Semi-Annual Report to the Pennsylvania Public Utility Commission

Phase III of Act 129

Program Year 11

(June 1, 2019 – May 31, 2020)

For Pennsylvania Act 129 of 2008

Energy Efficiency and Conservation Plan

Prepared by Cadmus

For

PPL Electric Utilities

January 15, 2020

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Acronyms

BDR	Behavioral Demand Response
C&I	Commercial and Industrial
CFL	Compact Fluorescent Lamp
CSP	Conservation Service Provider or Curtailment Service Provider
DLC	Direct Load Control
DR	Demand Response
EDC	Electric Distribution Company
EDT	Eastern Daylight Time
EE&C	Energy Efficiency and Conservation
EM&V	Evaluation, Measurement, and Verification
EUL	Effective Useful Life
GNE	Government, Nonprofit, Education
HVAC	Heating, Ventilating, and Air Conditioning
ICSP	Implementation Conservation Service Provider
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light-Emitting Diode
LIURP	Low-Income Usage Reduction Program
M&V	Measurement and Verification
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-Gross
P3TD	Phase III to Date
PA PUC	Pennsylvania Public Utility Commission
PSA	Phase III to Date Preliminary Savings Achieved; equal to VTD + PYTD
PSA+CO	PSA savings plus Carryover from Phase II
PY	Program Year: e.g. PY8, from June 1, 2016, to May 31, 2017
PYRTD	Program Year Reported to Date
PYVTD	Program Year Verified to Date
RTD	Phase III to Date Reported Gross Savings
SWE	Statewide Evaluator
TRC	Total Resource Cost
TRM	Technical Reference Manual
VTD	Phase III to Date Verified Gross Savings

Types of Savings

Gross Savings: The change in energy consumption and/or peak demand that results directly from program-related actions taken by participants in an EE&C program, regardless of why they participated.

Net Savings: The total change in energy consumption and/or peak demand that is attributable to an EE&C program. Depending on the program delivery model and evaluation methodology, the net savings estimates may differ from the gross savings estimate due to adjustments for the effects of free riders, changes in codes and standards, market effects, participant and nonparticipant spillover, and other causes of changes in energy consumption or demand not directly attributable to the EE&C program.

Reported Gross: Also referred to as *ex ante* (Latin for "beforehand") savings. The energy and peak demand savings values calculated by the EDC or its program Implementation Conservation Service Providers (ICSP) and stored in the program tracking system.

Verified Gross: Also referred to as *ex post* (Latin for "from something done afterward") gross savings. The energy and peak demand savings estimates reported by the independent evaluation contractor after the gross impact evaluation and associated M&V efforts have been completed.

Verified Net: Also referred to as *ex post* net savings. The energy and peak demand savings estimates reported by the independent evaluation contractor after application of the results of the net impact evaluation. Typically calculated by multiplying the verified gross savings by a net-to-gross (NTG) ratio.

Annual Savings: Energy and demand savings expressed on an annual basis, or the amount of energy and/or peak demand an EE&C measure or program can be expected to save over the course of a typical year. Annualized savings are noted as MWh/year or MW/year. The Pennsylvania TRM provides algorithms and assumptions to calculate annual savings, and Act 129 compliance targets for consumption reduction are based on the sum of the annual savings estimates of installed measures.

Lifetime Savings: Energy and demand savings expressed in terms of the total expected savings over the useful life of the measure. Typically calculated by multiplying the annual savings of a measure by its effective useful life. The TRC Test uses savings from the full lifetime of a measure to calculate the cost-effectiveness of EE&C programs.

Program Year Reported to Date (PYRTD): The reported gross energy and peak demand savings achieved by an EE&C program or portfolio within the current program year. PYTD values for energy efficiency will always be reported gross savings in a semi-annual or preliminary annual report.

Program Year Verified to Date (PYVTD): The verified gross energy and peak demand savings achieved by an EE&C program or portfolio within the current program year.

Phase III to Date (P3TD): The energy and peak demand savings achieved by an EE&C program or portfolio within Phase III of Act 129. Reported in several permutations described below.

> **Phase III to Date Reported (RTD):** The sum of the reported gross savings recorded to date in Phase III of Act 129 for an EE&C program or portfolio.
>
> **Phase III to Date Verified (VTD):** The sum of the verified gross savings recorded to date in Phase III of Act 129 for an EE&C program or portfolio, as determined by the impact evaluation finding of the independent evaluation contractor.

Phase III to Date Preliminary Savings Achieved (PSA): The sum of the verified gross savings (VTD) from previous program years in Phase III where the impact evaluation is complete plus the reported gross savings from the current program year (PYTD).

Phase III to Date Preliminary Savings Achieved + Carryover (PSA+CO): The sum of the verified gross savings from previous program years in Phase III plus the reported gross savings from the current program year plus any verified gross carryover savings from Phase II of Act 129. This is the best estimate of an EDC's progress toward the Phase III compliance targets.

Table 1 lists savings values for a hypothetical EDC as of the PY10 semi-annual report, when the first six months of PY10 reported savings are available. The calculations below are then used to illustrate the differences between various savings values.

Table 1: P3TD Savings Calculation Example

Program Period	Reported Gross (MWh/year)	Verified Gross (MWh/year)
Phase II (Carryover)	N/A	400
PY8	800	700
PY9	900	850
PY10 (Q1+Q2)	500	N/A

PYRTD (PY10) = 500 MWh/year

RTD = 800 + 900 + 500 = 2,200 MWh/year

VTD = 700 + 850 = 1,550 MWh / year

PSA = 1,550 + 500 = 2,050 MWh/year

PSA + CO = 2,050 + 400 = 2,450 MWh/year

1 Introduction

Pennsylvania Act 129 of 2008, signed on October 15, 2008, mandated energy savings and demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania for Phase I (2008 through 2013). Phase II of Act 129 began in 2013 and concluded in 2016. In late 2015, each EDC filed a new energy efficiency and conservation (EE&C) plan with the PA PUC detailing the proposed design of its portfolio for Phase III. These plans were updated based on stakeholder input and subsequently approved by the PUC in 2016.

Implementation of Phase III of the Act 129 programs began on June 1, 2016. This report documents the progress and effectiveness of the Phase III EE&C accomplishments for PPL Electric Utilities in Program Year 11 (PY11), as well as the cumulative accomplishments of the Phase III programs since inception. This report additionally documents the energy savings carried over from Phase II. The Phase II carryover savings count towards EDC savings compliance targets for Phase III.

This report details the participation, spending, and reported gross impacts of the energy efficiency programs in PY11 quarters 1 and 2. Compliance with Act 129 savings goals are ultimately based on verified gross savings. PPL Electric Utilities has retained Cadmus as an independent evaluation contractor for Phase III of Act 129. Cadmus is responsible for the measurement and verification of the savings and calculation of verified gross savings. The verified gross savings for PY11 energy efficiency programs will be reported in the final annual report, to be filed on November 15, 2020.

Phase III of Act 129 includes a demand response goal for PPL Electric Utilities. Demand response events are limited to the months of June through September, which are the first four months of the Act 129 program year. Because the demand response season is completed early in the program year, it is possible to complete the independent evaluation of verified gross savings for demand response sooner than is possible for energy efficiency programs. *Section 6.2* of this report includes the verified gross demand response impacts for PY11 as well as the cumulative demand response performance of this EE&C program to date for Phase III of Act 129.

2 Summary of Achievements

2.1 Carryover Savings from Phase II of Act 129

PPL Electric Utilities does not have carryover savings from Phase II. Figure 1 compares PPL Electric Utilities' Phase II verified gross savings total to the Phase II compliance target to illustrate the carryover calculation.

The Commission's Phase III Implementation Order[1] also allowed EDCs to carry over savings in excess of the overall (portfolio) Phase II savings compliance target, in excess of the Phase II GNE savings compliance target and in excess of the Phase II low-income savings compliance target.[2] PPL Electric Utilities did not have carry over savings for the portfolio but did exceed its Phase II compliance targets for GNE and low-income. However, in the August 3, 2017, Compliance Order,[3] the PA PUC determined that because PPL Electric Utilities did not obtain Phase II savings in excess of its Phase II consumption reduction requirement, PPL Electric Utilities was not entitled to any GNE or low-income sector carryover savings into Phase III.

2.2 Phase III Energy Efficiency Achievements to Date

Since the beginning of Program Year 11 on June 1, 2019, PPL Electric Utilities has claimed:

- 220,231 MWh/yr of reported gross electric energy savings (PYRTD)
- 29.85 MW/yr of reported gross peak demand savings (PYRTD) from energy efficiency programs
- 103.1 MW/yr of reported gross peak demand savings (PYRTD) from demand response programs

Since the beginning of Phase III of Act 129 on June 1, 2016, PPL Electric Utilities has achieved:

- 1,417,298 MWh/yr of reported gross electric energy savings (RTD)
- 243.71 MW/yr of reported gross peak demand savings (RTD) from energy efficiency programs
- 1,350,795 MWh/yr of gross electric energy savings (PSA), which includes verified gross savings from previous Phase III program years[4] and the PYTD reported gross savings from PY11
- 190.09 MW/yr of gross peak demand savings (PSA) from energy efficiency programs
- 109.8 MW/yr of reported gross peak demand savings (RTD) from demand response, reported as the average demand savings across all PY9, PY10, and PY11 Act 129 demand response events

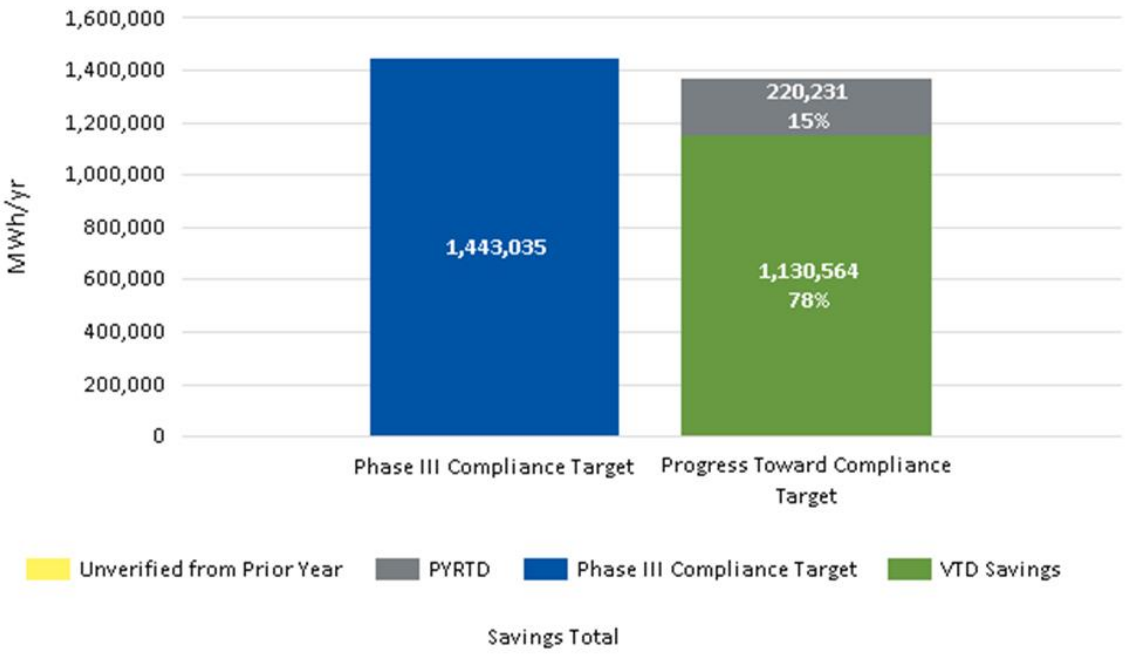
[1] Pennsylvania Public Utility Commission, *Energy Efficiency and Conservation Program* Implementation Order, at Docket No. M-2014-2424864, (*Phase III Implementation Order*), entered June 11, 2015.
[2] Proportionate to those savings achieved by dedicated low-income programs in Phase III.
[3] The Order addresses the EDCs' compliance with the Phase II energy reduction targets and the Petitions for reconsideration of the April 6, 2017, Compliance Order filed by Duquesne, PECO, and PPL Electric Utilities. Pennsylvania Public Utility Commission. Act 129 Phase II Final Compliance Order. Docket No. M-2012-2289411. Adopted August 3, 2017. Available online: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/energy_efficiency_and_conservation_ee_c_program.aspx
[4] Verified savings from previous program years have been adjusted to account for Home Energy Education Program energy savings uplift (see Appendix C in the PY10 Annual Report). Uplift results in savings counted in more than one program; therefore, an adjustment is made to prevent double counting.

- 112.8 MW/yr of verified gross peak demand savings (PSA) from demand response programs, calculated as the average demand savings across all PY9, PY10, and PY11 Act 129 demand response events

PPL Electric Utilities has achieved:

- 1,350,795 MWh/yr of PSA+CO energy savings recorded to date in Phase III[5]
    - This represents 94% of the May 31, 2021, energy savings compliance target of 1,443,035 MWh/yr.

Figure 1: EE&C Plan Performance Toward Phase III Portfolio Compliance Target



*The total may not sum to 100% due to rounding.

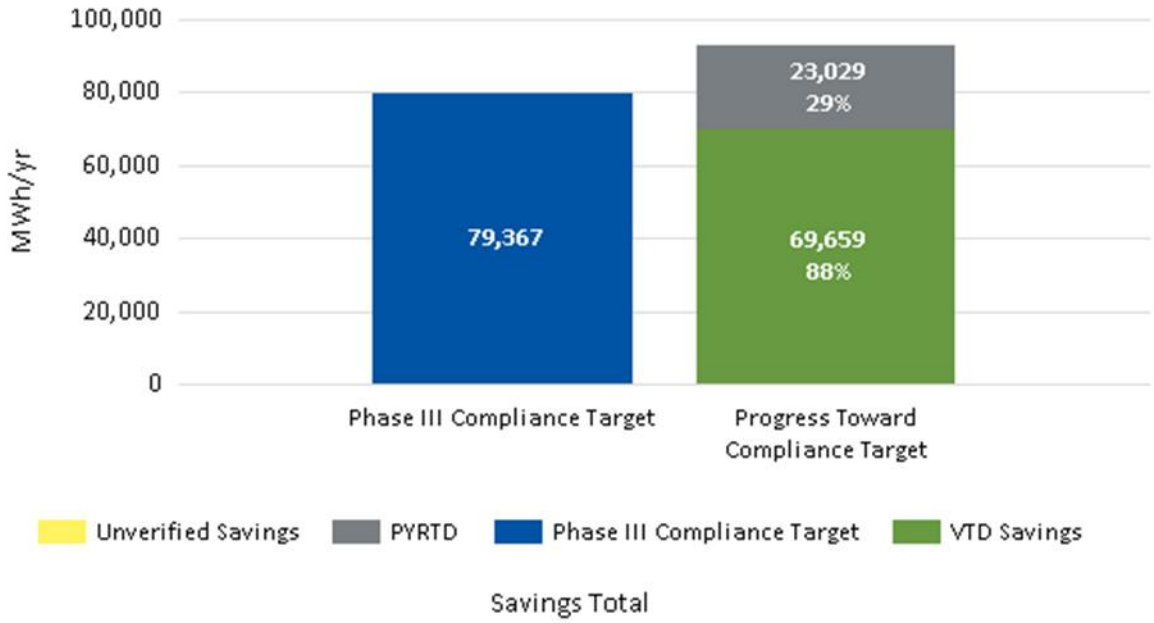
The Phase III Implementation Order directed EDCs to offer conservation measures to the low-income customer segment based on the proportion of electric sales attributable to low-income households. The proportionate number of measures target for PPL Electric Utilities is 9.95%. PPL Electric Utilities offers a total of 109 EE&C measures to its residential and nonresidential customer classes. There are 22 measures available to the low-income customer segment at no cost to the customer. This represents 20% of the total measures offered in the EE&C plan and exceeds the proportionate number of measures target.

The PA PUC also established a low-income energy savings target of 5.5% of the portfolio savings goal. The low-income savings target for PPL Electric Utilities is 79,367 MWh/yr verified gross energy savings. Figure 2 compares the PSA+CO performance to date for the low-income customer segment to the Phase III savings target. Based on

[5] Verified savings from previous program years have been adjusted to account for Home Energy Education Program energy savings uplift (see Appendix C in the PY10 Annual Report). Uplift results in savings counted in more than one program; therefore, an adjustment is made to prevent double counting.

the latest available information, PPL Electric Utilities has achieved 117% of the Phase III low-income energy savings target.

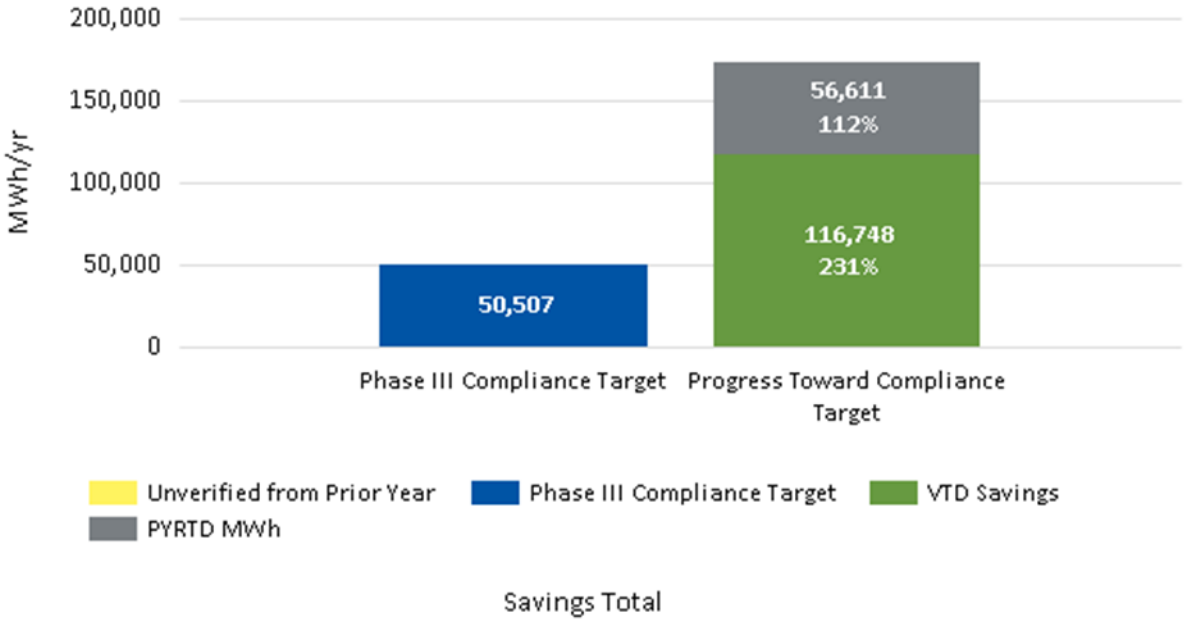
Figure 2: EE&C Plan Performance Toward Phase III Low-Income Compliance Target [(1)]



[(1)]WRAP includes savings for master-metered multifamily projects that are allocated to the GNE and Small C&I sectors based on the rate class of the buildings' meters (included in this figure). All savings from the WRAP program are counted toward the low-income compliance target, as set forth in PPL Electric Utilities EE&C Plan Act 129 Phase III, Docket No. M-2015-2515642, November 2018. Therefore, the total savings shown here do not match the totals in Table 4: Phase III Summary Statistics by Customer Segment. The additional savings counted toward the low-income compliance target total 2,657 MWh/yr of verified savings: 2,215 MWh/yr from GNE and 442 MWh/yr from Small C&I, and 329 MWh/yr of reported savings from PY11: 275 MWh/yr from GNE and 54 MWh/yr from Small C&I.

The Phase III Implementation Order established a government, nonprofit, and educational energy savings target of 3.5% of the portfolio savings goal. The GNE savings target for PPL Electric Utilities is 50,507 MWh/yr verified gross energy savings. Figure 3 compares the PSA+CO performance to date for the GNE customer segment to the Phase III savings target. Based on the latest available information, PPL Electric Utilities has achieved 343% of the Phase III GNE energy savings target.

Figure 3: EE&C Plan Performance Toward Phase III GNE Compliance Target [(1)]



[(1)]WRAP includes savings for master-metered multifamily projects that are allocated to the GNE and Small C&I sectors based on the rate class of the buildings' meters (included in this figure). All savings from the WRAP program are counted toward the low-income compliance target, as set forth in PPL Electric Utilities EE&C Plan Act 129 Phase III, Docket No. M-2015-2515642, November 2018. Therefore, the savings in this figure do not include the 2,215 verified MWh/yr and 275 reported MWh/yr GNE savings allocated to Low Income WRAP and do not match the GNE savings in Table 4: Phase III Summary Statistics by Customer Segment.

2.3 Phase III Demand Response Achievements to Date

The Phase III demand response performance target for PPL Electric Utilities is 92 MW per event hour. Compliance targets for demand response programs are based on average performance across events and were established at the system level, which means the load reductions measured at the customer meter must be escalated to reflect transmission and distribution losses.

Act 129 demand response events are triggered by PJM's day-ahead load forecast. When the day-ahead forecast is above 96% of the peak load forecast for the year, a demand response event is initiated for the following day. In PY11, there were four demand response events called. Table 2 lists the days that DR events were called along with the verified gross demand reductions achieved by each program. Table 2 also lists the average DR performance for PY11 and for Phase III to date. PPL Electric Utilities' average DR performance to date is above the Phase III compliance reduction target by 23%.

Table 2: PY11 Demand Response PYVTD Performance by Event

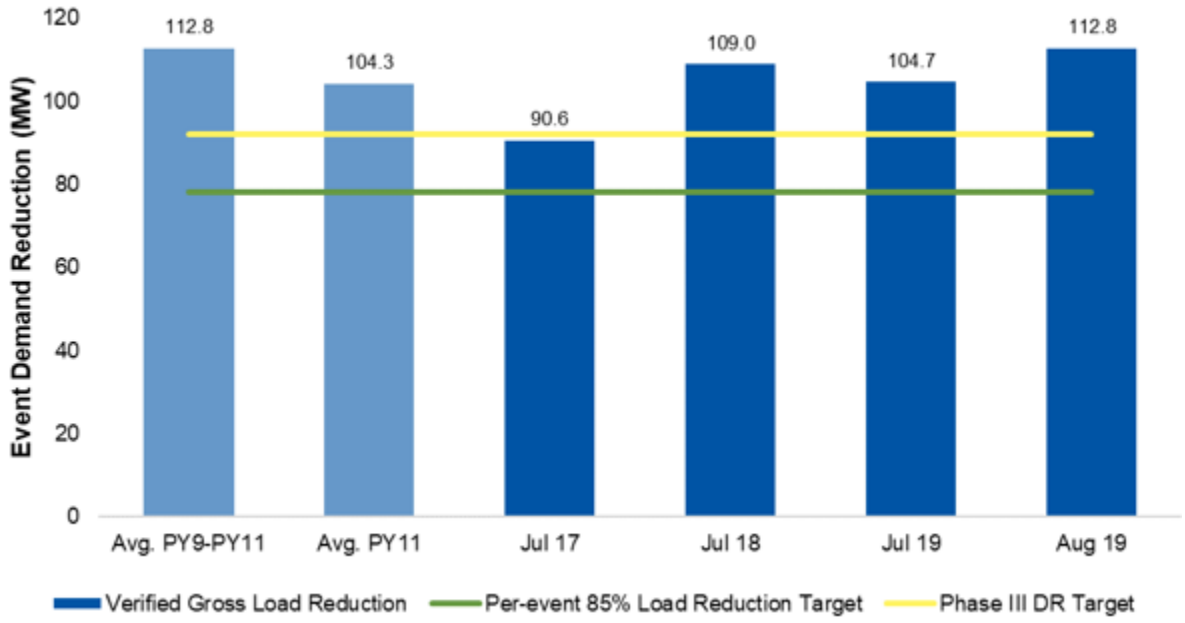
Event Date	Start Hour	End Hour	Small CI Load Curtailment (MW)	Large CI Load Curtailment (MW)	GNE Load Curtailment (MW)	Portfolio MW/event Impact [1]
July 17	2:00 p.m.	6:00 p.m.	1.7	82.4	6.5	90.6
July 18	3:00 p.m.	7:00 p.m.	2.0	100.0	7.0	109.0
July 19	2:00 p.m.	6:00 p.m.	1.4	97.3	5.9	104.7
August 19	2:00 p.m.	6:00 p.m.	1.4	107.2	4.3	112.8
PYVTD - Average PY11 DR Event Performance						**104.3**
VTD - Average Phase III DR Event Performance						**112.8**

[1] Portfolio MW/event may not equal sum of customer segment MW/event because of rounding.

The Commission's Phase III Implementation Order also established a requirement that EDCs achieve at least 85% of the Phase III compliance reduction target in each DR event. For PPL Electric Utilities, this translates to a 78.2 MW minimum for each DR event. Figure 4 compares the performance of each of the DR events in PY11 to the event-specific minimum and average targets.

Cadmus analyzed participant AMI consumption data to calculate load impacts; these have been grossed up to reflect transmission and distribution losses.

Figure 4: Event Performance Compared to 85% Per-Event Target



2.4 PHASE III PERFORMANCE BY CUSTOMER SEGMENT

Table 3 presents the participation, savings, and spending by customer sector for PY11. The residential, small C&I, large C&I sectors are defined by EDC tariff and the residential low-income and governmental/educational/ nonprofit sector were defined by statute (66 Pa. C.S. § 2806.1). The residential low-income (LI) segment is a subset of the residential customer class. The GNE segment includes customers who are part of the small C&I or large C&I

rate classes. The savings, spending, and participation values for the LI and GNE segments have been removed from the parent sectors in Table 3.

Table 3: PY11 Summary Statistics by Customer Segment

Parameter	Residential [1]	Low-Income	Small C&I [1]	Large C&I	GNE	Total [2]
Number of Participants [3]	114,941	22,389	6,311	659	1,390	145,690
PYRTD MWh/yr	50,452	22,701	62,110	28,082	56,886	220,231
PYRTD MW/yr (Energy Efficiency)	7.09	1.86	9.94	3.19	7.77	29.85
PYVTD MW/yr (Demand Response) [4]	N/A	N/A	1.63	96.71	5.91	104.26
Incentives ($1000)	$2,754	$0	$5,009	$2,838	$1,090	$11,692

[1] 7,969 of reported MWh/yr and 1.67 MW from Efficient Lighting are attributed to Small C&I.
[2] Total may not sum due to rounding.
[3] Please see Table 5 for participant definitions. Some participant definitions, e.g., WRAP, have been retroactively changed.
[4] Savings are presented as the average of the total demand response savings per event across the July 17, July 18, July 19 and August 19 Act 129 events.

Table 4 summarizes plan performance by sector since the beginning of Phase III.

Table 4: Phase III Summary Statistics by Customer Segment

Parameter	Residential (1) (2)	Low Income (2)	Small C&I (1)	Large C&I	GNE	Total (3)
Number of Participants (4)	1,337,216	91,813	59,171	2,352	6,234	1,496,786
PSA MWh/yr (5)	562,574	89,703	321,721	217,481	175,849	1,367,329
PSA MW/yr (5) (Energy Efficiency)	77.17	8.69	52.42	27.67	25.83	191.77
Phase III MW/yr (Demand Response) (6)	N/A	N/A	1.55	106.34	4.89	112.78
Incentives ($1000)	$30,335	$0	$21,265	$15,984	$8,230	$75,815

(1) 82,882 of PSA MWh/yr and 17.32 PSA MW from Efficient Lighting are attributed to Small C&I.
(2) 3,134 of PSA MWh/yr and 0.33 PSA MW from Student Energy Efficient Education are attributed to Low-Income.
(3)Total may not sum due to rounding.
(4) Please see Table 5 for participant definitions. Some participant definitions, e.g., WRAP, have been retroactively changed.
(5) The residential verified savings included in PSA MWh/yr and MW/yr have not been adjusted to account for energy savings uplift (double counting) in the Home Energy Education Program. As shown in Table 6 and Table 7, the double-counting adjustments applied to cumulative verified savings are -16,534 MWh and -1.68 MW.
(6) Savings are presented as the average of the total demand response savings per event across the June 13, 2017, July 20, 2017, July 21, 2017, July 2, 2018, July 3, 2018, August 6, 2018, August 28, 2018, September 4, 2018, September 5, 2018 and July 17, 2019, July 18, 2019, July 19, 2019 and August 19, 2019 Act 129 events.

3 Updates and Findings

3.1 Implementation Updates and Findings

This section contains implementation updates.

- **Appliance Recycling (residential sector).** Customers continue to provide PPL Electric Utilities with positive feedback for this program. There were 9,552 participants in PY11-to-date and 47,982 phase-to-date who recycled refrigerators, freezers, room air conditioners, and dehumidifiers. PPL Electric Utilities has been holding small appliance recycling events throughout the territory and, in PY11, an event was held at Harrisburg Area Community College. These events are extremely well received by customers and this one collected 440 units. These events provide a convenient drop-off location for room air conditioners and dehumidifiers without the necessity of including a large appliance. During the PY11 recycling event, PPL Electric Utilities partnered with the Girl Scouts for a food drive where a pack of LEDs was given to any customer who brought in two or more canned goods.
- **Demand Response.** PPL Electric Utilities' ICSP, CPower, enrolled 70 customers' facilities in the program either itself or through sub-contractors during PY11 (June 1, 2019, to May 31, 2020) and 64 participated in at least one event. PPL Electric Utilities initiated four events during the summer of PY11 because the PJM threshold trigger was met. The average reported performance of the events was 103.1 MWs, exceeding the program performance requirement of 92 MW per event and a minimum of 78.2 MWs per event.
- **Efficient Lighting (residential sector).** PPL Electric Utilities continued to see strong LED bulb sales with sales in PY11-to-date approaching 1,000,000 bulbs. Over 10,100,000 bulbs were sold phase-to-date. PPL Electric Utilities continued to build upon the strong relationships with independent retailers established in PY8. There was a diverse mix of bulbs sold – General Service 66%, Reflector 16%, Specialty 13%, and Indoor Fixtures 5%. Given the uncertainty of the current lighting legislation, the Efficient Lighting Program was designed to emphasize the lighting incentives in the early part of Phase III, with a phase out target toward the end of 2019. By the end of November 2019, the lighting incentives were discontinued by major retailers. Limited quantities of incentivized products could remain available in January 2020 in smaller independent retailers such as Ace and True Value, as they sell through special orders made for the program. Although the lighting incentive is phasing out, PPL Electric Utilities will still maintain the lighting page on its website and will continue to encourage customers to purchase LEDs
- **Energy Efficiency Kits and Education (residential low-income sector).** The Energy Efficiency Kits and Education program launched June 1, 2016, and targets income eligible customers. The program has delivered more than 50,000 kits through direct mail or one of the 20 participating agencies. The ICSP stopped distributing kits to agencies and through direct mail in 2019. The program enjoys a very high customer satisfaction level at 97%.
- **Energy Efficient Home (residential sector).** Phase-to-date, over 49,700 customers have completed the online assessment and approximately 36,000 received an energy efficiency kit for their home. Ductless heat pumps remain the most popular HVAC measure with over 900 projects in PY11-to-date. PPL Electric Utilities continues to experience strong performance in efficient new home construction with 579 homes-to-date in PY11. A new instant rebate pilot for heat pump water heaters (HPWH) and dehumidifiers was launched in November 2019 at Home Depot locations. This pilot ended on December 31, 2019. The home heating fuel switching rebate measure has reached the maximum number of projects that can be

completed within Phase III and was discontinued as of December 1. The hot water fuel switching rebate will remain open.

- **Home Energy Education (residential sector).** This program sends home energy reports to customers; it is not a rebate program. This program has shown decreasing customer satisfaction, which is due in part to customer fatigue in receiving the reports over several years. The program also sends emails that encourage and challenge customers to save energy. These email challenges and the home energy reports were discontinued beginning January 1, 2020 in preparation for Phase IV. The low-income customers will continue to receive the home energy reports through the end of Phase III.
- **Non-Residential: Custom (nonresidential sector).** The Custom program continues to be a popular program with 35% of the nonresidential savings in PY10 attributed to custom projects. While a large portion of the custom savings are attributed to CHP projects, PPL Electric Utilities has a mix of HVAC, advanced lighting controls, process improvement, and motor projects that are contributing to the custom savings. In PY11, custom projects are also offered through the direct install distribution channel.
- **Non-Residential: Efficient Equipment (nonresidential sector).** PPL Electric Utilities continues to receive applications for prescriptive equipment projects. About 2% of the overall savings for the nonresidential portfolio are attributed to the prescriptive equipment projects. Effective January 1, 2020 all efficient equipment projects require pre-approval.
- **Non-Residential: Efficient Equipment Lighting (nonresidential sector).** About 51% of nonresidential PY10 savings are attributed to Efficient Equipment lighting measures. Direct Discount (DD) channel contributes about 11% of the nonresidential portfolio PY10 savings, and that percentage continues to increase as PPL Electric Utilities refines this offering. On December 1, 2019, the DD incentive decreased to $0.13/kWh. Effective January 1, 2020, all efficient equipment lighting projects require pre-approval.
- **Non-Residential: Midstream Lighting (nonresidential sector).** This program continues to gain traction as PPL Electric Utilities now has 26 distributors with 96 locations and continues to ensure distributors are active participants. In PY10, 13% of total savings were attributed to the midstream lighting Distributor Instant Discount (DID) program.
- **Student Energy Efficient Education (residential sector)**. The program is fully subscribed for PY11 with wait lists for each student cohort. The program will reach over 24,000 children at approximately 200 schools, including over 23,000 kits distributed to participating children. With the PA PUC approval of changes to PPL Electric Utilities' EE&C Plan, a portion of the program's energy savings, budget, and participants from this residential program will be reallocated to the low-income sector. In PY11, this program focused on schools in low-income areas of PPL Electric Utilities' service territory with a minimum of 45% reduced and free lunches, as documented by the Pennsylvania Department of Education. Savings for the low-income component will be reported under WRAP. A new showerhead was added to the Innovations kit in PY11 and, if installation rates increase, it will be added to the Take Action kit in PY12.
- **WRAP (residential low-income sector).** This program for income eligible customers launched June 1, 2016 with a seamless transition for customers from Phase II to Phase III. Customer interest and satisfaction remains high. The program has completed more than 35,000 jobs, including participants in the Manufactured Home Initiative.

3.2 Evaluation Updates and Findings

This section summarizes evaluation activities occurring within each program during PY11. For each program offered in PY11, Cadmus updated the evaluation plans, and submitted them to PPL Electric Utilities and the SWE. Cadmus received Q1 and Q2 participation data and confirmed that it contained the necessary data for evaluation activities. Cadmus will launch surveys with Q1 and Q2 participants in January 2020 for the Appliance Recycling, Energy Efficient Home, Custom, Efficient Equipment and WRAP programs.

- **Appliance Recycling (residential sector).** Cadmus drafted the participant survey.
- **Demand Response (nonresidential sector).** Cadmus estimated the load impacts for each of the PY11 participant facilities during the hours of the four events. Cadmus administered an online and telephone survey with enrolled customers and drafted the findings of the load impact analysis, staff interviews, and customer surveys for the PY11 DR annual report submitted January 15, 2020.
- **Efficient Lighting (residential sector).** Cadmus will conduct a records review with Q1 and Q2 data in January 2020.
- **Energy Efficiency Kits and Education (residential low-income sector).** Cadmus received Q1 enrollment and survey data from the ICSP and expects to receive Q2 enrollment and survey data in early January 2020. Cadmus will conduct a records review with Q1 and Q2 data provided by the subcontracting ICSP.
- **Energy Efficient Home (residential sector).** Cadmus finalized the satisfaction survey instrument drafts in December 2019 for the equipment, online assessment, in-home audit, weatherization, and online marketplace components and will launch the online surveys for these components in January 2020.
- **Home Energy Education (residential sector).** No PY11 evaluation activities have taken place.
- **Non-Residential: Custom (nonresidential sector).** Cadmus verified savings for 14 PY11 projects in the large stratum in Q1 and Q2. Ongoing evaluation activities, including review of project documentation, creation of site-specific measurement and verification plans, deployment of evaluator installed metering equipment, determination of project savings using a high-rigor approach, and presenting finalized savings in a verification report, are currently underway for six projects in the small stratum sample and approximately 28 large stratum projects.
- **Non-Residential: Efficient Equipment (nonresidential sector).** Cadmus selected a combined Q1 and Q2 evaluation project sample and prepared the data request. Cadmus will conduct a review of project-specific documentation. Verification site visits will begin in late January.
- **Efficient Equipment Lighting (nonresidential sector).** Cadmus selected the PY11 Q1 and Q2 evaluation samples for prescriptive lighting and Direct Discount lighting projects. Cadmus conducted a documentation review of Q1 threshold lighting projects. Cadmus prepared the PY11 Q1 and Q2 Lighting data requests and will review project-specific documentation and conduct Q1 and Q2 site verification visits in January and February.
- **Non-Residential: Midstream Lighting (nonresidential sector).** Cadmus selected a combined Q1 and Q2 evaluation project sample. Cadmus will review project-specific documentation and conduct desk reviews and site visits in January and February 2020.
- **Student Energy Efficient Education (residential sector)**. No PY11 evaluation activities have taken place.
- **WRAP (residential low-income sector).** Cadmus will conduct a records review with Q1 and Q2 data in January 2020.

4 Summary of Participation by Program

Participation is defined differently for each program depending on the program delivery channel and data tracking practices. The nuances of the participant definition vary by program and are summarized by program in Table 5. The table provides the current participation totals for PY11 and Phase III.

Table 5: EE&C Plan Participation by Program

Program	Participant Definition	PY11TD Participation	P3TD Participation
Appliance Recycling	Unique job number; corresponds with each unique appliance decommissioned through the program during the program year.	9,552	47,982
Demand Response	Unique account number; corresponds to a customer that enrolled in the Program; not the number who participated in at least one event.	70	227
Efficient Lighting	Person or business purchasing discounted bulbs. See the Efficient Lighting Chapter, section *10.1.1 Definition of a Participant* in the PY10 Annual report [1] describing the approach to computing number of participants.	100,622	984,598
Energy-Efficiency Kits and Education	Unique job number; corresponds to an energy-savings kit delivered to an income-eligible customer through the agency or the direct-mail delivery channel Participation is determined by the unique job numbers. Returned kits are assigned two unique job numbers: one for the distributed kit, and one for the returned kit.	14,261	53,716
Energy Efficient Home	Unique job number; corresponds to a rebated project Households could have more than one rebated project.	8,610	73,211
Home Energy Education [2]	Unique bill account number (household) that receives a home energy report in any program year (a household is counted once, even if it received reports in more than one year).	Not available	205,750
Non-Residential Energy Efficiency	*Custom:* Unique job number; commercially operable job that received an incentive payment during the reporting period. *Midstream Lighting Program:* Unique job number (RBT); corresponds to each purchase of discounted products. *Prescriptive Lighting and Equipment*: Unique job number; corresponds to each unique job that received a rebate.	4,440	20,952
Student Energy Efficient Education [2]	Number of participants is counted as the number of energy conservation kits delivered.	Not available	72,024

Program	Participant Definition	PY11TD Participation	P3TD Participation
Winter Relief Assistance Program (WRAP)	Unique bill account number; corresponds to an income-eligible household that receives an audit and program services. In PY8, a participant was defined as a unique job, but the PY9 updated definition is applied retroactively here. Therefore, the P3TD total will not match the PY8 total plus PY9TD PY10TD + PY11TD. In PY10, an LED giveaway component was added to the program. The participant count for this component is equal to the number of packs given away, 2,450 in PY10.	8,135	38,326
Portfolio Total		**145,690**	**1,496,786**

[1] PPL Electric Utilities. Annual Report Program Year 10: June 1, 2018–May 31, 2019. Presented to Pennsylvania Public Utility Commission. Prepared by Cadmus. November 15, 2019.
(2) Participants in the Home Energy Education and Student Energy Efficient Education programs are not available in January 2020 for the Semi-Annual Report and will be reported later in PY11 for the Annual Report.

5 Summary of Energy Impacts by Program

Figure 5 presents a summary of the PYTD reported gross energy savings by program for Program Year 11. The energy impacts in this report are presented at the meter level and do not reflect adjustments for transmission and distribution losses.

Figure 5: PYTD Reported Gross Energy Savings by Program

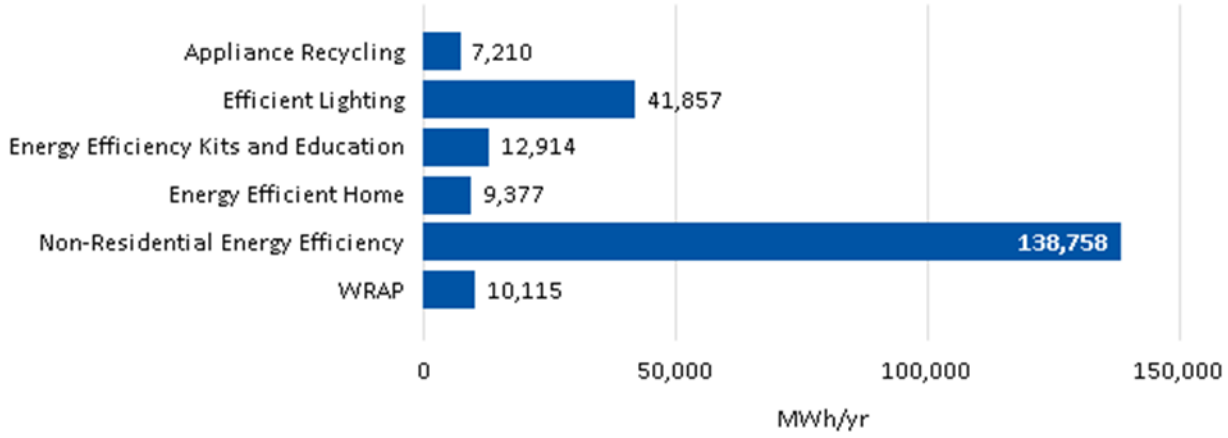
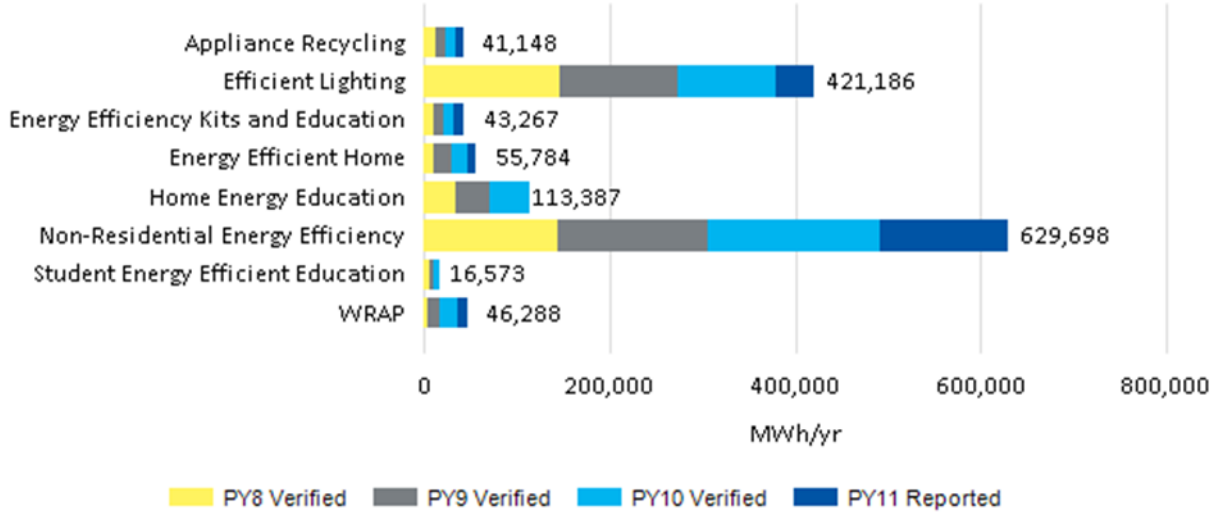


Figure 6 presents a summary of the PSA gross energy savings by program for Phase III of Act 129. PSA savings include verified gross savings from previous program years and the PYTD savings from the current program year.

Figure 6: PSA Energy Savings by Program for Phase III



A summary of energy impacts by program through the current reporting period is presented in Table 6.

Table 6: Energy Savings by Program (MWh/Year)

Program	PYTD MWh/yr	RTD MWh/yr	VTD MWh/yr	Unverified Savings from PY10 MWh/yr	PSA MWh/yr [1]
Appliance Recycling	7,210	46,994	33,938	0	41,148
Efficient Lighting[2]	41,857	430,523	379,329	0	421,186
Energy Efficiency Kits and Education	12,914	47,622	30,352	0	43,267
Energy Efficient Home	9,377	62,137	46,407	0	55,784
Home Energy Education	0	116,422	113,387	0	113,387
Non-Residential Energy Efficiency	138,758	644,523	490,939	0	629,698
Student Energy Efficient Education [3]	0	16,790	16,573	0	16,573
WRAP [4]	10,115	52,286	36,172	0	46,288
Total	**220,231**	**1,417,298**	**1,147,098**	**0**	**1,367,329**
Adjustment for Residential Home Energy Education Program Double-Counted Savings			(16,534)	0	(16,534)
Adjusted Portfolio Savings			**1,130,564**	**0**	**1,350,795**

[1] Total may not sum due to rounding.
[2] 82,882 of PSA MWh/yr from Efficient Lighting are attributed to Small C&I (cross-sector sales).
[3] 3,134 of PSA MWh/yr from program are attributed to Low-Income.
[4] 43,302 of PSA MWh/yr from program are attributed to Low-Income, 2,490 MWh/yr to GNE and 496 MWh/yr to Small C&I.

6 Summary of Demand Impacts by Program

PPL Electric Utilities' Phase III EE&C programs achieve peak demand reductions in two ways. The first is through coincident reductions from energy efficiency measures and the second is through dedicated demand response programs that exclusively target temporary demand reductions on peak days. Energy efficiency reductions coincident with system peak hours are reported and used in the calculation of benefits in the TRC Test, but do not contribute to Phase III peak demand reduction compliance goals. Phase III peak demand reduction targets are exclusive to demand response programs.

The two types of peak demand reduction savings are also treated differently for reporting purposes. Peak demand reductions from energy efficiency are generally additive across program years, meaning that the P3TD savings reflect the sum of the first-year savings in each program year. Conversely, demand response goals are based on average portfolio impacts across all events so cumulative DR performance is expressed as the *average* performance of each of the DR events called in Phase III to date. Because of these differences, demand impacts from energy efficiency and demand response are reported separately in the following sub-sections.

6.1 Energy Efficiency

Act 129 defines peak demand savings from energy efficiency as the average expected reduction in electric demand from 2:00 p.m. to 6:00 p.m. EDT on non-holiday weekdays from June to August. The peak demand impacts from energy efficiency in this report are presented at the meter level and do not reflect adjustments for transmission and distribution losses. Figure 7 presents a summary of the PYRTD reported gross peak demand savings by energy efficiency program for Program Year 11.

Figure 7: PYRTD Gross Demand Savings by Energy Efficiency Program

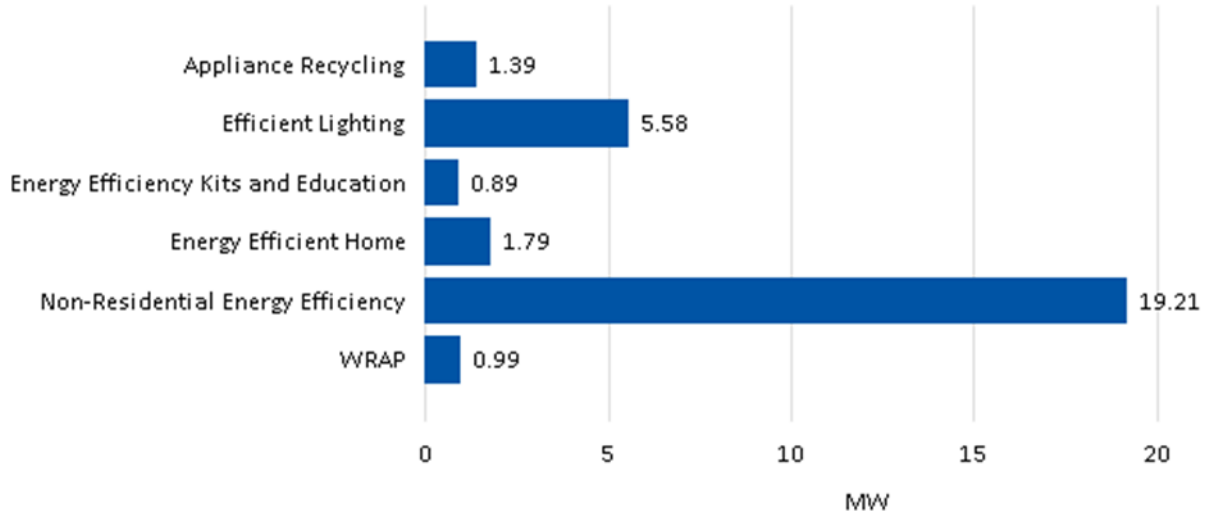
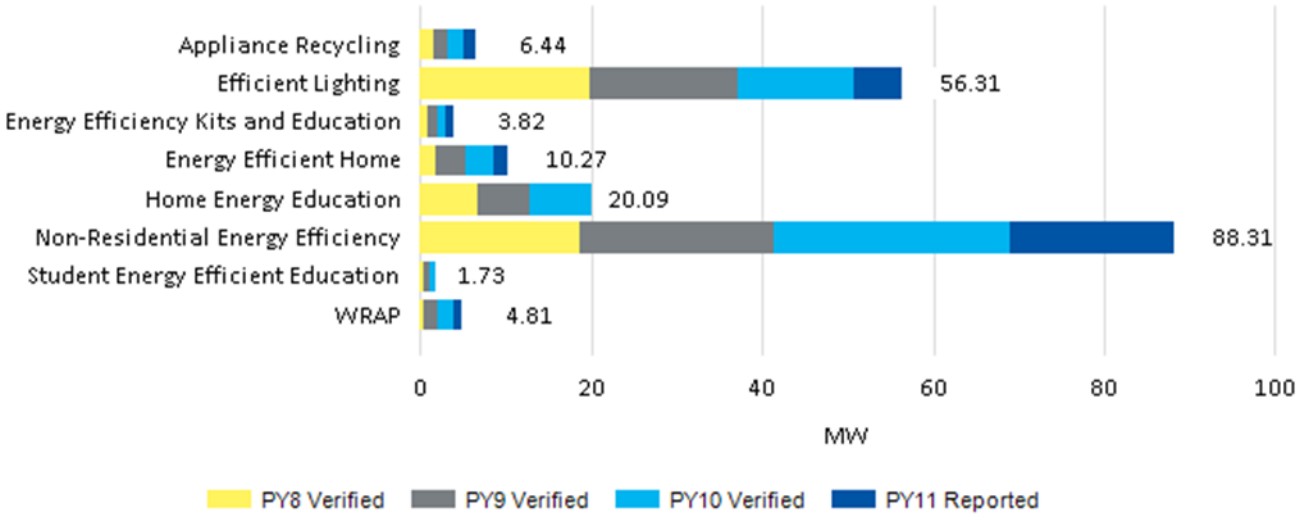


Figure 8 presents a summary of the PSA gross demand savings by energy efficiency program for Phase III of Act 129.

Figure 8: PSA Demand Savings by Energy Efficiency Program for Phase III



A summary of the peak demand impacts by energy efficiency program through the current reporting period are presented in Table 7.

Table 7: Peak Demand Savings by Energy Efficiency Program (MW/Year)

Program	PYTD MW/yr	RTD MW/yr	VTD MW/yr	Unverified Savings from PY10 MW/yr	PSA MW/yr [1]
Appliance Recycling	1.39	7.09	5.05	0	6.44
Efficient Lighting[2]	5.58	60.65	50.74	0	56.31
Energy Efficiency Kits and Education	0.89	3.36	2.93	0	3.82
Energy Efficient Home	1.79	11.02	8.47	0	10.27
Home Energy Education	0.00	68.22	20.09	0	20.09
Non-Residential Energy Efficiency	19.21	86.62	69.10	0	88.31
Student Energy Efficient Education [3]	0.00	1.62	1.73	0	1.73
WRAP [4]	0.99	5.12	3.82	0	4.81
Total	**29.85**	**243.71**	**161.93**	**0**	**191.77**
Adjustment for Residential Home Energy Education Program Double-Counted Savings			**-1.683**	0	**-1.683**
Adjusted Portfolio Savings			**160.24**	**0**	**190.09**

[1] Total may not sum due to rounding.
[2] 17.32 of PSA MW from Efficient Lighting are attributed to Small C&I.
[3] 0.33 of PSA MW/yr from program are attributed to Low-Income.
[4] 4.54 of PSA MW/yr from program are attributed to Low-Income, 0.22 MWh/yr to GNE and 0.04 MW/yr to Small C&I

6.2 DEMAND RESPONSE

Act 129 defines peak demand savings from demand response as the average reduction in electric demand during the hours when a demand response event is initiated. Phase III DR events are initiated according to the following requirements included in the Phase III Implementation Order:

1) Curtailment events shall be limited to the months of June through September.
2) Curtailment events shall be called for the first six days of each program year (starting in PY9) in which the peak hour of PJM's day-ahead forecast for the PJM RTO is greater than 96% of the PJM RTO summer peak demand forecast for the months of June through September.
3) Each curtailment event shall last four hours.
4) Each curtailment event shall be called such that it will occur during the day's forecasted peak hour(s) above 96% of PJM's RTO summer peak demand forecast.
5) Once six curtailment events have been called in a program year, the peak demand reduction program shall be suspended for that program year.

The peak demand impacts from demand response in this report are presented at the system level and reflect adjustments to account for transmission and distribution losses. PPL Electric Utilities uses the following line loss percentages/multipliers by sector.

- Residential = [8.75% or 1.0875]
- Small C&I = [8.75% or 1.0875]
- Large C&I = [4.2% or 1.0420]

Table 8 summarizes the PYVTD and VTD demand reductions for each of the demand response programs in the EE&C plan and for the demand response portfolio as a whole. VTD demand reductions are the average performance across all Phase III demand response events independent of how many events occurred in a given program year. The relative precision columns indicate the margin of error (at the 90% confidence interval) around the PYVTD and VTD demand reductions.

Table 8: Verified Gross Demand Response Impacts by Program

Program	PYVTD Gross MW	Relative Precision (90%)	VTD Gross MW	Relative Precision (90%)
Demand Response	104.3	3.5%	112. 8	1.9%
Portfolio Total	**104.3**	**3.5%**	**112. 8**	**1.9%**

7 Summary of Finances

Section 7 provides an overview of the expenditures associated with PPL Electric Utilities' portfolio and the recovery of those costs from ratepayers.

7.1 Program Financials

Program-specific and portfolio total finances through the end of Q2 for PY11 are shown in Table 9. The columns in Table 9 and Table 10 are adapted from the 'Direct Program Cost' categories in the Commission's EE&C Plan template[6] for Phase III. EDC Materials, Labor, and Administration includes costs associated with an EDC's own employees. ICSP Materials, Labor, and Administration includes both the program implementation contractor and the costs of any other outside vendors an EDC employs to support program delivery. The dollar amounts are based on EDC tracking of expenditures with no adjustments to account for inflation.[7]

Table 9: Program Year (PY11) to Date Financials ($1,000)

Program	Incentives to Participants and Trade Allies	EDC Materials, Labor, and Administration	ICSP Materials, Labor, and Administration	EM&V	Total [1]
Appliance Recycling Program	$261	$29	$853	-	$1,143
Demand Response Program	$1,183	$16	$267	-	$1,466
Efficient Lighting Program	$1,172	$28	$671	-	$1,871
Energy Efficiency Kits & Education Program [2]	-	$26	$956	-	$982
Energy Efficient Home Program	$1,465	$31	$1,419	-	$2,916
Home Energy Education Program	$0	$26	$1,120	-	$1,146
Non-Residential Energy Efficiency	$7,612	$95	$3,580	-	$11,287
Student Energy Efficiency Education Program	-	$19	$770	-	$789
WRAP Program [2]	-	$116	$4,757	-	$4,873
Common Portfolio Costs [3]	-	$1,203	$421	$1,205	$2,829
Portfolio Total [4]	**$11,693**	**$1,589**	**$14,815**	**$1,205**	**$29,302**
SWE Costs [5]					**$200**
Total [4]	**$11,693**	**$1,589**	**$14,815**	**$1,205**	**$29,502**

[1] Total may not equal sum of column due to rounding.
[2] Costs associated with low income program measures provided to customers at no cost are categorized as administrative costs (rather than incentives to participants).
[3] Common Portfolio Costs are costs applicable to more than one customer class, to more than one program, or those that provide portfolio-wide benefits. These include PPL Electric Utilities labor and materials, costs related to PPL Electric Utilities' tracking system, EE&C plan development, etc.
[4] Portfolio Total and Total may not equal total of column due to rounding.
[5] Statewide Evaluation costs are outside of the 2% spending cap.

[6] Pennsylvania Public Utility Commission Phase III Energy Efficiency and Conservation Plan Template (Docket No. M-2014-2424864) dated July 21, 2015. (http://www.puc.pa.gov/pcdocs/1372426.doc)
[7] The cost-recovery of program expenses through riders generally happens promptly so that costs are being recovered from ratepayers in the same dollars that they are incurred.

Program-specific and portfolio total finances since the inception of Phase III are shown in Table 10.

Table 10: Phase III to Date Financials ($1,000)

Program	Incentives to Participants and Trade Allies	EDC Materials, Labor, and Administration	ICSP Materials, Labor, and Administration	EM&V	Total [1]
Appliance Recycling Program	$1,369	$153	$5,719	-	$7,241
Demand Response Program	$4,041	$259	$2,301	-	$6,602
Efficient Lighting Program	$22,567	$207	$5,657	-	$28,432
Energy Efficiency Kits & Education Program [2]	-	$176	$6,010	-	$6,186
Energy Efficient Home Program	$8,907	$191	$11,425	-	$20,524
Home Energy Education Program	$0	$129	$5,025	-	$5,154
Non-Residential Energy Efficiency	$38,931	$684	$21,793	-	$61,408
Student Energy Efficiency Education Program	-	$170	$3,779	-	$3,949
WRAP Program [2]	-	$778	$26,146	-	$26,924
Common Portfolio Costs [3]	-	$10,969	$4,676	$9,697	$25,342
Portfolio Total [4]	**$75,816**	**$13,718**	**$92,532**	**$9,697**	**$191,763**
SWE Costs [5]					**$1,700**
Total [4]	**$75,816**	**$13,718**	**$92,532**	**$9,697**	**$193,463**

[1] Total may not equal sum of column due to rounding.
[2] Costs associated with low income program measures provided to customers at no cost are categorized as administrative costs.
[3] Common Portfolio Costs are costs applicable to more than one customer class, to more than one program, or those that provide portfolio-wide benefits. These include PPL Electric Utilities labor and materials, costs related to PPL Electric Utilities' tracking system, EE&C plan development, etc.
[4] Portfolio Total and Total may not equal total of column due to rounding.
[5] Statewide Evaluation costs are outside of the 2% spending cap.

Cost-effectiveness testing for Act 129 EE&C programs is performed using the TRC Test. Benefit cost modeling is conducted annually using verified gross and verified net savings once the results of the independent impact evaluation are completed. TRC test results for PY11 will be presented in the final annual report to the PA PUC on November 15, 2020 along with a more granular breakdown of portfolio costs.

7.2 Cost Recovery

Act 129 allows Pennsylvania EDCs to recover EE&C plan costs through a cost-recovery mechanism. PPL Electric Utilities' cost-recovery charges are organized separately by customer sectors to ensure that the electric rate classes that finance the programs are the rate classes that receive the direct energy and conservation benefits. Cost-recovery is necessarily tied to the way customers are metered and charges for electric service. Readers should be mindful of the differences between Table 11 and *Section 7.1*. For example, the low-income customer segment is a subset of PPL Electric Utilities' residential tariff(s) and therefore not listed in Table 11.

Table 11: EE&C Plan Expenditures by Cost-Recovery Category [1] ($1,000)

Cost Recovery Customer Sector	Rate Schedules Included	PYTD Spending	P3TD Spending
Residential & Low-Income	Residential (primarily RS)	$13,654	$97,950
Small C&I	Small C&I (primarily GS1 & GS3)	$7,068	$33,300
Large C&I	Large C&I (primarily LP4 & LP5)	$4,186	$27,678
GNE	Residential, Small C&I, and Large C&I	$2,305	$15,140
Common [2]	N/A	$2,289	$19,396
Portfolio Total [3]	**-**	**$29,502**	**$193,463**

[1] Includes SWE costs.
[2] Includes costs not collected at the sector level. These costs are allocated to the sectors at the end of the phase.
[3] Totals may not sum due to rounding.