Residential	Residential Lighting	2009 CFL Savings Analysis	02-Mar-10	22-Apr-10
Residential	Targeted Home Performance with ENERGY STAR	Targeted HPWES Nonparticipant Survey Results	08-Oct-09	20-Nov-09
Residential	Targeted Home Performance with ENERGY STAR	Targeted Home Performance with ENERGY STAR: Participant Characterization	17-Dec-09	22-Jan-10
Residential	Targeted Home Performance with ENERGY STAR	N/A - Distributed directly via email. (Participant survey instrument.)	12-Jan-10	12-Apr-10
Residential	Targeted Home Performance with ENERGY STAR	THPWES Participant Survey Results	15-Mar-10	12-Apr-10

Program Area	Program	Document Title	Draft Report Date	Final Report Date
Residential	Together We Save Pilot	Milwaukee Neighborhood Efficiency Project Pilot: Process Evaluation Plan	06-Nov-09	04-Dec-09
Residential	Together We Save Pilot	Milwaukee Pilot in-Depth Energy Advocate Interview Topic Guide	03-Dec-09	15-Dec-09
Residential	Together We Save Pilot	Milwaukee Pilot in-Depth Energy Consultant Interview Topic Guide	15-Dec-09	07-Jan-10
Residential	Together We Save Pilot	Milwaukee Together We Save Participant Survey	17-Jan-10	29-Jan-10
Residential	Together We Save Pilot	Key Findings from In-depth Interviews with Together We Save Program Staff and Database Analysis	28-Jan-10	26-Feb-10
Residential	Together We Save Pilot	Together We Save: Process Evaluation Report	19-Mar-10	22-Apr-10

APPENDIX F: COMPARISON OF CURRENT SAVINGS WITH MARKET POTENTIAL

Tables F-1 to F-4 show a comparison of CY09 program savings and estimated 2012 potential program savings for residential and business programs. Potential savings values are from the findings of a report prepared by the Energy Center of Wisconsin (ECW): *Energy Efficiency and Customer-Sited Renewable Resource Potential in Wisconsin: for the years 2012 and 2018* ("the Potential Study"). In the tables, the two right-hand columns show the percentage of 2012 potential that was achieved from January to December 2009, and the additional annual potential that is estimated to exist. A low percentage number indicates a market where savings are growing. A high percentage number, especially a number above 100 percent, indicates a market that is mature and has decreasing additional opportunities going forward. The table is sorted from highest to lowest estimated potential relative to current savings, grouped by program.

It is important to understand how the annual potential in CY09 can exceed 100 percent of the potential in 2012. Since these are annual potential values, as the market for a class of technologies becomes saturated, there are fewer additional opportunities for savings. The figure, below illustrates this possibility for a hypothetical measure category. The blue line represents the penetration of a technology over time, represented as months on the horizontal axis. The potential in any one year is the change in the vertical axis over twelve months. If the penetration of a technology in CY09 were at the point represented by the left bar in the figure, and a market potential study represented the time period of the right bar in the figure, the market potential in the latter year could be substantially lower than current annual savings.

Figure F-1. Hypothetical Diffusion of an Efficient Technology and its Effect on Annual Market Potential

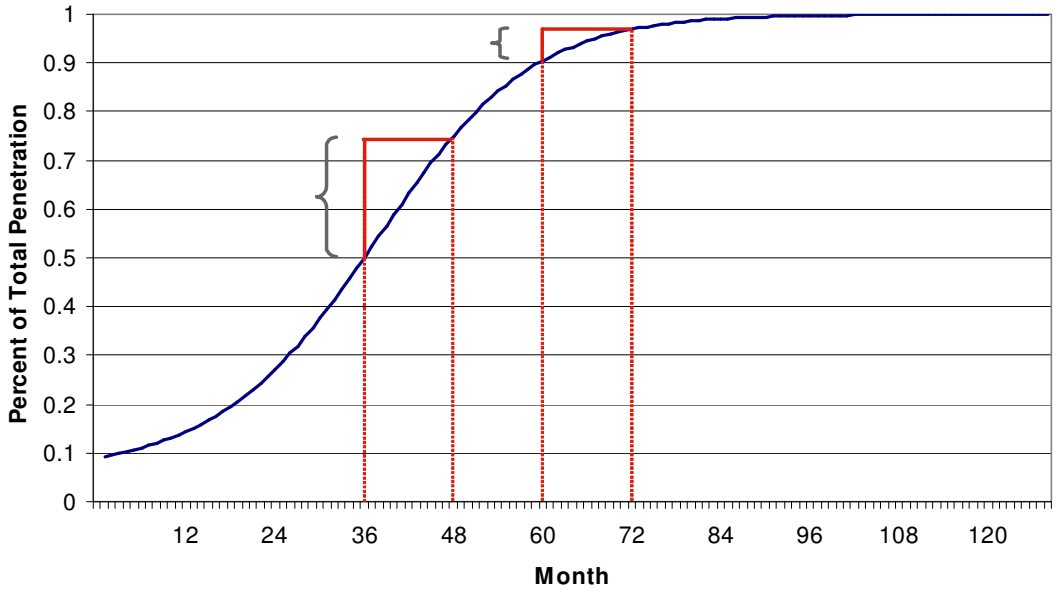


Table F-1. Comparison of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
ACES	Common Area Lighting Improvements in Multifamily	6,266	2.9%	475	0.5%	7.6%	5,791
ACES	Weatherization - Direct Install	2,770	1.3%	40	0.0%	1.4%	2,730
ACES	CFL Bulbs, purchased replacement (2012)	5,276	2.4%	4,644	4.7%	88.0%	633
ACES	ECM Furnace	356	0.2%	12	0.0%	3.3%	344
ACES	Water Heater Blanket	263	0.1%	0	0.0%	0.0%	263
ACES	Home Electronics Efficiency Upgrade (ENERGY STAR)	226	0.1%	0	0.0%	0.0%	226
ACES	Heat Pump Water Heater	215	0.1%	0	0.0%	0.0%	215
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Elec. Dryer)	161	0.1%	0	0.0%	0.0%	161
ACES	ENERGY STAR Clothes Washer (w/ Elec. WH & Elec. Dryer)	158	0.1%	0	0.0%	0.0%	158
ACES	Second Refrigerator Turn In	97	0.0%	0	0.0%	0.0%	97
ACES	Efficient Electric Water Heater	86	0.0%	0	0.0%	0.0%	86
ACES	Exterior Lighting Controls	77	0.0%	0	0.0%	0.0%	77
ACES	New Construction, Improved Plumbing Design	36	0.0%	0	0.0%	0.0%	36
ACES	Range/Oven Fuel Switch	32	0.0%	0	0.0%	0.0%	32
ACES	ENERGY STAR Compliant Personal Computer	32	0.0%	0	0.0%	0.0%	32
ACES	Room A/C Turn In	25	0.0%	0	0.0%	0.0%	25
ACES	ENERGY STAR Dishwasher (Electric Water Heating)	9	0.0%	0	0.0%	0.0%	9
ACES	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	8	0.0%	0	0.0%	0.0%	8

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
ACES	ENERGY STAR Dehumidifier	1	0.0%	0	0.0%	2.0%	1
ACES	Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	0	0.0%	0	0.0%	0.0%	0
ACES	Boiler Controls-Gas	0	0.0%	11	0.0%	0.0%	-11
ACES	Boiler	0	0.0%	26	0.0%	0.0%	-26
ACES	HVAC - General	0	0.0%	28	0.0%	0.0%	-28
ACES	LED Bulbs, purchased replacement (2018)	0	0.0%	34	0.0%	0.0%	-34
ACES	Hot Water - Unspecified	0	0.0%	40	0.0%	0.0%	-40
ACES	Appliances	0	0.0%	59	0.1%	0.0%	-59
ACES	Motors & Drives	0	0.0%	62	0.1%	0.0%	-62
ACES	Air Conditioning	0	0.0%	135	0.1%	0.0%	-135
ACES	Hot Water - Electric	0	0.0%	748	0.8%	0.0%	-748
ACES	Low Flow Showerhead (w/ Electric Hot Water)	489	0.2%	1,536	1.6%	313.8%	-1,047
ACES	New Construction	0	0.0%	1,701	1.7%	0.0%	-1,701
ACES	Lighting	0	0.0%	1,772	1.8%	0.0%	-1,772
Residential	Weatherization - Direct Install	33,254	15.2%	1,226	1.2%	3.7%	32,028
Residential	Whole-house Electricity-Use Feedback Display Retrofit	23,478	10.7%	0	0.0%	0.0%	23,478
Residential	ECM Furnace	19,237	8.8%	6,329	6.4%	32.9%	12,908
Residential	Common Area Lighting Improvements in Multifamily	7,595	3.5%	0	0.0%	0.0%	7,595
Residential	CFL Bulbs, purchased replacement (2012)	74,276	34.0%	67,212	68.4%	90.5%	7,065
Residential	Dryer Fuel Switch	3,697	1.7%	0	0.0%	0.0%	3,697
Residential	Home Electronics Efficiency Upgrade (ENERGY STAR)	3,598	1.6%	0	0.0%	0.0%	3,598
Residential	Exterior Lighting Controls	3,558	1.6%	0	0.0%	0.0%	3,558
Residential	Low Flow Showerhead	6,649	3.0%	3,214	3.3%	48.3%	3,435
Residential	Second Refrigerator Turn In	3,298	1.5%	0	0.0%	0.0%	3,298
Residential	Water Heater Blanket	3,161	1.4%	0	0.0%	0.0%	3,161

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
Residential	Shower Controls (Shower Start Technology)	3,158	1.4%	0	0.0%	0.0%	3,158
Residential	Pipe Wrap	2,981	1.4%	0	0.0%	0.0%	2,981
Residential	Heat Pump Water Heater	2,899	1.3%	0	0.0%	0.0%	2,899
Residential	Range/Oven Fuel Switch	2,636	1.2%	0	0.0%	0.0%	2,636
Residential	ENERGY STAR Clothes Washer (w/ Elec. WH & Elec. Dryer)	2,499	1.1%	0	0.0%	0.0%	2,499
Residential	Second Freezer Turn In	2,254	1.0%	0	0.0%	0.0%	2,254
Residential	Efficient Electric Water Heater	1,987	0.9%	0	0.0%	0.0%	1,987
Residential	ENERGY STAR Dehumidifer	458	0.2%	0	0.0%	0.0%	458
Residential	New Construction, Improved Plumbing Design	419	0.2%	0	0.0%	0.0%	419
Residential	ENERGY STAR Compliant Personal Computer	340	0.2%	0	0.0%	0.0%	340
Residential	Room A/C Turn In	289	0.1%	0	0.0%	0.0%	289
Residential	Setback Thermostats	146	0.1%	0	0.0%	0.0%	146
Residential	ENERGY STAR Dishwasher (Electric Water Heating)	135	0.1%	0	0.0%	0.0%	135
Residential	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	65	0.0%	0	0.0%	0.0%	65
Residential	Building Shell	0	0.0%	-5	0.0%	0.0%	5
Residential	New Construction	4	0.0%	0	0.0%	0.0%	4
Residential	Other	0	0.0%	-1	0.0%	0.0%	1
Residential	Hot Water	0	0.0%	120	0.1%	0.0%	-120
Residential	Duct Sealing (Outside Conditioned Space)- gas	59	0.0%	293	0.3%	498.4%	-234
Residential	Air Conditioning	0	0.0%	346	0.4%	0.0%	-346
Residential	Hot Water	0	0.0%	417	0.4%	0.0%	-417
Residential	Appliances	0	0.0%	1,312	1.3%	0.0%	-1,312
Residential	Lighting	0	0.0%	6,512	6.6%	0.0%	-6,512
Total	**Total**	**218,714**	**1**	**98,298**	**1**	**44.9%**	**120,416**

Table F-2. Comparison of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31 2009) and Achievable Potential—Residential Markets

Program	Measure Category	2012 Therms Potential	Percent of Total Therms Potential	Net Therms Saved	Percent of Total Therms Saved	Percent of 2012 Potential Achieved
ACES	CFL Bulbs, purchased replacement (2012)	-126,520	-3.6%	0	0.0%	0.0%
ACES	Wx - Direct Install	112,544	3.2%	18,604	0.8%	16.5%
ACES	ECM Furnace	0	0.0%	229	0.0%	
ACES	Second Refrigerator Turn In	-1,973	-0.1%	0	0.0%	0.0%
ACES	Home Electronics Efficiency Upgrade (ENERGY STAR)	-5,539	-0.2%	0	0.0%	0.0%
ACES	Range/Oven Fuel Switch	-809	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Compliant Personal Computer	-724	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	215	0.0%	0	0.0%	0.0%
ACES	New Construction	0	0.0%	126,150	5.2%	
ACES	Low Flow Showerhead (w/ Gas DHW)	68,392	1.9%	348,225	14.3%	509.2%
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Gas Dryer)	3,127	0.1%	0	0.0%	0.0%
ACES	High Efficiency Furnace - Natural Gas	1,349	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Dishwasher (w/Gas DHW)	2,966	0.1%	0	0.0%	0.0%
ACES	Drainwater heat recovery	152,464	4.3%	0	0.0%	0.0%
ACES	Boiler Controls-Gas	172,321	4.9%	8,484	0.3%	4.9%
ACES	Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	27,357	0.8%	46,841	1.9%	171.2%
ACES	Mainline Air vent (MF) - gas	24,996	0.7%	0	0.0%	0.0%
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Elec. Dryer)	10,682	0.3%	0	0.0%	0.0%
ACES	Water heater tank wrap - Gas	911	0.0%	0	0.0%	0.0%
ACES	Common Area Lighting Improvements in Multifamily	-26,858	-0.8%	0	0.0%	0.0%
ACES	Motors & Drives	0	0.0%	0	0.0%	
ACES	Boiler	0	0.0%	235,041	9.6%	
ACES	Appliances	0	0.0%	786	0.0%	
ACES	Hot Water - Gas	0	0.0%	183,533	7.5%	

Program	Measure Category	2012 Therms Potential	Percent of Total Therms Potential	Net Therms Saved	Percent of Total Therms Saved	Percent of 2012 Potential Achieved
ACES	Hot Water - Unspecified	0	0.0%	-151	0.0%	
ACES	HVAC - General	0	0.0%	536	0.0%	
ACES	Other	0	0.0%	151	0.0%	
Residential	Whole-house Electricity-Use Feedback Display Retrofit	-288,838	-8.2%	0	0.0%	0.0%
Residential	Improved Plumbing Layout - Gas Heat	85,334	2.4%	0	0.0%	0.0%
Residential	Drainwater heat recovery	378,750	10.8%	0	0.0%	0.0%
Residential	Boiler Controls-Gas	45,731	1.3%	0	0.0%	0.0%
Residential	Efficient Steam Boiler (MF) - gas	2,332	0.1%	301	0.0%	12.9%
Residential	Common Area Lighting Improvements in Multifamily	-19,750	-0.6%	0	0.0%	0.0%
Residential	Duct Sealing (Outside Conditioned Space)-gas	104,078	3.0%	22,260	0.9%	21.4%
Residential	Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	11,947	0.3%	0	0.0%	0.0%
Residential	CFL Bulbs, purchased replacement (2012)	-1,789,433	-50.8%	0	0.0%	0.0%
Residential	Dryer Fuel Switch	-147,882	-4.2%	0	0.0%	0.0%
Residential	ECM Furnace	0	0.0%	135,591	5.6%	
Residential	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	1,462	0.0%	0	0.0%	0.0%
Residential	ENERGY STAR Clothes Washer (w/ Gas WH & Gas Dryer)	103,196	2.9%	0	0.0%	0.0%
Residential	ENERGY STAR Compliant Personal Computer	-7,770	-0.2%	0	0.0%	0.0%
Residential	ENERGY STAR Dishwasher (w/Gas DHW)	38,506	1.1%	0	0.0%	0.0%
Residential	High Efficiency Boiler w/ indirect DHW	145,975	4.1%	0	0.0%	0.0%
Residential	High Efficiency Furnace - Natural Gas	85,604	2.4%	0	0.0%	0.0%
Residential	Home Electronics Efficiency Upgrade (ENERGY STAR)	-85,371	-2.4%	0	0.0%	0.0%
Residential	Low Flow Showerhead (w/ Gas DHW)	1,011,447	28.7%	0	0.0%	0.0%
Residential	New Construction	9,369	0.3%	0	0.0%	0.0%
Residential	Range/Oven Fuel Switch	-82,399	-2.3%	0	0.0%	0.0%

Program	Measure Category	2012 Therms Potential	Percent of Total Therms Potential	Net Therms Saved	Percent of Total Therms Saved	Percent of 2012 Potential Achieved
Residential	Second Freezer Turn In	-43,745	-1.2%	0	0.0%	0.0%
Residential	Second Refrigerator Turn In	-67,472	-1.9%	0	0.0%	0.0%
Residential	Setback Thermostats	323,756	9.2%	0	0.0%	0.0%
Residential	Wx - Direct Install	3,290,886	93.5%	545,277	22.3%	16.6%
Residential	Lighting	0	0.0%	-85	0.0%	
Residential	Hot Water	0	0.0%	14,724	0.6%	
Residential	Building Shell	0	0.0%	148,262	6.1%	
Residential	Boiler	0	0.0%	396,471	16.2%	
Residential	Appliances	0	0.0%	-48,622	-2.0%	
Residential	Hot Water	0	0.0%	164,600	6.7%	
Residential	Other	0	0.0%	95,116	3.9%	
Total	**Total**	**3,520,614**	**100.0%**	**2,442,324**	**100.0%**	**69.4%**

Table F-3. Comparisons of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31 2009) and Achievable Potential—Business Markets

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
Agriculture	Dairy/Livestock Operation - Milking Parlor	19,234	2.3%	9,330	3.1%	48.5%	9,904
Agriculture	Dairy/Livestock Operation - Ventilation	657	0.1%	0	0.0%	0.0%	657
Agriculture	Air Conditioning	0	0.0%	0	0.0%	0.0%	0
Agriculture	Furnaces	0	0.0%	1	0.0%	0.0%	-1
Agriculture	Appliances	0	0.0%	17	0.0%	0.0%	-17
Agriculture	Grain Drying Operations - Process Improvements	0	0.0%	23	0.0%	0.0%	-23
Agriculture	Compressors	0	0.0%	24	0.0%	0.0%	-24
Agriculture	Greenhouses - Space Heating	0	0.0%	51	0.0%	0.0%	-51
Agriculture	Lighting	0	0.0%	72	0.0%	0.0%	-72
Agriculture	HVAC - General	0	0.0%	125	0.0%	0.0%	-125
Agriculture	Controls	0	0.0%	183	0.1%	0.0%	-183
Agriculture	Irrigation Systems - General	328	0.0%	836	0.3%	255.1%	-508
Agriculture	Motors & Drives	0	0.0%	525	0.2%	0.0%	-525
Agriculture	Other	0	0.0%	756	0.2%	0.0%	-756
Agriculture	Dairy/Livestock Operation - Lighting	4,248	0.5%	8,852	2.9%	208.4%	-4,603
Commercial	Lighting controls / design	78,281	9.3%	1,758	0.6%	2.2%	76,523

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
Commercial	Refrig - RCx / controls	56,305	6.7%	1,929	0.6%	3.4%	54,376
Commercial	Lighting equipment	87,756	10.4%	58,632	19.3%	66.8%	29,124
Commercial	Data / computing / office equip	28,142	3.3%	3,079	1.0%	10.9%	25,064
Commercial	Cooling Equipment	27,139	3.2%	4,271	1.4%	15.7%	22,867
Commercial	DHW System improvements	22,438	2.7%	467	0.2%	2.1%	21,972
Commercial	Refrig - Cooler/Freezer equip	21,093	2.5%	3,064	1.0%	14.5%	18,029
Commercial	HVAC RCx / Controls	47,204	5.6%	29,297	9.6%	62.1%	17,907
Commercial	Refrig - Displays	16,255	1.9%	1,313	0.4%	8.1%	14,943
Commercial	Elec heating	14,676	1.7%	0	0.0%	0.0%	14,676
Commercial	Shell improvement	6,124	0.7%	25	0.0%	0.4%	6,099
Commercial	Faucets / Nozzles	2,308	0.3%	0	0.0%	0.0%	2,308
Commercial	Process equip	1,511	0.2%	126	0.0%	8.3%	1,385
Commercial	Pool	957	0.1%	0	0.0%	0.0%	957
Commercial	Clotheswashing	811	0.1%	0	0.0%	0.0%	811
Commercial	Process equip: cooking	360	0.0%	279	0.1%	77.4%	81
Commercial	Boiler	0	0.0%	0	0.0%	0.0%	0
Commercial	Heat Recovery	15	0.0%	22	0.0%	149.8%	-7
Commercial	Dishwashing	58	0.0%	90	0.0%	153.6%	-31
Commercial	Gas Heating Equip	0	0.0%	89	0.0%	0.0%	-89
Commercial	Appliances	0	0.0%	168	0.1%	0.0%	-168
Commercial	Refrigeration	0	0.0%	1,374	0.5%	0.0%	-1,374
Commercial	HVAC - General	0	0.0%	2,330	0.8%	0.0%	-2,330
Commercial	Motors & Drives	0	0.0%	3,351	1.1%	0.0%	-3,351
Commercial	Other	0	0.0%	3,412	1.1%	0.0%	-3,412
Commercial	Controls	0	0.0%	4,203	1.4%	0.0%	-4,203
Commercial	Lighting	0	0.0%	10,092	3.3%	0.0%	-10,092
Industrial	Motors - VSD, Motor Optimization and Efficient Motors	97,522	11.5%	429	0.1%	0.4%	97,093
Industrial	Motors - System Component Improvement and Replacement	61,695	7.3%	0	0.0%	0.0%	61,695
Industrial	Lighting - Efficient System Design and Controls	55,665	6.6%	7,479	2.5%	13.4%	48,185
Industrial	HVAC - Efficient System Design and Controls	21,099	2.5%	0	0.0%	0.0%	21,099
Industrial	Motors - Improved Controls and Sensors	19,357	2.3%	0	0.0%	0.0%	19,357

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
Industrial	Process Cooling - VSD, Motor Optimization and Efficient Motors	25,116	3.0%	7,594	2.5%	30.2%	17,522
Industrial	HVAC - Improved Operations and Maintenance	16,069	1.9%	5	0.0%	0.0%	16,063
Industrial	Process Heating (E) - Process Controls	13,192	1.6%	0	0.0%	0.0%	13,192
Industrial	Process Cooling - Improved Operations and Maintenance	12,637	1.5%	0	0.0%	0.0%	12,637
Industrial	HVAC - Insulation and Sealing of System Components	10,782	1.3%	0	0.0%	0.0%	10,782
Industrial	Motors - Improved Operations and Maintenance	10,743	1.3%	0	0.0%	0.0%	10,743
Industrial	Motors - Process Management and Continuous Improvement	8,033	1.0%	0	0.0%	0.0%	8,033
Industrial	Process Cooling - Equipment Upgrades and Replacement	7,593	0.9%	0	0.0%	0.0%	7,593
Industrial	Process Heating (E) - Process and Waste Heat Recovery	6,010	0.7%	0	0.0%	0.0%	6,010
Industrial	Process Cooling - Efficient System Design and Controls	5,175	0.6%	0	0.0%	0.0%	5,175
Industrial	HVAC - Cooling - Efficient System Design and Controls	4,695	0.6%	0	0.0%	0.0%	4,695
Industrial	Air Compression - Efficient System Design and Controls	3,993	0.5%	0	0.0%	0.0%	3,993
Industrial	Other - System Component Improvement and Replacement	3,373	0.4%	0	0.0%	0.0%	3,373
Industrial	Air Compression - Equipment Upgrades and Replacement	3,204	0.4%	0	0.0%	0.0%	3,204
Industrial	Process Heating (E) - Process Management and Continuous Improvement	2,409	0.3%	0	0.0%	0.0%	2,409

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
Industrial	HVAC - Cooling - Equipment Upgrades and Replacement	3,719	0.4%	1,642	0.5%	44.1%	2,077
Industrial	Process Heating (E) - Heat Containment Improvements	1,509	0.2%	0	0.0%	0.0%	1,509
Industrial	Process Heating (E) - Heat Transfer Improvements	1,498	0.2%	0	0.0%	0.0%	1,498
Industrial	Other - Improved Operations and Maintenance	477	0.1%	0	0.0%	0.0%	477
Industrial	Process Heating (G) - Waste and/or Process Heat Recovery	0	0.0%	-233	-0.1%	0.0%	233
Industrial	Process Heating (E) - Equipment Upgrades and Replacement	97	0.0%	0	0.0%	0.0%	97
Industrial	Other - VSD, Motor Optimization and Efficient Motors	13	0.0%	0	0.0%	0.0%	13
Industrial	Building Shell	0	0.0%	-4	0.0%	0.0%	4
Industrial	Hot Water	0	0.0%	0	0.0%	0.0%	0
Industrial	HVAC - Heating - Equipment Upgrades and Replacement	0	0.0%	8	0.0%	0.0%	-8
Industrial	Appliances	0	0.0%	9	0.0%	0.0%	-9
Industrial	Process Heating (G) - Improved System Design and Controls	0	0.0%	221	0.1%	0.0%	-221
Industrial	HVAC - General	0	0.0%	555	0.2%	0.0%	-555
Industrial	Lighting	0	0.0%	1,228	0.4%	0.0%	-1,228
Industrial	Boiler Equipment	0	0.0%	1,654	0.5%	0.0%	-1,654
Industrial	Compressors	0	0.0%	2,125	0.7%	0.0%	-2,125
Industrial	Air Compression - Improved Operations and Maintenance	4,812	0.6%	9,063	3.0%	188.3%	-4,251
Industrial	Chiller Service	0	0.0%	4,542	1.5%	0.0%	-4,542
Industrial	Air Compression - Variable Speed Drives and Motor Upgrades	1,999	0.2%	6,560	2.2%	328.2%	-4,561
Industrial	Refrigeration	0	0.0%	7,130	2.3%	0.0%	-7,130
Industrial	Motors & Drives	0	0.0%	7,286	2.4%	0.0%	-7,286
Industrial	Industrial Process	0	0.0%	14,112	4.6%	0.0%	-14,112
Industrial	Other	0	0.0%	14,954	4.9%	0.0%	-14,954

Program	Measure Category	2012 MWh Potential	Percent Total MWh Potential	Focus CY09 MWh Saved	Percent Total MWh Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (MWh)
Industrial	Lighting - Equipment Upgrades and Replacement	6,449	0.8%	52,721	17.4%	817.5%	-46,272
Schools & Government	Boiler	0	0.0%	1	0.0%	0.0%	-1
Schools & Government	Appliances	0	0.0%	57	0.0%	0.0%	-57
Schools & Government	Air Conditioning	0	0.0%	63	0.0%	0.0%	-63
Schools & Government	HVAC - General	0	0.0%	109	0.0%	0.0%	-109
Schools & Government	Building Shell	0	0.0%	144	0.0%	0.0%	-144
Schools & Government	Refrigeration	0	0.0%	329	0.1%	0.0%	-329
Schools & Government	Motors & Drives	0	0.0%	2,535	0.8%	0.0%	-2,535
Schools & Government	Other	0	0.0%	3,116	1.0%	0.0%	-3,116
Schools & Government	Lighting	0	0.0%	8,041	2.6%	0.0%	-8,041
Total	**Total**	**844,829**	**100.0%**	**303,636**	**100.0%**	**35.9%**	**541,194**

Table F-4. Comparisons of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31 2009) and Achievable Potential—Business Markets

Program	Measure Category	2012 Therms (1,000s) Potential	Percent Total Therms Potential	Focus CY09 Therms (1,000s) Saved	Percent Total Therms (1,000s) Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (1,000 Therms)
Agriculture	Grain Drying Operations - Process Improvements	169	0.5%	20	0.2%	12.1%	149
Agriculture	Greenhouses - Space Heating	121	0.4%	27	0.3%	22.6%	94
Agriculture	Furnaces	0	0.0%	0	0.0%	0.0%	0
Agriculture	HVAC - General	0	0.0%	0	0.0%	0.0%	0
Agriculture	Appliances	0	0.0%	0	0.0%	0.0%	0
Agriculture	Boiler	0	0.0%	2	0.0%	0.0%	-2
Agriculture	Hot Water - Gas	0	0.0%	2	0.0%	0.0%	-2
Agriculture	Dairy/Livestock Operation - Milking Parlor	-37	-0.1%	-14	-0.1%	38.3%	-23
Agriculture	Other	0	0.0%	41	0.4%	0.0%	-41

Program	Measure Category	2012 Therms (1,000s) Potential	Percent Total Therms Potential	Focus CY09 Therms (1,000s) Saved	Percent Total Therms (1,000s) Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (1,000 Therms)
Agriculture	Greenhouses - Shell Improvements	6	0.0%	259	2.4%	4210.4%	-253
Commercial	HVAC RCx / Controls	5,020	14.6%	794	7.3%	15.8%	4,226
Commercial	DHW System improvements	2,825	8.2%	11	0.1%	0.4%	2,814
Commercial	Faucets / Nozzles	746	2.2%	43	0.4%	5.8%	703
Commercial	Shell improvement	681	2.0%	38	0.4%	5.6%	643
Commercial	Gas Heating Equip	656	1.9%	40	0.4%	6.2%	615
Commercial	Clotheswashing	354	1.0%	0	0.0%	0.0%	354
Commercial	Cooking	312	0.9%	21	0.2%	6.8%	291
Commercial	Dishwashing	210	0.6%	3	0.0%	1.6%	206
Commercial	Heat Recovery	193	0.6%	21	0.2%	10.7%	172
Commercial	Pool	31	0.1%	0	0.0%	0.0%	31
Commercial	Cooling Equipment	0	0.0%	-6	-0.1%	0.0%	6
Commercial	Process equip	-1	0.0%	0	0.0%	0.0%	-1
Commercial	Refrig - RCx / controls	0	0.0%	6	0.1%	0.0%	-6
Commercial	Controls	0	0.0%	21	0.2%	0.0%	-21
Commercial	Boiler	0	0.0%	37	0.3%	0.0%	-37
Commercial	Appliances	0	0.0%	48	0.4%	0.0%	-48
Commercial	HVAC - General	0	0.0%	143	1.3%	0.0%	-143
Commercial	Data / computing / office equip	-195	-0.6%	0	0.0%	0.0%	-195
Commercial	Other	0	0.0%	367	3.4%	0.0%	-367
Commercial	Elec heating	-570	-1.7%	0	0.0%	0.0%	-570
Commercial	Lighting equipment	-929	-2.7%	0	0.0%	0.0%	-929
Commercial	Lighting controls / design	-1,170	-3.4%	0	0.0%	0.0%	-1,170
Industrial	Steam Production - Improved Operations and Maintenance	6,006	17.5%	142	1.3%	2.4%	5,865
Industrial	Process Heating (G) - Improved Operations and Maintenance	4,690	13.7%	0	0.0%	0.0%	4,690
Industrial	Steam Production - Improved System Design and Controls	4,597	13.4%	0	0.0%	0.0%	4,597
Industrial	Process Heating (G) - Insulation and Sealing of System Components	2,464	7.2%	0	0.0%	0.0%	2,464
Industrial	Steam Production - Waste and/or Process Heat Recovery	1,560	4.5%	0	0.0%	0.0%	1,560

Program	Measure Category	2012 Therms (1,000s) Potential	Percent Total Therms Potential	Focus CY09 Therms (1,000s) Saved	Percent Total Therms (1,000s) Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (1,000 Therms)
Industrial	Process Heating (G) - Equipment Upgrades and Replacement	1,276	3.7%	0	0.0%	0.0%	1,276
Industrial	Steam Production - Equipment Upgrades and Replacement	1,226	3.6%	0	0.0%	0.0%	1,226
Industrial	Process Heating (G) - Waste and/or Process Heat Recovery	1,373	4.0%	619	5.7%	45.0%	755
Industrial	Steam Production - Insulation and Sealing of System Components	733	2.1%	0	0.0%	0.0%	733
Industrial	Process Heating (G) - Improved System Design and Controls	724	2.1%	6	0.1%	0.8%	718
Industrial	HVAC - Heating - Insulation and Sealing of System Components	461	1.3%	35	0.3%	7.5%	426
Industrial	HVAC - Heating - Waste and/or Process Heat Recovery	276	0.8%	0	0.0%	0.0%	276
Industrial	HVAC - Heating - Equipment Upgrades and Replacement	198	0.6%	13	0.1%	6.4%	185
Industrial	HVAC - Heating - Improved System Design and Controls	209	0.6%	177	1.6%	84.9%	32
Industrial	Hot Water	0	0.0%	0	0.0%	0.0%	0
Industrial	Appliances	0	0.0%	0	0.0%	0.0%	0
Industrial	HVAC - Improved Operations and Maintenance	0	0.0%	0	0.0%	0.0%	0
Industrial	Air Compression - Improved Operations and Maintenance	0	0.0%	5	0.0%	0.0%	-5
Industrial	HVAC - Efficient System Design and Controls	0	0.0%	9	0.1%	0.0%	-9
Industrial	Compressors	0	0.0%	37	0.3%	0.0%	-37
Industrial	Building Shell	0	0.0%	105	1.0%	0.0%	-105
Industrial	Boiler Equipment	0	0.0%	106	1.0%	0.0%	-106

Program	Measure Category	2012 Therms (1,000s) Potential	Percent Total Therms Potential	Focus CY09 Therms (1,000s) Saved	Percent Total Therms (1,000s) Saved	Percent of 2012 Potential Achieved	Potential Additional Savings (1,000 Therms)
Industrial	HVAC - Heating - Improved Operations and Maintenance	75	0.2%	217	2.0%	289.2%	-142
Industrial	HVAC - General	0	0.0%	221	2.0%	0.0%	-221
Industrial	Other	0	0.0%	957	8.8%	0.0%	-957
Industrial	Industrial Process	0	0.0%	5,561	51.0%	0.0%	-5,561
Schools & Government	Appliances	0	0.0%	0	0.0%	0.0%	0
Schools & Government	Hot Water	0	0.0%	0	0.0%	0.0%	0
Schools & Government	Air Conditioning	0	0.0%	15	0.1%	0.0%	-15
Schools & Government	HVAC - General	0	0.0%	20	0.2%	0.0%	-20
Schools & Government	Building Shell	0	0.0%	214	2.0%	0.0%	-214
Schools & Government	Other	0	0.0%	247	2.3%	0.0%	-247
Schools & Government	Boiler	0	0.0%	264	2.4%	0.0%	-264
Total	**Total**	**34,292**	**100.0%**	**10,897**	**100.0%**	**31.8%**	**23,395**

APPENDIX G:COMPARISONS OF FOCUS ENERGY IMPACTS AND ACHIEVABLE POTENTIAL

Table G-1. Comparisons of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
ACES	CFL Bulbs, purchased replacement (2012)	5,276,272	2.4%	4,646,267	6.1%	88.1%
ACES	Wx - Direct Install	2,770,320	1.3%	44,655	0.1%	1.6%
ACES	ECM Furnace	355,566	0.2%	11,732	0.0%	3.3%
ACES	Low Flow Showerhead (w/ Electric Hot Water)	489,461	0.2%	1,537,092	2.0%	314.0%
ACES	Second Refrigerator Turn In	96,664	0.0%	0	0.0%	0.0%
ACES	Exterior Lighting Controls	77,297	0.0%	0	0.0%	0.0%
ACES	Home Electronics Efficiency Upgrade (ENERGY STAR)	226,093	0.1%	0	0.0%	0.0%
ACES	Water Heater Blanket	263,101	0.1%	0	0.0%	0.0%
ACES	Heat Pump Water Heater	215,370	0.1%	0	0.0%	0.0%
ACES	Range/Oven Fuel Switch	32,364	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Clothes Washer (w/ Elec. WH & Elec. Dryer)	157,965	0.1%	0	0.0%	0.0%
ACES	Efficient Electric Water Heater	86,398	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Dehumidifer	1,314	0.0%	27	0.0%	2.0%
ACES	New Construction, Improved Plumbing Design	36,168	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Compliant Personal Computer	31,760	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Dishwasher (Electric Water Heating)	9,050	0.0%	0	0.0%	0.0%
ACES	Room A/C Turn In	24,735	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	7,699	0.0%	0	0.0%	0.0%
ACES	New Construction	0	0.0%	1,701,275	2.3%	
ACES	LED Bulbs, purchased replacement (2018)	0	0.0%	33,856	0.0%	
ACES	Boiler Controls-Gas	0	0.0%	12,694	0.0%	
ACES	Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	0	0.0%	-188	0.0%	

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Elec. Dryer)	161,241	0.1%	0	0.0%	0.0%
ACES	Common Area Lighting Improvements in Multifamily	6,266,200	2.9%	488,868	0.6%	7.8%
ACES	Lighting	0	0.0%	1,790,988	2.4%	
ACES	Motors & Drives	0	0.0%	69,051	0.1%	
ACES	Air Conditioning	0	0.0%	137,355	0.2%	
ACES	Boiler	0	0.0%	29,440	0.0%	
ACES	Appliances	0	0.0%	63,001	0.1%	
ACES	Hot Water - Electric	0	0.0%	747,592	1.0%	
ACES	Hot Water - Unspecified	0	0.0%	44,744	0.1%	
ACES	HVAC - General	0	0.0%	31,301	0.0%	
Residential	Whole-house Electricity-Use Feedback Display Retrofit	23,478,000	10.7%	0	0.0%	0.0%
Residential	Common Area Lighting Improvements in Multifamily	7,594,950	3.5%	0	0.0%	0.0%
Residential	Duct Sealing (Outside Conditioned Space)- gas	58,724	0.0%	292,680	0.4%	498.4%
Residential	CFL Bulbs, purchased replacement (2012)	74,276,305	34.0%	44,359,885	58.7%	59.7%
Residential	Dryer Fuel Switch	3,697,051	1.7%	0	0.0%	0.0%
Residential	ECM Furnace	19,236,625	8.8%	6,329,106	8.4%	32.9%
Residential	Efficient Electric Water Heater	1,986,901	0.9%	0	0.0%	0.0%
Residential	ENERGY STAR Clothes Washer (w/ Elec. WH & Elec. Dryer)	2,499,458	1.1%	0	0.0%	0.0%
Residential	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	64,865	0.0%	0	0.0%	0.0%
Residential	ENERGY STAR Compliant Personal Computer	339,563	0.2%	0	0.0%	0.0%
Residential	ENERGY STAR Dehumidifer	458,448	0.2%	0	0.0%	0.0%
Residential	ENERGY STAR Dishwasher (Electric Water Heating)	135,159	0.1%	0	0.0%	0.0%
Residential	Exterior Lighting Controls	3,558,038	1.6%	0	0.0%	0.0%
Residential	Heat Pump Water Heater	2,898,854	1.3%	0	0.0%	0.0%
Residential	Home Electronics Efficiency Upgrade (ENERGY STAR)	3,597,565	1.6%	0	0.0%	0.0%
Residential	Low Flow Showerhead	6,648,555	3.0%	3,213,723	4.3%	48.3%
Residential	New Construction	3,756	0.0%	0	0.0%	0.0%

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
Residential	New Construction, Improved Plumbing Design	419,268	0.2%	0	0.0%	0.0%
Residential	Pipe Wrap	2,981,026	1.4%	0	0.0%	0.0%
Residential	Range/Oven Fuel Switch	2,635,970	1.2%	0	0.0%	0.0%
Residential	Room A/C Turn In	289,078	0.1%	0	0.0%	0.0%
Residential	Second Freezer Turn In	2,253,868	1.0%	0	0.0%	0.0%
Residential	Second Refrigerator Turn In	3,298,419	1.5%	0	0.0%	0.0%
Residential	Setback Thermostats	145,932	0.1%	0	0.0%	0.0%
Residential	Shower Controls (Shower Start Technology)	3,157,605	1.4%	0	0.0%	0.0%
Residential	Water Heater Blanket	3,160,533	1.4%	0	0.0%	0.0%
Residential	Wx - Direct Install	33,254,449	15.2%	1,294,564	1.7%	3.9%
Residential	Lighting	0	0.0%	6,532,372	8.6%	
Residential	Hot Water	0	0.0%	119,943	0.2%	
Residential	Air Conditioning	0	0.0%	346,352	0.5%	
Residential	Building Shell	0	0.0%	-4,677	0.0%	
Residential	Appliances	0	0.0%	1,312,413	1.7%	
Residential	Hot Water	0	0.0%	417,470	0.6%	
Residential	Other	0	0.0%	-1,460	0.0%	
Total	**Total**	**218,714,003**	**100.0%**	**75,602,122**	**100.0%**	**34.6%**

Table G-2. Comparisons of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Residential Markets

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
ACES	CFL Bulbs, purchased replacement (2012)	-126,520	-3.6%	0	0.0%	0.0%
ACES	Wx - Direct Install	112,544	3.2%	19,473	0.8%	17.3%
ACES	ECM Furnace	0	0.0%	229	0.0%	
ACES	Second Refrigerator Turn In	-1,973	-0.1%	0	0.0%	0.0%
ACES	Home Electronics Efficiency Upgrade (ENERGY STAR)	-5,539	-0.2%	0	0.0%	0.0%
ACES	Range/Oven Fuel Switch	-809	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Compliant Personal Computer	-724	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	215	0.0%	0	0.0%	0.0%
ACES	New Construction	0	0.0%	126,150	5.0%	
ACES	Low Flow Showerhead (w/ Gas DHW)	68,392	1.9%	348,323	13.9%	509.3%

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Gas Dryer)	3,127	0.1%	0	0.0%	0.0%
ACES	High Efficiency Furnace - Natural Gas	1,349	0.0%	0	0.0%	0.0%
ACES	ENERGY STAR Dishwasher (w/Gas DHW)	2,966	0.1%	0	0.0%	0.0%
ACES	Drainwater heat recovery	152,464	4.3%	0	0.0%	0.0%
ACES	Boiler Controls-Gas	172,321	4.9%	8,880	0.4%	5.2%
ACES	Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	27,357	0.8%	49,029	2.0%	179.2%
ACES	Mainline Air vent (MF) - gas	24,996	0.7%	0	0.0%	0.0%
ACES	ENERGY STAR Clothes Washer (w/ Gas WH & Elec. Dryer)	10,682	0.3%	0	0.0%	0.0%
ACES	Water heater tank wrap - Gas	911	0.0%	0	0.0%	0.0%
ACES	Common Area Lighting Improvements in Multifamily	-26,858	-0.8%	0	0.0%	0.0%
ACES	Motors & Drives	0	0.0%	0	0.0%	
ACES	Boiler	0	0.0%	245,656	9.8%	
ACES	Appliances	0	0.0%	777	0.0%	
ACES	Hot Water - Gas	0	0.0%	183,533	7.3%	
ACES	Hot Water - Unspecified	0	0.0%	-158	0.0%	
ACES	HVAC - General	0	0.0%	561	0.0%	
ACES	Other	0	0.0%	158	0.0%	
Residential	Whole-house Electricity-Use Feedback Display Retrofit	-288,838	-8.2%	0	0.0%	0.0%
Residential	Improved Plumbing Layout - Gas Heat	85,334	2.4%	0	0.0%	0.0%
Residential	Drainwater heat recovery	378,750	10.8%	0	0.0%	0.0%
Residential	Boiler Controls-Gas	45,731	1.3%	0	0.0%	0.0%
Residential	Efficient Steam Boiler (MF) - gas	2,332	0.1%	315	0.0%	13.5%
Residential	Common Area Lighting Improvements in Multifamily	-19,750	-0.6%	0	0.0%	0.0%
Residential	Duct Sealing (Outside Conditioned Space)- gas	104,078	3.0%	22,260	0.9%	21.4%
Residential	Indirect-fired domestic water heater - NG boiler w/ EF = 0.65	11,947	0.3%	0	0.0%	0.0%
Residential	CFL Bulbs, purchased replacement (2012)	-1,789,433	-50.8%	0	0.0%	0.0%
Residential	Dryer Fuel Switch	-147,882	-4.2%	0	0.0%	0.0%

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
Residential	ECM Furnace	0	0.0%	135,591	5.4%	
Residential	ENERGY STAR Clothes Washer (w/ Elec. WH & NG Dryer)	1,462	0.0%	0	0.0%	0.0%
Residential	ENERGY STAR Clothes Washer (w/ Gas WH & Gas Dryer)	103,196	2.9%	0	0.0%	0.0%
Residential	ENERGY STAR Compliant Personal Computer	-7,770	-0.2%	0	0.0%	0.0%
Residential	ENERGY STAR Dishwasher (w/Gas DHW)	38,506	1.1%	0	0.0%	0.0%
Residential	High Efficiency Boiler w/ indirect DHW	145,975	4.1%	0	0.0%	0.0%
Residential	High Efficiency Furnace - Natural Gas	85,604	2.4%	0	0.0%	0.0%
Residential	Home Electronics Efficiency Upgrade (ENERGY STAR)	-85,371	-2.4%	0	0.0%	0.0%
Residential	Low Flow Showerhead (w/ Gas DHW)	1,011,447	28.7%	0	0.0%	0.0%
Residential	New Construction	9,369	0.3%	0	0.0%	0.0%
Residential	Range/Oven Fuel Switch	-82,399	-2.3%	0	0.0%	0.0%
Residential	Second Freezer Turn In	-43,745	-1.2%	0	0.0%	0.0%
Residential	Second Refrigerator Turn In	-67,472	-1.9%	0	0.0%	0.0%
Residential	Setback Thermostats	323,756	9.2%	0	0.0%	0.0%
Residential	Wx - Direct Install	3,290,886	93.5%	591,000	23.6%	18.0%
Residential	Lighting	0	0.0%	-85	0.0%	
Residential	Hot Water	0	0.0%	14,724	0.6%	
Residential	Building Shell	0	0.0%	148,265	5.9%	
Residential	Boiler	0	0.0%	396,471	15.8%	
Residential	Appliances	0	0.0%	-48,622	-1.9%	
Residential	Hot Water	0	0.0%	164,600	6.6%	
Residential	Other	0	0.0%	95,116	3.8%	
Total	**Total**	**3,520,614**	**100.0%**	**2,502,247**	**100.0%**	**71.1%**

Table G-3. Comparisons of Focus Gas Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
Agriculture	Dairy/Livestock Operation - Milking Parlor	19,233,789	2.3%	9,329,556	3.1%	48.5%
Agriculture	Dairy/Livestock Operation - Lighting	4,248,149	0.5%	8,444,482	2.8%	198.8%
Agriculture	Dairy/Livestock Operation - Ventilation	656,949	0.1%	0	0.0%	0.0%
Agriculture	Irrigation Systems - General	327,595	0.0%	835,825	0.3%	255.1%
Agriculture	Grain Drying Operations - Process Improvements	0	0.0%	22,778	0.0%	
Agriculture	Greenhouses - Space Heating	0	0.0%	50,820	0.0%	
Agriculture	Lighting	0	0.0%	71,522	0.0%	
Agriculture	Appliances	0	0.0%	16,563	0.0%	
Agriculture	Motors & Drives	0	0.0%	525,114	0.2%	
Agriculture	Air Conditioning	0	0.0%	304	0.0%	
Agriculture	Controls	0	0.0%	183,093	0.1%	
Agriculture	Furnaces	0	0.0%	634	0.0%	
Agriculture	HVAC - General	0	0.0%	125,344	0.0%	
Agriculture	Compressors	0	0.0%	23,637	0.0%	
Agriculture	Other	0	0.0%	756,045	0.3%	
Commercial	Clotheswashing	810,620	0.1%	0	0.0%	0.0%
Commercial	Cooling Equipment	27,138,539	3.2%	4,271,123	1.4%	15.7%
Commercial	Data / computing / office equip	28,142,465	3.3%	3,078,552	1.0%	10.9%
Commercial	DHW System improvements	22,438,116	2.7%	466,578	0.2%	2.1%
Commercial	Dishwashing	58,376	0.0%	89,650	0.0%	153.6%
Commercial	Elec heating	14,675,645	1.7%	0	0.0%	0.0%
Commercial	Faucets / Nozzles	2,307,754	0.3%	0	0.0%	0.0%
Commercial	Gas Heating Equip	0	0.0%	89,109	0.0%	
Commercial	Heat Recovery	14,664	0.0%	21,960	0.0%	149.8%
Commercial	HVAC RCx / Controls	47,204,099	5.6%	29,296,831	9.7%	62.1%
Commercial	Lighting controls / design	78,281,201	9.3%	1,758,296	0.6%	2.2%
Commercial	Lighting equipment	87,755,510	10.4%	56,519,304	18.8%	64.4%
Commercial	Pool	956,550	0.1%	0	0.0%	0.0%
Commercial	Process equip	1,510,658	0.2%	125,897	0.0%	8.3%
Commercial	Process equip: cooking	359,790	0.0%	278,618	0.1%	77.4%
Commercial	Refrig - Cooler/Freezer equip	21,093,405	2.5%	3,063,997	1.0%	14.5%
Commercial	Refrig - Displays	16,255,180	1.9%	1,312,642	0.4%	8.1%
Commercial	Refrig - RCx / controls	56,305,004	6.7%	1,929,338	0.6%	3.4%
Commercial	Shell improvement	6,124,229	0.7%	25,269	0.0%	0.4%
Commercial	Lighting	0	0.0%	10,092,438	3.4%	
Commercial	HVAC - General	0	0.0%	2,330,408	0.8%	

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
Commercial	Boiler	0	0.0%	-401	0.0%	
Commercial	Motors & Drives	0	0.0%	3,350,871	1.1%	
Commercial	Refrigeration	0	0.0%	1,374,046	0.5%	
Commercial	Controls	0	0.0%	4,202,767	1.4%	
Commercial	Appliances	0	0.0%	168,453	0.1%	
Commercial	Other	0	0.0%	3,411,518	1.1%	
Industrial	Air Compression - Efficient System Design and Controls	3,992,883	0.5%	0	0.0%	0.0%
Industrial	Air Compression - Equipment Upgrades and Replacement	3,203,878	0.4%	0	0.0%	0.0%
Industrial	Air Compression - Improved Operations and Maintenance	4,811,965	0.6%	9,062,593	3.0%	188.3%
Industrial	Air Compression - Variable Speed Drives and Motor Upgrades	1,998,790	0.2%	6,560,012	2.2%	328.2%
Industrial	HVAC - Cooling - Efficient System Design and Controls	4,694,715	0.6%	0	0.0%	0.0%
Industrial	HVAC - Cooling - Equipment Upgrades and Replacement	3,719,056	0.4%	1,641,808	0.5%	44.1%
Industrial	HVAC - Efficient System Design and Controls	21,099,215	2.5%	0	0.0%	0.0%
Industrial	HVAC - Heating - Equipment Upgrades and Replacement	0	0.0%	7,603	0.0%	
Industrial	HVAC - Improved Operations and Maintenance	16,068,962	1.9%	5,497	0.0%	0.0%
Industrial	HVAC - Insulation and Sealing of System Components	10,781,944	1.3%	0	0.0%	0.0%
Industrial	Lighting - Efficient System Design and Controls	55,664,687	6.6%	7,479,211	2.5%	13.4%
Industrial	Lighting - Equipment Upgrades and Replacement	6,449,047	0.8%	52,707,563	17.5%	817.3%
Industrial	Motors - Improved Controls and Sensors	19,356,507	2.3%	0	0.0%	0.0%
Industrial	Motors - Improved Operations and Maintenance	10,742,687	1.3%	0	0.0%	0.0%
Industrial	Motors - Process Management and Continuous Improvement	8,032,817	1.0%	0	0.0%	0.0%
Industrial	Motors - System Component Improvement and Replacement	61,694,668	7.3%	0	0.0%	0.0%

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
Industrial	Motors - VSD, Motor Optimization and Efficient Motors	97,521,933	11.5%	429,350	0.1%	0.4%
Industrial	Other - Improved Operations and Maintenance	476,742	0.1%	0	0.0%	0.0%
Industrial	Other - System Component Improvement and Replacement	3,372,669	0.4%	0	0.0%	0.0%
Industrial	Other - VSD, Motor Optimization and Efficient Motors	12,953	0.0%	0	0.0%	0.0%
Industrial	Process Cooling - Efficient System Design and Controls	5,174,503	0.6%	0	0.0%	0.0%
Industrial	Process Cooling - Equipment Upgrades and Replacement	7,592,690	0.9%	0	0.0%	0.0%
Industrial	Process Cooling - Improved Operations and Maintenance	12,636,687	1.5%	0	0.0%	0.0%
Industrial	Process Cooling - VSD, Motor Optimization and Efficient Motors	25,116,332	3.0%	7,594,087	2.5%	30.2%
Industrial	Process Heating (E) - Equipment Upgrades and Replacement	96,564	0.0%	0	0.0%	0.0%
Industrial	Process Heating (E) - Heat Containment Improvements	1,508,947	0.2%	0	0.0%	0.0%
Industrial	Process Heating (E) - Heat Transfer Improvements	1,497,984	0.2%	0	0.0%	0.0%
Industrial	Process Heating (E) - Process and Waste Heat Recovery	6,009,857	0.7%	0	0.0%	0.0%
Industrial	Process Heating (E) - Process Controls	13,192,217	1.6%	0	0.0%	0.0%
Industrial	Process Heating (E) - Process Management and Continuous Improvement	2,409,191	0.3%	0	0.0%	0.0%
Industrial	Process Heating (G) - Improved System Design and Controls	0	0.0%	220,807	0.1%	
Industrial	Process Heating (G) - Waste and/or Process Heat Recovery	0	0.0%	-233,429	-0.1%	
Industrial	Lighting	0	0.0%	1,228,225	0.4%	
Industrial	HVAC - General	0	0.0%	554,784	0.2%	
Industrial	Motors & Drives	0	0.0%	7,286,424	2.4%	
Industrial	Appliances	0	0.0%	8,844	0.0%	

Program	Measure Category	2012 kWh Potential	% of Total kWh Potential	Net kWh Saved	% of Total kWh Saved	% of 2012 Potential Achieved
Industrial	Refrigeration	0	0.0%	7,129,859	2.4%	
Industrial	Building Shell	0	0.0%	-3,638	0.0%	
Industrial	Hot Water	0	0.0%	-77	0.0%	
Industrial	Compressors	0	0.0%	2,125,275	0.7%	
Industrial	Boiler Equipment	0	0.0%	1,653,600	0.5%	
Industrial	Chiller Service	0	0.0%	4,542,080	1.5%	
Industrial	Industrial Process	0	0.0%	14,112,479	4.7%	
Industrial	Other	0	0.0%	14,953,616	5.0%	
Schools & Government	Lighting	0	0.0%	8,040,745	2.7%	
Schools & Government	Boiler	0	0.0%	961	0.0%	
Schools & Government	Motors & Drives	0	0.0%	2,535,056	0.8%	
Schools & Government	Refrigeration	0	0.0%	328,536	0.1%	
Schools & Government	Air Conditioning	0	0.0%	62,525	0.0%	
Schools & Government	HVAC - General	0	0.0%	108,830	0.0%	
Schools & Government	Building Shell	0	0.0%	143,942	0.0%	
Schools & Government	Appliances	0	0.0%	56,568	0.0%	
Schools & Government	Other	0	0.0%	3,116,347	1.0%	
Total	**Total**	**844,829,373**	**100.0%**	**301,103,066**	**100.0%**	**35.6%**

Table G-4. Comparisons of Focus Electric Energy Impacts (Net, 12 Month Period from January 1 to December 31, 2009) and Achievable Potential—Business Markets

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
Agriculture	Dairy/Livestock Operation - Milking Parlor	-36,786	-0.1%	-14,101	-0.1%	38.3%
Agriculture	Grain Drying Operations - Process Improvements	169,301	0.5%	20,443	0.2%	12.1%
Agriculture	Greenhouses - Shell Improvements	6,143	0.0%	258,661	2.4%	4210.4%
Agriculture	Greenhouses - Space Heating	120,944	0.4%	27,310	0.3%	22.6%
Agriculture	Appliances	0	0.0%	389	0.0%	
Agriculture	Hot Water - Gas	0	0.0%	2,405	0.0%	
Agriculture	Boiler	0	0.0%	2,127	0.0%	
Agriculture	Furnaces	0	0.0%	116	0.0%	
Agriculture	HVAC - General	0	0.0%	157	0.0%	

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
Agriculture	Other	0	0.0%	40,907	0.4%	
Commercial	Clotheswashing	354,373	1.0%	0	0.0%	0.0%
Commercial	Cooking	311,820	0.9%	21,088	0.2%	6.8%
Commercial	Cooling Equipment	0	0.0%	-5,706	-0.1%	
Commercial	Data / computing / office equip	-194,871	-0.6%	0	0.0%	0.0%
Commercial	DHW System improvements	2,825,023	8.2%	10,697	0.1%	0.4%
Commercial	Dishwashing	209,516	0.6%	3,293	0.0%	1.6%
Commercial	Elec heating	-570,017	-1.7%	0	0.0%	0.0%
Commercial	Faucets / Nozzles	745,842	2.2%	42,887	0.4%	5.8%
Commercial	Gas Heating Equip	655,827	1.9%	40,408	0.4%	6.2%
Commercial	Heat Recovery	192,963	0.6%	20,675	0.2%	10.7%
Commercial	HVAC RCx / Controls	5,020,177	14.6%	794,239	7.3%	15.8%
Commercial	Lighting controls / design	-1,169,619	-3.4%	0	0.0%	0.0%
Commercial	Lighting equipment	-929,311	-2.7%	0	0.0%	0.0%
Commercial	Pool	31,368	0.1%	0	0.0%	0.0%
Commercial	Process equip	-1,127	0.0%	0	0.0%	0.0%
Commercial	Refrig - RCx / controls	0	0.0%	5,980	0.1%	
Commercial	Shell improvement	681,377	2.0%	38,337	0.4%	5.6%
Commercial	HVAC - General	0	0.0%	143,225	1.3%	
Commercial	Boiler	0	0.0%	36,536	0.3%	
Commercial	Controls	0	0.0%	20,921	0.2%	
Commercial	Appliances	0	0.0%	47,581	0.4%	
Commercial	Other	0	0.0%	367,222	3.4%	
Industrial	Air Compression - Improved Operations and Maintenance	0	0.0%	4,921	0.0%	
Industrial	HVAC - Efficient System Design and Controls	0	0.0%	9,411	0.1%	
Industrial	HVAC - Heating - Equipment Upgrades and Replacement	197,971	0.6%	12,624	0.1%	6.4%
Industrial	HVAC - Heating - Improved Operations and Maintenance	75,038	0.2%	217,041	2.0%	289.2%
Industrial	HVAC - Heating - Improved System Design and Controls	209,037	0.6%	177,403	1.6%	84.9%
Industrial	HVAC - Heating - Insulation and Sealing of System Components	460,785	1.3%	34,685	0.3%	7.5%
Industrial	HVAC - Heating - Waste and/or Process Heat Recovery	276,175	0.8%	0	0.0%	0.0%
Industrial	HVAC - Improved Operations and Maintenance	0	0.0%	499	0.0%	

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
Industrial	Process Heating (G) - Equipment Upgrades and Replacement	1,276,295	3.7%	0	0.0%	0.0%
Industrial	Process Heating (G) - Improved Operations and Maintenance	4,689,951	13.7%	0	0.0%	0.0%
Industrial	Process Heating (G) - Improved System Design and Controls	723,891	2.1%	5,537	0.1%	0.8%
Industrial	Process Heating (G) - Insulation and Sealing of System Components	2,463,518	7.2%	0	0.0%	0.0%
Industrial	Process Heating (G) - Waste and/or Process Heat Recovery	1,373,476	4.0%	618,667	5.7%	45.0%
Industrial	Steam Production - Equipment Upgrades and Replacement	1,226,438	3.6%	0	0.0%	0.0%
Industrial	Steam Production - Improved Operations and Maintenance	6,006,191	17.5%	141,652	1.3%	2.4%
Industrial	Steam Production - Improved System Design and Controls	4,597,218	13.4%	0	0.0%	0.0%
Industrial	Steam Production - Insulation and Sealing of System Components	733,195	2.1%	0	0.0%	0.0%
Industrial	Steam Production - Waste and/or Process Heat Recovery	1,559,723	4.5%	0	0.0%	0.0%
Industrial	HVAC - General	0	0.0%	221,002	2.0%	
Industrial	Appliances	0	0.0%	303	0.0%	
Industrial	Building Shell	0	0.0%	104,612	1.0%	
Industrial	Hot Water	0	0.0%	145	0.0%	
Industrial	Compressors	0	0.0%	37,404	0.3%	
Industrial	Boiler Equipment	0	0.0%	105,645	1.0%	
Industrial	Industrial Process	0	0.0%	5,561,021	51.0%	
Industrial	Other	0	0.0%	957,135	8.8%	
Schools & Government	Boiler	0	0.0%	264,432	2.4%	
Schools & Government	Air Conditioning	0	0.0%	15,439	0.1%	
Schools & Government	HVAC - General	0	0.0%	20,020	0.2%	
Schools & Government	Building Shell	0	0.0%	213,995	2.0%	
Schools & Government	Appliances	0	0.0%	-347	0.0%	
Schools & Government	Hot Water	0	0.0%	469	0.0%	

Program	Measure Category	2012 Therms Potential	% of Total Therms Potential	Net Therms Saved	% of Total Therms Saved	% of 2012 Potential Achieved
Schools & Government	Other	0	0.0%	247,014	2.3%	
Total	**Total**	**34,291,844**	**100.0%**	**10,896,526**	**100.0%**	**31.8%**

APPENDIX H: CLARIFICATION OF THE DIFFERENT APPROACHES TO CALCULATING FOCUS IMPACT VALUES

Focus impact data in Chapter 2 and elsewhere are reported in a variety of ways relative to the timing of savings and what is included when savings are summed. It is important to understand distinctions that are made between *annual first year* savings, *lifetime* savings, and *lifecycle* savings. This appendix is intended to help clarify these distinctions.

Table H-1 illustrates a simplified, hypothetical situation for a single measure. In each program year, one hundred measures are installed. Each measure conserves sixty kWh per year for a total program savings of 6,000 kWh per year. The measure has a lifetime of six years. Superimposed on Table H-1 are ovals indicating the savings that are summed in each of three definitions of program impacts.

Annual first year savings are represented by the orange circle. These represent the total energy savings in the first year of installation. In this example, the savings are 6,000 kWh. Annual first year savings are shown, for instance, in Tables 2-1c and 2-1f of this report.

Lifetime savings are represented by the blue oval in Table H-1. These are all savings that will be obtained from measures installed in a given year, over the lifetimes of those measures. In this example, the savings are 36,000 kWh. Lifetime savings values are shown in Table 2-1a. Note, that there is no discounting of those savings. For benefit-cost analysis, the value of energy saved in the future is calculated and discounted to account for the time-value of money.

Lifecycle savings are represented by the green oval in Table H-1. This is the sum of savings from all program installed measures that have not passed their measure life. In this example, it is 36,000 kWh. It is important to understand that this 36,000 kWh savings is arrived at in a completely different way than what is represented by the lifetime savings. In reality, the numbers sum to different values because of the different mix of measures that are installed in each year. Lifecycle savings values are shown, for instance, in Tables 2-1b and 2-1e. They are also represented in Figures 2-1 to 2-6.

Table H-1. The Timing of Energy Savings from a Hypothetical Program

Program Year	Quantity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
FY01	100	6,000	6,000	6,000	6,000	6,000	6,000									
FY02	100		6,000	6,000	6,000	6,000	6,000	6,000								
FY03	100			6,000	6,000	6,000	6,000	6,000	6,000							
FY04	100				6,000	6,000	6,000	6,000	6,000	6,000						
FY05	100					6,000	6,000	6,000	6,000	6,000	6,000					
FY06	100						6,000	6,000	6,000	6,000	6,000	6,000				
FY07	100							6,000	6,000	6,000	6,000	6,000	6,000			
18 MCP	100								6,000	6,000	6,000	6,000	6,000	6,000		
CY09	100									6,000	6,000	6,000	6,000	6,000	6,000	
CY10	100										6,000	6,000	6,000	6,000	6,000	6,000