

Focus on Energy
Calendar Year 2014 Evaluation Report
Volume I
May 27, 2015

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List of Acronyms

Acronym	Term
CB&I	Chicago Bridge & Iron Company
CFL	Compact Fluorescent Lamp
CY	Calendar Year
EIA	Energy Information Administration
EM&V	Evaluation, Measurement, and Verification
EUL	Expected Useful Life
HID	High Intensity Discharge
HVAC	Heating, Ventilation, and Air Conditioning
KBtu/h	Thousand British Thermal Units per Hour
kW	Kilowatt
kWh	Kilowatt Hour
LED	Light-Emitting Diode
LMP	Locational Marginal Pricing
MISO	Midcontinent Independent Transmission System Operator, Inc.
MMBtu	Million British Thermal Units
MThm	Megatherm
MWh	Megawatt Hour
NTG	Net-to-Gross
PSC	Public Service Commission of Wisconsin
QA/QC	Quality Assurance/Quality Control
SEERA	Statewide Energy Efficiency and Renewable Administration
SMP	Standard Market Practice
SPECTRUM	Statewide Program for Energy Customer Tracking, Resource Utilization, and Data Management
TRC	Total Resource Cost (test)
TRM	Technical Reference Manual
VFD	Variable-Frequency Drive (also known as Variable-Speed Drive)

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Executive Summary

This report describes the evaluation findings and impacts achieved by Focus on Energy for calendar year (CY) 2014. Since CY 2014 was the last year of the quadrennial period of CY 2011-2014, this report also includes the aggregated four-year impacts. Volume I of the evaluation report summarizes findings across all programs and measure categories in the portfolio, and Volume II provides detailed evaluation results for each program. The report appendices contain additional detail on evaluation approaches, including savings by county, political district, and utility territory as well as supporting data and evaluation materials. All three report sections (Volume I, Volume II, and the appendices) should be read together to gain a comprehensive perspective on the Focus on Energy portfolio.

On a portfolio level, the programs surpassed the four-year net annual electric energy savings goal set by the Public Service Commission of Wisconsin, while falling just short of Commission's goals for electric demand savings and gas energy savings. The entire savings portfolio was delivered very cost-effectively, providing the state of Wisconsin $3.06 in benefits for $1 in costs incurred during the quadrennium. On an individual basis, most programs achieved their CY 2014 life-cycle savings goal and are well-positioned to sustain the energy and economic impacts heading into the next quadrennial cycle.

Summary of Methods

The Evaluation Team defined the following key evaluation terms as follows, and described in more detail in the Glossary of Terms found in Appendix B:

- **Gross savings:** Program reported change in energy consumption and/or demand resulting from an efficiency program.
- **Verified gross savings:** Energy savings verified by an independent evaluation team.
- **Net savings:** Savings directly attributable to program efforts, i.e., net of what would have occurred in the program's absence.

To determine verified gross savings, the Evaluation Team reviewed and assessed the technical assumptions used in calculating savings, participation levels, and measure installation and retention rates. To determine net savings, the Evaluation Team relied almost exclusively upon primary research conducted throughout the quadrennium.

Key Achievements

A Public Service Commission of Wisconsin Order adopted a four-year (CY 2011 through CY 2014) net annual electric energy savings goal of 1,816,320,000 kWh, net annual electric demand savings goal of 335,080 kW, and a net annual natural gas savings goal of 73,040,000 therms.[1] Table 1 lists the net annual savings achieved by the programs during CY 2014 as well as during the quadrennial period (January 1, 2011, to December 31, 2014) by segment.

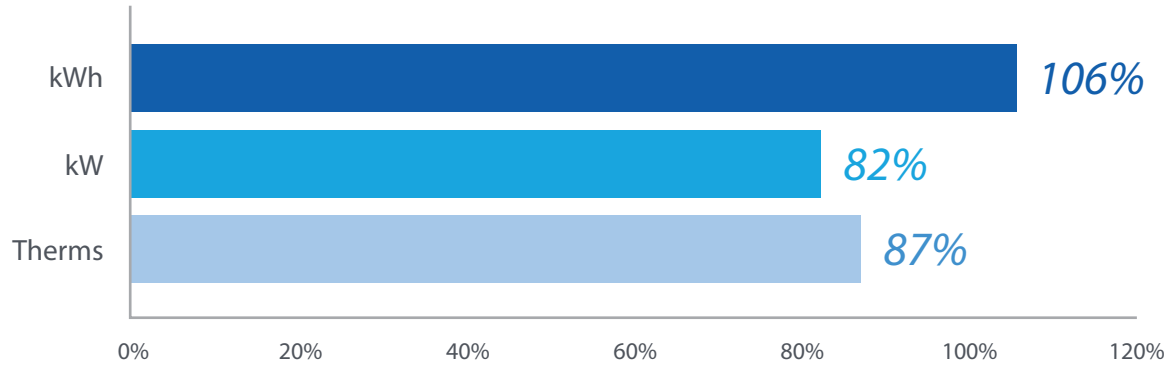
Table 1. CY 2014 and Quadrennium (2011-2014) First-Year Annual Verified Net Savings by Segment[1]

Year	Savings Type	Residential	Nonresidential	Total
2014	kWh	239,161,899	318,522,062	**557,683,961**
	kW	30,508	46,424	**76,932**
	Therms	3,078,143	15,242,822	**18,320,964**
2011-2014	kWh	724,780,904	1,195,580,425	**1,920,361,329**
	kW	97,364	178,597	**275,961**
	Therms	11,911,669	51,673,952	**63,585,621**

[1] Includes Renewable Energy Measures. Totals may not match the sum of nonresidential and residential due to rounding.

As shown in Figure 1, Focus on Energy achieved 106% of the electric energy savings goal, 82% of the electric demand savings goal, and 87% of the gas savings goal. Focus' gas savings achievement was limited by a significant decrease in gas prices, which occurred after the Commission's goal was established and limited available cost-effective options for gas saving measures.

Figure 1. Focus on Energy's Achievement of Four-Year (CY 2011–CY 2014) Net Annual Savings Goal[1]



[1] 100% reflects PSC's established net annual goals of 1,816,320,000 kWh, 335,080 kW and 73,040,000 therms.

[1] PSC Docket 5-GF-191, REF#:158228.

Additionally, the PSC has ordered that the Focus on Energy Program Administrator and Implementers track savings goals relative to gross life-cycle savings targets: 24,000,000,000 kWh, 1,152,000,000 therms, and 335,080 kW.[2] Table 2 shows the life-cycle savings achieved by Focus on Energy in CY 2014 as well as during the quadrennium. Life-cycle savings represent the savings programs can realize through measures over their effective useful lifetimes (EULs).

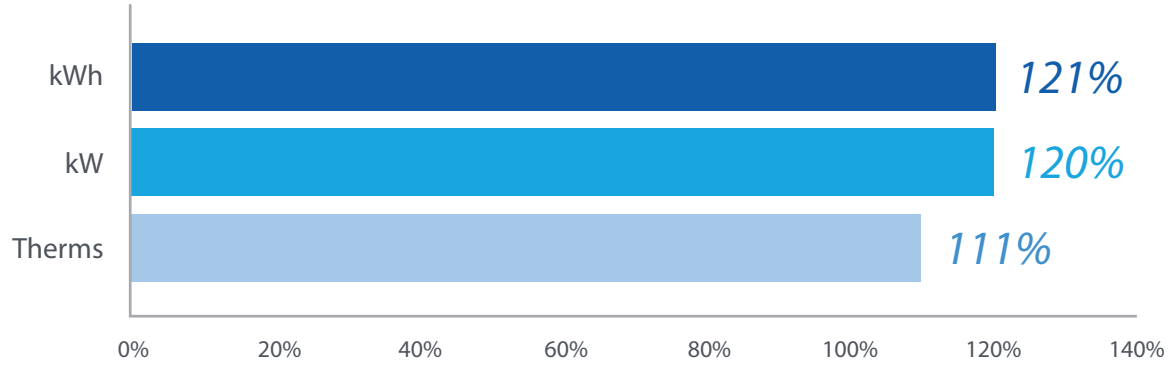
Table 2. CY 2014 and Quadrennium (2011-2014) Verified Gross Life-Cycle Savings by Segment[1]

Year	Savings Type	Residential	Nonresidential	Total
2014	kWh	2,696,994,975	5,490,288,656	**8,187,283,631**
	kW	43,538	62,305	**105,843**
	Therms	94,541,074	263,264,489	**357,805,563**
2011-2014	kWh	8,126,367,258	20,796,300,356	**28,922,667,614**
	kW	139,325	263,955	**403,280**
	Therms	325,651,224	949,939,325	**1,275,590,549**

[1] Includes Renewable Energy Measures. Totals may not match the sum of nonresidential and residential due to rounding

As shown in Figure 2, Focus on Energy achieved 121% of the electric energy savings goal, 120% of the electric demand savings goal, and 111% of the gas savings goal.

Figure 2. Program Administrator's and Implementer's Achievement of Four-Year (CY 2011–CY 2014) Verified Gross Life-Cycle Savings Goal[1]



[1] 100% reflects Program Administrator and Implementer established verified gross life-cycle goals of 24,000,000,000 kWh, 335,080 kW, and 1,152,000,000 therms.

[2] PSC Docket 5-GF-191, REF#:158228.

Table 3 lists the findings from the Evaluation Team's benefit/cost analysis of the CY 2014 portfolio. The residential and nonresidential segments and overall portfolio were cost effective.

Table 3. CY 2014 Cost-Effectiveness Results

Unit	Two Segments Inclusive of Renewables	Two Segments and Renewables Separate
Nonresidential Segment	3.54	3.79
Residential Segment	2.88	3.17
Renewables	N/A	1.52
Total	**3.33**	**3.33**

Table 4 lists the findings from the Evaluation Team's benefit/cost analysis of the Focus on Energy portfolio for the CY 2011-2014 quadrennium. The residential and nonresidential segments and overall portfolio were cost effective.

Table 4. Quadrennium (2011–2014) Cost-Effectiveness Results

Unit	Two Segments Inclusive of Renewables	Two Segments and Renewables Separate
Nonresidential Segment	3.23	3.73
Residential Segment	2.68	2.94
Renewables	N/A	0.89
Total	**3.06**	**3.06**

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Introduction

Focus on Energy is Wisconsin's statewide energy-efficiency and renewable-resource program, which is funded by the state's investor-owned energy utilities—as required under Wisconsin Statute §196.374(2)(a)—and participating municipal utilities and electric cooperatives. The Public Service Commission of Wisconsin (PSC) provides oversight of Focus on Energy.

Focus on Energy works with eligible Wisconsin residents and businesses to install cost-effective energy-efficiency and renewable-energy projects. Information, technical support, and financial incentives enable consumers to implement and complete energy projects they otherwise would not have been able to complete or to complete projects ahead of schedule. Focus on Energy helps Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect the environment, and control Wisconsin's growing demand for electricity and natural gas. The 2005 Wisconsin Act 141 requires the PSC to conduct a review of energy-efficiency and renewable-resource programs at least once every four years; a planning process in 2010 set policies for CY 2011–CY 2014.[3]

CB&I (Chicago Bridge & Iron Company, formerly Shaw Environmental & Infrastructure, Inc.) is contracted to serve as the Program Administrator for the quadrennial cycle (CY 2011 through CY 2014). CB&I is responsible for designing all of Focus on Energy's programs and the overall performance of these programs in meeting Wisconsin's energy-savings goals. CB&I is also responsible for managing and coordinating individual program offerings, supporting customers and trade allies through a customer service center, coordinating with participating utilities, guiding marketing and communication activities, and reporting to the Statewide Energy Efficiency and Renewable Administration (SEERA) and to the PSC. SEERA, formed by the state's investor-owned utilities, is responsible for collecting utility funding for Focus on Energy and contracting with the Program Administrator.

In November 2011, the PSC contracted with a team of energy consulting and market research firms to verify Focus on Energy savings and evaluate the programs during the quadrennial cycle (CY 2011 through CY 2014). These firms, collectively referred to as the Evaluation Team, are Cadmus, Nexant, Inc., and St. Norbert College Strategic Research Institute.

As in previous years, Focus on Energy targeted two customer segments in CY 2014:

- The residential segment, servicing single-family and multifamily homes
- The nonresidential segment, servicing commercial, industrial, schools, local government, and agricultural customers

[3] The PSC conducted a planning process in 2014 to set policies for CY 2015–CY 2018.

Quadrennium (2011-2014) Evaluation

The Evaluation Team investigated the performance of the Focus on Energy programs delivering energy savings across four years. Table 5 lists the programs evaluated by residential and nonresidential segments. The CY 2011 program offerings are listed separately because the portfolio was redesigned for CY 2012 and beyond. Appendix C provides detailed descriptions of the CY 2014 programs.

Table 5. Residential and Nonresidential Programs

Residential Programs	Nonresidential Programs
2012-2014 Programs	
Multifamily Direct Install	Business Incentive
Multifamily Energy Savings	Chain Stores and Franchises
Appliance Recycling	Large Energy Users
Lighting and Appliance	Small Business
Home Performance with ENERGY STAR®	Design Assistance
Assisted Home Performance with ENERGY STAR	Renewable Energy Competitive Incentive
New Homes	Retrocommissioning
Residential Rewards	
Enhanced Rewards	
Express Energy Efficiency	
2011 Programs (Legacy Programs)	
ACES-New Home Construction	
ACES-Whole Building Existing	
Appliance and Plug Load	
Efficient Heating and Cooling[1]	
ENERGY STAR Lighting[1]	
Head Start	
Home Performance with ENERGY STAR	
New Homes[1]	
Residential Renewables	
Targeted Home Performance[1]	

[1] Program continued beyond 2011 and CY 2011 savings are included with corresponding CY 2012–2014 program

Summary of Measures by Segment

The Evaluation Team assessed the electric and gas savings each measure achieved during the first year of its operation as well as the impacts that can occur over each measure's EUL. Reporting on both first-year annual and life-cycle savings provides the most applicable representation of each program's performance.

Table 6 lists all measure categories in the residential and nonresidential programs.

Table 6. Quadrennial Period Residential and Nonresidential Program Measure Categories

Residential Only	Residential and Nonresidential Segments	Nonresidential Only
• Appliance Recycling • Furnace	• Boilers and Burners • Bonus[1] • Building Shell • Domestic Hot Water • Fuel Conversion[2] • Hot Water • HVAC • Laundry • Lighting • Motors and Drives • New Construction • Refrigeration • Renewable Energy • Vending and Plug Loads	• Agriculture • Compressed Air/Vacuum Pumps • Computer Technology/IT • Custom[3] • EMS Scheduling[4] • Food Service • High Intensity Discharge (HID)[5] • Industrial Ovens and Furnaces • New Building Design • Pools • Process Efficiency • Training and Special[6] • Waste Water Treatment Whole Building[7]

[1] Bonus incentives applied to certain savings levels or certain customer categories.

[2] Changing equipment to a more efficient fuel source for a particular application.

[3] Customized equipment and building retrofits tailored to suit the needs of a business or facility.

[4] Process used to improve commercial facilities' energy management systems (EMS).

[5] High-intensity discharge (HID) lamps are a type of electrical gas-discharge lamp.

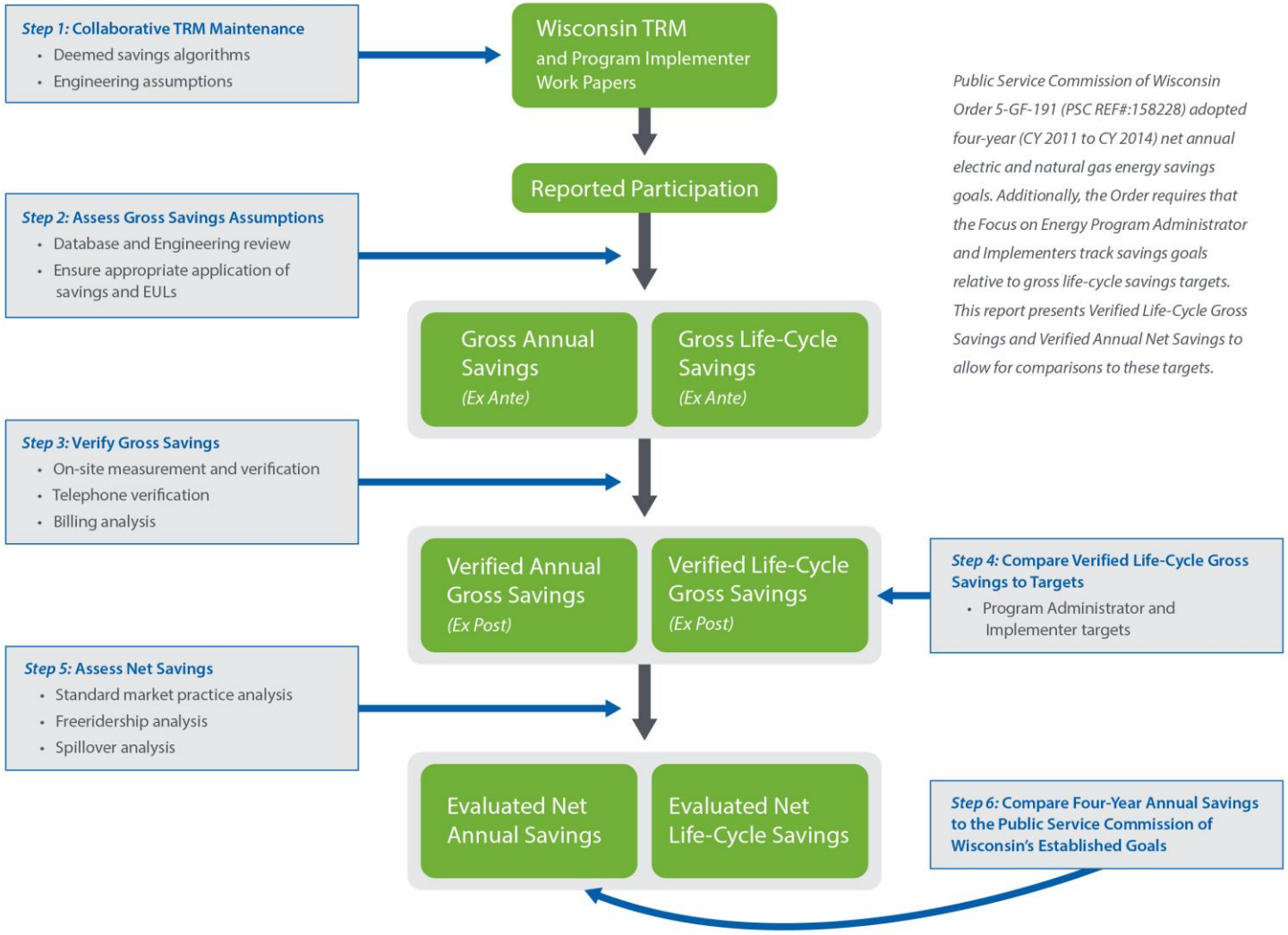
[6] Energy education and training on energy-saving operations and maintenance practices.

[7] Customized equipment and building retrofits that treat the building as an energy system with interacting components.

Overview of Evaluation Activities

Figure 3 depicts the six steps the Evaluation Team followed for its evaluation activities. The Evaluation Team followed this process on an ongoing basis throughout the quadrennial period of CY 2011 through CY 2014.

Figure 3. Quadrennium Evaluation Steps



Public Service Commission of Wisconsin Order 5-GF-191 (PSC REF#:158228) adopted four-year (CY 2011 to CY 2014) net annual electric and natural gas energy savings goals. Additionally, the Order requires that the Focus on Energy Program Administrator and Implementers track savings goals relative to gross life-cycle savings targets. This report presents Verified Life-Cycle Gross Savings and Verified Annual Net Savings to allow for comparisons to these targets.

The Evaluation Team conducted the following steps:

- **Step 1.** Collaborated with the PSC and key Focus on Energy program actors to ensure that the programs' deemed savings, algorithms, and input assumptions are appropriate. Documentation is currently being compiled into the Wisconsin Technical Reference Manual (TRM). The TRM will serve as a comprehensive reference in future years.
- **Step 2.** Conducted a review of the implementation database to check for entry errors, inconsistencies, ineligible equipment, and any other potential errors. This information was reconciled with Program Administrator and Program Implementer data. The process produced the *ex ante* gross annual and life-cycle savings.
- **Step 3.** Conducted an assessment of the gross savings. In this step the Evaluation Team verified—either through site visits or phone surveys—installation of measures and assessed gross savings, including revisiting baseline assumptions and engineering inputs. The Evaluation Team's data collection and analysis methods depended on the program and the installed measures.
- **Step 4.** Compared *ex post* gross life-cycle saving to the targets for the Program Administrator and Program Implementers.
- **Step 5.** Estimated net-to-gross (NTG) ratios (that is, freeridership and spillover). The Evaluation Team applied the NTG ratios to the *ex post* savings from Step 4 and estimated net savings.
- **Step 6.** Compared evaluated net annual savings to the four-year goal established in the January 13, 2012, Public Service Commission of Wisconsin Order, docket 5-GF-191 (PSC REF#:158228).

Table 7 and Table 8 list the data collection activity and sample sizes used for the residential and nonresidential segments. The tables contain a summary of CY 2014 activities and show the total sample sizes for the quadrennial period.

Table 7. Residential Evaluation Activities

Evaluation Activity	CY 2014	CY 2011–CY 2014
On-Site Evaluation Measurement and Verification[1]	0	430
Participant Surveys	130	1,674
Partial and Nonparticipant Surveys	0	194
Program Administrator and Implementer Interviews[2]	12	61
Trade Ally and Market Actor Interviews[2]	0	170

[1]All projects included in on-site EM&V also received a project records review.

[2]Values represent number of individuals interviewed.

Table 8. Nonresidential Evaluation Activities

Evaluation Activity	CY 2014	CY 2011–CY 2014
On-Site Evaluation Measurement and Verification[1]	55	490
Project Audit[2]	103	514
Participant Surveys	7	567
Partial and Nonparticipant Surveys	0	85
Program Administrator and Implementer Interviews[3]	8	106
Trade Ally and Market Actor Interviews[3]	31	246

[1]All projects included in on-site EM&V also received a project records review.

[2]Exclusive of project audits conducted for on-site EM&V.

[3]Values represent number of individuals interviewed.

Quadrennium Evaluation Findings

Table 9 lists the overall verified gross life-cycle electricity, demand, and gas savings for the portfolio by calendar year.

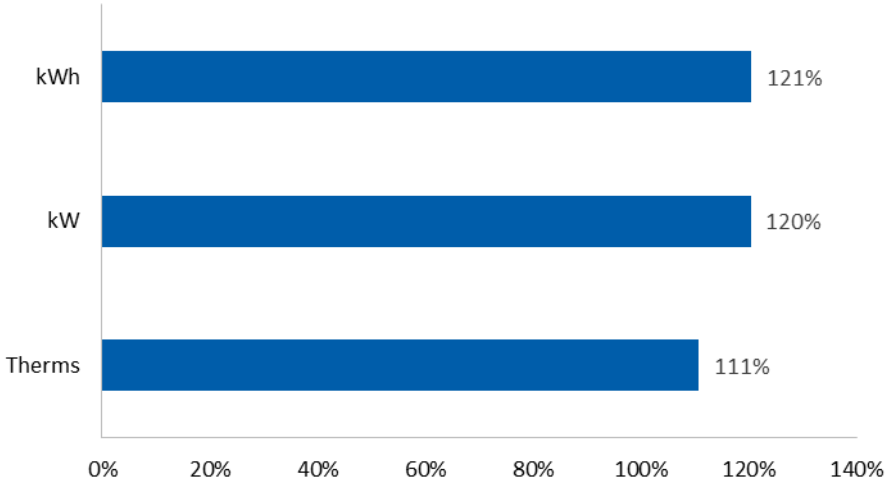
Table 9. Overall Portfolio Verified Gross Life-Cycle Savings by Calendar Year

Calendar Year	Electric Savings (kWh)	Demand Savings (kW)	Gas Savings (therms)
2011	5,259,904,739	77,076	246,171,404
2012	6,881,823,059	94,219	353,518,681
2013	8,593,656,185	126,143	318,094,901
2014	8,187,283,631	105,843	357,805,563
Total—All Years	**28,922,667,614**	**403,280**	**1,275,590,549**

Additionally, PSC Order 5-GF-191 requires that the Focus on Energy Program Administrator and Implementers track savings goals relative to gross life-cycle savings targets of 24,000,000,000 kWh, 335,080 kW 1,152,000,000 therms. Relative to these goals, the Focus on Energy programs reached 121% of the kWh savings goal, 120% of the kW goal and 111% of the therms savings goal.

Figure 4 shows the actual life-cycle savings totals (CY 2011 through CY 2014) compared to the Program Administrator's and Implementers' quadrennial savings goals.

Figure 4. Program Administrator's and Implementers' Achievement of Four-Year (CY 2011–CY 2014) Verified Gross Life-Cycle Savings Goal[1]



[1]100% reflects Program Administrator and Implementer established verified gross life-cycle goals of 24,000,000,000 kWh, 335,080 kW, and 1,152,000,000 therms.

Table 10 lists the overall net annual electricity, demand, and gas savings for the portfolio by calendar year.

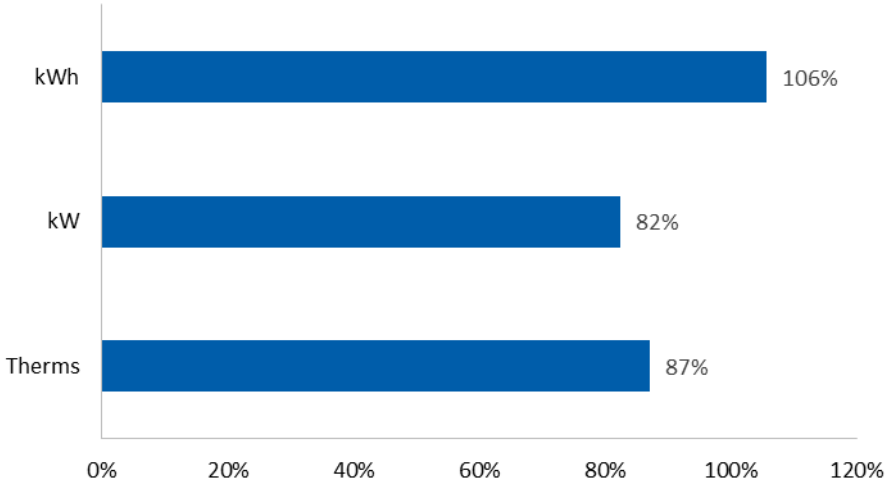
Table 10. Overall Portfolio Net Savings by Calendar Year

Calendar Year	Electric Savings (kWh)	Demand Savings (kW)	Gas Savings (therms)
2011	268,965,048	47,323	11,251,430
2012	460,784,732	66,817	16,476,789
2013	632,927,588	84,889	17,536,438
2014	557,683,961	76,932	18,320,964
Total—All Years	**1,920,361,329**	**275,961**	**63,585,621**

The PSC Order, docket 5-GF-191 (PSC REF#:158228) set four-year net annual savings goals of 1,816,320,000 kWh, 335,080 kW, and 73,040,000 therms. Relative to these goals, the Focus on Energy programs reached 106% of the kWh savings goal, 82% of the kW savings goal, and 87% of the therms savings goal.

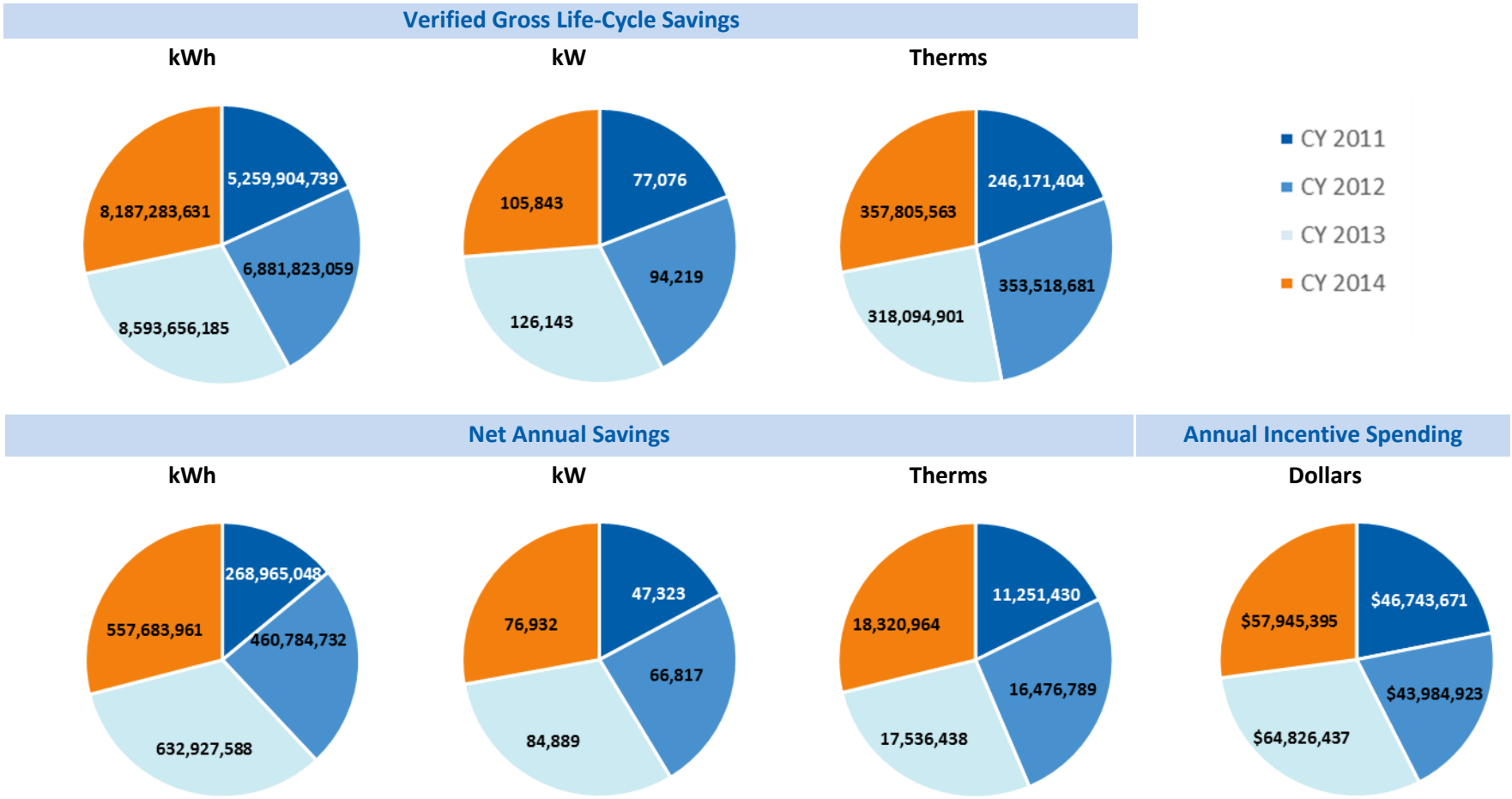
Figure 5 and Figure 6 show the actual savings and spending totals (CY 2011 through CY 2014) compared to the PSC's quadrennial savings goals. This report shows savings and progress toward goals on an annual basis. The PSC's established goals and verified gross targets are for the full four-year cycle.

Figure 5. Focus on Energy's Achievement of Four-Year (CY 2011–CY 2014) Net Annual Savings Goal[1]



[1]100% reflects PSC's established net annual goals of 1,816,320,000 kWh, 335,080 kW, and 73,040,000 therms.

Figure 6. Focus on Energy Four-Year (CY 2011–CY 2014) Savings and Incentive Spending by Year



Summary of Findings by Program

This section provides a summary of the savings and participation for each program in the Focus on Energy portfolio in CY 2014. Volume II discusses in more detail the savings for each program and the approaches used for calculating the savings values. The Evaluation Team varied its approach and activities by program, depending upon the level of participation, the savings achieved, and the information available.

Across all programs, the Evaluation Team applied the following standard methods when calculating verified and evaluated savings:

Equation for Verified Gross Life-Cycle Savings:

$$Verified\ Gross\ Life-Cycle\ Savings\ = \sum(Verified\ Gross\ Annual\ Savings \times EUL\ for\ each\ measure)$$

Equation for Net Annual Savings:

$$Verified\ Net\ Annual\ Savings = \sum(Verified\ Gross\ Annual\ Savings\ \times NTG\ for\ each\ measure)$$

Equation for Net Life-Cycle Savings:

$$Verified\ Net\ Life-Cycle\ Savings = \sum(Verified\ Gross\ Lifecycle\ Savings \times NTG\ for\ each\ measure)$$

Table 11 and Table 12 lists the total participation in CY 2014 and for the four years of the quadrennium (measured as number of participating customers) in each program and segment.

Figure 7 shows the CY 2014 gross verified life-cycle savings by sector. Figure 8 shows the gross verified life-cycle savings by sector for CY 2011–CY 2014. Figure 9 through Figure 12 show summaries of the verified gross life-cycle electric and gas energy savings by program for residential and nonresidential programs for CY 2014 and for the four years of the quadrennium. Key findings from both segments include:

- The Residential Lighting and Appliance Program provided the greatest amount of electric savings for the residential segment.
- The Residential Rewards Program provided the greatest amount of gas savings for the residential segment.
- The Business Incentive Program provided the greatest amount of electric savings for the nonresidential segment.
- The Large Energy Users Program provided the greatest amount of gas savings for the nonresidential segment.

Table 11. Total Participation by Program in CY 2014

Segment	Program	CY 2014 Participation
Residential	Multifamily Direct Install	124
Residential	Multifamily Energy Savings	289
Residential	Appliance Recycling	17,992
Residential	Residential Lighting and Appliance	923,044[1]
Residential	Home Performance with ENERGY STAR	2,339
Residential	Assisted Home Performance with ENERGY STAR	629
Residential	New Homes	2,096
Residential	Residential Rewards	23,550
Residential	Enhanced Rewards	1,655
Residential	Express Energy Efficiency	17,121
Residential Subtotal[2]		**65,795**
Nonresidential	Business Incentive	2,895
Nonresidential	Chain Stores and Franchises	329
Nonresidential	Large Energy Users	374
Nonresidential	Small Business	2,571
Nonresidential	Design Assistance	65
Nonresidential	The Renewable Energy Competitive Incentive	38
Nonresidential	Training	1
Nonresidential Subtotal		**6,273**

[1] For CY 2014, the Evaluation Team determined participation for lightbulbs using newly available data from a Wisconsin Homescan survey panel of randomly recruited households. The data contained all purchases made by households that purchased CFLs in CY 2014. Because the Homescan data track the same people over time, the Evaluation Team could estimate the number of unique participating customers by calculating the average number of CFL packages each household purchased in each calendar year. Using the average packages purchased per household from the Homescan analysis and the total number of packages purchased from the implementer tracking system, the Evaluation Team estimated the number of households that participated in the Program in CY 2014. The Evaluation Team continued to assume one showerhead or clothes washer per participant. See Volume II for methods used to determine annual participation.

[2] The Residential Lighting and Appliance Program is not included in the residential subtotal of participants in order to remain consistent with the CY 2011-CY 2014 totals reported in Table 12.

Table 12. Four-Year (CY 2011–CY 2014) Total Participation by Program

Segment	Program	CY 2011–CY 2014 Participation
Residential	Multifamily Direct Install	593
Residential	Multifamily Energy Savings[2]	730
Residential	Appliance Recycling	51,665
Residential	Residential Lighting and Appliance[2]	4,022,606[4]
Residential	Home Performance with ENERGY STAR[2]	13,305
Residential	Assisted Home Performance with ENERGY STAR[2]	1,527
Residential	New Homes[2]	7,416
Residential	Residential Rewards	60,335
Residential	Enhanced Rewards	3,167
Residential	Express Energy Efficiency	51,848
Residential	2011 and Legacy Programs[3]	69,511
Residential Subtotal[5]		**260,097**
Nonresidential	Business Incentive[2]	9,256
Nonresidential	Chain Stores and Franchises	1,048
Nonresidential	Large Energy Users[2]	933
Nonresidential	Small Business	8,806
Nonresidential	Design Assistance	67
Nonresidential	The Renewable Energy Competitive Incentive	59
Nonresidential	Training	1
Nonresidential	Retrocommissioning	19
Nonresidential	2011 and Legacy Programs[3]	15,421
Nonresidential Subtotal		**35,610**

[1] The CY 2011-2014 total number of participants represents the sum of unique participants in each year.

[2] Includes legacy programs and carryover participation.

[3] Participation only for programs that did not continue into CY 2012-CY2014.

[4] This value represents the estimated number of transactions (as opposed to unique customers) occurring over all four years. The Homescan data which allowed the Evaluation Team to estimate participating households in CY 2014 was not available for CY 2011 and CY 2012. Therefore, the Evaluation Team estimated participation for the four-year period using the method cited in the CY 2013 Evaluation Report, which relied on data obtained from customers who used coupons for compact fluorescent lamp or other bulb purchases through the Program. This coupon data allowed the Team to estimate the number of purchase transactions but did not allow the estimation of purchases over time for unique customers. See Volume II for methods used to determine annual transactions.

[5] The Residential Lighting and Appliance Program is not included in the residential subtotal of participants because the four-year total for this Program represents the estimated number of transactions and not unique participants.

Figure 7. CY 2014 Gross Verified Life-Cycle Savings Impact by Sector

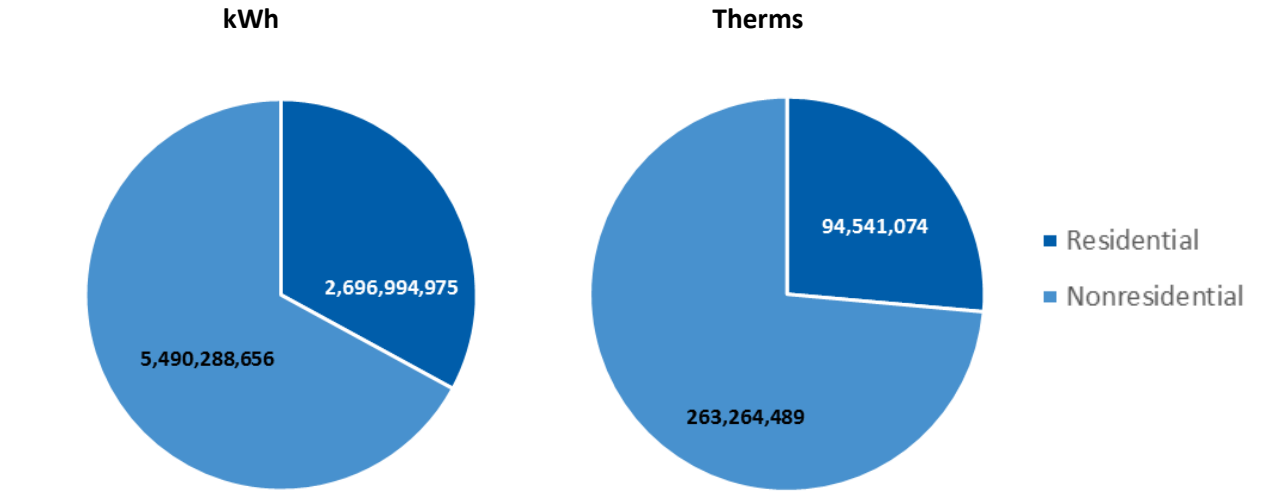


Figure 8. Quadrennium (CY 2011–CY 2014) Gross Verified Life-Cycle Savings Impact by Sector

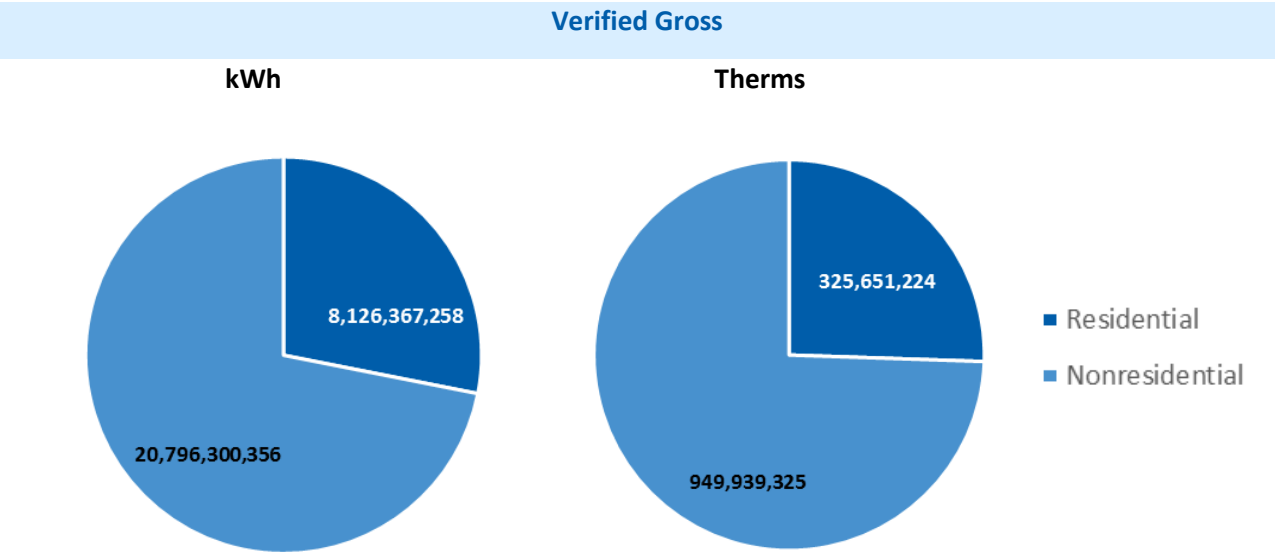


Figure 9. CY 2014 Verified Gross Life-Cycle Electric Energy Impacts by Program

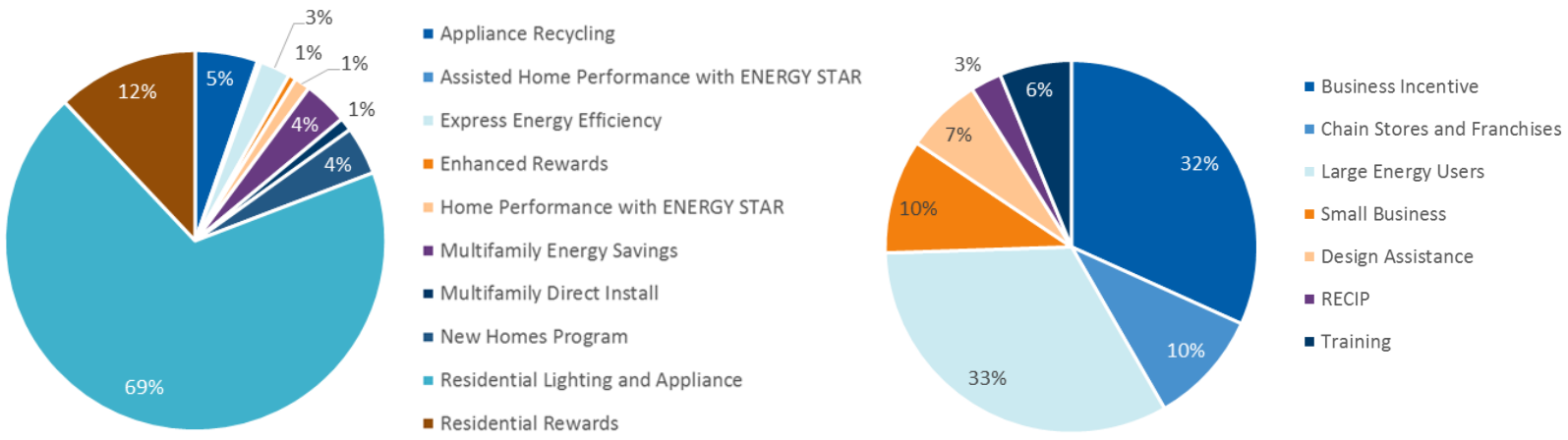


Figure 10. CY 2014 Verified Gross Gas Life-Cycle Energy Impacts by Program

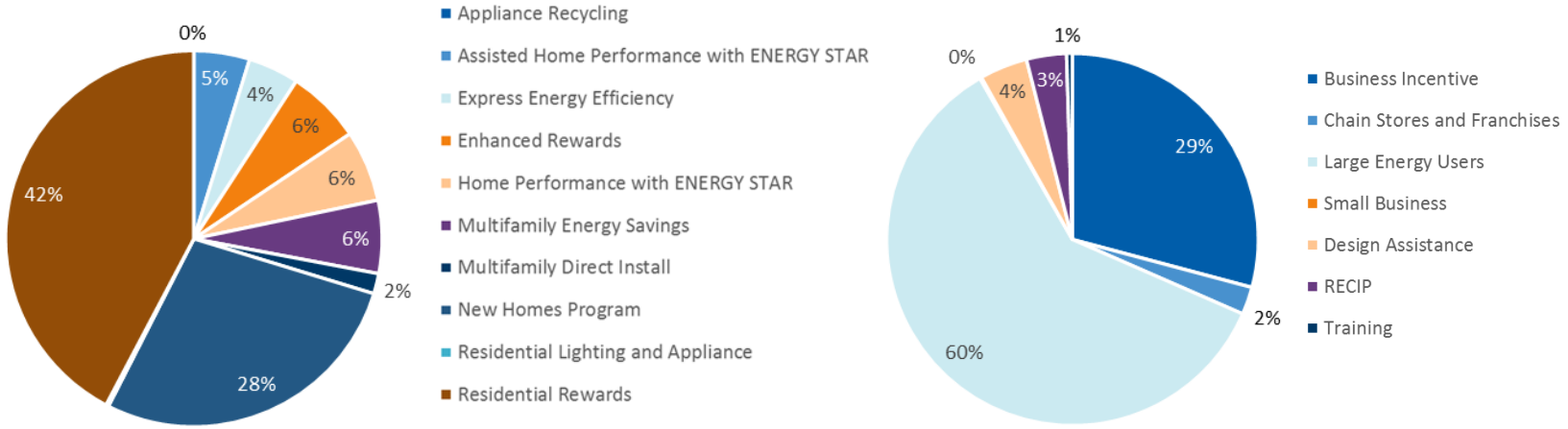


Figure 11. Four-Year (CY 2011–CY 2014) Verified Gross Life-Cycle Electric Energy Impacts by Program

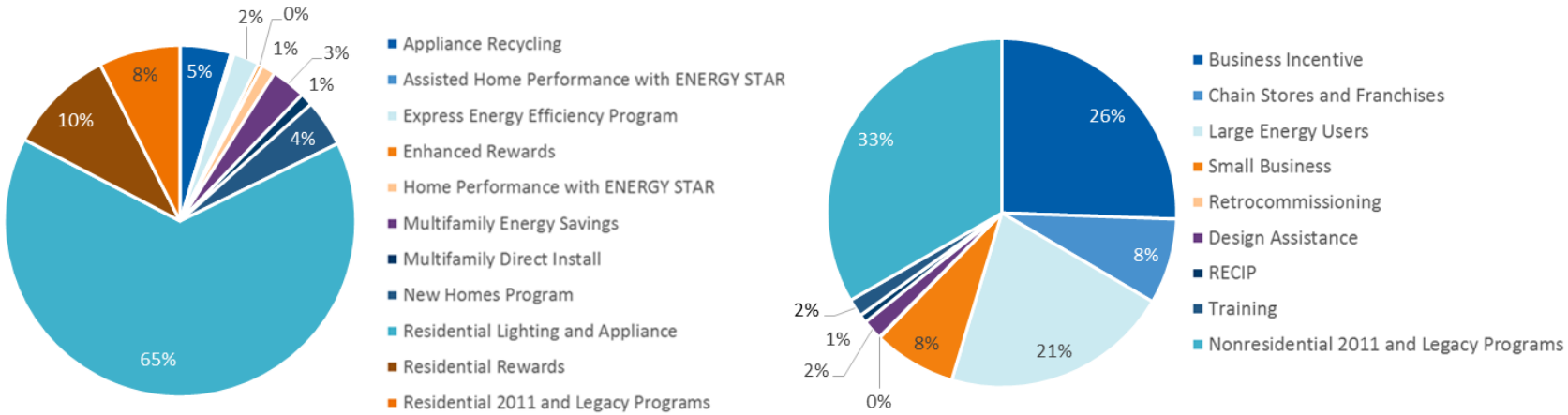


Figure 12. Four-Year (CY 2011–CY 2014) Verified Gross Life-Cycle Gas Energy Impacts by Program

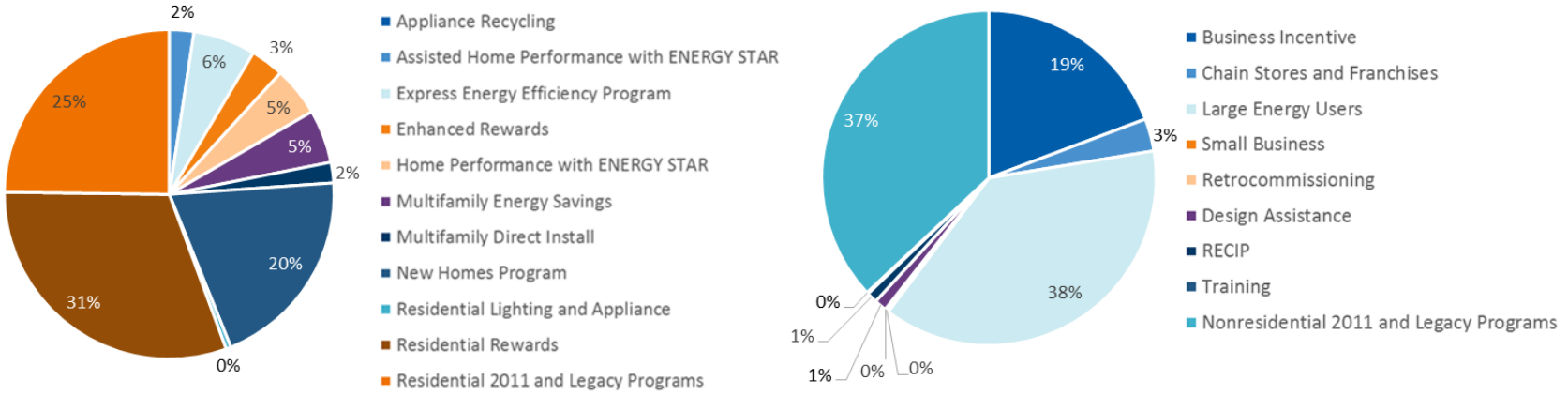


Table 13 lists the CY 2014 annual gross, verified gross, and verified net peak demand savings for electricity and gas by program, segment, and overall portfolio.

Table 13. Summary of CY 2014 Annual Savings By Program

Program Name	Gross			Verified Gross			Verified Net		
	kWh	kW	Therms	kWh	kW	Therms	kWh	kW	Therms
Residential Programs									
Multifamily Direct Install	2,504,195	224	155,516	2,428,022	217	150,429	2,428,022	217	150,429
Multifamily Energy Savings	9,023,306	1,012	426,323	9,023,306	1,012	426,323	7,211,812	781	367,453
Appliance Recycling	21,599,340	2,865	0	17,897,745	2,374	0	9,483,162	1,258	0
Residential Lighting and Appliance	267,271,017	21,024	19,282	272,050,680	30,510	20,229	198,241,011	22,141	5,553
Home Performance with ENERGY STAR	1,450,062	487	559,390	1,963,987	660	233,795	1,911,523	635	223,664
Assisted Home Performance with ENERGY STAR	439,262	151	182,856	431,706	150	182,610	431,706	150	182,610
New Homes	3,843,213	1,233	875,717	3,843,213	1,233	875,717	2,563,247	811	564,984
Residential Rewards[1]	14,538,832	6,126	1,750,828	14,537,961	6,126	1,750,828	8,012,201	3,259	957,788
Enhanced Rewards	756,380	334	264,495	756,380	334	264,495	756,380	334	264,495
Express Energy Efficiency	8,688,056	971	443,658	8,122,835	922	361,167	8,122,835	922	361,167
Residential Total	**330,113,663**	**34,427**	**4,678,066**	**331,055,834**	**43,538**	**4,265,593**	**239,161,899**	**30,508**	**3,078,143**
Nonresidential Programs									
Business Incentive	144,754,497	20,972	7,179,610	143,217,468	22,332	6,616,652	103,932,594	16,228	5,152,387
Chain Stores and Franchises	46,127,984	6,540	459,340	44,744,926	6,540	476,975	27,088,731	3,953	287,153
Large Energy Users	121,537,211	15,364	12,069,530	145,735,249	18,871	11,909,020	112,931,861	14,726	8,869,045
Small Business	40,626,815	7,905	38,350	40,626,815	7,905	38,350	30,104,585	5,786	32,614
Design Assistance[4]	19,090,790	4,113	586,454	18,221,315	2,245	548,084	10,428,992	1,285	313,697
Renewable Energy Competitive Incentive	7,749,555	1,479	471,528	7,901,966	1,357	474,565	8,159,495	1,391	492,124
Training	25,875,803	3,055	95,802	25,875,803	3,055	95,802	25,875,803	3,055	95,802
Nonresidential Total	**405,762,654**	**59,428**	**20,900,613**	**426,323,541**	**62,305**	**20,159,448**	**318,522,062**	**46,424**	**15,242,822**
Total All Programs	**735,876,317**	**93,856**	**25,578,678**	**757,379,375**	**105,843**	**24,425,040**	**557,683,961**	**76,932**	**18,320,964**

[1] The Residential Rewards Program savings include savings from residential and nonresidential Renewable Rewards Program measures.

[2] The Design Assistance Program savings include residential and nonresidential savings.

Table 14 lists the four-year annual gross, verified gross, and verified net peak demand savings for electricity and gas by program, segment, and overall portfolio.

Table 14. Summary of Quadrennium (2011-2014) Annual Savings By Program

Program Name	Gross			Verified Gross			Verified Net		
	kWh	kW	Therms	kWh	kW	Therms	kWh	kW	Therms
Residential Programs									
Multifamily Direct Install	10,402,669	639	590,953	10,548,250	827	622,625	10,426,893	814	615,264
Multifamily Energy Savings	23,589,486	3,210	1,247,672	23,575,406	3,193	1,244,162	17,237,574	2,227	958,182
Appliance Recycling	61,309,027	8,920	0	47,735,819	6,840	0	25,214,201	3,613	0
Residential Lighting and Appliance[1]	800,414,927	72,958	130,451	786,687,645	93,041	151,051	580,024,559	67,570	50,951
Home Performance with ENERGY STAR[1]	4,581,074	1,765	2,187,930	5,573,355	2,118	1,520,944	5,070,887	1,855	1,316,184
Assisted Home Performance with ENERGY STAR[1]	1,301,485	412	478,125	1,298,794	411	478,154	1,298,794	411	478,154
New Homes [1]	11,777,422	3,241	2,601,153	11,777,422	3,242	2,601,315	8,812,691	2,336	1,924,322
Residential Rewards[2]	35,550,949	14,525	4,427,408	35,549,830	14,525	4,427,250	20,664,499	8,197	2,756,193
Enhanced Rewards	1,436,260	644	464,728	1,436,258	644	464,727	1,436,258	644	464,727
Express Energy Efficiency	26,340,025	2,494	2,079,780	24,915,674	2,426	1,782,401	24,207,106	2,368	1,698,885
2011 + Legacy Residential Programs[3]	52,051,732	11,625	2,489,855	52,812,907	12,059	2,562,136	30,387,442	7,328	1,648,808
Residential Total	**1,028,755,056**	**120,434**	**16,698,054**	**1,001,911,361**	**139,325**	**15,854,766**	**724,780,904**	**97,364**	**11,911,669**
Nonresidential Programs									
Business Incentive	428,935,731	61,946	16,342,895	424,723,567	71,499	15,792,745	320,743,446	47,697	12,829,530
Chain Stores and Franchises	145,895,410	21,773	2,240,104	144,482,157	21,588	2,224,054	91,721,178	13,437	1,296,736
Large Energy Users	309,132,488	39,264	23,801,550	360,861,685	45,660	26,116,651	285,817,739	36,254	19,514,680
Small Business	149,915,994	29,712	200,138	150,160,915	29,207	201,063	110,515,264	21,010	166,285
Retrocommissioning	3,136,877	255	273,965	2,867,235	225	285,695	2,849,745	225	280,706
Design Assistance[4]	20,156,290	4,233	597,859	19,286,815	2,365	559,489	10,953,208	1,349	322,779
Renewable Energy Competitive Incentive	9,061,404	2,846	492,789	8,515,058	1,680	509,897	8,795,272	1,726	528,763
Training	25,875,803	3,055	95,802	25,875,803	3,055	95,802	25,875,803	3,055	95,802
2011 + Legacy Nonresidential Programs[5]	571,161,590	82,025	31,096,708	550,461,604	88,677	27,906,466	338,308,771	53,843	16,638,670
Nonresidential Total	**1,663,271,586**	**245,109**	**75,141,810**	**1,687,234,838**	**263,955**	**73,691,862**	**1,195,580,425**	**178,597**	**51,673,952**
Total All Programs	**2,692,026,643**	**365,542**	**91,839,864**	**2,689,146,199**	**403,280**	**89,546,628**	**1,920,361,329**	**275,961**	**63,585,621**

[1] Include savings from the former 2011 programs

[2] The Residential Rewards Program savings include savings from residential and nonresidential Renewable Rewards Program measures.

[3] Includes: ACES-New Home Construction, ACES-Whole Building Existing, Appliance and Plug Load, Efficient Heating and Cooling, Head Start, Residential Renewables

[4] The Design Assistance Program savings include residential and nonresidential savings.

[5] Includes: Agricultural, ENERGY STAR Lighting, Commercial, New Construction, Industrial, Schools and Government Programs

Summary of Findings by Measure Category

Table 15 and Table 16 list the CY2014 and quadrennium residential energy savings, demand savings, and incentive monies spent by measure category. Table 16 contains only the results from the CY 2012 through CY 2014 programs because CY 2011 program tracking utilized different measure categories.

Table 15. Summary of CY 2014 Annual Savings by Measure Category in the Residential Segment

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW %	Therm	Therm %		
Boilers & Burners - Boiler	0	0.00%	0	0.00%	279,683	6.56%	$490,063	1.97%
Boilers & Burners - Controls	0	0.00%	0	0.00%	2,377	0.06%	$300	0.00%
Boilers & Burners - Tune-up / Repair / Commissioning	0	0.00%	0	0.00%	10,455	0.25%	$7,649	0.03%
Boilers & Burners - Variable Speed Drive	16,018	0.00%	0	0.00%	0	0.00%	$303	0.00%
Building Shell - Air Sealing	3,393	0.00%	0	0.00%	8,722	0.20%	$11,174	0.05%
Building Shell - Insulation	51,549	0.02%	695	1.60%	24,170	0.57%	$31,442	0.13%
Building Shell - Window	5,017	0.00%	5	0.01%	3,898	0.09%	$4,956	0.02%
Domestic Hot Water - Aeration	1,154,404	0.35%	95	0.22%	193,810	4.54%	$130,474	0.53%
Domestic Hot Water - Controls	56,153	0.02%	0	0.00%	28,811	0.68%	$0	0.00%
Domestic Hot Water - Insulation	91,742	0.03%	0	0.00%	7,387	0.17%	$15,218	0.06%
Domestic Hot Water - Other	244,098	0.07%	28	0.06%	13,813	0.32%	$27,377	0.11%
Domestic Hot Water - Pre-Rinse Sprayer	0	0.00%	0	0.00%	42	0.00%	$0	0.00%
Domestic Hot Water - Showerhead	1,677,148	0.51%	131	0.30%	306,007	7.17%	$154,519	0.62%
Domestic Hot Water - Water Heater	292,383	0.09%	28	0.06%	7,304	0.17%	$49,891	0.20%
HVAC - Controls	55,591	0.02%	0	0.00%	7,840	0.18%	$13,982	0.06%
HVAC - Energy Recovery	-2,514	0.00%	2	0.01%	1,418	0.03%	$675	0.00%
HVAC - Furnace	10,611,642	3.21%	4,245	9.75%	1,686,838	39.55%	$5,197,375	20.94%
HVAC - Other	1,991,435	0.60%	1,424	3.27%	231,707	5.43%	$1,052,350	4.24%
HVAC - Rooftop Unit / Split System AC	13,376	0.00%	43	0.10%	0	0.00%	$20,800	0.08%
HVAC - Steam Trap	0	0.00%	0	0.00%	140,110	3.28%	$9,475	0.04%
Laundry - Clothes Washer	691,965	0.21%	193	0.44%	21,851	0.51%	$184,300	0.74%

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW %	Therm	Therm %		
Lighting - Controls	542,246	0.16%	0	0.00%	0	0.00%	$43,871	0.18%
Lighting - Delamping	39,780	0.01%	5	0.01%	0	0.00%	$192	0.00%
Lighting - Fluorescent, Compact (CFL)	281,830,706	85.13%	31,578	72.53%	0	0.00%	$9,311,900	37.52%
Lighting - Fluorescent, Linear	486,995	0.15%	59	0.13%	0	0.00%	$62,391	0.25%
Lighting - Light Emitting Diode (LED)	4,359,429	1.32%	502	1.15%	0	0.00%	$606,571	2.44%
Lighting - Other	745,276	0.23%	65	0.15%	0	0.00%	$83,550	0.34%
Motors & Drives - Motor	85,500	0.03%	34	0.08%	0	0.00%	$21,375	0.09%
New Construction - Whole Building	3,431,629	1.04%	1,158	2.66%	875,004	20.51%	$1,159,375	4.67%
Other - Bonus	0	0.00%	0	0.00%	0	0.00%	$239,004	0.96%
Other - Other	1,486,879	0.45%	2	0.00%	410,259	9.62%	$4,295,685	17.31%
Refrigeration - Other	17,895,973	5.41%	2,374	5.45%	0	0.00%	$799,770	3.22%
Renewable Energy - Geothermal	1,104,390	0.33%	71	0.16%	2,061	0.05%	$106,600	0.43%
Renewable Energy - Photovoltaics	1,847,767	0.56%	765	1.76%	0	0.00%	$618,172	2.49%
Vending & Plug Loads - Dishwasher, Residential	84,784	0.03%	16	0.04%	2,027	0.05%	$33,650	0.14%
Vending & Plug Loads - Refrigerator / Freezer - Residential	161,082	0.05%	20	0.05%	0	0.00%	$35,325	0.14%

Table 16. Summary of Quadrennium (2012-2014) Annual Savings by Measure Category in the Residential Segment

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars%
	kWh	kWh %	kW	kW %	Therm	Therm %		
Boilers & Burners - Boiler	-2,152	0.00%	2	0.00%	931,268	7.17%	$1,278,102	1.90%
Boilers & Burners - Controls	0	0.00%	0	0.00%	14,883	0.11%	$2,100	0.00%
Boilers & Burners - Insulation	0	0.00%	0	0.00%	6,449	0.05%	$7,390	0.01%
Boilers & Burners - Tune-up / Repair / Commissioning	0	0.00%	0	0.00%	62,386	0.48%	$42,817	0.06%
Boilers & Burners - Variable Speed Drive	128,833	0.01%	0	0.00%	0	0.00%	$2,372	0.00%
Building Shell - Air Sealing	37,362	0.00%	0	0.00%	8,722	0.07%	$30,623	0.05%
Building Shell - Insulation	160,149	0.02%	1,023	0.85%	33,958	0.26%	$57,890	0.09%

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars%
	kWh	kWh %	kW	kW %	Therm	Therm %		
Building Shell - Other	764,451	0.08%	339	0.28%	352,171	2.71%	$381,642	0.57%
Building Shell - Window	329,153	0.04%	33	0.03%	6,404	0.05%	$46,202	0.07%
Domestic Hot Water - Aeration	3,419,703	0.38%	95	0.08%	742,103	5.72%	$345,827	0.52%
Domestic Hot Water - Boiler	-1,700	0.00%	0	0.00%	1,440	0.01%	$3,400	0.01%
Domestic Hot Water - Controls	97,031	0.01%	0	0.00%	88,623	0.68%	$0	0.00%
Domestic Hot Water - Insulation	738,843	0.08%	0	0.00%	181,305	1.40%	$140,269	0.21%
Domestic Hot Water - Other	1,476,068	0.16%	30	0.03%	150,887	1.16%	$81,985	0.12%
Domestic Hot Water - Pre-Rinse Sprayer	0	0.00%	0	0.00%	168	0.00%	$0	0.00%
Domestic Hot Water - Showerhead	6,932,096	0.76%	373	0.31%	1,559,183	12.01%	$402,082	0.60%
Domestic Hot Water - Water Heater	577,978	0.06%	41	0.03%	104,656	0.81%	$291,183	0.43%
Domestic Hot Water - Fuel Switching	53,792	0.01%	5	0.00%	-2,046	-0.02%	$0	0.00%
HVAC - Air Sealing	103	0.00%	0	0.00%	164	0.00%	$300	0.00%
HVAC - Chiller	325,962	0.04%	71	0.06%	0	0.00%	$45,438	0.07%
HVAC - Controls	395,330	0.04%	0	0.00%	22,501	0.17%	$58,257	0.09%
HVAC - Energy Recovery	-18,569	0.00%	11	0.01%	11,272	0.09%	$21,376	0.03%
HVAC - Furnace	30,262,508	3.33%	11,311	9.43%	4,093,404	31.54%	$14,299,950	21.31%
HVAC - Other	4,362,536	0.48%	3,169	2.64%	525,843	4.05%	$2,704,046	4.03%
HVAC - Rooftop Unit / Split System AC	26,345	0.00%	85	0.07%	0	0.00%	$45,073	0.07%
HVAC - Steam Trap	0	0.00%	0	0.00%	193,862	1.49%	$17,280	0.03%
HVAC - Tune-up / Repair / Commissioning	3,000	0.00%	0	0.00%	0	0.00%	$80	0.00%
HVAC - Variable Speed Drive	320,116	0.04%	0	0.00%	0	0.00%	$11,115	0.02%
HVAC - Fan	225,307	0.02%	346	0.29%	88,003	0.68%	$0	0.00%
Laundry - Clothes Washer	1,950,423	0.21%	526	0.44%	59,419	0.46%	$720,760	1.07%
Lighting - Controls	1,286,481	0.14%	10	0.01%	0	0.00%	$75,499	0.11%
Lighting - Delamping	39,780	0.00%	5	0.00%	0	0.00%	$192	0.00%
Lighting - Fluorescent, Compact (CFL)	785,858,268	86.55%	88,967	74.14%	0	0.00%	$25,666,523	38.25%
Lighting - Fluorescent, Linear	1,843,338	0.20%	178	0.15%	-623	0.00%	$165,841	0.25%
Lighting - High Intensity Discharge (HID)	158,709	0.02%	15	0.01%	0	0.00%	$6,602	0.01%

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars%
	kWh	kWh %	kW	kW %	Therm	Therm %		
Lighting - Induction	7,490	0.00%	0	0.00%	0	0.00%	$700	0.00%
Lighting - Light Emitting Diode (LED)	7,595,993	0.84%	850	0.71%	0	0.00%	$935,195	1.39%
Lighting - Other	2,722,702	0.30%	271	0.23%	0	0.00%	$226,373	0.34%
Motors & Drives - Motor	238,465	0.03%	120	0.10%	0	0.00%	$62,230	0.09%
New Construction - Whole Building	10,157,591	1.12%	2,984	2.49%	2,338,174	18.01%	$3,066,175	4.57%
Other - Bonus	0	0.00%	0	0.00%	0	0.00%	$1,640,017	2.44%
Other - Other	-9,268,652	-1.02%	475	0.40%	1,351,195	10.41%	$10,439,897	15.56%
Refrigeration - Other	47,832,835	5.27%	6,858	5.72%	0	0.00%	$1,999,295	2.98%
Renewable Energy - Geothermal	2,103,592	0.23%	91	0.08%	6,742	0.05%	$200,850	0.30%
Renewable Energy - Photovoltaics	3,944,390	0.43%	1,634	1.36%	0	0.00%	$1,277,147	1.90%
Renewable Energy - Solar Thermal	42,177	0.00%	1	0.00%	11,867	0.09%	$150,762	0.22%
Renewable Energy - Wind Electric	2,509	0.00%	0	0.00%	0	0.00%	$0	0.00%
Vending & Plug Loads - Dehumidifier	50	0.00%	1	0.00%	0	0.00%	$25	0.00%
Vending & Plug Loads - Dishwasher, Residential	224,554	0.02%	16	0.01%	9,792	0.08%	$71,195	0.11%
Vending & Plug Loads - Refrigerator / Freezer - Residential	354,654	0.04%	44	0.04%	0	0.00%	$76,655	0.11%
Food Service - Dishwasher, Commercial	130,410	0.01%	0	0.00%	7,245	0.06%	$0	0.00%
Process - Energy Recovery	182,416	0.02%	14	0.01%	17,827	0.14%	$0	0.00%
Training & Special - Other	1,636	0.00%	0	0.00%	276	0.00%	$0	0.00%

Table 17 and Table 18 list the CY 2014 and quadrennium annual nonresidential savings and incentive monies spent by measure category. Table 18 contains only results from the CY 2012 through CY 2014 programs, as CY 2011 program tracking utilized different measure categories.

Table 17. Summary of CY 2014 Annual Savings by Measure Category in the Nonresidential Segment

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW%	Therms	Therms %		
Agriculture	5,135,838	1.20%	680	1.09%	54,724	0.27%	$331,070	1.00%
Boilers & Burners	5,805,474	1.36%	184	0.30%	2,759,514	13.69%	$1,898,187	5.74%
Building Shell	793,981	0.19%	874	1.40%	726,838	3.61%	$381,506	1.15%
Compressed Air, Vacuum Pumps	44,782,067	10.50%	6,025	9.67%	592,767	2.94%	$1,692,312	5.12%
Domestic Hot Water	2,672,268	0.63%	447	0.72%	32,947	0.16%	$118,907	0.36%
Food Service	1,157,973	0.27%	172	0.28%	118,540	0.59%	$164,363	0.50%
HVAC	42,491,664	9.97%	6,668	10.70%	6,006,894	29.80%	$4,736,579	14.33%
Industrial Ovens and Furnaces	-16,590	0.00%	7	0.01%	386,931	1.92%	$266,038	0.80%
Information Technology	2,335,550	0.55%	131	0.21%	0	0.00%	$92,052	0.28%
Laundry	-2,509	0.00%	-10	-0.02%	145,796	0.72%	$142,035	0.43%
Lighting	166,485,382	39.05%	27,231	43.71%	0	0.00%	$11,299,827	34.19%
Motors & Drives	128,315	0.03%	8	0.01%	0	0.00%	$6,114	0.02%
New Construction	15,777,915	3.70%	2,245	3.60%	548,084	2.72%	$1,753,098	5.30%
Other	1,236,057	0.29%	-19	-0.03%	117,647	0.58%	$901,589	2.73%
Pools	518,574	0.12%	40	0.06%	15,168	0.08%	$19,768	0.06%
Process	47,525,760	11.15%	6,413	10.29%	7,983,192	39.60%	$4,689,408	14.19%
Refrigeration	29,280,208	6.87%	3,510	5.63%	100,039	0.50%	$1,342,908	4.06%
Renewable Energy	32,785,453	7.69%	4,514	7.25%	474,565	2.35%	$3,116,322	9.43%
Training & Special	25,875,803	6.07%	3,055	4.90%	95,802	0.48%	$35,845	0.11%
Vending & Plug Loads	504,418	0.12%	0	0.00%	0	0.00%	$7,111	0.02%
Waste Water Treatment	1,049,940	0.25%	129	0.21%	0	0.00%	$57,204	0.17%

Table 18. Summary of Quadrennium (2012-2014) Annual Savings by Measure Category in the Nonresidential Segment[1]

Measure Category	Verified Gross						Incentive Dollars	Incentive Dollars %
	kWh	kWh %	kW	kW%	Therms	Therms %		
Agriculture	17,614,163	1.31%	5,401	2.62%	265,098	0.44%	$906,458	0.92%
Boilers & Burners	19,548,176	1.46%	1,700	0.82%	14,325,363	23.93%	$5,022,178	5.12%
Building Shell	6,541,111	0.49%	2,677	1.30%	2,320,477	3.88%	$1,146,969	1.17%
Compressed Air, Vacuum Pumps	125,571,832	9.37%	17,354	8.42%	1,633,031	2.73%	$5,143,702	5.25%
Domestic Hot Water	13,753,439	1.03%	2,054	1.00%	803,625	1.34%	$354,604	0.36%
Food Service	3,826,106	0.29%	534	0.26%	360,364	0.60%	$516,433	0.53%
HVAC	127,432,983	9.51%	23,794	11.54%	18,423,773	30.78%	$13,870,452	14.15%
Industrial Ovens and Furnaces	1,729,104	0.13%	178	0.09%	410,846	0.69%	$574,993	0.59%
Information Technology	13,631,811	1.02%	887	0.43%	-1,023	0.00%	$603,251	0.62%
Laundry	244,898	0.02%	42	0.02%	291,761	0.49%	$349,687	0.36%
Lighting	587,545,212	43.83%	104,120	50.49%	0	0.00%	$31,103,060	31.72%
Motors & Drives	40,313,734	3.01%	4,442	2.15%	0	0.00%	$1,458,733	1.49%
New Construction	20,107,057	1.50%	3,122	1.51%	764,385	1.28%	$3,719,269	3.79%
Other	25,832,970	1.93%	275	0.13%	389,440	0.65%	$4,689,924	4.78%
Pools	1,813,524	0.14%	112	0.05%	45,213	0.08%	$94,119	0.10%
Process	145,023,673	10.82%	16,261	7.89%	18,942,545	31.64%	$12,181,657	12.42%
Refrigeration	88,764,313	6.62%	10,520	5.10%	227,333	0.38%	$4,257,600	4.34%
Renewable Energy	62,018,761	4.63%	8,268	4.01%	530,948	0.89%	$10,700,416	10.91%
Training & Special	25,875,803	1.93%	3,055	1.48%	95,802	0.16%	$560,453	0.57%
Vending & Plug Loads	2,363,267	0.18%	0	0.00%	0	0.00%	$21,317	0.02%
Waste Water Treatment	10,970,685	0.82%	1,413	0.69%	30,923	0.05%	$778,609	0.79%

Cost-Effectiveness Findings

As part of the quadrennium evaluation activities, the Evaluation Team reviewed the cost-effectiveness of the Focus on Energy programs. This section presents the findings of a benefit/cost analysis for Focus on Energy portfolio across all four years. In the current quadrennial cycle, the Program Administrator has, with PSC approval, elected to use a cost-effectiveness calculator for program planning purposes.

Consistency between planning and evaluation approaches is critical for an effective understanding of program performance relative to expectations. As a result, the Evaluation Team used the same calculator for its analysis.

Several tests are used for evaluating the cost-effectiveness of energy-efficiency and renewable-energy measures. The primary benefit/cost test, approved for Focus on Energy, is based upon the total resource cost (TRC) test, which is commonly administered in the energy industry. The modified TRC test is required by PSC Order, docket 5-GF-191 (PSC REF#:141173) for this evaluation. The test counts the avoided cost of supplying the displaced energy against the program implementation and participant costs. The purpose of the test is to determine whether the costs incurred by residents, businesses, and Focus on Energy for operating a program are outweighed by the benefits received by residents, businesses, and Focus on Energy.

The modified TRC test essentially determines the ratio of program benefits to program costs. A value greater than 1 translates into a program or a portfolio of programs that is cost-effective (net benefits are positive and determined by subtracting the costs from the TRC benefits). The equation is:

Equation for TRC Test

$$TRC\ B/C\ = \frac{[Value\ of\ Net\ Saved\ Energy\ (Avoided\ Costs) + Value\ of\ Net\ Avoided\ Emissions]}{[Program\ Adminstrative\ Costs\ +\ (Incremental\ Measure\ Cost\ *NTG\ Ratio)]}$$

The following section and Appendix I provide a more detailed discussion of the inputs to the TRC test.

Value of Net Saved Energy

The value of energy saved, or displaced, equals the net energy saved multiplied by the utility-avoided cost of the saved energy. In the case of energy-efficiency and renewable-resource programs, avoided cost is the incremental (or marginal) cost to a utility for additional energy and capacity required if the utility has to generate or purchase from another source rather than pay for the efficient measure that offsets this demand.

To calculate electric energy avoided costs in this quadrennium, the Evaluation Team used an avoided cost model/annualized forecast model. The forecast relied on the Midcontinent Independent Transmission System Operator, Inc.'s (MISO's) forecast of Locational Marginal Pricing (LMP) for the years 2016, 2021, and 2026. The PSC established the electric energy avoided costs in the June 18, 2012, PSC Order, docket 5-GF-191 (PSC REF#:166932). The gas avoided costs are based on market prices for

commodity and transportation, and were developed in the Benefit/Cost Analysis CY 2009 Evaluation Report.[4]

To derive net savings, the Evaluation Team decreased the verified gross energy savings by the conventional attribution factor of the NTG ratio. The Evaluation Team then increased the net savings by the line loss factor of 8% to account for distribution losses. Table 19 shows the assumptions for the four-year (CY 2011–CY 2014) avoided cost used for the cost-effectiveness tests.

Table 19. Avoided Cost Comparison Between Years[1]

Avoided Cost	CY 2011–CY 2014	CY 2014	CY 2013	CY 2012	CY 2011
Electric Energy ($/kWh)	0.0379-0.0561	0.0448 to 0.0561	0.0414 to 0.0561	0.0379 to 0.0561	0.041
Electric Capacity ($/kW year)	114.3	114.3	114.3	114.3	114.3
Gas ($/therms)	1.005	1.005	1.005	1.005	1.005
Avoided Cost Inflation	0%	0%	0%	0%	0%
Real Discount Rate	2%	2%	2%	2%	2%
Line Loss	8%	8%	8%	8%	8%

[1]The value listed here for electric energy of $0.041 per kWh and in the CY 2011 Evaluation Report represents a single value. In modeling the cost-effectiveness, the Evaluation Team used a time series of values. Similarly, the CY 2012 and CY 2013 cost-effectiveness analyses used a time series that grows from 0.0379 to 0.0561 over 15 years in the forecast model.

Emissions Benefits

The emissions benefits require three key parameters—life-cycle net energy savings, emissions factors, and the dollar value of the displaced emissions. Emissions factors are simply the rate at which the criteria pollutants are emitted per unit of energy and are most often expressed in tons of pollutant per energy unit—electric is in tons/megawatt hour (MWh) and gas is in tons/mega therm (MThm). The product of the emissions factor and the net life-cycle energy savings is the total weight of air pollutant displaced by the program. The product of the total tonnage of pollutant displaced and the dollar value of the displaced emissions per ton is therefore the avoided emissions benefit.

The Evaluation Team revised the electric emissions factors from the CY 2011 evaluation report in accordance with the forecasted CY 2012 estimates in the report, Focus on Energy Evaluation Emission

[4] PA Consulting group and KEMA, Inc. *Focus on Energy Benefit/Cost Analysis CY 2009 Evaluation Report.* Submitted to Public Service Commission of Wisconsin. Final: November 24, 2009. http://www.focusonenergy.com/files/Document_Management_System/Evaluation/bcanalysiscy09_evaluationreport.pdf

Factors Update.[5] The gas emissions factors remained constant from the CY 2011 evaluation report. Table 20 lists the emissions factors and allowance prices.

Table 20. Emissions Factors and Allowance Price

Service Fuel Type	CO_2	NOX	SO_2
Electric Emissions Factor (Tons / MWh)	0.8300	0.0012	0.0008
Gas Emissions Factor (Tons / MThm)	5.85	N/A	N/A
Allowance Price ($/Ton)	$30	$4.10	$1.08

The Evaluation Team obtained the nitrogen oxides (NOx) and sulfur dioxides (SO_2) emissions allowance prices from the Energy Information Administration (EIA).[6] The Evaluation Team used the CO_2 emissions price the PSC established under Order, docket 5-GF-191 (PSC REF#:158228), which states, "A levelized carbon value of $30 per ton shall be used in the benefit/cost modeling of energy-efficiency programs."

Table 21 lists the emissions benefits for all programs by segment.

Table 21. Total Program Emissions Benefits by Segment

Program Year	Residential	Nonresidential	Total
CY 2011–CY 2014 Emissions Benefits	$165,297,474	$428,327,147	$593,624,621
CY 2014 Emissions Benefits	$50,514,063	$123,033,140	$173,547,203
CY 2013 Emissions Benefits	$64,154,495	$111,096,441	$175,250,936
CY 2012 Emissions Benefits	$30,961,769	$110,122,130	$141,083,899
CY 2011 Emissions Benefits	$19,667,147	$84,075,436	$103,742,583

Program Costs

The program costs represent all costs associated with running the efficiency and renewable programs (including administration and delivery costs). The Evaluation Team did not include incentive costs as program costs as they are deemed transfer payments to the customer.[7] The fiscal agent, Wipfli, provided the program costs used in this evaluation.

Table 22 shows the four-year (CY 2011–CY 2014) program and incentive cost values used for the cost-effectiveness tests.

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5 PA Consulting Group. *Focus on Energy Evaluation Emission Factors Update.* December 22, 2009.

6 More information available online at: http://www.eia.gov/todayinenergy/detail.cfm?id=4830.

7 The Evaluation Team included the incentive costs as part of the incremental cost but did not add them as a program cost.

Table 22. Sector Cost Per Year

Costs	CY 2011–CY 2014	CY 2014	CY 2013	CY 2012	CY 2011
Residential					
Incentive Costs	$85,328,124	$25,041,460	$28,493,177	$17,540,611	$14,252,876
Administrative Costs	$16,267,768	$4,589,801	$4,839,300	$4,216,256	$2,622,411
Delivery Costs	$37,097,763	$10,466,793	$11,035,762	$9,614,943	$5,980,265
Total Residential Non-Incentive Program Costs	**$53,365,531**	**$15,056,594**	**$15,875,062**	**$13,831,199**	**$8,602,676**
Nonresidential					
Incentive Costs	$133,074,000	$32,973,509	$36,376,259	$31,233,437	$32,490,795
Administrative Costs	$16,119,569	$4,147,941	$4,458,325	$3,752,393	$3,760,910
Delivery Costs	$65,822,911	$16,937,770	$18,205,197	$15,322,583	$15,357,361
Total Nonresidential Non-Incentive Program Costs	**$81,942,480**	**$21,085,711**	**$22,663,522**	**$19,074,976**	**$19,118,271**
All Sectors					
Incentive Costs	$218,402,124	$58,014,969	$64,869,436	$48,774,048	$46,743,671
Administrative Costs	$32,387,337	$8,737,742	$9,297,625	$7,968,649	$6,383,321
Delivery Costs	$102,920,674	$27,404,563	$29,240,959	$24,937,526	$21,337,626
Total All Sector Costs	**$135,308,011**	**$36,142,305**	**$38,538,584**	**$32,906,175**	**$27,720,947**

Incremental Costs

The gross incremental costs are the additional costs incurred by participants as a result of purchasing efficient equipment over and above a baseline non-qualified product. Gross incremental cost values used in this evaluation were derived from two sources—the incremental cost study conducted by the Program Administrator, implementers, and Evaluation Team; and the Focus on Energy Benefit-Cost Analysis CY09 Evaluation Report (with the exception of renewable-based measures).

All new CY2014 program measures used incremental measure costs from approved work papers when available or were mapped to program planning measures and received incremental cost estimates from these sources. The Evaluation Team applied the CY2011 incremental cost logic to all CY2012 legacy and carryover-based program measures.

Similar to the 2011, 2012, and 2013 evaluation effort, the Evaluation Team assigned actual project cost values from the program tracking databases to the renewable energy projects.

The gross incremental costs, similar to the energy savings values used in the cost-effectiveness tests, required the application of attribution factors to account for freeridership. The Evaluation Team derived the values, namely the NTG ratios, for attribution factors for all legacy and carryover program measures from the 2010 evaluation and applied them to the 2014 evaluation on a measure-by-measure basis.

Table 23 shows the four-year (2011–2014) total measure net incremental costs used for the cost-effectiveness tests. The TRC test does not include incentive costs.

Table 23. Net Incremental Measure Cost Comparison

Calendar Year	Residential	Nonresidential
CY 2011–CY 2014	$204,203,260	$491,939,445
CY 2014	$56,554,521	$134,463,692
CY 2013	$62,287,090	$115,237,111
CY 2012	$44,069,866	$137,324,482
CY 2011	$41,291,783	$104,914,159

Table 24 lists four-year (2011–2014) incentive costs by sector, with renewables incorporated.

Table 24. Incentive Costs by Sector (with Renewables Incorporated)

Calendar Year	Residential	Nonresidential	Total
CY 2011–CY 2014	$85,328,123	$133,074,000	$218,402,123
CY 2014	$25,041,460	$32,973,509	$58,014,968
CY 2013	$28,493,177	$36,376,259	$64,869,436
CY 2012	$17,540,611	$31,233,437	$48,774,048
CY 2011	$14,252,876	$32,490,795	$46,743,671

Table 25 lists the findings of a benefit/cost analysis for Focus on Energy's CY 2014 program by sector, with renewable measures incorporated into each sector.

Table 25. CY 2014 Costs, Benefits, and TRC Ratio by Sector (with Renewables Incorporated)

	Residential	Nonresidential	Total
Administrative Costs	$4,589,801	$4,147,941	$8,737,742
Delivery Costs	$10,466,793	$16,937,770	$27,404,563
Incremental Measure Costs	$56,554,521	$134,463,692	$191,018,213
Total Non-Incentive Costs	**$71,611,115**	**$155,549,403**	**$227,160,519**
Electric Benefits	$108,611,640	$242,461,759	$351,073,399
Gas Benefits	$46,971,540	$184,838,874	$231,810,414
Emissions Benefits	$50,514,063	$123,033,140	$173,547,203
Total TRC Benefits	**$206,097,243**	**$550,333,772**	**$756,431,015**
TRC Benefits Minus Costs	**$134,486,128**	**$394,784,369**	**$529,270,497**
TRC Ratio[1]	**2.88**	**3.54**	**3.33**

[1]The TRC ratio equals total TRC benefits divided by non-incentive costs.

Table 26 lists the findings of a benefit/cost analysis for Focus on Energy's four-year (CY 2011–CY 2014) program cycle by sector, with renewable measures incorporated into each sector.

Table 26. Quadrennium (CY2011–CY 2014) Costs, Benefits, and TRC Ratio by Sector (with Renewables Incorporated)

	Residential	Nonresidential	Total
Administrative Costs	$16,267,768	$16,119,568	$32,387,336
Delivery Costs	$37,097,763	$65,822,911	$102,920,674
Incremental Measure Costs	$204,203,260	$491,939,445	$696,142,704
Total Non-Incentive Costs	**$257,568,791**	**$573,881,924**	**$831,450,715**
Electric Benefits	$340,478,379	$852,316,757	$1,192,795,137
Gas Benefits	$183,486,847	$571,180,385	$754,667,232
Emissions Benefits	$165,297,474	$428,327,147	$593,624,621
Total TRC Benefits	**$689,262,700**	**$1,851,824,290**	**$2,541,086,990**
TRC Benefits Minus Costs	**$431,693,909**	**$1,277,942,366**	**$1,709,636,275**
TRC Ratio[1]	**2.68**	**3.23**	**3.06**

[1]The TRC ratio equals total TRC benefits divided by non-incentive costs.

Table 27 lists the CY 2014, CY 2013, CY 2012, and CY 2011 cost-effectiveness results.

Table 27. Cost-Effectiveness Results for Focus on Energy Portfolio

Calendar Year	Residential	Nonresidential	Renewables[1]	Total
CY 2014: With Renewables	2.88	3.54	N/A	3.33
CY 2014: Renewables Separate	3.17	3.79	1.52	3.33
CY 2013: With Renewables	3.22	3.51	N/A	3.41
CY 2013: Renewables Separate	3.27	3.80	0.97	3.41
CY 2012: With Renewables	2.41	3.07	N/A	2.89
CY 2012: Renewables Separate	2.69	3.83	0.82	2.89
CY 2011: With Renewables	1.84	2.71	N/A	2.46
CY 2011: Renewables Separate	2.26	3.41	0.52	2.46

[1]The TRC for renewables increased over the course of the quadrennium because average savings per project increased while average cost per project decreased.

For additional details on the processes used for calculating the cost-effectiveness of the Focus on Energy portfolio, please refer to Appendix I, as well as the Benefit/Cost Analysis CY 2009 Evaluation Report.[8]

[8] PA Consulting group and KEMA, Inc. *Focus on Energy Benefit/Cost Analysis CY 2009 Evaluation Report.* Submitted to Public Service Commission of Wisconsin. Final: November 24, 2009. http://www.focusonenergy.com/files/Document_Management_System/Evaluation/bcanalysiscy09_evaluationreport.pdf