

INDEX TO EXHIBITS

Docket No. M-2020-3020824

Hearing Date: February 8, 2021

NUMBER

PPL'S Exhibit:

1 Phase IV E&C Plan
Statement 1 Direct Testimony of Dirk Childs
Statement 2 Direct Testimony of Terry Fry
Statement 3 Direct Testimony of Scott Koch
Statement
DC-1R Rebuttal Testimony of Dirk Childs
Statement
4-R Rebuttal Testimony of Melinda Stumpf
Statement
1-R Supp Rebuttal Supplemental Testimony of Dirk Childs

OCA'S EXHIBITS:

Statement 1 Direct Testimony of Stacy Sherwood

CAUSE-PA'S EXHIBITS:

Statement 1 Direct Testimony of Mitchell Miller
Statement

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Statement 1 Direct Testimony of Eugene M. Brady

NRDC'S EXHIBITS:

Statement 1 Direct Testimony of Alice Napoleon and Kenji
Takahashi

PPLICA's EXHIBITS:

Statement 1 Supplemental Direct Testimony of Jeffrey
Pollock with Exhibits

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PPL Electric Utilities Corporation
Energy Efficiency and Conservation Plan
Act 129 Phase IV

Docket No. M-2020-3020824

Filed November 30, 2020



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Acronyms and Abbreviations

Acronyms and Abbreviations

Acronym	Definition
ACR	Act 129 Compliance Rider
Act 129	Act 129 of 2008, P.L. 1592, 66 Pa. C.S. §§ 2806.1, 2806.2
BPM	Brushless permanent magnet
C&I	Commercial and industrial
CCFL	Cold-cathode fluorescent lamp
cfm	Cubic feet per minute
CHP	Combined heat and power
CIP	Continuous improvement process
Commission	Pennsylvania Public Utility Commission
CRAC	Computer room air conditioning
CRAH	Computer room air handling
CSP	Conservation service provider
DEER	California Database for Energy -Efficiency Resources
DLC	DesignLights Consortium
DOE	U.S. Department of Energy
EC	Electronically commutated
ECM	Electronically commutated motor
EDC	Electric distribution company
EE&C Plan	Act 129 Phase IV Energy Efficiency and Conservation Plan
EE&C Plan Template	EE&C Plan Template issued by the Commission on September 9, 2020, at Docket No. M-2020-3015228
EISA	Energy Independence and Security Act of 2007
EM&V	Evaluation, measurement, and verification
FCM	Forward capacity market
FHPC	Floating Head Pressure Control
FPIG	Federal Poverty Income Guidelines
GNE	Government/Nonprofit/Educational
GNI	Government, nonprofit, and institutional
HER	Home energy report
HID	High intensity discharge
HP	Horsepower
HVLS	High Volume Low Speed
IECC	International Energy Conservation Code
Implementation Order	Pennsylvania Public Utility Commission's Final Implementation Order entered on June 18, 2020, at Docket No. M-2020-3015228
IRR	Internal rate of return
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
LIURP	Low-Income Usage Reduction Program
M&V	Measurement and verification
MW	Megawatt
MWh	Megawatt-hour

Acronyms and Abbreviations

Acronym	Definition
MWh/year	MWh credited towards compliance target in the year a measure is installed
NTG	Net-to-gross
NYMEX	New York Mercantile Exchange
Pa PUC	Pennsylvania Public Utility Commission
Phase IV Plan	Act 129 Phase IV Energy Efficiency and Conservation Plan
PJM	PJM Interconnection LLC
PMS	Permanent magnet synchronous
PSC	Permanent split capacitor
psi	Pounds per square inch
psig	Pounds per square in gauge
QA/QC	Quality assurance and quality control
RFP	Request for proposals
SCOP	Seasonal coefficient of performance
SCR	Silicon controlled rectifier
SCT	Saturated condensing temperature
SEM	Strategic energy management
SP	Shaded-pole
SWE	Statewide Evaluator
T&D	Transmission and distribution
TRC	Total resource cost
TRM	Pennsylvania Technical Reference Manual
VFD	Variable-frequency drive
VSD	Variable speed drive
WRAP	Winter Relief Assistance Program

1 Overview of PPL Electric Utilities' Act 129 Phase IV Plan

1.1 Summary Description of the Plan

PPL Electric Utilities Corporation (“PPL Electric Utilities” or the “Company”) hereby submits its Act 129 Phase IV Energy Efficiency and Conservation Plan (“EE&C Plan,” “Plan,” or “Phase IV Plan”) in compliance with Act 129 of 2008, P.L. 1592, 66 Pa. C.S. §§ 2806.1, 2806.2 (“Act 129”). This Plan is being filed pursuant to the Pennsylvania Public Utility Commission’s (“Pa PUC” or the “Commission”) Final Implementation Order entered on June 18, 2020, at Docket No. M-2020-3015228,¹ the Commission’s 2021 TRC Test Order at Docket No. M-2019-3006868,² and the Phase IV EE&C Plan Template served by Secretarial Letter on September 9, 2020, at Docket No. M-2020-3015228. The proposed portfolio comprises the three continuing comprehensive programs and nine associated components listed in Table 1.

Table 1. PPL Electric Utilities' Phase IV Programs and Components

#	Programs and Components
1. Residential Program	
1.1	Appliance Recycling
1.2	Efficient Lighting – Specialty Bulbs
1.3	Energy Efficient Homes
1.4	Student Energy Efficient Education
2. Low-Income Program	
2.1	Low-Income Assessment
3. Non-Residential Program	
3.1	Small Commercial and Industrial Efficient Equipment Prescriptive Rebate
3.2	Large Commercial and Industrial Efficient Equipment Prescriptive Rebate
3.3	Small Commercial and Industrial Custom
3.4	Large Commercial and Industrial Custom

The portfolio offers PPL Electric Utilities’ customers a cost-effective, equitable, flexible, and comprehensive set of programmatic choices, incentives, information, and educational opportunities. Together, these programs meet the goals set forth in the Implementation Order, including cost-effectively achieving all savings objectives within the required budget caps (Table 2). The three programs, along with their associated program components, are described in Section 3.

¹ *Energy Efficiency and Conservation Program*, Docket No. M-2020-3015228 (Order entered June 18, 2020) (“Implementation Order”).

² *2021 Total Resource Cost (TRC) Test*, Docket No. M-2019-3006868 (Order entered Dec. 19, 2019) (“2021 TRC Test Order”).

Table 2. Summary of Compliance Targets

	Compliance Target ¹	EE&C Plan ²
Overall Energy Reductions (MWh/year)	1,250,157	1,540,687
Overall Peak Demand Reductions (MW) ³	229	248
Low-Income Energy Reductions (MWh/year)	72,509	74,793
Budget Cap (excluding SWE costs)	\$307,506,880	\$307,491,356
Cost-Effectiveness (per TRC)	1.0	1.17

¹ Per the Implementation Order, there are no government, nonprofit, and institutional ("GNI") compliance targets for Phase IV, page 5. PPL Electric Utilities will continue to serve the GNI sector through the Non-Residential Program.

² The overall energy reductions (MWh/year) exclude 200,000 MWh/year of carryover program savings from Phase III.

³ Peak Demand is at generation.

1.1.1 Portfolio Objectives

PPL Electric Utilities designed the Phase IV Plan to meet the requirements set forth by the Commission's Implementation Order:

- Offer programs for a five-year term, beginning on June 1, 2021, and concluding on May 31, 2026.
- Comply with the designated expenditure cap of 2% of 2006 annual revenues for each year of the five-year Plan, which equates to a total energy efficiency budget of approximately \$307.5 million,³ over the five-year Phase IV period, and an average program acquisition cost of approximately \$0.246 per kWh saved.
- Achieve 3.3% reduction in overall energy consumption, which is equivalent to 1,250,157 MWh/year of gross verified savings. The EE&C Plan must be designed to achieve at least 15% of the total cumulative energy reduction target in each of the five program years, which equates to 187,524 MWh/year each year.
- Achieve required energy reduction set-aside target from the low-income customer sector (those who are at or below 150% of the Federal Poverty Income Guidelines ["FPIG"]), which is equal to a minimum of 5.8% (72,509 MWh per year of gross verified savings) of the total portfolio energy reductions. Compliance savings must come entirely from income-qualified programs and may not accrue from low-income customer participation in non-low-income-specific residential programs.
- Achieve compliance target of cumulative peak demand reduction of 229 MW gross verified savings exclusively through deployment of energy efficiency measures offering coincident peak reduction benefits. The EE&C Plan must be designed to achieve at least 15% of the total cumulative demand reduction target in each of the five program years, which equates to 34.35 MW per year.
- Offer at least one comprehensive program for residential customers and one comprehensive program for non-residential customers.

³ This dollar amount excludes approximately \$5 million for PPL Electric Utilities' portion of the statewide evaluator ("SWE") costs that are not subject to the funding cap.

- Provide a portfolio cost recovery tariff mechanism.
- Dedicate at least 50% of funds to incentives at the portfolio level.
- Ensure the portfolio is cost-effective based on the total resource cost (“TRC”) test and compliance with TRC guidance.⁴
- Include high-level plans to measure, evaluate, and verify the performance of individual programs and the Plan as a whole.
- Allocate the cost of measures to the customer class that receives the benefit of those measures.

In addition, PPL Electric Utilities designed the EE&C Plan to accomplish several corporate objectives:

- Exceed compliance targets, by approximately 39% MWh⁵ and 8% MW, to allow for evaluation and other uncertainties.
- Enhance program comprehensiveness by offering overarching programs to serve residential, low-income, small commercial and industrial (“C&I”), and large C&I customers. These programs comprise customizable measure offerings bundled into components that span end uses, consolidate administrative functions, and eliminate arbitrary program designations that may serve as a barrier to participation.
- Achieve broad stakeholder consensus to the extent practical.
- Provide significant energy efficiency education to encourage customers to take a more comprehensive, holistic approach to energy efficiency (such as upgrading multiple measures, like weatherization and HVAC and water heating systems, or conducting whole-house and whole-building upgrades).
- Provide programs that achieve high customer satisfaction.
- Provide a transition for customers from Phase III to Phase IV program:
 - Offer residential customers a comparable mix of measures and incentive levels as those provided during Phase III for at least the first three months of Phase IV.
 - Offer comparable incentives to customers with non-residential projects on the Phase III waitlist that are completed in early Phase IV.
- Allow Phase III non-residential projects on the waitlist that are completed in Phase IV within the first three months to be eligible for a rebate based on Phase III eligibility requirements.
- Provide low-income programs at no cost to participants, although Act 129 Compliance Rider (“ACR”) charges will appear on their bills.
- Provide a number of energy efficiency measures to low-income households that are proportionate to those households’ share of total energy usage in the service territory (12.50%).
- Deliver programs using a customer-sector approach that is flexible enough to control the pace of programs if customer preferences or market conditions change.

⁴ This TRC guidance is outline in the Commission’s 2021 TRC Test Order.

⁵ This includes 200,000 MWh/year of carryover savings from Phase III (23% without carryover savings).

- Achieve a reasonable net-to-gross (“NTG”) ratio for each program.
- Continue to support an effective trade ally network that stocks and promotes efficient equipment.
- Achieve an equitable distribution of programs, savings, and costs for all customer sectors.
- Nominate a portion of the portfolio’s peak demand reduction into the PJM Interconnection LLC (“PJM”) Forward Capacity Market (“FCM”).

PPL Electric Utilities is well-positioned to deliver a portfolio of programs that will meet customers’ needs, fulfill the Company’s Plan objectives, and achieve the results required for Phase IV. The Company designed its programs to provide residential, low-income, and non-residential (small and large C&I) customers with a comprehensive range of options intended to drive participation. PPL Electric Utilities uses targeted marketing techniques that capitalize on ongoing market research and on customer and trade ally feedback to match outreach and messaging strategies with likely participants’ primary participation drivers. The common features of all programs are education, customer care, technical support, quality assurance and quality control (“QA/QC”), and evaluation, measurement, and verification (“EM&V”).

The entire portfolio is supported by financial incentives, an active trade ally network, tracking, and a delivery approach focused on providing customers the support they need to achieve their energy efficiency objectives and encourage their continued engagement with PPL Electric Utilities’ programs. Implementation activities range from simple, common energy efficiency measures that can be installed with minimal oversight or administration to more complex measures that may be (but are not required to be) part of a facility-wide energy management strategy. The Plan identifies opportunities for customers in all sectors to participate in one or more program components.

1.1.2 Overall Strategy to Achieve Energy Efficiency and Conservation Goals

In Phase IV, PPL Electric Utilities’ savings acquisition cost will increase from \$0.20 to \$0.246. In Phase III, to achieve compliance with a lower budget allocation, the Company implemented several operational and delivery strategies aimed at increasing cost efficiencies and ratepayer value. In Phase IV, PPL Electric Utilities will continue these efforts but also recognizes the need to increase the amount of savings per customer interaction to meet its Phase IV goals. Therefore, in the Phase IV portfolio, the Company will offer customers a more holistic path to achieving deep energy savings. To facilitate this approach, PPL Electric Utilities developed budgets, savings targets, and performance objectives based on comprehensive program offerings for its primary customer sectors: residential, low-income, and non-residential. To accomplish this, the Company relied on Phase IV market potential studies, its Phase III program delivery experience and evaluation results, and an analysis of the Phase IV compliance requirements including the overall residential, low-income, and non-residential savings targets.

PPL Electric Utilities then issued requests for proposals (“RFPs”) for the design and delivery of residential, low-income, and non-residential (targeting both small C&I and large C&I customers) programs. The Company used the responses to the RFPs to confirm that its savings targets and budgets

were achievable and to determine an appropriate mix of measures and delivery strategies to include in the EE&C Plan. In addition, PPL Electric Utilities engaged The Cadmus Group LLC (“Cadmus”) to conduct a cost-effectiveness analysis of the EE&C Plan.⁶

This process enabled PPL Electric Utilities to identify overarching programs that target each key customer segment and encompass more granular paths for participation in the form of program components. These program components are based on measure bundles or delivery strategies so customers can participate at the level that best meets their needs without having to face administrative hurdles or participation barriers.

PPL Electric Utilities' sector-level programs include four Residential Program components, one Low-Income Program component, and four Non-Residential Program components (*i.e.*, two small C&I and two large C&I), together comprising the Phase IV EE&C portfolio. PPL Electric Utilities will continue to administer its programs, support its trade allies and strategic partners, and track and report its portfolio performance at the more granular component level. To customers, component-level administrative and delivery designations will be invisible, and the benefits of a holistic approach to efficiency will be clearly articulated. The portfolio is projected to be cost-effective and to comply with Act 129 targets, at or below the Company's budget cap.

To further support achievement of its Phase IV energy efficiency and conservation goals, PPL Electric Utilities has several additional portfolio strategies:

- ***Continue to deliver programs that optimize cost efficiency and deliver the greatest value to ratepayers.*** The Phase IV programs have a slightly higher acquisition cost than the Phase III programs,⁷ primarily due to the loss of residential lighting opportunities, which were some of the least expensive savings. To address this, PPL Electric Utilities will continue to seek opportunities to reduce and control program administrative costs:
 - Offer comprehensive programs that focus on cost-effective measures with high savings and reasonable NTG ratios to all customer segments throughout the service territory.
 - Emphasize energy efficiency measures with coincident peak demand benefits to achieve demand reduction goals.
 - Create simple incentive applications in multiple submission formats (such as hard copy mail-in, online, and tablet entry by trade allies).

⁶ Cadmus is a 100% employee-owned consulting firm. For more than 30 years, Cadmus has been helping organizations forecast energy demand and trends, design programs and portfolios to capture the energy savings, and assess achievement of energy savings and demand reduction.

⁷ The program acquisition cost is defined as PPL Electric Utilities' total cost to implement the program (including administration and incentives) divided by the annual kilowatt-hours saved.

- Continue to focus on providing personalized and flexible customer service to help ensure customers receive timely feedback to questions, information and educational resources that are directly relatable and immediately applicable, and rapid rebate processing.
- ***Work directly with conservation service providers (“CSPs”) that have institutional knowledge of PPL Electric Utilities’ market and implementation environment.*** These CSPs will implement comprehensive residential, low-income, and non-residential (small C&I and large C&I) programs and enable PPL Electric Utilities to accomplish several goals:
 - Provide a smooth a transition from Phase III to Phase IV programs to maximize customer satisfaction and allow seamless distribution of incentives (and savings) for projects that straddle both phases.⁸
 - Create economies of scale associated with cross-program functions (such as the customer call center, rebate processing, market analytics, marketing, website development, and program management).
 - Facilitate integrated customer engagement across all programs to improve the effectiveness of marketing, customer communications, and cross-promotion of efficiency opportunities, thereby increasing the extent of participation and project comprehensiveness and reducing outreach and recruitment costs.
 - Provide journey mapping to help identify pain points for PPL Electric Utilities’ customers , so it can create an enhanced and effortless customer experience.
 - Journey mapping will enable PPL Electric Utilities to segment its customers based on distinct characteristics and create customized approaches to their needs.
 - Implement contracts that tie payments to CSP performance (in terms of costs and savings), ensuring that these providers are accountable for successful program delivery.
 - Continue to provide automated rebate applications and processing, QA/QC, performance tracking, reporting, and other functions where practical.
- ***Emphasize comprehensive solutions for all customers.*** PPL Electric Utilities’ redesigned portfolio will accomplish three tasks:
 - Offer multiple savings opportunities (in terms of measures, end uses, delivery channels, and incentive mechanisms) in each program.
 - Provide customers with high-quality energy efficiency education through both digital and traditional print outreach and engagement channels as well as through direct communications with trade allies, CSPs, strategic partners, and PPL Electric Utilities’ staff.
 - Promote the benefits of multiple-measure, comprehensive projects (whole-home and whole-building approaches).

⁸ The Company uses the in-service date of the project to determine whether to provide the funding under Phase III or Phase IV.

- **Ensure that program staff are effective, knowledgeable, and accountable to defined performance metrics.** Engaged and knowledgeable staff are essential to successful programs. To this end, PPL Electric Utilities is committed to ensuring several qualities about its staff:
 - Have a full understanding of all aspects of their programs and the markets in which they operate.
 - Adhere to program-specific performance metrics to track, monitor, and analyze program success.
 - Benchmark program performance metrics against similar Pennsylvania and national programs.
 - Maintain effective relationships with trade allies through frequent communications and by striving to understand trade ally practices and business needs.
 - Possess a strong knowledge of customer preferences, behavioral triggers, motivations, and barriers.

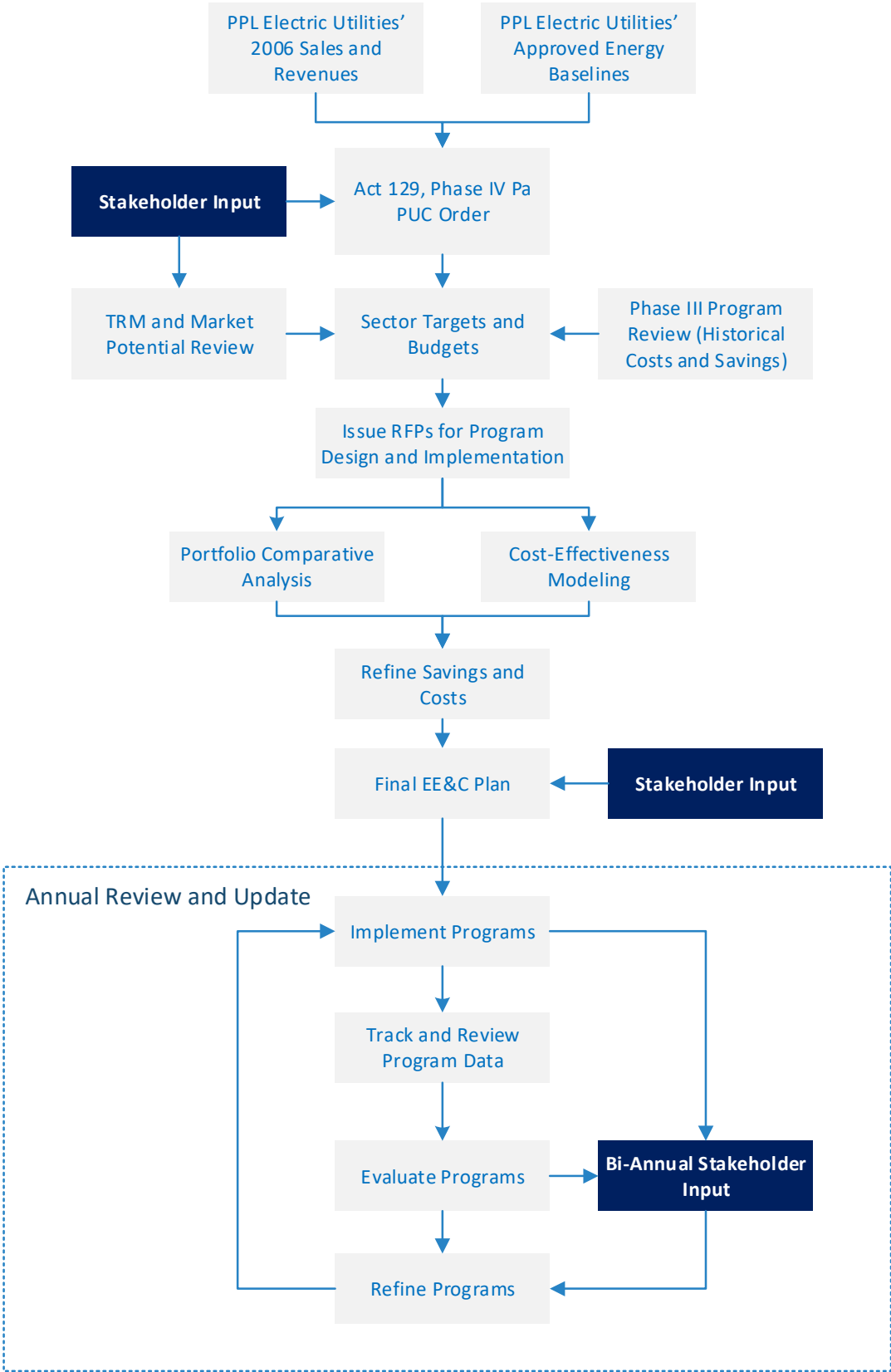
1.2 Plan Development Process and Key Assumptions

PPL Electric Utilities began developing the EE&C Plan shortly after the Pa PUC entered the Tentative Implementation Order on March 12, 2020, at Docket No. M-2020-3015228. After more than a decade of offering Act 129 programs, PPL Electric Utilities has cultivated an experienced professional staff of program managers who work closely with CSPs, trade allies, customers, and stakeholders to seek their input on programs and measures.

The Company designed the Plan to comply with Act 129's requirements and the Commission's Implementation Order and to draw on the Phase IV market potential studies (for energy efficiency and demand response), experience from Phase I through Phase III, stakeholder input, and the RFP responses from program implementers who informed the overarching strategy.

To achieve the Commission's energy savings targets within the required budget caps, PPL Electric Utilities looked to the implementation market for solutions. By issuing competitive RFPs requesting innovative strategies from potential implementation contractors, the Company was able to identify an optimal mix of measures and programs that can achieve significant energy savings at a comparatively low acquisition cost. Figure 1 summarizes PPL Electric Utilities' process for developing the Plan and ensuring continuous improvement.

Figure 1. Process for Developing the Plan



1.2.1 Principles Guiding Development of the Plan

PPL Electric Utilities has a longstanding commitment to energy efficiency and helping customers use electricity wisely and save on their electricity bills. The Company relies on several principles to guide development of the measures, programs, and implementation strategies in its portfolio:

- **Customer focus.** During Phase I through Phase III, PPL Electric Utilities has consistently focused on the customer and improved its programs to meet changing customer and market preferences. The Company designed its portfolio to educate and empower customers to take actions that save energy and money by providing personalized customer service, accelerated rebate processing, and clear and easy-to-understand program information on its website and program applications. Phase IV will continue to build on the virtual strategies the Company began in Phase III for the sake of customer safety and convenience. Through the Plan, PPL Electric Utilities offers a diverse range of information, education, and incentives to help its customers engage in energy efficiency and make informed, sustainable choices that will have a lasting impact on their energy costs.
- **Compliance with Act 129.** Consistent with the requirements of Act 129 and the Implementation Order, PPL Electric Utilities developed a portfolio of cost-effective energy efficiency programs that consider stakeholders' input and will generate the energy savings and peak demand reductions needed to meet the goals required by Act 129 and the Commission. The Plan is designed to exceed PPL Electric Utilities' compliance targets by approximately 39% MWh and 8% MW and within the budget cap.
- **Flexibility to address changing market conditions.** PPL Electric Utilities designed its Plan to achieve its EE&C targets within its designated budget cap even as market conditions and customer preferences change over time. The Company achieves this objective through specific actions:
 - Rely on a diverse set of proven, market-ready, and cost-effective energy efficiency (electric) technologies and conservation strategies.
 - Use an overarching program structure and CSPs that will help achieve economies of scale by consolidating program component-level administrative and delivery functions and by encouraging customer participation in multiple program components through effective cross-promotion and having a single view of the customer across all measures and components.
 - Provide multiple program options and controls that help PPL Electric Utilities manage the pace of programs (to achieve the savings and costs in the EE&C Plan) and reduce the frequency of formal EE&C Plan changes. These include modifying marketing tactics, adjusting incentive levels within specified ranges, offering different measures at different times, and offering multiple delivery channels.
- **Effective program design.** To design these programs, the Company relied on proven, cost-effective technologies and delivery strategies and based its participation, savings, and cost

projections on well-researched market potential data, historical performance, and analysis of regional and national trends in similar markets.

- **Equitable programs.** PPL Electric Utilities examined Phase III evaluation findings to identify the priorities, opportunities, and challenges faced by the variety of customer sectors, trade allies, and market partners that its programs serve. The Company designed the EE&C Plan to prioritize equity by capitalizing on identified opportunities and by mitigating challenges for disadvantaged customers. The Plan includes a range of measures and programs designed to meet the needs of all of PPL Electric Utilities' customers, with savings and costs distributed equitably across all customer sectors.
- **Market acceptance.** PPL Electric Utilities designed its Plan to stimulate market acceptance and installation of energy efficient technologies. The Company works closely with retailers, distributors, contractors, and other trade allies to encourage them to stock, specify, and promote energy efficient technologies. The EE&C Plan includes provisions for training and education; outreach to trade allies, distributors, and stakeholders; and an active awareness campaign to increase customer knowledge about and acceptance of the benefits of energy efficient equipment and to keep them informed about new advances in energy efficient products. PPL Electric Utilities will continue to encourage the wide availability of program-eligible energy efficiency measures and to support increasing demand for energy efficient products and equipment. The Company will monitor and adjust its programs' performance as required if programs are not successful or if NTG ratios are low.
- **Commitment to low-income customers.** The EE&C Plan continues PPL Electric Utilities' commitment to helping low-income customers reduce their electricity consumption. PPL Electric Utilities will continue its successful Low-Income Assessment component.

1.2.2 Developing the Portfolio

In its RFPs, the Company challenged bidders to propose a portfolio of program components that could achieve the required savings targets within the allocated budget. Specifically, each program must be designed to achieve verified gross energy savings and peak demand reduction that is approximately proportional to its customer mix and based on historical program performance over the five-year Plan period and to capture at least 15% of the total cumulative savings each year. Additionally, the Company required each program to meet its savings objective at a proportional total direct program cost (including incentives and non-incentives incurred by the CSP and excluding the allocation of common, portfolio-level costs) and overall cost (including common costs) within its overall budget cap. See Section 2 for program costs and savings detail in Table 10.

PPL Electric Utilities further directed its CSPs to adhere to its overall guiding principles and to comply with additional design features tailored to each customer sector, as described below.

- Residential Program
 - Achieve acceptable NTG ratios as determined by PPL Electric Utilities, its evaluator, or the SWE.

- Wherever possible, be cost-effective as determined by the Pennsylvania 2021 TRC test method.
- Offer diverse and comprehensive measure choices to all residential customers across PPL Electric Utilities' entire service territory.
- Achieve high customer satisfaction (where at least 85% of customers rate themselves as *very satisfied* or *satisfied*).
- Low-Income Program
 - Offer a low-income component at no cost to households that are at or below 150% of the FPIG according to the U.S. Department of Health and Human Services in January of each program year.⁹
 - Provide a variety of energy efficiency measures and strive to maximize savings, within budget constraints, from direct install measures.
 - Achieve high customer satisfaction where at least 85% of customers rate themselves as *very satisfied* or *satisfied*).
 - Provide a broad selection of energy efficiency measures to qualifying low-income households.
 - Address renters and owners of single-family homes, multifamily buildings that are in the residential customer class and are occupied by low-income customers, and manufactured homes.
 - Offer information to Low-Income Assessment participants regarding PPL Electric Utilities' other universal service and energy conservation programs, such as the Company's Customer Assistance Program (*i.e.*, OnTrack).¹⁰
- Non-Residential Program
 - Achieve high customer satisfaction (where at least 85% of customers rate themselves as *very satisfied* or *satisfied*).
 - Offer a broad selection of energy efficiency measures across multiple end uses as well as to both the small C&I and large C&I customer segments across PPL Electric Utilities' service territory.
 - Achieve acceptable NTG ratios as determined by PPL Electric Utilities, its evaluator, or the SWE.
 - Be cost-effective as determined by the TRC test method.

PPL Electric Utilities worked with Cadmus to model program- and portfolio-level cost-effectiveness based on projected peak load reductions, energy savings, and costs (such as delivery, incentives,

⁹ The Low-Income Program is not required to be cost-effective (per the 2021 TRC Test Order) as long as the EE&C portfolio overall is cost-effective.

¹⁰ Through its OnTrack Program, PPL Electric Utilities offers reduced monthly payments to assist low-income customers with account balances in arrears.

incremental measure, and participant costs). PPL Electric Utilities provided the lifecycle costs, savings, and avoided cost benefits, enabling Cadmus to compute the cost-effectiveness from a TRC perspective.¹¹ The key assumptions used to estimate energy savings and peak demand reduction, calculate costs, and determine cost-effectiveness are listed in Section 8.

Finally, PPL Electric Utilities iteratively adjusted the expected number of participants and customer incentive levels for each program component and for each measure to balance the portfolio, meet all savings targets, increase cost-effectiveness, and stay within the budget for each customer sector.

1.3 Summary Tables of Portfolio Savings Goals, Budgets, and Cost-Effectiveness

The tables in this section summarize the estimated savings, budget, and cost-effectiveness for PPL Electric Utilities’ entire portfolio. The tables are numbered sequentially, with the formats matching those provided in the EE&C Plan Template issued by the Commission on September 9, 2020, at Docket No. M-2020-3015228. Each table caption includes a reference to the corresponding table number provided in the EE&C Plan Template:

- Table 3. Pa PUC Table 1 - Portfolio Summary of Lifetime Costs and Benefits of Energy Efficiency Measures
- Table 4. Pa PUC Table 2 - Summary of Portfolio Energy and Demand Savings (Meter-Level)
- Table 5. Pa PUC Table 3 - Summary of Portfolio Energy and Demand Savings (System-Level)
- Table 6. Pa PUC Table 4 - Summary of Portfolio Costs

Table 3. Pa PUC Table 1 - Portfolio Summary of Lifetime Costs and Benefits of Energy

Portfolio	Total Discounted Lifetime Costs (\$000) ¹	Total Discounted Lifetime Benefits (\$000)	Total Discounted Net ² Lifetime Benefits (\$000)	Cost-Benefit Ratio (TRC)
Residential (exclusive of Low-Income) ³	\$135,548	\$153,247	\$17,699	1.13
Low-Income	\$43,977	\$19,144	\$(24,833)	0.44
Commercial/Industrial Small	\$226,867	\$354,590	\$127,722	1.56
Commercial/Industrial Large	\$369,257	\$383,384	\$14,127	1.04
Total	\$775,649	\$910,364	\$134,716	1.17

¹Discounted common costs are included in the appropriate sector totals. See Table 55 (Pa PUC Table 11) for the allocation of common costs.

²“Net” refers to the arithmetic difference between the previous two columns. It does not refer to net verified savings.

³The Implementation Order disallowed the inclusion of low-income participation in standard, non-low-income-specific residential programs in the calculation of savings towards the low-income carve-out.

¹¹ The calculation methods and assumptions used for estimating all program costs are provided in Appendix C.

Table 4. Pa PUC Table 2 - Summary of Portfolio Energy and Demand Savings

MWh Saved for Consumption Reductions (Meter-Level)	PY13		PY14		PY15		PY16		PY17		Total	
	1st-Year MWh	Lifetime MWh	1st-Year MWh	Lifetime MWh	1st-Year MWh	Lifetime MWh	1st-Year MWh	Lifetime MWh	1st-Year MWh	Lifetime MWh	1st-Year MWh	Lifetime MWh
Baseline¹	38,214,368		38,214,368		38,214,368		38,214,368		38,214,368		38,214,368	
Residential Sector (exclusive of Low-Income) – Cumulative Projected Portfolio Savings	39,768	482,159	81,282	988,466	121,218	1,468,993	160,369	1,935,614	199,312	2,396,940	199,312	2,396,940
Low-Income Sector – Cumulative Projected Portfolio Savings	12,712	69,297	28,420	154,920	45,625	248,706	62,830	342,492	74,793	407,706	74,793	407,706
Commercial/Industrial Small Sector – Cumulative Projected Portfolio Savings	102,924	1,402,529	214,171	2,927,008	326,250	4,469,658	434,846	5,965,812	545,004	7,487,697	545,004	7,487,697
Commercial/Industrial Large Sector – Cumulative Net Weather Adjusted Savings	138,124	1,976,773	284,686	4,080,107	432,229	6,202,784	577,160	8,290,924	721,578	10,372,285	721,578	10,372,285
EE&C Plan Total – Cumulative Projected Savings	293,528	3,930,758	608,559	8,150,501	925,321	12,390,141	1,235,204	16,534,842	1,540,687	20,664,628	1,540,687	20,664,628
Estimated Phase III Carryover Savings											200,000	
Total Cumulative Projected Savings Phase IV + Estimated Phase III Carryover Savings	293,528		608,559		925,321		1,235,204		1,540,687		1,740,687	
EE&C Plan Total – Percentage of Target to be Met²	23%		49%		74%		99%		123%		139%	
Percent Reduction from Baseline	1%		2%		2%		3%		4%		5%	
Commission-Identified Goal²											1,250,157	
Percent Savings due to Portfolio Above or Below Commission-Identified Goal											39%	

¹ As defined in the Implementation Order.

² The Implementation Order directed that electric distribution companies (“EDCs”) achieve at least 15% of the target amount in each program year.

Table 5. Pa PUC Table 3 - Summary of Portfolio Energy and Demand Savings

MW Saved for Consumption Reductions (System-Level)	PY13		PY14		PY15		PY16		PY17		Total ³	
	1st-Year MW	Lifetime MW	1st-Year MW	Lifetime MW	1st-Year MW	Lifetime MW	1st-Year MW	Lifetime MW	1st-Year MW	Lifetime MW	1st-Year MW	Lifetime MW
Baseline¹												
Residential Sector (exclusive of Low-Income) – Cumulative Projected Portfolio Savings	11.38	11.38	22.94	22.94	32.23	32.23	40.31	40.31	47.79	47.79	47.79	47.79
Low-Income Sector – Cumulative Projected Portfolio Savings	1.68	1.68	3.75	3.75	6.02	6.02	8.29	8.29	9.86	9.86	9.86	9.86
Commercial/Industrial Small Sector – Cumulative Projected Portfolio Savings	17.06	17.06	35.23	35.23	53.41	53.41	71.02	71.02	88.86	88.86	88.86	88.86
Commercial/Industrial Large Sector – Cumulative Net Weather Adjusted Savings	19.59	19.59	40.26	40.26	60.97	60.97	81.28	81.28	101.51	101.51	101.51	101.51
EE&C Plan Total – Cumulative Projected Savings	49.71	49.71	102.18	102.18	152.64	152.64	200.90	200.90	248.03	248.03	248.03	248.03
EE&C Plan Total – Percentage of Target to be Met²	22%	22%	45%	45%	67%	67%	88%	88%	108%	108%	108%	108%
Percent Reduction from Baseline												
Commission-Identified Goal¹											229	229
Percent Savings due to Portfolio Above or Below Commission-Identified Goal											8%	8%

¹ As defined in the Implementation Order.

² The Implementation Order directed that EDCs achieve at least 15% of the target amount in each program year.

³ Demand savings in this table are at generation.

Table 6. Pa PUC Table 4 - Summary of Portfolio Costs¹

Sector	PY13		PY14		PY15		PY16		PY17	
	\$000	%	\$000	%	\$000	%	\$000	%	\$000	%
Residential Portfolio Annual Budget	\$13,424	22%	\$13,717	21%	\$12,845	20%	\$12,443	20%	\$12,318	20%
Low-Income Portfolio Annual Budget	\$7,417	12%	\$8,673	14%	\$9,310	15%	\$9,326	15%	\$7,174	12%
Commercial/Industrial Small Portfolio Annual Budget	\$14,980	25%	\$15,662	24%	\$15,624	24%	\$15,211	24%	\$15,362	25%
Commercial/Industrial Large Portfolio Annual Budget	\$16,696	27%	\$17,413	27%	\$17,456	27%	\$17,180	27%	\$17,162	28%
Common Costs ²	\$8,620	14%	\$8,620	13%	\$8,620	13%	\$8,620	14%	\$8,620	14%
Total Portfolio Annual Budget	\$61,137	100%	\$64,085	100%	\$63,855	100%	\$62,780	100%	\$60,635	100%

¹ Values in this table are nominal.

² Includes \$5 million of SWE costs.

1.4 Summary of Program Implementation Schedule

Table 7 provides a visual summary of PPL Electric Utilities’ implementation schedule in accordance with the Commission’s EE&C Plan Template.

Table 7. PPL Electric Utilities Implementation Schedule



1.5 Strategy to Acquire 15% of Consumption Reduction and Peak Demand Reduction Target Each Program Year

Consistent with the Implementation Order, PPL Electric Utilities designed its programs to achieve at least 15% of the total consumption reduction target in each program year. The Company directed its CSPs to develop implementation strategies that also reflect this objective. The EE&C Plan includes many components and measures that will continue from Phase III. PPL Electric Utilities has significant experience with these measures and programs and believes it can control the programs' pace, as it has in previous phases. In addition, PPL Electric Utilities designed the EE&C Plan to focus on energy efficiency measures that provide coincident peak demand reduction opportunities.

PPL Electric Utilities will monitor actual performance, adjusting marketing, advertising, incentive levels, and eligible measures to manage participation as necessary to achieve at least 15% of its portfolio target annually.

1.6 Summary Description of the Programs or Measure Categories from which the Electric Distribution Company (EDC) Intends to Nominate Peak Demand Reduction into PJM's Forward Capacity Market (FCM), along with the Projected Megawatt Totals to be Bid by Year

Per the Implementation Order, PPL Electric Utilities will rely on energy efficiency measures with coincident peak demand reduction potential, such as lighting and cooling, in all its sector-level programs to achieve its annual and total peak demand reduction targets. Relying on this strategy will help the Company deliver consistent long-term peak demand reduction benefits at a lower cost than through targeted demand response programs.

PPL Electric Utilities will solicit bids from qualified third-party vendors to provide technical support to nominate a portion of its peak demand reduction as a capacity resource into PJM's FCM. At that time, PPL Electric Utilities will identify eligible peak demand reduction measures for nomination for each program. PPL Electric Utilities will own the forward capacity rights and the ability to bid this capacity into the PJM FCM for any energy efficiency project, measure installed, or product purchased, that includes an upstream/downstream/midstream discount, direct discount, rebate or incentive paid, or free measures installed or provided by PPL Electric Utilities, their representative CSP, partners, trade allies or distributors.

1.7 Strategy to Manage EE&C Portfolio and Engage Customers and Trade Allies

For its implementation strategy, PPL Electric Utilities will rely on a broad range of CSPs, employees, trade allies, community agencies, stakeholders, and other entities engaged in energy efficiency to promote, deliver, and support the effective deployment of programs.

PPL Electric Utilities will use two program-level CSPs—one CSP will implement the residential and non-residential (small C&I and large C&I) programs and one CSP will deliver the low-income program—to

deliver its portfolio. These CSPs will have the primary responsibility to design and deliver the EE&C programs, including marketing, customer care, application and rebate processing, and development and maintenance of effective trade ally networks, while jointly developing marketing plans with PPL Electric Utilities. In addition, PPL Electric Utilities will provide some overarching marketing and customer care for EE&C programs. PPL Electric Utilities will also enhance its marketing efforts and customer experience by developing an energy analyzer.

PPL Electric Utilities based its implementation strategy on an assessment of features needed to engage customers in EE&C programs and encourage them to take energy efficient actions. The engagement approach involves active, ongoing outreach to customers and trade allies. The Company follows several key strategies:

- Conduct annual EM&V to obtain several objectives:
 - Identify marketing channels and tactics most likely to elicit responses from customers and trade allies.
 - Understand drivers, motivations, and challenges to implementing energy efficiency upgrades among specific customer segments and related to common customer characteristics.
 - Develop messaging strategies matched to key customer and trade ally drivers.
 - Assess customer response to programs and evaluate whether programs are meeting customer needs.
- Offer a range of voluntary customer programs that provide tangible benefits.
- Emphasize customer service among PPL Electric Utilities staff, CSPs, and trade allies.
- Evaluate customer satisfaction and response.
- Modify programs as necessary to improve programs and customer satisfaction.
- Coordinate with trade allies, community-based organizations, and other local market participants through outreach, training, and co-marketing so that these partners are aware of PPL Electric Utilities' programs, can effectively articulate program features and benefits to potential customers, and can support customers in their decision to take energy efficiency actions.

In addition to CSPs' and PPL Electric Utilities' marketing, the success of Phase IV programs will depend on trade allies and other market partners to engage customers, promote programs, evaluate projects, and stock and install energy efficient equipment. The Company's objective is to strike a reasonable balance of costs, ratepayer value, customer choice, quality service, and energy and capacity savings. If necessary to achieve savings objectives, the Company will offer incentives to trade allies that promote, stock, and install efficient measures included in the EE&C Plan.

1.8 Data Management, Quality Assurance, and Evaluation Processes

The following sections describe the Company's approach to implementing data management, QA/QC, and evaluation processes.

1.8.1 Data Management

Each CSP's tracking system and PPL Electric Utilities' tracking database allow for program activities to be tracked daily. These systems generate reports and queries to allow for ongoing monitoring, management, analysis, and reporting of activities.

1.8.2 Quality Assurance and Quality Control

During planning and design, PPL Electric Utilities will continue to follow QA procedures to promote consistency and avoid errors. QC activities and inspection points during the implementation and evaluation phases help guide the correction of errors and identification of areas for improvement. Together, QA and QC will improve program performance.

PPL Electric Utilities will employ QA/QC procedures for Act 129 at various levels of program implementation, including CSP recruitment and training, data tracking, program operations, and inspections:

- Anticipate, detect, and prevent problems or errors rather than reacting to them.
- Strive to perform work correctly the first time.
- Establish screening and qualification protocols to confirm that qualified individuals perform all work functions.
- Train staff, CSPs, and trade allies to maintain current knowledge and skills needed for their positions.
- Document data collection and QA/QC protocols and conduct a full review to confirm that the proper data are collected consistently, resources are allocated appropriately, and program performance can be measured accurately.
- Conduct adequate planning, coordination, supervision, and technical direction.
- Define and develop a clear understanding of job requirements and procedures.
- Conduct post-installation inspections of an appropriately sized random sample of participants to confirm that the program-reported measures were installed, followed best practices and procedures, and function as expected.

A detailed description of PPL Electric Utilities' QA/QC protocols and standards is provided in Section 6.

1.8.3 Evaluation Processes

PPL Electric Utilities' EM&V CSP will conduct ongoing and annual evaluations of each program in compliance with all Pa PUC requirements and the Evaluation Framework. As part of this process, the EM&V CSP will develop an Evaluation Plan that describes the EM&V scope of work, objectives, methods, and activities for evaluating program impacts, processes, cost-effectiveness, net savings analysis, and QA/QC protocols.

The EM&V CSP will develop this Evaluation Plan in accordance with Evaluation Framework requirements and submit it to the SWE for review and approval. PPL Electric Utilities and the EM&V CSP will review (at least annually) and may update the Evaluation Plan if changes are made to programs, participation levels, savings levels, or Act 129 evaluation requirements.

The EM&V CSP will conduct evaluations annually, focusing the impact evaluation on developing accurate estimates of the programs' actual savings based on protocols developed by the SWE and the Commission, as summarized in the Evaluation Framework and the Pennsylvania Technical Reference Manual ("TRM"), as well as in the Pa PUC's Implementation Order. The impact evaluation also will include an assessment to confirm that all data required for the impact evaluation are collected (evaluability assessment). For the process evaluation, the CSP will focus on qualitative assessments of the programs' design, operation, and implementation.

The CSP will also conduct annual evaluations to determine the cost-effectiveness of the programs and portfolio using the TRC test method specified by the Commission in its 2021 TRC Test Order.

Finally, the CSP will conduct net savings evaluations as indicated by the Evaluation Framework and outlined in the Evaluation Plan to determine the net verified savings of each program. Net savings include the effects of free ridership and spillover. The EM&V CSP may also propose to conduct market effects studies to understand changes in the market and to further inform net savings. Guidance for net savings analyses are provided in the Evaluation Framework, with periodic updates from the SWE and the NTG Working Group.

Over the life of the Phase IV EE&C Plan, PPL Electric Utilities expects to revisit and revise a number of assumptions to reflect updated market conditions. The Company will submit required revisions to the Commission for review and approval in accordance with the Commission's requirements for revising EE&C Plans.

1.9 Cost Recovery Mechanism

Act 129 directs each EDC to establish a reconcilable cost recovery tariff mechanism in accordance with 66 Pa. C.S. § 1307 and to include this mechanism in its EE&C Plan (66 Pa. C.S. § 2806.1(b)(1)(i)(H), (k)(1)).

2 Energy Efficiency Portfolio/Program Summary Tables and Charts

The following tables provide a quantitative overview of the Phase IV Plan. Note that tables in this section are numbered sequentially, but the applicable table formats are based on those provided in the Commission's EE&C Plan Template (as noted below). The table captions include references to the corresponding table numbers provided in the EE&C Plan Template.

Tables in this section are the following:

- Table 8. Pa PUC Table 5 – Residential, C&I Small, and C&I Large Portfolio Summaries
- Table 9. Pa PUC Table 6 – Budget and Parity Analysis
- Table 10. Summary of Costs and Savings by Program and Customer Sector

Table 8. Pa PUC Table 5 - Residential, C&I Small, and C&I Large Portfolio Summaries

Program Name	Component Name	Program Market	Program Two-Sentence Summary	Program Years Operated	Lifetime MWh Savings	Lifetime MW Savings	Percentage of Portfolio Resource Savings (MWh% and MW%)	
Residential Portfolio Program (exclusive of Low-Income)	Appliance Recycling	All customers (primarily residential)	Free pick up and recycling of inefficient refrigerators, freezers, room air conditioners and possibly dehumidifiers. Incentive paid for each eligible appliance.	PY13 - PY17	142,556	6,130	1%	3%
	Efficient Lighting – Specialty Bulbs	All customers (primarily residential)	Upstream retail promotion and incentives applied to eligible light emitting diode (“LED”) specialty bulbs. Other distribution channels include online, mail, directly to customers, welcome kits, etc.	PY13 - PY17	191,446	13,081	1%	6%
	Energy Efficient Homes	Existing and new residential single family and multifamily homes	Offers rebates on a wide range of energy efficient measures for retrofit and new construction applications.	PY13 - PY17	1,736,782	21,867	8%	9%
	Student Energy Efficient Education	Residential customers: students and teachers	Energy efficiency education targeting primary and secondary grades, including classroom presentations, curriculum, and energy efficiency kits.	PY13 - PY17	326,155	2,868	2%	1%
	Home Energy Efficiency Report ¹	Residential single and multifamily	Education, online home energy surveys and Home Energy Reports comparing energy use to other customers in PPL Electric Utilities’ service territory, and offering energy efficiency and demand response tips.	PY15 - PY17	-	-	0%	0%
	Totals for Residential Sector					2,396,940	43,946	12%
Low-Income Sector Program	Low-Income Assessment	Income-qualified single family, multifamily and manufactured homes	Offers a range of free direct install energy efficiency measures to customers whose incomes are at or below 150% of FPIG.	PY13 - PY17	407,706	9,071	2%	4%
	Totals for Low-Income Sector					407,706	9,071	2%

Section 2 Energy Efficiency Portfolio/Program Summary Tables and Charts

Program Name	Component Name	Program Market	Program Two-Sentence Summary	Program Years Operated	Lifetime MWh Savings	Lifetime MW Savings	Percentage of Portfolio Resource Savings (MWh% and MW%)	
Commercial/Industrial Small Portfolio Program	SCI- Custom and Efficient Equipment	Small C&I	Provides rebates/incentives for a list of qualified energy efficiency measures and custom measures not included in PPL Electric Utilities' other programs. Includes combined heat and power ("CHP"), process upgrades, retro-commissioning, and other measures.	Custom PY13 - PY17	2,002,359	19,201	10%	8%
				Efficient Equipment PY13 - PY17	5,485,338	62,510	27%	27%
	Totals for C&I Small Sector					7,487,697	81,711	36%
Commercial/Industrial Large Portfolio Program	LCI-Custom and Efficient Equipment	Large C&I	Provides rebates/incentives for a list of qualified energy efficiency measures and custom measures not included in PPL Electric Utilities' other programs. Includes CHP, , process upgrades, retro-commissioning, and other measures.	Custom PY13 - PY17	6,972,229	59,099	34%	25%
				Efficient Equipment PY13 - PY17	3,400,056	38,322	16%	17%
	Totals for C&I Large Sector					10,372,285	97,421	50%
Totals for Plan					20,664,628	232,148	100%	100%

¹ Although PPL Electric Utilities does not currently project participation for HERs in the Phase IV Plan, the Company may decide to offer HERs within the Phase IV period, within the approved budget, and therefore includes the HERS component in this table.

Table 9. Pa PUC Table 6 - Budget and Parity Analysis

Customer Sector	Phase IV EE&C Budget (inclusive of allocated common cost)	% of Total EDC EE&C Budget	% of EDC Total Annual Revenue	% of EDC Total MWh Sales
Residential Sector (<i>exclusive of Low-Income</i>)	\$74,769,337	24%	52%	39%
Low Income Sector ¹	\$48,386,207	15%		
Residential Subtotal	\$123,155,544	39%	52%	39%
Commercial/Industrial Small Sector	\$89,392,278	29%	26%	39%
Commercial/Industrial Large Sector	\$99,943,535	32%	22%	22%
Non-Residential Subtotal	\$189,335,813	61%	48%	61%
EDC TOTAL	\$312,491,356	100%	100%	100%

¹ Customers in the Low-Income sector are all customers in the residential customer class. Therefore, the Low-Income sector's figures are included in the Residential part of this table.

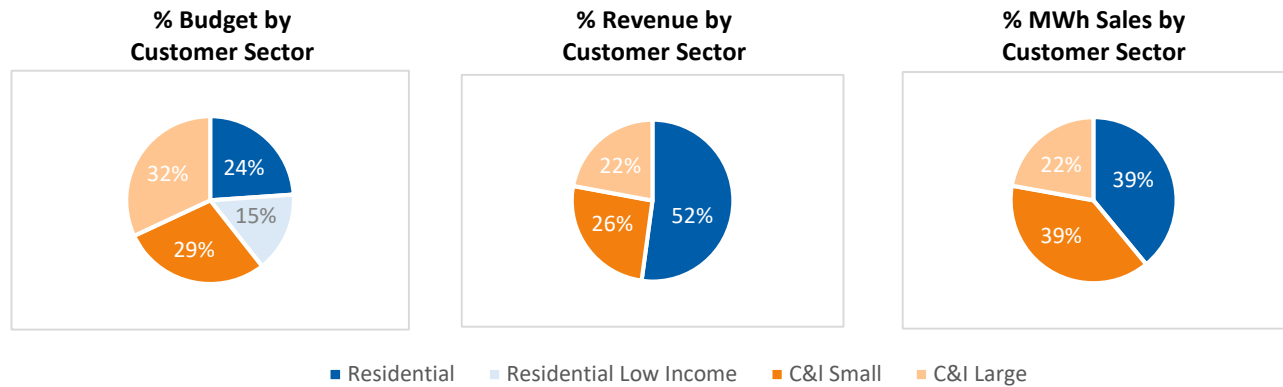


Table 10. Summary of Costs and Savings by Program and Customer Sector¹

Component	Residential			Low-Income			Small C&I			Large C&I			Total Cost (\$1000)	Total MWh/yr. Reduction ^{2,3}	\$/kWh ⁴	Total MW Reduc-tion ^{2,5}	\$/kW ^{4,8}
	Costs (\$1000)	Savings MWh/yr ²	Savings MW/yr ²	Costs (\$1000)	Savings MWh/yr ²	Savings MW/yr ²	Costs (\$1000)	Savings MWh/yr ²	Savings MW/yr ²	Costs (\$1000)	Savings MWh/yr ²	Savings MW/yr ²					
Total Residential Program	\$64,747	199,312	48										\$64,747	199,312	\$0.32	48	\$1,355
Total Low-Income Program				\$41,900	74,793	10							\$41,900	74,793	\$0.56	10	\$4,248
Total Non-Residential Program							\$76,838	545,004	89	\$85,906	721,578	102	\$162,745	1,266,582	\$0.13	190	\$855
Total - Direct Program Costs	\$64,747			\$41,900			\$76,838			\$85,906			\$269,391				
Percent of Total Direct Costs ⁶	24.03%			15.55%			28.52%			31.89%			100%				
Common Costs Allocation ⁷	\$10,023			\$6,486			\$12,554			\$14,037			\$43,100				
TOTAL ESTIMATED EE&C PLAN COST⁷	\$74,769			\$48,386			\$89,392			\$99,944			\$312,491				
Estimated SWE Cost													\$5,000				
Total Cost excluding SWE Costs													\$307,491				
Total Estimated Phase IV MWh/Yr Reduction ³		199,312			74,793			545,004			721,578			1,540,687			
Total Estimated Phase IV MW Reduction ⁵			48			10			89			102				248	
Phase IV Cost Cap													\$307,506				
Energy Reduction Compliance Target (MWh/year) ³					72,509									1,250,157			
Peak Demand Reduction Compliance Target (MW) ⁵																229	
\$/kWh (direct & common) for energy efficiency programs	\$0.38			\$0.65			\$0.16			\$0.14					\$0.20		
Carryover from Phase III					20,000									200,000			
Total Plan and Carryover MWh/yr					94,793									1,740,687			

¹ Peak demand savings are gross verified MW at the generator level (grossed up to reflect transmission and distribution (“T&D”) line losses).

² Savings are for measures installed and operable from June 1, 2021, through May 31, 2026.

³ MWh/year are on a verified gross basis.

⁴ Program acquisition cost for energy efficiency programs equals program costs divided by first year's savings.

⁵ MW are on a verified gross basis.

⁶ Direct percentages are slightly different for common costs as none of the Key Account Management costs are allocated to residential or low income sectors.

⁷ Includes \$5 million SWE costs that are not subject to the cost cap.

⁸ \$/kW are rounded values.

3 Program and Component Descriptions

3.1 *Process Used for Selection of Programs and Components*

To enhance customer engagement in energy efficiency, PPL Electric Utilities revised the structure of its program offerings for Phase IV. Rather than offering a portfolio of individual programs consisting of bundled measure offerings, PPL Electric Utilities' Phase IV Plan will focus on providing each target customer sector with comprehensive solutions. PPL Electric Utilities will contract with implementation CSPs that will be tasked with providing balanced, integrated offerings to customers in the sector(s) over which they are responsible.

Customers are typically unaware of the existence of program designations; they simply want to find information easily, have a smooth participation process, and receive their incentive quickly. Under the new design, customers in the key sector will have the opportunity to implement as many, or as few, of individual energy efficiency and peak demand improvements as they like. PPL Electric Utilities designed its Phase IV programs to facilitate a seamless customer experience and provide the flexibility to enable customers who want deeper, more comprehensive efficiency upgrades to implement the project that best fits their needs and budget.

Because implementation CSPs will be tasked with (and will receive incentives for) delivering comprehensive solutions across an entire customer sector, they will be empowered to educate customers on the benefits of holistic energy efficiency strategies and to cross-promote appropriate solutions that result in more complete retrofits and higher energy and peak demand savings per participant. This comprehensive, solutions-based portfolio approach is consistent with best practices and industry trends.

The revised portfolio structure offers PPL Electric Utilities an opportunity to capture operational efficiencies, facilitate more extensive promotion and participation, encourage deeper energy efficiency and peak demand enhancements per customer, and have greater flexibility and control to manage program delivery and achieve objectives. Each program comprises components through which PPL Electric Utilities can deliver targeted offerings to its customers based on the predominant operational and delivery characteristics of that component.

These program components are very similar to the successful offerings in Phases I through III. Under its revised program design strategy, PPL Electric Utilities will continue to administer, evaluate, and report on program performance at a component level. PPL Electric Utilities developed separate budgets, savings targets, and performance objectives for each program—residential, low-income, and non-residential—and for the associated program components. Delineation of components will be largely invisible from a customer perspective, especially in the residential sector. Access to individual measures or whole home solutions will be broadly customizable and solely at the customer's discretion. This strategy allows PPL Electric Utilities and its CSPs and trade allies to capitalize on the existing portfolio's momentum and enhance the customer experience by broadening customers' choices.

The remainder of this section provides details on individual programs, program components, and the analysis PPL Electric Utilities conducted to construct its Phase IV portfolio.

3.1.1 Portfolio Objectives and Metrics that Define Success

Portfolio Objectives

PPL Electric Utilities designed the Phase IV EE&C Plan to meet the requirements set forth by the Implementation Order and to achieve additional objectives associated with customer satisfaction and operational efficiency. These objectives are described in detail in Section 1 of this Plan.

Metrics that Define Success

The primary objectives of this Plan are to meet the requirements of Act 129 and encourage more efficient use of electric power by PPL Electric Utilities’ customers. PPL Electric Utilities will monitor its progress in meeting these objectives by tracking specific performance indicators and, when deficiencies are found, identifying corrective action. The Company will employ a range of EM&V, QA/QC, and data tracking activities to assess and monitor program and component performance and customer and trade ally satisfaction throughout Phase IV. Table 11 identifies the performance indicators and metrics PPL Electric Utilities will use to measure program and component success.

Table 11. Key Indicators and Metrics for Monitoring Portfolio Success

Key Indicator	Metrics
Market Response	<ul style="list-style-type: none"> • Number of participants • Number of measures installed per participant • Participation benchmarked against industry norms • Feedback from trade allies
Impacts	<ul style="list-style-type: none"> • kWh/year savings • kW/year saving • Average project size
Customer and Trade Ally Satisfaction	<ul style="list-style-type: none"> • Responses to participant surveys administered as part of QA and/or EM&V • Feedback from trade allies
Operating Efficiency	<ul style="list-style-type: none"> • Application processing time • Incentive processing time • Expenditures in each category • Acquisition cost (\$/kWh saved)¹ • Levelized cost (\$/kWh saved)¹
Cost-Effectiveness	<ul style="list-style-type: none"> • TRC benefit/cost ratio

¹ Acquisition cost is ratio of total EDC expenditures to annual kWh. Levelized cost is the full TRC cost (including participant cost) over lifetime kWh.

3.1.2 How Program Components Were Constructed

PPL Electric Utilities relied on its Phase III program designs as a template for assigning eligible energy efficiency and peak demand measures to specific program components for analyzing cost-effectiveness and impacts. The Company then examined new measures identified through the Phase IV market

potential studies, its Phase III experience, and other market research to assess the ability of these measures to supplement or enhance existing customer offerings. PPL Electric Utilities assigned each promising measure to one or more components and then estimated participation and costs based on previous experience and an analysis of Phase IV requirements, including compliance targets and associated budgets.

After defining sector-level budgets and targets, PPL Electric Utilities issued RFPs for the design and implementation (i.e., delivery) of the residential, non-residential, and low-income programs. These RFPs were intended to confirm that PPL Electric Utilities' savings targets and budgets were achievable and realistic for each sector and to confirm the types of programs, components, and measures to include in the EE&C Plan.

Each measure underwent an extensive technical and economic screening analysis (see Section 8) to determine component, program, and portfolio-level cost-effectiveness. This analysis was the basis for iteratively adjusting individual elements to balance the portfolio and provide a reasonable mix of programs to meet all the Act 129 requirements. These requirements include the low-income set-aside targets, the overall cost cap, equity and comprehensiveness across customer segments, and cost-effectiveness at the portfolio level. The result is a mix of proven energy efficiency and peak demand strategies that will enable PPL Electric Utilities to reach its program goals within the parameters set forth in Act 129 and the Implementation Order.

For the launch and delivery of programs in Phase IV, PPL Electric Utilities will capitalize on existing activities and relationships with market partners, rely on the implementation CSPs' delivery experience, and account for the seasonality of some program components to achieve its Act 129 goals.

PPL Electric Utilities' Phase IV programs are intended to provide comprehensive energy and peak demand savings across end uses, as shown in Figure 2.

Figure 2. End Uses Addressed, by Program

End-Use	Residential	Low Income	Non-Residential
Agricultural			●
Appliances	●	●	
Appliance Recycling	●	●	●
Audits	●	●	
CHP			●
Compressed Air			●
Cooling	●		
Cooling Chillers			●
Food Service			●
Heat Pump	●	●	●
Heating	●		
HVAC			●
Industrial			●
Kits	●	●	
Lighting	●	●	●
Lighting Controls			●
Miscellaneous	●	●	●
Motors, Pumps & Fans			●
New Homes	●		
Office Equipment			●
Plug Loads	●	●	
Pool Pumps	●		
Refrigeration (Commercial)			●
Thermostats	●	●	
Ventilation			●
Water Heat	●	●	●
Weatherization	●		

3.1.3 Measures Included in the Portfolio of Program Components

Measures to be offered in the Phase IV program components are described in Sections 3.2 through 3.4 (see the Eligible Measures and Incentive Strategy section in each program component description).

3.1.4 Comprehensive Measures to Be Offered

The Implementation Order directs EDCs to “include at least one comprehensive program for residential customers and at least one comprehensive program for non-residential customers.”¹² To satisfy this requirement for residential customers, PPL Electric Utilities will offer two programs: (1) the Residential

¹² Implementation Order at 23.

Program targeting its non-low-income customers; and (2) the Low-Income Program targeting its low-income customers. Both programs will provide a comprehensive mix of cost-effective energy efficiency measures for all building types (single-family, multifamily, and manufactured homes and existing and new construction). Both programs will offer in-home energy audits that assess end uses, including weatherization, water heating, lighting (available through the Efficient Lighting component), HVAC, and appliances. Residential customers will receive energy efficiency and peak demand education and be encouraged to implement multiple measures and to take a comprehensive approach to energy efficiency.

To meet the requirement for non-residential customers, PPL Electric Utilities will offer the Non-Residential Program that will target business customers of all sizes and in every segment, as well as government and educational institutions and master metered low-income multifamily buildings, with a comprehensive range of prescriptive measures (including HVAC, lighting, and water heating) as well as opportunities to implement a custom efficiency project for measures not included in PPL Electric Utilities' Energy Efficient Equipment (prescriptive) component and not included in the TRM. Custom component measures cover a comprehensive set of non-residential needs, including new or replacement energy efficient and peak demand-saving equipment, retro-commissioning, repairs, equipment optimization, building management or industrial process controls, new construction projects, CHP, and operational and process improvements that result in cost-effective energy efficiency savings.

3.2 Residential Program (2021-2026)

The following sections describe the components in PPL Electric Utilities’ proposed Residential Program:

- Appliance Recycling
- Efficient Lighting – Specialty Bulbs
- Energy Efficient Homes
- Student Energy Efficient Education

The next sections describe each component and their objectives; target market; implementation strategy; issues, risks, and risk management strategy; anticipated costs to participating customers; ramp-up strategy; marketing strategy; eligible measures and incentive strategy; deadline for rebate applications; start date with key schedule milestones; EM&V; administrative requirements; and estimated savings and participation. Please note that participation levels, savings, costs, and incentive ranges are estimates as directed by the Pa PUC EE&C Plan Template.

Table 12 lists estimated savings and costs by program year. The Residential Program budget is 20.7% of the total portfolio budget.¹³

Table 12. Pa PUC Table 9 - Residential Costs and Benefits by Program Year and Total (\$1000)

Cost Element		PY13	PY14	PY15	PY16	PY17	Phase IV Total ¹
Total Budget (\$000)		\$13,424	\$13,717	\$12,845	\$12,443	\$12,318	\$64,747
Incentives (\$000)	Rebates	\$3,132	\$3,160	\$3,188	\$3,216	\$3,246	\$15,943
	Upstream/Midstream Buydown	\$4,407	\$4,506	\$3,574	\$3,075	\$2,823	\$18,385
	Kits	\$938	\$955	\$973	\$992	\$1,011	\$4,869
	Direct Install Materials & Labor	\$343	\$349	\$356	\$363	\$370	\$1,781
	Incentive Total	\$8,820	\$8,971	\$8,092	\$7,646	\$7,449	\$40,977
Non-Incentives (\$000)	CSP Program Design	\$46	-	-	-	-	\$46
	CSP Administrative	\$567	\$595	\$626	\$651	\$675	\$3,115
	CSP Delivery Fees	\$3,281	\$3,437	\$3,412	\$3,422	\$3,459	\$17,012
	CSP Marketing	\$490	\$493	\$495	\$503	\$515	\$2,496
	EDC Administrative	\$220	\$220	\$220	\$220	\$220	\$1,100
	EDC Other	-	-	-	-	-	-
	Non-Incentive Total	\$4,604	\$4,746	\$4,753	\$4,797	\$4,869	\$23,769
Percent Incentives		66%	65%	63%	61%	60%	63%

¹Total values may not equal the sum of all program year values due to rounding.

¹³ This percentage represents the program budget without common costs over the total portfolio budget, which includes common costs.

The Residential Program is projected to be cost-effective, with a TRC test ratio of 1.13. Table 13 shows net present value benefits and costs, net benefits, and the overall benefit/cost ratio.

Table 13. Residential Program Cost-Effectiveness Results, TRC Test (\$1,000)

NPV Benefits	\$153,247
NPV Costs	\$135,548
Net Benefits	\$17,699
Benefit/Cost Ratio	1.13

As noted in Section 1.6, PPL Electric Utilities will rely on energy efficiency measures with coincident peak demand reduction potential to achieve its annual and total demand reduction goals. PPL Electric Utilities will target end uses to nominate roughly 1 to 20% of eligible PJM peak demand savings from the Residential Program over the five-year Plan. PPL Electric Utilities is not aware at this time which measures will be nominated; however, they will likely include cooling and lighting. PPL Electric Utilities will competitively select a qualified third-party vendor to provide technical support in nominating a portion of its peak demand reductions as a capacity resource in PJM’s FCM.

Appliance Recycling

Description

PPL Electric Utilities offers free pick-up and recycling of refrigerators, freezers, dehumidifiers, room air conditioners, and possibly consumer electronics (without savings or incentive). The Company offers customers a rebate for each recycled appliance, which must be plugged in and functioning when picked up. Room air conditioners, consumer electronics (if offered), and dehumidifiers are eligible for pick up with a refrigerator or freezer. PPL Electric Utilities may decide to allow dehumidifiers and room air conditioners as stand-alone measures. If feasible, the Company will offer small appliance pick-up events to which customers may bring room air conditioners and/or dehumidifiers for disposal and receive PPL Electric Utilities’ incentives. The component will have the flexibility to offer in-person home pick-up or contactless curbside pick-up.

PPL Electric Utilities offers scheduling, pick-up, and decommissioning of refrigerators and freezers units and transports the units to a Pennsylvania-based processing center for disposal in an environmentally responsible manner. The disposal process involves removing hazardous materials, such as chlorinated fluorocarbons, from the refrigerant and foam insulation, preparing refrigerant for reclamation, and recycling other materials including metal and plastic.

Objectives

The objectives of Appliance Recycling are:

- Encourage customers to dispose of their existing, inefficient refrigerators, freezers, air-conditioning units, and dehumidifiers in an environmentally responsible manner.
- Reduce the use of secondary, inefficient refrigerators, freezers, and air-conditioning units.

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- Enhance relationships with box stores and independent retailers to encourage participation in the “buy new and recycle” component.
- Decommission appliances on the site to prevent resale in a secondary market.
- Promote other PPL Electric Utilities energy efficiency programs.
- Achieve a total energy reduction of approximately 26,316 MWh/year and 6.7 MW¹⁴ gross verified savings.
- Achieve high customer and trade ally satisfaction.

Target Market

Appliance Recycling targets residential customers but is available to customers in all sectors with working, residential-grade refrigerators, freezers, dehumidifiers, and room air-conditioning units. PPL Electric Utilities also encourages landlords and multifamily property managers/owners in its service territory to recycle refrigerators and freezers in their tenant units.

Implementation Strategy

The Residential CSP will manage and deliver Appliance Recycling to customers, which involves scheduling, picking up appliances, decommissioning, recycling, training retailer staff to promote the component, and tracking data. The Residential CSP will also support program-level functions by operating a customer call center, marketing and advertising, processing incentives, and tracking component activities. PPL Electric Utilities’ energy efficiency staff will provide overall strategic direction and management. The EM&V CSP will provide evaluation services.

Issues, Risks, and Risk Management Strategy

Table 14 presents market risks associated with Appliance Recycling and strategies PPL Electric Utilities will use to manage each risk.

Table 14. Appliance Recycling Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Convenient time required for customer to be available for pick-up.	Customer may have the interest to recycle but not have time available.	Residential CSP works with customers to provide as convenient a pick-up as possible. On a case-by-case basis, special pick-up times may be arranged to meet customer needs.
Lack of component awareness among customers.	Customer participation might be low.	Residential CSP manages a robust marketing strategy, including distributing materials at community events and to retailers, running a media campaign, and designing PPL Electric Utilities bill inserts.
Customer may not see benefit of recycling qualified appliance(s).	Customer disposes of units through channels other than this component.	Residential CSP works with retailers where new units are sold to display information about the benefits of recycling. PPL Electric Utilities offers free pick-up

¹⁴ Peak Demand is at generation.

Component Issue	Risk	Risk Management Strategies
		services plus an incentive to encourage customers to recycle appliances.

Anticipated Costs to Participating Customers

There are no direct costs incurred by customers in this component.

Ramp-up Strategy

Appliance Recycling is an existing, mature offering being carried forward from Phase III. The Residential CSP will develop marketing materials to facilitate the transition to Phase IV.

Marketing Strategy

PPL Electric Utilities’ staff will work with the Residential CSP to develop and execute a marketing plan that captures sector-level economies of scale and employs targeted outreach where practical. The marketing strategy may include the following:

- Promote component through “Connect,” bill inserts, the Customer Engagement Hub, and email blasts.
- Provide online access to the component via the Company’s EE&C website.
- Distribute materials at community events.
- Advertise through multiple channels.
- Educate retailer staff and customers through in-store events.
- Distribute point-of-purchase materials to local retailers.
- Train local retailer staff to cross-promote component when customers purchase a new refrigerator.
- Conduct targeted outreach to PPL Electric Utilities’ customers who submit a new refrigerator rebate application.

Eligible Measures and Incentive Strategy

Qualified customers receive free pick-up and disposal and an incentive for recycling working refrigerators, freezers, dehumidifiers, room air conditioners, and possibly consumer electronics (without savings or incentives). Room air conditioners, consumer electronics, and dehumidifiers may be picked up along with a qualified refrigerator or freezer. PPL Electric Utilities may decide to allow dehumidifiers and room air conditioners as stand-alone measures.

Table 15 lists PPL Electric Utilities’ proposed measures, minimum eligibility qualifications, and ranges of incentive levels.

Table 15. Pa PUC Table 7-Appliance Recycling Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
Dehumidifier Recycling	Per Product	No	Retirement and recycling without direct EDC replacement of an operable but older and inefficient room dehumidifier unit that would not have otherwise been recycled.	\$15	4	\$15	\$10 to \$25
Recycle Fridge	Per Product	No	Working unit, > 10 cubic feet and ≤ 30 cubic feet	\$35	6	\$35	\$35 to \$75
Recycle Freezer	Per Product	No	Working unit, > 10 cubic feet and ≤ 30 cubic feet	\$35	5	\$35	\$35 to \$75
RAC Recycling	Per Product	No	Retirement and recycling without direct EDC replacement of an operable but older and inefficient room AC (RAC) unit that would not have otherwise been recycled.	\$10	3	\$10	\$10 to \$25

¹ All eligible measures are listed in this table regardless of participation projections.

Not all measures may be available at all times. PPL Electric Utilities may suspend a measure depending on popularity, pace of the component (savings and costs), free ridership, evaluation requirements, complexity of information required from customers, administrative requirements for the measure, or other reasons. PPL Electric Utilities will review the component continually and may adjust available measures or eligibility qualifications to achieve savings and cost budgets. The Company may offer tiered incentives that encourage the recycling of older equipment, installation of multiple measures, or a more comprehensive whole-home or facility approach.

Deadline for Rebate Applications

There is no rebate application for this component.

Start Date with Key Schedule Milestones

Appliance Recycling is currently offered in Phase III, and PPL Electric Utilities will manage the transition to Phase IV. Table 16 lists estimated key schedule milestones for Appliance Recycling. PPL Electric Utilities will lead implementation or provide management oversight of all tasks.

Table 16. Appliance Recycling Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
06/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. PPL Electric Utilities and its EM&V CSP will conduct annual evaluations of each program component in compliance with all Pa PUC requirements and the Evaluation Framework. As part of this process, the EM&V CSP will review a sample of CSP records to verify quantity, efficiency level, and qualifying equipment. The EM&V CSP will follow all applicable methods in the TRM and the Evaluation Framework to calculate energy savings and peak demand reduction. For the Appliance Recycling component, PPL Electric Utilities anticipates conducting annual impact evaluations and conducting one process evaluation during Phase IV (activities vary by year).

Administrative Requirements

The Residential CSP will provide overall administrative and operational management of Appliance Recycling. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Savings and Participation

Table 17 shows the order of magnitude participation estimates for Appliance Recycling. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 17. Pa PUC Table 8-Appliance Recycling Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Dehumidifier Recycling	Energy Savings (MWh/year)	866	866	866	866	866	4,330
	Demand Reduction (MW)	0.201	0.201	0.201	0.201	0.201	1.004
	Projected Participation	1,200	1,200	1,200	1,200	1,200	6,000
Recycle Fridge	Energy Savings (MWh/year)	3,208	3,273	3,338	3,405	3,473	16,697
	Demand Reduction (MW)	0.518	0.528	0.539	0.550	0.561	2.695
	Projected Participation	7,055	7,196	7,340	7,487	7,637	36,715
Recycle Freezer	Energy Savings (MWh/year)	883	900	918	937	955	4,594
	Demand Reduction (MW)	0.142	0.145	0.148	0.151	0.154	0.741
	Projected Participation	1,761	1,796	1,832	1,869	1,906	9,164
RAC Recycling	Energy Savings (MWh/year)	134	136	139	142	145	696
	Demand Reduction (MW)	0.324	0.331	0.338	0.344	0.351	1.689
	Projected Participation	1,633	1,666	1,699	1,733	1,768	8,499

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

² Total values may not equal the sum of all program year values due to rounding

Efficient Lighting - Specialty Bulbs**Description**

PPL Electric Utilities encourages residential customers to purchase and install specialty LED bulbs.¹⁵ Participating customers can purchase a variety of discounted LED bulbs at local retail stores and the Company's Online Marketplace. The Residential CSP will manage operations and provide support to participating retailers and manufacturers that promote and sell eligible bulbs.

Objectives

The objectives of Efficient Lighting are:

- Provide a mechanism for customers to easily obtain discounted specialty LED bulbs in local retail stores and/or the Online Marketplace.
- Achieve widespread visibility through independent and regional retailers that carry eligible specialty LED bulbs.
- Develop and execute strategies aimed at continuing the transformation of the market for specialty LED bulbs.
- Educate customers on new lighting technologies.
- Engage retailers by educating and training retail sales associates about specialty LED bulbs.
- Achieve a total energy reduction of approximately 12,763 MWh/year and 14.2 MW¹⁶ gross verified savings.
- Achieve high customer and trade ally satisfaction.

Target Market

Efficient Lighting targets residential customers but is available to all PPL Electric Utilities customers.

Implementation Strategy

The Residential CSP will administer the component by managing retailer/manufacturer recruitment, delivering incentives to participating energy efficient light bulb manufacturers, providing marketing and educational support, and overseeing marketing and product placement in retail stores. The Residential CSP will also support program-level functions by operating a customer call center, following PPL Electric Utilities' marketing and branding guidelines, and tracking activities. PPL Electric Utilities' energy efficiency staff will provide overall strategic direction and management. The EM&V CSP will provide evaluation services.

¹⁵ Based on actual results from Phase III, PPL Electric Utilities estimated a portion of costs and savings associated with the Efficient Lighting Component for the small C&I sector from cross-sector sales. The actual costs and savings for the small C&I sector will be determined by the EM&V CSP during the annual evaluation.

¹⁶ Peak Demand is at generation.

Issues, Risks, and Risk Management Strategy

Table 18 presents market risks associated with Efficient Lighting and the strategies PPL Electric Utilities will use to manage each risk.

Table 18. Efficient Lighting Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Cost of energy efficient bulbs may be higher than the customer is willing to pay.	<ul style="list-style-type: none"> • Low sales translating to low savings. • Customers may not be willing to purchase new, more efficient light bulbs if their current light bulbs are functioning. • Economic conditions may limit customers’ ability to purchase energy efficient bulbs. 	<ul style="list-style-type: none"> • PPL Electric Utilities offers incentives to offset the cost of efficient bulbs at retail locations. PPL Electric Utilities will likely use other distribution channels such as offering free bulbs at customer giveaway events, and through the Online Marketplace. • PPL Electric Utilities educates customers on the long-term energy cost-saving benefits of higher efficiency lighting.
Lack of customer awareness about energy usage associated with different types of bulbs.	Customers do not see a need to use more efficient bulbs.	Residential CSP manages a robust marketing and education strategy, including point-of-sale promotions and discounts.
Reduction in savings due to Energy Independence and Securities Act of 2007 standards.	Specialty bulb market saturation.	PPL Electric Utilities determines the proper product mix of bulbs to reduce reliance on savings for specific bulbs
Energy efficient bulb performance.	Customer may not purchase energy efficient bulbs if they perceive bulbs do not perform well.	Residential CSP conducts ongoing communication with retailers, including training, outreach, and education.
Changing technology may affect lifecycle cost.	Customer decision-making process may change as new technology becomes available in the market.	PPL Electric Utilities adds new measures as efficiency improves.

Anticipated Costs to Participating Customers

Although the incentives will cover a portion of the efficient products’ incremental costs, participating customers will be responsible for the remaining costs of purchased LED bulbs. Customer-incurred costs will vary by bulb type.

Ramp-up Strategy

This is a relaunch of the Efficient Lighting offering from Phase III, but focusing specifically on specialty bulbs. The Residential CSP will develop marketing material to facilitate the transition to Phase IV.

Marketing Strategy

PPL Electric Utilities will work with the Residential CSP to develop and execute a marketing plan that captures sector-level economies of scale and employs targeted outreach where practical. The marketing strategy may include the following:

- Promote the component through “Connect,” bill inserts, the Customer Engagement Hub, and email blasts.

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- Provide online access to the program via the Company’s EE&C website.
- Advertise through multiple channels.
- Educate retailer staff and customers through in-store events.
- Distribute point-of-purchase materials to local retailers.
- Collaborate with ENERGY STAR® and lighting manufacturers.
- Cross-promote the lighting component with other energy efficiency educational materials.

Eligible Measures and Incentive Strategy

Table 19 identifies PPL Electric Utilities’ proposed list of measures, minimum eligibility qualifications, and range of incentive levels. In general, the incentives provided at the retail level are designed to cover up to 50% of the retail cost of LEDs.

Table 19. Pa PUC Table 7- Efficient Lighting Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
TCP 11.68 Downlight Solid State Retrofit	Per Bulb	No	Downlight fixture, ≥ 400 lumens	\$5	15	\$3	\$5 to \$8
Decorative and Min-Base AVG	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	\$3	15	\$3	\$5 to \$8
Globe AVG	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	\$5	15	\$3	\$5 to \$8
Reflectors AVG	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	\$5	15	\$3	\$5 to \$8
Outdoor AVG	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	\$5	15	\$3	\$5 to \$8
MaxLite 11 Parabolic Aluminized Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8
MaxLite 5 Globe	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	N/A	N/A	N/A	\$5 to \$8
MaxLite 6.5 Multifaceted Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8
Philips 4.5 Specialty	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	N/A	N/A	N/A	\$5 to \$8
Philips 7.2 Bulged Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8
Philips 9 Bulged Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8
TCP 10.5 Parabolic Aluminized Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8
TCP 4 Globe	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	N/A	N/A	N/A	\$5 to \$8
TCP 5 Globe	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	N/A	N/A	N/A	\$5 to \$8
TCP 5 Specialty	Per Bulb	No	Decorative, mini-base, or globe, 250- 2,600 lumens	N/A	N/A	N/A	\$5 to \$8
TCP 7.5 Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
TCP 9.5 Bulged Reflector	Per Bulb	No	Reflectors or outdoor, 250-2,600 lumens	N/A	N/A	N/A	\$5 to \$8

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.

All measures may not be available at all times. PPL Electric Utilities may suspend a measure depending on popularity, pace of the component (savings and costs), free ridership, evaluation requirements, administrative requirements for the measure, or other reasons. PPL Electric Utilities will review the component continually and may adjust available measures or eligibility qualifications to achieve savings and cost budgets.

Deadline for Rebate Applications

PPL Electric Utilities offers Efficient Lighting incentives at the point of sale; therefore, there is no rebate application.

Start Date with Key Schedule Milestones

Efficient Lighting was offered in Phase III, and PPL Electric Utilities will facilitate its relaunch as a component in Phase IV, but focus on specialty lighting. Table 20 lists the estimated key schedule milestones

Table 20. Efficient Lighting Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
06/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

The EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. PPL Electric Utilities and its EM&V CSP will conduct annual evaluations of each component in compliance with all Pa PUC requirements and the Evaluation Framework. As part of this process, the EM&V CSP will verify savings attributable to this component. The EM&V CSP will verify bulb quantities and savings for lighting distributed through other channels (such as giveaways) where the specific participant is known. The EM&V CSP will follow all applicable methods in the TRM and the Evaluation Framework to calculate energy savings and peak demand reduction. For Efficient Lighting, PPL Electric Utilities anticipates conducting annual impact and process evaluations (activities vary by year).

Administrative Requirements

The Residential CSP will provide overall administrative and operational management of Efficient Lighting. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Participation

Table 21 shows the order of magnitude participation estimates for Efficient Lighting. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 21. Pa PUC Table 8-Efficient Lighting Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
TCP 11.68 Downlight Solid State Retrofit	Energy Savings (MWh/year)	588	576	288	115	58	1,624
	Demand Reduction (MW)	0.613	0.600	0.300	0.120	0.060	1.693
	Projected Participation	102,000	99,960	49,980	20,000	10,000	281,940
Decorative and Min-Base AVG	Energy Savings (MWh/year)	732	717	359	179	75	2,062
	Demand Reduction (MW)	0.803	0.787	0.393	0.197	0.082	2.261
	Projected Participation	210,000	205,800	102,900	51,450	21,438	591,588
Globe AVG	Energy Savings (MWh/year)	413	405	202	101	51	1,172
	Demand Reduction (MW)	0.454	0.445	0.223	0.111	0.056	1.289
	Projected Participation	96,000	94,080	47,040	23,520	11,760	272,400
Reflectors AVG	Energy Savings (MWh/year)	2,021	1,981	990	495	206	5,694
	Demand Reduction (MW)	2.252	2.207	1.104	0.552	0.230	6.345
	Projected Participation	330,000	323,400	161,700	80,850	33,687	929,637
Outdoor AVG	Energy Savings (MWh/year)	699	699	466	233	116	2,212
	Demand Reduction (MW)	0.471	0.471	0.314	0.157	0.079	1.493
	Projected Participation	72,000	72,000	48,000	24,000	12,000	228,000

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

² Total values may not equal the sum of all program year values due to rounding.

Energy Efficient Homes

Description

PPL Electric Utilities provides comprehensive energy efficiency options for new and existing homes. The Company offers a range of energy efficient measures, rebates, education, and services that help its customers increase their homes’ efficiency. The component contains these delivery channels:

- The **new homes channel** encourages construction of energy efficient new homes through a rebate to builders or homeowners who exceed the energy efficiency performance required by current building codes in newly constructed homes. This offer is for both single-family and multifamily buildings.
- In the **comprehensive in-home audit and weatherization channel**, customers learn about the benefits of energy efficiency measures, such as appliance recycling, lighting, HVAC, and water heating. Depending on audit recommendations, customers may receive direct-install or giveaway measures and may qualify for insulation and air sealing rebates. Energy efficiency kits

may also be offered to PPL Electric Utilities' customers interested in learning more about energy efficiency and the programs offered by the Company.

- In the **midstream and/or downstream energy efficiency equipment** channel PPL Electric Utilities provides rebates for high-performance heat pumps, heat pump water heaters, pool pumps, and central air conditioners, as well as other energy efficient appliances.

PPL Electric Utilities is also considering offering an enhanced bonus incentive to customers who install a comprehensive package of measures.

Objectives

The objectives of Energy Efficient Homes are:

- Encourage customers to view energy efficiency in a holistic manner.
- Provide customers with education, audits, and energy-saving solutions.
- Promote construction of energy efficient new homes.
- Educate construction industry professionals and other trade allies about the benefits of energy efficient homes.
- Achieve a total energy reduction of approximately 122,803 MWh/year and 23.8 MW¹⁷ gross verified savings.
- Achieve high customer and trade ally satisfaction.

Target Market

Energy Efficient Homes is targeted to residential homebuilders and customers residing in single-family and individually metered multifamily homes.

Implementation Strategy

The Residential CSP will deliver Energy Efficient Homes to customers and homebuilders through marketing, participant recruitment, and trade ally recruitment and support. Because the component consists of three separate channels, trade ally support will vary. These are the responsibilities of the Residential CSP and PPL Electric Utilities:

- **New homes.** The Residential CSP will identify, recruit, and train potential builders; assist new home builders with paperwork; answer specific questions; test new home performance; and issue incentives to builders and homeowners.
- **Audit and weatherization.** The Residential CSP will conduct in-home audits; identify, recruit, and train HVAC contractors; form and maintain a trade ally network; and answer questions.
- **Energy efficient equipment.** The Residential CSP will work with retailers, distributors, trade allies, and manufacturers to promote energy efficient equipment such as HVAC equipment and pool pumps through a midstream approach that builds on its current and new relationships with distributors in PPL Electric Utilities' service territory and may decide to offer an HVAC Tune-Up

¹⁷ Peak Demand is at generation.

Optimization measure within this component. PPL Electric Utilities will continue to broaden its market reach by offering rebates for qualified products at the point of sale.

- **Online Marketplace.** PPL Electric Utilities will offer customers the opportunity to purchase energy efficient lighting and equipment through a virtual storefront.

The Residential CSP will also support program-level functions by operating a customer call center, managing marketing and advertising, processing incentives to customers, and tracking activities. PPL Electric Utilities will provide overall strategic direction and management. The EM&V CSP will provide evaluation services.

Issues, Risks, and Risk Management Strategy

Table 22 presents market risks associated with Energy Efficient Homes and the strategies PPL Electric Utilities will use to manage each risk.

Table 22. Energy Efficient Homes Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Efficiency is not a common priority for builders and customers.	Builders do not take advantage of rebates, resulting in lower savings.	Residential CSP educates builders on the value and benefits associated with energy efficiency.
Builders may not abide by the efficient building practices required to qualify for the rebate	Builders may choose cheaper, less efficient equipment and building practices.	Residential CSP educates builders on the performance standards and building practices required to qualify for program rebates.
The economic environment may limit the ability of builders and customers to purchase energy efficient equipment and appliances for these reasons: <ul style="list-style-type: none"> • High-efficiency equipment is viewed as too expensive. • There is little incentive to upgrade equipment that is still operational or to weatherize a home. 	Builders or customers may choose to install cheaper, less efficient equipment.	<ul style="list-style-type: none"> • Residential CSP conducts robust program marketing and provides general energy efficiency information to customers. • PPL Electric Utilities offers rebates that help reduce incremental costs. • Residential CSP educates customers on the long-term energy cost-saving benefits of higher-efficiency equipment and home weatherization.

Anticipated Costs to Participating Customers

Costs incurred by Energy Efficient Homes participants will vary by delivery channel and type of qualifying equipment installed through the component.

Ramp-up Strategy

Energy Efficient Homes is an existing, mature offering carried forward from Phase III. The Residential CSP will develop marketing material to facilitate the transition to Phase IV. The CSP also plans to make rebates for HVAC equipment and pool pumps available through a midstream channel. PPL Electric Utilities may continue to offer downstream rebates on these measures.

Marketing Strategy

PPL Electric Utilities will work with the Residential CSP to develop and execute a marketing plan that captures sector-level economies of scale and employs targeted outreach where practical. The marketing strategy may include the following:

- Promote component through “Connect,” bill inserts, the Customer Engagement Hub, and email blasts.
- Provide online access to the component via the Company’s EE&C website.
- Advertise through multiple marketing channels.
- Identify builders through collaboration with state and regional builders’ associations and provide them with component details.
- Educate retailer staff and customers through in-store events.
- Distribute point-of-purchase materials to local retailers.
- Recruit and train retailers and distributors on qualifying technology, rebates, and cross-promotion.

The Residential CSP will also conduct outreach to previously participating and new trade allies (retailers, manufacturers, distributors, homebuilders, and contractors) and provide them with rebate information, educate them on Phase IV changes, and offer ongoing support.

Eligible Measures and Incentive Strategy

Table 23 lists PPL Electric Utilities’ expected measures, minimum eligibility qualifications, and incentive level ranges.

Table 23. Pa PUC Table 7-Energy Efficient Homes Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
Connected Thermostat-Electric Heat AVG (downstream)	Per Product	No	ENERGY STAR Certified Product List	\$140	11	\$75	Up to \$200
Connected Thermostat-CAC AVG (downstream)	Per Product	No	ENERGY STAR Certified Product List	\$140	11	\$75	Up to \$200
New Homes-Connected Thermostat-Electric Heat (downstream)	Per Product	No	ENERGY STAR Certified Product List	\$140	11	\$75	Up to \$200
New Homes-Connected Thermostat-CAC (downstream)	Per Product	No	ENERGY STAR Certified Product List	\$140	11	\$75	Up to \$200
Fuel Switching – Central Heating (downstream) Maximum of 200 units across all customer sectors/programs	Per Project	No	Must replace electric equipment with ENERGY STAR certified natural gas, propane, or fuel oil equipment	\$8,600	15	\$200	Up to \$300
Fuel Switching – DHW (downstream)	Per Project	No	Must replace electric water heater with ENERGY STAR	\$1,416	11	\$200	Up to \$300

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
Maximum of 200 units across all customer sectors/programs			certified natural gas or propane equipment				
HPWH-AVG	Per Project	No	ENERGY STAR	\$671	10	\$400	Up to \$500
Air Sealing -AVG (weatherization – downstream)	Per Project	No	Must be performed in accordance with BPI standards with pre- and post-blower door testing. Must have a 10% minimum improvement. Home must have a main source electric heating or central air conditioning.	\$1,596	15	\$200	Up to \$200
ENERGY STAR Dehumidifiers (downstream)	Per Product	No	ENERGY STAR	\$11	12	\$50	Up to \$25
Ductless Mini-Split Heat Pump (16 SEER/9.0 HSPF) – replacing baseboard/room AC	Per Project	No	ENERGY STAR	\$3,847	15	\$400	Up to \$500
ENERGY STAR Air Source Heat Pump 16 SEER/9.0 HSPF/12.5 EER or Higher	Per Project	No	ENERGY STAR	\$987	15	\$450	Up to \$400
ENERGY STAR Air Source Heat Pump 17.5 SEER/9.7 HSPF/EER 13.5 or Higher	Per Project	No	ENERGY STAR	\$1,222	15	\$450	Up to \$500
ENERGY STAR Refrigerator (downstream)	Per Product	No	ENERGY STAR, at least 15% more efficient than baseline	\$68	14	\$50	Up to \$75
Ceiling Insulation AVG-Electric Heat (weatherization – downstream)	Per Project	No	The existing R-value cannot exceed R-30. Final R-value must be ≥ R-49, home has electric main source heat. Rebate cannot exceed the cost of the measure.	\$2,401	15	\$500	75% of cost, up to \$500
Ceiling Insulation AVG-Non-Electric Heat (weatherization – downstream)	Per Project	No	The existing R-value cannot exceed R-30. Final R-value must be ≥ R-49, home has central air conditioning. Rebate cannot exceed the cost of the measure.	\$2,401	15	\$200	75% of cost, up to \$300
Basement Wall Insulation AVG (weatherization – downstream)	Per Project	No	Home has electric main source heat or central air conditioning. Basement or crawl space insulation should have either a minimum R-10 continuous insulated sheathing on the interior or exterior of the home, or R-13 cavity insulation at the interior of the crawl space wall in International Energy Conservation Code (“IECC”) Climate Zone 4, and R-15	\$1,870	15	\$500	75% of cost, up to \$500

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
			continuous or R-19 cavity insulation in zones 5 or 6.				
ENERGY STAR Central Air Conditioner (13 SEER/12EER to 16 SEER/12.5EER)	Per Project	No	ENERGY STAR	\$1,037	15	\$300	Up to \$400
ENERGY STAR Central Air Conditioner (14 SEER/12EER to 17.5 SEER/13.5EER)	Per Project	No	ENERGY STAR	\$719	15	\$300	Up to \$500
Variable speed pool pump	Per Project	No	Replace constant speed	\$396	10	\$350	Up to \$350
New Homes-15% or higher better than code-Electric Heat	Per Project	No	Individually metered, must have own heating, < 6 stories, dwellings must occupy 80% or more of occupiable space, 15% or higher better than code	\$1,930	15	\$838	Up to \$4,500
New Homes-15% or higher better than code-Gas Heat	Per Project	No	Individually metered, must have own heating, < 6 stories, dwellings must occupy 80% or more of occupiable space, 15% or higher better than code	\$1,930	15	\$370	Up to \$4,500
In-Home Audit Incentive (Elec Heat + AC)	Per Project	No	Home has electric main source heat and central air conditioning	\$0	0	\$350	Up to \$350
In-Home Audit Incentive (Elec Heat or Central AC)	Per Project	No	Home has electric main source heat or central air conditioning	\$0	0	\$200	Up to \$200
Comprehensive Retrofit Bonus- Tier 1	Per Project	No	Tier 1	\$0	0	\$250	Up to \$250
Comprehensive Retrofit Bonus- Tier 2	Per Project	No	Tier 2	\$0	0	\$350	Up to \$350
Electric Hot Water Kit (Single Family – In-Home Audits)	Per Kit	No	Electric hot water only	\$38	7	\$38	\$38
Gas Hot Water Kit (Single Family – In-Home Audits)	Per Kit	No	Gas hot water only	\$29	6	\$29	\$29
Electric Hot Water Kit (Single Family)	Per Kit	No	Electric hot water only	\$38	7	\$38	\$38
Gas Hot Water Kit (Single Family)	Per Kit	No	Gas hot water only	\$29	6	\$29	\$29
Smart Thermostat (Online Marketplace)	Per Product	No	ENERGY STAR	\$140	11	\$65	Up to \$75
Weatherstrip (Online Marketplace)	Per Project	No	Must be installed on doors, windows, or attic hatches/doors	\$2	15	\$4	Up \$5
Advanced Power Strip (Online Marketplace)	Per Product	No	Tier 1	\$32	5	\$9	Up to \$15
Occupancy Sensor Switch (Online Marketplace)	Per Product	No	Installation of occupancy sensors and/or connected (“smart”) lighting	\$26	10	\$5	Up to \$15
ENERGY STAR Dehumidifier (Online Marketplace)	Per Product	No	ENERGY STAR	\$11	12	\$50	Up to \$25

Section 3 Program and Component Descriptions

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
Electric Hot Water Kit (Single Family – Virtual Assessments)	Per Kit	No	Electric hot water only	\$38	7	\$38	\$38
Gas Hot Water Kit (Single Family – Virtual Assessments)	Per Kit	No	Gas hot water only	\$29	6	\$29	\$29
ENERGY STAR Air Purifier (downstream rebates and online marketplace)	Per Product	No	ENERGY STAR	\$74	9	\$25	N/A
Water Heater Pipe Insulation (online marketplace)	Per Foot	No	≥ R-3	\$4	15	\$5	N/A
Holiday Lights (online marketplace)	Per Product	No	Replace incandescent holiday lights	\$6	10	\$5	N/A
ENERGY STAR Clothes Washers (downstream rebates)	Per Product	No	ENERGY STAR	\$187	11	\$50	N/A
ENERGY STAR Ceiling Fans (downstream rebates)	Per Product	No	ENERGY STAR	\$15	15	\$25	N/A
GSHP DeSuperheaters (midstream)	Per Project	No	Installation on new or existing Ground Source Heat Pump to replace any type of electric water heater	\$1,811	15	\$1,000	N/A
Solar Water Heaters (midstream)	Per Project	No	Existing electric water heater	\$6,655	15	\$1,000	N/A
Water Heater Tank Wrap (online marketplace)	Per Project	No	Installation of R-8 wrap insulation to existing electric water heater with R-24 or less	\$72	7	\$10	N/A
Compact Refrigerators (downstream rebates)	Per Product	No	ENERGY STAR	\$36	14	\$10	N/A
Duct Sealing 50% unvented crawlspace, 30% attic (average)	Per Project	No	Home with electric ducted heating system. Requires duct leakage test by BPI certified trade allies.	\$479	15	\$175	N/A
Duct Sealing & Insulation 50% unvented crawlspace, 30% attic (average)	Per Project	No	Home with electric ducted heating system. Requires duct leakage test by BPI certified trade allies.	\$1,702	15	\$500	N/A
Custom Measures	Per kW	No	Minimum TRC requirement may be implemented as a requirement for projects if necessary to help ensure the program or portfolio TRC is greater than 1.0. Incentive \$500/kW, incentive capped at \$1,000.	N/A	N/A	N/A	N/A
Home Energy Report	Per Project	No	Must be PPL Electric Utilities residential customer	N/A	Varies based on TRM	N/A	N/A

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.

All measures may not be available at all times. PPL Electric Utilities may suspend a measure depending on popularity, pace of the component (savings and costs), free ridership, evaluation requirements, complexity of information required by customer, administrative requirements for the measure, or other reasons. PPL Electric Utilities will review the component continually and may add or adjust available measures, eligibility qualifications, or incentives to achieve savings and cost budgets. It may offer tiered incentives that encourage installation of multiple measures or a more comprehensive whole home or facility approach. PPL Electric Utilities plans to work with other EDCs and stakeholders to offer a consistent mechanism for new home construction delivery.

PPL Electric Utilities will offer comprehensive in-home diagnostic audits throughout Phase IV. The cost of a comprehensive audit may vary depending on the auditor chosen by the customer. Customers will receive a rebate, the amount of which may vary depending on the type of heating and cooling equipment installed in the home.

To the extent that a project is eligible under the new construction offering, the Company will work with interested stakeholders to help ensure that the Act 129 funds allocated for multifamily affordable housing projects are not substituted for funds otherwise provided through state or federal assistance programs.

Deadline for Rebate Applications

The rebate application will list the deadline for its submission. The deadline will not exceed 180 days from the date the measure was installed or purchased. For some measures, PPL Electric Utilities may allow customers to request project preapproval to lock in the stipulated incentive level and guarantee project funding.

Start Date with Key Schedule Milestones

Table 24 lists the estimated key schedule milestones for Energy Efficient Homes. PPL Electric Utilities will lead implementation or provide management oversight of all tasks.

Table 24. Energy Efficient Homes Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
06/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

The EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. PPL Electric Utilities and its EM&V CSP will conduct annual evaluations of each component in compliance with all Pa PUC requirements and the Evaluation Framework. The EM&V CSP will follow all applicable methods in the TRM and the Evaluation Framework to calculate

energy savings and peak demand reduction. For Energy Efficient Homes, PPL Electric Utilities anticipates conducting annual impact and process evaluations (activities vary by year).

Through Energy Efficient Homes, PPL Electric Utilities offers incentives for new home construction, in-home energy audits, and a variety of weatherization and equipment. Each of these requires an evaluation approach specifically tailored to the product.

As part of the savings verification and evaluation, the EM&V CSP will review a sample of participant rebates and Residential CSP records to verify the quantity, efficiency level, and rebate qualifications by measure type. Because the Company offers a variety of equipment and services, the EM&V CSP will stratify the verification sample accordingly, designating a sample size appropriate for each stratum and technology. Overall, the sample size will meet the level of rigor specified in the Evaluation Framework, which will probably be 85% confidence with 15% precision (85/15) at the component level, the same as in Phase III.

Administrative Requirements

The Residential CSP will provide overall administrative and operational management of Energy Efficient Homes. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Participation

Table 25 shows the order of magnitude participation estimates for Energy Efficient Homes. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 25. Pa PUC Table 8-Energy Efficient Homes Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Connected Thermostat-Electric Heat AVG (downstream)	Energy Savings (MWh/year)	672	685	700	713	727	3,497
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	554	565	577	588	600	2,884
Connected Thermostat- CAC AVG (downstream)	Energy Savings (MWh/year)	46	47	48	49	50	239
	Demand Reduction (MW)	0.007	0.008	0.008	0.008	0.008	0.039
	Projected Participation	264	269	275	280	286	1,374
New Homes-Connected Thermostat-Electric Heat (downstream)	Energy Savings (MWh/year)	152	155	158	161	165	792
	Demand Reduction (MW)	0.005	0.006	0.006	0.006	0.006	0.028
	Projected Participation	350	357	364	371	379	1,821
New Homes-Connected Thermostat-CAC (downstream)	Energy Savings (MWh/year)	36	37	37	38	39	187
	Demand Reduction (MW)	0.006	0.006	0.006	0.006	0.006	0.030
	Projected Participation	350	357	364	371	379	1,821
Fuel Switching – Central Heating (downstream) Maximum of 200 units across all customer sectors/programs	Energy Savings (MWh/year)	218	224	224	231	237	1,135
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	34	35	35	36	37	177
Fuel Switching – DHW (downstream) Maximum of 200 units across all customer sectors/programs	Energy Savings (MWh/year)	58	58	61	61	64	301
	Demand Reduction (MW)	0.005	0.005	0.005	0.005	0.005	0.024
	Projected Participation	21	21	22	22	23	109

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
HPWH-AVG	Energy Savings (MWh/year)	722	736	751	766	782	3,757
	Demand Reduction (MW)	0.060	0.061	0.063	0.064	0.065	0.313
	Projected Participation	516	526	537	548	559	2,686
Air Sealing -AVG (weatherization – downstream)	Energy Savings (MWh/year)	15	15	16	16	16	79
	Demand Reduction (MW)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0015
	Projected Participation	16	16	17	17	17	83
ENERGY STAR Dehumidifiers (downstream)	Energy Savings (MWh/year)	320	327	333	340	347	1,667
	Demand Reduction (MW)	0.080	0.082	0.084	0.085	0.087	0.418
	Projected Participation	1,660	1,693	1,727	1,762	1,797	8,639
Ductless Mini-Split Heat Pump (16 SEER/9.0 HSPF) – replacing baseboard/room AC	Energy Savings (MWh/year)	14,867	16,303	16,405	16,405	16,405	80,386
	Demand Reduction (MW)	1.873	2.053	2.066	2.066	2.066	10.125
	Projected Participation	2,900	3,180	3,200	3,200	3,200	15,680
ENERGY STAR Air Source Heat Pump 16 SEER/9.0 HSPF/12.5 EER or Higher	Energy Savings (MWh/year)	677	691	705	-	-	2,073
	Demand Reduction (MW)	0.141	0.144	0.147	-	-	0.432
	Projected Participation	1,144	1,167	1,190	-	-	3,501
ENERGY STAR Air Source Heat Pump 17.5 SEER/9.7 HSPF/EER 13.5 or Higher	Energy Savings (MWh/year)	-	-	-	719	733	1,452
	Demand Reduction (MW)	-	-	-	0.149	0.151	0.300
	Projected Participation	-	-	-	1,214	1,238	2,452
ENERGY STAR Refrigerator (downstream)	Energy Savings (MWh/year)	80	82	84	85	87	418
	Demand Reduction (MW)	0.017	0.017	0.017	0.018	0.018	0.086
	Projected Participation	1,711	1,745	1,780	1,816	1,852	8,904
Ceiling Insulation AVG-Electric Heat (weatherization – downstream)	Energy Savings (MWh/year)	217	222	226	230	235	1,129
	Demand Reduction (MW)	0.042	0.043	0.044	0.045	0.045	0.218
	Projected Participation	232	237	241	246	251	1,207
Ceiling Insulation AVG-Non- Electric Heat (weatherization – downstream)	Energy Savings (MWh/year)	17	17	17	18	18	86
	Demand Reduction (MW)	0.012	0.013	0.013	0.013	0.013	0.065
	Projected Participation	131	134	136	139	142	682
Basement Wall Insulation AVG (weatherization – downstream)	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006
	Projected Participation	4	4	4	4	4	20
ENERGY STAR Central Air Conditioner (13 SEER/12EER to 16 SEER/12.5EER)	Energy Savings (MWh/year)	271	276	282	-	-	829
	Demand Reduction (MW)	0.161	0.164	0.168	-	-	0.493
	Projected Participation	932	951	970	-	-	2,853
ENERGY STAR Central Air Conditioner (14 SEER/12EER to 17.5 SEER/13.5EER)	Energy Savings (MWh/year)	-	-	-	285	290	575
	Demand Reduction (MW)	-	-	-	0.173	0.177	0.350
	Projected Participation	-	-	-	989	1,009	1,998
Variable speed pool pump	Energy Savings (MWh/year)	514	524	534	546	556	2,675
	Demand Reduction (MW)	0.169	0.172	0.176	0.180	0.183	0.880
	Projected Participation	353	360	367	375	382	1,837
New Homes-15% or higher better than code-Electric Heat	Energy Savings (MWh/year)	2,221	2,266	2,311	2,356	2,404	11,558
	Demand Reduction (MW)	0.866	0.884	0.902	0.919	0.938	4.509
	Projected Participation	837	854	871	888	906	4,356
New Homes-15% or higher better than code-Gas Heat	Energy Savings (MWh/year)	600	612	625	637	650	3,124
	Demand Reduction (MW)	0.531	0.541	0.553	0.563	0.574	2.763
	Projected Participation	513	523	534	544	555	2,669
	Energy Savings (MWh/year)	-	-	-	-	-	-

Section 3 Program and Component Descriptions

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
In-Home Audit Incentive (Elec Heat + AC)	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	50	51	52	53	54	260
In-Home Audit Incentive (Elec Heat or Central AC)	Energy Savings (MWh/year)	-	-	-	-	-	-
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	26	26	27	27	28	134
Comprehensive Retrofit Bonus- Tier 1	Energy Savings (MWh/year)	-	-	-	-	-	-
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	75	77	78	80	81	391
Comprehensive Retrofit Bonus- Tier 2	Energy Savings (MWh/year)	-	-	-	-	-	-
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	25	26	26	27	27	131
Electric Hot Water Kit (Single Family – In-Home Audits)	Energy Savings (MWh/year)	8	8	8	8	8	40
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.004
	Projected Participation	50	51	52	53	54	260
Gas Hot Water Kit (Single Family – In-Home Audits)	Energy Savings (MWh/year)	2	2	2	3	3	13
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0012
	Projected Participation	26	27	27	28	28	136
Electric Hot Water Kit (Single Family)	Energy Savings (MWh/year)	576	584	593	602	611	2,966
	Demand Reduction (MW)	0.061	0.062	0.063	0.064	0.065	0.316
	Projected Participation	3,753	3,808	3,864	3,922	3,980	19,327
Gas Hot Water Kit (Single Family)	Energy Savings (MWh/year)	247	251	255	260	264	1,278
	Demand Reduction (MW)	0.021	0.021	0.021	0.022	0.022	0.107
	Projected Participation	2,489	2,529	2,569	2,611	2,653	12,851
Smart Thermostat (Online Marketplace)	Energy Savings (MWh/year)	172	176	179	183	187	897
	Demand Reduction (MW)	0.028	0.028	0.029	0.030	0.030	0.145
	Projected Participation	992	1,012	1,032	1,053	1,074	5,163
Weatherstrip (Online Marketplace)	Energy Savings (MWh/year)	20	22	23	24	24	112
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004
	Projected Participation	580	620	660	680	680	3,220
Advanced Power Strip (Online Marketplace)	Energy Savings (MWh/year)	15	15	15	16	16	77
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.008
	Projected Participation	182	186	189	193	197	947
Occupancy Sensor Switch (Online Marketplace)	Energy Savings (MWh/year)	0	0	1	1	1	2
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	17	17	18	18	18	88
ENERGY STAR Dehumidifier (Online Marketplace)	Energy Savings (MWh/year)	77	77	77	77	77	386
	Demand Reduction (MW)	0.019	0.019	0.019	0.019	0.019	0.097
	Projected Participation	400	400	400	400	400	2,000
Electric Hot Water Kit (Single Family – Virtual Assessments)	Energy Savings (MWh/year)	84	85	87	89	90	435
	Demand Reduction (MW)	0.008	0.008	0.008	0.008	0.009	0.042
	Projected Participation	551	562	573	584	596	2,866
Gas Hot Water Kit (Single Family – Virtual Assessments)	Energy Savings (MWh/year)	10	10	11	11	11	53
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.005
	Projected Participation	110	112	115	117	119	573
	Energy Savings (MWh/year)	56	56	56	56	56	278
	Demand Reduction (MW)	0.006	0.006	0.006	0.006	0.006	0.032

Section 3 Program and Component Descriptions

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
ENERGY STAR Air Purifier (downstream rebates and online marketplace)	Projected Participation	100	100	100	100	100	500
Water Heater Pipe Insulation (online marketplace)	Energy Savings (MWh/year)	0.1	0.1	0.1	0.1	0.1	0.6
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006
	Projected Participation	100	100	100	100	100	500
Holiday Lights (online marketplace)	Energy Savings (MWh/year)	2	2	2	2	2	10
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	100	100	100	100	100	500
ENERGY STAR Clothes Washers (downstream rebates)	Energy Savings (MWh/year)	10	10	10	10	10	52
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	100	100	100	100	100	500
ENERGY STAR Ceiling Fans (downstream rebates)	Energy Savings (MWh/year)	3	3	3	3	3	15
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0011
	Projected Participation	100	100	100	100	100	500
GSHP DeSuperheaters (midstream)	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	2	2	2	2	2	10
Solar Water Heaters (midstream)	Energy Savings (MWh/year)	9	9	9	9	9	47
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	5	5	5	5	5	25
Water Heater Tank Wrap (online marketplace)	Energy Savings (MWh/year)	14	14	14	14	14	68
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.008
	Projected Participation	100	100	100	100	100	500
Compact Refrigerators (downstream rebates)	Energy Savings (MWh/year)	0.3	0.3	0.3	0.3	0.3	1.7
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	10	10	10	10	10	50
Duct Sealing 50% unvented crawlspace, 30% attic (average)	Energy Savings (MWh/year)	8	8	8	8	8	38
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.003
	Projected Participation	15	15	15	15	15	75
Duct Sealing & Insulation 50% unvented crawlspace, 30% attic (average)	Energy Savings (MWh/year)	12	12	12	12	12	59
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.010
	Projected Participation	15	15	15	15	15	75

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

² Total values may not equal the sum of all program year values due to rounding.

Student Energy Efficient Education

Description

PPL Electric Utilities offers energy efficiency kits and education to students and teachers. The component consists of these three channels:

- **Primary Grade Energy Efficiency Education**, in which the Company offers an interactive classroom presentation to students in grades 2-3.

- **Intermediate Grade Energy Efficiency Education**, in which the Company offers an interactive classroom presentation to students in grades 5-7.
- **Secondary Grade Energy Efficiency Education**, in which the Company offers an interactive classroom presentation to students in grades 9-12.

The presentation educates students about energy and conservation topics using hands-on activities. Content is correlated to Pennsylvania Education Academic Standards for the appropriate grade levels and endorsed by the Pennsylvania Department of Education. Students who participate in the presentation receive a take-home energy efficiency kit.

The CSP will offer a poster contest and innovation challenge, which will support the component by giving students an additional opportunity to reflect on what they learned and how they acted on tips provide during the presentations.

PPL Electric Utilities will provide participating teachers with energy efficiency measures, such as smart power strips, to use as instructional aides to educate students about energy efficiency.

Objectives

The objectives of Student Energy Efficient Education are:

- Expand and promote energy efficiency literacy through education outreach components.
- Provide energy efficiency education to students offered through school assemblies and classroom curriculum.
- Confirm energy efficiency education correlates to Pennsylvania Education Academic Standards.
- Provide students and teachers with a take-home kit of energy efficiency measures that can be installed at home.
- Provide teachers with energy efficiency information, lesson plans, activities, training, materials, and support for classroom use.
- Achieve a total energy reduction of approximately 37,429 MWh/year and 3.1 MW¹⁸ gross verified savings.
- Achieve high customer and teacher satisfaction.

Target Market

PPL Electric Utilities targets Student Energy Efficient Education to residential customers throughout its service territory by using schools as an outreach mechanism.

Implementation Strategy

The Residential CSP will deliver the component to schools and have sole responsibility for marketing to and recruiting potential schools and teachers, creating curriculum correlated to Pennsylvania Education

¹⁸ Peak Demand is at generation.

Academic Standards, securing endorsement by the Pennsylvania Department of Education, conducting the energy efficiency presentations, and assembling and shipping the take-home energy efficiency kits. The Residential CSP will also provide support by operating a customer call center, following PPL Electric Utilities’ marketing and branding guidelines, and tracking activities.

PPL Electric Utilities’ energy efficiency staff will provide overall strategic direction and management. The EM&V CSP will provide evaluation services.

Issues, Risks, and Risk Management Strategy

Table 26 presents market risks associated with Student Energy Efficient Education and the strategies PPL Electric Utilities will use to manage each risk.

Table 26. Student EE Education Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Teachers may not have time in their schedules to incorporate the presentations.	Lesson plans are often created far in advance and teachers may not see value in the presentation and, therefore, may not participate.	Residential CSP ensures that the curriculum is correlated to the Pennsylvania Education Academic Standards and fits into teachers’ existing lesson plans.
Customers do not install the energy efficiency measures or complete the survey included in their take-home kits	Although the education component would be completed, measurable energy savings would not be achieved.	<ul style="list-style-type: none"> Residential CSP provides instructions on how to install the devices in the kits. Residential CSP manages a customer call center for participants who have questions about the kits or how to install the measures.
Virtual presentations.	Not as much direct interactions with students, so it may be more difficult to capture their attention.	<ul style="list-style-type: none"> Residential CSP may provide follow-up calls with teachers and email follow-ups with students after the presentation.

Anticipated Costs to Participating Customers

There are no direct costs incurred by customers in this component.

Ramp-up Strategy

Student Energy Efficient Education is an existing, mature offering being carried forward from Phase III. The Residential CSP will develop marketing material to facilitate the transition to Phase IV.

Marketing Strategy

To recruit teachers and schools to participate in Student Energy Efficient Education, the Residential CSP will work with PPL Electric Utilities to secure a list of qualified schools in the PPL Electric Utilities’ service territory. The Residential CSP will issue promotional materials directly to potential participants via email and direct mail.

Eligible Measures and Incentive Strategy

Participants in each component receive a take-home energy efficiency kit that contains a variety of low-cost measures, such as LEDs and water-saving measures. PPL Electric Utilities will review the component continually and may adjust available measures or eligibility qualifications to achieve savings and cost budgets.

Table 27. Pa PUC Table 7-Student EE Education Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)
Bright Kids (Primary School) Kit	Per Kit	No	Meets current TRM requirements	\$20	5	\$20	\$20
Take Action (Middle School) Kit	Per Kit	No	Meets current TRM requirements	\$31	9	\$31	\$31
Innovation (High School) TI Strip Kit	Per Kit	No	Meets current TRM requirements	\$30	9	\$30	\$30

¹ All eligible measures are listed in this table regardless of participation projections.

Deadline for Rebate Applications

PPL Electric Utilities offers Student Energy Efficient Education services at no cost to customers; therefore, there is no rebate application.

Start Date with Key Schedule Milestones

Student Energy Efficient Education is currently offered in Phase III, and PPL Electric Utilities will facilitate the transition to Phase IV. Table 28 lists the estimated key schedule milestones for Student Energy Efficient Education. PPL Electric Utilities will lead implementation or provide management oversight of all tasks.

Table 28. Student Energy Efficient Education Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
06/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

The EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. PPL Electric Utilities and its EM&V CSP will conduct annual evaluations of each component in compliance with all Pa PUC requirements and the Evaluation Framework. As part of this process, the EM&V CSP will review a sample of CSP records and student surveys and will follow all

applicable methods in the TRM and the Evaluation Framework to calculate energy savings and peak demand reduction. For the Student Energy Efficient Education component, PPL Electric Utilities anticipates conducting annual impact and process evaluations (activities vary by year).

Through Student Energy Efficient Education, PPL Electric Utilities offers classroom training for students and delivers energy conservation kits free of charge to participants. Typically, the energy efficiency kits include a paper/online survey for students to complete. As part of the evaluation, the EM&V CSP will analyze data collected from all returned student surveys.

Administrative Requirements

The Residential CSP will provide overall administrative and operational management of Student Energy Efficient Education. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Participation

Table 29 shows order of magnitude participation estimates for Student Energy Efficient Education. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 29. Pa PUC Table 8-Student Energy Efficient Education Projected Participation¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Bright Kids (Primary School) Kit	Energy Savings (MWh/year)	514	525	535	546	557	2,677
	Demand Reduction (MW)	0.042	0.043	0.043	0.044	0.045	0.217
	Projected Participation	5,168	5,271	5,377	5,484	5,594	26,894
Take Action (Middle School) Kit	Energy Savings (MWh/year)	4,839	4,935	5,034	5,135	5,238	25,181
	Demand Reduction (MW)	0.367	0.374	0.382	0.389	0.397	1.909
	Projected Participation	13,899	14,177	14,461	14,750	15,045	72,332
Innovation (High School) TI Strip Kit	Energy Savings (MWh/year)	1,839	1,876	1,914	1,952	1,991	9,571
	Demand Reduction (MW)	0.143	0.145	0.148	0.151	0.154	0.742
	Projected Participation	5,290	5,396	5,504	5,614	5,726	27,530

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

²Total values may not equal the sum of all program year values due to rounding.

3.3 Low-Income Program (2021-2026)

This section summarizes PPL Electric Utilities’ proposed Low-Income Program component (*i.e.*, Low-Income Assessment) and the component’s objectives, target market, implementation strategy, issues, risks and risk management strategy, anticipated costs to participating customers, ramp-up strategy, marketing strategy, eligible measures and incentive strategy, deadline for rebate applications, start date with key schedule milestones, EM&V, administrative requirements, estimated savings and participation, and plans for achieving compliance with the Implementation Order.

Table 30 lists estimated savings and costs by program year. The Low-Income Program budget is 13.4% of the total portfolio budget.¹⁹

Table 30. Pa PUC Table 9 - Low-Income Costs and Benefits by Program Year (\$1000)

Cost Element		PY13	PY14	PY15	PY16	PY17	Phase IV Total ¹
Total Budget (\$000)		\$7,417	\$8,673	\$9,310	\$9,326	\$7,174	\$41,900
Incentives (\$000)	Rebates	-	-	-	-	-	-
	Upstream/Midstream Buydown	-	-	-	-	-	-
	Kits	\$155	\$191	\$209	\$209	\$146	\$910
	Direct Install Materials & Labor	\$4,067	\$4,751	\$5,094	\$5,094	\$3,895	\$22,901
	Incentive Total	\$4,221	\$4,943	\$5,303	\$5,303	\$4,041	\$23,811
Non-Incentives (\$000)	CSP Program Design	-	-	-	-	-	-
	CSP Administrative	\$523	\$539	\$556	\$573	\$589	\$2,781
	CSP Delivery Fees	\$2,203	\$2,721	\$2,980	\$2,980	\$2,073	\$12,958
	CSP Marketing	\$250	\$250	\$250	\$250	\$250	\$1,250
	EDC Administrative	\$220	\$220	\$220	\$220	\$220	\$1,100
	EDC Other	-	-	-	-	-	-
	Non-Incentive Total	\$3,196	\$3,731	\$4,006	\$4,023	\$3,133	\$18,089
Percent Incentives	57%	57%	57%	57%	56%	57%	

¹ Total values may not equal the sum of all program year values due to rounding.

The Low-Income Program is projected not to be cost-effective, with a TRC test ratio of 0.44. Table 31 shows net present value benefits and costs, net benefits, and the overall benefit/cost ratio.

Table 31. Low-Income Program Cost-Effectiveness Results, TRC Test (\$1,000)

NPV Benefits	\$19,144
NPV Costs	\$43,977
Net Benefits	(\$24,833)
Benefit/Cost Ratio	0.44

¹⁹ This percentage represents the program budget without common costs over the total portfolio budget, which includes common costs.

As noted in Section 1.6, PPL Electric Utilities will rely on energy efficiency measures with coincident peak demand reduction potential to achieve its annual and total peak demand reduction goals. PPL Electric Utilities will target end uses to nominate roughly 1 to 20% of eligible PJM peak demand savings from the low-income program over the five-year Plan. PPL Electric Utilities is not aware at this time which measures will be nominated; however, they will likely include cooling and lighting. PPL Electric Utilities will competitively select a qualified third-party vendor to provide technical support in nominating a portion of its peak demand reductions as a capacity resource in PJM's FCM.

Low-Income Assessment

Description

Through Low-Income Assessment, PPL Electric Utilities will offer a broad selection of no-cost energy-saving improvements and education to qualifying low-income customers residing in single-family homes, individually metered multifamily units, and manufactured homes.²⁰ Direct installation of energy efficiency measures for lighting, water aeration, and weatherization will be offered through PPL Electric Utilities' in-home and remote assessment delivery channels. Additionally, PPL Electric Utilities may offer comprehensive measures, such as ductless mini-split heat pumps, heat pump maintenance, heat pump water heaters, and smart thermostats through the in-home assessment delivery channel.

Low-income residents in individually metered multifamily units will be eligible for all measures provided in the Low-Income Assessment, but specific measures may require landlord approval. Common space in multifamily building will be treated separately through PPL Electric Utilities' Non-Residential Program. Multifamily buildings' eligibility requirements are not affected by the number of living units in the buildings. All delivery channels are subject to available funding and must fall within the overall acquisition cost of the program.

Objectives

The objectives of the Low-Income Assessment component are:

- Provide low-income customers with no-cost energy-saving improvements and education to help them reduce their energy and peak demand usage.
- Achieve high customer, preferred partner, and trade ally satisfaction.
- Promote other PPL Electric Utilities energy efficiency program components.
- Provide low-income customers several options for receiving services safely and in consideration of their preferences.

²⁰ Under Low-Income Assessment, individually metered low-income multifamily residences are eligible for the same measures as individually metered single family low-income residences. Individually metered manufactured homes are also eligible for the same measures as any other type of individually metered home receiving services from Low-Income Assessment as long as they meet income guidelines.

- Achieve a total energy reduction of approximately 74,793 MWh/year and 10 MW/year²¹ of gross verified savings.
- Increase the safety of low-income customers’ homes by installing no-cost measures such as smoke and carbon monoxide detectors, which will be coordinated with the Low-Income Usage Reduction Program (“LIURP”) Assessment.

Target Market

Through Low-Income Assessment, PPL Electric Utilities targets low-income customers (renters and owners) living in single-family homes, individually metered multifamily buildings (residential customer class), and manufactured homes. To qualify as low-income, household income must be at or below 150% of the Federal Poverty Income Guidelines (FPIG). Enrollees in PPL Electric Utilities’ OnTrack Program are eligible.²² Tenants must obtain landlord approval for certain measures to participate in the component. The number of units in a multifamily building does not affect the eligibility of its residents to receive energy-saving improvements and education.

Implementation Strategy

The Low-Income CSP will deliver the Low-Income Assessment component and will be responsible for outreach, customer recruitment, assessments, education, and equipment installation. The Low-Income CSP will also support sector-level functions, including operating a customer call center, marketing, and tracking activities. PPL Electric Utilities’ energy efficiency staff will provide overall strategic direction and management. The EM&V CSP will provide evaluation services.

Issues, Risks, and Risk Management Strategy

Table 32 presents market risks associated with Low-Income Assessment and the strategies PPL Electric Utilities will use to manage each risk.

Table 32. Low-Income Assessment Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Homeowner and landlord lack of component awareness.	Low participation	<ul style="list-style-type: none"> • Low-Income CSP markets directly to income-eligible customers and through other partners and trade allies. • Low-Income CSP conducts neighborhood sweeps where few customers have participated in assessments. • Low-Income CSP markets at town hall gatherings and other venues
Difficulty getting landlord approval for participation by low-income tenants.	Low participation among renters	<ul style="list-style-type: none"> • Low-Income CSP markets directly to landlords. • Low-Income CSP seeks joint ventures with equipment suppliers, trade allies, and other organizations to provide additional incentives/discounts (such as financial incentives to eliminate code violations) to remove landlord barriers.

²¹ Peak Demand is at generation.

²² Through its OnTrack Program, PPL Electric Utilities offers reduced monthly payments to assist low-income customers with account balances in arrears.

Component Issue	Risk	Risk Management Strategies
Possible saturation of eligible assessment participants.	Low participation and savings	<ul style="list-style-type: none"> • PPL Electric Utilities strongly encourages that all OnTrack Program enrollees also participate in Low-Income Assessment. • Low-Income CSP installs additional measures for customers who previously participated. • Low-Income CSP reaches out to landlords who previously declined participation.

Anticipated Costs to Participating Customers

There are no direct costs incurred by customers in this component.

Ramp-up Strategy

The Low-Income Assessment is an existing, mature component being carried forward from Phase III. The Low-Income CSP will develop marketing materials and an implementation strategy to facilitate the transition to Phase IV.

Marketing Strategy

PPL Electric Utilities will work with the Low-Income CSP to develop and execute a marketing plan that captures sector-level economies of scale and employs targeted outreach where practical. In addition to the current outreach encouraging OnTrack customers to participate in Low-Income Assessment, the Company will work with the Low-Income CSP to create and target marketing and outreach to eligible low-income customers who are not enrolled in OnTrack. The Company will describe its Low-Income Assessment marketing efforts at its Act 129 EE&C stakeholder meetings and ask stakeholders for feedback and recommendations.

The marketing strategy may include the following:

- Promote the component in PPL Electric Utilities’ publications.
- Provide online access to the component through the Company’s EE&C website.
- Introduce a welcome kit to recruit customers for the Low-Income Assessment component.
- Implement direct outreach, such as neighborhood sweeps, community and town hall events, and door-to-door canvassing, to create awareness about the Low-Income Assessment component; such outreach will involve identifying low-income neighborhoods, multifamily buildings, and manufactured home parks that may benefit from services and canvassing with door hangers.
- Conduct targeted telemarketing and direct mailing to customers participating in the OnTrack Program and Low-Income Home Energy Assistance Program (“LIHEAP”) and to other income-eligible customers.
- Develop partnerships with housing and redevelopment authorities, community action groups, and other social service agencies.
- Recruit multifamily building owners and tenants to implement energy efficiency measures.

Eligible Measures and Incentive Strategy

Table 33 identifies PPL Electric Utilities’ proposed list of measures, minimum eligibility qualifications, and range of incentive levels.

Table 33. Pa PUC Table 7-Low-Income Assessment Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Full Cost (\$/unit)	Estimated Useful Life	Incentive Amount or Incentive Range (\$/unit)
Welcome Kit REA	Per Kit	Yes	Must be current OnTrack customer	\$9	15	\$9
Welcome Kit On-site	Per Kit	Yes	Must be current OnTrack customer	\$9	15	\$9
Water Kit SF REA	Per Kit	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$10	9	\$10
Water Kit MF REA	Per Kit	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$10	9	\$10
Water Kit SF On-site	Per Kit	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$10	9	\$10
Water Kit MF On-site	Per Kit	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$10	9	\$10
Kitchen Aerator SF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$3	10	\$3
Kitchen Aerator MF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$3	10	\$3
Bath Aerator SF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 0.5 gallons per minute	\$2	10	\$2
Bath Aerator MF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 0.5 gallons per minute	\$2	10	\$2
Low Flow Showerhead SF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$7	9	\$7
Low Flow Showerhead MF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$7	9	\$7
Low Flow Showerhead Hand Held SF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$11	9	\$11
Low Flow Showerhead Hand Held MF REA	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$11	9	\$11
LED Night Light REA	Per Product	Yes	Meets current TRM requirements, Replaces incandescent night light	\$2	8	\$2
LED Specialty (Globe/Candelabra) REA	Per Bulb	Yes	Meets current TRM requirements, ENERGY STAR	\$6	15	\$6
LED GSL A-Line (9 Watt or other) REA	Per Bulb	Yes	Meets current TRM requirements, ENERGY STAR	\$6	15	\$6
LED Reflector (Par/BR/R/downlight) REA	Per Bulb	Yes	Meets current TRM requirements, ENERGY STAR	\$6	15	\$6
Smart Strips - Tier 1 REA	Per Product	Yes	Meets current TRM requirement	\$19	5	\$19
Remote assessment & Energy Education REA	Per Project	Yes	Must be PPL Electric Utilities customer regardless of heating fuel	\$70	1	\$70
Carbon Monoxide Detector REA	Per Product	Yes	Must be recommended by auditor	\$20	1	\$20
Smoke Alarm REA	Per Product	Yes	Must be recommended by auditor	\$5	1	\$5
Kitchen Aerator SF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$4	10	\$4

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Full Cost (\$/unit)	Estimated Useful Life	Incentive Amount or Incentive Range (\$/unit)
Kitchen Aerator MF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$4	10	\$4
Bath Aerator SF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 0.5 gallons per minute	\$3	10	\$3
Bath Aerator MF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 0.5 gallons per minute	\$3	10	\$3
Water Heater Pipe Insulation On-site	Per Foot	Yes	Electric hot water only	\$2	13	\$2
Low Flow Showerhead SF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$9	9	\$9
Low Flow Showerhead MF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$9	9	\$9
Low Flow Showerhead Hand Held SF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$15	9	\$15
Low Flow Showerhead Hand Held MF On-site	Per Product	Yes	Electric hot water only, maximum flow rate is 1.5 gallons per minute	\$15	9	\$15
Thermostatic Shower Restriction Valve SF On-site	Per Product	Yes	Electric hot water only, Meets current TRM requirements	\$26	15	\$26
Thermostatic Shower Restriction Valve MF On-site	Per Product	Yes	Electric hot water only, Meets current TRM requirements	\$26	15	\$26
Water Heater Temperature Setback On-site	Per Product	Yes	Electric hot water only, Meets current TRM requirements	\$10	2	\$10
Heat Pump Water Heater Replacement On-site	Per Project	Yes	Electric hot water only, ENERGY STAR	\$2,768	10	\$2,768
Furnace Whistle On-site	Per Product	Yes	Meets current TRM requirements	\$4	5	\$4
LED Night Light On-site	Per Product	Yes	Meets current TRM requirements, Replaces incandescent night light	\$3	8	\$3
LED Specialty (Globe/Candelabra) On-site	Per Bulb	Yes	Meets current TRM requirements, ENERGY STAR	\$8	15	\$8
LED A-Line (9 Watt or other) On-site	Per Bulb	Yes	Meets current TRM requirements, ENERGY STAR	\$8	15	\$8
LED Reflector (Par/BR/R/downlight) On-site	Per Bulb	Yes	Meets current TRM requirements, ENERGY STAR	\$8	15	\$8
Removal/Disposal of Extra Refrigeration Unit On-site	Per Product	Yes	Existing, working refrigerator or freezer 10-30 cubic feet in size, unit is primary or secondary unit	\$50	5	\$50
Recycle and Replace Freezer On-site	Per Product	Yes	Existing, working refrigerator or freezer 10-30 cubic feet in size, unit is primary or secondary unit	\$696	5	\$696
Smart Strips - Tier 1 On-site	Per Product	Yes	Meets current TRM requirement	\$25	5	\$25
Carbon Monoxide Detector On-site	Per Product	Yes	Must be recommended by auditor	\$20	1	\$20
Smoke Alarm On-site	Per Product	Yes	Must be recommended by auditor	\$5	1	\$5

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Full Cost (\$/unit)	Estimated Useful Life	Incentive Amount or Incentive Range (\$/unit)
Smart Thermostat Heat Pump On-site	Per Product	Yes	ENERGY STAR	\$320	11	\$320
Smart Thermostat Electric Furnace On-site	Per Product	Yes	ENERGY STAR	\$320	11	\$320
Heat Pump Maintenance On-site	Per Product	Yes	Repair or replacement, Meets current TRM requirements	\$250	3	\$250
On-site Assessment & Energy Education On-site	Per Product	Yes	Must be PPL Electric Utilities customer regardless of heating fuel	\$100	1	\$100
Ductless Mini-split Heat Pumps On-site	Per Product	Yes	Repair or replacement, Meets current TRM requirements. ENERGY STAR	Up to \$8,000	15	Up to \$8,000
Water Heater Pipe Insulation REA	Per Foot	Yes	Electric hot water only	N/A	N/A	N/A
Thermostatic Shower Restriction Valve SF REA	Per Product	Yes	Electric hot water only, Meets current TRM requirements	N/A	N/A	N/A
Thermostatic Shower Restriction Valve MF REA	Per Product	Yes	Electric hot water only, Meets current TRM requirements	N/A	N/A	N/A
Furnace Whistle REA	Per Product	Yes	Meets current TRM requirements	N/A	N/A	N/A
Recycle and Replace Refrigerator REA	Per Product	Yes	Existing, working refrigerator or freezer 10-30 cubic feet in size, unit is primary or secondary unit	N/A	N/A	N/A
Removal/Disposal of Extra Refrigeration Unit REA	Per Product	Yes	Existing, working refrigerator or freezer 10-30 cubic feet in size, unit is primary or secondary unit	N/A	N/A	N/A
Recycle and Replace Freezer REA	Per Product	Yes	Existing, working refrigerator or freezer 10-30 cubic feet in size, unit is primary or secondary unit	N/A	N/A	N/A
Smart Strips - Tier 2 REA	Per Product	Yes	Meets current TRM requirement	N/A	N/A	N/A
ES Dehumidifier REA	Per Product	Yes	ENERGY STAR	N/A	N/A	N/A
Battery Replaced in Existing Smoke Alarm REA	Per Product	Yes	As recommended by auditor	N/A	N/A	N/A
Recycle and Replace Refrigerator On-site	Per Product	Yes	Existing, working refrigerator or freezer 10-30 cubic feet in size, unit is primary or secondary unit	N/A	N/A	N/A
Smart Strips - Tier 2 On-site	Per Product	Yes	Meets current TRM requirement	N/A	N/A	N/A
Energy Star Dehumidifier On-site	Per Product	Yes	ENERGY STAR	N/A	N/A	N/A
Battery Replaced in Existing Smoke Alarm On-site	Per Product	Yes	As recommended by auditor	N/A	N/A	N/A

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.

PPL Electric Utilities and the Low-Income CSP will work with stakeholders, preferred partners, and trade allies to create partnerships that can take advantage of additional incentives or cost savings for low-income customers.

All measures may not be available at all times. PPL Electric Utilities will review the component continually and may adjust available measures or eligibility qualifications to achieve savings and cost budgets. PPL Electric Utilities will coordinate Low-Income Assessment with its LIURP Assessment to maximize the effectiveness of measures and services provided to participants.

If a low-income home is eligible for full cost treatment,²³ the Company will install eligible measures through its LIURP Assessment or Low-Income Assessment budget, provided that the following conditions are all met:

- The customer receives landlord approval, as appropriate.
- The customer has installed electric heat in at least 50% of the home.
- The customer's home did not previously receive full cost services through the Low-Income Winter Relief Assistance Program (WRAP) in Phase III.
- The customer's home has no health or safety concerns that prevent the installation of full cost measures.
- The cost of the full cost measures can be accommodated in the LIURP Assessment or Low-Income Assessment budget.

Some measures provided in a home will be covered by Low-Income Assessment and others by LIURP Assessment. PPL Electric Utilities intends to increase the coordination and provide additional efficiencies between the Low-Income Assessment and LIURP Assessment, including:

- Single source for coordinated marketing campaigns.
- Reduced customer acquisition cost.
- Integrated intake and customer eligibility screening.
- Additional LIURP pre-screening opportunities for enhanced delivery of the program.
- Streamlined administrative and management processes.
- Consistent QA/QC procedures.

Potential LIURP Assessment measures will be identified during the Low-Income Assessment. If eligibility is determined, a Personal Energy Guide will refer the customer to a Preferred Partner for the installation of the LIURP measures.²⁴

The Low-Income Assessment will provide baseload measures for LIURP Assessment customers whose income is less than 150% of the FPIG, allowing more of the LIURP budget to focus on comprehensive

²³ Full cost treatment may include weatherization and other measures outside scope of traditional assessments.

²⁴ See page 127 for Preferred Partner definition.

measures. Baseload measures for customers whose income is between 150% and 200% of the FPIG will be funded through the LIURP budget.

Deadline for Rebate Applications

PPL Electric Utilities offers Low-Income Assessment services at no cost to customers; therefore, there is no rebate application.

Start Date with Key Schedule Milestones

Table 34 lists the estimated key schedule milestones for Low-Income Assessment. PPL Electric Utilities staff will lead implementation or provide management oversight of all tasks.

Table 34. Low-Income Assessment Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
06/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

The EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. The EM&V CSP will follow all applicable methods in the TRM to calculate energy savings and peak demand reduction. PPL Electric Utilities anticipates conducting annual impact evaluations and conducting process evaluations at least once during Phase IV.

The EM&V CSP will review a sample of participant records to verify the quantity, efficiency level, and qualification based on measure type and job type. If a home receives measures from Low-Income Assessment and LIURP Assessment, the Evaluation Plan will describe how their savings will be allocated.

Administrative Requirements

The Low-Income CSP will provide overall administrative and operational management of Low-Income Assessment. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Participation

Table 35 shows the order of magnitude participation estimates for Low-Income Assessment. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 35. Pa PUC Table 8-Low-Income Assessment Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Welcome Kit REA	Energy Savings (MWh/year)	254	314	344	344	239	1,495

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Demand Reduction (MW)	0.112	0.138	0.151	0.151	0.105	0.658
	Projected Participation	11,900	14,700	16,100	16,100	11,200	70,000
Welcome Kit On-site	Energy Savings (MWh/year)	109	135	147	147	103	641
	Demand Reduction (MW)	0.048	0.059	0.065	0.065	0.045	0.282
	Projected Participation	5,100	6,300	6,900	6,900	4,800	30,000
Water Kit SF REA	Energy Savings (MWh/year)	18	22	25	25	17	107
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.011
	Projected Participation	114	141	154	154	107	670
Water Kit MF REA	Energy Savings (MWh/year)	1	1	1	1	1	5
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005
	Projected Participation	6	7	8	8	6	35
Water Kit SF On-site	Energy Savings (MWh/year)	8	10	11	11	7	46
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.005
	Projected Participation	49	60	66	66	46	287
Water Kit MF On-site	Energy Savings (MWh/year)	0	0	1	1	0	2
	Demand Reduction (MW)	0.000	0.000	0.000	0.000	0.000	0.000
	Projected Participation	3	3	3	3	2	15
Kitchen Aerator SF REA	Energy Savings (MWh/year)	608	751	823	823	572	3,578
	Demand Reduction (MW)	0.082	0.102	0.111	0.111	0.077	0.484
	Projected Participation	3,426	4,232	4,635	4,635	3,224	20,151
Kitchen Aerator MF REA	Energy Savings (MWh/year)	24	30	32	32	23	141
	Demand Reduction (MW)	0.003	0.004	0.004	0.004	0.003	0.019
	Projected Participation	180	223	244	244	170	1,061
Bath Aerator SF REA	Energy Savings (MWh/year)	410	506	555	555	386	2,411
	Demand Reduction (MW)	0.056	0.069	0.075	0.075	0.052	0.327
	Projected Participation	5,375	6,639	7,272	7,272	5,059	31,616
Bath Aerator MF REA	Energy Savings (MWh/year)	27	33	36	36	25	158
	Demand Reduction (MW)	0.004	0.005	0.005	0.005	0.003	0.021
	Projected Participation	283	349	383	383	266	1,664
Low Flow Showerhead SF REA	Energy Savings (MWh/year)	228	281	308	308	214	1,338
	Demand Reduction (MW)	0.018	0.023	0.025	0.025	0.017	0.108
	Projected Participation	788	973	1,065	1,065	741	4,632
Low Flow Showerhead MF REA	Energy Savings (MWh/year)	12	15	16	16	11	70

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	41	51	56	56	39	244
Low Flow Showerhead Hand Held SF REA	Energy Savings (MWh/year)	796	984	1,077	1,077	749	4,684
	Demand Reduction (MW)	0.064	0.080	0.087	0.087	0.061	0.379
	Projected Participation	2,756	3,405	3,729	3,729	2,594	16,213
Low Flow Showerhead Hand Held MF REA	Energy Savings (MWh/year)	41	51	56	56	39	244
	Demand Reduction (MW)	0.003	0.004	0.005	0.005	0.003	0.020
	Projected Participation	145	179	196	196	137	853
LED Night Light REA	Energy Savings (MWh/year)	228	281	308	308	214	1,340
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	9,594	11,852	12,981	12,981	9,030	56,438
LED Specialty (Globe/Candelabra) REA	Energy Savings (MWh/year)	717	886	970	970	675	4,219
	Demand Reduction (MW)	0.099	0.122	0.134	0.134	0.093	0.583
	Projected Participation	26,864	33,185	36,346	36,346	25,284	158,025
LED GSL A-Line (9 Watt or other) REA	Energy Savings (MWh/year)	3,361	4,152	4,547	4,547	3,163	19,770
	Demand Reduction (MW)	0.481	0.594	0.650	0.650	0.453	2.828
	Projected Participation	92,106	113,778	124,614	124,614	86,688	541,800
LED Reflector (Par/BR/R/downlight) REA	Energy Savings (MWh/year)	157	194	213	213	148	924
	Demand Reduction (MW)	0.022	0.027	0.030	0.030	0.021	0.130
	Projected Participation	3,838	4,741	5,192	5,192	3,612	22,575
Smart Strips - Tier 1 REA	Energy Savings (MWh/year)	1,417	1,754	1,923	1,923	1,332	8,350
	Demand Reduction (MW)	0.143	0.177	0.194	0.194	0.135	0.844
	Projected Participation	15,919	19,711	21,607	21,607	14,970	93,815
Remote assessment & Energy Education REA	Energy Savings (MWh/year)	608	751	823	823	572	3,576
	Demand Reduction (MW)	0.003	0.004	0.005	0.005	0.003	0.020
	Projected Participation	7,676	9,482	10,385	10,385	7,224	45,150
Carbon Monoxide Detector REA	Energy Savings (MWh/year)	-	-	-	-	-	-
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	724	894	979	979	673	4,249
Smoke Alarm REA	Energy Savings (MWh/year)	-	-	-	-	-	-
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	5,757	7,111	7,788	7,788	5,418	33,863
Kitchen Aerator SF On-site	Energy Savings (MWh/year)	270	333	365	365	254	1,586

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Demand Reduction (MW)	0.036	0.045	0.049	0.049	0.034	0.215
	Projected Participation	1,519	1,876	2,055	2,055	1,429	8,934
Kitchen Aerator MF On-site	Energy Savings (MWh/year)	11	13	14	14	10	62
	Demand Reduction (MW)	0.001	0.002	0.002	0.002	0.001	0.008
	Projected Participation	80	99	108	108	75	470
Bath Aerator SF On-site	Energy Savings (MWh/year)	174	215	235	235	164	1,022
	Demand Reduction (MW)	0.024	0.029	0.032	0.032	0.022	0.138
	Projected Participation	2,278	2,814	3,082	3,082	2,144	13,401
Bath Aerator MF On-site	Energy Savings (MWh/year)	11	14	15	15	11	67
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.001	0.009
	Projected Participation	120	148	162	162	113	705
Water Heater Pipe Insulation On-site	Energy Savings (MWh/year)	12	14	16	16	11	68
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.005
	Projected Participation	1,480	1,829	2,003	2,003	1,393	8,708
Low Flow Showerhead SF On-site	Energy Savings (MWh/year)	98	120	132	132	92	574
	Demand Reduction (MW)	0.008	0.010	0.011	0.011	0.007	0.046
	Projected Participation	338	417	457	457	318	1,985
Low Flow Showerhead MF On-site	Energy Savings (MWh/year)	5	6	7	7	5	30
	Demand Reduction (MW)	0.000	0.001	0.001	0.001	0.000	0.002
	Projected Participation	18	22	24	24	17	104
Low Flow Showerhead Hand Held SF On-site	Energy Savings (MWh/year)	341	422	462	462	321	2,007
	Demand Reduction (MW)	0.028	0.034	0.037	0.037	0.026	0.163
	Projected Participation	1,181	1,459	1,598	1,598	1,112	6,949
Low Flow Showerhead Hand Held MF On-site	Energy Savings (MWh/year)	18	22	24	24	17	105
	Demand Reduction (MW)	0.001	0.002	0.002	0.002	0.001	0.008
	Projected Participation	62	77	84	84	59	366
Thermostatic Shower Restriction Valve SF On-site	Energy Savings (MWh/year)	14	17	19	19	13	83
	Demand Reduction (MW)	0.001	0.001	0.002	0.002	0.001	0.007
	Projected Participation	243	300	329	329	229	1,429
Thermostatic Shower Restriction Valve MF On-site	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004
	Projected Participation	13	16	17	17	12	75
	Energy Savings (MWh/year)	62	77	84	84	58	365

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Water Heater Temperature Setback On-site	Demand Reduction (MW)	0.005	0.006	0.007	0.007	0.005	0.030
	Projected Participation	622	768	841	841	585	3,657
Heat Pump Water Heater Replacement On-site	Energy Savings (MWh/year)	136	169	185	185	128	803
	Demand Reduction (MW)	0.007	0.009	0.010	0.010	0.007	0.043
	Projected Participation	75	92	101	101	70	439
Furnace Whistle On-site	Energy Savings (MWh/year)	1	2	2	2	1	8
	Demand Reduction (MW)	0.0003	0.0004	0.0004	0.0004	0.0003	0.0017
	Projected Participation	107	132	145	145	101	629
LED Night Light On-site	Energy Savings (MWh/year)	98	121	132	132	92	574
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	4,112	5,079	5,563	5,563	3,870	24,188
LED Specialty (Globe/Candelabra) On-site	Energy Savings (MWh/year)	307	380	416	416	289	1,808
	Demand Reduction (MW)	0.042	0.052	0.057	0.057	0.040	0.250
	Projected Participation	11,513	14,222	15,577	15,577	10,836	67,725
LED A-Line (9 Watt or other) On-site	Energy Savings (MWh/year)	1,200	1,483	1,624	1,624	1,130	7,061
	Demand Reduction (MW)	0.172	0.212	0.232	0.232	0.162	1.010
	Projected Participation	32,895	40,635	44,505	44,505	30,960	193,500
LED Reflector (Par/BR/R/downlight) On-site	Energy Savings (MWh/year)	67	83	91	91	63	396
	Demand Reduction (MW)	0.009	0.012	0.013	0.013	0.009	0.056
	Projected Participation	1,645	2,032	2,225	2,225	1,548	9,675
Removal/Disposal of Extra Refrigeration Unit On-site	Energy Savings (MWh/year)	1	1	1	1	1	5
	Demand Reduction (MW)	0.0001	0.0002	0.0002	0.0002	0.0001	0.0008
	Projected Participation	1	1	1	1	1	6
Recycle and Replace Freezer On-site	Energy Savings (MWh/year)	8	10	10	10	7	45
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.004
	Projected Participation	16	20	22	22	15	97
Smart Strips - Tier 1 On-site	Energy Savings (MWh/year)	534	660	723	723	503	3,142
	Demand Reduction (MW)	0.054	0.067	0.073	0.073	0.051	0.318
	Projected Participation	6,002	7,415	8,121	8,121	5,648	35,307
Carbon Monoxide Detector On-site	Energy Savings (MWh/year)	-	-	-	-	-	-
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	313	386	422	422	295	1,838
Smoke Alarm On-site	Energy Savings (MWh/year)	-	-	-	-	-	-

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	2,467	3,048	3,338	3,338	2,322	14,513
Smart Thermostat Heat Pump On-site	Energy Savings (MWh/year)	13	16	17	17	12	75
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	22	27	30	30	21	129
Smart Thermostat Electric Furnace On-site	Energy Savings (MWh/year)	18	22	24	24	17	104
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	12	15	16	16	11	71
Heat Pump Maintenance On-site	Energy Savings (MWh/year)	9	12	13	13	9	55
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.001	0.009
	Projected Participation	43	54	59	59	41	255
On-site Assessment & Energy Education On-site	Energy Savings (MWh/year)	261	322	353	353	245	1,533
	Demand Reduction (MW)	0.001	0.002	0.002	0.002	0.001	0.009
	Projected Participation	3,290	4,064	4,451	4,451	3,096	19,350
Ductless Mini-split Heat Pumps On-site	Energy Savings (MWh/year)	19	23	25	25	18	110
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.010
	Projected Participation	9	11	12	12	8	50

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

² Total values may not equal the sum of all program year values due to rounding.

Plans for Achieving Compliance with the Implementation Order

PPL Electric Utilities designed its EE&C Plan to achieve its low-income targets with Phase IV transactions (projects that are implemented during Phase IV) through an income-qualified component only, the Low-Income Assessment.

3.4 Non-Residential Program (2021-2026)

PPL Electric Utilities’ proposed Non-Residential Program will be offered to all large C&I and small C&I customers, including government and educational institutions and master metered low-income multifamily buildings. The following sections describe the two components in PPL Electric Utilities’ proposed Non-Residential Program:

- Efficient Equipment (Prescriptive)
- Custom

The component sections below provide the component description; objectives; target market; implementation strategy; issues, risks, and risk management strategy; anticipated costs to participating customers; ramp-up strategy; marketing strategy; eligible measures and incentive strategy; deadline for

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rebate applications; start date with key schedule milestones; EM&V; administrative requirements; and estimated savings and participation. Please note that participation levels, savings, costs, and incentive ranges are estimates as directed by the Pa PUC EE&C Plan Template.

Table 36 and Table 37 list estimated savings and costs by program year and in total for the Non-Residential Program (large C&I and small C&I, respectively). The Non-Residential Large C&I budget is 27.5% of the total portfolio budget, and the Non-Residential Small C&I budget is 24.6% of the total portfolio budget.²⁵

Table 36. Pa PUC Table 9 - Large C&I Costs and Benefits by Program Year (\$1000)

Cost Element		PY13	PY14	PY15	PY16	PY17	Phase IV Total ¹
Total Budget (\$000)		\$16,696	\$17,413	\$17,456	\$17,180	\$17,162	\$85,906
Incentives (\$000)	Rebates	\$10,733	\$11,191	\$11,189	\$10,993	\$10,955	\$55,060
	Upstream/Midstream Buydown	\$537	\$552	\$533	\$507	\$501	\$2,630
	Kits	-	-	-	-	-	-
	Direct Install Materials & Labor	-	-	-	-	-	-
	Incentive Total	\$11,270	\$11,742	\$11,722	\$11,500	\$11,456	\$57,690
Non-Incentives (\$000)	CSP Program Design	\$101	-	-	-	-	\$101
	CSP Administrative	\$769	\$849	\$885	\$906	\$934	\$4,343
	CSP Delivery Fees	\$4,032	\$4,254	\$4,262	\$4,176	\$4,159	\$20,884
	CSP Marketing	\$414	\$457	\$477	\$488	\$503	\$2,339
	EDC Administrative	\$110	\$110	\$110	\$110	\$110	\$550
	EDC Other	-	-	-	-	-	-
	Non-Incentive Total	\$5,426	\$5,671	\$5,734	\$5,680	\$5,706	\$28,216
Percent Incentives		68%	67%	67%	67%	67%	67%

¹ Total values may not equal the sum of all program year values due to rounding.

Table 37. Pa PUC Table 9 - Small C&I Costs and Benefits by Program Year (\$1000)

Cost Element		PY13	PY14	PY15	PY16	PY17	Phase IV Total ¹
Total Budget (\$000)		\$14,980	\$15,662	\$15,624	\$15,211	\$15,362	\$76,838
Incentives (\$000)	Rebates	\$8,731	\$9,181	\$9,168	\$8,923	\$9,022	\$45,025
	Upstream/Midstream Buydown	\$1,461	\$1,483	\$1,445	\$1,393	\$1,370	\$7,152
	Kits	-	-	-	-	-	-
	Direct Install Materials & Labor	\$150	\$178	\$176	\$174	\$167	\$845
	Incentive Total	\$10,342	\$10,842	\$10,789	\$10,490	\$10,560	\$53,022
	CSP Program Design	\$129	-	-	-	-	\$129

²⁵ This percentage represents the program budget without common costs over the total portfolio budget, which includes common costs.

Non-Incentives (\$000)	CSP Administrative	\$702	\$755	\$767	\$768	\$786	\$3,778
	CSP Delivery Fees	\$3,319	\$3,548	\$3,546	\$3,430	\$3,482	\$17,325
	CSP Marketing	\$378	\$407	\$413	\$413	\$423	\$2,034
	EDC Administrative	\$110	\$110	\$110	\$110	\$110	\$550
	EDC Other	-	-	-	-	-	-
	Non-Incentive Total	\$4,638	\$4,820	\$4,835	\$4,721	\$4,802	\$23,816
Percent Incentives		69%	69%	69%	69%	69%	69%

¹ Total values may not equal the sum of all program year values due to rounding.

Table 38 and Table 39 show net present value benefits and costs, net benefits, and the overall benefit/cost ratio for the large C&I and small C&I sectors, respectively.

Table 38. Large C&I Cost-Effectiveness Results, TRC Test (\$1,000)

NPV Benefits	\$383,384
NPV Costs	\$369,257
Net Benefits	\$14,127
Benefit/Cost Ratio	1.04

Table 39. Small C&I Cost-Effectiveness Results, TRC Test (\$1,000)

NPV Benefits	\$354,590
NPV Costs	\$226,867
Net Benefits	\$127,722
Benefit/Cost Ratio	1.56

As noted in Section 1.6, PPL Electric Utilities will rely on energy efficiency measures with coincident peak demand reduction potential to achieve its annual and total peak demand reduction goals. PPL Electric Utilities will target end uses to nominate roughly 1% to 20% of eligible PJM peak demand savings from the Non-Residential Program over the five-year Plan. PPL Electric Utilities is not aware at this time which measures will be nominated; however, they will likely include cooling and lighting. PPL Electric Utilities will competitively select a qualified third-party vendor to provide technical support in nominating a portion of its peak demand reductions as a capacity resource in PJM’s FCM.

Efficient Equipment Component

The Efficient Equipment component is the same for both large C&I and small C&I customers unless noted otherwise.

Description

Through the Efficient Equipment component, PPL Electric Utilities promotes the purchase and installation of a wide range of high-efficiency measures, including lighting, HVAC, refrigeration, motors/drives, commercial kitchen equipment, agricultural equipment, equipment controls, and new construction projects. The Company provides customers financial incentives based on the measure

installed and savings achieved, which offset the higher purchase costs of energy efficient and peak demand-saving equipment.

The component has four delivery channels:

- **Downstream rebates.** In Phase IV, PPL Electric Utilities will continue to offer rebate submissions, similar to the downstream channel successfully used in Phase III. Customers, contractors, or trade allies will submit applications for review and validation by the Non-Residential CSP. The CSP will review and validate all submitted applications and eligible projects will be processed and incentives paid upon project completion and final savings calculations.
- **Direct discount.** PPL Electric Utilities will implement the direct discount delivery channel to engage small C&I customers. This approach is supported by a network of qualified contractors and higher incentives that motivate them to complete projects that would otherwise not receive their attention. The Non-Residential CSP helps the contractor orchestrate the project from beginning to end on behalf of the customer. Small C&I customers benefit by having an expert identify the applicable measures, manage the project, and apply for and secure incentives to offset the upfront cost of the project. The amount of the incentive appears on the project invoice, and the customer is responsible for the remaining project cost. Once the project is complete and the application is updated, the Non-Residential CSP commences measurement and verification. The CSP then reimburses the contractor with a check for the incentive.
- **Direct install.** In Phase IV, PPL Electric Utilities will build on the successful direct install offering from Phase III. The Non-Residential CSP will target hard-to-reach small C&I customers and provide a no-cost assessment to identify retrofit measures and operational improvements to lower energy consumption and costs and to install energy efficiency measures. After the assessment, the Non-Residential CSP will send customers an assessment report with additional recommendations to support their overall energy efficiency and peak demand needs and goals and recommendations for qualified trade allies with whom they can work.
- **Midstream.** PPL Electric Utilities will continue using a midstream delivery channel to help customers choose and procure certain high-efficiency products more quickly and easily than through typical downstream methods. In the midstream approach, trade allies and customers may purchase high-efficiency products listed by ENERGY STAR or DesignLights Consortium (“DLC”) directly from participating and qualified midstream distributors and receive an immediate rebate at the point of purchase. This approach has proven to raise customer and trade ally satisfaction; reduce administrative expenses; increase the volume of installed, high-efficiency lighting and socket upgrades, particularly for customers implementing routine projects; and lower the number of contractors and customers who use high-efficiency lighting products but fail to submit program applications.

The Non-Residential CSP will manage and coordinate the Efficient Equipment component, maintain a call and rebate processing center, recruit and educate trade allies, and conduct marketing to achieve the desired participation and encourage customers to take a whole-building approach or implement multiple measures.

Objectives

The objectives of the Efficient Equipment component are:

- Provide energy and peak demand-savings opportunities and incentives to qualified customers.
- Increase the market penetration of high-efficiency technologies and building systems for customers by offering incentives for high-efficiency and ENERGY STAR-rated appliances, lighting equipment, and HVAC systems.
- Increase customer awareness of the features and benefits of energy efficient equipment.
- Support emerging technologies and nontypical efficiency solutions in cost-effective applications.
- Engage trade allies to stock, promote, and provide high-efficiency technology options to customers.
- Promote other PPL Electric Utilities energy efficiency program components.
- Collect energy, peak demand, and operating data from customers, as required to confirm customer and measure eligibility and to determine energy and peak demand savings and cost-effectiveness.
- Achieve a total energy reduction of approximately 665,361 MWh/year and 108 MW²⁶ gross verified savings for large C&I and small C&I customers, or business types.

Implementation Strategy

The Non-Residential CSP will deliver the Efficient Equipment component promoting the various energy efficiency options available to the non-residential customer segment with a range of marketing and outreach tactics. The Efficient Equipment component relies on projects being initiated by customers, trade allies, distributors, and the Non-Residential CSP. The Non-Residential CSP will build on trade ally and distributor relationships to co-market energy efficient equipment and the value of participation.

Key steps include the following:

- Educate customers on energy efficiency opportunities and direct them to the appropriate path through marketing activities, the website, or direct contact with equipment distributors or equipment installation contractors/trade allies.
- Have customers complete applications or work with customers, equipment/appliance retailers, midstream distributors, and installation contractors to complete program applications.
- Ensure customers/contractors submit the required documentation for processing.
- Review pending and completed project documentation to verify applicant is a PPL Electric Utilities customer and the completed project and installed equipment meet program eligibility criteria.

²⁶ Peak Demand is at generation.

- When possible, work with customers to confirm project preapproval before ordering energy efficiency equipment.
- Recruit and develop an effective trade ally network.
- Process applications and issue rebates for qualified projects/equipment.
- Verify completed equipment/appliance installation for a sample of participants to confirm program integrity as part of M&V.

Issues, Risks, and Risk Management Strategy

Table 40 presents market risks associated with the Efficient Equipment component and the strategies that PPL Electric Utilities will use to manage each risk.

Table 40. Efficient Equipment Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Customer or building owner does not prioritize energy efficiency.	<ul style="list-style-type: none"> • Decision-makers choose to install cheaper, less efficient equipment with shorter payback/internal rate of return (“IRR”), resulting in lower savings. • Owners are not informed about how their facility uses energy. • Existing debt may limit funds to purchase new efficient equipment. • Customers place a priority on fluctuating commodity prices. 	<ul style="list-style-type: none"> • PPL Electric Utilities offers incentives to reduce payback and IRR for business owners. • Non-Residential CSP offers planning assistance to enhance energy savings. • Non-Residential CSP educates customers about the long-term benefits of energy efficiency, available incentives, and other components.
Customers typically replace equipment only upon failure.	<ul style="list-style-type: none"> • Customers see no need to replace functioning equipment. • Customers are not informed about the most efficient equipment available when the need to replace it is immediate. Some efficient equipment may have a longer delivery time that would affect customer operations. 	<ul style="list-style-type: none"> • Non-Residential CSP educates trade allies and customers about available energy efficient choices before equipment fails and encourages businesses to plan for equipment replacement. • PPL Electric Utilities provides incentives for trade allies to stock, promote, and install efficient measures.
Customers are unaware of the benefits of installing and properly maintaining energy efficient equipment.	<ul style="list-style-type: none"> • Customers do not properly maintain equipment, and savings benefits erode over time. 	<ul style="list-style-type: none"> • Non-Residential CSP promotes the importance and value of equipment maintenance and training.

Anticipated Costs to Participating Customers

Costs incurred by customers participating in Efficient Equipment will vary by the specific type of efficient equipment installed.

Ramp-Up Strategy

Efficient Equipment component is an existing, mature offering being carried forward from Phase III. The Non-Residential CSP will develop marketing material to facilitate the transition to Phase IV. The Non-Residential CSP has developed a transitional strategy to bridge incentives for customers whose participation in the program spans Phase III and Phase IV.

PPL Electric Utilities expects to implement the following transition plan between Phase III and Phase IV:

- Projects on the Phase III waitlist will receive comparable incentives if completed and installed early in Phase IV. Comparable is defined as the Phase III rebate, up to \$0.05/annual kWh saved and subject to Phase III per project or per customer incentive caps. Projects must be completed by August 31, 2021, for most measures. PPL Electric Utilities will consider exceptions to that deadline on a case-by-case basis, depending on the project details.
- Projects approved (funds reserved) in Phase III that are installed (placed in service) in Phase IV may be eligible for the approved Phase III rebate and will be accounted for as Phase IV projects.

Marketing Strategy

PPL Electric Utilities will work with the Non-Residential CSP to develop and execute a marketing plan that captures sector-level economies of scale and employs targeted outreach where practical. The marketing strategy may include the following:

- Take advantage of trade ally and manufacturer relationships to co-market energy efficient equipment and products.
- Host webinars.
- Participate in trade shows and other outreach events.
- Communicate and provide access to program component information on the Company's EE&C website.
- Promote the component in newsletters.
- Advertise using newspaper, radio, direct mail, bill inserts, cross-program component advertisements, commercial ads, and other mass media.
- Coordinate advertising opportunities with trade allies.
- Develop, publish, and distribute brochures and case studies.
- Conduct one-on-one marketing to small C&I customers through trade allies, business accounts specialists, and Non-Residential CSP outreach.
- Target marketing to facility managers, building or process engineers, building owners and managers associations, HVAC contractors, energy services firms, architects and engineers, real estate developers, economic development organizations, customer advocacy groups, trade associations, and other trade allies to encourage installation of new energy efficient technologies and adoption of best-operating practices.
- Provide specific outreach to individual tenants as well as building owners and property managers in leased commercial buildings to encourage participation in the program.
- Target specific sectors identified as having a high unrealized energy efficiency potential.

- Publish marketing materials including charts, brochures, and case studies.
- Provide newsletters and coordinate with key market partners, including trade associations and agencies.
- Use limited time offers, special promotions, and no-cost measures to promote energy efficiency.
- Offer trade ally incentives and rewards.
- Cross-promote through other PPL Electric Utilities energy efficiency program components.
- Provide information and training on specific technologies directed towards niche markets.
- Incorporate customers in area- or territory-focused promotions.
- Work with distributors to promote and encourage purchases of efficient equipment to capture savings opportunities missed by other outreach methods.

Eligible Measures and Incentive Strategy

PPL Electric Utilities will offer rebates and incentives to qualified customers (or trade allies, depending on the delivery channel) who submit completed applications and documentation of the efficiency measures installed. Customers will have the option to assign rebate payments to a third party.

PPL Electric Utilities offers performance incentives based on the avoided or reduced energy (kWh/year) or peak demand (kW) savings resulting from the project. Incentives may be capped at 50% to 100% of the total project costs (excluding internal labor) or \$500,000 and are subject to an annual cap for each project and each participating customer. The per-customer-site cap is defined as one building with one or more meters. A parent company cap of \$1 million per year will apply to a campus setting or multiple buildings (on the same property or in different locations) with a common owner. For all measures offered through the Efficient Equipment component, PPL Electric Utilities will provide incentives in the range of \$0.02 to \$0.22 per annual kWh saved and/or \$30 to \$1,200 per kW peak demand.

PPL Electric Utilities may distribute lighting measures to customers through the traditional rebate, direct discount (i.e., incentive paid to a trade ally), direct install, or midstream channel. Table 41 and Table 42 lists PPL Electric Utilities' proposed measures and minimum eligibility qualifications for large C&I and small C&I, respectively.

Table 41. Pa PUC Table 7-Large C&I Efficient Equipment Rebates Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Lighting Improvements	Per Project	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$46,521	13	\$8,860	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Exit Signs	Per Product	No	Replacement of existing incandescent or fluorescent exit signs with a new LED exit sign.	\$55	15	\$21	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
HVAC Systems	Per Product	No	This measure excludes water source, ground source, and groundwater source heat pump measures that are covered in the Water Source and Geothermal Heat Pumps measure. All HVAC applications other than comfort cooling and heating, such as process cooling, are ineligible for this measure.	\$194	15	\$441	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Electric Chillers	Per Product	No	Installation of high efficiency electric chillers that exceed the minimum performance allowed by the current PA Energy Code.	\$4,021	15	\$1,890	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Water Source and Geothermal Heat Pumps	Per Product	No	High-efficiency groundwater source, water source, or ground source heat pump system that exceeds the energy efficiency requirements of the IECC 2015, Table 403.2.3(1).	\$52,603	15	\$111	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Ductless mini-split heat pumps < 5.4 tons	Per Product	No	<5.4 tons, ENERGY STAR with inverter technology.	\$2,313	15	\$379	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Room A/C	Per Product	No	ENERGY STAR	-\$65	9	\$3	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Guest Room Occupancy Sensor controls	Per Ton	No	Guest rooms that are equipped with energy management thermostats replacing manual heating/cooling temperature set-point and fan On/Off/Auto thermostat controls.	\$180	15	\$34	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Economizer controls	Per Control	No	Adding an economizer and dual enthalpy (differential) control on existing HVAC unit with no economizer or with a non-functional/disabled economizer.	\$1,421	10	\$973	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
VFD Improvements	Per Control	No	A motor with a variable-frequency drive (“VFD”) control replacing a motor without an existing VFD control.	\$2,607	15	\$1,282	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ECM Circulating fan	Per Product	No	Circulating fan motors of 1 horsepower (“HP”) or less with a baseline shaded-pole (“SP”) or permanent-split capacitor (“PSC”) evaporator fan motor in an air handling unit.	\$417	15	\$34	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VSD on Kitchen Exhaust Fan	Per Fan	No	The energy efficient condition is a kitchen ventilation system equipped with a variable speed drive (“VSD”) and demand ventilation controls and sensors. The baseline equipment is kitchen ventilation that has a constant speed ventilation motor.	\$2,296	15	\$216	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Refrigeration/Freezer Cases	Per Product	No	ENERGY STAR, Eligible refrigerators and freezers are self-contained with vertical-closed transparent or solid doors.	\$853	12	\$39	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency evaporator fan motors for walk in or reach in cases	Per Product	No	Replacement of existing SP evaporator fan motors or PSC motors in walk-in or reach-in refrigerated display cases with an electronically commutated motor (“ECM”) or a permanent magnet synchronous (“PMS”) motor.	\$343	15	\$40	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Evaporator Fan controllers	Per Control	No	Installation of evaporator fan controls in medium-temperature walk-in or reach-in coolers and low temperature walk-in or reach-in freezers.	\$563	15	\$71	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Anti-sweat heater controls	Per Control	No	Adding controls to glass door cooler or refrigerator with uncontrolled heaters utilizing either ON/OFF or micro pulse controls.	\$1,051	12	\$221	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Variable speed refrigeration compressor	Per Horsepower	No	VSD control system replacing a slide valve control system in existing commercial refrigeration systems.	\$85	15	\$16	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Strip curtains for walk-in freezers and coolers	Per Door	No	Install or retrofit strip curtains in commercial walk-in cooler and freezer doors. Strip curtains must be at least 0.06 inches thick.	\$359	4	\$676	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Night covers for display cases	Per Foot	No	Install on existing open-type refrigerated display cases, where covers are deployed during the facility’s unoccupied hours.	\$42	5	\$3	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Auto door closers	Per Product	No	Retrofit doors not equipped with auto-closers and assume the doors have strip curtain for walk-in coolers and freezers. Auto-closer must be able to firmly close door when it is within one inch of full closure. Walk-in door perimeter must be \geq 16 feet.	\$498	8	\$96	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Door gaskets for walk-in and reach-in coolers and freezers	Per Door	No	Replace worn-out gaskets with new better-fitting gaskets.	\$98	4	\$18	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low or No anti-sweat heat for reach-in freezers and coolers	Per Door	No	Install a no-heat/low-heat clear glass door on an upright display case. Limited to door heights of 57 inches or more. Doors must have either heat reflective treated glass, be gas filled, or both.	\$1,213	12	\$37	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Refrigerated Display cases with doors replacing open cases	Per Foot	No	A new, vertical case with no sweat doors that meets federal standard requirements.	\$449	12	\$28	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Adding doors to existing refrigerated display cases	Per Foot	No	Retrofit existing vertical open display cases with zero heat doors.	\$521	12	\$31	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Ice machines	Per Product	No	ENERGY STAR	\$378	8	\$127	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Beverage machine controls	Per Product	No	Added to non-ENERGY STAR machines.	\$180	5	\$99	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Office equipment	Per Product	No	ENERGY STAR	\$10	6	\$7	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Cycling refrigerated thermal mass dryer	Per Horsepower	No	Baseline: non-cycling (e.g., continuous) air dryer with a capacity of 600 cubic feet per minute ("cfm") or below. The replacement of desiccant, deliquescent, heat-of-compression, membrane, or other types of dryers does not qualify under this measure.	\$24	10	\$4	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
No-loss condensate drains	Per Product	No	Retrofit existing timed drained system with new no-loss condensate drains.	\$194	5	\$167	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Variable speed drive air compressor	Per Horsepower	No	Install or retrofit a single VSD unit less than 40 HP with variable speed control.	\$191	13	\$59	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency ventilation fans with and w/o thermostats	Per Product	No	Agricultural Application: Installation of high efficiency ventilation fans where standard efficiency ventilation fans are replaced and/or the installation of a thermostat controlling either new efficient fans or existing fans.	\$175	15	\$31	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VSD Controller on dairy vacuum pumps	Per Product	No	Agricultural Application: Installation of a VSD and controls on dairy vacuum pumps, or the purchase of dairy vacuum pumps with variable speed capability.	\$5,120	15	\$663	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Improvements for Midstream	Per Fixture	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$77	15	\$76	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Improvements for Midstream	Per Lamp	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$6	15	\$4	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
HVAC Systems Midstream	Per Product	No	This measure excludes water source, ground source, and groundwater source heat pump measures that are covered in the Water Source and Geothermal Heat Pumps measure. All HVAC applications other than comfort cooling and heating, such as process cooling, are ineligible for this measure.	\$194	15	\$561	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Ductless mini-split heat pumps < 5.4 tons Midstream	Per Product	No	<5.4 tons, ENERGY STAR with inverter technology.	\$2,313	15	\$482	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Ice machines Midstream	Per Product	No	ENERGY STAR	\$378	8	\$162	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial fryer Midstream	Per Product	No	ENERGY STAR	\$1,038	12	\$220	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial hot food holding cabinet Midstream	Per Product	No	ENERGY STAR	\$895	12	\$155	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
High efficiency ventilation fans with and w/o thermostats Midstream	Per Product	No	Agricultural Application: Installation of high efficiency ventilation fans where standard efficiency ventilation fans are replaced and/or the installation of a thermostat controlling either new efficient fans or existing fans.	\$175	15	\$40	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VSD Controller on dairy vacuum pumps Midstream	Per Product	No	Agricultural Application: Installation of a VSD and controls on dairy vacuum pumps, or the purchase of dairy vacuum pumps with variable speed capability.	\$5,120	15	\$844	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Controls	Per kW Controlled	No	Lighting controls turn lights on and off automatically, which are activated by time, light, motion, or sound.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Channel Signage	Per Foot	No	Replacement of neon and/or incandescent channel letter signs with efficient LED channel letter signs. Replacement signs cannot use more than 20% of the actual input power of the sign that is replaced.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Refrigeration Display Case Lighting	Per Door	No	Installation of LED case lighting with or without motion sensors on existing refrigerators, coolers, and freezers - specifically on vertical displays.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Fuel Switching	Per Product	No	Must replace electric equipment with ENERGY STAR certified natural gas, propane, or fuel oil equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Computer room A/C	Per Product	No	Newly installed computer room air conditioner systems that exceed the baseline efficiencies (in seasonal coefficient of performance ("SCOP")) outlined in Table 3-56 of the current PA TRM.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Computer room A/C EC fans	Per Product	No	Installation of electronically commutated ("EC") plug fans in computer room air conditioning ("CRAC") and computer room air handling ("CRAH") units.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Computer room VFD on fans	Per Horsepower	No	Installation of a VSD to control AC fan motors in CRAC and CRAH units.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Circulation Fan: High Volume Low Speed	Per Product	No	Installation of High Volume Low Speed ("HVLS") fans (diameters ranging from 8 to 24 feet) replacing conventional circulating fans. Commercial and industrial applications only.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Premium Efficiency Motors	Per Horsepower	No	Replacement of old motors with new energy efficient motors of the same rated HP.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ECM Circulator Pump	Per Pump	No	An ECM or brushless permanent magnet (BPM) circulator pump replacing single-speed induction motor circulator pumps in space heating and hot water applications.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High Efficiency Pumps	Per Horsepower	No	Compliant pumps will achieve a PEI of 1.0 or less. All pumps manufactured after January 27, 2020 must comply with the U.S. Department of Energy's ("DOE") energy conservation standard as described in 10 CFR 431 Subpart Y.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Heat Pump Water Heaters	Per Product	No	Installation of a heat pump water heater instead of a code minimum electric water heater.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low Flow Pre-rinse Sprayers	Per Product	No	Efficient low flow pre-rinse sprayers that use less than 1.6 gallons of water per minute. Only applicable to premises with electric water heating.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Fuel Switching: electric water heaters to gas/propane	Per Product	No	Must replace electric water heater with ENERGY STAR certified natural gas or propane equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Floating head pressure control ("FHPC")	Per Control	No	Adding FHPCs to a refrigeration system. FHPCs must have a minimum Saturated Condensing Temperature ("SCT") programmed for the floating head pressure control of ≤ 70 °F. The use of FHPC would require balanced-port expansion valves, allowing satisfactory refrigerant flow over a range of head pressures. The compressor must be 1 HP or larger.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Evaporator coil defrost controls	Per Evaporator Unit	No	Adding defrost controls to existing walk-in coolers or freezers without defrost controls.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Suction pipe insulation for walk-in coolers and freezers	Per Foot	No	Insulate bare refrigeration suction pipes for walk-in coolers and freezers according to the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air cooled refrigeration condenser	Per Ton	No	Installing an efficient, close-approach air-cooled refrigeration condenser that meets the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Refrigerated case light occupancy sensors	Per Watt Controlled	No	Installation of motion-based lighting controls that allow the LED case lighting to be dimmed or turned off completely during unoccupied conditions.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Refrigeration economizers	Per Compressor Horsepower	No	Economizers installed on a walk-in refrigeration system.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Clothes washer	Per Product	No	ENERGY STAR, installed in commercial laundromats or multifamily complex laundry rooms.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR bathroom ventilation fan	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Snack machine controls	Per Product	No	Added to non-ENERGY STAR, non-refrigerated machines.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Electric steam cooker	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Combination oven	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial convection oven	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial fryer	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial hot food holding cabinet	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Dishwasher	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Griddle	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Wall and Ceiling Insulation	Per SQFT	No	Applies to buildings that are heated and/or cooled using electricity. Existing construction buildings are required to meet or exceed the code requirement. New construction buildings must exceed the code requirement.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Office Equipment - Network power management enabling	Per Workstation	No	Applicable to any software that manages workstations in a networked environment that meets the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Advanced power strips	Per Workstation	No	Installation of an Advanced Power Strip Tier 1 or Tier 2.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Servers	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Server virtualization	Per Product	No	Servers must be consolidated to increase utilization of the remaining servers, and the virtualized servers must be either a) removed or b) physically disconnected from power.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air-entraining air nozzle	Per Product	No	Replace non-air entraining air nozzle (open copper tube of 1/8-inch or 1/4-inch orifice diameter) with an energy efficient air-entraining air nozzle that uses less than 15 cfm at 100 pounds per square inch ("psi") for industrial applications.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air tanks for Load/No load compressors	Per Horsepower	No	Minimum storage ratio of 4 gallons per cfm.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed air controller	Per Horsepower	No	The baseline condition is having no existing pressure/flow controller and an existing compressed air system with a total compressor motor capacity \geq 40 hp. This measure requires a minimum storage of 3gal/cfm.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed air low pressure drop filters	Per Horsepower	No	The baseline condition is a standard coalescing filter with a pressure drop of 3 psi when new and 5 psi or more at element change. The efficient condition is a low pressure drop filter with pressure drop not exceeding 1 psi when new and 3 psi at element change.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Compressed air mist eliminators	Per Horsepower	No	The compressed air system must be greater than 50 HP to qualify, and the mist eliminator must have less than a 1 pound per square inch gauge (“psig”) pressure drop and replace a coalescing filter.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency transformer	Per Product	No	Transformers more efficient than the federal standard.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Engine block heat timer	Per Product	No	Agricultural Application: Installation of a timer on an engine block heater.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High frequency battery chargers	Per Product	No	Baseline equipment is a silicon controlled rectifier (“SCR”) or ferroresonant battery charger system with minimum 8-hour shift operation five days per week. Energy-efficient equipment is a high frequency battery charger system with a minimum power conversion efficiency of 90% and 8-hour shift operation five days per week.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Automatic Milker takeoffs	Per Cow	No	Agricultural Application: Automatic milker take-offs that determine milking end time, and the vacuum pump system serving the impacted milking units must be equipped with a variable speed drive.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Dairy scroll compressors	Per Product	No	Agricultural Application: Installation of a scroll compressor to replace an existing reciprocating compressor or to be installed in a new construction application.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Heat reclaimers	Per Product	No	Agricultural Application: Installation of heat recovery equipment on dairy parlor milk refrigeration systems to heat hot water. This measure only applies to dairy parlors with electric water heating equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High Volume Low Speed fans	Per Product	No	Agricultural Application: Installation of HVLS fans to replace conventional circulating fans. HVLS fans are a minimum of 16 feet long in diameter.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Livestock waterer	Per Product	No	Agricultural Application: Thermostatically controlled with 2 inches or more of factory-installed insulation.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Low pressure irrigation system	Per Acre	No	Agricultural Application: Replace systems operating on 50% or less than existing system pressure.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
New Construction Lighting	Per SQFT	No	Eligible lighting equipment and fixture/lamp types include fluorescent fixtures (lamps and ballasts), compact fluorescent lamps, high intensity discharge (“HID”) lamps, interior and exterior LED lamps and fixtures, cold-cathode fluorescent lamps (“CCFLs”), induction lamps, and lighting controls.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Electric steam cooker Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Combination oven Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial convection oven Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Dishwasher Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Griddle Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Automatic Milker takeoffs Midstream	Per Cow	No	Agricultural Application: Automatic milker take-offs that determine milking end time, and the vacuum pump system serving the impacted milking units must be equipped with a variable speed drive.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Dairy scroll compressors Midstream	Per Product	No	Agricultural Application: Installation of a scroll compressor to replace an existing reciprocating compressor or to be installed in a new construction application.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Heat reclaimers Midstream	Per Product	No	Agricultural Application: Installation of heat recovery equipment on dairy parlor milk refrigeration systems to heat hot water. This measure only applies to dairy parlors with electric water heating equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
High Volume Low Speed fans Midstream	Per Product	No	Agricultural Application: Installation of HVLS fans to replace conventional circulating fans. HVLS fans are a minimum of 16 feet long in diameter.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Livestock waterer Midstream	Per Product	No	Agricultural Application: Thermostatically controlled with 2-inches or more of factory-installed insulation.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.

² PPL Electric Utilities does not pay incentives on a per unit basis, but rather on a cents per kWh/yr and/or dollars per kW basis.

³ Note that incentive rates may vary due to availability of program funds and/or changes made to encourage participation in a certain measure.

Table 42. Pa PUC Table 7-Small C&I Efficient Equipment Rebates Eligible Measures and Incentives

Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Lighting Improvements	Per Project	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$46,521	13	\$8,860	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Exit Signs	Per Product	No	Replacement of existing incandescent or fluorescent exit signs with a new LED exit sign.	\$55	15	\$21	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
HVAC Systems	Per Product	No	This measure excludes water source, ground source, and groundwater source heat pump measures that are covered in the Water Source and Geothermal Heat Pumps measure. All HVAC applications other than comfort cooling and heating, such as process cooling, are ineligible for this measure.	\$194	15	\$441	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Electric Chillers	Per Product	No	Installation of high efficiency electric chillers that exceed the minimum performance allowed by the current PA Energy Code.	\$4,021	15	\$1,890	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Water Source and Geothermal Heat Pumps	Per Product	No	High-efficiency groundwater source, water source, or ground source heat pump system that exceeds the energy efficiency requirements of the IECC 2015, Table 403.2.3(1).	\$52,603	15	\$111	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Ductless mini-split heat pumps < 5.4 tons	Per Product	No	<5.4 tons, ENERGY STAR with inverter technology.	\$2,313	15	\$379	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
ENERGY STAR Room A/C	Per Product	No	ENERGY STAR	-\$65	9	\$3	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Guest Room Occupancy Sensor controls	Per Ton	No	Guest rooms that are equipped with energy management thermostats replacing manual heating/cooling temperature set-point and fan On/Off/Auto thermostat controls.	\$180	15	\$34	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Economizer controls	Per Control	No	Adding an economizer and dual enthalpy (differential) control to an HVAC unit with no economizer installers or with a non-functional/disabled economizer.	\$1,421	10	\$973	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VFD Improvements	Per Control	No	A motor with a VFD control replacing a motor without a VFD control.	\$2,607	15	\$1,282	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ECM Circulating fan	Per Product	No	Circulating fan motors of 1 HP or less with a baseline SP or PSC evaporator fan motor in an air handling unit.	\$417	15	\$34	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VSD on Kitchen Exhaust Fan	Per Fan	No	The energy efficient condition is a kitchen ventilation system equipped with a VSD and demand ventilation controls and sensors. The baseline equipment is kitchen ventilation that has a constant speed ventilation motor.	\$2,296	15	\$216	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Refrigeration/Freezer Cases	Per Product	No	ENERGY STAR. Eligible refrigerators and freezers are self-contained with vertical-closed transparent or solid doors.	\$853	12	\$39	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency evaporator fan motors for walk in or reach in cases	Per Product	No	Replacement of existing SP evaporator fan motors or PSC motors in walk-in or reach-in refrigerated display cases with ECM or PMS motor.	\$343	15	\$40	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Evaporator Fan controllers	Per Control	No	Installation of evaporator fan controls in medium-temperature walk-in or reach-in coolers and low temperature walk-in or reach-in freezers.	\$563	15	\$71	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Anti-sweat heater controls	Per Control	No	Adding controls to glass door cooler or refrigerator with uncontrolled heaters utilizing either ON/OFF or micro pulse controls.	\$1,051	12	\$221	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Variable speed refrigeration compressor	Per Horsepower	No	VSD control system replacing a slide valve control system in existing commercial refrigeration systems.	\$85	15	\$16	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Strip curtains for walk-in freezers and coolers	Per Door	No	Install or retrofit strip curtains in commercial walk-in cooler and freezer doors. Strip curtains must be at least 0.06 inches thick.	\$359	4	\$676	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Night covers for display cases	Per Foot	No	Install on existing open-type refrigerated display cases, where covers are deployed during the facility's unoccupied hours.	\$42	5	\$3	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Auto door closers	Per Product	No	Retrofit doors not equipped with auto-closers and assume the doors have strip curtain for walk-in coolers and freezers. The auto-closer must be able to firmly close the door when it is within one inch of full closure. Walk-in door perimeter must be ≥ 16 feet.	\$498	8	\$96	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Door gaskets for walk-in and reach-in coolers and freezers	Per Door	No	Replace worn-out gaskets with new better-fitting gaskets.	\$98	4	\$18	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low or No anti-sweat heat for reach-in freezers and coolers	Per Door	No	Install a no-heat/low-heat clear glass door on an upright display case. Limited to door heights of 57 inches or more. Doors must have either heat reflective treated glass, be gas filled, or both.	\$1,213	12	\$37	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Refrigerated Display cases with doors replacing open cases	Per Foot	No	A new, vertical case with no sweat doors that meets federal standard requirements.	\$449	12	\$28	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Adding doors to existing refrigerated display cases	Per Foot	No	Retrofit existing vertical open display cases with zero heat doors.	\$521	12	\$31	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Ice machines	Per Product	No	ENERGY STAR	\$378	8	\$127	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Beverage machine controls	Per Product	No	Added to non-ENERGY STAR machines.	\$180	5	\$99	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Office equipment	Per Product	No	ENERGY STAR	\$10	6	\$7	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Cycling refrigerated thermal mass dryer	Per Horsepower	No	Baseline: non-cycling (e.g., continuous) air dryer with a capacity of 600 cfm or below. The replacement of desiccant, deliquescent, heat-of-compression, membrane, or other types of dryers does not qualify under this measure.	\$24	10	\$4	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
No-loss condensate drains	Per Product	No	Retrofit existing timed drained system with new no-loss condensate drains.	\$194	5	\$167	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Variable speed drive air compressor	Per Horsepower	No	Install or retrofit a single VSD unit less than 40 HP with variable speed control.	\$191	13	\$59	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency ventilation fans with and w/o thermostats	Per Product	No	Agricultural Application: Installation of high efficiency ventilation fans where standard efficiency ventilation fans are replaced and/or the installation of a thermostat controlling either new efficient fans or existing fans.	\$175	15	\$31	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VSD Controller on dairy vacuum pumps	Per Product	No	Agricultural Application: Installation of a VSD and controls on dairy vacuum pumps, or the purchase of dairy vacuum pumps with variable speed capability.	\$5,120	15	\$663	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Improvements for Midstream	Per Fixture	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$77	15	\$76	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Improvements for Midstream	Per Bulb	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$6	15	\$4	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
HVAC Systems Midstream	Per Product	No	This measure excludes water source, ground source, and groundwater source heat pump measures that are covered in the Water Source and Geothermal Heat Pumps measure. All HVAC applications other than comfort cooling and heating, such as process cooling, are ineligible for this measure.	\$194	15	\$561	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Ductless mini-split heat pumps < 5.4 tons Midstream	Per Product	No	<5.4 tons, ENERGY STAR with inverter technology.	\$2,313	15	\$482	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Ice machines Midstream	Per Product	No	ENERGY STAR	\$378	8	\$162	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial fryer Midstream	Per Product	No	ENERGY STAR	\$1,038	12	\$220	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial hot food	Per Product	No	ENERGY STAR	\$895	12	\$155	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
holding cabinet Midstream							
High efficiency ventilation fans with and w/o thermostats Midstream	Per Product	No	Agricultural Application: Installation of high efficiency ventilation fans where standard efficiency ventilation fans are replaced and/or the installation of a thermostat controlling either new efficient fans or existing fans.	\$175	15	\$40	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
VSD Controller on dairy vacuum pumps Midstream	Per Product	No	Agricultural Application: Installation of a VSD and controls on dairy vacuum pumps, or the purchase of dairy vacuum pumps with variable speed capability.	\$5,120	15	\$844	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Adding doors to existing refrigerated display cases Direct Discount	Per Foot	No	Retrofit existing vertical open display cases with zero heat doors.	\$521	12	\$39	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air tanks for Load/No load compressors Direct Discount	Per Horsepower	No	Minimum storage ratio of 4 gallons per cfm.	\$80	15	\$33	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air-entraining air nozzle Direct Discount	Per Product	No	Replace non-air entraining air nozzle (open copper tube of 1/8-inch or 1/4-inch orifice diameter) with an energy efficient air-entraining air nozzle that uses less than 15 cfm at 100 psi for industrial applications.	\$89	15	\$183	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Anti-sweat heater controls Direct Discount	Per Control	No	Adding controls to glass door cooler or refrigerator with uncontrolled heaters utilizing either ON/OFF or micro pulse controls.	\$1,051	12	\$273	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Auto door closers Direct Discount	Per Product	No	Retrofit doors not equipped with auto-closers, and assume the doors have strip curtain for walk-in coolers and freezers. The auto-closer must be able to firmly close the door when it is within one inch of full closure. The walk-in door perimeter must be ≥ 16 feet.	\$498	8	\$119	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Beverage machine controls Direct Discount	Per Product	No	Added to non-ENERGY STAR machines.	\$180	5	\$122	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed air controller Direct Discount	Per Horsepower	No	The baseline condition is having no existing pressure/flow controller and an existing compressed air system with a total compressor motor capacity ≥ 40 hp. This measure requires a minimum storage of 3gal/cfm.	\$27	15	\$16	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Compressed air low pressure drop filters Direct Discount	Per Horsepower	No	The baseline condition is a standard coalescing filter with a pressure drop of 3 psi when new and 5 psi or more at element change. The efficient condition is a low pressure drop filter with pressure drop not exceeding 1 psi when new and 3 psi at element change.	\$10	10	\$3	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed air mist eliminators Direct Discount	Per Horsepower	No	The compressed air system must be greater than 50 HP to qualify, and the mist eliminator must have less than a 1 psig pressure drop and replace a coalescing filter.	\$22	5	\$7	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Cycling refrigerated thermal mass dryer Direct Discount	Per Horsepower	No	Baseline: non-cycling (e.g., continuous) air dryer with a capacity of 600 cfm or below. The replacement of desiccant, deliquescent, heat-of-compression, membrane, or other types of dryers does not qualify under this measure.	\$24	10	\$5	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Economizer controls Direct Discount	Per Control	No	Adding an economizer and dual enthalpy (differential) control to an HVAC unit with no economizer installers or with a non-functional/disabled economizer.	\$1,421	10	\$1,202	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Evaporator Fan controllers Direct Discount	Per Control	No	Installation of evaporator fan controls in medium-temperature walk-in or reach-in coolers and low temperature walk-in or reach-in freezers.	\$563	15	\$88	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency evaporator fan motors for walk in or reach in cases Direct Discount	Per Product	No	Replacement of existing SP evaporator fan motors or PSC motors in walk-in or reach-in refrigerated display cases with an ECM or a PMS motor.	\$343	15	\$49	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Refrigeration Display Case Lighting Direct Discount	Per Door	No	Installation of LED case lighting with or without motion sensors on existing refrigerators, coolers, and freezers - specifically on vertical displays.	\$51	8	\$40	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Controls Direct Discount	Per kW Controlled	No	Lighting controls turn lights on and off automatically, which are activated by time, light, motion, or sound.	\$387	8	\$77	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Improvements Direct Discount	Per Project	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$46,521	13	\$9,590	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low Flow Pre-rinse Sprayers Direct Discount	Per Product	No	Efficient low flow pre-rinse sprayers that use less than 1.6 gallons of water per minute. Only applicable to premises with electric water heating.	\$124	8	\$89	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
No-loss condensate drains Direct Discount	Per Product	No	Retrofit existing timed drained system with new no-loss condensate drains.	\$194	5	\$207	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Refrigerated case light occupancy sensors Direct Discount	Per Watt Controlled	No	Installation of motion-based lighting controls that allow the LED case lighting to be dimmed or turned off completely during unoccupied conditions.	\$1	8	\$0	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Strip curtains for walk-in freezers and coolers Direct Discount	Per Door	No	Install or retrofit strip curtains in commercial walk-in cooler and freezer doors. Strip curtains must be at least 0.06 inches thick.	\$359	4	\$835	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Variable speed drive air compressor Direct Discount	Per Horsepower	No	Install or retrofit a single VSD unit less than 40 HP with variable speed control.	\$191	13	\$73	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Variable speed refrigeration compressor Direct Discount	Per Horsepower	No	VSD control system replacing a slide valve control system in existing commercial refrigeration systems.	\$85	15	\$20	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Improvements Direct Install	Per Project	No	Products must meet the minimum requirements of ENERGY STAR or the DLC and complete PA TRM Lighting Form.	\$186	13	\$186	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low Flow Pre-rinse Sprayers Direct Install	Per Product	No	Efficient low flow pre-rinse sprayers that use less than 1.6 gallons of water per minute. Only applicable to premises with electric water heating.	\$72	8	\$72	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Lighting Controls	Per kW Controlled	No	Lighting controls turn lights on and off automatically, which are activated by time, light, motion, or sound.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Channel Signage	Per Foot	No	Replacement of neon and/or incandescent channel letter signs with efficient LED channel letter signs. Replacement signs cannot use more than 20% of the actual input power of the sign that is replaced.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Refrigeration Display Case Lighting	Per Door	No	Installation of LED case lighting with or without motion sensors on existing refrigerators, coolers, and freezers - specifically on vertical displays.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Fuel Switching	Per Product	No	Must replace electric equipment with ENERGY STAR certified natural gas, propane, or fuel oil equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Computer room A/C	Per Product	No	Newly installed computer room air conditioner systems that exceed the baseline efficiencies (in SCOP) outlined in Table 3-56 of the current PA TRM.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Computer room A/C EC fans	Per Product	No	Installation of EC plug fans in CRAC and CRAH units.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Computer room VFD on fans	Per Horsepower	No	Installation of a VSD to control AC fan motors in CRAC and CRAH units.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Circulation Fan: High Volume Low Speed	Per Product	No	Installation of HVLS fans (diameters ranging from 8 to 24 feet) replacing conventional circulating fans. Commercial and industrial applications only.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Premium Efficiency Motors	Per Horsepower	No	Replacement of old motors with new energy efficient motors of the same rated HP.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ECM Circulator Pump	Per Pump	No	An ECM or BPM circulator pump replacing single-speed induction motor circulator pumps in space heating and hot water applications.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High Efficiency Pumps	Per Horsepower	No	Compliant pumps will achieve a PEI of 1.0 or less. All pumps manufactured after January 27, 2020 must comply with the DOE's energy conservation standard as described in 10 CFR 431 Subpart Y.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Heat Pump Water Heaters	Per Product	No	Installation of a heat pump water heater instead of a code minimum electric water heater.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low Flow Pre-rinse Sprayers	Per Product	No	Efficient low flow pre-rinse sprayers that use less than 1.6 gallons of water per minute. Only applicable to premises with electric water heating.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Fuel Switching: electric water heaters to gas/propane	Per Product	No	Must replace electric water heater with ENERGY STAR certified natural gas or propane equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Floating head pressure controls	Per Control	No	Adding FHPCs to a refrigeration system. FHPCs must have a minimum SCT programmed for the floating head pressure control of ≤ 70 °F. The use of FHPC would require balanced-port expansion valves, allowing satisfactory refrigerant flow over a range of head pressures. The compressor must be 1 HP or larger.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Evaporator coil defrost controls	Per Evaporator Unit	No	Adding defrost controls to existing walk-in coolers or freezers without defrost controls.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Suction pipe insulation for walk-in coolers and freezers	Per Foot	No	Insulate bare refrigeration suction pipes for walk-in coolers and freezers according to the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air cooled refrigeration condenser	Per Ton	No	Installing an efficient, close-approach air-cooled refrigeration condenser that meets the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Refrigerated case light occupancy sensors	Per Watt Controlled	No	Installation of motion-based lighting controls that allow the LED case lighting to be dimmed or turned off completely during unoccupied conditions.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Refrigeration economizers	Per Compressor Horsepower	No	Economizers installed on a walk-in refrigeration system.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Clothes washer	Per Product	No	ENERGY STAR, installed in commercial laundromats or multifamily complex laundry rooms.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR bathroom ventilation fan	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Snack machine controls	Per Product	No	Added to non-ENERGY STAR, non-refrigerated machines.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Electric steam cooker	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Combination oven	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial convection oven	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial fryer	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial hot food holding cabinet	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
ENERGY STAR Commercial Dishwasher	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Griddle	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Wall and Ceiling Insulation	Per SQFT	No	Applies to buildings that are heated and/or cooled using electricity. Existing construction buildings are required to meet or exceed the code requirement. New construction buildings must exceed the code requirement.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Office Equipment - Network power management enabling	Per Workstation	No	Applicable to any software that manages workstations in a networked environment that meets the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Advanced power strips	Per Workstation	No	Installation of an Advanced Power Strip.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Servers	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Server virtualization	Per Product	No	Servers must be consolidated to increase utilization of the remaining servers, and the virtualized servers must be either a) removed or b) physically disconnected from power.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air-entraining air nozzle	Per Product	No	Replace non-air entraining air nozzle (open copper tube of 1/8-inch or 1/4-inch orifice diameter) with an energy efficient air-entraining air nozzle that uses less than 15 cfm at 100 psi for industrial applications.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Air tanks for Load/No load compressors	Per Horsepower	No	Minimum storage ratio of 4 gallons per cfm.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed air controller	Per Horsepower	No	The baseline condition is having no existing pressure/flow controller and an existing compressed air system with a total compressor motor capacity \geq 40 hp. This measure requires a minimum storage of 3gal/cfm.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Compressed air low pressure drop filters	Per Horsepower	No	The baseline condition is a standard coalescing filter with a pressure drop of 3 psi when new and 5 psi or more at element change. The efficient condition is a low pressure drop filter with pressure drop not exceeding 1 psi when new and 3 psi at element change.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed air mist eliminators	Per Horsepower	No	The compressed air system must be greater than 50 HP to qualify, and the mist eliminator must have less than a 1 psig pressure drop and replace a coalescing filter.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High efficiency transformer	Per Product	No	Transformers more efficient than the federal standard.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Engine block heat timer	Per Product	No	Agricultural Application: Installation of a timer on an engine block heater.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High frequency battery chargers	Per Product	No	The baseline equipment is a SCR or ferroresonant battery charger system with minimum 8-hour shift operation five days per week. The energy efficient equipment is a high frequency battery charger system with a minimum power conversion efficiency of 90% and 8-hour shift operation five days per week.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Automatic Milker takeoffs	Per Cow	No	Agricultural Application: Automatic milker take-offs that determine milking end time, and the vacuum pump system serving the impacted milking units must be equipped with a variable speed drive.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Dairy scroll compressors	Per Product	No	Agricultural Application: Installation of a scroll compressor to replace an existing reciprocating compressor or to be installed in a new construction application.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Heat reclaimers	Per Product	No	Agricultural Application: Installation of heat recovery equipment on dairy parlor milk refrigeration systems to heat hot water. This measure only applies to dairy parlors with electric water heating equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
High Volume Low Speed fans	Per Product	No	Agricultural Application: Installation of HVLS fans to replace conventional circulating fans. HVLS fans are a minimum of 16 feet long in diameter.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
Livestock waterer	Per Product	No	Agricultural Application: Thermostatically controlled with 2-inches or more of factory-installed insulation.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Low pressure irrigation system	Per Acre	No	Agricultural Application: Replace systems operating on 50% or less than existing system pressure.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
New Construction Lighting	Per SQFT	No	Eligible lighting equipment and fixture/lamp types include fluorescent fixtures (lamps and ballasts), compact fluorescent lamps, HID lamps, interior and exterior LED lamps and fixtures, CCFLs, induction lamps, and lighting controls.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Electric steam cooker Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Combination oven Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial convection oven Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Dishwasher Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
ENERGY STAR Commercial Griddle Midstream	Per Product	No	ENERGY STAR	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Automatic Milker takeoffs Midstream	Per Cow	No	Agricultural Application: Automatic milker take-offs that determine milking end time, and the vacuum pump system serving the impacted milking units must be equipped with a variable speed drive.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Dairy scroll compressors Midstream	Per Product	No	Agricultural Application: Installation of a scroll compressor to replace an existing reciprocating compressor or to be installed in a new construction application.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Heat reclaimers Midstream	Per Product	No	Agricultural Application: Installation of heat recovery equipment on dairy parlor milk refrigeration systems to heat hot water. This measure only applies to dairy parlors with electric water heating equipment.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure ¹	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{2,3}
High Volume Low Speed fans Midstream	Per Product	No	Agricultural Application: Installation of HVLS fans to replace conventional circulating fans. HVLS fans are a minimum of 16 feet long in diameter.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Livestock waterer Midstream	Per Product	No	Agricultural Application: Thermostatically controlled with 2-inches or more of factory-installed insulation.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Door gaskets for walk-in and reach-in coolers and freezers Direct Discount	Per Door	No	Replace worn-out gaskets with new better-fitting gaskets.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Evaporator coil defrost controls Direct Discount	Per Evaporator Unit	No	Adding defrost controls to existing walk-in coolers or freezers without defrost controls.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LED Exit Signs Direct Discount	Per Product	No	Early replacement of existing incandescent or fluorescent exit signs with a new LED exit sign.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Night covers for display cases Direct Discount	Per Foot	No	Install on existing open-type refrigerated display cases, where covers are deployed during the facility's unoccupied hours.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Snack machine controls Direct Discount	Per Product	No	Added to non-ENERGY STAR, non-refrigerated machines.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Suction pipe insulation for walk-in coolers and freezers Direct Discount	Per Foot	No	Insulate bare refrigeration suction pipes for walk-in coolers and freezers according to the current PA TRM requirements.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.

² PPL Electric Utilities does not pay incentives on a per unit basis, but rather on a cents per kWh/yr and/or dollars per kW basis.

³ Note that incentive rates may vary due to availability of program funds and/or changes made to encourage participation in a certain measure.

All measures may not be available at all times. PPL Electric Utilities may suspend a measure depending on popularity, pace of the component savings and costs, free ridership, evaluation requirements, complexity of the information required from customers, administrative requirements for the measure, or other reasons. PPL Electric Utilities will review the component continually and may adjust available measures or eligibility qualifications to achieve savings and cost budgets.

PPL Electric Utilities may offer tiered incentives that encourage the installation of multiple measures or a more comprehensive whole facility approach. Measures, eligibility requirements, and incentives may change to reflect progress, changes in the TRM, market conditions, or other factors. PPL Electric Utilities shall strive to keep the rebates and per-site caps as consistent as possible while recognizing the need to adjust incentives and caps to control the pace of components within their savings and cost budgets.

PPL Electric Utilities may also implement a minimum TRC requirement for qualifying measures if it is necessary to help ensure the Non-Residential Program or portfolio TRC is greater than 1.0. PPL Electric Utilities will notify customers, trade allies, and stakeholders at least 60 days before the effective date of this TRC requirement or a subsequent change in the TRC requirement. Any TRC requirement would be in effect for new applications submitted after the effective date.

Deadline for Rebate Applications

The rebate application website and portal will state the deadline for final submission. The deadline will not exceed 180 days from the date the measure was installed. For some measures, PPL Electric Utilities will allow customers to request project preapproval to lock in the stipulated incentive level and guarantee the funding. PPL Electric Utilities will require preapproval for some non-custom measures or specific customer sectors to allow sufficient time to identify budget commitments and reduce the likelihood of exceeding budgets for the component or customer sectors. PPL Electric Utilities reserves the right to waive the preapproval requirement with 60 days’ notice to customers, trade allies and stakeholders.

Start Date with Key Schedule Milestones

Table 43 lists the estimated key schedule milestones for the Efficient Equipment component. PPL Electric Utilities will lead implementation or provide management oversight of all tasks.

Table 43. Efficient Equipment Component Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
06/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

The EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. PPL Electric Utilities and its EM&V CSP will conduct annual evaluations of each component in compliance with all Pa PUC requirements and the Evaluation Framework. As part of this process, the EM&V CSP will review a sample of participant rebate applications and Non-Residential CSP records to verify quantity, efficiency level, and qualifying equipment. The EM&V CSP will follow all applicable methods in the TRM and the Evaluation Framework to calculate energy savings and peak demand reduction.

For the Non-Residential Efficient Equipment component, PPL Electric Utilities anticipates conducting annual impact and process evaluations (activities vary by year).

The EM&V CSP will develop an evaluation plan and sampling protocol that fits the Efficient Equipment component and all associated delivery channels. The EM&V CSP will review a sample of participant and Non-Residential CSP records to verify quantity, efficiency level, and qualifying equipment. On-site assessment may be included as a verification activity.

Administrative Requirements

The Non-Residential CSP will administer and provide operational management of the Efficient Equipment component. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Participation

Table 44 and Table 45 show the order of magnitude participation estimates for Large and Small C&I Efficient Equipment. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 44. Pa PUC Table 8-Large C&I Efficient Equipment Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Lighting Improvements	Energy Savings (MWh/year)	46,451	46,451	44,128	41,806	41,341	220,177
	Demand Reduction (MW)	6.720	6.720	6.384	6.048	5.981	31.854
	Projected Participation	445	445	423	401	396	2,111
LED Exit Signs	Energy Savings (MWh/year)	10	10	10	9	9	50
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	42	42	40	38	38	201
HVAC Systems	Energy Savings (MWh/year)	421	421	421	421	421	2,107
	Demand Reduction (MW)	0.084	0.084	0.084	0.084	0.084	0.422
	Projected Participation	83	83	83	83	83	415

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Electric Chillers	Energy Savings (MWh/year)	11	11	11	11	11	53
	Demand Reduction (MW)	0.008	0.008	0.008	0.008	0.008	0.040
	Projected Participation	0.5	0.5	0.5	0.5	0.5	2.4
Water Source and Geothermal Heat Pumps	Energy Savings (MWh/year)	0.5	0.5	0.5	0.5	0.5	2.5
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004
	Projected Participation	0.4	0.4	0.4	0.4	0.4	1.9
Ductless mini-split heat pumps < 5.4 tons	Energy Savings (MWh/year)	49	49	49	49	49	244
	Demand Reduction (MW)	0.005	0.005	0.005	0.005	0.005	0.023
	Projected Participation	11	11	11	11	11	56
ENERGY STAR Room A/C	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.008
	Projected Participation	21	21	21	21	21	105
Guest Room Occupancy Sensor controls	Energy Savings (MWh/year)	82	82	82	82	82	412
	Demand Reduction (MW)	0.015	0.015	0.015	0.015	0.015	0.073
	Projected Participation	210	210	210	210	210	1,048
Economizer controls	Energy Savings (MWh/year)	26	26	26	26	26	130
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	2	2	2	2	2	12
VFD Improvements	Energy Savings (MWh/year)	365	365	365	365	365	1,825
	Demand Reduction (MW)	0.033	0.033	0.033	0.033	0.033	0.167
	Projected Participation	25	25	25	25	25	124
ECM Circulating fan	Energy Savings (MWh/year)	3	3	3	3	3	17
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	8	8	8	8	8	42
VSD on Kitchen Exhaust Fan	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0014
	Projected Participation	1	1	1	1	1	4

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
ENERGY STAR Refrigeration/Freezer Cases	Energy Savings (MWh/year)	3	3	4	4	4	18
	Demand Reduction (MW)	0.0003	0.0004	0.0004	0.0005	0.0005	0.0022
	Projected Participation	6	7	8	9	9	40
High efficiency evaporator fan motors for walk in or reach in cases	Energy Savings (MWh/year)	99	118	128	138	148	632
	Demand Reduction (MW)	0.012	0.015	0.016	0.017	0.018	0.077
	Projected Participation	215	258	279	301	322	1,376
Evaporator Fan controllers	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.003
	Projected Participation	3	3	3	3	3	13
Anti-sweat heater controls	Energy Savings (MWh/year)	14	17	18	19	21	88
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.010
	Projected Participation	5	7	7	8	8	35
Variable speed refrigeration compressor	Energy Savings (MWh/year)	0.01	0.01	0.01	0.01	0.01	0.06
	Demand Reduction (MW)	0.000001	0.000002	0.000002	0.000002	0.000002	0.000008
	Projected Participation	0.0	0.1	0.1	0.1	0.1	0.3
Strip curtains for walk-in freezers and coolers	Energy Savings (MWh/year)	1	1	1	2	2	7
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0010
	Projected Participation	0.1	0.2	0.2	0.2	0.2	0.9
Night covers for display cases	Energy Savings (MWh/year)	0.002	0.002	0.002	0.002	0.003	0.011
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	0.0	0.1	0.1	0.1	0.1	0.3
Auto door closers	Energy Savings (MWh/year)	0.3	0.3	0.3	0.4	0.4	1.7
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0002	0.0006
	Projected Participation	0.2	0.3	0.3	0.3	0.4	1.6
Door gaskets for walk-in and reach-in coolers and freezers	Energy Savings (MWh/year)	0.2	0.2	0.2	0.2	0.2	1.0
	Demand Reduction (MW)	0.00002	0.00003	0.00003	0.00003	0.00003	0.00014
	Projected Participation	1	1	1	1	1	5

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Low or No anti-sweat heat for reach-in freezers and coolers	Energy Savings (MWh/year)	0.0	0.1	0.1	0.1	0.1	0.3
	Demand Reduction (MW)	0.00001	0.00001	0.00001	0.00001	0.00001	0.00003
	Projected Participation	0.1	0.1	0.1	0.1	0.1	0.6
Refrigerated Display cases with doors replacing open cases	Energy Savings (MWh/year)	0.3	0.3	0.3	0.4	0.4	1.6
	Demand Reduction (MW)	0.00003	0.00004	0.00004	0.00004	0.00005	0.00020
	Projected Participation	1	1	1	1	1	5
Adding doors to existing refrigerated display cases	Energy Savings (MWh/year)	0	1	1	1	1	3
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	1	1	2	2	2	7
ENERGY STAR Ice machines	Energy Savings (MWh/year)	2	2	2	3	3	12
	Demand Reduction (MW)	0.000	0.000	0.001	0.001	0.001	0.003
	Projected Participation	1	2	2	2	2	8
Beverage machine controls	Energy Savings (MWh/year)	0.1	0.1	0.1	0.1	0.1	0.4
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	0.0	0.1	0.1	0.1	0.1	0.3
ENERGY STAR Office equipment	Energy Savings (MWh/year)	0.5	0.5	0.5	0.5	0.5	2.4
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	6	6	6	6	6	30
Cycling refrigerated thermal mass dryer	Energy Savings (MWh/year)	0.03	0.03	0.03	0.03	0.03	0.16
	Demand Reduction (MW)	0.00001	0.00001	0.00001	0.00001	0.00001	0.00003
	Projected Participation	1	1	1	1	1	3
No-loss condensate drains	Energy Savings (MWh/year)	3	3	3	3	3	14
	Demand Reduction (MW)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0024
	Projected Participation	1	1	1	1	1	7
Variable speed drive air compressor	Energy Savings (MWh/year)	0.3	0.3	0.3	0.3	0.3	1.5
	Demand Reduction (MW)	0.00005	0.00005	0.00005	0.00005	0.00005	0.00024
	Projected Participation	0.4	0.4	0.4	0.4	0.4	2.2

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
High efficiency ventilation fans with and w/o thermostats	Energy Savings (MWh/year)	0.3	0.3	0.3	0.3	0.3	1.6
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	1	1	1	1	1	4
VSD Controller on dairy vacuum pumps	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0017
	Projected Participation	0.3	0.3	0.3	0.3	0.3	1.5
Lighting Improvements for Midstream	Energy Savings (MWh/year)	5,709	5,713	5,427	5,142	5,085	27,077
	Demand Reduction (MW)	1.064	1.065	1.012	0.959	0.948	5.047
	Projected Participation	6,521	6,525	6,199	5,874	5,808	30,927
Lighting Improvements for Midstream	Energy Savings (MWh/year)	309	309	294	278	275	1,465
	Demand Reduction (MW)	0.063	0.063	0.060	0.056	0.056	0.297
	Projected Participation	6,521	6,525	6,199	5,874	5,808	30,927
HVAC Systems Midstream	Energy Savings (MWh/year)	136	271	339	339	339	1,423
	Demand Reduction (MW)	0.024	0.047	0.059	0.059	0.059	0.247
	Projected Participation	21	42	52	52	52	220
Ductless mini-split heat pumps < 5.4 tons Midstream	Energy Savings (MWh/year)	28	57	71	71	71	297
	Demand Reduction (MW)	0.002	0.005	0.006	0.006	0.006	0.024
	Projected Participation	5	10	13	13	13	54
ENERGY STAR Ice machines Midstream	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0007
	Projected Participation	0.4	0.4	0.4	0.4	0.4	2.2
ENERGY STAR Commercial fryer Midstream	Energy Savings (MWh/year)	1	1	1	1	1	6
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0009
	Projected Participation	0.4	0.4	0.4	0.4	0.4	2.2
ENERGY STAR Commercial hot food holding cabinet Midstream	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006
	Projected Participation	0.4	0.4	0.4	0.4	0.4	2.2

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
High efficiency ventilation fans with and w/o thermostats Midstream	Energy Savings (MWh/year)	0.2	0.4	0.5	0.5	0.5	1.9
	Demand Reduction (MW)	0.0000	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	0	1	1	1	1	4
VSD Controller on dairy vacuum pumps Midstream	Energy Savings (MWh/year)	1	1	2	2	2	7
	Demand Reduction (MW)	0.0001	0.0002	0.0002	0.0002	0.0002	0.0009
	Projected Participation	0.1	0.1	0.2	0.2	0.2	0.7

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

² Total values may not equal the sum of all program year values due to rounding.

Table 45. Pa PUC Table 8-Small C&I Efficient Equipment Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Lighting Improvements	Energy Savings (MWh/year)	46,451	46,451	44,128	41,806	41,341	220,177
	Demand Reduction (MW)	6.720	6.720	6.384	6.048	5.981	31.854
	Projected Participation	445	445	423	401	396	2,111
LED Exit Signs	Energy Savings (MWh/year)	10	10	10	9	9	50
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	42	42	40	38	38	201
HVAC Systems	Energy Savings (MWh/year)	421	421	421	421	421	2,107
	Demand Reduction (MW)	0.084	0.084	0.084	0.084	0.084	0.422
	Projected Participation	83	83	83	83	83	415
Electric Chillers	Energy Savings (MWh/year)	11	11	11	11	11	53
	Demand Reduction (MW)	0.008	0.008	0.008	0.008	0.008	0.040
	Projected Participation	0.5	0.5	0.5	0.5	0.5	2.4
Water Source and Geothermal Heat Pumps	Energy Savings (MWh/year)	0.5	0.5	0.5	0.5	0.5	2.5
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004
	Projected Participation	0.4	0.4	0.4	0.4	0.4	1.9
Ductless mini-split heat pumps < 5.4 tons	Energy Savings (MWh/year)	49	49	49	49	49	244
	Demand Reduction (MW)	0.005	0.005	0.005	0.005	0.005	0.023
	Projected Participation	11	11	11	11	11	56
ENERGY STAR Room A/C	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.008

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Projected Participation	21	21	21	21	21	105
Guest Room Occupancy Sensor controls	Energy Savings (MWh/year)	82	82	82	82	82	412
	Demand Reduction (MW)	0.015	0.015	0.015	0.015	0.015	0.073
	Projected Participation	210	210	210	210	210	1,048
Economizer controls	Energy Savings (MWh/year)	26	26	26	26	26	130
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	2	2	2	2	2	12
VFD Improvements	Energy Savings (MWh/year)	365	365	365	365	365	1,825
	Demand Reduction (MW)	0.033	0.033	0.033	0.033	0.033	0.167
	Projected Participation	25	25	25	25	25	124
ECM Circulating fan	Energy Savings (MWh/year)	3	3	3	3	3	17
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.006
	Projected Participation	8	8	8	8	8	42
VSD on Kitchen Exhaust Fan	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0014
	Projected Participation	1	1	1	1	1	4
ENERGY STAR Refrigeration/Freezer Cases	Energy Savings (MWh/year)	3	3	4	4	4	18
	Demand Reduction (MW)	0.0003	0.0004	0.0004	0.0005	0.0005	0.0022
	Projected Participation	6	7	8	9	9	40
High efficiency evaporator fan motors for walk in or reach in cases	Energy Savings (MWh/year)	99	118	128	138	148	632
	Demand Reduction (MW)	0.012	0.015	0.016	0.017	0.018	0.077
	Projected Participation	215	258	279	301	322	1,376
Evaporator Fan controllers	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.003
	Projected Participation	3	3	3	3	3	13
Anti-sweat heater controls	Energy Savings (MWh/year)	14	17	18	19	21	88
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.010
	Projected Participation	5	7	7	8	8	35
Variable speed refrigeration compressor	Energy Savings (MWh/year)	0.01	0.01	0.01	0.01	0.01	0.06
	Demand Reduction (MW)	0.000001	0.000002	0.000002	0.000002	0.000002	0.000008
	Projected Participation	0.0	0.1	0.1	0.1	0.1	0.3
Strip curtains for walk-in freezers and coolers	Energy Savings (MWh/year)	1	1	1	2	2	7

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0010
	Projected Participation	0.1	0.2	0.2	0.2	0.2	0.9
Night covers for display cases	Energy Savings (MWh/year)	0.002	0.002	0.002	0.002	0.003	0.011
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	0.0	0.1	0.1	0.1	0.1	0.3
Auto door closers	Energy Savings (MWh/year)	0.3	0.3	0.3	0.4	0.4	1.7
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0002	0.0006
	Projected Participation	0.2	0.3	0.3	0.3	0.4	1.6
Door gaskets for walk-in and reach-in coolers and freezers	Energy Savings (MWh/year)	0.2	0.2	0.2	0.2	0.2	1.0
	Demand Reduction (MW)	0.00002	0.00003	0.00003	0.00003	0.00003	0.00014
	Projected Participation	1	1	1	1	1	5
Low or No anti-sweat heat for reach-in freezers and coolers	Energy Savings (MWh/year)	0.0	0.1	0.1	0.1	0.1	0.3
	Demand Reduction (MW)	0.00001	0.00001	0.00001	0.00001	0.00001	0.00003
	Projected Participation	0.1	0.1	0.1	0.1	0.1	0.6
Refrigerated Display cases with doors replacing open cases	Energy Savings (MWh/year)	0.3	0.3	0.3	0.4	0.4	1.6
	Demand Reduction (MW)	0.00003	0.00004	0.00004	0.00004	0.00005	0.00020
	Projected Participation	1	1	1	1	1	5
Adding doors to existing refrigerated display cases	Energy Savings (MWh/year)	0	1	1	1	1	3
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	1	1	2	2	2	7
ENERGY STAR Ice machines	Energy Savings (MWh/year)	2	2	2	3	3	12
	Demand Reduction (MW)	0.000	0.000	0.001	0.001	0.001	0.003
	Projected Participation	1	2	2	2	2	8
Beverage machine controls	Energy Savings (MWh/year)	0.1	0.1	0.1	0.1	0.1	0.4
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	0.0	0.1	0.1	0.1	0.1	0.3
ENERGY STAR Office equipment	Energy Savings (MWh/year)	0.5	0.5	0.5	0.5	0.5	2.4
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	6	6	6	6	6	30

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Cycling refrigerated thermal mass dryer	Energy Savings (MWh/year)	0.03	0.03	0.03	0.03	0.03	0.16
	Demand Reduction (MW)	0.00001	0.00001	0.00001	0.00001	0.00001	0.00003
	Projected Participation	1	1	1	1	1	3
No-loss condensate drains	Energy Savings (MWh/year)	3	3	3	3	3	14
	Demand Reduction (MW)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0024
	Projected Participation	1	1	1	1	1	7
Variable speed drive air compressor	Energy Savings (MWh/year)	0.3	0.3	0.3	0.3	0.3	1.5
	Demand Reduction (MW)	0.00005	0.00005	0.00005	0.00005	0.00005	0.00024
	Projected Participation	0.4	0.4	0.4	0.4	0.4	2.2
High efficiency ventilation fans with and w/o thermostats	Energy Savings (MWh/year)	0.3	0.3	0.3	0.3	0.3	1.6
	Demand Reduction (MW)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	Projected Participation	1	1	1	1	1	4
VSD Controller on dairy vacuum pumps	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0017
	Projected Participation	0.3	0.3	0.3	0.3	0.3	1.5
Lighting Improvements for Midstream	Energy Savings (MWh/year)	15,644	15,573	15,004	14,436	14,182	74,838
	Demand Reduction (MW)	2.916	2.903	2.797	2.691	2.644	13.950
	Projected Participation	17,869	17,787	17,138	16,488	16,198	85,480
Lighting Improvements for Midstream	Energy Savings (MWh/year)	847	843	812	781	767	4,050
	Demand Reduction (MW)	0.172	0.171	0.165	0.158	0.156	0.821
	Projected Participation	17,869	17,787	17,138	16,488	16,198	85,480
HVAC Systems Midstream	Energy Savings (MWh/year)	271	542	678	678	678	2,846
	Demand Reduction (MW)	0.047	0.094	0.118	0.118	0.118	0.495
	Projected Participation	42	84	105	105	105	441
Ductless mini-split heat pumps < 5.4 tons Midstream	Energy Savings (MWh/year)	57	113	142	142	142	595
	Demand Reduction (MW)	0.005	0.009	0.011	0.011	0.011	0.048
	Projected Participation	10	20	26	26	26	107
ENERGY STAR Ice machines Midstream	Energy Savings (MWh/year)	2	2	2	2	2	8
	Demand Reduction (MW)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0015
	Projected Participation	1	1	1	1	1	4

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
ENERGY STAR Commercial fryer Midstream	Energy Savings (MWh/year)	2	2	2	2	2	11
	Demand Reduction (MW)	0.0004	0.0004	0.0004	0.0004	0.0004	0.0019
	Projected Participation	1	1	1	1	1	4
ENERGY STAR Commercial hot food holding cabinet Midstream	Energy Savings (MWh/year)	2	2	2	2	2	8
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0012
	Projected Participation	1	1	1	1	1	4
High efficiency ventilation fans with and w/o thermostats Midstream	Energy Savings (MWh/year)	0	1	1	1	1	4
	Demand Reduction (MW)	0.0001	0.0001	0.0002	0.0002	0.0002	0.0007
	Projected Participation	1	2	2	2	2	8
VSD Controller on dairy vacuum pumps Midstream	Energy Savings (MWh/year)	1	3	3	3	3	14
	Demand Reduction (MW)	0.0002	0.0003	0.0004	0.0004	0.0004	0.0018
	Projected Participation	0.1	0.3	0.3	0.3	0.3	1.4
Adding doors to existing refrigerated display cases Direct Discount	Energy Savings (MWh/year)	1	1	2	2	2	7
	Demand Reduction (MW)	0.0001	0.0002	0.0002	0.0002	0.0002	0.0008
	Projected Participation	1	3	4	4	4	16
Air tanks for Load/No load compressors Direct Discount	Energy Savings (MWh/year)	0.1	0.2	0.2	0.2	0.2	0.7
	Demand Reduction (MW)	0.00001	0.00002	0.00002	0.00002	0.00002	0.00011
	Projected Participation	0.2	0.4	0.4	0.4	0.4	1.9
Air-entraining air nozzle Direct Discount	Energy Savings (MWh/year)	4	4	4	5	4	22
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.001	0.003
	Projected Participation	2	2	2	3	2	11
Anti-sweat heater controls Direct Discount	Energy Savings (MWh/year)	88	183	204	225	226	928
	Demand Reduction (MW)	0.010	0.020	0.022	0.025	0.025	0.102
	Projected Participation	28	58	65	72	72	295
Auto door closers Direct Discount	Energy Savings (MWh/year)	15	26	27	27	26	120
	Demand Reduction (MW)	0.005	0.009	0.009	0.009	0.009	0.042
	Projected Participation	11	19	19	20	19	88
Beverage machine controls Direct Discount	Energy Savings (MWh/year)	13	18	18	16	16	82
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	9	13	13	12	12	58

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Compressed air controller Direct Discount	Energy Savings (MWh/year)	0.2	0.2	0.2	0.3	0.3	1.2
	Demand Reduction (MW)	0.00002	0.00004	0.00004	0.00004	0.00004	0.00018
	Projected Participation	1	1	1	1	1	6
Compressed air low pressure drop filters Direct Discount	Energy Savings (MWh/year)	0.02	0.02	0.02	0.02	0.02	0.08
	Demand Reduction (MW)	0.000002	0.000002	0.000002	0.000002	0.000002	0.000012
	Projected Participation	0.4	0.4	0.4	0.4	0.4	2.1
Compressed air mist eliminators Direct Discount	Energy Savings (MWh/year)	0.02	0.02	0.02	0.02	0.02	0.08
	Demand Reduction (MW)	0.000002	0.000002	0.000002	0.000002	0.000002	0.000012
	Projected Participation	0.2	0.2	0.2	0.2	0.2	1.1
Cycling refrigerated thermal mass dryer Direct Discount	Energy Savings (MWh/year)	0.01	0.01	0.01	0.01	0.01	0.06
	Demand Reduction (MW)	0.000002	0.000002	0.000002	0.000002	0.000002	0.000009
	Projected Participation	0.2	0.2	0.2	0.2	0.2	1.1
Economizer controls Direct Discount	Energy Savings (MWh/year)	6	12	12	12	6	46
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	0	1	1	1	0	3
Evaporator Fan controllers Direct Discount	Energy Savings (MWh/year)	1	1	1	1	1	4
	Demand Reduction (MW)	0.0002	0.0002	0.0002	0.0003	0.0003	0.0011
	Projected Participation	1	1	1	1	1	4
High efficiency evaporator fan motors for walk in or reach in cases Direct Discount	Energy Savings (MWh/year)	4	8	9	10	10	41
	Demand Reduction (MW)	0.000	0.001	0.001	0.001	0.001	0.005
	Projected Participation	7	14	16	18	18	73
LED Refrigeration Display Case Lighting Direct Discount	Energy Savings (MWh/year)	32	56	54	53	49	245
	Demand Reduction (MW)	0.005	0.009	0.008	0.008	0.007	0.037
	Projected Participation	70	122	118	115	107	533
Lighting Controls Direct Discount	Energy Savings (MWh/year)	37	64	63	61	57	282
	Demand Reduction (MW)	0.007	0.012	0.012	0.012	0.011	0.054
	Projected Participation	42	73	71	69	64	320
Lighting Improvements Direct Discount	Energy Savings (MWh/year)	18,104	18,670	18,104	17,538	16,972	89,388
	Demand Reduction (MW)	2.592	2.673	2.592	2.511	2.430	12.800
	Projected Participation	168	174	168	163	158	831

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Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Low Flow Pre-rinse Sprayers Direct Discount	Energy Savings (MWh/year)	11	13	13	13	13	62
	Demand Reduction (MW)	0.002	0.002	0.002	0.002	0.002	0.010
	Projected Participation	11	13	13	13	13	61
No-loss condensate drains Direct Discount	Energy Savings (MWh/year)	1	1	1	1	1	5
	Demand Reduction (MW)	0.0001	0.0002	0.0002	0.0002	0.0002	0.0007
	Projected Participation	0.2	0.4	0.4	0.4	0.4	1.9
Refrigerated case light occupancy sensors Direct Discount	Energy Savings (MWh/year)	0.02	0.03	0.03	0.03	0.03	0.13
	Demand Reduction (MW)	-	-	-	-	-	-
	Projected Participation	6	10	9	9	9	43
Strip curtains for walk-in freezers and coolers Direct Discount	Energy Savings (MWh/year)	4	6	8	10	12	40
	Demand Reduction (MW)	0.001	0.001	0.001	0.001	0.002	0.005
	Projected Participation	0	1	1	1	1	4
Variable speed drive air compressor Direct Discount	Energy Savings (MWh/year)	2	4	4	4	4	17
	Demand Reduction (MW)	0.000	0.001	0.001	0.001	0.001	0.003
	Projected Participation	3	4	4	5	4	20
Variable speed refrigeration compressor Direct Discount	Energy Savings (MWh/year)	1	1	1	1	2	6
	Demand Reduction (MW)	0.0001	0.0002	0.0002	0.0002	0.0002	0.0008
	Projected Participation	3	5	6	6	7	27
Lighting Improvements Direct Install	Energy Savings (MWh/year)	1,623	1,894	1,860	1,826	1,758	8,962
	Demand Reduction (MW)	0.233	0.272	0.267	0.262	0.252	1.286
	Projected Participation	758	884	868	852	821	4,182
Low Flow Pre-rinse Sprayers Direct Install	Energy Savings (MWh/year)	105	157	167	172	167	768
	Demand Reduction (MW)	0.018	0.028	0.029	0.030	0.029	0.135
	Projected Participation	126	189	202	208	202	928

¹ To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

² Total values may not equal the sum of all program year values due to rounding.

Custom Component

The Custom component is the same for both large C&I and small C&I customers unless noted otherwise.

Description

Through the Custom component, PPL Electric Utilities will offer incentives to support completion of complex and comprehensive projects that involve measures not covered by the Efficient Equipment component. These measures include, but are not limited to, operational process improvements, retro-commissioning, equipment optimization, CHP, solar, advanced lighting controls, compressed air, and other custom measures.

As with Efficient Equipment, PPL Electric Utilities' Custom component will be offered through a downstream approach. The Non-Residential CSP will work with customers and trade allies to identify and qualify custom projects. Customers or trade allies will submit applications for review. Eligible projects will be processed, and incentives will be paid upon project completion and final savings review.

In Phase IV, an HVAC Optimization delivery channel will be added to serve customers with packaged HVAC systems. The Non-Residential CSP will work with a network of trade allies to implement this channel to produce additional, cost-effective energy and peak demand savings. A Strategic Energy Management ("SEM") offering may also be implemented at some time during Phase IV. Though the SEM would be a measure in the Custom component, incentive levels may differ from the standard custom incentive amount.

Objectives

The objectives of the Custom component are:

- Provide energy and peak demand-savings opportunities and incentives to qualified customers.
- Encourage customers to take a comprehensive, whole-facility approach to energy efficiency by installing high-efficiency custom measures or processes.
- Encourage qualifying equipment repairs, optimization, and operational or process changes that reduce electricity consumption.
- Increase customer awareness of the features and benefits of energy efficient equipment.
- Support emerging technologies and nontypical efficiency solutions in cost-effective applications.
- Encourage advanced energy efficiency strategies required for certification by national market transformation programs such as Leadership in Energy and Environmental Design ("LEED"), Architecture 2030, or ENERGY STAR Buildings.
- Engage trade allies to stock, promote, and provide high-efficiency technology options to customers.
- Promote other PPL Electric Utilities energy efficiency components.

- Collect energy, peak demand, and operating data from customers, as required to confirm customer and measure eligibility and to determine energy and peak demand savings and cost-effectiveness.
- Achieve a total energy reduction of approximately 601,221 MWh/year and 82 MW²⁷ gross verified savings that will target large C&I and small C&I customers, or business types.

Implementation Strategy

The Non-Residential CSP will deliver the Custom component, promoting the various energy efficiency options available to the non-residential customer segment with a range of marketing and outreach tactics. The Custom component relies on projects being initiated by customers, trade allies, distributors, and the Non-Residential CSP. The Non-Residential CSP will build on trade ally and distributor relationships to co-market energy efficient equipment and the value of participation.

For custom measures, the Non-Residential CSP will work directly with trade allies and customers to help identify, develop, and implement custom projects. The Non-Residential CSP will develop project scopes, analyze costs, determine potential energy and peak demand savings of proposed projects, conduct field verification of completed projects, and help determine the reported energy and peak demand savings from installed projects. The EM&V CSP will conduct independent evaluations to determine verified savings. The Non-Residential CSP will develop, update, and process rebate applications and payments. PPL Electric Utilities will manage the Non-Residential CSP.

Key steps include the following:

- Educate customers on energy efficiency opportunities and direct them to the appropriate path through marketing activities, the website, or direct contact with equipment distributors or equipment installation contractors/trade allies.
- Have customers complete applications or work with customers, equipment/appliance retailers, midstream distributors, and installation contractors to complete program applications.
- Ensure customers/contractors submit the required documentation for processing.
- Review pending and completed project documentation to verify applicant is a PPL Electric Utilities customer and the completed project and installed equipment meet eligibility criteria.
- When possible, work with customers to confirm project preapproval before ordering energy efficiency equipment.
- Recruit and develop an effective trade ally network.
- Process applications and issue rebates for qualified projects/equipment.
- Verify completed equipment/appliance installation for a sample of participants to confirm component integrity as part of M&V.

²⁷Peak Demand is at generation.

Issues, Risks, and Risk Management Strategy

Table 46 presents market risks associated with the Custom component and strategies PPL Electric Utilities will use to manage each risk.

Table 46. Custom Component Issues, Risks, and Risk Management Strategies

Component Issue	Risk	Risk Management Strategies
Customer or building owner does not prioritize energy efficiency.	<ul style="list-style-type: none"> • Decision-makers choose to install cheaper, less efficient equipment with shorter payback/IRR, resulting in lower savings. • Owners are not informed about how their facility uses energy. • Existing debt may limit funds to purchase new efficient equipment. • Customers place a priority on fluctuating commodity prices. 	<ul style="list-style-type: none"> • PPL Electric Utilities offers incentives and programs to reduce payback and IRR for business owners. • Non-Residential CSP offers planning assistance to enhance energy savings. • Non-Residential CSP educates customers about the long-term benefits of energy efficiency, available incentives, and other components.
Customers typically replace equipment only upon failure.	<ul style="list-style-type: none"> • Customers see no need to replace functioning equipment. • Customers are not informed about the most efficient equipment available when the need to replace it is immediate. Some efficient equipment may have a longer delivery time that would affect customer operations. 	<ul style="list-style-type: none"> • Non-Residential CSP educates trade allies and customers about available energy efficient choices before equipment fails and encourages businesses to plan for equipment replacement. • PPL Electric Utilities provides incentives for trade allies to stock, promote, and install efficient measures.
Customers are unaware of the benefits of installing and properly maintaining energy efficient equipment.	<ul style="list-style-type: none"> • Customers do not properly maintain equipment, and savings benefits erode over time. 	<ul style="list-style-type: none"> • Non-Residential CSP promotes the importance and value of equipment maintenance and training.

Anticipated Costs to Participating Customers

Costs incurred by customers participating in the Custom component will vary based on the specific type of efficient equipment installed.

Ramp-Up Strategy

The Custom component is an existing, mature offering being carried forward from Phase III. The Non-Residential CSP will develop marketing material to facilitate the transition to Phase IV. The Non-Residential CSP has developed a transitional strategy to bridge incentives for customers whose participation spans Phase III and Phase IV.

PPL Electric Utilities expects to implement the following transition plan between Phase III and Phase IV:

- Projects on the Phase III waitlist will receive comparable incentives if completed and installed early in Phase IV. Comparable is defined as the Phase III rebate, up to \$0.05 (Efficient Equipment), \$0.06 (Custom)/annual kWh saved and subject to Phase III per project or per

customer incentive caps. Projects must be completed by August 31, 2021, for most measures. PPL Electric Utilities will consider exceptions to that deadline on a case-by-case basis, depending on the project details.

- Projects approved (funds reserved) in Phase III that are installed (placed in service) in early Phase IV may be eligible for the approved Phase III rebate and will be accounted for as Phase IV projects.

Marketing Strategy

PPL Electric Utilities will work with the Non-Residential CSP to develop and execute a marketing plan that captures sector-level economies of scale and employs targeted outreach where practical. The marketing strategy may include the following:

- Take advantage of trade ally and manufacturer relationships to co-market energy efficient equipment and products.
- Host webinars.
- Participate in trade shows and other outreach events.
- Communicate and provide access to program component information on the Company's EE&C website.
- Promote the components in newsletters.
- Advertise using newspaper, radio, direct mail, bill inserts, cross component advertisements, commercial ads, and other mass media.
- Coordinate advertising opportunities with trade allies.
- Conduct one-on-one marketing to small C&I customers through trade allies, business accounts specialists, and Non-Residential CSP outreach.
- Target marketing to facility managers, building or process engineers, building owners and managers associations, HVAC contractors, energy services firms, architects and engineers, real estate developers, economic development organizations, customer advocacy groups, trade associations, and other trade allies to encourage installation of new energy efficient technologies and adoption of best-operating practices.
- Provide specific outreach to individual tenants as well as building owners and property managers in leased commercial buildings to encourage participation.
- Target specific sectors identified as having a high unrealized energy efficiency potential.
- Publish marketing materials including charts, brochures, and case studies.
- Provide newsletters and coordinate with key market partners, including trade associations and agencies.
- Use limited time offers, special promotions, and no-cost measures to promote energy efficiency.
- Offer trade ally incentives and rewards.
- Cross-promote through other PPL Electric Utilities energy efficiency components.
- Provide information and training on specific technologies directed towards niche markets.
- Incorporate customers in area- or territory-focused promotions.

- Work with distributors to promote and encourage purchases of efficient equipment to capture savings opportunities missed by other outreach methods.

Eligible Measures and Incentive Strategy

PPL Electric Utilities will offer rebates and incentives to qualified customers (or trade allies, depending on the delivery channel) who submit completed applications and documentation of the efficiency measures installed. Customers will have the option to assign rebate payments to a third party.

PPL Electric Utilities offers performance incentives based on the avoided or reduced kWh/year or kW peak demand reductions resulting from the project. Incentives may be capped at 50% to 100% of the total project costs (excluding internal labor) or \$500,000 and are subject to an annual cap for each project and each participating customer. The per-customer-site cap is defined as one building with one or more meters. A parent company cap of \$1 million per year will apply to a campus setting or multiple buildings (on the same property or in different locations) with a common owner. For all measures offered through the Custom component, PPL Electric Utilities will provide incentives in the range of \$0.02 to \$0.22 per annual kWh saved and/or \$30 to \$1,200 per kW peak demand.

Table 47 and Table 48 lists PPL Electric Utilities' proposed measures and minimum eligibility qualifications for large C&I and small C&I, respectively.

Table 47. Pa PUC Table 7-Large C&I Custom Eligible Measures and Incentives

Measure	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{1,2}
Custom Combined Heat and Power	Per Project	No	Preapproval is required for all CHP projects.	\$2,174,821	15	\$180,043	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom HVAC Optimization	Per Product	No	Applies to documented tune-ups for package or split systems up to 20 tons. All HVAC applications other than comfort cooling and heating, such as process cooling, are ineligible for this measure. Preapproval is required for all custom projects.	\$263	3	\$329	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Compressed Air Retrofit	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$57,969	15	\$18,543	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom Horticultural Lighting	Per Project	No	Agricultural Application: Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$71,602	15	\$28,686	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom VFD Improvements	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$140,710	15	\$26,752	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom Refrigeration	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$43,554	15	\$3,306	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{1,2}
Custom Process Improvement	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$215,583	15	\$38,684	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom HVAC	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$711,897	15	\$34,642	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom Solar	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$1,169,564	15	\$119,881	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
LCI-Behavioral operational improvements	Per Project	No	Must be PPL Electric Utilities customer	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.² PPL Electric Utilities does not pay incentives on a per unit basis, but rather on a cents per kWh/yr and/or dollars per kW basis.

³ Note that incentive rates may vary due to availability of program funds and/or changes made to encourage participation in a certain measure.

Table 48. Pa PUC Table 7-Small C&I Custom Eligible Measures and Incentives

Measure	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) ^{1,2}
Custom Combined Heat and Power	Per Project	No	Preapproval is required for all CHP projects.	\$2,174,821	15	\$180,043	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom HVAC Optimization	Per Product	No	Applies to documented tune-ups for package or split systems up to 20 tons. All HVAC applications other than comfort cooling and heating, such as process	\$263	3	\$329	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

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Measure	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) <small>1,2</small>
			cooling, are ineligible for this measure. Preapproval is required for all custom projects.				
Compressed Air Retrofit	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$57,997	15	\$18,543	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom Horticultural Lighting	Per Project	No	Agricultural Application: Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$71,602	15	\$28,686	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom VFD Improvements	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$148,642	15	\$26,752	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom Refrigeration	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$43,554	15	\$3,306	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom Process Improvement	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$215,689	15	\$38,684	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom HVAC	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$423,863	15	\$34,642	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

Section 3 Program and Component Descriptions

Measure	Unit	Low-Income Measure (Yes/No)	Eligibility Requirements	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit) <small>1,2</small>
Custom Solar	Per Project	No	Per project cap will range from \$250,000 to \$500,000 per customer site per year or \$1 million per parent company per year for customers with multiple sites. Incentive cannot exceed 50% - 100% of the total project cost (excluding internal labor). Preapproval is required for all custom projects.	\$1,169,564	15	\$119,881	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
Custom HVAC Optimization Direct Discount	Per Product	No	Applies to documented tune-ups for package or split systems up to 20 tons. All HVAC applications other than comfort cooling and heating, such as process cooling, are ineligible for this measure. Preapproval is required for all custom projects.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings
SCI-Behavioral operational improvements	Per Project	No	Must be PPL Electric Utilities customer.	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kW first year savings

¹ All eligible measures are listed in this table regardless of participation projections. N/A indicates measure may be offered in future program years but not at the launch of Phase IV.² PPL Electric Utilities does not pay incentives on a per unit basis, but rather on a cents per kWh/yr and/or dollars per kW basis.

³ Note that incentive rates may vary due to availability of program funds and/or changes made to encourage participation in a certain measure.

For Custom measures, projects must meet a minimum TRC of 0.7 for CHP and a minimum TRC of 0.85 for other types of projects (non-CHP). PPL Electric Utilities may implement a new minimum TRC requirement for projects if it is necessary to help ensure the Non-Residential Program or portfolio TRC is greater than 1.0. PPL Electric Utilities will notify customers, trade allies, and stakeholders at least 60 days before the effective date of a change in the TRC requirement. Any TRC requirement would be in effect for new applications submitted after the effective date.

All measures may not be available at all times. PPL Electric Utilities may suspend a measure depending on popularity, pace of the component savings and costs, free ridership, evaluation requirements, complexity of the information required from customers, administrative requirements for the measure, or other reasons. PPL Electric Utilities will review the component continually and may adjust available measures or eligibility qualifications to achieve savings and cost budgets.

PPL Electric Utilities may offer tiered incentives that encourage the installation of multiple measures or a more comprehensive whole facility approach. Measures, eligibility requirements, and incentives may change to reflect progress, changes in the TRM, market conditions, or other factors. PPL Electric Utilities shall strive to keep the rebates and per-site caps as consistent as possible while recognizing the need to adjust incentives and caps to control the pace of components within their savings and cost budgets.

Deadline for Rebate Applications

The rebate application website and portal will state the deadline for its submission. The deadline will not exceed 180 days from the date the measure was installed.. For Custom measures, PPL Electric Utilities will require preapproval to allow it (or the Non-Residential CSP) sufficient time to qualify the project, minimize free ridership, screen for cost-effectiveness, determine the site-specific M&V plan, and conduct any required pre-metering.

Start Date with Key Schedule Milestones

Table 49 lists the estimated key schedule milestones for the Custom component. PPL Electric Utilities will lead implementation or provide management oversight of all tasks.

Table 49. Custom Component Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to Pa PUC
6/01/2021	Launch Phase IV component
Annually starting 01/15/2022	EDCs submit semiannual program report
Annually starting 09/30/2022	EDCs submit final annual program report
05/31/2026	Program ends

Evaluation, Measurement, and Verification

The EM&V requirements will be detailed in PPL Electric Utilities’ Evaluation Plan, which will be submitted to the SWE for review. PPL Electric Utilities and its EM&V CSP will conduct annual evaluations of each component in compliance with all Pa PUC requirements and the Evaluation Framework. As part

of this process, the EM&V CSP will review a sample of participant rebate applications and CSP records to verify quantity, efficiency level, and qualifying equipment. The EM&V CSP will follow all applicable methods in the TRM and the Evaluation Framework to calculate energy savings and peak demand reduction.

For the Custom component, PPL Electric Utilities anticipates conducting annual impact and process evaluations (activities vary by year).

The EM&V CSP will develop an evaluation plan and sampling protocol that fits the Custom component and all associated delivery channels. The EM&V CSP will review a sample of participant and CSP records to verify quantity, efficiency level, and qualifying equipment. On-site assessment may be included as a verification activity. The EM&V CSP will also develop an evaluation plan and sampling protocol that fits the Custom component and develop site-specific EM&V plans to meet Act 129 evaluation requirements.

Administrative Requirements

The Non-Residential CSP will administer and provide operational management of the Custom component. PPL Electric Utilities will provide oversight and operational support to establish effective deployment.

Estimated Participation

Table 50 and Table 51 show the order of magnitude participation estimates for the Large and Small C&I Custom component. Actual quantities will vary, and PPL Electric Utilities will manage the component to stay within budget.

Table 50. Pa PUC Table 8-Large C&I Custom Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Custom Combined Heat and Power	Energy Savings (MWh/year)	8,805	8,805	8,805	8,805	8,805	44,025
	Demand Reduction (MW)	1.274	1.274	1.274	1.274	1.274	6.369
	Projected Participation	3	3	3	3	3	16
Custom HVAC Optimization	Energy Savings (MWh/year)	160	160	160	160	160	801
	Demand Reduction (MW)	0.077	0.077	0.077	0.077	0.077	0.386
	Projected Participation	105	105	105	105	105	524
Compressed Air Retrofit	Energy Savings (MWh/year)	11,413	11,869	12,782	12,782	12,782	61,629
	Demand Reduction (MW)	1.443	1.500	1.616	1.616	1.616	7.790
	Projected Participation	35	36	39	39	39	187
Custom Horticultural Lighting	Energy Savings (MWh/year)	432	432	432	432	432	2,160
	Demand Reduction (MW)	0.089	0.089	0.089	0.089	0.089	0.446
	Projected Participation	1	1	1	1	1	7
Custom VFD Improvements	Energy Savings (MWh/year)	15,243	17,148	17,783	17,783	17,783	85,739
	Demand Reduction (MW)	1.998	2.248	2.331	2.331	2.331	11.239
	Projected Participation	33	37	39	39	39	187
Custom Refrigeration	Energy Savings (MWh/year)	3,068	3,452	3,580	3,580	3,580	17,260
	Demand Reduction (MW)	0.247	0.278	0.288	0.288	0.288	1.389
	Projected Participation	33	37	39	39	39	187
Custom Process Improvement	Energy Savings (MWh/year)	24,968	28,089	29,130	29,130	29,130	140,447
	Demand Reduction (MW)	2.690	3.026	3.138	3.138	3.138	15.129
	Projected Participation	33	37	39	39	39	187
Custom HVAC	Energy Savings (MWh/year)	19,041	21,421	22,214	22,214	22,214	107,104

Section 3 Program and Component Descriptions

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
	Demand Reduction (MW)	2.575	2.897	3.004	3.004	3.004	14.486
	Projected Participation	33	37	39	39	39	187
Custom Solar	Energy Savings (MWh/year)	1,258	1,258	1,258	1,258	1,258	6,291
	Demand Reduction (MW)	0.373	0.373	0.373	0.373	0.373	1.865
	Projected Participation	1	1	1	1	1	7

¹To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

²Total values may not equal the sum of all program year values due to rounding.

Table 51. Pa PUC Table 8-Small C&I Custom Projected Participation ¹

Measure	Metric	PY13	PY14	PY15	PY16	PY17	Total ²
Custom Combined Heat and Power	Energy Savings (MWh/year)	2,935	2,935	2,935	2,935	5,870	17,610
	Demand Reduction (MW)	0.425	0.425	0.425	0.425	0.849	2.547
	Projected Participation	1	1	1	1	2	6
Custom HVAC Optimization	Energy Savings (MWh/year)	569	569	569	569	569	2,843
	Demand Reduction (MW)	0.274	0.274	0.274	0.274	0.274	1.370
	Projected Participation	372	372	372	372	372	1,859
Compressed Air Retrofit	Energy Savings (MWh/year)	2,283	2,739	3,652	3,652	3,652	15,978
	Demand Reduction (MW)	0.289	0.346	0.462	0.462	0.462	2.020
	Projected Participation	7	8	11	11	11	49
Custom Horticultural Lighting	Energy Savings (MWh/year)	432	432	432	432	432	2,160
	Demand Reduction (MW)	0.089	0.089	0.089	0.089	0.089	0.446
	Projected Participation	1	1	1	1	1	7
Custom VFD Improvements	Energy Savings (MWh/year)	3,176	3,811	5,081	5,081	5,081	22,229
	Demand Reduction (MW)	0.416	0.500	0.666	0.666	0.666	2.914
	Projected Participation	7	8	11	11	11	49
Custom Refrigeration	Energy Savings (MWh/year)	511	895	1,023	1,023	1,023	4,475
	Demand Reduction (MW)	0.041	0.072	0.082	0.082	0.082	0.360
	Projected Participation	6	10	11	11	11	49
Custom Process Improvement	Energy Savings (MWh/year)	4,161	7,282	8,323	8,323	8,323	36,412
	Demand Reduction (MW)	0.448	0.784	0.897	0.897	0.897	3.922
	Projected Participation	6	10	11	11	11	49
Custom HVAC	Energy Savings (MWh/year)	3,173	5,554	6,347	6,347	6,347	27,768
	Demand Reduction (MW)	0.429	0.751	0.858	0.858	0.858	3.756
	Projected Participation	6	10	11	11	11	48
Custom Solar	Energy Savings (MWh/year)	1,258	1,258	1,258	1,258	1,258	6,291
	Demand Reduction (MW)	0.373	0.373	0.373	0.373	0.373	1.865
	Projected Participation	1	1	1	1	1	7

¹To show numerical values in the Pa PUC Table 8 tables, deviation from the standard use of decimals throughout Section 3 may have been applied.

²Total values may not equal the sum of all program year values due to rounding.

4 Management and Implementation Strategies

4.1 Overview of EDC Management and Implementation Strategies

PPL Electric Utilities has over a decade of successfully managing and implementing its EE&C programs. It will apply this knowledge and experience, lessons learned, and best practices and will rely on the strong relationships it has built to deliver programs in Phase IV. Programs will be effectively managed by PPL Electric Utilities' EE&C staff and implemented by qualified CSPs.

4.1.1 Services to Be Provided by EDCs, Consultants, Trade Allies, and CSPs

For its implementation strategy, PPL Electric Utilities relies on qualified CSPs, preferred partners, trade allies, and other entities engaged in energy efficiency to promote, deliver, and support the deployment of its programs. PPL Electric Utilities' EE&C Plan will use CSPs to manage delivery of its residential, low-income, and non-residential (small and large C&I) programs. PPL Electric Utilities will use another CSP to provide EM&V services and will issue an RFP for a CSP to coordinate the sale of peak demand into the PJM FCM.

PPL Electric Utilities also depends on trade allies and other market partners to engage customers, promote the programs, evaluate projects, furnish and install energy efficient equipment, and provide ancillary energy efficiency services. PPL Electric Utilities will draw on the expertise available from trade allies, such as contractors and retailers, to support the local economy and allow customers to interact with the trade allies of their choice.

Conservation Service Providers

CSPs are individuals or firms registered with the Pa PUC that, pursuant to contract with EDCs, provide consultation, design, administration, management, and/or implementation services related to the delivery of EE&C program components. PPL Electric Utilities anticipates that CSPs will have a major role in delivering its Phase IV programs and their respective components.

As indicated in Table 52, implementation CSP roles involve the delivery of programs and their associated components and cross-program activities. PPL Electric Utilities will train its implementation CSPs on reporting requirements, use of the Company's data management and tracking system, customer service requirements, QA/QC standards, and protocols for addressing quality issues should they arise. PPL Electric Utilities will require all implementation CSPs to submit data and reports that include customer data and detailed information on installed measures and incentive transactions to support EM&V, tracking against the Plan budgets and goals, and reporting to the Commission.

To facilitate implementation of the Phase IV EE&C portfolio, PPL Electric Utilities will engage two CSPs—one will deliver the Residential and Non-Residential (small C&I and large C&I) Programs and one will deliver the Low-Income Program. Each will be responsible for implementing all program components in their designated sector(s), including overseeing subcontractors. An EM&V CSP will be responsible for independently evaluating the entire portfolio of EE&C programs and functions.

Table 52. Program Conservation Service Provider Implementation Roles and Responsibilities

Program Function			
Portfolio Planning	PPL Electric Utilities		
Research & Development			
Marketing Strategy			
CSP Management & Coordination			
Trade Ally Network Management	Residential CSP	Low-Income CSP	Non-Residential CSP
Marketing & Advertising			
Customer Intake & Routing			
Project Delivery			
Application Review & Approval			
Incentive Processing			
Customer Care			
QA/QC	Implementation CSPs, PPL Electric Utilities, and EM&V CSP		
Measurement & Verification	PPL Electric Utilities		
Program Tracking	EM&V CSP		
Evaluation and Pa PUC Annual/Mid-Year Reports			

PPL Electric Utilities will hire other companies, not classified as CSPs, to perform functions such as providing/hosting the tracking system, legal support, and marketing and advertising (overarching or specific campaigns other than the marketing and advertising provided by each implementation CSP).

Trade Allies

Trade allies provide products and services directly to customers in support of program components but are not under contract to PPL Electric Utilities. Examples of the types of trade allies PPL Electric Utilities will use to deliver its program components are:

- **Lighting and other contractors, retailers, distributors/dealers and installers** that provide sales, equipment or building diagnostics, audits, maintenance, and installation services for energy efficient equipment, such as lighting, energy management systems and controls, HVAC, water heaters, insulation, commercial and industrial equipment, and appliances. These trade allies will inform customers about PPL Electric Utilities’ applicable programs and rebates; provide essential information for customers to understand the costs and benefits of equipment or services and encourage customers to take advantage of PPL Electric Utilities’ program components.
- **Residential and commercial builders, developers, remodelers, contractors, architects, engineers, or other market participants** that design, develop, and build residential and commercial buildings and that will deliver services to support the Energy Efficient Home component and applicable Efficient Equipment components.
- **Technical engineering and energy services firms** that install energy efficiency projects for small and large C&I customers.

Market Partners

Market partners are independent entities that may provide support or services to PPL Electric Utilities’ customers, typically in an effort to achieve mutually beneficial results or to serve mutual target

populations. Market partners are not generally supported by Company funding and are not under contract to the Company. For example, schools that engage with PPL Electric Utilities' Student Energy Efficient Education component are considered market partners because they act as a conduit for reaching the school community, but they do not receive a direct financial benefit. Stakeholders and community based organizations are also market partners.

Preferred Partners

Preferred partners are service providers with whom the CSP has an agreement to perform services for a specific program component.

4.1.2 Performance, Technology, Market, and Evaluation Risks and Risk Management Strategies

As described previously, the MWh compliance targets set forth in the Implementation Order are lower than the Phase III goals, but the MW goals are higher and must be met within the same average cost cap. This means that the Phase IV program acquisition cost is slightly higher than in Phase III (\$0.246 annual kWh compared to \$0.20 in Phase III).

Though this slight improvement in acquisition cost could be expected to alleviate some risk associated with delivery of PPL Electric Utilities' EE&C portfolio and improve its ability to achieve its savings targets, as of the time of this Plan's development, the U.S. is facing unprecedented challenges and uncertainties that could significantly alter the program delivery environment.

PPL Electric Utilities has identified the following market risks:

- **Economic conditions.** The advent of the COVID-19 pandemic, and associated economic impacts, could have significant implications for PPL Electric Utilities' portfolio. As the pandemic has continued to pervade across the U.S., utilities and their customers in all sectors are facing related challenges on multiple fronts:
 - **Residential sector.** Although restrictive stay-at-home orders have been lifted in Pennsylvania, residential customers continue to be wary of participating in programs that involve at-home contractor visits. Many utilities, including PPL Electric Utilities, have introduced program modifications to protect customer health and safety (such as curbside appliance recycling pickup, expanded access to efficient products through mail or other alternative methods, and virtual energy audits), but programs that have historically relied on direct measure installation have seen significant reductions in participation. Furthermore, many residential customers have suffered job losses, wage disruptions, and evictions. Declining economic conditions now—or uncertainty about the future—may be limiting customers' ability to invest in nonessential efficiency upgrades.
 - **Low-income sector.** Lower-income individuals have borne a greater share of economic hardship than any other customer class; the COVID-19 pandemic is creating a larger low-income population and worsening the conditions for those already existing below the poverty line. In light of this situation, these customers will probably need help to reduce

their utility bills more than in typical years, yet they face the same risks and concerns about direct engagement with contractors in their homes.

- **Small commercial sector.** COVID-19 has had a profound, disruptive effect on businesses across the U.S. Small businesses have particularly suffered, with more than 100,000 businesses closed across the country. These conditions significantly reduce the population of potential PPL Electric Utilities program participants, and they are expected to create long-term adverse economic ripples across the state.
- **Supply disruptions.** In addition to the potentially catastrophic economic effects of the COVID-19 pandemic, equipment industry representatives are reporting supply chain disruptions that have implications for PPL Electric Utilities' programs. There are indicators that the pandemic has affected retail purchasing habits. Lighting sales are declining at traditional utility partner retailers like big box stores and shifting to grocery and drug stores while many other product sales are moving online. At the same time, industrial production in China has fallen significantly, affecting many efficient products such as lighting, thermostats, and other high-efficiency equipment.
- **Market dynamics.** In nearly every industry, customer choice, personalized services, and competitive pricing have become the norm. Customers are increasingly demanding that their service providers offer a variety of simple, low-cost options from which to customize their engagement experience and to communicate with them using a variety of digital and traditional platforms. To keep pace, the utility industry must continue to offer value, customized solutions, a personalized experience, and, increasingly, a total digital engagement solution. Additionally, reaching key energy decision-makers in non-residential sectors can present a special challenge to PPL Electric Utilities and its CSPs. Rental properties—both residential and commercial—entail barriers associated with split incentives.
- **Changing equipment standards.** Changing building codes and new equipment standards tend to lower baseline energy use, thereby reducing the potential savings from affected measures. The 2020 Phase IV Energy Efficiency and Peak Demand Reduction Market Potential Study illustrates this phenomenon. For example, lighting savings, which has historically been among the lowest cost resources, is expected to diminish in the residential sector and to a lesser extent in the small C&I and large C&I sectors. The 2020 Potential Study cited regulatory uncertainty impacting lighting savings resulting from the U.S. Energy Independence and Security Act of 2007 ("EISA") and, more recently, the DOE's December 2019 final determination that rescinds EISA and leaves the current efficiency standards for light bulbs in place.²⁸ Despite the December 2019 action, multiple lawsuits filed against DOE's decision, possible changes to the DOE in 2021, and a rapidly

²⁸ See U.S. Department of Energy, 2019. "Department of Energy Issues Final Determination for General Service Incandescent Lamps, Finds More Stringent Standards Are More Costly to the American People and Not Economically Justified." DOE news release, December 20. <https://www.energy.gov/articles/department-energy-issues-final-determination-general-service-incandescent-lamps-finds-more>.

transforming lighting market will almost certainly extend and may exacerbate the market uncertainty around the potential for lighting savings.

- **Distributed energy resources and storage.** A growing share of customers have installed distributed energy solutions, and more are planning to do so in the next few years. A recent study found that although only 4% of consumers currently own a rooftop solar system, 34% expressed interest in getting one.²⁹ Meanwhile, as storage costs decline, downstream meter storage will likely accelerate the rate of solar adoption, which will, in turn, impact utilities' load growth projections.
- **Focus on climate policy.** In light of differing priorities at the federal level, many states are enacting their own climate goals and policies. Twenty states and the District of Columbia have adopted specific greenhouse gas reduction targets and are experimenting with policies including carbon pricing, emission limits, and steps to promote cleaner transportation alternatives. The Pennsylvania Climate Action Plan, developed by the Climate Change Advisory Committee and submitted to Governor Wolf in 2019, recommends legislative changes to the General Assembly necessary to reach a goal of 26% reduction in greenhouse gas emissions by 2025 and 80% reduction by 2050, as required by the Pennsylvania Climate Change Act of 2008. The implications of any legislative action as a result of these recommendations on PPL Electric Utilities' ability to achieve its EE&C Plan objectives are as yet unknown. As state-level energy and environmental policy continues to evolve and become increasingly intertwined, PPL Electric Utilities expects to engage with its stakeholders, policymakers, and regulators to help ensure it can make a meaningful contribution to any future energy policy while still continuing to provide safe, affordable energy services to its customers.

4.1.3 Plans to Address Human Resource and Contractor Resource Constraints

PPL Electric Utilities' EE&C Plan balances program component delivery needs and resource allocation across an experienced pool of internal staff, CSPs, trade allies, and market partners. PPL Electric Utilities' professional staff has extensive experience and a proven record of success managing the CSPs that deliver program components and engaging with trade allies.

Over more than 10 years, PPL Electric Utilities has developed a robust network of trade allies to provide the proposed services, and the EE&C Plan continues to emphasize ongoing contractor recruitment, outreach, and training to maintain continued success. PPL Electric Utilities offers training so contractors are up to date on the latest technologies, program rules, and rebates being offered. Through its market research and engagement efforts, the Company frequently solicits feedback from its customers and contractors, especially contractors who meet face to face with customers, and this feedback has provided valuable insights on gaps in contractor resources that can be quickly resolved.

²⁹ Association of Energy Service Professionals and Essense Partners. *Distributed Energy Resources*. Part 3 of 4. October 2017.

The Company will assign managers and support staff to oversee its CSPs and the programs and their associated components. PPL Electric Utilities regularly evaluates workloads and staffing needs and makes adjustments if necessary.

A description of PPL Electric Utilities’ EE&C Plan management structure and an organizational chart are provided in Section 4.2.1.

4.1.4 Early Warning System

PPL Electric Utilities continually monitors program performance (such as savings and costs) through its tracking database, the CSPs’ tracking systems, and management oversight. PPL Electric Utilities and its EM&V CSP also regularly solicit customer and trade ally feedback and conduct other market research to monitor the portfolio’s compliance with the Company’s other corporate objectives. These mechanisms provide the means for promptly identifying programs or components that are not meeting their objectives.

4.1.5 Implementation Schedule with Milestones

On July 2, 2020, PPL Electric Utilities issued a competitive RFP for implementation CSPs, and on July 16 2020, issued a competitive RFP for an EM&V CSP. At the time of this filing, PPL Electric Utilities has selected its Residential, Low-Income, Non-Residential and EM&V CSPs. Most of the Phase IV program components are continuing from Phase III, and implementation will continue uninterrupted to facilitate the transition for customers and trade allies. Table 53 lists the key schedule milestones for the EE&C Plan.

Table 53. PPL Electric Utilities’ Phase IV Implementation Schedule and Milestones

Schedule	Milestones
11/30/2020	Phase IV EE&C Plan submitted to the Pa PUC
06/01/2021	Launch of all Phase IV energy efficiency programs
Annually starting 01/15/2022	EDCs submit semiannual program reports
Annually starting 09/30/2022	EDCs submit final annual program reports
05/31/2026	Programs end

4.1.6 Stakeholder Engagement

PPL Electric Utilities is committed to obtaining stakeholder input and consensus and to keeping customers, stakeholders, and the general public informed about the results of the energy efficiency programs and progress toward Plan goals. It meets regularly with its CSPs and trade allies to review Plan progress, consider new products and services, and/or identify opportunities to improve EE&C programs.

PPL Electric Utilities intends to continue to meet with other interested stakeholders as needed but not less than twice annually until May 31, 2026, to discuss progress, review results, and solicit input for possible changes to the EE&C Plan during Phase IV. The Company also provides Act 129 information,

including its EE&C Plan and semiannual and annual reports, in a dedicated stakeholder section on www.pplelectric.com. Additionally, the Company shares success stories with customers, trade allies, and the public by publishing and distributing case studies.

4.2 Executive Management Structure

4.2.1 Structures for Addressing Portfolio Strategy

PPL Electric Utilities staff will design, implement, and manage programs and associated components; oversee sector and cross-functional CSPs; and support the requirements of delivery, such as marketing, advertising, and customer education.

PPL Electric Utilities’ **Director – Customer Service Project Management** is responsible for PPL Electric Utilities’ Act 129 energy efficiency programs, non-Act 129 regulatory programs, and innovation delivery including the PPL Electric Utilities energy efficiency website.

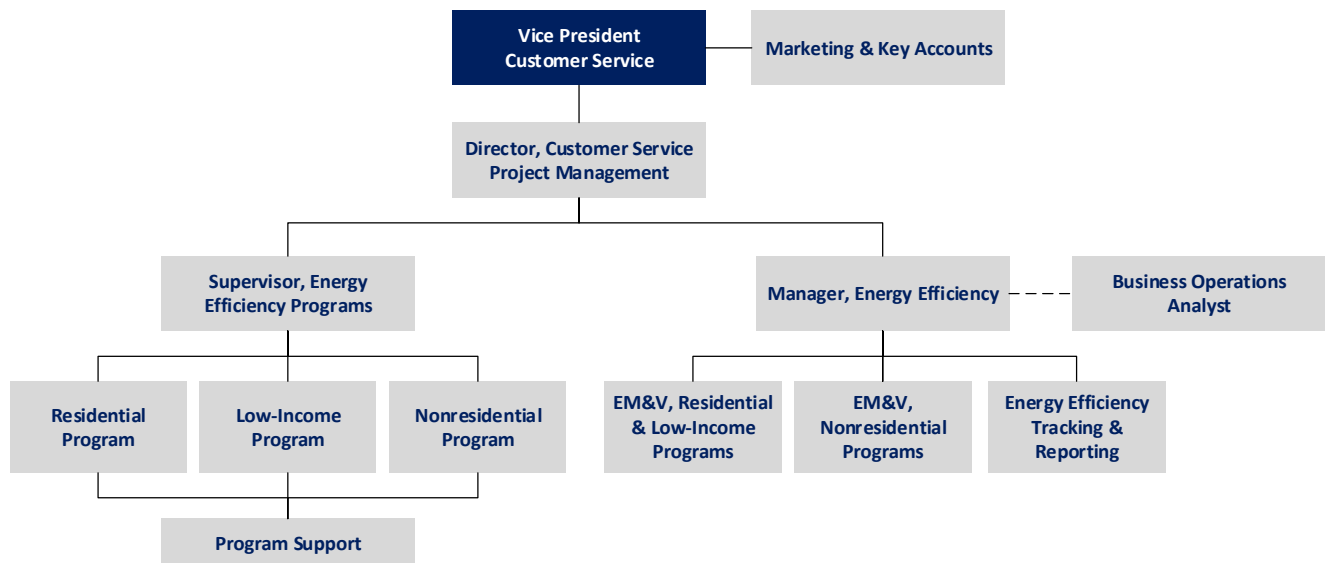
PPL Electric Utilities’ **Manager – Energy Efficiency** has overall responsibility for the development, implementation, operation, evaluation, reporting, and compliance of PPL Electric Utilities’ Act 129 energy efficiency programs.

PPL Electric Utilities’ **Program Manager** staff manages each program and the respective program implementation CSPs. PPL Electric Utilities’ Key Account Managers support and help promote the Non-Residential Program.

PPL Electric Utilities also has staff responsible for EE&C program administration, operational and technical support, program planning, and evaluation.

Figure 3 summarizes PPL Electric Utilities’ EE&C management structure.

Figure 3. PPL Electric Utilities EE&C Plan Management Structure



4.2.2 Approach to Overseeing the Performance of Subcontractors and Implementers

PPL Electric Utilities oversees its CSPs to confirm they meet the requirements of their contracts and performance expectations and, as needed, will modify programs and components (e.g., design, incentives, measures, marketing) to meet its savings, costs, cost-effectiveness, and customer satisfaction objectives. PPL Electric Utilities' oversight process includes the following elements:

- **Sector-level CSPs.** To reduce administrative costs and provide sufficient accountability for objectives, PPL Electric Utilities will use two CSPs that will have overall responsibility for their program and program components.
- **PPL Electric Utilities staff.** PPL Electric Utilities management and program staff are responsible for confirming that each program meets its objectives. They will continually monitor performance and oversee each program CSP.
- **EM&V CSP.** PPL Electric Utilities' EM&V CSP will provide independent evaluations of program components to verify impacts (such as savings, costs, and cost-effectiveness) and to determine if components are operating effectively.

4.2.3 Administrative Budget

Administrative costs include all utility costs to develop, implement, and manage the Plan, excluding payments to customers/trade allies (rebates and incentives). Administrative costs consist of all expenses associated with PPL Electric Utilities' labor and materials, CSP labor and material, marketing, QA/QC, EM&V, tracking systems, legal services, and the SWE. The cost of goods and services provided to low-income and other customers at no cost is classified as incremental measure costs, with offsetting incentives, as directed by the 2021 TRC Test Order.

4.3 Conservation Service Providers

4.3.1 Selected CSPs and Basis for Selection

PPL Electric Utilities issued RFPs for three sector-level implementation CSPs (for Residential, Non-Residential, and Low-Income) and one CSP to provide EM&V. PPL Electric Utilities conducted its RFP processes in accordance with the procedures approved by the Commission. At the time this EE&C Plan was submitted, PPL Electric Utilities was preparing the implementation CSP contracts.

4.3.2 Work and Measures Being Performed by CSPs

See Section 4.1.1 for a description of the work and measures being performed by CSPs. The CSPs' roles are also described within each individual component description in Section 3.

4.3.3 Pending RFPs

PPL Electric Utilities will solicit bids from qualified third-party vendors to provide technical support to nominate a portion of its peak demand reduction as a capacity resource in PJM's FCM. PPL Electric Utilities intends to issue the RFP in February 2021.

5 Reporting and Tracking Systems

PPL Electric Utilities' reporting and tracking system protocols are described below.

5.1 *Semiannual and Annual Reports*

PPL Electric Utilities will provide semiannual, annual, and *ad hoc* reports to the Commission and the SWE in accordance with the schedule, format, and content prescribed by the Commission and the SWE.

PPL Electric Utilities expects the schedule, format, and content to be comparable with Phase III reports.

5.2 *Project Management Tracking System*

5.2.1 Overview of Data Tracking System

PPL Electric Utilities will continue to use its tracking database to record energy efficiency transactions and calculate reported savings. PPL Electric Utilities uses its corporate accounting system to track all energy efficiency cost information at the program-component level and its tracking database and its corporate business intelligence system for internal analysis and internal reporting on energy efficiency activities. PPL Electric Utilities will modify these management and tracking systems as necessary to incorporate Phase IV changes to program components, reports to the Commission and the SWE, data extracts, and other requirements.

5.2.2 Software Format, Data Exchange Format, and Database Structure

PPL Electric Utilities' information system is based on a commercially available database platform, which enables program implementation CSPs to record and track all the data necessary to calculate energy savings impacts at all levels. Examples of data fields the system captures include these:

- Participant contact information
- Measure name
- Measure type
- Measure life and installed cost
- Number of measures installed
- Building and space type
- Space heating, cooling, and water heating fuel types
- Rebate amount
- Existing conditions and equipment

The information system will include the features and capabilities described below.

Database Structure

- Allows for multiple levels of data resolution (e.g., measure, project, premise, customer site, sector, program type, CSP).
- Allows users to navigate through layers of data (e.g., measures, project, program, component).
- Provides a place to store electronic documents related to program participants and other functions.
- Provides a straightforward interface for adding programs and components.

Functionality

- Records energy efficiency transaction information such as customer account number, unique record ID, installation date of the measure, description and parameters of the measure (e.g., quantity, size, efficiency rating, end use), program and component name, customer, sector, and data required to calculate savings, as well as other required information about each transaction
- Allows CSPs to file transactions via a secure web link or other secure method.
- Calculates and allocates reported gross savings to the program and component, customer sector, and reporting period.
- Allows data extracts to be securely exported to external parties such as PPL Electric Utilities' EM&V CSP and the SWE.

Data Quality Control

- Has intelligent use of drop-down lists, menus, and keyboard shortcuts.
- Allows data parameters (e.g., maximum/minimum) to be set for each data element to avoid erroneous entries.
- Checks for and alerts users to possible duplicate data entry before posting data.
- Provides an audit trail for all corrected data entry errors, deletions, etc.
- Tracks transactions and workflow.
- Generates standard and customized reports for PPL Electric Utilities' day-to-day portfolio analysis and management.

5.2.3 Mechanism for Access for Commission and Statewide EE&C Plan Evaluator

PPL Electric Utilities' information system provides accessibility to external parties through the following features.

- Is accessible through the Internet or direct links, as appropriate, and will be traceable, that is, maintaining a log of users' access.
- Controls access via security rights assigned to each user or groups of users.
- Allows for appropriate security (e.g., releases, encryption) of customer data.
- Allows varying levels of security-controlled access by PPL Electric Utilities staff, program CSPs, and system administrators. Direct access (read-only) is not recommended for Commission personnel, the SWE, or PPL Electric Utilities' EM&V CSP because they would need significant training to understand the system. PPL Electric Utilities provides data extracts to those parties instead.

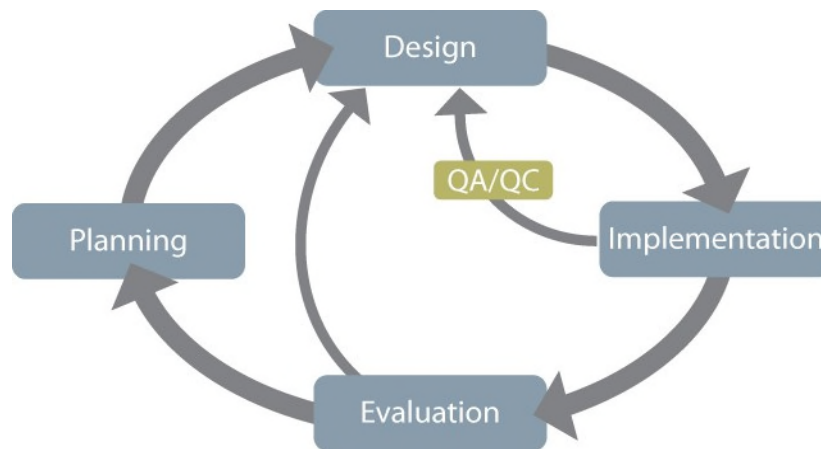
6 Quality Assurance and Evaluation, Measurement, and Verification

6.1 Quality Assurance/Quality Control

6.1.1 Approach to Quality Assurance and Quality Control

PPL Electric Utilities will use a continuous improvement process (“CIP”) as the framework for managing its Phase IV portfolio. The basic principle of CIP, illustrated in Figure 4, is establishing effective QA/QC and EM&V procedures to track program and component activities, monitor performance and progress toward targets, and take corrective actions when warranted. The process integrates QA/QC procedures with implementation activities and allows feedback to flow back into the design and delivery processes. The CIP will consist of three essential elements—activity tracking, QA/QC, and process and impact evaluations.

Figure 4. PPL Electric Utilities’ Continuous Improvement Process



QA/QC is integral to the design and delivery of all program components in PPL Electric Utilities’ EE&C Plan. The QA procedures establish standards to follow during the planning and design phases to proactively promote consistency and avoid errors. QC activities and inspection points during the implementation and evaluation phases help guide the repair of errors and identification of areas for improvement. Activities and procedures that comprise QA and QC are described in greater detail below.

Quality Assurance

QA procedures comprise proactive activities that occur throughout the program lifecycle to align processes with objectives, avoid risk, and promote efficiency. At PPL Electric Utilities, QA includes activities to confirm that the Company’s program and component rules and requirements are documented and current, its CSPs and participating trade allies are properly licensed and trained and maintain high quality standards in all customer interactions, and all data captured are accurate and sufficient to allow for rigorous energy savings analysis.

These activities include, but are not necessarily limited to, the following:

- Developing component-level logic models and process maps that document the goals, processes, and expected outcomes associated with key activities.
- Implementing training protocols that describe training procedures and requirements for key stakeholders, such as CSPs and trade allies.
- Applying rigorous screening and qualifying protocols to CSPs, trade allies, and field staff that interact directly with customers.
- Documenting data collection protocols, including data and customer information needed to track activities and calculate savings for each component.
- Summarizing CSPs' gross energy savings calculation methods that are reported at the measure and/or project level to support consistency and accuracy across each component.

Quality Control

PPL Electric Utilities conducts QC to test and verify that component activities adhere to industry best practices and established QA procedures and conform to performance expectations at the program, component, and portfolio levels. In conducting QC activities, PPL Electric Utilities addresses operational procedures, data and records, and measure installation, as described below.

- Ongoing tracking of component activities and costs.
- Reviewing all data and records to confirm that the proper data are collected consistently, resources are allocated appropriately, and performance can be measured accurately. For measure-based components, this activity involves verifying the collection of all information (including signatures, dates, and project-specific data) required to verify customer eligibility, calculate incentive payments, estimate and report energy savings and peak demand reduction, and confirm that recommended measures were installed.
- Conducting follow-up calls to participants to evaluate their satisfaction with the rendered services and to identify opportunities to improve the effectiveness of energy efficiency programs.
- Conducting post-installation inspections of an appropriately sized, random sample of all participants to confirm that program-reported measures were installed, installation followed best practice procedures, and measures function as expected.

6.1.2 Procedures for Measure and Project Installation Verification, Quality Assurance and Control, and Savings Documentation

PPL Electric Utilities documents and tracks all component, program, and portfolio activity through its participant tracking database, which can record and/or calculate reported gross energy savings. The Company designed the tracking system with input interfaces customized to individual components and coordinated with EM&V personnel so that they collect appropriate data to feed into the evaluation processes and to meet the needs of the SWE. PPL Electric Utilities trains implementation CSPs to use the tracking system. In cases where a turnkey CSP delivers all aspects of a component, the Company will

expect that the CSP track all activity via secure Internet access or upload. CSPs may also collect and store additional data required for evaluation in their internal tracking systems.

Section 3 contains summary information about EM&V approaches specific to each component. The EM&V CSP will develop detailed EM&V plans describing all evaluation activities and sampling plans for the impact and process evaluations.

6.1.3 Process for Collecting and Addressing Feedback

Customers may submit suggestions, comments, and complaints by telephone, by email, and in writing. PPL Electric Utilities publishes telephone numbers, addresses, and an email link on its website and on applications. PPL Electric Utilities and CSPs are responsible for following up, in a timely manner, on all comments and complaints. The Company requires CSPs to keep a log of complaints and resolutions, which they regularly provide to PPL Electric Utilities.

PPL Electric Utilities, in conjunction with the EM&V CSP, will implement an evaluation plan for each component. The EM&V CSP typically conducts ongoing customer and periodic trade ally surveys as part of the impact and process evaluations. The EM&V CSP will provide survey results and findings to PPL Electric Utilities on a regular basis.

PPL Electric Utilities and implementation CSPs may also conduct customer satisfaction surveys in addition to those conducted by the EM&V CSP.

6.2 Planned Market and Process Evaluations

The Pa PUC and the SWE are responsible for conducting formal baseline studies and market potential studies. If requested by PPL Electric Utilities, the EM&V CSP may also conduct market potential or baseline studies.

The EM&V CSP will conduct process evaluations for the Phase IV portfolio of components. These process evaluations are a principal component of PPL Electric Utilities' CIP, allowing the Company to monitor the progress of individual components and provide timely feedback to internal and external stakeholders. These evaluations also provide the necessary context for interpreting impact evaluation results. For each program in the Plan, the EM&V CSP will focus the process evaluation on improving component operations and delivery efficiency.

A primary objective of the process evaluations is to assess which processes work well and which present challenges or may be improved. The EM&V CSP begins process evaluations by creating a logic model for each program, describing the component theory in terms of its goals, processes, outcomes, and metrics that enable assessment performance relative to its objectives.

PPL Electric Utilities uses the results of process evaluation activities, benchmarking, and market effects studies to assess the components' effectiveness in terms of market reach, measure adoption, and customer satisfaction. These activities and evaluations uncover opportunities to improve market

penetration and identify barriers that may impede participation and the adoption of efficiency measures.

The main sources of data for the process evaluation will be documentation reviews, logic models, interviews with internal PPL Electric Utilities program staff and with CSPs and key market actors, secondary research, and participant and nonparticipant surveys. Key market actors will vary from component to component and may include equipment vendors, contractors, distributors, and retailers.

The EM&V CSP will survey participants and, where necessary and specified in the Evaluation Plan, will survey a comparable sample of nonparticipants. The EM&V CSP will design and execute survey sample plans to meet criteria for statistical confidence and precision specified in the Act 129 Evaluation Framework.

For each component, the EM&V CSP may stratify samples, as appropriate, by customer sector, market segment, technology, geographic area, and project size (i.e., savings) so samples are representative of the population. The EM&V CSP will implement the process evaluations in a manner that provides timely feedback to planners and CSPs and that allows enough time to implement any recommended changes. Process evaluation activities will vary by component and by program year, as needed to provide desired information.

6.3 Strategy for Coordinating with the Statewide EE&C Plan Evaluator

PPL Electric Utilities expects that, for Phase IV, the SWE will develop an Evaluation Framework, requirements for the Evaluation Plan, a process for creating savings protocols for new measures (not currently in the TRM), standard formats for semiannual and annual reports, and standard formats for data requests and data extracts. The Implementation Order provides a reporting calendar with dates when the reports and data must be provided to the SWE. PPL Electric Utilities and its EM&V CSP shall strive to adhere to those requirements or request approval for exceptions.

Impact evaluations will serve as the principal means of verifying the installation of EE&C measures and quantifying the resulting energy and demand impacts. Methods for measuring and verifying savings can vary by measure, according to the TRM and Evaluation Framework. Methods can also vary by program, component, and sector. The Evaluation Plan for each program details the evaluation methodology and sampling and verification plans. The EM&V CSP will submit these plans to the SWE for review and approval and will adjust them where required by the SWE. The EM&V CSP will update the evaluation plans annually, if needed, and provide them to the SWE for review.

The SWE and the Commission may call quarterly evaluation group meetings for all EDCs and their evaluators. The SWE may also call *ad hoc* working group sessions to discuss TRM protocols, net savings approaches, or other Act 129 matters. PPL Electric Utilities and the EM&V CSP will attend these meetings to provide input and stay informed of the SWE's activities and decisions.

PPL Electric Utilities and its EM&V CSP may also contact the SWE with requests for clarification of TRM protocols, decisions, net savings approaches, or any other relevant matter. The communications among all parties will remain open and flexible.

7 Cost Recovery Mechanism

7.1 Total Annual Revenues as of December 31, 2006

Section 2806.1(g) of the Public Utility Code requires that the total cost of any EE&C Plan cannot exceed 2% of the EDC's total annual revenue as of December 31, 2006. PPL Electric Utilities' total annual revenues for calendar year 2006 were approximately \$3 billion. Accordingly, the 2% cost cap established by Act 129 is approximately \$61.5 million.

In its Implementation Order, the Commission stated that the 2% budgetary cap applies to the EDC's annual budget and not to the budget for the entire Phase IV.³⁰ In addition, the Commission determined that certain implementation costs recoverable under Act 129 are not subject to the 2% cost cap, including PPL Electric Utilities' share of the costs for the SWE.

7.2 Plan to Fund the EE&C Measures, Including Administrative Costs

PPL Electric Utilities will spend most of its \$307.5 million budget to implement its EE&C Plan during Phase IV.³¹ This budget also includes costs PPL Electric Utilities incurs to develop and modify its EE&C Plan. The Implementation Order states that EDCs should be permitted to recover the incremental cost incurred to design, create, and obtain Commission approval of an EE&C Plan. The Company proposes to amortize and recover those deferred costs ratably over the 60-month life of its Phase IV EE&C Plan (June 1, 2021, through May 31, 2026).

7.3 Data Tables

The tables on the following pages provide cost data for each program. Cost-effectiveness calculations by program are provided in Section 8. The table captions make reference to the corresponding table numbers provided in the EE&C Plan Template.

Tables in this section include the following:

- Table 54: Pa PUC Table 10 –Summary of EE&C Costs
- Table 55: Pa PUC Table 11 – Allocation of Common Costs to Applicable Customer Sector
- Table 56: Pa PUC Table 12 – Summary of Portfolio EE&C Costs

³⁰ Implementation Order at 11.

³¹ \$307.5 million is the allowable budget under PPL Electric Utilities' Act 129 cost cap. In addition to this cost, PPL Electric Utilities expects to incur approximately \$5 million for its share of the SWE's cost, which are not subject to the cost cap.

Table 54. Pa PUC Table 10 - Summary of EE&C Costs¹

Portfolio											
EE&C Program	Cost Elements (\$) ³							Total Cost	Expected Acquisition Cost ² (\$/MWh)	Levelized Cost ³ (\$/MWh)	Expected Acquisition Cost (\$/MW)
	Incentives	CSP Program Design	CSP Administrative	CSP Delivery Fees	CSP Marketing	EDC Administrative	EDC Other				
Residential	\$40,977,331	\$ 46,000	\$ 3,114,935	\$17,011,974	\$2,496,277	\$ 1,100,000	-	\$64,746,517	\$ 324.85	\$ 70.40	\$ 1,473,330
Low-Income	\$23,811,371	-	\$2,780,500	\$12,958,126	\$1,250,000	\$ 1,100,000	-	\$41,899,997	\$ 560.21	\$ 115.17	\$ 4,619,367
Small C&I	\$53,022,270	\$128,786	\$3,778,092	\$17,324,983	\$2,034,357	\$550,000	-	\$76,838,488	\$ 140.99	\$ 39.19	\$ 940,368
Large C&I	\$57,689,951	\$100,776	\$ 4,343,105	\$20,883,928	\$2,338,595	\$ 550,000	-	\$85,906,355	\$ 119.05	\$ 49.45	\$ 881,807
Sector Total	\$175,500,922	\$275,562	\$14,016,632	\$68,179,011	\$8,119,229	\$3,300,000	-	\$269,391,356	\$ 174.85	\$ 49.65	\$ 1,160,429

¹ Common Costs are not included in this table

² The numerator in the acquisition cost calculation is the full direct program cost. Acquisition costs based on first-year savings.

³ Levelized costs are lifetime. Appendix A of the 2021 TRC Test Order provides formulas to calculate levelized cost. See 2021 TRC Test Order, available at <http://www.puc.pa.gov/pdocs/1648126.docx>.

Table 55. Pa PUC Table 11 - Allocation of Common Costs to Applicable Customer Sector

Common Cost Element	Total Cost (\$)	Basis for Cost Allocation	Sector Cost Allocation (\$)		
			Residential (Including Low-Income)	Commercial/Industrial -- Small	Commercial/Industrial -- Large
Advertising & Marketing	\$10,400,000	% of Direct Program Cost	\$4,117,360	\$2,966,080	\$3,316,560
Phase IV Tracking System/Technical Support	\$7,800,000	% of Direct Program Cost	\$3,088,020	\$ 2,224,560	\$2,487,420
EE&C Phase IV Plan Development	\$1,100,000	% of Direct Program Cost	\$435,490	\$313,720	\$350,790
Evaluation and Measurement	\$15,000,000	% of Direct Program Cost	\$5,938,500	\$4,278,000	\$4,783,500
Plan Management	\$2,400,000	% of Direct Program Cost	\$950,160	\$684,480	\$765,360
Major Accounts	\$1,400,000	% of Direct Program Cost (excluding residential)	-	\$660,950	\$739,050
Statewide Evaluator	\$5,000,000	% of Direct Program Cost	\$1,979,500	\$1,426,000	\$1,594,500
Totals	\$ 43,100,000		\$16,509,030	\$12,553,790	\$14,037,180

Table 56. Pa PUC Table 12 - Summary of Portfolio EE&C Costs

Portfolio	Total Sector Portfolio-Specific Costs	Total Common Costs	Total of All Costs
Residential (Including Low-Income)	\$106,646,514	\$16,509,030	\$123,155,544
Commercial/Industrial -- Small	\$76,838,488	\$12,553,790	\$89,392,278
Commercial/Industrial -- Large	\$85,906,355	\$14,037,180	\$99,943,535
Totals	\$269,391,356	\$43,100,000	\$312,491,356

7.4 Tariffs and Cost Recovery Mechanism

Section 2806.1(k)(1) of the Public Utility Code authorizes EDCs to recover the costs of their EE&C Plan through a reconcilable adjustment clause under Section 1307 of the Public Utility Code

Because all programs in PPL Electric Utilities' proposed EE&C Plan will benefit both shopping and non-shopping customers, the Company designed its cost recovery mechanism to be non-bypassable. The ACR-IV will be calculated separately for PPL Electric Utilities' three major customer classes—residential, small C&I, and large C&I. For residential customers, PPL Electric Utilities will apply the cost recovery mechanism as a cents per kWh component of the distribution charge. For small C&I customers, the Company will apply the cost recovery mechanism as a cents per kWh charge as a separate line item on the customers' bill. For large C&I customers, PPL Electric Utilities will apply the cost recovery mechanism as a dollars per kW charge, as a separate line item on the customers' bill, where the demand (kW) is a customer's PJM peak load contribution (which may change yearly).

PPL Electric Utilities proposes to calculate the ACR-IV on an annual basis according to the projected program costs that it anticipates it will incur during that Phase IV program year. PPL Electric Utilities proposes an annual reconciliation of the ACR-IV for each of its three major customer classes. Specifically, each year PPL Electric Utilities will compare actual ACR-IV revenues to actual expenses and will recover or refund any over or under-collections in the next ACR-IV application year.

In addition to the annual reconciliation, upon determination that a customer class's ACR-IV rate, if left unchanged, would result in a material over- or under-collection of Phase IV Act 129 costs incurred or expected to be incurred during the current 12-month period, the Company, in its discretion, may file with the Commission for an interim revision of the ACR-IV rate.

7.5 Cost Recovery Mechanism to Ensure Approved Measures Are Financed by Corresponding Customer Class

Section 2806.1(a)(11) of the Public Utility Code requires that EE&C measures be paid for by the same customer class that receives the energy and conservation benefits of those measures. PPL Electric Utilities will directly assign costs to the customer class that received the benefits of the EE&C measures whenever those costs can be directly assigned.

However, some costs, such as common costs and/or portfolio-level costs, relate to EE&C measures that are applicable to more than one customer class or that provide systemwide benefits. In Phases I, II, and III, the Commission directed PPL Electric Utilities to allocate those costs, and general administrative costs, using reasonable and generally acceptable cost of service principles that are commonly utilized in base rate proceedings. In Phase IV, as in Phases I, II, and III, PPL Electric Utilities proposes to allocate such costs using an allocation factor equal to the percentage of the total actual EE&C costs directly assigned to each customer class.

7.6 Phase IV Cost Accounting

PPL Electric Utilities will account for Phase IV costs separately from those incurred in prior phases using separate and distinct account numbers that break out charges by program, sector, and cost category (e.g., incentives, CSP costs, and payroll). The Company will use different account numbers for Phase IV from those used in prior phases. Any costs associated with energy efficiency measures installed and operable on or before May 31, 2021, will be accounted for as Phase III costs. Any costs associated with energy efficiency measures installed and operable after May 31, 2021, will be accounted for as Phase IV costs.

7.7 PJM FCM Cost Recovery

PPL Electric Utilities will nominate a portion of the expected peak demand savings in its Phase IV program into PJM's FCM. PPL Electric Utilities will update the annual report template to include and clearly show FCM proceeds or penalties. Cost recovery will be assigned by the customer class that provides the capacity and will be adjusted to reflect the proceeds or penalties from this activity.

8 Cost-Effectiveness

8.1 Plan Cost-Effectiveness as Defined by the Total Resource Cost Test

The cost-effectiveness of the proposed portfolio was demonstrated in data presented in Section 3 and in Table 59 and Table 60 for each program in the EE&C Plan, PPL Electric Utilities determined cost-effectiveness in accordance with the Commission's 2021 TRC Test Order.

PPL Electric Utilities began assessing the cost-effectiveness of each program in the Plan by creating a valuation of the total resource benefits ("TRC Benefits") over the life of each conservation measure, for a maximum of 15 years as directed in the 2021 TRC Test Order. The Company also determined each program's total resource costs ("TRC Costs") using the SWE Team Incremental Measure Cost Database and program delivery and administration costs. The 2021 TRC Test Order indicates that the portfolio of programs is cost-effective if its TRC Benefits exceed its TRC costs or the benefit/cost ratio is at least 1.0, as shown by the following equations:

$$\begin{aligned} \text{TRC Benefits} - \text{TRC Costs} &\geq 0 \\ \text{or} \\ \text{TRC Benefits/TRC Costs} &\geq 1 \end{aligned}$$

The TRC Benefits data in this EE&C Plan are estimates based on the planning assumptions in this EE&C Plan. The Company will complete a cost-effectiveness evaluation using actual program results as part of its yearly evaluations.

8.1.1 Calculation of Avoided Costs of Supplying Electricity

PPL Electric Utilities calculated the avoided costs of delivered electricity for a 15-year planning horizon in three segments, using the SWE avoided cost calculator, as follows:

- **Years 1-4 (June 2021-May 2025).** The Company used the NYMEX Electricity Futures Price at the PJM West Hub as of September 1, 2020, and applied a locational basis adjustment from PJM West Hub to the Company's Zone.
- **Years 5-10 (June 2025-May 2031).** PPL Electric Utilities used NYMEX Henry Hub Natural Gas Futures and the EIA AEO Natural Gas Price Forecast for Mid-Atlantic Region as of September 1, 2020, converted to electric prices using an on-peak and off-peak heat rate and spark spread.
- **Years 11-15 (June 2031-May 2036).** PPL Electric Utilities used Middle Atlantic Natural Gas Prices for Electric Power from the Energy Information Administration Annual Energy Outlook, Energy Prices by Sector and Source, converted to electric prices using the on-peak and off-peak heat rate and including on-peak and off-peak spark price spreads.

The Company estimated avoided generation capacity costs using PJM base residual auction results for 2021/2022. Subsequent years are inflated by 2% as specified in the 2021 TRC Test Order. Avoided T&D costs for PY13 are from the SWE Demand Response Potential study, with the subsequent years

escalated by 2% as specified in the 2021 TRC Test Order. The assumptions used to calculate avoided costs are summarized by sector in Table 57.

Table 57. Main Assumptions Used in Avoided Costs and TRC Calculations

Discount Rates (Nominal)	Utility Discount Rate	5.00%
	Participant Discount Rate	5.00%
	Societal Discount Rate	5.00%
	TRC Discount Rate	5.00%
Line Losses ¹	Energy	
	Residential	108.75%
	Commercial (Small C&I)	108.75%
	Industrial (Large C&I)	104.20%
	Demand	
	Residential	108.75%
	Commercial (Small C&I)	108.75%
Industrial (Large C&I)	104.20%	
T&D Prices ²	Average BLS Escalator	-
	Transmission & Distribution (\$/kW-year 2021-2022)	\$121.21
	Transmission Only (\$/kW-year 2021-2022)	\$0.00

¹ Line losses are consistent with those provided in the 2021 TRM Volume 1 Table 1-4. The line loss factor in this table represents meter to the generator.

² T&D prices are consistent with those provided on page 47 (Table 2) of the 2021 TRC Test Order.

Table 58 shows PPL Electric Utilities’ calculated avoided costs of delivered electricity for a 15-year planning horizon.

Table 58. Overall Avoided Costs (All Sectors)

Program Year	Electric Energy Avoided Costs (\$/kWh)					Capacity Avoided Costs (\$/kW-Year)		
	Winter		Summer		Yearly Average	Generation	T&D	Transmission Only
	On Peak	Off Peak	On Peak	Off Peak				
2022	\$0.04	\$0.03	\$0.03	\$0.02	\$0.03	\$52.32	\$121.21	\$0.00
2023	\$0.04	\$0.03	\$0.03	\$0.02	\$0.03	\$41.70	\$123.63	\$0.00
2024	\$0.04	\$0.03	\$0.03	\$0.02	\$0.03	\$42.54	\$126.11	\$0.00
2025	\$0.04	\$0.03	\$0.03	\$0.02	\$0.03	\$43.39	\$128.63	\$0.00
2026	\$0.04	\$0.03	\$0.03	\$0.02	\$0.03	\$44.26	\$131.20	\$0.00
2027	\$0.04	\$0.03	\$0.03	\$0.02	\$0.03	\$45.14	\$133.83	\$0.00
2028	\$0.05	\$0.04	\$0.04	\$0.02	\$0.04	\$46.04	\$136.50	\$0.00
2029	\$0.05	\$0.04	\$0.04	\$0.03	\$0.04	\$46.97	\$139.23	\$0.00
2030	\$0.06	\$0.04	\$0.04	\$0.03	\$0.04	\$47.90	\$142.02	\$0.00
2031	\$0.06	\$0.05	\$0.04	\$0.03	\$0.05	\$48.86	\$144.86	\$0.00
2032	\$0.06	\$0.05	\$0.04	\$0.03	\$0.05	\$49.84	\$147.75	\$0.00
2033	\$0.06	\$0.05	\$0.04	\$0.03	\$0.05	\$50.84	\$150.71	\$0.00
2034	\$0.07	\$0.05	\$0.04	\$0.03	\$0.05	\$51.85	\$153.72	\$0.00
2035	\$0.07	\$0.05	\$0.05	\$0.03	\$0.05	\$52.89	\$156.80	\$0.00
2036	\$0.07	\$0.05	\$0.05	\$0.03	\$0.05	\$53.95	\$159.93	\$0.00
2037	\$0.07	\$0.06	\$0.05	\$0.03	\$0.05	\$55.03	\$163.13	\$0.00
2038	\$0.08	\$0.06	\$0.05	\$0.03	\$0.05	\$56.13	\$166.40	\$0.00
2039	\$0.08	\$0.06	\$0.05	\$0.04	\$0.05	\$57.25	\$169.72	\$0.00
2040	\$0.08	\$0.06	\$0.05	\$0.04	\$0.06	\$58.40	\$173.12	\$0.00
2041	\$0.08	\$0.06	\$0.05	\$0.04	\$0.06	\$59.56	\$176.58	\$0.00

8.1.2 Measure Data

PPL Electric Utilities obtained estimates of savings, incremental cost, and measure life for this EE&C Plan primarily from the TRM, the Pennsylvania Incremental Cost Database, and the SWE's Energy Efficiency Market Potential Study. The Company compiled data for new measures not found in the TRM from secondary sources, including the California Database for Energy Efficiency Resources ("DEER").

8.1.3 Program Benefit Components

The benefits used in the TRC calculation include the full value of time and seasonally differentiated generation, transmission and distribution, and capacity costs, and they account for avoided line losses. To capture the full value of time and seasonal impacts of each program measure, PPL Electric Utilities adjusted hourly (8,760) system-avoided costs by the hourly load shape of the end user affected by the measure. The Company included quantifiable non-energy benefits, such as water savings.

8.1.4 Cost Components

The cost component of the TRC analysis includes the incremental measure costs/participant costs and direct utility costs. Incremental measure costs are the expenses associated with installing energy efficiency measures and ongoing operation and maintenance costs, where applicable.

EDC costs consist of expenses associated with development, delivery, and ongoing operation, and fit into the four categories listed here.

EDC Labor, Material, and Supplies

- Costs to administer energy efficiency program components include (but are not limited to) PPL Electric Utilities' fully loaded incremental personnel costs, employee expenses, office supplies, and external legal costs.

Customer Incentives

- Rebates or other incentives paid to customers or trade allies (by PPL Electric Utilities or CSPs) for implementing measures.
- Incentive payments from PPL Electric Utilities to LED manufacturers and retailers who, in turn, discount those products at the point of sale.

CSP Labor, Materials, and Supplies

- Costs associated with performing implementation tasks, including (but not limited to) lead intake, customer service, rebate application processing and problem resolution, equipment installation inspections, and individual component reporting. CSPs' marketing costs are segregated under the next category, Marketing.

Marketing

- EDC and CSP expenditures related to promotion of EE&C program components include, but are not limited to, the production of energy efficiency literature, advertising, promotion and promotional items, displays, events, and communications. Advertising encompasses all forms of media, such as direct mail, print, radio, and the Internet.
- Costs associated with training and educating the trade ally community, including training associated with delivering, marketing, and promoting its programs and components, as well as best practices training (e.g., quality installation training). This category also includes vendor recruitment and coordination costs. Trade allies include, but are not limited to, HVAC contractors, weatherization contractors, equipment and product dealers, installers, and C&I auditors. Trade allies may also include community groups and trade associations.

PPL Electric Utilities also categorizes costs as follows:

- **Direct costs.** These costs are directly related and charged to a specific component. PPL Electric Utilities will assign costs directly to program components where possible.
- **Common costs (also known as portfolio-level costs).** These costs are applicable to more than one customer class, are applicable to more than one component or program, or provide portfolio-wide benefits.
- **EDC costs.** These costs—the four categories described above—are incurred by PPL Electric Utilities and include all direct and common costs. These costs are in the Plan budget and include the SWE costs that are not subject to the funding cap.
- **Participant costs.** These costs are incurred by the customer, such as for the purchase and installation of efficient measures. Often, the participant cost is determined by subtracting Act 129 EE&C incentives from the incremental cost of the measure. PPL Electric Utilities uses participant costs only in the TRC evaluation.

8.2 Data Tables

The tables on the following pages provide TRC benefits data for each program component and sector. Note that tables in this section are numbered sequentially, but table formats are based on those provided in the Commission EE&C Plan Template. Each table caption includes a reference to the corresponding table number provided in the EE&C Plan Template.

Tables in this section include these:

- Table 59. Pa PUC Table 13A – Gross TRC Benefits, By Program and Total Portfolio
- Table 60. Pa PUC Table 13B – Net Benefits, By Program and Total Portfolio

Section 8 Cost-Effectiveness

Table 59. Pa PUC Table 13A – Gross TRC Benefits, By Program and Total Portfolio

Portfolio	NTGR & TRC Ratio			TRC Costs By Program Per Year (\$000)				TRC Benefits By Program Per Year (\$000)				
	Program Year	NTGR	TRC ^{1,2}	Incremental Measure Cost		Program Administration Cost	Total TRC Costs ²	Capacity Benefits	Energy Benefits	Fossil Fuel and Water Benefits	O&M Benefits	Total TRC Benefits
				Paid by EDC	Paid by Participants							
Residential	PY13	1	1.28	\$8,820	\$14,614	\$4,397	\$27,831	\$20,483	\$14,555	\$557	\$0	\$35,594
Residential	PY14	1	1.28	\$8,544	\$14,895	\$4,456	\$27,894	\$20,097	\$15,111	\$539	\$0	\$35,747
Residential	PY15	1	1.19	\$7,340	\$13,545	\$4,318	\$25,202	\$15,198	\$14,263	\$557	\$0	\$30,018
Residential	PY16	1	1.15	\$6,605	\$12,540	\$4,231	\$23,376	\$12,492	\$13,753	\$556	\$0	\$26,802
Residential	PY17	1	1.13	\$6,128	\$11,820	\$4,183	\$22,132	\$11,029	\$13,510	\$547	\$0	\$25,086
Residential	Total	1	1.21	\$37,436	\$67,414	\$21,585	\$126,435	\$79,298	\$71,192	\$2,757	\$0	\$153,247
Low-Income	PY13	1	0.47	\$4,221	\$0	\$2,944	\$7,165	\$1,448	\$2,006	-\$50	\$0	\$3,403
Low-Income	PY14	1	0.50	\$4,707	\$0	\$3,492	\$8,199	\$1,715	\$2,429	-\$60	\$0	\$4,083
Low-Income	PY15	1	0.51	\$4,810	\$0	\$3,742	\$8,553	\$1,824	\$2,634	-\$64	\$0	\$4,394
Low-Income	PY16	1	0.52	\$4,581	\$0	\$3,680	\$8,261	\$1,772	\$2,608	-\$63	\$0	\$4,317
Low-Income	PY17	1	0.50	\$3,324	\$0	\$2,576	\$5,901	\$1,197	\$1,793	-\$44	\$0	\$2,947
Low-Income	Total	1	0.50	\$21,644	\$0	\$16,435	\$38,080	\$7,956	\$11,469	-\$281	\$0	\$19,144
Small C&I	PY13	1	1.58	\$10,342	\$29,587	\$4,340	\$44,270	\$31,541	\$41,835	-\$6,852	\$3,594	\$70,117
Small C&I	PY14	1	1.61	\$10,325	\$31,047	\$4,509	\$45,881	\$32,559	\$44,668	-\$6,801	\$3,445	\$73,872
Small C&I	PY15	1	1.66	\$9,786	\$29,819	\$4,421	\$44,026	\$31,740	\$44,647	-\$6,500	\$3,138	\$73,025
Small C&I	PY16	1	1.70	\$9,062	\$27,516	\$4,204	\$40,781	\$29,869	\$42,821	-\$6,217	\$2,852	\$69,325
Small C&I	PY17	1	1.69	\$8,687	\$27,639	\$4,169	\$40,496	\$29,469	\$43,062	-\$6,946	\$2,666	\$68,251
Small C&I	Total	1	1.65	\$48,203	\$145,608	\$21,643	\$215,454	\$155,179	\$217,032	-\$33,316	\$15,695	\$354,590
Large C&I	PY13	1	1.03	\$11,270	\$57,869	\$5,129	\$74,268	\$25,639	\$55,058	-\$6,409	\$2,371	\$76,659
Large C&I	PY14	1	1.05	\$11,183	\$59,177	\$5,301	\$75,661	\$25,792	\$57,718	-\$6,315	\$2,256	\$79,451
Large C&I	PY15	1	1.08	\$10,632	\$56,974	\$5,226	\$72,832	\$24,769	\$57,577	-\$6,079	\$2,040	\$78,306
Large C&I	PY16	1	1.10	\$9,934	\$53,542	\$5,038	\$68,514	\$23,385	\$55,961	-\$5,858	\$1,839	\$75,327
Large C&I	PY17	1	1.13	\$9,425	\$50,861	\$4,935	\$65,220	\$22,587	\$55,113	-\$5,790	\$1,730	\$73,641
Large C&I	Total	1	1.08	\$52,444	\$278,422	\$25,628	\$356,495	\$122,172	\$281,427	-\$30,451	\$10,236	\$383,384
Total			1.24	\$159,727	\$491,444	\$85,291	\$736,463	\$364,605	\$581,119	-\$61,291	\$25,931	\$910,364

¹ The TRC ratio will reflect the lifetime TRC, not an annual TRC ratio.

² Does not include common portfolio costs; whereas Tables 2 and 3 do include common costs.

Section 8 Cost-Effectiveness

Table 60. Pa PUC Table 13B - Net Benefits, By Program and Total Portfolio

Portfolio	NTGR & TRC Ratio			TRC Costs By Program Per Year (\$000)				TRC Benefits By Program Per Year (\$000)					
	Program	Program Year	NTGR	TRC ^{1,2}	Incremental Measure Cost		Program Administration Cost	Total TRC Costs ²	Capacity Benefits	Energy Benefits	Fossil Fuel and Water Benefits	O&M Benefits	Total TRC Benefits
					Paid by EDC	Paid by Participants							
Residential	PY13	0.79	1.28		\$8,820	\$9,367	\$2,566	\$20,753	\$15,485	\$10,526	\$529	\$0	\$26,539
Residential	PY14	0.79	1.28		\$8,544	\$9,560	\$2,662	\$20,766	\$15,138	\$10,888	\$512	\$0	\$26,538
Residential	PY15	0.79	1.17		\$7,340	\$8,550	\$2,736	\$18,625	\$11,096	\$10,188	\$526	\$0	\$21,809
Residential	PY16	0.79	1.11		\$6,605	\$7,835	\$2,783	\$17,222	\$8,879	\$9,775	\$524	\$0	\$19,178
Residential	PY17	0.79	1.09		\$6,128	\$7,346	\$2,825	\$16,299	\$7,692	\$9,580	\$515	\$0	\$17,786
Residential	Total	0.79	1.19		\$37,436	\$42,657	\$13,572	\$93,665	\$58,289	\$50,956	\$2,605	\$0	\$111,850
Low-Income	PY13	1.00	0.47		\$4,221	\$0	\$2,944	\$7,165	\$1,448	\$2,006	-\$50	\$0	\$3,403
Low-Income	PY14	1.00	0.50		\$4,707	\$0	\$3,492	\$8,199	\$1,715	\$2,429	-\$60	\$0	\$4,083
Low-Income	PY15	1.00	0.51		\$4,810	\$0	\$3,742	\$8,553	\$1,824	\$2,634	-\$64	\$0	\$4,394
Low-Income	PY16	1.00	0.52		\$4,581	\$0	\$3,680	\$8,261	\$1,772	\$2,608	-\$63	\$0	\$4,317
Low-Income	PY17	1.00	0.50		\$3,324	\$0	\$2,576	\$5,901	\$1,197	\$1,793	-\$44	\$0	\$2,947
Low-Income	Total	1.00	0.50		\$21,644	\$0	\$16,435	\$38,080	\$7,956	\$11,469	-\$281	\$0	\$19,144
Small C&I	PY13	0.70	1.50		\$10,607	\$17,838	\$1,700	\$30,145	\$20,129	\$27,112	-\$4,436	\$2,284	\$45,089
Small C&I	PY14	0.70	1.52		\$10,552	\$19,031	\$1,864	\$31,447	\$20,832	\$29,104	-\$4,403	\$2,189	\$47,722
Small C&I	PY15	0.70	1.56		\$10,004	\$18,393	\$1,921	\$30,318	\$20,250	\$29,189	-\$4,211	\$1,994	\$47,222
Small C&I	PY16	0.70	1.59		\$9,284	\$16,968	\$1,898	\$28,150	\$19,059	\$28,020	-\$4,031	\$1,813	\$44,861
Small C&I	PY17	0.70	1.57		\$8,896	\$17,212	\$1,960	\$28,068	\$18,842	\$28,222	-\$4,563	\$1,695	\$44,196
Small C&I	Total	0.70	1.55		\$49,342	\$89,442	\$9,343	\$148,128	\$99,113	\$141,646	-\$21,644	\$9,974	\$229,090
Large C&I	PY13	0.70	1.00		\$11,270	\$42,403	\$2,548	\$56,220	\$18,453	\$40,505	-\$4,619	\$1,642	\$55,982
Large C&I	PY14	0.70	1.01		\$11,183	\$43,470	\$2,734	\$57,387	\$18,601	\$42,541	-\$4,551	\$1,563	\$58,154
Large C&I	PY15	0.70	1.04		\$10,632	\$41,918	\$2,798	\$55,349	\$17,898	\$42,508	-\$4,386	\$1,413	\$57,433
Large C&I	PY16	0.70	1.06		\$9,934	\$39,425	\$2,785	\$52,143	\$16,918	\$41,355	-\$4,231	\$1,273	\$55,315
Large C&I	PY17	0.70	1.09		\$9,425	\$37,456	\$2,800	\$49,681	\$16,345	\$40,734	-\$4,183	\$1,198	\$54,095
Large C&I	Total	0.70	1.04		\$52,444	\$204,673	\$13,664	\$270,781	\$88,215	\$207,642	-\$21,969	\$7,089	\$280,977
Total			1.16		\$160,867	\$336,772	\$53,015	\$550,654	\$253,573	\$411,713	-\$41,289	\$17,064	\$641,061

¹ The TRC ratio will reflect the lifetime TRC, not an annual TRC ratio.

² Does not include common portfolio costs; whereas Tables 2 and 3 do include common costs.

9 Plan Compliance and Other Key Issues

9.1 Plan Compliance Issues

9.1.1 Variety of EE&C Measures with Equitable Distribution

PPL Electric Utilities' EE&C Plan offers a variety of measures and distributes costs and energy savings equitably across all customer sectors. The Company's process for developing the Plan, including an overview of the considerations and steps taken to help ensure compliance with the Implementation Order, is described in Section 1.2 and Figure 2 in Section 3.1.2 shows that PPL Electric Utilities will offer each a range of energy efficiency and demand reduction measures to serve all customers. PPL Electric Utilities included education, which is fundamental to understanding and making informed choices about energy efficiency, as an element of all program components.

Program components for residential customers (including low-income) comprise approximately 39% of the total cost and 18% of the total savings projected in this Plan. Program components for non-residential customers comprise approximately 61% of the total cost and 82% of the total savings.

These proportions demonstrate an equitable distribution of savings among customer sectors and are reasonably close to the percentages of market potential attributable to the sectors and the percentage of total PPL Electric Utilities revenue attributable to each sector. The percentage of residential (including low-income) cost is greater than the percentage of residential savings (and vice versa for non-residential) because the component acquisition cost is higher for residential (including low-income) than for non-residential, primarily because the component acquisition cost of low-income is much higher than for non-low-income components.

9.1.2 Manner in which the EE&C Plan Will Achieve Requirements Under 66 Pa. C.S. §§ 2806.1(c) & (d)

By its Implementation Order, the Commission requires PPL Electric Utilities to achieve 3.3% energy savings by May 31, 2026, which equates to 1,250,157 MWh/year. The Commission also requires PPL Electric Utilities to achieve 72,509 MWh/year of energy savings from the low-income sector and to achieve 229 MW of peak demand reduction during Phase IV. PPL Electric Utilities designed its Plan to achieve all of these objectives. As previously described, the Company designed the Plan to exceed the 1,250,157 MWh/year and 229 MW targets by approximately 39% MWh and 8% MW, respectively, to allow for uncertainties, such as evaluation results that are not available until significantly after the conclusion of each program year.

9.1.3 Manner in which the EE&C Plan Will Achieve Low-Income Requirements

The Implementation Order requires that a minimum of 72,509 MWh/year of the total required reductions come from the Low-Income customer sector. Consistent with Phase III, these savings may not accrue from low-income participation in general Residential Program components.

All low-income measures will be available at no cost to low-income customers. Though low-income customers can participate in Residential Program components, these specific measures are offered exclusively to the low-income sector. These measures comprise 12.5% of the total measures offered. As required under Act 129, this exceeds the fraction of the electric consumption of the utility’s low-income households divided by the total electricity consumption in the PPL Electric Utilities territory (9.95%).

Table 61. Low-Income Sector Compliance (Number of Measures)¹

	Low-Income Sector	All Sectors	Percentage Low-Income	Goal: Low-Income Measures as % of All Measures Offered
Number of measures offered	16	128	12.50%	9.95%

¹ Act 129 includes a provision requiring EDCs to offer a number of energy efficiency measures to low-income households that are “proportionate to those households’ share of the total energy usage in the service territory.” 66 Pa.C.S. §2806.1(b)(i)(G).

PPL Electric Utilities designed its Low-Income Program to achieve the Commission’s low-income set-aside target through the Phase IV program.

9.1.4 Funds Allocated to Experimental Equipment or Devices

All of the measures in this Plan are proven technologies that are commercially available and technically sound, and most, if not all, are in the TRM, will be added to the TRM, or will be treated as custom measures. As was done in Phase III, the Company will submit descriptions of any pilot programs or proposed technology additions to the Pa PUC and stakeholders prior to implementation. Table 62 shows the funds PPL Electric Utilities allocated to pilots, new technology, and experimental equipment by customer sector.

Table 62. PPL Electric Utilities Funds Allocated to Pilots, New Technology, and Experimental Equipment

Sector	Allocated Funds
Residential and Low-Income	\$3 million
Small C&I and Large C&I	\$3 million
Total	\$6 million

PPL Electric Utilities will track and limit expenditures on measures determined as experimental to help ensure that no more than 2% of Act 129 funds are allocated for this purpose.

9.1.5 How the EE&C Plan Will Be Competitively Neutral to All Distribution Customers

As described in Section 9.1.1, each customer class has an opportunity to choose among a range of programs, components, and measures. All program components are available to customers regardless of whether they receive default generation service from PPL Electric Utilities or obtain competitive supply from an electric generation supplier. Based on their contracted generation supply rate, competitive-

supply customers may experience different monthly bill savings than default generation service customers as a result of participating in one of PPL Electric Utilities' programs.

9.2 Other Key Issues

9.2.1 How EE&C Plan Will Lead to Long-Term, Sustainable Energy Efficiency Savings

PPL Electric Utilities designed its five-year portfolio of EE&C Plan programs to satisfy the performance requirements set forth in Act 129 and the Commission's Implementation Order. Many of the measures installed under the proposed program components will continue to perform and produce savings well beyond the term of the Plan. In addition, as described throughout the Plan, PPL Electric Utilities will encourage customers to take a comprehensive approach to energy efficiency and peak demand reduction by offering education and incentives designed to implement multiple measures and to take a whole-home/building approach.

Furthermore, PPL Electric Utilities program components have and will continue to stimulate demand for energy efficient and peak demand reduction products and encourage distributors and retailers to stock such equipment. For example, PPL Electric Utilities launched a midstream program for C&I lighting in Phase III. This innovative delivery channel encouraged lighting distributors to stock and promote efficient lighting technologies by providing them with incentives that they could pass onto the end user. The program was a success, with the number of participating distributors increasing throughout the phase. PPL Electric Utilities plans to build upon the success of this delivery channel by expanding midstream offerings to residential HVAC and pool pump measures in Phase IV.

9.2.2 How EE&C Plan Will Leverage and Utilize Other Financial Resources

PPL Electric Utilities encourages customers to maximize financial resources that are external to Act 129 funding. The Company monitors funding resources, such as state and federal rebates, tax credits, and equipment manufacturers' incentives that might benefit customers, to help offset some of their capital outlay for installing energy efficient products in addition to Act 129 EE&C incentives. The Company includes information about external resources in its annual program training and in regular updates to its CSPs, trade allies, and market partners, and provides relevant information to customers on its website and in relevant materials.

9.2.3 How PPL Electric Utilities Will Address Consumer Education

PPL Electric Utilities understands that educating customers about the value of energy efficiency and peak demand reduction is critical to achieving its goals, and it includes education as a key element of all its Phase IV program components. PPL Electric Utilities and its CSPs treat every customer touch point as an opportunity to provide customer education (see Section 3 for details).

9.2.4 How PPL Electric Utilities Will Provide Information on Federal and State Funding Programs

PPL Electric Utilities provides information about federal and state funding for EE&C on its energy efficiency website. Funding, including tax credits, has significantly diminished since the start of Act 129.

9.2.5 How PPL Electric Utilities Will Provide the Public with Information about Program Component Results

PPL Electric Utilities is committed to keeping customers, stakeholders, and the general public informed about the results of the energy efficiency program components and progress toward Plan goals.

PPL Electric Utilities hosts a dedicated section on www.pplelectric.com that provides Act 129 information, including semiannual and annual evaluation reports. The Company will periodically meet with stakeholders to review results, provide semiannual and annual reports to stakeholders, and post those reports on its website. Additionally, PPL Electric Utilities shares customer success stories with customers, trade allies, and the public by publishing and distributing case studies.

Appendix A: Approval of CSP Contracts

PPL Electric Utilities filed its EM&V CSP contract for Pa PUC approval on November 30, 2020. In addition, PPL Electric Utilities is currently negotiating implementation CSP contracts to implement the Residential, Non-Residential, and Low-Income Programs.

Appendix B: Calculations of Annual Savings and Costs

The PPL Electric Utilities Phase IV Plan includes tables showing calculations of savings and costs for each program and program year (see Section 7.3). Please refer to Table 54 (Pa PUC Table 10) in the Plan for portfolio specific assignment of EE&C costs. Table 55 (Pa PUC Table 11) provides detail on the allocation of common costs to applicable customer sectors. Table 56 (Pa PUC Table 12) provides a summary of portfolio EE&C costs.

Section 8 of the Plan provides a complete overview of program costs and benefits. The Plan includes cost-effectiveness calculations by program and program year in Section 8.2. Specifically, Table 59 (Pa PUC Tables 13A) and Table 60 (Pa PUC Tables 13B) show TRC benefits by program and program year for each sector.

Appendix C: Calculations Methods and Assumptions

PPL Electric Utilities based its savings and cost estimates on experience from Phase I, Phase II, Phase III, the TRM, and input from stakeholders and trade allies. The CSPs generated measure cost data using a variety of sources, including the SWE's Phase IV incremental cost database, Phase III program data, and for data not found in the incremental cost database, the CSPs used secondary sources, including the DOE's Technical Support Documents and other state-wide TRMs.

Many variables can impact the cost and effectiveness of a measure or program, and these variables led to numerous TRM changes during Phase I, Phase II, and Phase III that influenced program savings, acquisition cost, and TRC test results. In Phase IV, PPL Electric Utilities will use the experience and knowledge gained from prior phases to monitor and adjust measures and programs that help ensure the optimum balance of cost and benefits.

In most instances, the sector-level CSPs based their Phase IV savings calculations on the current TRM algorithms and industry practices. For measures that were not in the TRM, PPL Electric Utilities worked with the sector-level CSPs or used its experience gained from delivering programs in prior phases to calculate measure- and program-level savings, such as the average savings per lighting retrofit or custom project.

The CSPs based incentive and rebate levels on the percentage of incremental cost or the first-year unit-energy and unit-demand savings potential from the Market Potential Studies, online research, and conversations with installation contractors, as well as prior phase experience. These incentive and rebate amounts ranged, on average, from 25% to 75% of the incremental cost of a measure. Some measures require a higher incentive to motivate customer action, while others can have a lower incentive because market transformation and other factors can affect customer behavior.

Marketing and advertising costs for Phase IV consist of two components:

- Sector-level CSPs calculated costs required for individual program and cross-sector marketing to generate sufficient participation to meet the Act 129 targets, based on their implementation experience and knowledge of PPL Electric Utilities' market.
- PPL Electric Utilities allocated a portion of common costs for overarching marketing and advertising campaigns. This entails developing consistent messaging and branding guidelines, conducting market research to contribute to targeted messaging strategies, and providing direction and oversight to support sector-level CSP marketing efforts.

Finally, administrative costs include all utility costs to develop, implement, and manage the Plan, except payments to customers/trade allies (rebates and incentives). These costs include PPL Electric Utilities labor and materials, CSP labor and material, marketing, QA/QC and EM&V, tracking systems, legal, and

the SWE costs.³² These Phase IV costs were based on PPL Electric Utilities wage rates; tracking system cost from prior phases; and EM&V costs from prior phases to reflect efficiencies, lessons learned, and revisions to prior phase systems and processes to increase Phase IV operational efficiency.

³² PPL Electric Utilities' share of the SWE costs is not subject to the Act 129 cost cap.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Petition of PPL Electric Utilities Corporation for
Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan**

Docket No. M-2020-3020824

PPL Electric Utilities Corporation

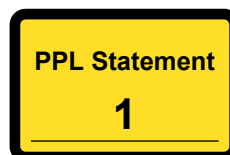
Statement No. 1

Direct Testimony of Dirk Chiles

List of Topics Addressed:

**Overview of the Filing
Summary of Phase IV EE&C Plan and Programs
Details on CSP Contracts**

Date: November 30, 2020



Direct Testimony of Dirk Chiles

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Q. Please state your full name and business address.

A. My name is Dirk Chiles, and my business address is 827 Hausman Road, Allentown PA 18104.

Q. By whom are you employed and in what capacity?

A. I am employed by PPL Electric Utilities Corporation (“PPL Electric” or the “Company”) as Manager-Energy Efficiency.

Q. What are your duties as Manager-Energy Efficiency Evaluation and Performance?

A. I am responsible for managing all aspects of PPL Electric’s Act 129 Energy Efficiency and Conservation (“EE&C”) programs, including the planning and development of the Phase IV Energy Efficiency and Conservation Plan (“Phase IV EE&C Plan” or “EE&C Plan”) and the implementation, evaluation, and compliance of the Company’s Phase III and Phase IV EE&C Plans.

Q. What is your educational background?

A. I received a B.A. in economics and an M.B.A. from Moravian College.

Q. Please describe your professional experience.

A. I have over 20 years of experience in the energy industry, including marketing, rates and tariffs, and finance, and approximately 11 years of experience developing, implementing, evaluating, and managing EE&C programs.

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Q. Have you previously testified as a witness before the Pennsylvania Public Utility Commission (“Commission”)?

A. No.

Q. Briefly describe the subject matter of your testimony in this proceeding.

A. I will explain the objectives, philosophy, and process that PPL Electric applied to the preparation of its Phase IV EE&C Plan filing as required by Act 129 of 2008 (“Act 129”), as well as the relevant Commission Orders for Phase IV. *See Energy Efficiency and Conservation Program*, Docket No. M-2020-3015228 (Order entered June 18, 2020) (“*Phase IV Implementation Order*”); *2021 Total Resource Cost (TRC) Test*, Docket No. M-2019-3006868 (Order entered Dec. 19, 2019) (“*2021 TRC Test Order*”) (collectively, “*Phase IV Orders*”).

Q. Please describe how PPL Electric’s EE&C Plan filing is organized.

- A. PPL Electric’s filing consists of the following documents:
1. A petition requesting approval of the EE&C Plan and the Company’s proposed cost recovery mechanism.
 2. The EE&C Plan (PPL Electric Exhibit 1);
 3. The direct testimony of Dirk S. Chiles (PPL Electric Statement No. 1);
 4. The direct testimony of Terry Fry (PPL Electric Statement No. 2); and
 5. The direct testimony of Scott R. Koch (PPL Electric Statement No. 3).

1 The Phase IV EE&C Plan is structured consistent with the Template for Energy
2 Efficiency and Conservation Plans issued by the Commission via Secretarial letter dated
3 September 9, 2020, at Docket No. M-2020-3015228. The EE&C Plan includes an
4 overview of the Plan; program summary tables and charts; program descriptions;
5 program management and implementation strategies; information about the reporting and
6 tracking systems; the Company's plans for quality assurance, evaluation, measurement,
7 and verification; details of the proposed cost recovery mechanism; an analysis of the
8 EE&C Plan's and programs' cost-effectiveness; and other information to support the
9 EE&C Plan.

10
11 **Q. Are you sponsoring any exhibits in this proceeding?**

12 A. Yes. Mr. Fry, Mr. Koch, and I are co-sponsoring PPL Electric Exhibit 1. Within that
13 exhibit, I am primarily responsible for and am sponsoring Sections 1, 4, 5, 6, and 9, the
14 program descriptions in Section 3, and Appendices A, B, and C. Mr. Fry is primarily
15 responsible for and is sponsoring Sections 2 and 8 and the calculations in Section 3. Mr.
16 Koch is primarily responsible for cost recovery issues and is sponsoring Section 7.

17
18 **Q. Please provide a summary of PPL Electric's Phase IV EE&C Plan.**

19 A. PPL Electric's Phase IV EE&C Plan includes a portfolio of EE&C programs for PPL
20 Electric's customers that are designed to meet the Company's Phase IV consumption
21 reduction and peak demand reduction targets and to comply with the other requirements
22 set forth in the Commission's *Phase IV Orders*. As discussed below, the Phase IV EE&C
23 Plan includes a range of EE&C programs for four customer sectors (*i.e.*, Residential,

1 Low-Income, Small Commercial and Industrial (“Small C&I”), and Large Commercial
2 and Industrial (“Large C&I”). These programs are designed as a portfolio of options,
3 which will offer all of PPL Electric’s customers cost-effective, flexible, and wide-ranging
4 choices and financial incentives to reduce their electric consumption and peak demand,
5 which ultimately will help customers reduce their energy costs.

6
7 **Q. What are the primary objectives of the Phase IV EE&C Plan?**

8 A. PPL Electric aims to deliver a cost-effective portfolio of programs that will meet
9 customers’ needs, fulfill the Company’s Phase IV EE&C Plan objectives, and achieve the
10 results required by Act 129 and the Commission’s *Phase IV Implementation Order*,
11 including the following:

- 12 • Achieve 1,250,157 MWh gross verified energy savings by May 31, 2026;
- 13 • Achieve 72,509 MWh gross verified energy savings from low-income customers by
14 May 31, 2026;
- 15 • Achieve 229 MW of peak demand savings (measured at the generator level) by May
16 31, 2026;
- 17 • Have a portfolio of EE&C programs that is cost-effective as determined by the Total
18 Resource Cost (“TRC”) Test; and
- 19 • Spend no more than \$307.5 million plus the costs for the Commission’s Statewide
20 Evaluator (“SWE”), which PPL Electric estimates are approximately \$5 million. I
21 note that at the time PPL Electric prepared its EE&C Plan, the Commission had not
22 awarded the Phase IV SWE contract.

23

1 **Q. Please describe PPL Electric’s overall strategy to achieve these objectives.**

2 A. Section 1.1.2 of the EE&C Plan describes the strategy in detail. PPL Electric’s portfolio
3 reflects an approach that is targeted, yet flexible enough to meet changing market
4 conditions and progress toward the Phase IV EE&C Plan goals. The portfolio builds on
5 customer, trade ally, and stakeholder relationships established during Phases I , II and III
6 through training, education, installation of energy efficient measures, marketing
7 strategies, effective trade ally networks, and customer support. Education about energy
8 efficiency will play a more significant role than in Phases I, II and III. In addition,
9 education, marketing, and the incentive structure in the Phase IV EE&C Plan strives to
10 promote a more-comprehensive, holistic approach to energy efficiency.

11 PPL Electric recognizes that no program can succeed unless it is accepted by the
12 customers and is executed well. The Phase IV EE&C Plan includes specific plans for a
13 smooth transition between Phases III and IV. This helps to provide consistency and
14 certainty to customers and trade allies, particularly for projects that start in Phase III but
15 go in-service in Phase IV and for non-residential customers who were placed on a waitlist
16 when program funding was fully subscribed before the end of Phase III.

17 PPL Electric’s Phase IV programs are designed with the flexibility to allow
18 customers to use their own resources and trade allies and to combine incentives from
19 multiple programs or from other sources to create the best solution for any facility or
20 system in a way that utilizes normal market mechanisms for these activities. Programs
21 are designed to engage trade allies and other local market participants through outreach,
22 training, and potential co-marketing to make them aware of PPL Electric’s programs,
23 enable them to articulate program features and benefits to potential customers, and help

1 them support customers in their decision to take energy efficiency and peak demand
2 reduction actions. Where appropriate, programs are designed to leverage existing market
3 delivery channels to provide efficient and simple implementation from the customer’s
4 perspective.

5

6 **Q. Please describe the process PPL Electric used to develop its Phase IV EE&C Plan.**

7 A. PPL Electric formed a project team consisting of internal staff from a variety of groups
8 and The Cadmus Group LLC (“Cadmus”), a nationally recognized energy consulting
9 firm, to prepare its Phase IV EE&C Plan. The Company conducted a thorough review of:
10 (1) the Phase IV Market Potential Study; (2) the Commission’s *Phase IV Orders*, and (3)
11 the results of PPL Electric’s Phase III EE&C programs. PPL Electric established guiding
12 principles, key objectives, and preliminary estimates of the savings and cost budgets for
13 each customer sector (i.e., Residential, Low-Income, Small C&I, and Large C&I) that
14 would satisfy the overall savings and peak demand targets, meet the Low-Income set-
15 aside target, and provide an equitable distribution of savings and costs across the
16 customer sectors.

17 PPL Electric issued requests for proposals (“RFPs”) for its three program
18 implementation conservation service provider (“CSP”) contracts (*i.e.*, Residential, Low-
19 Income, and Non-Residential). These proposals were essential to get confirmation from
20 bidders that the budgets and objectives were realistic (especially the savings and costs for
21 each sector), to better understand the types of programs and measures that were necessary
22 to achieve these budgets and objectives, and to confirm that the CSPs would be able to
23 achieve the program performance objectives. In addition, PPL Electric solicited bids for

1 its tracking system and for a CSP to conduct an independent evaluation of its EE&C Plan.
2 This input was also necessary to confirm PPL Electric’s cost estimates for these services
3 were realistic.

4 Based on these RFPs, PPL Electric defined likely measures and programs,
5 designed the programs, and estimated the savings and costs for each measure, program,
6 and customer sector. PPL Electric used an iterative “bottom up” approach to align with
7 the “top down” objectives, such as the savings and cost budgets for each sector, the
8 overall energy savings and peak demand compliance targets, the set-aside target for the
9 Low-Income sector, the cost-effectiveness requirement, and the overall cost cap.

10

11 **Q. Please describe the programs included in PPL Electric’s Phase IV EE&C Plan.**

12 A. The programs in the Phase IV EE&C Plan include the following:

- 13 • The Residential Program, which consists of the following components¹:
 - 14 ○ Appliance Recycling. This program component provides incentives for customers
15 to remove and recycle refrigerators, freezers, windows, air conditioners, and
16 dehumidifiers. This component is primarily for residential customers but is
17 available for all customer sectors. This component is similar to the Phase III
18 program.
 - 19 ○ Efficient Lighting. This program component provides discounts at the point of
20 sale for specialty light emitting diode (“LED”) light bulbs. This component also
21 has other, less significant delivery channels available, such as give-away

¹ In Table 8 of the Phase IV EE&C Plan, PPL Electric also includes a “Home Energy Efficiency Report” component in the list of the Residential Program’s components. Although PPL Electric Utilities does not currently project participation for home energy reports (“HERs”) in the Phase IV EE&C Plan, the Company may decide to offer HERs within the Phase IV period, within the approved budget, and therefore includes the HERS component in Table 8.

1 promotions and new customer welcome kits. This component is primarily for
2 residential customers but is available for all customer sectors.

3 ○ Energy Efficient Home. This program component provides incentives for energy
4 efficient equipment in a home, such as heating, cooling, water heating, smart
5 thermostats, appliances, pool pumps, insulation, and air sealing. This component
6 is for residential customers only. This component offers measures that are similar
7 to those delivered in Phase III.

8 ○ Student Energy Efficient Education. This program component provides energy
9 efficiency education and kits to students in grades K-12. This component is
10 similar to the Phase III program.

11 • The Low-Income Program, which consists of the following component:

12 ○ Act 129 Low-Income Assessment (formerly known as Low-Income Winter Relief
13 Assistance Program or “Low-Income WRAP”). This program component will
14 have both an in-home and virtual delivery channel based on customer preference.
15 The in-home assessment provides education and direct-install energy efficiency
16 measures in low-income customers’ homes at no cost to the customer and may
17 include weatherization, lighting, heating, cooling, appliance, water heating, and
18 water conservation measures. The virtual assessment provides education and
19 non-direct install energy efficiency measures listed above and at no cost. A
20 virtual walkthrough will be held with the customer to determine the customer’s
21 energy efficiency needs. Once the assessment is complete, the customer is sent a
22 customized energy reduction package. This program is similar to the Phase III
23 Low-Income WRAP but with a virtual component added to it.

- 1 • The Non-Residential Program, which consists of the following components:
 - 2 ○ Efficient Equipment. This program component provides incentives to non-
3 residential customers for energy efficient equipment. Measures may include
4 heating, cooling, lighting, refrigeration, motors, etc. This program is available to
5 the Small C&I and Large C&I customer sectors. This program is similar to the
6 Phase III program.
 - 7 ○ Custom. This program component provides incentives for any cost-effective
8 measure that reduces electric usage and is not covered by another PPL Electric
9 program component. These measures may include new or replacement energy-
10 efficient equipment, retro-commissioning, combined heat and power (“CHP”),
11 repairs, equipment optimization, new construction projects, operational and
12 process improvements, and behavioral changes that result in cost-effective electric
13 consumption reductions. This program is available to the Small C&I and Large
14 C&I customer sectors. This program covers more measures than the Phase III
15 Custom Program.

16

17 **Q. Is the Phase IV EE&C Plan designed to meet the consumption reduction targets**
18 **and the peak demand reduction target within the designated expenditure cap?**

19 A. Yes. The EE&C Plan is designed to meet the overall consumption reduction target, the
20 Low-Income set-aside consumption reduction target, and the peak demand reduction
21 target, all within the expenditure cap. In fact, PPL Electric has designed its EE&C Plan
22 to exceed all of the compliance targets, within the expenditure cap, to account for risks
23 and uncertainties, such as evaluation results that differ from expectations.

1 As shown in Table 2 of the EE&C Plan, the estimated overall consumption
2 reduction is 1,540,687 MWh, which exceeds the 1,250,157 MWh overall compliance
3 target by approximately 23% (or by approximately 39% with 200,000 MWh of carryover
4 savings from Phase III). The estimated consumption reduction from low-income
5 customers is 74,793 MWh, which exceeds the 72,509 MWh Low-Income compliance
6 target by approximately 3%. The estimated overall peak demand reduction of 248 MW
7 exceeds the 229 MW peak demand reduction compliance target by approximately 8%.

8
9 **Q. Please describe the Company’s strategy to ensure the EE&C Plan is designed to**
10 **achieve at least 15% of the total consumption reduction target in each program**
11 **year.**

12 A. As shown on Table 5 of the EE&C Plan, PPL Electric has designed its EE&C Plan to
13 achieve 22% of the total consumption reduction target in Program Year 13, 23% in
14 Program Year 14, 22% in Program Year 15, 21% in Program Year 16, and 20% in
15 Program Year 17 by leveling projected program performance and pace. PPL Electric will
16 also specify these objectives in the contracts for all program implementation CSPs.

17
18 **Q. Does the EE&C Plan include at least one comprehensive program for residential**
19 **customers and at least one comprehensive program for non-residential customers?**

20 A. Yes. As described in Section 3.1.4 of the EE&C Plan, the EE&C Plan includes
21 comprehensive measures in its Residential, Low-Income, and Non-Residential Programs.
22 Specifically, both the Residential and Low-Income Programs will provide a
23 comprehensive mix of cost-effective energy efficiency measures for all building types

1 (single-family, multifamily, and manufactured homes and existing and new construction).
2 Both programs will offer in-home energy audits that assess end uses, including
3 weatherization, water heating, lighting, HVAC, and appliances. All residential customers
4 will receive energy efficiency and peak demand education and be encouraged to
5 implement multiple measures and to take a comprehensive approach to energy efficiency.

6 For non-residential customers, PPL Electric’s Non-Residential Program will
7 target business customers of all sizes and in every segment, as well as government and
8 educational institutions and master metered low-income multifamily buildings, with a
9 comprehensive range of prescriptive measures (including HVAC, lighting, and water
10 heating) as well as opportunities to implement a custom efficiency project for measures
11 not included in PPL Electric’s Energy Efficient Equipment (prescriptive) component and
12 not included in the TRM. Custom component measures cover a comprehensive set of
13 non-residential needs, including new or replacement energy efficient and peak demand-
14 saving equipment, retro-commissioning, repairs, equipment optimization, building
15 management or industrial process controls, new construction projects, CHP, and
16 operational and process improvements that result in cost-effective energy efficiency
17 savings.

18
19 **Q. What process will the Company use to sell peak demand into PJM Interconnection**
20 **LLC’s (“PJM”) Forward Capacity Market?**

21 A. PPL Electric plans to issue an RFP sometime in the spring of 2021 to solicit bids from
22 demand response providers asking them to bid a portion of the qualified peak demand

1 measures into the PJM Forward Capacity Market. At this time, PPL Electric plans to bid
2 approximately 25% qualified measures into the market.

3

4 **Q. What process is the Company proposing to evaluate and update its EE&C Plan?**

5 A. PPL Electric’s staff plans to carefully monitor actual program performance compared to
6 estimates in the EE&C Plan. In addition, PPL Electric’s independent evaluator will
7 conduct an impact evaluation, an annual cost-effectiveness evaluation, and process
8 evaluations of each program and the overall portfolio. If actual performance deviates
9 from the estimates in the EE&C Plan, PPL Electric will work with its program
10 implementation CSPs to adjust the performance of programs or will recommend changes
11 to the EE&C Plan. This includes modifying marketing tactics, adjusting incentive levels
12 within specified ranges, offering different measures at different times, and offering
13 multiple delivery channels. To the extent that there are any changes that require
14 Commission approval, PPL Electric will seek approval of such changes in accordance
15 with the EE&C Plan change procedures outlined in the Commission’s *Minor Plan*
16 *Change Order* entered on June 10, 2011, at Docket No. M-2008-2069887, and the *Phase*
17 *IV Implementation Order*.

18

19 **Q. Does the Phase IV EE&C Plan offer at least one energy-efficiency program**
20 **for each customer sector?**

21 A. Yes. As shown in Table 1 and Figure 4 of the EE&C Plan (among numerous other
22 sections, tables, and figures), there is at least one program available for each of the four
23 customer sectors -- Residential, Low-Income, Small C&I, and Large C&I.

1

2 **Q. Has PPL Electric competitively bid its relevant contracts for the Phase IV EE&C**
3 **Plan?**

4 A. Yes. As mentioned previously, PPL Electric has issued competitive RFPs for all of its
5 CSPs and for a tracking system and has selected its CSPs and the tracking system vendor.
6 On November 30, 2020, PPL Electric filed its Evaluation, Measurement, and Verification
7 (“EM&V”) CSP contract with the Commission. The Company is finalizing the other
8 CSP contracts for submittal to the Commission for approval.

9

10 **Q. Does this conclude your direct testimony?**

11 A. Yes, it does. However, I reserve the right to supplement my testimony.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Petition of PPL Electric Utilities Corporation for
Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan**

Docket No. M-2020-3020824

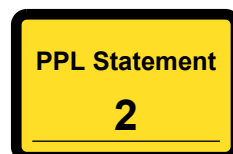
PPL Electric Utilities Corporation

Statement No. 2

Direct Testimony of Terry Fry

**List of Topics Addressed:
Development of the Phase IV EE&C Plan
Total Resource Cost (TRC) Test Calculations**

Date: November 30, 2020



Direct Testimony of Terry Fry

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Q. Please state your full name and business address.

A. My name is Terry Fry, and my business address is 475 14th Street, Suite 260 Oakland, CA 94612.

Q. On whose behalf are you presenting testimony in this proceeding?

A. I am testifying on behalf of PPL Electric Utilities Corporation (“PPL Electric” or the “Company”).

Q. By whom are you employed and in what capacity?

A. I am employed by The Cadmus Group LLC (“Cadmus”) as Senior Vice President of Energy Sector.

Q. What are your duties as Senior Vice President of Cadmus’s Energy Sector?

A. I am responsible for managing the firm’s consulting practices in the energy sector and providing technical leadership in utility planning, assessment, measurement, and verification practice areas of the firm.

Q. What is your educational background?

A. I hold an MPhil degree in Economics and Politics of Development from Cambridge University and a BS in Mechanical Engineering from Stanford University.

Q. Please describe your professional experience.

1 A. Since 1987, I have worked in the energy utility industry in various capacities, including as
2 a researcher, consultant, educator, and policy advisor. With the assistance of my staff, I
3 have provided technical advice and consultation to energy utilities on matters related to
4 resource planning, load research, grid modernization, market assessment, energy
5 efficiency, demand response, portfolio assessment, and performance measurement and
6 verification. Before joining Cadmus in 2017, I was Senior Vice President for Utility
7 Services at Nexant from 2000 to 2017. I served as senior Project Director at Bechtel
8 Technology and Consulting (the parent of Nexant’s spin-out) from 1997-2000. Prior to
9 that, I served as a principal in the consulting firm of Barakat & Chamberlin, where I led
10 the firm’s utility planning and strategy practice. I have also served as an appointed Advisor
11 on renewable energy and energy efficiency to the US Department of Commerce Secretary
12 since 2008 and am presently serving my fifth term.

13

14 **Q. What is the purpose of your testimony?**

15 A. The purpose of my testimony is to provide supplemental information regarding PPL
16 Electric’s proposed Phase IV Act 129 Energy Efficiency and Conservation Plan (“Phase
17 IV EE&C Plan” or “EE&C Plan”), which is being submitted in accordance with Act 129
18 of 2008, P.L. 1592, 66 Pa. C.S. §§ 2806.1, 2806.2 (“Act 129”), the Commission’s June 18,
19 2020 Implementation Order at Docket No. M-2020-3015228 (“*Phase IV Implementation*
20 *Order*”), and the Commission’s 2021 Total Resource Cost (“TRC”) Test Order entered on
21 December 19, 2019, at Docket No. M-2019-3006868 (“*2021 TRC Test Order*”).

22

23 **Q. What was your role in preparation of PPL Electric’s proposed EE&C Plan?**

1 A. I and my staff, working under my direct supervision, provided PPL Electric with technical
2 information regarding the design of some of the programs in the proposed Phase IV EE&C
3 Plan and assisted PPL Electric in preparing the portfolio, including the tables and charts in
4 the EE&C Plan. I also oversaw the technical analyses and quantitative program and
5 portfolio summaries prepared in accordance with the Commission’s EE&C Plan Template
6 issued on September 9, 2020, at Docket No. M-2020-3015228, as well as the benefit-cost
7 analyses performed in accordance with the Commission’s *2021 TRC Test Order*.

8

9 **Q. Are you sponsoring any exhibits in the filing?**

10 A. Yes. As Mr. Chiles explains in his direct testimony (PPL Electric Statement No. 1), he,
11 Mr. Koch, and I are co-sponsoring PPL Electric’s Phase IV EE&C Plan, which has been
12 identified as PPL Electric Exhibit 1. Specifically, I am responsible for and am sponsoring
13 Section 2, as well as calculations in Section 3 and Section 8 of that exhibit.

14

15 **Q. Please describe your responsibilities for each of these sections of the EE&C Plan.**

16 A. I, with support from my staff, made the following contributions to the various sections of
17 the EE&C Plan:

18 • **Section 2** - A quantitative overview of the entire Phase IV EE&C Plan for the five-
19 year period, in accordance with the Commission’s EE&C Plan Template. The
20 overview consists of the following tables:

- 21 ○ **Table 8** - Residential, Small Commercial and Industrial (“Small C&I”), and
22 Large Commercial and Industrial (“Large C&I”) Portfolio Summaries;
- 23 ○ **Table 9** - Budget and Parity Analysis;

1 ○ **Table 10** - Summary of Costs and Savings by Program and Customer
2 Sector;

- 3 • **Section 3** - Review of program-specific costs, savings, and cost-effectiveness
4 calculations; and
- 5 • **Section 8** - Determination of avoided costs and cost-effectiveness analysis for each
6 program and the portfolio according to the Commission’s *2021 TRC Test Order*.

7

8 **Q. Does the Phase IV EE&C Plan contain a process for conducting an annual cost-**
9 **effectiveness evaluation of the EE&C Plan in accordance with the Commission’s 2021**
10 ***TRC Test Order*?**

11 A. Yes. The Phase IV EE&C Plan outlines a process for conducting an annual cost-
12 effectiveness evaluation of the EE&C Plan in accordance with the Commission’s *2021*
13 *TRC Test Order*. See Section 1.8.3 of the Phase IV EE&C Plan.

14

15 **Q. What method was used to estimate the cost-effectiveness of the Phase IV EE&C Plan**
16 **and its individual programs?**

17 A. For each program in the Phase IV EE&C Plan and for the entire EE&C Plan (including
18 portfolio-level common costs), cost-effectiveness was estimated in accordance with the
19 procedures described in the Commission’s *2021 TRC Test Order* and the California
20 Standard Practice Manual (“SPM”)¹.

21

¹ See *California Standard Practice Manual for Economic Analysis of Demand-Side Management Programs and Projects*, California Energy Commission, October 2001.

1 **Q. Is the proposed Phase IV EE&C Plan cost-effective, as a whole, based on the TRC**
2 **critierion?**

3 A. Yes. The cost-effectiveness of the proposed portfolio is demonstrated using data presented
4 in the Phase IV EE&C Plan, specifically in Section 3 and in Tables 59 and 60 in Section 8.
5 For each program in the Phase IV EE&C Plan, PPL Electric determined cost-effectiveness
6 in accordance with the Commission’s *2021 TRC Test Order*.

7 PPL Electric’s proposed Phase IV EE&C Plan is cost-effective as a whole. *See*
8 Section 8 of the Phase IV EE&C Plan. Specifically, the TRC benefit-to-cost ratio for the
9 overall Phase IV EE&C Plan, inclusive of energy efficiency and demand response, is 1.17.
10 This exceeds the value of 1.0 required by Act 129 and is consistent with the benefit-cost
11 ratio of well-performing programs in other states, especially considering Pennsylvania’s
12 set-aside savings requirement for the Low-Income customer sector.

13 Tables 3 and 4 in the Phase IV EE&C Plan provide summaries of first-year and
14 lifetime costs and benefits used to compute each program’s cost-effectiveness from a TRC
15 perspective. I note that PPL Electric determined the unit savings, unit counts, and effective
16 useful life (“EUL”) for each measure. To determine lifetime savings, the Company
17 validated unit savings and EULs for each measure by assessing conformity with the
18 Commission’s *2021 TRM Update Amendment Tentative Order* entered on October 29,
19 2020, at Docket M-2019-3006867, and Phase III program data. The Company then
20 determined incremental costs and avoided cost benefits for each measure.

21
22 **Q. How did the Company assess the cost-effectiveness for each program?**

1 A. Assessment of cost-effectiveness for each program in the Phase IV EE&C Plan began with
2 determining each program’s total resource benefits (“TRC Benefits”) based on the savings
3 of the individual measures over their lives, for a maximum of 15 years as directed in the
4 *2021 TRC Test Order*,² as well as the program’s total resource costs (“TRC Costs”). A
5 program was deemed cost-effective if its TRC Benefits exceeded its TRC Costs or the
6 benefit-to-cost ratio exceeded 1.0.

7 The TRC data used in this assessment were estimates based on the planning
8 assumptions in this Phase IV EE&C Plan. The Company will complete a cost-effectiveness
9 evaluation using actual program results as part of its annual evaluations.

10

11 **Q. Please describe the calculation of avoided costs of supplying electricity.**

12 A. The avoided costs of delivered electricity were calculated for a 15-year planning horizon
13 in three segments, in accordance with the procedure prescribed in Sections IV.K and V.D
14 of the Commission’s *2021 TRC Test Order*, as follows:

- 15 • **Years 1-4 (June 2021-May 2025).** The Company used the New York Mercantile
16 Exchange (“NYMEX”) Electricity Futures Price at the PJM Interconnection LLC
17 (“PJM”) West Hub as of September 1, 2020, and applied a locational basis adjustment
18 from PJM West Hub to the Company’s Zone.
- 19 • **Years 5-10 (June 2025-May 2031).** PPL Electric used NYMEX Henry Hub Natural
20 Gas Futures and the U.S. Energy Information Administration’ (“EIA”) Annual Energy
21 Outlook (“AEO”) Natural Gas Price Forecast for Mid-Atlantic Region as of September

² *2021 TRC Test Order* at 4, 6, 21.

1 1, 2020, converted to electric prices using an on-peak and off-peak heat rate and spark
2 spread.

- 3 • **Years 11-15 (June 2031-May 2036).** PPL Electric used Middle Atlantic Natural Gas
4 Prices for Electric Power from the EIA AEO, Energy Prices by Sector and Source,
5 converted to electric prices using the on-peak and off-peak heat rate and including on-
6 peak and off-peak spark price spreads.

7 The Company estimated avoided generation capacity costs using PJM base residual auction
8 results for 2021/2022. Subsequent years are inflated by 2% as specified in the *2021 TRC*
9 *Test Order*. Avoided transmission and distribution costs for PY13 are from the Statewide
10 Evaluator’s (“SWE”) Demand Response Potential study, with the subsequent years
11 escalated by 2% as specified in the *2021 TRC Test Order*.

12
13 **Q. What are the sources for the Company’s estimates of savings, incremental cost, and**
14 **measure life?**

15 A. PPL Electric obtained estimates of savings, incremental cost, and measure life for its Phase
16 IV EE&C Plan primarily from the 2021 Pennsylvania Technical Reference Manual
17 (“TRM”), the SWE’s Phase IV incremental cost database, and Phase III program data. The
18 Company compiled data for new measures not found in the TRM from secondary sources,
19 including the Department of Energy Technical Support Documents and information
20 provided by the program implementation conservation service providers (“CSPs”).

21
22 **Q. What benefits were used in the TRC calculation?**

1 A. The benefits used in the TRC calculation include the full value of time and seasonally
2 differentiated avoided generation, transmission and distribution, and capacity costs. These
3 benefits also accounted for avoided line losses. To capture the full value of time and
4 seasonal impacts of each program measure, the annual generation capacity value was
5 assigned to each program measure according to the hourly load shape of the end user
6 affected by the measure. The Company factored non-energy benefits, such as water and
7 operations and maintenance (“O&M”) savings, into the calculation because these benefits.

8

9 **Q. What was included in the cost component of the TRC analysis?**

10 A. The cost component of the TRC analysis included: (1) incremental measure costs; and (2)
11 electric distribution company (“EDC”) costs.

12 Incremental measure costs are the expenses associated with the installation of
13 energy efficiency measures and ongoing O&M costs, where applicable. The incremental
14 measure costs were obtained primarily from the SWE’s Phase IV incremental cost
15 database. Measure costs not included in this study were obtained from a variety of sources,
16 including PPL Electric’s actual experience, the results of the Company’s Phase III
17 evaluations (such as the actual project cost for an average custom commercial and
18 industrial project), the Department of Energy Technical Support Documents and
19 information provided by the program implementation CSPs.

20 EDC costs are costs that are in the EE&C Plan budget subject to the funding cap
21 plus SWE costs that are not subject to the funding cap. EDC costs consist of expenses
22 associated with program development, delivery, and ongoing operation, specifically: (1)

1 EDC labor, material, and supplies; (2) customer incentives³; (3) CSP labor, materials, and
2 supplies; and (4) marketing.

3 PPL Electric’s EDC costs fall into two general categories:

- 4 • **Direct Program Costs:** The costs that are directly related to and charged to a specific
5 program; and
- 6 • **Common Costs (or “Portfolio-level Costs”):** The costs that are applicable to more
7 than one customer class or more than one program, or that provide portfolio-wide
8 benefits.

9

10 **Q. Does this conclude your direct testimony?**

11 A. Yes, it does. However, I reserve the right to supplement my testimony.

³ Customer incentives are not included in calculation of TRC costs, in accordance with procedures described in the Commission’s *2021 TRC Test Order*.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Petition of PPL Electric Utilities Corporation for
Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan**

Docket No. M-2020-3020824

PPL Electric Utilities Corporation

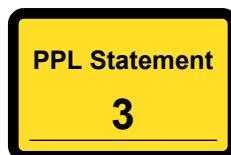
Statement No. 3

Direct Testimony of Scott R. Koch

List of Topics Addressed:

**Spending Cap for the Phase IV EE&C Plan
Phase IV EE&C Cost Recovery Mechanism**

Date: November 30, 2020



Direct Testimony of Scott R. Koch

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Q. Please state your full name and business address.

A. My name is Scott R. Koch, and my business address is Two North Ninth Street, Allentown, Pennsylvania 18101.

Q. By whom are you employed and in what capacity?

A. I am employed by PPL EU Services Corporation, an affiliate of PPL Electric Utilities Corporation (“PPL Electric” or the “Company”), as a Rates & Revenue Manager.

Q. What are your duties as Rates and Revenue Manager?

A. I am responsible for PPL Electric’s compliance with the regulatory requirements of the Pennsylvania Public Utility Commission (“Commission”) and the Federal Energy Regulatory Commission (“FERC”). This involves activities associated with the assembly and analysis of test period-related cost-of-service information for the preparation of distribution rate cases before the Commission and annual filings of the Company’s Formula Rate before FERC. As part of this function, I am responsible for the preparation and analysis of rate and revenue related information for budget preparation, forecasts, actuals, and variance analysis. This includes Securities and Exchange Commission (“SEC”) and FERC reporting as well as detailed analysis of the Company’s revenue. In addition, I am also responsible for the preparation and coordination of several cost recovery mechanisms and the management of regulatory audits of these recovery mechanisms.

Q. What is your educational background and experience?

1 A. I graduated from Shippensburg University in 2002 with a Bachelor of Science Degree in
2 Accounting. In 2010, I was employed by PPL Corporation, where I supported the
3 accounting and financial reporting activities of the company. In 2011, company
4 reorganization transferred me to PPL Electric providing the same support. In 2014, I
5 assumed a position as Senior Analyst - Regulatory Compliance with PPL Electric. In 2015,
6 a company reorganization transferred me to PPL EU Services Corporation providing the
7 same support. In 2016, I became the Regulatory Operations Supervisor. In 2020, I
8 assumed my current position.

9

10 **Q. Have you previously testified as a witness before the Commission?**

11 A. Yes. I testified and sponsored exhibits in PPL Electric’s 2015 base rate case at Docket No.
12 R-2015-2469275. I also testified at the en banc hearing on Alternative Rate Making
13 Methodologies at Docket No. M-2015-2518883. I testified regarding Rate Schedule LPEP
14 at Docket Nos. R-2016-2569975 and C-2016-2580526. Moreover, I recently testified in
15 PPL Electric’s Default Service Plan 5 proceeding at Docket No. P-2020-3019356.

16

17 **Q. Briefly describe the subject matter of your testimony in this proceeding.**

18 A. I will describe the calculation of PPL Electric’s spending cap for the programs in its Phase
19 IV Energy Efficiency and Conservation Plan (“Phase IV EE&C Plan” or “EE&C Plan”). I
20 also will explain the Company’s proposed mechanism for recovering the costs of its Phase
21 IV EE&C Plan.

22

23 **Q. Are you sponsoring any exhibits in this proceeding?**

1 A. Yes. I am primarily responsible for and sponsoring Section 7 of PPL Electric Exhibit 1,
2 the Company’s Phase IV EE&C Plan. I also am sponsoring PPL Electric Exhibit SRK-1,
3 which is a copy of the proposed *pro forma* tariff supplement for the Company’s Act 129
4 Compliance Rider – Phase 4 (“ACR-4”), which is PPL Electric’s proposed non-bypassable
5 surcharge that will recover the costs associated with the Phase IV EE&C Plan consistent
6 with Sections 1307 and 2806.1(k)(1) of the Public Utility Code.

7

8 **Q. What is the spending cap for PPL Electric’s Phase IV EE&C Plan?**

9 A. The spending cap for PPL Electric’s Phase IV EE&C Plan is \$307,506,880, excluding
10 approximately \$5 million for the Company’s share of the Statewide Evaluator (“SWE”)
11 costs. The SWE costs are not subject to the cost cap per the Commission’s Implementation
12 Order entered on June 18, 2020, at Docket No. M-2020-3015228 (“*Phase IV*
13 *Implementation Order*”). Thus, the Company’s total budget for its five-year Phase IV
14 EE&C Plan is approximately \$312.5 million, when including the SWE costs.

15

16 **Q. How was that spending cap calculated?**

17 A. The \$307,506,880 cap is based on 2% of the Company’s total annual revenue as of
18 December 31, 2006, which was \$3,075,068,825. The Commission stated in its
19 *Implementation Order* that the 2% cap applies to the annual budget and not the budget for
20 the entire phase of the EE&C Plan. Therefore, the approximately \$307.5 million budget is
21 for the full five-year period, derived from the 2% cap multiplied by \$3,075,068,825
22 (\$61,501,376 per year for five years).

23

1 **Q. How are the costs to design and develop the Company’s Phase IV EE&C Plan**
2 **reflected in its budget for the EE&C Plan?**

3 A. The Commission has allowed the Company to include the costs to design and develop its
4 Phase IV EE&C Plan, and those costs incurred prior to the start of the Plan are permitted
5 to be deferred. These costs are included in the \$312.5 million budget. PPL Electric
6 proposes to amortize and recover those costs ratably over the five-year, or 60-month, life
7 of its Phase IV EE&C Plan.

8
9 **Q. Please describe the Company’s proposed rate mechanism for recovering the costs of**
10 **its Phase IV EE&C Plan.**

11 A. The Company plans to use the proposed ACR-4, which is a non-bypassable cost recovery
12 mechanism that is authorized by Section 2806.1(k)(1) of the Public Utility Code and is
13 designed consistent with Section 1307 of the Public Utility Code. The Company will
14 calculate its ACR-4 rate for each of its three customer classes – Residential, Small C&I,
15 and Large C&I. For Residential customers, the ACR-4 will be recovered as a cents per
16 kilowatt hour (“kWh”) component included in the distribution charge on the customer’s
17 bill. For Small C&I customers, the ACR-4 will be recovered as a cents per kWh component
18 and will be shown as a separate line item from other charges but combined with any Act
19 129 Compliance Rider – Phase 3 (“ACR-3”) charges, which have been recovering the costs
20 associated with PPL Electric’s currently-effective Phase III EE&C Plan. In other words, a
21 Small C&I customer will see a single line item on the bill for all Act 129 charges. For
22 Large C&I customers, the ACR-4 will be recovered as a cents per kilowatt (“kW”) component
23 of the customer’s bill and will be shown similar to the Small C&I bill

1 presentment. All Act 129 charges (including ACR-3 and ACR-4) will be identified as a
2 single ACR line item shown separately from other distribution charges. For Large C&I
3 customers, the demand (kW) is the customer's PJM Interconnection LLC ("PJM") peak
4 load contribution and may change yearly.

5
6 **Q. How many different rates will be reflected in the ACR-4?**

7 A. Three different rates will be reflected in the Company's ACR-4 rate. The three rates will
8 be for each of the Company's customer classes – Residential, Small C&I, and Large C&I.

9
10 **Q. Please describe how PPL Electric will set the annual rates under the ACR-4.**

11 A. The Company will set the annual rates under its ACR-4 using an annual budget for all costs
12 required for the Company to implement its approved Phase IV programs during the
13 upcoming 12-month period. The annual budget, or annual projected program cost, is the
14 sum of the direct and indirect costs incurred by the Company for each of the respective
15 customer classes. The annual budget will also include the amortization of any deferred
16 costs for the 12-month rate application period.

17 The total annual budgeted amount will be divided by the expected kWh for
18 Residential and Small C&I customer classes and divided by the kW demand for the Large
19 C&I customer class.

20 The Company also will include in each customer class's ACR-4 rate calculation the
21 E-factor or prior period over or undercollection for the respective customer class. This
22 over or undercollection will also be divided by expected kWh usage or kW demand for the
23 customer class. The current period rate and the E-factor rate will be combined and include

1 an adjustment for gross receipts tax to obtain the ACR-4 rate for the customer class for the
2 period.

3

4 **Q. Please describe PPL Electric’s proposed reconciliation mechanism for the ACR-4.**

5 A. In accordance with the Commission’s *Phase IV Implementation Order*, the Company
6 proposes to file with the Commission a report of collections within 30 days following the
7 end of each application year. This report will be the reconciliation of the ACR-4 by each
8 of the three customer classes (*i.e.*, Residential, Small C&I, and Large C&I). The
9 reconciliation will compare the actual expenses incurred and the actual revenues received
10 for each of the customer classes at the end of each application year. In addition, as required
11 by the *Phase IV Implementation Order* (page 142), the Section 1307(e) reconciliation
12 statement will clearly identify the PJM Forward Capacity Market (“FCM”) proceeds as
13 cost reductions and PJM FCM deficiency charges as cost increases. No interest will be
14 included monthly on the over or under collections, as directed by the Commission on page
15 142 of the *Phase IV Implementation Order*.

16

17 **Q. Will the Phase IV cost recovery mechanism be a separate mechanism from the Phase
18 III cost recovery mechanism?**

19 A. PPL Electric proposes to include any remaining ACR-3 over or undercollection in its ACR-
20 4 E-factor, as described on pages 142 and 143 of the *Phase IV Implementation Order*. This
21 will effectively combine the ACR-3 with the ACR-4 effective June 1, 2021.

22

23 **Q. Is the Company proposing to include any capital costs as part of its ACR-4?**

1 A. No.

2

3 **Q. Is the Company proposing to include any EE&C Plan-related costs that have been**
4 **claimed and permitted recovery in base rates?**

5 A. No.

6

7 **Q. Does this conclude your direct testimony?**

8 A. Yes, it does. However, I reserve the right to supplement my testimony.



PPL Electric Utilities Corporation

GENERAL TARIFF

**RULES AND RATE SCHEDULES
FOR ELECTRIC SERVICE**

In the territory listed on pages 4, 4A, and 4B
and in the adjacent territory served.

ISSUED: TBD

EFFECTIVE: TBD

GREGORY N. DUDKIN, PRESIDENT

Two North Ninth Street
Allentown, PA 18101-1179

NOTICE

THIS TARIFF MAKES CHANGES (C) IN EXISTING RATES. SEE PAGE TWO.

PPL Electric Utilities Corporation

ACT 129 COMPLIANCE RIDER – PHASE 4

A Phase 4 Act 129 Compliance Rider (ACR 4) shall be applied, on a non-bypassable basis, to charges for electricity supplied to customers who receive distribution service from the Company under this Tariff. The ACR 4 will be implemented beginning June 1, 2021.

The ACR 4 shall be computed separately for each of the following three customer classes:

- (1) Residential: Consisting of Rate Schedules RS and RTS (R),
- (2) Small Commercial and Industrial (Small C&I): Consisting of Rate Schedules GS-1, GS-3, BL, SA, SM (R), SHS, SLE, SE, TS (R), and GH-2 (R), and
- (3) Large Commercial and Industrial (Large C&I): Consisting of Rate Schedules LP-4, LP-5, and LPEP.

The ACR 4 will be computed for each customer receiving distribution service from the Company using the formulae described below. For residential customers, the ACR 4 charge shall be included in the distribution charges on a kWh basis of the monthly bill. For all other customers, the ACR charge shall be listed as a separate charge on the monthly bill. All charges shall be reconciled on an annual basis for undercollections and overcollections experienced during the previous year. Charges set forth in the residential rate schedules in this tariff have been adjusted to reflect application of the currently effective ACR 4.

The ACR 4 for the Residential class and the Small C&I class shall be computed using the following formula:

$$\text{ACR 4} = [\text{ACc/S} - \text{E/S}] \times 1 / (1-\text{T})$$

The ACR 3 for the Large C&I class shall be computed using the following formula:

$$\text{ACR 4} = [\text{ACc/D} - \text{E/D}] \times 1 / (1-\text{T})$$

Where:

ACc = An annual budget of all costs required for the Company to implement its Commission-approved Phase 4 Energy Efficiency and Conservation (EE&C) Plan during a compliance year. A compliance year is the 12-month period beginning June 1 of each calendar year and ending May 31 of the following calendar year. The annual project program cost is the sum of all direct and indirect costs (including all deferred design and development costs, general administrative costs, and applicable statewide evaluator costs) required to implement the Company's EE&C Plan divided by the number of months in the Company's EE&C Plan for the given application year. All deferred design and development cost, general administrative costs, and applicable statewide evaluator costs will be amortized over a 60 month period.

The costs of each EE&C program available to only one customer class will be directly assigned to that customer class. Costs of EE&C programs which cannot be directly assigned to one customer class will be allocated to the customer classes benefiting from those programs using an allocation factor determined by dividing the EE&C costs directly assigned to each customer class by the total of the Company's EE&C Plan costs directly assigned to all customer classes.

(Continued)

ACT 129 COMPLIANCE RIDER – PHASE 4 (CONTINUED)

- D = For the Large C&I customer class, the total of the monthly billing demands for all customers in the class, projected for the computation year. The peak demand will be based on the customer's peak load contribution to the PJM peak load during the prior PJM Planning Year.
- E = Net over or undercollection of the ACR 4 charges as of the end of the 12-month period ending March 31 immediately preceding the next compliance year. Reconciliation of the ACR 4 will be conducted separately for each of the three customer classes based upon the actual expenses incurred and actual revenues received for each customer class. No interest shall be computed monthly on over or undercollections. The reconciliation of ACR 3 revenues and expenses shall be adjusted during the 2022-2023 ACR 4 application year to reflect actual data for the months of April and May 2021, as well as any expenses incurred prior to May 31, 2021, but paid after that date.
- S = The Company's total billed KWH sales in each customer class who receive distribution service under this tariff (including distribution losses), projected for the computation year.
- T = The total Pennsylvania gross receipts tax rate in effect during the billing period, expressed in decimal form.

The ACR 4 shall be filed with the Pennsylvania Public Utility Commission (Commission) by May 1 of each year. The ACR 4 charge shall become effective for distribution service provided to all customers on or after the following June 1, unless otherwise ordered by the Commission, and shall remain in effect for a period of one year, unless revised on an interim basis subject to the approval of the Commission. Upon determination that a customer class's ACR 4, if left unchanged, would result in a material over or undercollection of Phase 4 Act 129 Compliance costs incurred or expected to be incurred during the current 12-month period ending May 31, the Company may file with the Commission for an interim revision of the ACR 4 to become effective ten (10) days from the date of filing, unless otherwise ordered by the Commission.

At the conclusion of the Phase 3 EE&C Plan on May 31, 2021, collections under the ACR 3 for each customer class will be reconciled to the total cost of the EE&C Plan allowed by the Commission for that customer class. Overcollections or undercollections will be reflected as a separate line item in the E factor calculation and will be refunded or recovered through application of the ACR 4 rate effective June 1, 2021 through May 31, 2022. If any over/under collection balance is expected to remain after March 31, 2022, the collection will be included in the ACR 4 rate going forward.

Minimum bills shall not be reduced by reason of the ACR 4 nor shall charges hereunder be a part of the monthly rate schedule minimum. The ACR 4 shall not be subject to any credits or discounts. The State Tax Adjustment Surcharge (STAS) included in this Tariff is applied to charges under this Rider. Charges under ACR 3 and ACR 4 will be combined for billing purposes only.

The Company shall file a report of collections under the ACR 4 within thirty (30) days following the conclusion of each compliance-year.

Application of the ACR 4 shall be subject to review and audit by the Commission at intervals it shall determine. The Commission shall review the level of charges produced by the ACR 4 and the costs included therein.

(Continued)

ACT 129 COMPLIANCE RIDER – PHASE 4 (CONTINUED)

ACT 129 COMPLIANCE RIDER – PHASE 4 CHARGE

Charges under the ACR 4 for the period June 1, 2021 through May 31, 2022 , as set forth in the applicable Rate Schedules.

Customer Class	Large I&C -	Small I&C	Residential
Rate Schedule / Charge	LP4, LP-5, and LPEP	GS-1, GS-3, BL, and GH-2 (R)	RS and RTS (R)
	\$X.XXX /KW	\$X.XXXXX /KWH	\$X.XXXXX /KWH

Small C&I – Street Lights										
Rate Schedule/ Charge	SA		SM (R)		SHS		SLE		SE	TS (R)
	Nominal Lumens	Charge	Nominal Lumens	\$/Lamp	Nominal Lumens	\$/Lamp	Nominal Lumens	\$/Fixture	\$/KWH	\$/Watt
HPS 9,500	X.XXX \$/Lamp	3,350	X.XXX	5,800	X.XXX	2,600	X.XXX	X.XXXXX	X.XXXXX	
		6,650	X.XXX	9,500	X.XXX	3,300	X.XXX			
		10,500	X.XXX	16,000	X.XXX	3,800	X.XXX			
LED 4,300	X.XXX \$/Fixture	20,000	X.XXX	25,500	X.XXX	4,900	X.XXX	X.XXXXX	X.XXXXX	
		34,000	X.XXX	50,000	X.XXX	7,500	X.XXX			
		51,000	X.XXX			15,000	X.XXX			
						20,000	X.XXX			

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Petition of PPL Electric Utilities for
Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan**

Docket No. M-2020-3020824

PPL Electric Utilities Corporation

Statement No. 1-R

Rebuttal Testimony of Dirk Chiles

**List of Topics Addressed:
Other Parties' Issues and Recommendations Concerning the
Residential, Non-Residential, and Low-Income Programs**

Date: January 22, 2021

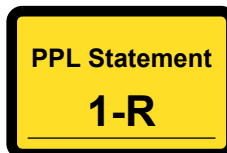


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Rebuttal Testimony of Dirk Chiles

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Q. Please state your full name and business address.

A. My name is Dirk Chiles, and my business address is 827 Hausman Road, Allentown PA 18104.

Q. By whom are you employed and in what capacity?

A. I am employed by PPL Electric Utilities Corporation (“PPL Electric” or the “Company”) as Manager-Energy Efficiency.

Q. Have you previously submitted testimony in this proceeding?

A. Yes. I submitted my direct testimony (PPL Electric Statement No. 1) in support of PPL’s petition for approval of its Phase IV Energy Efficiency and Conservation Plan (“EE&C Plan” or “Plan”) that was filed with the Pennsylvania Public Utility Commission (“Commission”) on November 30, 2020, at Docket No. M-2020-3020824, in accordance with Act 129 of 2008 (“Act 129” or the “Act”), as well as the relevant Commission Orders for Phase IV. *See Energy Efficiency and Conservation Program*, Docket No. M-2020-3015228 (Order entered June 18, 2020) (“*Phase IV Implementation Order*”); *2021 Total Resource Cost (TRC) Test*, Docket No. M-2019-3006868 (Order entered Dec. 19, 2019) (“*2021 TRC Test Order*”) (collectively, “*Phase IV Orders*”).

Q. Please briefly describe the subject matter of your rebuttal testimony in this proceeding.

1 A. I will respond to certain issues raised in the direct testimony submitted by the other
2 parties' witnesses, specifically: (1) the direct testimony of Stacy L. Sherwood (OCA
3 Statement No. 1) submitted on behalf of the Office of Consumer Advocate ("OCA"); (2)
4 the direct testimony of Mitchell Miller (CAUSE-PA Statement No. 1) submitted on
5 behalf of the Coalition for Affordable Utility Services and Energy Efficiency in
6 Pennsylvania ("CAUSE-PA"); (3) the direct testimony of Eugene M. Brady (CEO
7 Statement No. 1) submitted on behalf of the Commission on Economic Opportunity
8 ("CEO"); (4) the direct testimony of John Costlow (SEF Statement No. 1) submitted on
9 behalf of the Sustainable Energy Fund ("SEF"); and (5) the direct testimony of Alice
10 Napoleon and Kenji Takahashi (NRDC Statement No. 1) submitted on behalf of the
11 Natural Resources Defense Council ("NRDC").
12

13 **Q. Are you sponsoring any exhibits with your rebuttal testimony?**

14 A. Yes, attached to my rebuttal testimony as PPL Electric Exhibit DC-1R are the following
15 discovery responses served by the other parties in this proceeding: (1) PPL to CAUSE-I-
16 3, 6, 7, and 8; (2) PPL to CEO-I-3; (3) PPL to NRDC-I-8, 9, 10, and 11; (4) PPL to OCA-
17 I-3; and (5) PPL to SEF-I-3.
18

19 **Q. Do you have any general observations about the EE&C Plan and the other parties'**
20 **testimony?**

21 A. Yes, I do. First and foremost, no party has alleged in its direct testimony that the EE&C
22 Plan proposed by PPL Electric will fail to achieve the energy savings and peak demand
23 reduction targets set by the Commission. Indeed, the OCA affirmatively states that the

1 Company's proposed EE&C Plan will meet or exceed the targets. (OCA Statement No.
2 1, p. 5; OCA Exhibit SLS-1.) Instead, the parties focus primarily on: (1) proposing
3 selective changes to the EE&C Plan; and (2) raising issues that are outside the scope of
4 this proceeding, such as changes to the Company's Universal Service and Energy
5 Conservation Plan ("USECP") and the potential impact of the Regional Greenhouse Gas
6 Initiative ("RGGI") on the Commission's Act 129 EE&C Program.

7 Before addressing the parties' specific proposed changes, I want to emphasize that
8 the Company developed its EE&C Plan after conducting extensive research and soliciting
9 input from its regular stakeholder meetings about the types of programs that customers
10 want and the types of EE&C programs that have been successful in the past. Based on
11 this research and stakeholder input, PPL Electric developed an integrated EE&C Plan that
12 offers a variety of programs and measures. The Plan was carefully crafted and balanced
13 to achieve the targets set forth by the Commission in its *Phase IV Implementation Order*
14 within PPL Electric's budget.

15 The parties and the Commission also need to recognize that the Company cannot
16 simply modify one part of the EE&C Plan without addressing how those changes affect
17 other portions of the Plan, including: (1) how changes to one energy efficiency or
18 demand response measure would necessitate revisions to other measures in the Plan, cost
19 allocation to customer sectors, the total budget for the EE&C Plan, and the Low-Income
20 sector savings requirement; (2) how changes to a program would affect the cost-
21 effectiveness of that program and other programs; (3) how changes to a program would
22 impact the cost-effectiveness of the portfolio as a whole; (4) how changes would affect

1 the preferences of other stakeholders; and (5) how changes to a program would impact
2 PPL Electric's ability to comply with Act 129 and the Commission's *Phase IV Orders*.

3 In general, the other parties' testimonies simply offer proposed revisions to the
4 EE&C Plan without specific analysis or consideration of the other modifications that
5 would need to be made, the impact on programs' and the portfolio's cost-effectiveness,
6 the impact on savings, and the impact on costs (i.e., what other programs or measures
7 would have to be cut to fund the party's proposed changes, and by how much). (*See PPL*
8 *Electric Exhibit DC-1R [PPL to CAUSE-I-3, PPL to CEO-I-3, PPL to NRDC-I-8, PPL to*
9 *OCA-I-3, and PPL to SEF-I-3].*) Moreover, it is important to recognize that changes
10 requested by one party likely could negatively affect the preferences of another party. As
11 a result, PPL Electric strongly believes that absent fatal flaws (such as non-compliance
12 with the objective requirements of Act 129 or the *Phase IV Orders*), it is not in the public
13 interest to continue to iterate, fine-tune, and rebalance the Plan at this time, and
14 particularly where the opposing parties have presented no evidence as to the impacts of
15 their individual proposals on the Plan as a whole or other parts of the Plan.

16 In addition, some parties have averred, without any supporting analysis other than
17 their own unsupported conjecture, that PPL Electric may not be able to meet some of the
18 estimates in the EE&C Plan or adequately penetrate multifamily buildings. In response, I
19 would like to point out that PPL Electric has a proven track record of meeting its
20 estimates and the Commission's requirements in Phases I, II, and III. The Company is
21 confident it can deliver the Phase IV EE&C Plan as expected.

22 Finally, I want to stress that PPL Electric ultimately has the responsibility to
23 comply with Act 129 and the *Phase IV Orders*. If the Company fails in that endeavor,

1 PPL Electric will be the one potentially facing substantial penalties, not the other parties.
2 Therefore, as a matter of fundamental fairness, PPL Electric should be permitted
3 substantial flexibility and discretion in developing and implementing its Plan. Also, if
4 PPL Electric or its stakeholders determine over time that this initial Phase IV EE&C Plan
5 requires certain changes or fine-tuning, the Commission has established processes to
6 revise the EE&C Plan.

7
8 **Q. Please explain how your rebuttal testimony is organized.**

9 A. I address the parties' proposals largely based upon the types of programs implicated.
10 Consequently, I have arranged my testimony into the following sections: (I) Residential
11 Program; (II) Low-Income Program; (III) Non-Residential Program; and (IV)
12 Miscellaneous, to address other issues raised by the parties' witnesses.

13
14 **I. RESIDENTIAL PROGRAM**

15 **A. General**

16 **Q. OCA witness Sherwood states that she is concerned about the Total Resource Cost**
17 **("TRC") Test benefit-cost ratio ("BCR") of the Residential Program because it is**
18 **mature and, due to the level of discounted net lifetime benefits from the program**
19 **being low, there is "limited leeway for underperformance." (OCA St. No. 1, p. 9.)**
20 **Do you share her concern?**

21 A. The Company does not share Ms. Sherwood's concern about the Residential Program's
22 TRC BCR. In the Plan, the Company strives to set attainable goals that will, in
23 aggregate, lead to the Company achieving its overall savings targets; however, actually

1 achieving those goals depends on actual experience during Phase IV. Therefore, the
2 Company will continually monitor the progress of the programs and measures and will
3 make necessary mid-phase adjustments so that the Company remains on track to achieve
4 its required savings targets.

5 Further, as mentioned earlier in my testimony, PPL Electric bears the risk of not
6 meeting compliance targets and has a vested interest in making sure the Plan makes
7 reasonable assumptions and sets reachable targets. In fact, as Ms. Sherwood admitted in
8 discovery, “[t]he utility is the best positioned for evaluating and providing this level of
9 evaluation of energy efficiency and conservation offerings.” (PPL Electric Exhibit DC-
10 1R [PPL to OCA-I-3].)

11
12 **Q. Ms. Sherwood also recommends that the Company continue to innovate its**
13 **Residential Portfolio through Phase IV to address her concern about the Residential**
14 **Program’s TRC BCR. (OCA St. No. 1, pp. 4, 9-10, 18) Do you agree with this**
15 **recommendation?**

16 A. The Company agrees that continuing to innovate during Phase IV is key to reaching
17 Residential Program targets. This is consistent with the Company’s actions in prior
18 phases, where the Company continued to innovate during the phase. Some examples of
19 innovation during Phase III are as follows: PPL Electric shifted very quickly during the
20 COVID 19 pandemic to do virtual evaluation, measurement, and verification (“EM&V”),
21 changed its Student Energy Efficient Education Program to virtual, is doing remote
22 audits, is doing curbside pickup for the Appliance Recycling Program, and, in Phase IV,
23 is launching a mid-stream HVAC component in its Residential and Non-Residential

1 Programs. All of these innovations allowed or will allow PPL Electric to continue
2 working as changes occurred that could have adversely affected our plan. However, as
3 stated earlier, PPL Electric does not share Ms. Sherwood’s concern about the Residential
4 Program’s TRC BCR.

5
6 **B. Energy Efficient Home Component**

7 **Q. OCA witness Sherwood questions how the Company can achieve the projected**
8 **savings for the Energy Efficient Home Component of the Residential Program**
9 **“without significant programmatic changes to its marketing, which is not included**
10 **in the Plan.” (OCA St. No. 1, pp. 11-12.) Specifically, she points to the apparent**
11 **lack of “market evidence or a marketing plan to support the level of Ductless Mini-**
12 **Split Heat Pumps forecasted” in the Plan. (OCA St. No. 1, p. 4.) Do you agree with**
13 **Ms. Sherwood that the Company’s projected savings for this measure are**
14 **unrealistic?**

15 **A.** No. PPL Electric’s marketing plan will be designed to support the expansion of the
16 Energy Efficient Homes component. Also, in contrast to Phase III, all HVAC measures
17 and pool pump measures will be offered through mid-stream channels in Phase IV, which
18 is effectively like having the Company’s own sales force deliver the measures. PPL
19 Electric is introducing the mid-stream HVAC delivery channel based on success of the
20 mid-stream lighting delivery channel in Phase III. This strategy involves working closely
21 with distributors, as they will help promote more energy efficient units to their contractor
22 network. The Company expects to reach a broader contractor network through this
23 effort. The Company believes its mid-stream strategy and additional marketing supports

1 the additional energy savings projected in the Plan. However, as stated previously, PPL
2 Electric will continue to evaluate and adjust as necessary during Phase IV.

3
4 **Q. Ms. Sherwood also suggests that PPL Electric “should provide a more**
5 **comprehensive marketing plan to indicate how the Company plans to increase**
6 **program participation” and that if PPL Electric needs to file a Revised Plan because**
7 **it cannot provide support for the Energy Efficient Home Component, then PPL**
8 **Electric should redirect “some of the funding from the Ductless Mini-Split Heat**
9 **Pump” to the “current residential program offerings/measures or for the inclusion**
10 **of additional measures, such as a do-it-yourself install rebate for certain measures.”**
11 **(OCA St. No. 1, pp. 12-13.) Would you please respond?**

12 **A.** PPL Electric has not yet prepared a detailed marketing plan because the Residential
13 Program Conservation Service Provider (“CSP”) is not under contract. However, once
14 the contract is executed, the Company and the Residential Program CSP will develop a
15 detailed marketing plan. This comprehensive marketing plan will support all components
16 of the Residential Program after the Phase IV EE&C Plan is approved. As mentioned
17 above, Ductless Mini-Split Heat Pump incentives will be offered through the mid-stream
18 channel and are expected to reach a broader group of contractors through that channel. In
19 addition, the Plan already allows for customers to perform self-install insulation
20 measures. Finally, the Company has the flexibility to adjust the Residential Program
21 offerings mid-phase based on participation levels and achieved results compared to goals.

22

1 **Q. NRDC witnesses Napoleon and Takahashi recommend that PPL Electric provide**
2 **more details on the projected savings and costs for the Energy Efficient Homes**
3 **component, noting that the percentage of total customers who are projected to**
4 **participate in PPL Electric’s in-home energy audits and weatherization measures**
5 **are lower than National Grid and Eversource in Massachusetts. (NRDC St. No. 1,**
6 **pp. 7, 13-14.) Would you please respond?**

7 A. PPL Electric’s projected participation levels are based on historical participation data for
8 the Company’s service territory. However, PPL Electric does not intend to limit
9 participation in the in-home audits and weatherization measures if there is increased
10 interest from customers. Also, the comparison to National Grid and Eversource should
11 be disregarded. Pennsylvania has a different and generally warmer climate than
12 Massachusetts,¹ which can make weatherization measures much more advantageous,
13 from an electric savings perspective, for electric heating customers in Massachusetts.
14 Furthermore, the programs offered by National Grid and Eversource have a different
15 delivery and incentive structure than the one offered by PPL Electric. Specifically,
16 National Grid and Eversource offer the in-home audit at no out-of-pocket cost to
17 customers. Further, the budget for weatherization measures for National Grid and
18 Eversource is less strict than the total budget cap that applies to PPL Electric’s Phase IV
19 EE&C Plan under Act 129. I am advised by counsel that PPL Electric is legally

¹ See *Units and calculators explained: Degree days*, U.S. Energy Information Administration, available at <https://www.eia.gov/energyexplained/units-and-calculators/degree-days.php> (last visited Jan. 22, 2021); *Weekly and Monthly Heating Degree Day Data*, American Gas Association, available at <https://www.aga.org/research/data/heating-degree-day-data/> (dated Jan. 18, 2021).

1 prohibited by exceeding the Act 129 budget cap. Therefore, the comparison with
 2 National Grid and Eversource is not an apples-to-apples comparison.

3
 4 **Q. NRDC witnesses Napoleon and Takahashi also criticize the Company’s summary of**
 5 **projected savings and costs for the Energy Efficient Homes component “because the**
 6 **data for typical home retrofit measures such as insulation and appliance and**
 7 **equipment rebates are combined together.” (NRDC St. No. 1, pp. 25-26) They then**
 8 **recommend that PPL Electric: (1) provide both costs and energy savings estimates**
 9 **separately under the Energy Efficient Homes component for (a) new homes, (b)**
 10 **audit and weatherization, and (c) energy efficient equipment; and (2) provide**
 11 **program achievements in the Company’s annual program reports separately for**
 12 **each of those three categories. (NRDC St. No. 1, p. 27.) Please respond.**

13 **A.** The projected costs and savings for each of these measures are not broken out separately
 14 under the Energy Efficient Homes component because the measures are a subset of
 15 measures included in that component. However, projected incentive costs, energy
 16 savings, and demand reductions could be broken down for these sub-components, as
 17 shown in the table below. Additionally, PPL Electric is willing to provide the actual
 18 numbers in the Company’s annual reports, as requested by NRDC.

	Incentive Costs	Estimated kWh	Estimated kW
New Homes	\$ 4,636,657	14,681,790	7,271.72
In-Home Audits	\$ 131,680	52,428	5.44
Weatherization *	\$ 960,725	1,401,896	298.03
Energy Efficient Equipment **	\$ 15,440,613	106,666,827	14,291.83

Total Energy Efficient Homes	\$ 21,169,676	122,802,941	21,867

1 *Includes the Comprehensive Bonus measures since one of the measures has to be a weatherization
2 measure.
3 **Includes virtual assessment kits and giveaway kits as well as smart thermostats for New Homes
4 since they will be treated the same way as all smart thermostats.
5
6

7 **Q. The NRDC witnesses also recommend that PPL Electric commit to implementing**
8 **the Comprehensive Retrofit Bonus Incentive under the Residential Program.**
9 **(NRDC St. No. 1, p. 22.) What is your response?**

10 A. PPL Electric clarifies that it will offer the Comprehensive Retrofit Bonus Incentive and
11 will make that clearer in the Revised Phase IV EE&C Plan. Specifically, PPL Electric
12 will be offering a Comprehensive Retrofit Bonus Incentive with the incentive being
13 offered in two tiers: Tier 1 – customers who opt to have at least two “major measures”
14 installed are eligible for a \$250 rebate on top of measure-specific rebates, and Tier 2 –
15 Customers who opt to have three or more “major measures” installed are eligible for a
16 \$350 rebate on top of measure-specific rebates. At least one installed measure must be a
17 shell measure (insulation or air sealing).
18

19 **Q. NRDC witnesses Napoleon and Takahashi also raise a concern about electric-to-gas-**
20 **fuel switching measures being “misaligned with Pennsylvania’s long-term climate**
21 **goals” and resulting “in higher costs to ratepayers.” (NRDC St. No. 1, pp. 27-31.)**
22 **As a result, they recommend PPL Electric eliminate such measures from the Phase**
23 **IV EE&C Plan and focus instead on incentives for high-efficiency heat pump water**
24 **heaters and heat pumps. (NRDC St. No. 1, pp. 31-32.) Please respond.**

1 A. PPL Electric supports efforts to reduce greenhouse gas emissions, but the Company also
2 has to develop a balanced Plan to meet the targets set forth by the Commission. Electric-
3 to-gas measures are included in the 2021 Technical Reference Manual (“TRM”) and
4 appropriate for the Company to include in its Plan because they reduce electric
5 consumption and demand. Indeed, in its *Phase IV Implementation Order*, the
6 Commission expressly rejected the proposal by NRDC and others to remove fuel
7 switching measures from the 2021 TRM, stating the following:

8 The Commission disagrees with suggestions to prevent electric-to-fossil fuel
9 switching. The measures were adopted as part of the 2021 TRM and they are
10 eligible measures for Phase IV. The Commission notes that, historically, these
11 measures are rarely adopted, having accounted for less than one quarter of one
12 percent of verified savings through PY10 of Phase III. The Commission also
13 notes that the fossil fuel equipment is required to have efficiency levels that are
14 greater than or equal to the applicable ENERGY STAR requirement.

15 *Phase IV Implementation Order*, p. 99. Also, to the extent that there are conflicts
16 between Act 129 and other Pennsylvania policy goals, it is not the Company’s role to
17 resolve those conflicts. Rather, PPL Electric has designed its Plan to be compliant with
18 Act 129 and the Phase IV Orders as they exist today. That being said, the Company
19 would be amenable to discussions with stakeholders concerning the cap on the number of
20 fuel switching measures offered to customers.

21

1 **C. Student Energy Efficient Education Component**

2 **Q. OCA witness Sherwood raises a concern about this component potentially providing**
3 **multiple kits to the same household in the same or consecutive years. (OCA St. No.**
4 **1, p. 13.) She then recommends that PPL Electric “revise its offerings of the kits to**
5 **a limited number of grade levels to eliminate a saturation of measures,” such as**
6 **“one grade in each elementary, middle, and high school.” (OCA St. No. 1, p. 13.)**

7 **Would you please respond?**

8 **A. The Student Energy Efficient Education Component (“SEEEC”) already takes Ms.**
9 **Sherwood’s concern in consideration. Generally, the SEEEC is offered to one grade level**
10 **per school, unless it is a brand-new school to the component. In the case of a brand-new**
11 **school to this component, the Company allows multiple grades in the first year but**
12 **focuses on a single lower grade level in subsequent years.**

13
14 **II. LOW-INCOME PROGRAM**

15 **Q. Before turning to the specific low-income proposals presented by other parties, do**
16 **you have any general comments regarding these issues?**

17 **A. Yes. CAUSE-PA witness Miller raises a wide range of issues, observations, comments,**
18 **criticisms, and proposals regarding the Low-Income Program. Beyond a specific**
19 **response to each recommendation, I would like to make several more general**
20 **observations.**

21 First, to state the obvious, the Act 129 EE&C Program is an energy efficiency and
22 conservation program, not a low-income program. Under Act 129 and the Commission’s
23 *Phase IV Implementation Order*, the Company is required to have a Low-Income

1 Program. However, the Commission's Act 129 EE&C Program is not primarily about
2 low-income customers; it is about achieving energy conservation and efficiency on a
3 cost-effective basis. The Low-Income sector represent a small but important segment,
4 with specifically 5.8% of savings being required to come from that customer
5 sector. Despite the relative level of low-income savings, parties have raised
6 approximately 35 recommendations in this proceeding, which well exceeds the
7 approximately 21 recommendations raised about the rest of the Company's
8 programs. While low-income issues should be given due consideration, in my opinion,
9 they should not receive undue consideration, i.e., the tail should not wag the dog.

10 Second, the recommendations of CAUSE-PA witness Miller should not be
11 reviewed in a vacuum. PPL Electric has been very successful in every phase of Act 129
12 in achieving and exceeding its savings targets, while remaining under budget. PPL
13 Electric is continuing many of the same successful programs and measures into Phase IV,
14 including many of the components in the Low-Income Program. In light of that success,
15 it is somewhat difficult to believe that the Company's Phase IV Low-Income Program
16 requires 35 changes.

17 Third, low-income programs are not cost effective. The Company is projected to
18 spend 15.5% of its Phase IV EE&C Plan budget to get at least 5.8% of savings. Any
19 expansion of these less cost-effective programs should not be undertaken without a
20 comprehensive analysis of the impact on other programs and the Plan. Critically,
21 CAUSE-PA witness Miller never provided such analysis.

22 Fourth, Act 129 low income programs are not the only programs available to low
23 income customers. As described by PPL Electric witness Stumpf (PPL Electric St. No.

1 4-R), there are many programs available to low-income customers to help reduce the
2 financial burdens of their electric bills. Any review of the Company's Phase IV Low-
3 Income Program should take all low-income programs into account.

4 Fifth, residential non-low-income customers are paying for both the Residential
5 Program and the Low-Income Program as well. Any increase in these spending for these
6 programs will be paid for by the Residential customer class, who is already providing
7 very substantial subsidies to low-income customers, as explained by Ms. Stumpf (PPL
8 Electric St. No. 4-R). The Commission should proceed with caution before further
9 burdening the Residential customer class as a whole.

10 Finally, to a surprising degree, the specific low-income recommendations either
11 are already in place or are based on fundamental factual errors. Therefore, as explained
12 below, the recommendations should be summarily rejected.

13
14 **A. Comprehensive Measures Offered under the Low-Income Program**

15 **Q. Do you agree with CAUSE-PA witness Miller's claim that PPL Electric appears to**
16 **have "done the opposite" when it comes to focusing on comprehensive measures in**
17 **the Low-Income Program? (CAUSE-PA St. No. 1, p. 19.)**

18 A. No. PPL Electric provides several comprehensive measures in its Phase IV EE&C Plan.
19 These comprehensive measures include Heat Pump Water Heater replacement, removal
20 and replacement of refrigerators and freezers, installation of smart thermostats and
21 ductless mini-split heat pumps, and heat pump maintenance to existing units. PPL
22 Electric must design its Low-Income Program to meet the *Phase IV Implementation*
23 *Order's* target of achieving 5.8% of total plan savings from the Low-Income sector while

1 staying under total Plan budget requirements. This requires the Company to deliver the
2 Low-Income Program with a low acquisition cost. Notably, Mr. Miller has not
3 performed any formal studies on whether his suggestions are cost-effective or how they
4 will affect the overall Plan budget. (PPL Electric Exhibit DC-1R [PPL to CAUSE-I-3].)
5 The Company does not have the luxury of looking at measures in a vacuum but must
6 always consider the impact of specific measures on the Plan holistically.

7
8 **Q. Mr. Miller recommends that PPL Electric “revise its Plan to increase the**
9 **availability of measures that will produce deeper, more durable energy and bill**
10 **savings for households,” which “should include increased availability of water**
11 **heating measures and HVAC maintenance, repair, or replacement; inefficient**
12 **appliance replacement; and comprehensive building shell measures, such as**
13 **insulation and air sealing.” (CAUSE-PA St. No. 1, p. 22.) Do you agree with his**
14 **recommendation?**

15 A. No. PPL Electric’s Phase IV EE&C Plan does provide comprehensive measures as
16 described above. A majority of the comprehensive measures in the Low-Income
17 Program are already not cost-effective. Expending more resources on measures that are
18 not cost-effective negatively impacts the Residential and Non-Residential Programs. As
19 an example, if the Company is able to locate and perform 10,000 Heat Pump
20 Maintenance jobs, approximately 6% of the Plan budget would be exhausted while only
21 achieving 3% of the compliance target. As discussed earlier, Mr. Miller has not
22 performed any analysis of his recommendation or how it would impact the rest of the
23 Plan.

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Q. Mr. Miller is concerned that the Low-Income Program “relies far too heavily on low-cost and low-savings measures that will not produce meaningful, long-term bill savings for program participants.” (CAUSE-PA St. No. 1, p. 11.) As alleged support, he asserts that PPL Electric has eliminated building shell measures, has reduced HVAC repair or replacement and other heating-related measures, and has planned to drive a significant portion (approximately 48.26%) of the Low-Income sector’s savings from lighting measures. (CAUSE-PA St. No. 1, pp. 11, 19-21.)

Would you please respond?

A. PPL Electric’s Phase IV EE&C Plan is designed to provide “meaningful, long term bill savings” for participating customers. Approximately 76% of the Company’s planned EE&C measures have an estimated useful life of 10 to 15 years. Furthermore, some of the measures touted by Mr. Miller do not have superior measure lives. HVAC maintenance repair only has a measure life of 3 years. Moreover, Heat Pump Water Heater Replacement is on the lower end of the 10 to 15-year measure life projection. In contrast, the lighting measures that he criticizes have an expected measure life of 15 years and will produce substantial savings for participating customers over their projected 15-year measure lives. Lighting measures also are much more cost-effective. Thus, while Mr. Miller wants the Company to focus on “meaningful, long term bill savings,” his preferred measures appear to indicate otherwise.

Furthermore, Mr. Miller erroneously claims that the Commission “did not anticipate that PPL would propose that a majority of savings in its low-income program would be derived from light bulbs and water aerators alone.” (CAUSE-PA St. No. 1, p.

1 21.) The SWE does not direct the Act 129 EDCs on how to design their EE&C Plans.
2 The SWE’s market potential study is simply an exercise to determine the estimated
3 amount of cost-effective energy savings potential there is in each Act 129 EDC’s service
4 territory. To the best of my knowledge, the Commission has never expected the EDCs to
5 design their EE&C Plans to match the SWE’s assumptions on the potential measures, nor
6 has the Commission ever denied a portion of or an entire EE&C Plan because the
7 proposed design of the EE&C Plans did not match the SWE’s measure assumptions in the
8 market potential study.

9
10 **B. Coordination with LIURP and Other Programs**

11 **Q. CAUSE-PA witness Miller generally raises a concern about PPL Electric’s plan to**
12 **coordinate its Low-Income Program with its Low Income Usage Reduction Program**
13 **(“LIURP”) and other state and federal programs, and recommends that PPL**
14 **Electric “be required to provide additional clarity for how it intends to coordinate**
15 **services provided through its Act 129 Low Income Assessment Program with other**
16 **low income programs operated by PPL or within PPL’s service territory.”**
17 **(CAUSE-PA St. No. 1, pp. 27-34.) Do you have any overall comments about this**
18 **alleged concern and recommendation?**

19 **A.** PPL Electric recognizes it is important to coordinate its Low-Income Program with
20 LIURP and other low-income programs, and vice-versa, to ensure all programs succeed
21 and customers benefit. In fact, many of the Low-Income Program and LIURP Winter
22 Relief Assistance Program (“WRAP”) participants were identified through PPL Electric’s
23 Customer Assistance Program (“CAP”), also known as “OnTrack.” To that end, the

1 Company expects to coordinate its Low-Income Program with LIURP and other low-
2 income programs in essentially the same manner as in Phase III. The primary difference
3 from the coordination in Phases I and II versus Phases III and IV is the name of the entity
4 responsible for delivering Low-Income Program. The Company used a CSP in Phase III
5 and will be using a CSP in Phase IV, whereas in Phase II, the Company used LIURP
6 agencies for Act 129 low-income measures and LIURP. In Phase III, this change helped
7 improve coordination between the Low-Income Program and LIURP, reduced
8 administrative costs, and increased efficiencies. PPL Electric expects that the
9 coordination in Phase IV will be similar to Phase III and, therefore, continue those
10 benefits. However, PPL Electric cannot provide further details about the coordination
11 between Low-Income Program and LIURP and other low-income programs until: (1) a
12 Low-Income CSP Contract is approved by the Commission and becomes effective; (2)
13 the Commission approves the Company's Phase IV EE&C Plan; and the (3) Company
14 and the Low-Income CSP define program implementation requirements.

15
16 **Q. Do you agree with Mr. Miller that PPL Electric has no intent to coordinate its Low-**
17 **Income Program with any programs besides LIURP? (CAUSE-PA St. No. 1, p. 27.)**

18 A. No, there is absolutely no basis for Mr. Miller's completely unsupported statement. As
19 explained previously, PPL Electric will coordinate its Low-Income Program with other
20 programs besides LIURP, such as OnTrack, Low-Income Home Energy Assistance
21 Program ("LIHEAP"), Weatherization Assistance Program ("WAP"), and United Way

1 211². Additionally, the Company will coordinate multi-family common space measures
2 with the Non-Residential Program. With regard to the Residential Program, the
3 Company does move customer leads to the Low-Income Program when it is determined
4 that the customer is eligible.

5
6 **Q. Mr. Miller believes that it is “unclear” how the division between Act 129 and**
7 **LIURP “will occur or which program administrator will actually deliver the**
8 **services,” claiming that the Company “has provided conflicting information**
9 **regarding reporting and administration of its Act 129 Low Income Assessment**
10 **program and its LIURP.” (CAUSE-PA St. No. 1, pp. 27-30.) Please respond.**

11 A. I disagree that the Phase IV EE&C Plan is unclear on how the Act 129 Low-Income
12 Program will be coordinated with LIURP. The Company is in the process of engaging a
13 CSP to administer the Low-Income Program. The Low-Income CSP will only perform
14 the activities listed in the Plan for the Low-Income Program. Often a low-income
15 customer is eligible for LIURP measures in addition to Act 129 measures. In those
16 instances, the customer is referred to LIURP and receives the measures from LIURP
17 contractors. The Low-Income CSP will not perform LIURP work, nor will it co-mingle
18 measures funded partially by Act 129 and partially by LIURP. This is how the two
19 programs were coordinated in Phase III, and it has worked well. I recognize that Mr.
20 Miller suggests sending multiple contractors to a customer’s home is “troubling,” but he
21 fails to provide a compelling reason as to why he is troubled by this. The Company has

² United Way 211 is a free, confidential referral and information helpline and website that connects people of all ages and from all communities to the essential health and human services they need, 24 hours a day, seven days a week.

1 not received any complaints from customers in Phase III regarding separate contractors
2 performing Act 129 and LIURP work. Moreover, the Phase IV EE&C Plan does specify
3 on page 63 that the Company plans to “increase the coordination and provide additional
4 efficiencies between the Low-Income Assessment and LIURP Assessment.” This is a
5 two-way street with LIURP, as the Company’s other low-income programs also examine
6 whether a customer is eligible for Act 129 services as well. What Mr. Miller’s real
7 concern appears to be is that he is seeking a commitment from the Company to continue
8 to use community-based organizations (“CBOs”) for LIURP work. LIURP is governed
9 by the Company’s USECP, and his concerns would be more appropriately raised in a
10 matter dealing with that plan. Finally, if Mr. Miller is concerned about multiple
11 contractors going out to a customer’s premises, he actually should support PPL Electric
12 consolidating the Low-Income Program work under the Low-Income CSP and reducing
13 the number of contractors used for LIURP work.

14
15 **Q. Mr. Miller also recommends that if PPL Electric splits services across LIURP and**
16 **Act 129 programs as proposed, the Company should “explain how it intends to**
17 **track these jobs to ensure that it is not over-reporting its job rates or the per-job**
18 **savings achieved through its LIURP.” (CAUSE-PA St. No. 1, p. 35.) Please**
19 **respond.**

20 A. PPL Electric does not plan on cross funding individual measures in either of those
21 programs. Therefore, Mr. Miller’s recommendation is moot.

22

1 **Q. CAUSE-PA witness Miller contends that CAP “provides a plethora of information**
2 **that would allow PPL to target households in need of energy efficiency services” and**
3 **that the Company “could identify and target energy efficiency services to those in**
4 **danger of exceeding their maximum CAP credit limit or those with usage patterns**
5 **that suggest the household may be using space heaters or other inefficient seasonal**
6 **appliances such as a dehumidifier or window air conditioner.” (CAUSE-PA St. No.**
7 **1, p. 31.) Would you please respond?**

8 **A.** Mr. Miller is correct, and PPL Electric does exactly that. On a daily basis, PPL Electric
9 and its Low-Income CSP utilize information from the CAP (On-Track) program, such as
10 monthly usage, heat source, and income, to aggressively market Low-Income Assessment
11 services to those customers.

12
13 **Q. Mr. Miller also suggests that “those who receive Act 129 services that are not**
14 **enrolled in CAP should be referred to the program to help further improve bill**
15 **affordability.” (CAUSE-PA St. No. 1, p. 31.) Please respond.**

16 **A.** This is already occurring. The Company currently refers Act 129 customers who are not
17 enrolled in CAP (On-Track) to the program as well as other low-income programs, such
18 as LIHEAP, WAP, and United Way 211.

19
20 **Q. CAUSE-PA witness Miller also asserts that PPL Electric’s approach to “defer**
21 **higher-cost, comprehensive jobs for treatment through its LIURP is not new, and**
22 **has not resulted in an equal uptick in full cost jobs through LIURP in Phases II and**
23 **III,” nor has it “measurably decrease[d] the number of baseload jobs [the**

1 **Company] completed through LIURP.” (CAUSE-PA St. No. 1, pp. 23, 32-33.)**

2 **Would you please respond?**

3 A. I disagree with Mr. Miller’s conclusion that there has not been an uptick in full-cost jobs.
4 It appears that Mr. Miller only focuses on whether the Company reached its yearly
5 projection of full-cost jobs. He fails to acknowledge that the actual number of full-cost
6 jobs has significantly increased from the 2011 levels. Prior to Phase III of Act 129,
7 LIURP was performing on average 3,264 jobs per year. Since its coordination with Act
8 129, LIURP has performed on average 3,744 jobs per year, which is a 15% increase
9 while maintaining the same budget. Full-cost costs jobs previously averaged 1,466 jobs
10 per year and has since increased to 1,783 jobs per year – a 22% increase in full-cost jobs.
11 The way PPL Electric currently coordinates its Act 129 and LIURP work has resulted in
12 more low-cost and full-cost jobs being performed yearly than what was occurring using
13 the prior method. Mr. Miller is simply wrong.

14
15 **Q. Mr. Miller also suggests that PPL Electric “keep a list of available assistance**
16 **programs in each county that it can provide to households served through the**
17 **program” and that the Company should work with its CBOs and other members of**
18 **its Universal Service Advisory Committee to help create these resource lists for use**
19 **by its Low Income CSP. (CAUSE-PA St. No. 1, p. 34.) Would you please respond?**

20 A. Once again, this is already occurring. PPL Electric already maintains a list of available
21 assistance programs in each county and transmits that information to customers during
22 their participation in the Low-Income Program.

1 **Q. OCA witness Sherwood recommends that PPL Electric “develop a methodology to**
2 **allocate and track the savings captured under the Low-Income Program when it**
3 **leverages funding” from LIURP to avoid double-counting. For example, if a**
4 **measure has funding from both Act 129 and LIURP, PPL Electric would count the**
5 **percentage of savings equal to the percentage of funds coming from Act 129 toward**
6 **its EE&C Plan targets. (OCA St. No. 1, pp. 4, 16, 18.) Would you please respond?**

7 A. As explained previously, PPL Electric does not plan on cross funding individual
8 measures in either of its program. Therefore, Ms. Sherwood’s recommendation is moot.
9

10 **Q. CEO witness Brady proposes that: (1) income eligible customers be referred to the**
11 **CBOs that perform the Company’s LIURP work for the installations of Act 129**
12 **measures; and (2) such work be accomplished through use of existing non-CSP**
13 **contracts. (CEO St. No. 1, pp. 5-6.) Do you agree with his proposal?**

14 A. No. The Company moved toward a single Low-Income Program CSP in Phase III to help
15 reduce administrative costs and increase efficiencies. Mr. Brady’s recommendation
16 would have the opposite effect—increase administrative costs and reduce efficiencies
17 under the Phase IV EE&C Plan. In addition, I am advised by counsel that unless the
18 CBOs are working as subcontractors under the Low-Income CSP, their contracts with the
19 Company to perform work under the Phase IV EE&C Plan would have to be
20 Commission-approved CSP Contracts. A principal part of the CSP Contract approval
21 process is that those contracts must be competitively bid and awarded pursuant to PPL
22 Electric’s Commission-approved CSP Contract Bidding Procedures. Therefore, my

1 understanding is that Mr. Brady's proposal to use the existing non-CSP Contracts for this
2 type of work is not permissible.

3
4 **C. Administrative Costs**

5 **Q. CAUSE-PA witness Miller raises a concern about the amount of administrative**
6 **costs in the Low-Income Program and recommends that the Commission further**
7 **investigate these costs if additional information is not provided during the litigation.**
8 **(CAUSE-PA St. No. 1, p. 36.) Could you please provide additional information**
9 **about these administrative costs?**

10 **A.** The administrative costs represent the contract price to be paid to the Low-Income CSP
11 to administer the Program. The contract price is broken down into two components: (1)
12 the CSP Administrative portion, which is the fixed compensation; and (2) the CSP
13 Delivery Fees portion, which is the at-risk performance-based portion of the
14 compensation. PPL Electric has cut in half the amount of monthly fixed fees and doubled
15 the pay for performance for Phase IV. This change places more dollars at risk for
16 payment and puts emphasis on the CSP to reach its savings targets and customer
17 satisfaction targets on behalf of low-income customers. The need for the fixed fee exists
18 due the costs of administering the program, customer acquisition, customer call center for
19 Act 129, EM&V, quality assurance and quality control ("QA/QC"), coordination of
20 programs, and customer fulfillment. Further, concerns over the amount of the contract
21 price are unfounded. PPL Electric competitively bid the Low-Income Program CSP
22 contract, and the resulting contract price represents the market price for providing these

1 services. Additionally, the Company is projecting to reach its Low-Income energy
2 savings target within budget, which further supports that the contract price is reasonable.

3
4 **D. Other Recommendations**

5 **Q. CAUSE-PA witness Miller recommends that “PPL provide additional projections**
6 **for its Low Income Assessment Program, including”:** (1) “The estimated number of
7 **low income customers it will serve each program year”;** (2) “The number of
8 **customers that will receive baseload, low-cost, or full cost services”;** and (3) “The
9 **projected average job cost for baseload, low-cost, or full cost services.” (CAUSE-PA**
10 **St. No. 1, p. 23.) Can PPL Electric provide that information?**

11 **A.** Yes. The requested information is provided below.

12
13 (1) Estimated Number of Low-Income Customers Served by Program Year

Program Year	13	14	15	16	17
Jobs	10,965	13,545	14,835	14,835	10,320

14
15 (2) Estimated Number of Customers Who Will Receive Baseload, Low-Cost, or Full-
16 Cost Services

Program Year	13	14	15	16	17
Baseload	4,276	5,277	5,780	5,780	4,019
Low-Cost	6,689	8,256	9,042	9,042	6,289
Full-Cost	0	12	13	13	12

18
19

1 (3) Projected Average Job Cost for Baseload, Low-Cost, or Full-Cost Services

Job Type	Cost
Baseload	\$315
Low-Cost	\$355
Full-Cost	\$8,000

2

3 **Q. Mr. Miller also requests that the Company’s progress in meeting those additional**
4 **projections for the Low-Income Program be included in its reports to the**
5 **Commission and shared periodically at the Act 129 stakeholder meetings. (CAUSE-**
6 **PA St. No. 1, p. 23.) Will the Company accommodate that request?**

7 **A. Yes.**

8

9 **III. NON-RESIDENTIAL PROGRAM**

10 **Q. SEF witness Costlow believes that the proposed Phase IV EE&C Plan relies too**
11 **heavily on energy reduction among Small C&I customers without a more concrete**
12 **plan for awareness and education and without sufficient incentives for these**
13 **customers. (SEF St. No. 1, p. 6.) Do you agree with Mr. Costlow?**

14 **A. No. Mr. Costlow bases this argument on his erroneous belief that PPL Electric struggled**
15 **to achieve the kWh savings from the Small C&I sector in Phase III. There is no**
16 **compliance target in the Small C&I sector. The Company made a Phase III EE&C Plan**
17 **change in July 2018 to reduce the Small C&I savings by 120,000 MWh/yr to allow for**
18 **additional participation from the Government/Nonprofit/Educational (“GNE”) sector.**
19 **Without this Phase III EE&C Plan change, the GNE funds would have been fully**

1 exhausted well before the end of Phase III. To date, approximately 43% of the GNE
2 savings in Phase III have come from GNE customers in the Small C&I customer class.
3 Therefore, Mr. Costlow's suggestion that PPL Electric has been unsuccessful with Small
4 C&I customers is incorrect.

5 In addition, PPL Electric understands that the Large C&I customers have a larger
6 kWh savings opportunity per project due to energy usage, but there is a much larger
7 network of Small C&I customers in PPL Electric's service territory. After reviewing
8 Phase III participation data, a small percentage of the Small C&I customers have
9 participated in the EE&C programs, leaving a large untapped Small C&I customer
10 market. While PPL Electric will continue with customer education and outreach in all
11 sectors under the Phase IV EE&C Plan, the Company will also benefit from using
12 targeted data analytics in Phase IV. Specifically, the Company will use data analytic
13 tools to evaluate customer data and energy usage to make informed decisions on
14 marketing, outreach, and project recommendations. With the customer potential and the
15 addition of this targeted education/awareness/outreach strategy for Phase IV, the
16 Company believes it will meet the outlined Small C&I savings targets.

17
18 **Q. Relatedly, Mr. Costlow recommends that the Company engage an independent third**
19 **party who will set up educational seminars with the goal of educating Small C&I**
20 **customers on the spectrum of energy efficient initiatives. (SEF St. No. 1, p. 7.) This**
21 **independent third party would then create and implement a marketing program to**
22 **solicit Small C&I customer participation. (SEF St. No. 1, pp. 7-8.) Do you agree**
23 **with this recommendation?**

1 A. No. The Company agrees that it is important to educate all customers, including Small
2 C&I customers, on energy efficiency initiatives and provide a robust marketing campaign
3 for awareness. The selected Non-Residential Program CSP has the ability to provide
4 customer education and marketing initiatives to achieve program goals and savings
5 targets. Customer education was a component of the Phase III programs, in which the
6 CSP offered workshops, webinars, presentations, and customer outreach education
7 sessions. In Phase IV, the CSP will continue to offer these customer education sessions
8 and awareness opportunities, while focusing on more direct customer outreach and
9 education based on the previously mentioned data analytics. No need exists for Mr.
10 Costlow's recommendation for another contractor to produce a separate and largely
11 duplicative marketing program, all at the expense of the Company's ratepayers.

12
13 **Q. Mr. Costlow also argues that the incentive range offered to Small C&I customers is**
14 **too uncertain and that the incentive range should be changed from \$0.02-\$0.22 per**
15 **kWh to \$0.13-\$0.22 per kWh. (SEF St. No. 1, p. 8.) Do you agree?**

16 A. No. Mr. Costlow provides no analysis to support his conclusion. He does not provide
17 any information about the cost of his recommendation, the impact on program acquisition
18 cost, the impact on savings, or the impact on program cost-effectiveness. (PPL Electric
19 Exhibit DC-1R [PPL to SEF-I-3].) PPL Electric has extensive experience designing
20 programs for Small C&I customers, including the incentive levels required to achieve
21 desired participation and savings levels. PPL Electric believes the recommended
22 incentive level and ranges provide necessary flexibility and are sufficient to meet the
23 savings objectives within budget for this customer sector. Indeed, all of the bidders for

1 PPL Electric's Non-Residential Program CSP Contract confirmed that they could achieve
2 the savings objectives for the Small C&I sector with Company's proposed range of
3 incentives (i.e., \$0.02-\$0.22 per kWh).

4 There are also potential problems with Mr. Costlow's proposal. Narrowing the
5 incentive range as Mr. Costlow suggests could result in the allocated incentive budget
6 being depleted too early in the phase, resulting in components needing to be closed. The
7 Company felt it necessary to increase the incentive range based on its Phase III
8 experience. It was and will remain important to have the ability to update incentives as
9 needed to achieve the desired participation and help ensure that the current range meets
10 the Non-Residential Program's needs. The Company also recognizes that changing
11 rebate levels can cause confusion and uncertainty with customers and trade allies. As a
12 result, the Company has a set incentive amount/structure to begin Phase IV and will
13 strive to keep rebates as constant as possible, changing them only as necessary to control
14 the pace of the component within its savings and cost budgets or to respond to the
15 market. Moreover, the Company will effectively communicate to its customers and trade
16 allies about all changes to the incentive amounts in effect. For all of these reasons, Mr.
17 Costlow's proposed increase in the range of incentives should be rejected.

18
19 **Q. Mr. Costlow also claims that there is a lack of detail to ensure that savings attained**
20 **by GNE customers are accurately tracked. As a result, he recommends that: (1)**
21 **PPL Electric provide a detailed proposal as to how it will ensure that savings**
22 **attained by GNE customers are separately tracked; and (2) the Company separately**

1 track savings attained from small GNE customers and large GNE customers. (SEF
2 St. No. 1, pp. 9-10.) Would you please respond?

3 A. In Phase IV, PPL Electric will continue to track GNE customer savings the same way as
4 they were tracked in Phase III. The Energy Efficiency Management System used to track
5 program savings identifies GNE projects based on key factors, and that system will be
6 used for all annual reporting as well as for stakeholder updates. Based on the *Phase IV*
7 *Implementation Order*, PPL Electric will track all GNE savings consistent with its past
8 practice. Additionally, PPL Electric has the ability to split the GNE customer savings
9 into Small GNE and Large GNE reports. This was also an available in Phase III, and the
10 Company will continue utilizing that methodology of reporting savings in Phase IV.
11 Therefore, it is unnecessary for PPL Electric to write a detailed proposal on tracking
12 GNE savings, when the Company has already been doing it and will continue to do it.

13
14 **Q. NRDC witnesses Napoleon and Takahashi recommend that PPL Electric consider**
15 **tiered incentives, similar to those offered in Connecticut and New York, for the**
16 **Non-Residential Program. (NRDC St. No. 1, pp. 23-24.) Do you agree?**

17 A. PPL Electric agrees that a tiered incentive structure could be beneficial in soliciting
18 projects and encouraging deeper savings in Phase IV. The proposed EE&C Plan outlines
19 incentive ranges that provide PPL Electric and the selected CSP with flexibility to adjust
20 incentive structures and incentive amounts to drive participation and savings in the
21 market. While the Company can implement a tiered incentive structured as needed, PPL
22 Electric has been successful in previous phases with the current incentive structure.
23 Therefore, the Company does not believe it must shift to utilizing only a tiered incentive

1 structure during the entire 5-year phase. The incentive structure will be reviewed
2 throughout the phase and adjusted, if needed, to increase or slow down component
3 participation, and a tiered incentive structure can be implemented if deemed valuable to
4 hit targets within budget.

5
6 **IV. MISCELLANEOUS**

7 **A. Bidding Demand Response into PJM’s FCM**

8 **Q. OCA witness Sherwood contends that the Commission should require PPL Electric**
9 **to file its plan for nominating demand response into PJM Interconnection LLC’s**
10 **(“PJM”) Forward Capacity Market (“FCM”), including the following details: (1)**
11 **delivery year for the first nomination; (2) measures that will provide demand**
12 **reductions, by customer class; (3) methodology to determine which rate classes have**
13 **delivered demand reductions; and (4) details on how PPL Electric will limit**
14 **ratepayer exposure to penalties, including a sensitivity analysis of the impact” to the**
15 **Act 129 Compliance Rider – Phase 4 (“ACR-4”). (OCA St. No. 1, pp. 4-5, 17-19.)**

16 **Do you agree with her proposal?**

17 **A.** No. At this time, PPL Electric cannot provide such detail due to it being very early in the
18 process of the Company’s first attempt at participation in this type of program. PPL
19 Electric will be issuing a Request for Proposal (“RFP”) for a CSP to administer PJM
20 FCM bidding services in early 2021. It is anticipated that once a CSP is selected, the
21 Company and the CSP will work on developing a detailed plan to bid energy savings into
22 the PJM FCM during 2021. PPL Electric can commit to providing plan details by
23 January 2022. Additionally, the Company shares the OCA witness Sherwood’s concerns

1 regarding penalties. As part of PPL Electric's RFP process for this CSP Contract, the
2 Company will ask bidders to provide their plans on how to insulate the Company and its
3 ratepayers from the risk of potential penalties.
4

5 **Q. Similarly, NRDC witnesses Napoleon and Takahashi recommend that PPL Electric**
6 **provide more details on the Company's plans to bid demand response into PJM's**
7 **FCM, specifically, the Company's its estimate of Phase IV peak demand reductions,**
8 **by proposed program component and measure, and its plans to bid into PJM's**
9 **capacity market, its assumptions about the market, and an estimate of related**
10 **auction proceeds. (NRDC St. No. 1, p. 34.) Please respond.**

11 A. As explained above, PPL Electric is unable to provide those details at this time because
12 the CSP that will administer the PJM FCM bidding services has not been selected yet.
13

14 **Q. The NRDC witnesses also recommend that, when there is more clarity about the**
15 **changes to the capacity market, PPL Electric consider Reliability Pricing Model**
16 **requirements when it designs its programs, in order to optimize these proceeds.**
17 **(NRDC St. No. 1, p. 34.) Do you agree with their recommendation?**

18 A. The Company does not yet have a position on the Reliability Pricing Model. As
19 explained above, the Company will be engaging a CSP with expertise in bidding energy
20 savings into the PJM FCM. PPL Electric anticipates that it will be discussing many
21 aspects of the program, including the Reliability Pricing Model, with its CSP.
22

1 **B. Comprehensive Measures**

2 **Q. NRDC witnesses Napoleon and Takahashi generally assert that PPL Electric’s**
3 **proposed Phase IV EE&C Plan “misses opportunities for cost-effective savings,”**
4 **can do more to “facilitate customer adoption of more holistic energy saving**
5 **solutions,” and “lacks emphasis on comprehensive measures and audits for both the**
6 **residential and non-residential programs.” (NRDC St. No. 1, pp. 10-14.) Do you**
7 **agree?**

8 A. No. PPL Electric intends to work closely with participating trade allies to promote the in-
9 home assessments and comprehensive energy savings solutions. In Phase IV, the
10 Company will offer a Comprehensive Retrofit Bonus to encourage customers to
11 implement comprehensive work scopes. As mentioned above, the Company’s estimated
12 participation level is based on PPL Electric’s historical data. There are also key
13 differences between PPL Electric’s program offering and the incentive levels offered by
14 National Grid and Eversource, which explain the difference in estimated program
15 participation. The Non-Residential Program is designed to offer comprehensive
16 measures provided by various participation channels and encouraging the implementation
17 of robust custom measures. In Phase III, and continuing into Phase IV, the Plan outlines
18 the opportunity for onsite assessments, resulting in a report of energy efficiency project
19 recommendations. In Phase IV, data analytics will help target customers who would
20 benefit from such assessments and recommendations.

21 PPL Electric remains committed to offering customers the opportunity to receive
22 incentives for comprehensive measures. However, there are limitations based on the
23 TRM. Some measures are simply not cost effective based on mandated baselines or

1 deemed values or because the project cost may be too high for the project to pass the
2 TRC Test. PPL Electric will continue to monitor the progress of the Phase IV EE&C
3 Plan and may adjust program offerings and measures if necessary.
4

5 **Q. The NRDC witnesses also recommend that PPL Electric track its performance**
6 **related to the achievement of comprehensive energy savings, specifically the**
7 **following metrics: (1) lifetime kWh; (2) per customer kWh savings; and (3)**
8 **percentage of energy audits resulting in weatherization (air sealing and insulation).**
9 **(NRDC St. No. 1, pp. 24-25.) Would you please respond?**

10 A. PPL Electric has the ability to report savings at the customer level as well as information
11 about the number of customers who participated in the in-home audit and implemented
12 weatherization measures. Each customer's project kWh savings are calculated and
13 reported. When building the measure model for Phase IV, each measure has a measure
14 life as determined by the TRM. The Commission did not require reporting on lifetime
15 savings in the *Phase IV Implementation Order*; however, PPL Electric has the ability to
16 calculate lifetime kWh saving using the annually reported saving and the corresponding
17 measure life. PPL Electric already tracks and reports kWh savings per customer and will
18 continue tracking that metric throughout Phase IV.
19

20 **C. Multifamily**

21 **Q. CAUSE-PA witness Miller expresses a concern that “[b]ased on PPL’s projected**
22 **participation rates for Phase IV,” the “Low Income Assessment Program will not**

1 provide equitable services to consumers who reside in multifamily housing.”
2 (CAUSE-PA St. No. 1, p. 24.) Do you agree with his concern?

3 A. No. In Phase III, 36% of Low-Income savings were from multifamily assessments
4 (formerly known as WRAP). When including the low-income kits program, 50% of PPL
5 Electric’s reported Low-Income savings have been achieved in multifamily housing. In
6 fact, Mr. Miller admits that “PPL was relatively successful” in getting both master-
7 metered and individually-metered multifamily housing customers to participate in its
8 Phase III Plan. (PPL Electric Exhibit DC-1R [PPL to CAUSE-I-6 and 7].) PPL Electric
9 will strive to build upon that success and make multifamily housing an equitable part of
10 the Company’s Phase IV EE&C Plan.

11
12 **Q. In support of his arguments about PPL Electric’s projected participation rates, Mr.**
13 **Miller compares the Company’s and the SWE’s projections for water measures by**
14 **housing type, averring that the SWE had more Low-Income savings coming from**
15 **multifamily homes. (CAUSE-PA St. No. 1, p. 24.) Please respond.**

16 A. The comparison is not valid, and Mr. Miller is mistaken. As stated earlier, in Phase III,
17 PPL Electric got 36% (or 50% when kits are included) of its Low-Income savings from
18 multifamily, nearly double the 18% Mr. Miller referenced with regard to the SWE with
19 Phase IV. The Company plans for a similarly successful approach in Phase IV. As Mr.
20 Miller points out, multifamily “can be difficult to reach and serve,” but when the
21 Company does find them, PPL Electric is able to provide ample energy efficiency
22 opportunities.

23

1 **Q. Mr. Miller recommends that the Company: (1) “adjust its projected participant**
2 **rates for single family and multifamily measures to match the projections in the**
3 **Commission’s Phase IV Implementation Order”;** and (2) include a breakdown of all
4 **measures installed in various housing types, including single family, multifamily**
5 **(individual and single metered), and manufactured housing in its reporting to the**
6 **Commission.” (CAUSE-PA St. No. 1, pp. 24-25.) Do you agree?**

7 A. No. The Company has designed the Low-Income Program to be delivered in compliance
8 with the Commission’s *Phase IV Implementation Order*. The Commission never
9 established a multifamily target for PPL Electric or any other Act 129 EDC. The
10 Commission specifically state that it “disagree[d] with the suggestions to set specific
11 targets, such as targets for multifamily properties or street lighting, as this will result in
12 increased administrative burden and potentially hinder the EDCs’ flexibility to design a
13 mix of programs to meet Phase IV overall targets.” *Phase IV Implementation Order*, p.
14 43. Thus, while the Company will continue working with stakeholders in finding
15 multifamily customers to continue to run a successful program, the Company must
16 continue to have the flexibility to meet its actual compliance targets. As for the reporting
17 recommendation, PPL Electric will “report savings achieved in multifamily housing, both
18 for the low-income carve-out and for their portfolio of programs.” *Phase IV*
19 *Implementation Order*, p. 37. However, the further subsets of information that CAUSE-
20 PA recommends are burdensome and not necessary.

21
22 **Q. Mr. Miller recommends that PPL Electric “work closely with its CSP, as well as**
23 **members of its Universal Service Advisory Committee, to target outreach to**

1 **individuals in affordable multifamily and manufactured housing.” (CAUSE-PA St.**
2 **No. 1, p. 25.) Do you agree?**

3 A. Yes. PPL Electric will work with its CSP and stakeholders in targeting outreach to
4 individuals in affordable multifamily and manufactured housing. PPL Electric requests
5 that CAUSE-PA and other stakeholders work with the Company to provide lists of
6 multifamily locations for the Company to possibly serve.

7
8 **Q. Do you agree with Mr. Miller’s belief that the Low-Income Program “will be**
9 **disproportionately provided to homeowners, leaving tenants without equitable**
10 **access to energy efficiency services”?** (CAUSE-PA St. No. 1, p. 25.)

11 A. No. Under the Low-Income Program, PPL Electric does not approach customers based
12 on whether they are homeowners or tenants; rather, the Company strictly focuses on
13 whether they are at or below 150% of the Federal Poverty Level. Generally, most
14 energy-efficiency measure installations do not require landlord approval. It is anticipated
15 that less than 2% of the total projected savings measures will need landlord approval.
16 Therefore, I believe that tenants will have equitable access to energy efficiency services
17 under the Phase IV EE&C Plan.

18
19 **Q. Mr. Miller also criticizes the requirement for landlord approval before installing**
20 **certain measures and recommends that the Company not require landlord approval**
21 **for those measures, such as “light bulbs, smart strips, and other measures that are**
22 **easily installed and removed.” (CAUSE-PA St. No. 1, pp. 25-26.) Please respond.**

1 A. PPL Electric agrees and does not require landlord approval for the measures that are
2 “easily installed and removed” that Mr. Miller identifies in his testimony.

3

4 **Q. Mr. Miller also recommends that the landlord approval form be amended “to**
5 **further highlight the benefits of the program, and to make it more apparent that the**
6 **form is not a solicitation and that services are free to the tenant and the landlord.”**
7 **(CAUSE-PA St. No. 1, p. 26.) He also suggests that PPL Electric work with**
8 **members of its Universal Service Advisory Committee to review the document and**
9 **recommend changes based on members’ experience working with low income**
10 **tenants.” (CAUSE-PA St. No. 1, p. 27.) Would you please respond?**

11 A. The Company believes that its current landlord consent form does communicate the
12 benefits of the program and is distinguishable from solicitations. However, PPL Electric
13 is open to discussing suggested improvements to the consent form at future stakeholder
14 meetings.

15

16 **Q. Do you agree with Mr. Miller’s recommendation that the Company “provide a copy**
17 **of the landlord approval form directly to the tenant” and “permit the tenant to**
18 **obtain and return the form on the behalf of their landlord”? (CAUSE-PA St. No. 1,**
19 **p. 27.)**

20 A. Yes. In fact, the Company already provides the consent form to the tenant in Phase III.

21

22 **Q. CAUSE-PA witness Miller also raises a concern with PPL Electric serving**
23 **affordable, master-metered properties, as well as common areas of single metered**

1 **properties, through the Non-Residential Program, recommending instead that PPL**
2 **Electric have a “one-stop” program administration model for multifamily housing**
3 **providers that is likely best housed within the Low-Income Program. (CAUSE-PA**
4 **St. No. 1, pp. 37-39.) Please respond.**

5 A. PPL Electric’s Low-Income Program CSP serves as the coordinator of the program for
6 low-income multifamily. The Low-Income Program CSP performs work on the
7 individual units and refers the building owner to participate in the Non-Residential
8 Program. Additionally, PPL Electric’s Low-Income Program CSP refers the customer to
9 the Non-Residential Program CSP for follow-up.

10
11 **Q. Mr. Miller also recommends that PPL Electric “further define the criteria for**
12 **participation and available measures for low income master metered properties”**
13 **and “include an audit component to help low income building owners and operators**
14 **to identify efficiency opportunities.” (CAUSE-PA St. No. 1, p. 39.) Do you agree?**

15 A. PPL Electric’s Phase IV EE&C Plan already provides information on how customers
16 qualify to be eligible to participate in the proposed EE&C Programs. As explained
17 previously, there are opportunities for both owners of and tenants in low-income master-
18 metered properties to participate in the Phase IV EE&C Plan. However, the Company
19 did not include an audit component for low-income master-metered properties in its
20 Phase IV EE&C Plan because PPL Electric already served 121 and 96 master-metered
21 multifamily properties in Phase II and Phase III, respectively, with similar measures.
22 Therefore, PPL Electric does not believe there is much potential for such an audit
23 component.

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Q. Mr. Miller also asserts that when “identifying available measures,” the Company “should ensure that the measures are compatible with the building efficiency requirements imposed on low income housing providers in other sectors,” such as aligning the measures with those contained in Pennsylvania Housing Finance Agency’s (“PHFA”) Qualified Allocation Plan (“QAP”). (CAUSE-PA St. No. 1, pp. 39-40.) Please respond.

A. PPL Electric designed its proposed Phase IV EE&C Plan using the Commission’s 2021 TRM, which sets forth the potential measures and how to calculate each measure’s savings in Phase IV. Other building efficiency requirements, like the QAP, are different from the TRM because they are more akin to action plans, prescribing certain recommendations on what to install/replace and when. PPL Electric is required to follow the TRM when designing its EE&C Plan, not the QAP or other building efficiency requirements. Notwithstanding, PPL Electric generally believes that its Phase IV EE&C Plan aligns with many of those recommendations, although there may be some differences. Notably, Mr. Miller admits that he has not performed any analysis of which measures offered in PPL Electric’s EE&C Plan fail to align with the QAP. (PPL Electric Exhibit DC-1R [PPL to CAUSE-I-8].)

Q. CAUSE-PA witness Miller further recommends that PPL Electric “set a maximum customer contribution level of 20%” for master-metered low-income tenant units and that the Company “should reduce or waive that contribution if projects do not move forward.” (CAUSE-PA St. No. 1, p. 40.) Do you agree?

1 A. As stated previously, PPL Electric has been successful in targeting both master-metered
2 and individually metered multifamily housing, and Mr. Miller agrees that PPL Electric
3 has been “relatively successful.” Given that success, PPL Electric does not believe that it
4 is necessary to implement this recommendation. However, the Company will continually
5 monitor the progress of the Phase IV EE&C Plan and may adjust the EE&C Plan, if
6 necessary, as Phase IV progresses.

7

8 **D. Advanced EE&C Measures**

9 **Q. NRDC witnesses Napoleon and Takahashi recommend that PPL Electric offer**
10 **advanced EE&C measures and programs, such as linear light emitting diode**
11 **(“LED”) and troffer LED lights, high efficiency clothes dryer (e.g., heat pump**
12 **dryer), a deep energy retrofits pilot program, and a zero net energy homes pilot**
13 **program. (NRDC St. No. 1, pp. 19-22.) Would you please respond?**

14 A. Both linear LED and troffer LED lights are offered in the Non-Residential Program’s
15 downstream and midstream components. PPL Electric has not defined its pilot programs
16 yet. The Company is interested in conducting pilot programs in Phase IV to test
17 innovative approaches and new technologies. PPL Electric confirms that it will take
18 NRDC witnesses’ suggested pilot programs into consideration. However, the
19 development of pilot programs will be informed by the market and the interests of the
20 Company’s customer base.

21

1 **E. Financing Programs for EE&C Measures**

2 **Q. NRDC witnesses Napoleon and Takahashi point to allegedly “proven” financing**
3 **mechanisms for EE&C measures in other jurisdictions and recommend that PPL**
4 **Electric carve out funding within its Phase IV Residential Program to facilitate**
5 **customer access to zero-percent interest financing to fund comprehensive**
6 **improvements as part of its Energy Efficient Homes offering.” (NRDC St. No. 1, pp.**
7 **15-17.) Do you agree?**

8 A. No. As admitted in discovery, neither Ms. Napoleon nor Mr. Takahashi is aware of any
9 other EDCs offering low interest financing in Pennsylvania. (PPL Electric Exhibit DC-
10 1R [PPL to NRDC-I-10].) They are also unaware of any specific local financial
11 institutions that offer this type of service. (PPL Electric Exhibit DC-1R [PPL to NRDC-
12 I-11].) Low interest financing was discussed in Phase II and subsequently dropped.
13 Moreover, my understanding is that on-bill financing has been controversial in other
14 Commission proceedings. PPL Electric does not feel that utilizing valuable resources to
15 look at financing by EDCs yet again would be a prudent use of ratepayer money,
16 especially when the costs of such financing would be passed on to the Company’s
17 ratepayers.

18
19 **F. Health and Safety Measures**

20 **Q. CAUSE-PA witness Miller makes several recommendations concerning the**
21 **provision of “health and safety” measures to customers. (CAUSE-PA St. No. 1, pp.**
22 **31, 34-35.) Could you please summarize those recommendations?**

1 A. Mr. Miller believes that PPL Electric “should identify available assistance programs that
2 can help resolve identified health and safety issues and should follow up to provide
3 energy efficiency services once those issues have been remediated.” Mr. Miller
4 recommends that PPL Electric first try to “provide health and safety remediation through
5 its LIURP.” He states that PPL Electric should also “track households deferred for health
6 and safety reasons,” and then “follow up with those households within 3 months to
7 determine whether the issues that prevented service delivery have been remediated.”
8 Furthermore, he recommends that PPL Electric “devote \$1 million (\$200,000 per year) of
9 its \$3 million experimental budget to develop a health and safety pilot program.” This
10 pilot program “should remediate home health and safety issues that would enable PPL to
11 provide comprehensive energy efficiency services in the home.”

12
13 **Q. Do you agree with his “health and safety” proposals?**

14 A. No. Despite narrow room for error with the Low-Income Program’s compliance targets
15 and no attributable energy efficiency savings, the program still provides carbon monoxide
16 detectors, smoke alarms, and battery replacement for both in low-income housing. While
17 providing no energy efficiency savings, the Plan calls for almost 55,000 safety measures
18 and uses approximately 0.1% of the total EE&C Plan budget. By comparison, CAUSE-
19 PA witness Miller recommends that the Company more than triple that budget by
20 devoting \$200,000 annually (\$1 million over the 5-year phase) to health and safety
21 measures (i.e., approximately 0.33% of the total EE&C Plan budget). Based on PPL
22 Electric’s experience in prior phases, the Company’s EE&C Plan for 55,000 safety

1 measures is more than sufficient, and no additional funds need to be devoted to these
2 measures at the expense of other programs.

3
4 **G. AMI Data**

5 **Q. NRDC witnesses Napoleon and Takahashi believe there are additional opportunities**
6 **to use automated metering infrastructure (“AMI”) data to drive energy efficient**
7 **and recommend that PPL Electric take advantage of those AMI data capabilities.**
8 **(NRDC St. No. 1, pp. 18-19.) Would you please respond?**

9 A. PPL Electric agrees with this suggestion and intends to utilize AMI data to develop an
10 Energy Analyzer for use by Residential, Low-Income, and Small C&I customers.

11
12 **H. Regional Greenhouse Gas Initiative**

13 **Q. NRDC witnesses Napoleon and Takahashi devote a large portion of their testimony**
14 **about the potential impact of RGGI. (NRDC St. No. 1, pp. 34-39.) Do you have any**
15 **overall comments?**

16 A. Yes, I believe that the NRDC’s issues concerning RGGI are outside the scope of this
17 proceeding and irrelevant to determining the issue at hand – whether PPL Electric’s
18 Phase IV EE&C Plan complies with Act 129 and the *Phase IV Orders* and should be
19 approved. The RGGI-related issues and recommendations being raised by NRDC should
20 have been raised in response to the Commission’s Phase IV Tentative Implementation
21 Order. Then, all interested stakeholders, including the other Act 129 EDCs, could review
22 and comment on these issues and recommendations. Despite submitting comments on
23 the Phase IV Tentative Implementation Order, NRDC readily admits that these RGGI-

1 related issues and recommendations were not raised in those comments. (PPL Electric
2 Exhibit DC-1R [PPL to NRDC-I-9].)

3 Now, however, NRDC is raising these issues and recommendations in PPL
4 Electric's Phase IV EE&C Plan, even though some of NRDC's recommendations
5 implicate all of the Act 129 EDCs in Pennsylvania. For example, NRDC recommends
6 that: (1) Pennsylvania study the emissions from utilities that serve customers in the
7 Commonwealth, in order to support planning for participation in RGGI; and (2) PPL
8 Electric, in coordination with the other EDCs, conduct both the hourly efficient savings
9 and the emissions rates studies. (NRDC St. No. 1, pp. 38-39.) Effectively, NRDC is
10 making proposals in this PPL Electric-specific proceeding that would affect all of the Act
11 129 EDCs. Because all of the Act 129 EDCs are not parties to this proceeding, I am
12 advised by counsel that the consideration and adoption of NRDC's proposals would deny
13 those EDCs due process.

14 In addition, the Commission already rejected considering the impact of RGGI on
15 the TRC Test calculations for Phase IV, stating the following:

16 While Governor Wolf's Executive Order EO 2019-07 regarding
17 Pennsylvania joining RGGI signals an increased consideration of
18 emissions in Commonwealth policy, no law has been enacted at the time
19 of this Order. To properly account for RGGI participation and the
20 associated effects on avoided costs, the SWE would need to know the
21 magnitude and value of the allowances and other key details. Until such
22 time as the Legislature acts upon the Governor's Executive Order, we
23 conclude that it is premature to value emissions in the 2021 TRC Test.
24 Furthermore, the costs to the owners of electric generating plants required
25 to purchase emissions offsets would be passed along to ratepayers as part
26 of the cost of electric generation and therefore would, at such time,
27 become a relevant component of the TRC calculation.

28
29 *2021 TRC Test Order*, p. 72 (emphasis added) (footnote omitted). The Commission's
30 basic conclusion was that it is premature to account for the impact of RGGI today, given

1 that the General Assembly has not acted upon Governor Wolf’s executive order.
2 Moreover, the Pennsylvania Department of Environmental Protection’s (“DEP”) RGGI
3 rulemaking is ongoing, so the parties do not even know what the outcome of that
4 proceeding will be. Furthermore, the Commission has not determined whether the added
5 revenues from RGGI can even be flowed through the ACR-4 to offset costs under the
6 Phase IV EE&C Plan, if and when RGGI legislation is passed and implemented.

7 In sum, it is premature to speculate about the impact of RGGI. If RGGI indeed
8 becomes a reality, and the Commission needs to account for RGGI’s impact on the Phase
9 IV EE&C Plans, then the Commission has established processes for parties to petition to
10 modify the *Phase IV Implementation Order*, the *2021 TRC Test Order*, and the Phase IV
11 EE&C Plans. The parties simply cannot and should not do so now.

12
13 **Q. Assuming *arguendo* that NRDC’s RGGI-related issues and recommendations are**
14 **considered, would you please respond to those issues and recommendations?**
15 **(NRDC St. No. 1, pp. 34-39.)**

16 A. I disagree with NRDC’s witnesses. As stated above, it is premature to speculate about
17 the impact of RGGI. It is impossible to definitively determine today what those future
18 impacts may or may not be.

19 Moreover, NRDC’s witnesses claim that there are two pieces of information that
20 stakeholders need to assess and develop an approach to energy efficiency under RGGI:
21 (1) hourly savings profiles, using data on all measures (or groups of measures) currently
22 offered by the EE&C programs and for all technically feasible measures, so that they can
23 develop an optimal measure mix; and (2) which resources are dispatched to meet the

1 electricity needs of customers in Pennsylvania at different times of the day and of the
2 year, the plants that are highest cost and are therefore most likely to be displaced by
3 energy efficiency, and the emissions of these units, all of which can be compiled into
4 marginal emissions rates per MWh of energy reduced.

5 However, NRDC provides no details on how those studies could even be
6 developed. PPL Electric’s Radio Frequency (“RF”) Mesh metering network does not
7 enable the Company to determine which individual appliances are being used inside a
8 customer’s home. PPL Electric only sees the total kWh of electric usage, broken down
9 into 15-minute intervals. Therefore, I do not know how PPL Electric could create the
10 “hourly savings profiles” recommended by NRDC. As for the study on the resources that
11 are dispatched, PPL Electric’s transmission and distribution systems are not served by
12 distinct and identifiable power plants. It is unclear how the Company can identify which
13 power plants produced the electrons flowing to its customers on the distribution system at
14 different times of the day and year. And, given that the Company divested all of its
15 generation assets, it is unclear how the Company would gain access to any power plants’
16 costs and emissions data.

17
18 **Q. Does this conclude your rebuttal testimony?**

19 **A.** Yes, it does.

PPL Electric Exhibit DC-1R

Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan

Docket No. M-2020-3020824

Responses of the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania (CAUSE-PA) to PPL Electric Utilities

Set I

PPL to CAUSE-I-3

Re: CAUSE-PA Statement No. 1. For each recommendation made in CAUSE-PA Statement No. 1:

- (a) Please explain whether Mr. Miller has studied or evaluated his recommendation's impact on:
 - (1) The individual programs' cost-effectiveness;
 - (2) The overall portfolio's cost-effectiveness;
 - (3) The savings for all customer sectors and programs; and
 - (4) The costs for all sectors and programs.
 - (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Mr. Miller relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).
- (b) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.
- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.
- (d) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.
- (e) Please provide all documents, reports, and workpapers relied upon by Mr. Miller in providing the information requested in subparts (c) and (d) above.

Response:

- (a) Mr. Miller has not performed the requested analysis.
- (b) See CAUSE-PA St. 1 at 22:13 to 23:2.
- (c) Mr. Miller has not performed the requested analysis.
- (d) Mr. Miller has not performed the requested analysis.
- (e) n/a

Respondent: Mitchell Miller

Date: January 20, 2021

Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan

Docket No. M-2020-3020824

Responses of the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania (CAUSE-PA) to PPL Electric Utilities

Set I

PPL to CAUSE-I-6

Re: CAUSE-PA Statement No. 1, pp. 37-38. Does Mr. Miller agree that PPL Electric has been successful in getting master-metered low-income housing owners to participate in its Phase III EE&C Plan? If the answer is anything but an unqualified “Yes”:

- (a) Please explain in detail how the Company has not been successful.

Response:

Yes, Mr. Miller agrees that PPL was relatively successful in getting master-metered low-income housing owners to participate in its Phase III Plan.

Respondent: Mitchell Miller

Date: January 20, 2021

Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan

Docket No. M-2020-3020824

Responses of the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania (CAUSE-PA) to PPL Electric Utilities

Set I

PPL to CAUSE-I-7

Re: CAUSE-PA Statement No. 1, pp. 37-38. Does Mr. Miller agree that PPL Electric has been successful in getting individually-metered multifamily housing customers to participate in its Phase III EE&C Plan? If the answer is anything but an unqualified “Yes”:

- (a) Please explain in detail how the Company has not been successful.
- (b) Please list any individually-metered low-income housing “leads” that CAUSE-PA provided to PPL Electric in that were not already provided EE&C measures by the Company.
- (c) Provide all studies, documents, reports, and workpapers in your possession concerning the EE&C market potential for individually-metered low-income housing customers in PPL Electric’s service territory.

Response:

Yes, Mr. Miller agrees that PPL was relatively successful in getting individually-metered multifamily housing customers to participate in its Phase III Plan.

Respondent: Mitchell Miller

Date: January 20, 2021

Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan

Docket No. M-2020-3020824

Responses of the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania (CAUSE-PA) to PPL Electric Utilities

Set I

PPL to CAUSE-I-8

Re: CAUSE-PA Statement No. 1, p. 40. Please list all measures available under the Company's proposed Low-Income Program that do not "align with the measures contained in the Pennsylvania Housing Finance Agency (PHFA) Qualified Allocation Plan (QAP)."

Response:

Mr. Miller has not conducted the requested analysis.

Respondent: Mitchell Miller

Date: January 20, 2021

**INTERROGATORIES AND REQUESTS FOR
PRODUCTION OF DOCUMENTS ON
CEO – SET I**

PPL to CEO-I-3

Re: CEO Statement No. 1. For each recommendation made in CEO Statement No. 1:

- (a) Please explain whether Mr. Brady has studied or evaluated his recommendation's impact on:
 - (1) The individual programs' cost-effectiveness;
 - (2) The overall portfolio's cost-effectiveness;
 - (3) The savings for all customer sectors and programs; and
 - (4) The costs for all sectors and programs.
 - (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Mr. Brady relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).

RESPONSE: Mr. Brady did not study or evaluate the cost-effectiveness.

- (b) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.

RESPONSE: In that it is a proposed Plan the budget can be amended to the extent necessary.

- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.

RESPONSE: N/A

- (d) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.

RESPONSE: N/A

- (e) Please provide all documents, reports, and workpapers relied upon by Mr. Brady in providing the information requested in subparts (c) and (d) above.

RESPONSE: N/A

PPL to NRDC-I-8

Re: NRDC Statement No. 1. For each recommendation made in NRDC Statement No. 1:

- (a) Please explain whether Ms. Napoleon and/or Mr. Takahashi has studied or evaluated their recommendation's impact on:
 - (1) The individual programs' cost-effectiveness;
 - (2) The overall portfolio's cost-effectiveness;
 - (3) The savings for all customer sectors and programs; and

- (4) The costs for all sectors and programs.
- (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Ms. Napoleon and/or Mr. Takahashi relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).
- (b) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.
- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.
- (d) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.
- (e) Please provide all documents, reports, and workpapers relied upon by Ms. Napoleon and/or Mr. Takahashi in providing the information requested in subparts (c) and (d) above.

Response:

(a) (1)-(5) Ms. Napoleon and Mr. Takahashi have not formally evaluated their recommendation's impact on the factors in (1)-(4).

(b) Ideally, the dollars to implement the recommendations would be taken proportionally from all programs. The remaining EE&C resources would be reoptimized for lifetime savings (as recommended in NRDC Statement No. 1) and for PPL's other proposed metrics and compliance targets.

(c) Ms. Napoleon and Mr. Takahashi have not formally evaluated the budget, participation level, and savings.

(d) Ms. Napoleon and Mr. Takahashi have not formally evaluated the TRC of the proposed measures, programs, or pilot programs. Experience in other jurisdictions has shown these recommended programs to be cost-effective as follows:

- Residential Financing: Rhode Island incorporates the cost of its HEAT Loan program within its EnergyWise Program. In 2019, this program had a planned benefit-cost ratio of 1.90 according to the RI Cost-Effectiveness Test and 1.08 according to the Total Resource Cost Test.¹ Massachusetts incorporates the cost of the HEAT Loan program is included within the Statewide Electric Residential Program which had a planned overall Resource Benefit per Program Cost ratio in 2019 of 2.00.²

- For Zero-Net Energy Buildings: PECO has proposed to offer Residential Net Zero Energy Homes in its Phase IV Plan according to the Phase IV TRM.

- For Tiered Incentives: the utilities in Connecticut include tiered incentives as part of residential and commercial program offerings as part of the approved 2019-2021 Conservation & Load Management Plan which requires programs to be cost-effective.³

With respect to a deep energy retrofit pilot, one of the purposes of the recommended pilots would be to investigate how PPL can leverage its existing delivery mechanisms, administrative structures, and contractor networks to make a cost-effective offering.

¹ National Grid 2019 Energy Efficiency Program Plan (RIPUC Docket No. 4888). Table E-5 and Table E-5A. Available at: [http://www.ripuc.ri.gov/eventsactions/docket/4888-NGrid-EEPP2019\(10-15-18\).pdf](http://www.ripuc.ri.gov/eventsactions/docket/4888-NGrid-EEPP2019(10-15-18).pdf).

² Massachusetts Three-Year Plan 2019-2021. D.P.U. 18-110 – D.P.U. 18-119. October 31, 2018. Exhibit 1, Appendix C – Electric. 1. Summary Table.

³ 2019-2021 Conservation & Load Management Plan. Submitted by: Eversource Energy, United Illuminating, Connecticut Natural Gas Corporation, and Southern Connecticut Gas. November 19, 2018.

PPL to NRDC-I-9

Re: NRDC Statement No. 1, pp. 34-39. Ms. Napoleon and Mr. Takahashi testify about the Regional Greenhouse Gas Initiative and its potential impact on EE&C in Pennsylvania and make a series of related recommendations.

Did NRDC submit comments or reply comments on the Tentative Implementation Order at Docket No. Docket No. M-2020-3015228? If so, please explain whether those comments or reply comments raised these points and recommendations to the Commission.

Response:

NRDC submitted joint comments and reply comments with Sierra Club, Citizens for Pennsylvania's Future, Clean Air Council, Philadelphia Climate Works, POWER, and 350 Philadelphia in Docket No. M-2020-3015228.

These comments and reply comments did not raise the issues noted in Ms. Napoleon's and Mr. Takahashi's joint testimony with respect to Regional Greenhouse Gas Initiative and its potential impact on EE&C in Pennsylvania.

PPL to NRDC-I-10

Re: NRDC Statement No. 1, pp. 15-16. Is Ms. Napoleon or Mr. Takahashi aware of any electric distribution company ("EDC") in Pennsylvania that has offered, is offering, or is proposing to offer zero to low-interest loans under its Act 129 EE&C Plan? If so, please identify each EDC, identify the Act 129 Phase in which it was offered, and provide a brief description of the offer.

Response: No. Ms. Napoleon or Mr. Takahashi are not aware of any electric distribution company ("EDC") in Pennsylvania that has offered zero to low-interest loans under its Act 129 EE&C Plan.

PPL to NRDC-I-11

Re: NRDC Statement No. 1, p. 17. Ms. Napoleon and Mr. Takahashi state that “PPL should commit to reaching out to local financial institutions to examine partnerships to buy-down interest rates to increase access to funding.

- (a) Please identify all “local financial institutions” of which Ms. Napoleon and Mr. Takahashi are aware that would offer such an interest rate buy-down to PPL Electric.
- (b) Please provide all documents, reports, and workpapers in the possession of Ms. Napoleon and/or Mr. Takahashi about the “local financial institutions” they believe would offer such an interest rate buy-down to PPL Electric.

Response: (a) Ms. Napoleon and Mr. Takahashi have not identified “local financial institutions” nor do they prescribe any specific institution but note that successful partnerships have been developed in other jurisdictions, e.g. Rhode Island and Massachusetts.

- (b) See attached.

Re: OCA Statement No. 1. For each recommendation made in OCA Statement No. 1:

- (a) Please explain whether Ms. Sherwood has studied or evaluated her recommendation's impact on:
 - (1) The individual programs' cost-effectiveness;
 - (2) The overall portfolio's cost-effectiveness;
 - (3) The savings for all customer sectors and programs; and
 - (4) The costs for all sectors and programs.
 - (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Ms. Sherwood relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).
- (b) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.
- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.
- (d) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.
- (e) Please provide all documents, reports, and workpapers relied upon by Ms. Sherwood in providing the information requested in subparts (c) and (d) above.

OCA RESPONSE:

Recommendation: As part of its rebuttal, the Company should provide market evidence or a marketing plan to support the level of Ductless Mini-Split Heat Pumps forecasted in the Efficient Home component. If the Company cannot provide reasonable support of this projection, then it should file a revised plan with the Commission. If the Company properly addresses this issue, I recommend the Commission approve PPL's Phase IV Plan.

- (1) The individual programs' cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the Efficient Home component's cost-effectiveness in relation to this recommendation. However, if the Company fails to achieve this level of projected savings under the Efficient Home component for the ductless mini-split heat pumps, then the cost-effectiveness of the program could be negatively impacted.

- (2) The overall portfolio's cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the portfolio's cost-effectiveness in relation to this recommendation. However, if the Company fails to achieve this level of savings projected under the Efficient Home component for the ductless mini-split heat pumps, then the cost-effectiveness of the portfolio could be negatively impacted.

- (3) The savings for all customer sectors and programs; and

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the savings for all customer sectors and programs in relation to this recommendation. However, if the savings forecasted for the Efficient Home component is not achieved, the residential sector energy savings will be lower and as a result the ratio of residential savings compared to non-residential savings will be lower than forecasted. It should be noted that at the current projections of residential to non-residential energy savings is disproportionately split 23/77, respectively. Therefore, if the projected savings for the Efficient Home component are not realized, then the ratio of energy savings between residential and non-residential sectors will more greatly favor the non-residential sector.

- (4) The costs for all sectors and programs.

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the costs for all customer sectors and programs in relation to this recommendation.

- (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Ms. Sherwood relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).

OCA RESPONSE:

Ms. Sherwood did not rely upon any documents, reports, and workpapers in developing this recommendation.

- (b) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.

OCA RESPONSE:

Not Applicable.

- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.

OCA RESPONSE:

Not Applicable.

- (d) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.

OCA RESPONSE:

Not Applicable.

- (e) Please provide all documents, reports, and workpapers relied upon by Ms. Sherwood in providing the information requested in subparts (c) and (d) above.

OCA RESPONSE:

Not Applicable.

Recommendation: The Company should continue to innovate its Phase IV portfolio throughout the implementation of the Plan to consider offering measures that increase cost-effectiveness of the residential portfolio to offset the maturity of the programs and the decrease in lighting measures.

- (1) The individual programs' cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the impact of this recommendation on an individual programs' cost-effectiveness; however, there should be limited to no impact to individual program cost-effectiveness as any investment in this recommendation would likely have a larger impact on the overall portfolio.

- (2) The overall portfolio's cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the impact of this recommendation on the overall portfolio's cost-effectiveness. There will likely be a decrease in the overall cost-effectiveness, as pilot programs and new measure offerings tend to not produce enough energy savings to offset their costs.

- (3) The savings for all customer sectors and programs; and

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the impact of this recommendation on the savings for all customer sectors and programs.

- (4) The costs for all sectors and programs.

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the impact of this recommendation on the costs for all customer sectors and programs.

- (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Ms. Sherwood relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).

OCA RESPONSE:

Ms. Sherwood did not rely upon any documents, reports, and workpapers in developing this recommendation.

- (a) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.

OCA RESPONSE:

As this recommendation is related to residential programs, Ms. Sherwood recommends that a portion of the residential budget be used to support such efforts. As much as 2% of the residential budget could be reallocated from the residential components to support this effort.

- (b) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.

OCA RESPONSE:

As noted in the Phase IV Implementation Order, the utility is the best positioned for evaluating and providing this level of evaluation of energy efficiency and conservation offerings.

- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.

OCA RESPONSE:

As noted in the Phase IV Implementation Order, the utility is the best positioned for evaluating and providing this level of evaluation of energy efficiency and conservation offerings.

- (d) Please provide all documents, reports, and workpapers relied upon by Ms. Sherwood in providing the information requested in subparts (c) and (d) above.

OCA RESPONSE:

Ms. Sherwood did not rely upon any documents, reports, and workpapers in developing this recommendation.

Recommendation: The Company should develop a methodology to allocate and track the savings captured under the Low-Income Program when it leverages funding from the Low-Income Usage Reduction Program (“LIURP”).

- (1) The individual programs’ cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the Low-Income Program’s cost-effectiveness in relation to this recommendation.

- (2) The overall portfolio’s cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the overall portfolio’s cost-effectiveness in relation to this recommendation.

- (3) The savings for all customer sectors and programs; and

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the savings for all customer sectors and programs in relation to this recommendation.

- (4) The costs for all sectors and programs.

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the costs for all customer sectors and programs in relation to this recommendation.

- (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Ms. Sherwood relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).

OCA RESPONSE:

Not applicable.

- (a) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.

OCA RESPONSE:

The process to verify that savings is not double-counted should be funded through the evaluation, measurement, and verification (EM&V) budget that is allocated under the Low-Income Program.

- (b) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.

OCA RESPONSE:

Not applicable.

- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.

OCA RESPONSE:

Not applicable.

- (d) Please provide all documents, reports, and workpapers relied upon by Ms. Sherwood in providing the information requested in subparts (c) and (d) above.

OCA RESPONSE:

Not applicable.

Recommendation: The Commission should require PPL to file its plan for nominating demand response into the PJM FCM, which should include the following details:

- *Delivery year for the first nomination;*
- *Measures that will provide demand reductions, by customer class;*
- *Methodology to determine which rate classes have delivered demand reductions; and*
- *Details on how PPL will limit ratepayer exposure to penalties, including a sensitivity analysis of the impact to the Act 129 Compliance Rider – Phase IV (“ACR-IV”).*

- (1) The individual programs’ cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of any individual programs’ cost-effectiveness in relation to this recommendation.

- (2) The overall portfolio’s cost-effectiveness;

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of the overall portfolio’s cost-effectiveness in relation to this recommendation.

- (3) The savings for all customer sectors and programs; and

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of savings for all sectors and programs in relation to this recommendation.

- (4) The costs for all sectors and programs.

OCA RESPONSE:

Ms. Sherwood did not conduct a formal evaluation of costs for all sectors and programs in relation to this recommendation.

- (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Ms. Sherwood relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).

OCA RESPONSE:

Ms. Sherwood did not rely upon any documents, reports, and workpapers in developing this recommendation.

- (e) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.

OCA RESPONSE:

Ms. Sherwood believes that the funding for this should have been included as part of the development of the Phase IV plan, as it was required by the Phase IV Implementation Order that the description of the strategy and approach of offering resources into the PJM capacity market, including a trajectory of the peak demand reductions over time be included as part of the plan.

- (f) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.

OCA RESPONSE:

Not applicable.

- (g) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.

OCA RESPONSE:

Not applicable.

- (h) Please provide all documents, reports, and workpapers relied upon by Ms. Sherwood in providing the information requested in subparts (c) and (d) above.

OCA RESPONSE:

Not applicable.

RESPONDENT: STACY SHERWOOD
Dated: 01/20/2021

**SUSTAINABLE ENERGY FUND OF CENTRAL EASTERN PENNSYLVANIA'S
RESPONSES TO PPL'S FIRST SET OF INTERROGATORIES AND REQUESTS
FOR PRODUCTION OF DOCUMENTS**

PPL to SEF-I-3

Re: SEF Statement No. 1. For each recommendation made in SEF Statement No. 1:

- (a) Please explain whether Mr. Costlow has studied or evaluated the impact of this recommendation on:
 - (1) The individual programs' cost-effectiveness;
 - (2) The overall portfolio's cost-effectiveness;
 - (3) The savings for all customer sectors and programs; and
 - (4) The costs for all sectors and programs.
 - (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Mr. Costlow relied upon in performing those studies or evaluations, in their native format (e.g. Microsoft excel).
- (b) Please identify where the dollars in the budget for the Phase IV EE&C Plan will come from to implement this recommendation.
- (c) If the recommendation is the addition of a new measure, program, or pilot program, please provide its projected budget, participation level, and savings for each Program Year of Phase IV.
- (d) If the recommendation is the addition of a new measure, program, or pilot program, please provide its TRC benefit-cost ratio.
- (e) Please provide all documents, reports, and workpapers relied upon Mr. Costlow in providing the information requested in subparts (c) and (d) above.

Response:

- (a) I have not studied or evaluated the impact of (i) increasing and narrowing incentive ranges for Small C&I Customers, (ii) utilizing an independent third-party for Small C&I education and awareness efforts, or (iii) to propose that PPL provide a plan to measure savings attained from Small GNE and Large GNE customers. My testimony is based on decades working within the energy industry and years working with Small Commercial and Industrial users of electricity within the PPL service area.
- (b) I believe the money to implement recommendations (i) and (ii) can already found within PPL Electric's Phase IV Plan. I

**SUSTAINABLE ENERGY FUND OF CENTRAL EASTERN PENNSYLVANIA'S
RESPONSES TO PPL'S FIRST SET OF INTERROGATORIES AND REQUESTS
FOR PRODUCTION OF DOCUMENTS**

recommend that the money already earmarked for energy education be spent on an independent third-party that can and will provide an unbiased view of energy conservation and energy efficiency.

(c) Not applicable.

(d) Not applicable.

(e) I did not rely on any documents other than PPL's proposed Phase IV EE&C Plan.

Prepared By: John Costlow

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Petition of PPL Electric Utilities for
Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan**

Docket No. M-2020-3020824

PPL Electric Utilities Corporation

Statement No. 4-R

Rebuttal Testimony of Melinda Stumpf

**List of Topics Addressed:
Low-Income Programs and Initiatives
Other Parties' Low-Income Issues and Recommendations**

Date: January 22, 2021

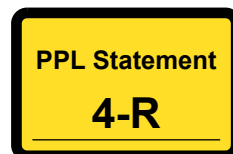


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Q. Please state your full name and business address.

A. My name is Melinda Stumpf, and my business address is PPL Electric Utilities Corporation, 827 Hausman Road, Allentown, PA 18104.

Q. By whom are you employed and in what capacity?

A. I am employed by PPL Electric Utilities Corporation (“PPL Electric” or the “Company”) as Manager of Regulatory Programs and Business Services.

Q. Have you previously submitted testimony in this proceeding?

A. No.

Q. What are your duties as Manager of Regulatory Programs and Business Services?

A. I am responsible for the oversight and implementation of PPL Electric’s universal service programs, including OnTrack (Customer Assistance Program or “CAP”), WRAP (Low-Income Usage Reduction Program or “LIURP”), Operation HELP (hardship fund), and CARES (referral service). In addition, I lead various advocacy and outreach efforts for the Low-Income Home Energy Assistance Program (“LIHEAP”).

Q. What is your educational background?

A. I have an undergraduate degree in Business Administration from Muhlenberg College and a Master of Business Administration from St. Joseph’s University.

1 **Q. Please describe your professional experience.**

2 A. I began my career at PPL Electric in 2012 as the Regional Affairs Director, where I was
3 the Company spokesperson and liaison with legislators, townships, community leaders,
4 and municipalities. I then moved into my current role as the Manager of Regulatory
5 Programs and Business Services, where I am responsible for all of the company's low-
6 income programs.

7
8 **Q. Have you previously testified as a witness before the Pennsylvania Public Utility
9 Commission ("Commission")?**

10 A. Yes, I testified in the Company's Default Service Plan V proceeding at Docket No. P-2020-
11 3019356.

12
13 **Q. Please briefly describe the subject matter of your rebuttal testimony in this
14 proceeding.**

15 A. I will respond to certain issues raised in the direct testimony submitted by the other parties'
16 witnesses, specifically: (1) the direct testimony of Stacy L. Sherwood (OCA Statement No.
17 1) submitted on behalf of the Office of Consumer Advocate ("OCA"); (2) the direct
18 testimony of Mitchell Miller (CAUSE-PA Statement No. 1) submitted on behalf of the
19 Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
20 ("CAUSE-PA"); and (3) the direct testimony of Eugene M. Brady (CEO Statement No. 1)
21 submitted on behalf of the Commission on Economic Opportunity ("CEO").

22

1 **I. PPL ELECTRIC'S LOW-INCOME PROGRAMS AND INITIATIVES**

2 **Q. Several parties reference the Company's non-Act 129 low-income programs and**
3 **initiatives, such as LIURP and CAP. (See CAUSE-PA St. No. 1, pp. 2-3, 12, 18, 27-**
4 **35, 41-42; CEO St. No. 1, pp. 2-7; OCA St. No. 1, pp. 4, 15-16.) Could you please**
5 **provide details on each of the Company's non-Act 129 low-income programs and**
6 **initiatives?**

7 **A. OnTrack (CAP)**

8 OnTrack is PPL Electric's Customer Assistance Program (CAP). The primary features of
9 OnTrack include a reduced fixed payment based on income, household size and usage, debt
10 forgiveness over a specified period of time (typically 18 months), bill credits which cover
11 the difference between the fixed payment and the actual bill, and protection from
12 termination of service.

13 OnTrack is available to residential customers who are at or below 150% of federal
14 poverty level. Customers do not need to have an overdue balance or defaulted payment
15 plan to qualify. The customer must either provide documentation of their income or
16 complete a form affirming that they have no source of income. Customers with zero
17 income are enrolled in a special 9-month program called OnTrack Lifestyle. Customers
18 may apply for OnTrack online, by phone, by mail, or by contacting the community-based
19 organization ("CBO") directly. Income-eligible customers are also referred to the program
20 automatically when setting up a payment agreement on their electric bill. On-Track
21 customers whose usage exceeds specified thresholds may also be referred to WRAP, which
22 is PPL Electric's LIURP.

23

1 **WRAP (LIURP)**

2 WRAP is PPL Electric’s Low Income Usage Reduction Program. The primary objective
3 of the program is to reduce energy usage and electric bills of low-income customers;
4 secondary objectives include improving customer comfort and promoting safer living
5 conditions.

6 The home must be within PPL Electric’s service area, be individually metered, and
7 be the customer’s primary residence. The electric service must be in the name of one of
8 the occupants, and the household must be at or below 150% of federal poverty level. PPL
9 Electric will serve up to 20% of customers between 150-200% of federal poverty level.
10 Homeowners and renters are eligible. Landlord consent is required for most measures.
11 Customers may apply online, by phone or by mail. Applications are reviewed and
12 approved by PPL Electric’s Universal Service Representatives (“USRs”).

13 Eligible customers receive an energy survey or audit to identify what energy-saving
14 measures the contractor will install in the home. Contractors install measures based on
15 PPL Electric’s WRAP Standards and Field Guide. Contractors also make referrals to other
16 programs and provide energy education and a customized action plan to the customer. PPL
17 Electric conducts post-installation inspections to verify the installation of invoiced
18 measures and to identify any concerns or missed opportunities.

19 On average, PPL Electric’s LIURP produces significant savings for customers who
20 participate in the program. As reported in the Company’s LIURP Annual Report for 2018
21 (filed Apr. 30, 2020), the average kWh savings per home in 2018 was approximately 1,977
22 kWh.

23

1 **Operation HELP**

2 Operation HELP is a hardship fund supported by donations from PPL Corporation, its
3 employees, retirees, and customers. The program provides direct financial assistance for
4 overdue energy bills and protection against termination.

5 Operation HELP focuses on low-income customers (defined as at or below 200%
6 of federal poverty level) who have overdue balances and an inability to pay the full amount
7 of their energy bills. The income guideline has been temporarily raised to 250% of federal
8 poverty level until December 31, 2021. One of the program’s objectives is to offer
9 assistance to customers who are ineligible for LIHEAP. The program pays for *any* type of
10 home energy bill (electric, oil, gas, coal).

11 Customers can apply for Operation HELP by phone, online, or by contacting a
12 participating CBO directly.

13 **CARES**

14 The Customer Assistance and Referral Evaluation Service (CARES) program is a special
15 service for customers with previous good payment histories who now have temporary
16 hardships, such as illness, injury, loss of job, or high medical bills.

17 CARES is available to residential customers regardless of income level. Referrals
18 typically originate either from the Customer Contact Center (“CCC”) or from CBOs
19 administering PPL Electric’s other universal service programs. CARES may provide
20 temporary protection against shutoff of service, referrals to other programs, or direct
21 financial assistance with the electric bill. PPL Electric has a limited budget for CARES
22 Credits, which are direct payments to the customer’s bill. The funding for this budget
23 comes from PPL Corporation’s annual donation to Operation HELP.
24 comes from PPL Corporation’s annual donation to Operation HELP.

1 PPL Electric’s USRs review CARES referrals and determine customers’ eligibility.
 2 They can put a hold on the customer’s account to provide temporary protection from
 3 termination, or they may grant CARES credits to be applied to the customer’s bill.

4 The following table summarizes the Company’s spending for these programs from
 5 2015-2019:

Program	2015	2016	2017	2018	2019
OnTrack	\$83,614,471	\$86,446,411	\$80,923,575	\$80,034,598	\$82,047,452
WRAP	\$9,371,754	\$9,859,640	\$9,984,911	\$10,229,891	\$10,072,389
Operation HELP	\$1,620,801	\$1,146,809	\$1,165,538	\$1,133,591	\$1,057,891
CARES	\$54,000	\$61,000	\$52,035	\$54,000	\$49,050
TOTAL	\$94,661,026	\$97,513,860	\$92,126,059	\$91,452,080	\$93,226,782

6
 7 **Q. Do you believe that the instant Phase IV EE&C Plan proceeding is an appropriate**
 8 **proceeding to make changes to the Company’s non-Act 129 low-income programs**
 9 **and initiatives?**

10 A. No. This proceeding should be focused entirely on the proposed Phase IV EE&C Plan,
 11 including the Low-Income Program proposed therein. I believe that it would be wholly
 12 inappropriate to make changes to other low-income programs and initiatives, which have
 13 been approved in other proceedings, through the instant Phase IV EE&C Plan proceeding.
 14 I am advised by counsel that making such changes to the other low-income programs and
 15 initiatives through this case raises due process concerns.

16 In addition, to the extent that the Company wants to make changes to those other
 17 low-income programs and initiatives, any interested parties will have the opportunity to

1 respond to those proposals. Now, however, is not the time to address the potential changes
2 PPL Electric may or may not make to non-Act 129 low-income programs and initiatives.

3
4 **Q. Assuming *arguendo* that the Company’s non-Act 129 low-income programs and**
5 **initiatives are considered in this proceeding, do you believe that PPL Electric’s Phase**
6 **IV EE&C Plan and its non-Act 129 low-income programs and initiatives adequately**
7 **serve the low-income customers in the Company’s service territory?**

8 A. Absolutely. PPL Electric has several successful programs and initiatives available for
9 those customers and strives to improve on them continuously. Since the last filed Universal
10 Service and Energy Conservation Plan (“USECP”), PPL Electric has worked on enhancing
11 the customer experience by making it easier for customers to apply for all of the programs,
12 such as adding an online application and the ability to apply over the phone. Because of
13 many of the enhanced features, PPL Electric has seen a significant increase in the number
14 of participants in OnTrack, and WRAP also has had a steady stream of customers to serve.
15 PPL Electric has made it easy for customers to participate in the low-income programs and
16 has seen a 47% increase in customers participating in OnTrack, which has a direct
17 correlation to decreasing the number of terminations. Additionally, all low-income
18 customers are referred to the suite of low-income programs when they contact PPL Electric
19 to discuss their termination notice.

20

1 **II. OTHER PARTIES' LOW-INCOME ISSUES AND RECOMMENDATIONS**

2 **Q. CAUSE-PA witness Miller asserts that the Company “should be required to indicate**
3 **whether and to what extent its Act 129 CSP will deliver any portion of LIURP**
4 **services.” (CAUSE-PA St. No. 1, p. 35.) Would you please respond?**

5 A. LIURP will be delivered by the contractor(s) engaged by the Company to deliver LIURP
6 services under the USECP. The Phase IV EE&C Plan will not limit the contractor(s) that
7 can be engaged to provide LIURP services under the USECP, given that the USECP is
8 approved in a different Commission proceeding. However, the Low-Income Program CSP
9 does have discretion to hire subcontractors to provide services under the Phase IV EE&C
10 Plan’s Low-Income Program. Thus, whether the LIURP contractor(s) will be the same as
11 any of the Low-Income Program CSP’s subcontractors is up to the discretion of the Low-
12 Income Program CSP.

13
14 **Q. CEO witness Brady proposes that PPL Electric commit to: (1) the LIURP annual**
15 **funding set forth in its Commission-approved USECP, with any unspent funds being**
16 **carried over to the subsequent year; and (2) using those CBOs that it has traditionally**
17 **used in its LIURP program absent any performance issues on the part of those CBOs.**
18 **(CEO St. No. 1, p. 7.) Please respond.**

19 A. PPL Electric currently carries over any unspent funds from the previous year to subsequent
20 year. Regarding his recommendation to use CBOs, as I stated previously, I do not believe
21 it is appropriate to make changes to the Company’s Commission-approved USECP through
22 the instant proceeding. The Company currently uses CBOs under its USECP, and any
23 future changes to that practice should be addressed in the Company’s USECP proceeding.

1

2 **Q. Does this conclude your rebuttal testimony?**

3 **A.** Yes, it does.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Petition of PPL Electric Utilities for
Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan**

Docket No. M-2020-3020824

PPL Electric Utilities Corporation

Statement No. 1-R (Supp)

Supplemental Rebuttal Testimony of Dirk Chiles

List of Topics Addressed:

Overall Electric Consumption and Peak Demand Reduction Targets

Design of the Non-Residential Program

Rate Impact of the Phase IV EE&C Plan

Recommendation for PPL Electric to Maintain Lists of Available Assistance Programs

Date: February 3, 2021

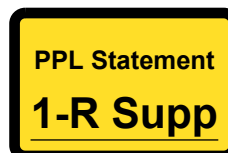


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Q. Please state your full name and business address.

A. My name is Dirk Chiles, and my business address is 827 Hausman Road, Allentown PA 18104.

Q. By whom are you employed and in what capacity?

A. I am employed by PPL Electric Utilities Corporation (“PPL Electric” or the “Company”) as Manager-Energy Efficiency.

Q. Have you previously submitted testimony in this proceeding?

A. Yes. I submitted my direct testimony (PPL Electric Statement No. 1) and rebuttal testimony (PPL Electric Statement No. 1-R) in support of PPL Electric’s petition for approval of its Phase IV Energy Efficiency and Conservation Plan (“EE&C Plan” or “Plan”) that was filed with the Pennsylvania Public Utility Commission (“Commission”) on November 30, 2020, at Docket No. M-2020-3020824, in accordance with Act 129 of 2008 (“Act 129” or the “Act”), as well as the relevant Commission Orders for Phase IV. *See Energy Efficiency and Conservation Program*, Docket No. M-2020-3015228 (Order entered June 18, 2020) (“*Phase IV Implementation Order*”); *2021 Total Resource Cost (TRC) Test*, Docket No. M-2019-3006868 (Order entered Dec. 19, 2019) (“*2021 TRC Test Order*”) (collectively, “*Phase IV Orders*”).

Q. Please briefly describe the subject matter of your supplemental rebuttal testimony in this proceeding.

1 A. I will respond to issues raised in the supplemental direct testimony submitted by the other
2 parties' witnesses, specifically: (1) the supplemental direct testimony of Jeffry Pollock
3 (PPLICA Statement No. 1) submitted on behalf of the PP&L Industrial Customer
4 Alliance ("PPLICA"); and (2) the supplemental direct testimony of John Costlow (SEF
5 Statement No. 1-SD) submitted on behalf of the Sustainable Energy Fund ("SEF"). I also
6 will clarify a statement on page 23 of my rebuttal testimony, concerning a
7 recommendation made by Mitchell Miller in his direct testimony (CAUSE-PA Statement
8 No. 1) submitted on behalf of the Coalition for Affordable Utility Services and Energy
9 Efficiency in Pennsylvania ("CAUSE-PA").

10

11 **Q. Are you sponsoring any exhibits with your supplemental rebuttal testimony?**

12 A. Yes, attached to my supplemental rebuttal testimony as PPL Electric Exhibit DC-2R are
13 the following discovery responses served by PPLICA: PPL to PPLICA-I-3 through 14.

14

15 **I. PPLICA STATEMENT NO. 1**

16 **Q. Do you have any general observations about PPLICA's supplemental direct**
17 **testimony?**

18 A. Yes. In my rebuttal testimony, I outlined several general observations about the other
19 parties' direct testimony, such as how the other parties propose selective changes to the
20 EE&C Plan without any formal study or evaluation of those changes' impact on the
21 proposed Phase IV EE&C Plan. (PPL Electric Statement No. 1-R, pp. 2-5.) I reiterate
22 that all of those general observations apply even more so to PPLICA's proposals in its
23 supplemental direct testimony. As explained herein, PPLICA proposes that the

1 Commission: (1) reduce the mandatory peak demand reduction target that the
2 Commission established in the *Phase IV Implementation Order*; (2) “either reject or pare
3 back the programs” for Large Commercial and Industrial (“Large C&I”) customers “by *at*
4 *least 50%”*¹; and (3) prohibit PPL Electric from designing its Phase IV EE&C Plan to
5 achieve greater electric consumption and peak demand reductions higher than the
6 Commission-established targets in the *Phase IV Implementation Order*. (PPLICA
7 Statement No. 1, pp. 2-3, 8-9, 11.)

8 These drastic and radical proposals not only would fundamentally change the
9 design of the Phase IV EE&C Plan—at the very least, they would place PPL Electric’s
10 ability to achieve its required electric consumption and peak demand reduction targets in
11 serious doubt. Whatever misgivings PPLICA may have with Act 129 EE&C Plans, now
12 is not the time to relitigate the merits of Act 129 or the targets established by the
13 Commission in its *Phase IV Implementation Order*. PPL Electric is legally required to
14 design and propose a Phase IV EE&C Plan that will achieve the Commission’s required
15 electric consumption and peak demand reduction targets as well as meet all of the other
16 requirements in the *Phase IV Orders*. Thus, PPL Electric must have flexibility in
17 designing its Phase IV EE&C Plan to achieve the Commission-established targets within
18 budget.

¹ The only program available to Large C&I customers is the Non-Residential Program. There are not multiple programs offered to Large C&I customers, as alleged by PPLICA.

1 **Q. PPLICA witness Pollock recommends that “the Commission either reject or**
2 **significantly reduce the proposed Phase IV peak demand reduction targets.”**
3 **(PPLICA Statement No. 1, pp. 2, 11.) Would you please respond?**

4 A. I do not believe it is appropriate to relitigate the peak demand reduction target in this
5 proceeding. Both PPL Electric and PPLICA raised concerns about the Commission’s
6 proposed peak demand reduction target in their Comments on the Phase IV Tentative
7 Implementation Order. Specifically, as part of the Industrial Customers who submitted
8 Comments, PPLICA asked for clarification on the assumptions used to arrive at the
9 proposed peak demand reduction targets, criticized an apparent lack of detail supporting
10 those targets, and supported the complete removal of peak demand reduction targets for
11 the Act 129 electric distribution companies (“EDCs”). *Phase IV Implementation Order*,
12 pp. 6, 76. Meanwhile, PPL Electric supported other commenters’ “request for reduction
13 of consumption and [peak demand reduction] targets due to the loss of residential lighting
14 savings and anticipated depressed economic conditions.” *Id.* The Company also
15 observed that “more funding will have to be allocated to C&I to meet the [peak demand
16 reduction] targets, resulting in less funding for residential and low-income customers.”
17 *Id.*

18 Based on my review of the *Phase IV Implementation Order*, the Commission
19 considered these concerns and then reduced PPL Electric’s peak demand reduction target
20 from 244 MW to 229 MW. *Id.*, p. 80. Once the Commission established the peak
21 demand reduction target, I and other members of PPL Electric’s EE&C team worked with
22 The Cadmus Group LLC to design and develop an EE&C Plan that meets that target, the

1 electric consumption target, and all of the other requirements in the Commission's *Phase*
2 *IV Implementation Order*.

3 Mr. Pollock never alleges that this level of cost-effective peak demand reduction
4 potential exists in PPL Electric's service territory, nor does he present an alternative
5 market potential study that would establish that fact. Rather, the primary concerns that he
6 raises are about the peak demand reduction target's impact on the ACR-4 rates of Large
7 C&I customers. As stated above, the Commission already considered those concerns in
8 establishing PPL Electric's peak demand reduction target. Moreover, as explained later
9 in my testimony, Mr. Pollock exaggerates the rate impact on Large C&I customers.

10 Additionally, I am advised by counsel that the Commission did establish a process
11 for PPL Electric and other EDCs to challenge the electric consumption target the peak
12 demand reduction target, or both. Specifically, PPL Electric would have had to file a
13 petition within 15 days after the *Phase IV Implementation Order*, which would trigger an
14 expedited proceeding and hearings where the Company "would have the opportunity to
15 present evidence and argument as to its reasonable consumption and peak demand
16 reduction requirements for Phase IV." *Phase IV Implementation Order*, p. 47. However,
17 PPL Electric did not file such a petition. As a result, the Company is "deemed to have
18 accepted the facts and will be bound by the consumption and peak demand reduction
19 requirements contained in that order for that EDC as there would be no remaining
20 disputed facts." *Id.*

21
22 **Q. In his direct testimony, Mr. Pollock compares PPL Electric's electric consumption**
23 **and peak demand reduction targets in the Phase III and Phase IV EE&C Plans,**

1 **both overall and for Large C&I customers specifically. (PPLICA Statement No. 1,**
2 **pp. 3, 5.) Is Mr. Pollock missing anything when performing this comparison?**

3 A. Yes. Mr. Pollock fails to realize the difference in how the Commission calculated the
4 Phase III and Phase IV targets. As the Commission explained in the *Phase IV*
5 *Implementation Order*, “the Phase III reporting of MWh and MW are both at the meter-
6 level.” *Phase IV Implementation Order*, p. 77. Although the “Phase IV targets for MWh
7 are at the meter-level,” the “Phase IV [peak demand reduction] targets are at the system-
8 level, meaning they are inclusive of line losses.” *Id.* PPL Electric’s projected peak
9 demand reductions of 249 MW includes line losses. If line losses were removed, like in
10 Phase III, the Company’s projected peak demand reductions would be 229 MW.
11 Therefore, Mr. Pollock’s comparison between the peak demand reduction targets in the
12 Phase III and Phase IV EE&C Plans is not an apples-to-apples comparison.

13 In addition, in Phase III, PPL Electric had to achieve its Phase III peak demand
14 reduction target through dispatchable demand response exclusively. The increase in the
15 peak demand reduction target from Phase III to Phase IV also reflects how the EDCs in
16 Phase IV will rely on PJM Interconnection LLC (“PJM”) accepted energy efficiency
17 measures to produce peak demand reductions, which greatly expands the number of
18 measures that can contribute peak demand reductions toward that compliance target.

19
20 **Q. Mr. Pollock states that the Phase IV EE&C Plan “would place substantially greater**
21 **emphasis on peak demand reduction, and somewhat less emphasis on energy**
22 **reduction than its Phase III Plan.” (PPLICA Statement No. 1, p. 3.) Do you agree?**

1 A. Not entirely. As mentioned previously, the focus on peak demand reduction in Phase IV
2 is categorically different than in Phase III. In contrast to Phase III, PPL Electric must
3 achieve its Phase IV peak demand reduction target only through the peak demand
4 reductions associated with energy efficiency measures, i.e., without dispatchable demand
5 response. *Phase IV Implementation Order*, p. 68. As a result, PPL Electric is not
6 necessarily placing a “substantially greater emphasis on peak demand reduction,” as
7 alleged by Mr. Pollock. Rather, the Company must place a greater emphasis on energy
8 efficiency measures that produce peak demand reductions.

9
10 **Q. Mr. Pollock argues that the Phase IV peak demand reduction target “is based**
11 **primarily on achieving demand reductions through energy efficiency measures, such**
12 **as lighting improvements, custom process improvements, and HVAC,” citing PPL’s**
13 **Phase IV EE&C Plan Tables 44 and 50. (PPLICA Statement No. 1, p. 4) (emphasis**
14 **added). Do you agree?**

15 A. No. As stated previously, PPL Electric must achieve its Phase IV peak demand reduction
16 target through the peak demand reductions associated with energy efficiency measures.
17 Therefore, the target is exclusively, not “primarily,” based on achieving demand
18 reductions through energy efficiency measures.

19
20 **Q. Mr. Pollock alleges that the peak demand reduction target established by the**
21 **Commission results in “substantial realignment of costs between Phase III and**
22 **Phase IV,” comparing the actual Phase III costs incurred to date plus the expected**

1 **Phase III costs with the proposed Phase IV EE&C Plan budget. (PPLICA**
2 **Statement No. 1, pp. 5-6.) Would you please respond?**

3 A. I generally agree that the Commission’s decision to exclude dispatchable demand
4 response from Phase IV required the Company to shift more costs to the Small C&I and
5 Large C&I sectors because the energy efficiency measures in those sectors produce
6 greater peak demand reductions than measures in the Residential and Low-Income
7 sectors.

8 However, Mr. Pollock is overlooking how the elimination of Residential lighting
9 measures greatly contributed the shift in focus toward the Small C&I and Large C&I
10 sectors in the Phase IV EE&C Plan. In Phase III, PPL Electric’s Residential lighting
11 measures produced 56.83 MW of peak demand reductions on their own. Without
12 Residential lighting, PPL Electric must shift its focus to obtaining peak demand
13 reductions through energy efficiency measures implemented by the Small C&I and Large
14 C&I sectors. Thus, the Commission’s change in how the peak demand reduction target
15 will be achieved is not the only factor contributing toward an increased focus on the
16 Small C&I and Large C&I sectors.

17
18 **Q. Mr. Pollock also contends that the “proposed Phase IV Large C&I programs fail”**
19 **because they have a Total Resource Cost (“TRC”) Test benefit-cost ratio (“BCR”)**
20 **of 1.04, which, according to him, is “within a reasonable margin of error.”**
21 **(PPLICA Statement No. 1, p. 8.) He therefore recommends that the Commission**
22 **not approve programs “when the TRC results are within a reasonable margin of**
23 **error.” (PPLICA Statement No. 1, p. 8.) Do you agree with Mr. Pollock?**

1 A. Absolutely not. Individual programs do not need to be cost-effective on a TRC Test
2 basis. Instead, only the overall EE&C Plan portfolio must be cost-effective. The
3 Commission has made this point very clear to PPLICA multiple times. In Phase II,
4 PPLICA argued that the Company’s proposed changes to the Large C&I Prescriptive
5 Equipment Program should be denied because they would cause the TRC BCR for this
6 program to drop from 1.44 to 0.94 and, therefore, not be cost-effective. *See Petition of*
7 *PPL Electric Utilities Corporation for Approval of its Act 129 Phase II Energy Efficiency*
8 *and Conservation Plan*, Docket No. M-2012-2334388, pp. 35-36 (Order Entered May 19,
9 2015) (“*Revision II Order*”). The Commission rejected PPLICA’s argument to deny the
10 changes because “the cost-effectiveness requirement of Act 129 applies to the EE&C
11 portfolio as a whole, not to individual programs or measures.” *Revision II Order*, p. 37.
12 Notably, Mr. Pollock never reviewed the *Revision II Order* before submitting his
13 supplemental direct testimony. (PPL Electric Exhibit DC-2R [PPL to PPLICA-I-9].)

14 Then, in Phase III, the Commission denied PPLICA’s proposal that PPL Electric
15 annually eliminate any program or measure found to be not cost-effective over the past
16 year. The Commission observed how, as stated in the *Phase III Implementation Order*,
17 “while cost-effectiveness is always a priority, an individual program does not have to be
18 cost-effective in order to be implemented.” *Petition of PPL Electric Utilities Corp. for*
19 *Approval of its Act 129 Phase III Energy Efficiency and Conservation Plan*, Docket No.
20 M-2015-2515642, p. 47 (Order entered Mar. 17, 2016) (“*Phase III Plan Order*”) (citing
21 *Phase III Implementation Order*, pp. 49, 59-60).

22 Most recently, in the Industrial Customers’ Comments on the Phase IV Tentative
23 Implementation Order, PPLICA and the other Industrial Customers argued that the

1 Commission should not continue EE&C measures that have a TRC BCR less than 1.0.
2 *See* Industrial Customers’ Comments, Docket No. M-2020-3015228, pp. 24-25 (Apr. 27,
3 2020). Once again, the Commission rejected that proposal in its *Phase IV*
4 *Implementation Order*. *Phase IV Implementation Order*, pp. 22-24.

5 Yet, now PPLICA makes an even more aggressive and unfounded proposal—that
6 the Commission deny the Large C&I programs because they are not cost-effective
7 enough. Although Mr. Pollock does not dispute that the Large C&I measures offered
8 under the Non-Residential Program are cost-effective, he believes that a TRC BCR of
9 1.04 is within a “reasonable margin of error” and, therefore, “the proposed Phase IV
10 Large C&I programs fail.” (PPLICA Statement No. 1, p. 8.)

11 To be clear, as stated previously, PPL Electric’s individual programs do not need
12 to be cost-effective on a TRC Test basis. However, even if they were required to be, PPL
13 Electric’s Large C&I measures under the Non-Residential Program are cost-effective.
14 Importantly, Mr. Pollock does not dispute PPL Electric’s TRC Test calculations. (PPL
15 Electric Exhibit DC-2R [PPL to PPLICA-I-12].)

16 In addition, a TRC BCR of 1.04 is not “within a reasonable margin of error,” as
17 alleged by Mr. Pollock. (PPLICA Statement No. 1, p. 8.) Mr. Pollock never reviewed
18 the Commission’s *2021 TRC Test Order* before submitting his supplemental direct
19 testimony, so he does not appear to have much experience, if any, with the TRC Test.
20 (PPL Electric Exhibit DC-2R [PPL to PPLICA-I-5].) However, when measures are cost-
21 effective, customers are likely to pursue them because they will produce electric
22 consumption and peak demand reductions in excess of their costs. Interestingly, Mr.
23 Pollock has no “knowledge of whether PPLICA members have installed energy

1 efficiency or peak demand measures with a TRC BCR equal to or less than 1.04.” (PPL
2 Electric Exhibit DC-2R [PPL to PPLICA-I-13].)

3 Furthermore, Mr. Pollock has failed to identify when the TRC BCR is no longer
4 within his alleged “reasonable margin of error.” In discovery, PPL Electric specifically
5 asked him, “At what point is the TRC BCR no longer ‘within a reasonable margin of
6 error’” and requested all documents, studies, reports, and workpapers that he relied upon
7 to derive the TRC BCR that is no longer “within a reasonable margin of error.” (PPL
8 Electric Exhibit DC-2R [PPL to PPLICA-I-12].) Mr. Pollock’s response was that he “has
9 not investigated and is not challenging PPL’s Compliance with the Commission’s 2021
10 TRC Test Order.” (PPL Electric Exhibit DC-2R [PPL to PPLICA-I-12].) Stated
11 otherwise, when asked to define his “reasonable margin of error,” Mr. Pollock
12 completely failed to do so. Therefore, his allegation about the TRC BCR of 1.04 being
13 within a “reasonable margin of error” is entirely without merit.

14 Thus, consistent with the Commission’s prior and repeated rejections of similar
15 PPLICA proposals, I believe the Commission should reject Mr. Pollock’s
16 recommendation that the “the Commission should not authorize programs when the TRC
17 results are within a reasonable margin of error.” (PPLICA Statement No. 1, p. 8.)

18
19 **Q. Do you agree with Mr. Pollock that TRC calculations “are inherently inaccurate”**
20 **because they are “based entirely on projections of future costs”?** (PPLICA
21 **Statement No. 1, p. 8)**

22 **A.** No. TRC calculations are based on projected input values of future measure costs,
23 avoided costs, and implementation costs. Measure costs and avoided costs are carefully

1 and publicly vetted by experts in developing the 2021 Technical Reference Manual
2 (“TRM”) and Phase IV Avoided Cost Calculator, which are established in the
3 Commission’s *Phase IV Orders*. Implementation costs are determined on the basis of
4 competitively procured services to be provided by implementation Conservation Service
5 Providers at contractually fixed costs. There is absolutely no reason to believe that the
6 Commission’s determinations or any other input values are inherently inaccurate.
7

8 **Q. Mr. Pollock alleges that the Large C&I customers will experience a “massive rate
9 increase” under the proposed Act 129 Compliance Rider – Phase 4 (“ACR-4”) based
10 on the Phase IV EE&C Plan’s budgets. (PPLICA Statement No. 1, pp. 7-11.) He
11 recommends that the Commission avoid this allegedly “massive rate increase” in the
12 Large C&I ACR rate by entirely “reject[ing]” or “significantly scal[ing] back the
13 mandated Large C&I peak demand reduction target.” (PPLICA Statement No. 1,
14 pp. 2, 8, 11.) Do you agree with Mr. Pollock?**

15 **A.** No. First, Mr. Pollock exaggerates the projected incremental rate impact of the ACR-4
16 on Large C&I customers. The ACR rate fluctuates based on the actual costs incurred by
17 the customer classes for the prior program year (trued up in the E-Factor) and the
18 budgeted costs for the upcoming program year (included in the C-Factor). In his
19 supplemental direct testimony, Mr. Pollock compares the projected ACR-4 Large C&I
20 rate against the ACR-3 Large C&I rate that has been effective in the final program year
21 of Phase III. Based on that comparison, he claims that the ACR-4 rates will be a 102%
22 increase for Large C&I, a 37% increase for Small C&I, and a 49% increase for
23 Residential.

1 However, the final ACR-3 rates are generally lower due to: (1) the Company
 2 being in the final program year of Phase III when programs are winding down; and (2)
 3 the adverse impact of COVID-19 on customers’ willingness and ability to implement
 4 EE&C measures. A better measure of the projected rate increase would be to compare a
 5 three-year average of the ACR-3 Large C&I rate against the projected ACR-4 Large C&I
 6 rate. As seen below, the purported rate impacts are not nearly as significant as Mr.
 7 Pollock portrays them:

	ACR-3				ACR-4	Percent Increase or (Decrease) over 3-Year Average
	June 2020 – May 2021	June 2019 – May 2020	June 2018 – May 2019	3-Year Average	June 2021 – May 2022	
Residential (per kWh)	0.129 cents	0.247 cents	0.217 cents	0.198 cents	0.192 cents	(3%)
Small C&I (per kWh)	0.131 cents	0.265 cents	0.075 cents	0.157 cents	0.179 cents	14%
Large C&I (per kW)	\$0.505	\$0.901	\$0.928	\$0.778	\$1.021	24%

8

9 Second, as explained previously, now is not the time to relitigate the peak demand
 10 reduction target established by the Commission. While the specific rate impact on Large
 11 C&I customers may not have been known at the time of the *Phase IV Implementation*
 12 *Order* (PPLICA Statement No. 1, p. 7), PPLICA knew or should have known that the
 13 Commission’s programmatic changes for Phase IV would lead to a general increase in
 14 Large C&I customers’ costs under the Phase IV EE&C Plan. However, no party could
 15 ever know the precise rate impact on a customer class until the actual EE&C Plan is

1 designed and proposed. Adopting PPLICA’s approach here, where parties could ask the
2 Commission to revise the previously-established electric consumption and peak demand
3 reduction targets in an individual EE&C Plan proceeding, would upend the
4 Commission’s work in establishing those targets in the *Phase IV Implementation Order*
5 and would reverse the Commission’s established and sound processes for determining the
6 overall savings targets and approving EDCs’ Act 129 EE&C Plans. Moreover,
7 PPLICA’s proposal would throw the Company’s design of its Phase IV EE&C Plan into
8 disarray only a few months before Phase IV begins, leaving insufficient time for PPL
9 Electric to rework its entire Phase IV EE&C Plan and potentially issue new Requests for
10 Proposal to the program implementation Conservation Service Providers (“CSPs”).

11
12 **Q. Mr. Pollock also recommends that the Commission “either reject or pare back the**
13 **programs” for Large C&I customers “by at least 50%.” (PPLICA Statement No. 1,**
14 **p. 11) (emphasis in original). Do you agree with his recommendation?**

15 A. No. First, I would like to note that Mr. Pollock clarified in discovery that this
16 “recommendation is conditioned upon the Commission approving a modification of
17 PPL’s energy savings target” and “PPL’s demand reduction target that would facilitate
18 the reduction to Large C&I program costs.” (PPL Electric Exhibit DC-2R [PPL to
19 PPLICA-I-14].) In his testimony, Mr. Pollock never proposed a modification of the
20 Commission-established electric consumption reduction target for PPL Electric.
21 Therefore, to the extent that his recommended rejection or significant “pare back” of the
22 Large C&I components is based on a modification to that target, it is completely
23 unsupported. And if it were properly raised in his testimony, I explained previously that

1 now is not the time to relitigate the compliance targets established by the Commission.
2 Those targets were set in the *Phase IV Implementation Order*, and PPL Electric did not
3 file a petition to challenge those targets within 15 days after the *Phase IV Implementation*
4 *Order* was entered. Therefore, the Company was required to design and propose an
5 EE&C Plan that will meet the electric consumption target.

6 Second, regarding his proposed modification of the Commission-established
7 demand reduction target, I previously addressed the issues with his recommendation and
8 explained why it should be rejected. Consequently, his recommendation to either reject
9 or pare back the Large C&I components by at least 50%, which is conditioned upon his
10 recommended modification of the peak demand reduction target, also must fail.

11 Third, Mr. Pollock never presents any study or analysis on what the electric
12 consumption and peak demand reduction targets should be lowered to in order to
13 accommodate his recommended rejection or “pare back” of the Large C&I components
14 “by *at least* 50%.” (PPLICA Statement No. 1, p. 11.) Nor did he conduct any study or
15 evaluation on how his recommendation would affect the individual programs’ cost-
16 effectiveness, the overall portfolio’s cost-effectiveness, the savings for all customer
17 sectors and programs, or the costs for all sectors and programs. (PPL Electric Exhibit
18 DC-2R [PPL to PPLICA-I-3].) In all likelihood, Mr. Pollock did not perform such a
19 study or evaluation because: (1) he has zero experience in designing, developing,
20 administering, or implementing an EE&C Plan (PPL Electric Exhibit DC-2R [PPL to
21 PPLICA-I-10 and 11]); and (2) prior to submitting his testimony, Mr. Pollock never

1 reviewed the Commission’s *2021 TRC Test Order*, the *2021 TRM Order*,² the *2021 TRM*
2 *Amendment Tentative Order*,³ or the 2021 TRM itself. (PPL Electric Exhibit DC-2R
3 [PPL to PPLICA-5, 6, and 7].) Based on my experience and review of his proposals,
4 however, Mr. Pollock’s recommendation to completely eliminate the Large C&I sector’s
5 components from the EE&C Plan, or reduce them by at least 50%, would have critical
6 and significant impacts on the Phase IV EE&C Plan and the other customer sectors’
7 projected costs and savings, even if the compliance targets are modified.

8
9 **Q. Mr. Pollock also asserts that it is “both questionable policy and problematic” to**
10 **increase Large C&I customers’ rates because of the ongoing COVID-19 pandemic.**
11 **(PPLICA Statement No. 1, p. 8.) Would you please respond?**

12 A. In its *Phase IV Implementation Order*, the Commission considered and rejected
13 commenters’ arguments about the impact of COVID-19. *Phase IV Implementation*
14 *Order*, pp. 144-45. Specifically, the Commission stated that “comments regarding
15 potential future impacts of COVID-19 and incorporating a process into the Phase IV
16 Implementation Order for adjusting reduction targets within Phase IV” are “speculative
17 and premature.” *Id.*, p. 145.

18 Moreover, PPL Electric recognizes the impact that the COVID-19 pandemic has
19 had on the financial constraints of its customer base. However, the Company firmly
20 believes that the EE&C measures offered under its Phase IV EE&C Plan, including those

² *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2021 Update*, Docket No. M-2019-3006867 (Order entered Aug. 8, 2019) (“2021 TRM Order”).

³ *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2021 Update*, Docket No. M-2019-3006867 (Tentative Order entered Oct. 29, 2020) (“2021 TRM Amendment Tentative Order”).

1 to Large C&I customers, can play a prominent role in the economy’s recovery. Although
2 the objective of the Commission’s Act 129 EE&C program is to reduce electric
3 consumption and peak demand for the Commonwealth as a whole,⁴ the Phase IV EE&C
4 Plan’s broad portfolio of EE&C measures will help participating customers reduce their
5 electric consumption and peak demand and, in turn, their bills for electric service.
6

7 **Q. Mr. Pollock also questions the need for Large C&I EE&C programs and measures**
8 **because Large C&I customers supposedly “already receive strong price signals to**
9 **manage their peak loads” and are aware of and practice good energy and load**
10 **management. (PPLICA Statement No. 1, pp. 9-10.) Would you please respond?**

11 A. Although there are Large C&I customers who take EE&C initiatives on their own, the
12 bottom line is that the Company is required to offer a broad portfolio of EE&C programs
13 and measures to all of its customer classes, including Large C&I customers.
14

15 **Q. Mr. Pollock further contends that “[i]n no event should the Commission allow PPL**
16 **to set higher target energy and peak demand reductions than were approved in the**
17 **Implementation Order.” (PPLICA Statement No. 1, pp. 9, 11.) Do you agree?**

18 A. Absolutely not. PPL Electric must set electric consumption and peak demand reduction
19 targets that exceed the Commission-established targets, or else the Company is at
20 substantial risk of failing to achieve the required targets. Mr. Pollock, who has zero
21 experience in designing, developing, administering, or implementing an EE&C Plan
22 (PPL Electric Exhibit DC-2R [PPL to PPLICA-I-10 and 11]), effectively wants PPL

⁴ See *Phase IV Implementation Order*, p. 104.

1 Electric to design its EE&C Plan to hit the Commission-established targets of 1,250,157
2 MWh and 229 MW without any cushion or contingency. In other words, if PPL Electric
3 goes over by 1 MWh or 1 MW, it appears that Mr. Pollock believes the Company has
4 imprudently incurred too many costs. His position completely contravenes how: (1)
5 EE&C Plans have been designed and implemented by EDCs in Pennsylvania since the
6 Commission's Act 129 EE&C program began; and (2) any prudent EE&C Plan
7 administrator would design and run an EE&C Plan in order to achieve the required
8 reductions in electric consumption and peak demand.

9 In addition, Mr. Pollock incorrectly views the Commission's electric consumption
10 and peak demand reduction targets as the ceiling, when they are actually the floor.
11 Although there is a cap on EE&C Plan spending, no such cap exists on the savings
12 achieved under the EE&C Plan. I believe that so long as PPL Electric remains under that
13 budget cap, the Company should strive to maximize electric consumption and peak
14 demand reductions.

15 Mr. Pollock's position also conflicts with his own testimony about the TRC Test.
16 Elsewhere in his supplemental direct testimony, Mr. Pollock states that the TRC Test
17 calculations "are inherently inaccurate" because they are "based entirely on projections of
18 future costs." (PPLICA Statement No. 1, p. 8.) As I explained previously, this statement
19 about the TRC Test is technically incorrect. However, PPL Electric designs its EE&C
20 Plans to exceed the Commission's targets so that the Company accounts for the
21 uncertainties regarding the actual costs, savings, and participation figures that will be
22 experienced over the five-year Phase IV. In fact, the Phase IV EE&C Plan's costs,
23 savings, and participation figures are all projections. Without the foresight of the actual

1 Phase IV costs, savings, and participation figures, PPL Electric must design and
2 implement an EE&C Plan that is projected to exceed the Commission’s electric
3 consumption and peak demand reduction targets within budget.

4 Moreover, the whole reason that carryover savings exist is so that the EDCs can
5 continue running their EE&C programs and not have to shut them down when the savings
6 targets are achieved. Mr. Pollock effectively wants the Company to stop offering its
7 EE&C programs as soon as PPL Electric hits its required savings targets in Phase IV.
8 Going dark in the middle of a Phase is very disruptive to the market, installers,
9 contractors, and the Company’s customers.

10 Finally, I am aware of no EE&C Plan in Pennsylvania that has ever been denied
11 because the EDC’s projected electric consumption and peak demand reductions exceeded
12 the Commission’s required targets. In fact, in the *Phase III Plan Order*, the Commission
13 approved PPL Electric’s proposed Phase III EE&C Plan because: (1) “its projected total
14 energy savings will exceed the prescribed Phase III energy consumption reduction
15 targets”; and (2) “the projected annual peak demand reduction will exceed the prescribed
16 Phase III target.” *Phase III Plan Order*, pp. 25-26 (emphasis added).

17
18 **II. SEF STATEMENT NO. 1-SD**

19 **Q. SEF witness Costlow states that “unless and until PPL provides some details
20 regarding how it will achieve a Phase IV savings target that has increased by
21 202,143 MWh” for Small C&I customers, he “remain[s] skeptical of PPL’s ability to
22 actually attain that goal and believe[s] it warrants a close examination of PPL’s
23 overall savings targets to ensure it can achieve the Commission’s mandated**

1 **1,250,157 MWh per year verified savings.” (SEF Statement No. 1-SD, pp. 2-3.)**

2 **Would you please respond?**

3 A. I generally responded to Mr. Costlow’s concern about the projected savings for the Small
4 C&I customer sector in my rebuttal testimony. (PPL Electric Statement No. 1-R, pp. 27-
5 28.) However, in response to his supplemental direct testimony, I would like to add more
6 details about PPL Electric’s success in achieving its Small C&I savings projections in
7 Phase III.

8 Under the Company’s originally-filed Phase III EE&C Plan, PPL Electric
9 projected to achieve 432,810 MWh per year from the Small C&I sector. Under the
10 Commission-approved EE&C Plan change referenced in Mr. Costlow’s direct testimony,
11 PPL Electric reduced those projected savings to 312,810 MWh per year to allow for
12 additional participation from the Government/Nonprofit/Education (“GNE”) sector in the
13 Phase III EE&C Plan. However, the actual Small C&I savings achieved to date, plus the
14 Small C&I savings projected through the end of Phase III, total 437,314 MWh per year.
15 Thus, PPL Electric is on track to exceed its originally-projected savings from the Small
16 C&I sector within budget.

17 In Phase IV, PPL Electric will be adding approximately \$10 million to the Small
18 C&I sector’s budget, while projecting Small C&I sector savings of only 107,690 MWh
19 per year more than the Phase III Small C&I sector’s projected savings of 437,314 MWh
20 per year. Moreover, the Phase IV Small C&I sector’s savings will include the savings
21 from Small C&I GNE customers, which were separately included in the Phase III GNE
22 sector’s savings. By the end of Phase III, Small C&I GNE customers will have produced
23 savings of approximately 95,300 MWh per year. For these reasons, the Company

1 believes that its Phase IV EE&C Plan is well-positioned to achieve the projected Small
2 C&I sector savings in the Phase IV EE&C Plan.

3
4 **III. CAUSE-PA STATEMENT NO. 1**

5 **Q. On page 23 of your rebuttal testimony, you address CAUSE-PA witness Miller’s**
6 **recommendation that PPL Electric “keep a list of available assistance programs in**
7 **each county that it can provide to households served through the program” and that**
8 **the Company should work with its CBOs and other members of its Universal**
9 **Service Advisory Committee to help create these resource lists for use by its Low**
10 **Income CSP. (CAUSE-PA St. No. 1, p. 34; see PPL Electric St. No. 1-R, p. 23.) Do**
11 **you have anything to clarify about your response to that recommendation?**

12 A. Yes. To clarify, PPL Electric does not maintain a Company-developed list. The
13 Company’s Low-Income CSP relies on the United Way 211’s referral system for
14 available assistance programs and encourages customers who participate in the Low-
15 Income Program to use the 211 system. However, PPL Electric is willing to develop its
16 own lists by county for use by the Low-Income CSP, as suggested by Mr. Miller in his
17 direct testimony.

18
19 **Q. Does this conclude your supplemental rebuttal testimony?**

20 A. Yes, it does.

PPL Electric Exhibit DC-2R

**Petition of PPL Electric Utilities Corporation
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Docket No. M-2020-3020824**

**RESPONSES OF PP&L INDUSTRIAL CUSTOMER ALLIANCE TO
PPL ELECTRIC UTILITIES CORPORATION'S INTERROGATORIES SET I**

PPL to PPLICA-I-3: Re: PPLICA Statement No. 1. For each recommendation made in PPLICA Statement No. 1:

(a) Please explain whether Mr. Pollock has studied or evaluated his recommendation's impact on:

- (1) The individual programs' cost-effectiveness;
- (2) The overall portfolio's cost-effectiveness;
- (3) The savings for all customer sectors and programs; and
- (4) The costs for all sectors and programs.
- (5) If so, please provide those studies or evaluations, including all documents, reports, and workpapers that Mr. Pollock relied upon in performing those studies or evaluations, in their native format (e.g., Microsoft Excel).

Response: (1)-(4) No.
(5) Not Applicable

Response Provided by: Jeffry Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL to PPLICA-I-4: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Prior to submitting PPLICA Statement No. 1, did Mr. Pollock fully review the Commission's *Phase IV Implementation Order*?

Response: Mr. Pollock reviewed the Phase IV Implementation Order relevant to the issues addressed in his testimony.

Response Provided by: Jeffrey Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL to PPLICA-I-5: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Prior to submitting PPLICA Statement No. 1, did Mr. Pollock fully review the Commission's *2021 TRC Test Order*?

Response: No.

Response Provided by: Jeffry Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL to PPLICA-I-6: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Prior to submitting PPLICA Statement No. 1, did Mr. Pollock fully review the Commission's *2021 TRM Order*?

Response: No.

Response Provided by: Jeffry Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL to PPLICA-I-7: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Prior to submitting PPLICA Statement No. 1, did Mr. Pollock fully review the Commission's *2021 TRM Amendment Tentative Order*?

Response: No.

Response Provided by: Jeffrey Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL to PPLICA-I-8: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Prior to submitting PPLICA Statement No. 1, did Mr. Pollock fully review the Commission's TRM?

Response: No.

Response Provided by: Jeffrey Pollock, J. Pollock, Inc.

Date: February 2, 2021

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**RESPONSES OF PP&L INDUSTRIAL CUSTOMER ALLIANCE TO
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PPL to PPLICA-I-9: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Prior to submitting PPLICA Statement No. 1, did Mr. Pollock fully review all of the Commission's Orders issued in PPL Electric's prior EE&C Plan proceedings, including any Commission Orders ruling on any EE&C Plan change petitions? If not, please identify which of those Orders, if any, he reviewed prior to submitting PPLICA Statement No. 1.

Response: Mr. Pollock did not review the Commission Orders ruling on PPL's EE&C Plan Change Petitions.

Response Provided by: Jeffry Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL to PPLICA-I-10: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Has Mr. Pollock ever designed or developed an electric utility's EE&C Plan, either in Pennsylvania or any other state? If so, please list all such EE&C Plans, providing: (1) the name of each electric utility; and (2) the docket number where each EE&C Plan was approved.

Response: No.

Response Provided by: Jeffry Pollock, J. Pollock, Inc.

Date: February 2, 2021

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PPL ELECTRIC UTILITIES CORPORATION'S INTERROGATORIES SET I**

PPL to PPLICA-I-11: Re: PPLICA Statement No. 1, p. 1; PPLICA Exhibit JP-1. Has Mr. Pollock ever administered or implemented an electric utility's EE&C Plan, either in Pennsylvania or any other state? If so, please list all such EE&C Plans, providing: (1) the name of each electric utility; and (2) the docket number where each EE&C Plan was approved.

Response: No.

Response Provided by: Jeffry Pollock, J. Pollock, Inc.

Date: February 2, 2021

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**RESPONSES OF PP&L INDUSTRIAL CUSTOMER ALLIANCE TO
PPL ELECTRIC UTILITIES CORPORATION'S INTERROGATORIES SET I**

PPL to PPLICA-I-12: Re: PPLICA Statement No. 1, p. 8. Mr. Pollock asserts that a TRC benefit-cost ratio (“BCR”) of 1.04 is “within a reasonable margin of error” and recommends that the Commission not approve programs “when the TRC results are within a reasonable margin of error.”

- (a) At what point is the TRC BCR no longer “within a reasonable margin of error”? Please provide all documents, studies, reports, and workpapers relied upon by Mr. Pollock in deriving the TRC BCR that is no longer “within a reasonable margin of error.”
- (b) Does Mr. Pollock agree that PPL Electric’s TRC Test calculations were performed consistent with the Commission’s 2021 TRC Test Order? If the answer is anything but an unqualified “Yes,” please identify all such TRC Test calculations that he believes were not performed consistent with the Commission’s 2021 TRC Test Order and provide all documents, studies, reports, and workpapers relied upon by Mr. Pollock in reaching that conclusion.

Response: Mr. Pollock has not investigated and is not challenging PPL’s Compliance with the Commission’s 2021 TRC Test Order.

Response Provided by: Jeffrey Pollock, J. Pollock, Inc.

Date: February 2, 2021

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**RESPONSES OF PP&L INDUSTRIAL CUSTOMER ALLIANCE TO
PPL ELECTRIC UTILITIES CORPORATION'S INTERROGATORIES SET I**

PPL to PPLICA-I-13: Re: PPLICA Statement No. 1, pp. 8, 10. Mr. Pollock asserts that a TRC BCR of 1.04 is “within a reasonable margin of error” and that “Large C&I customers are already more aware of and practice sound energy and load management.”

- (a) Have any members of PPLICA in this proceeding installed any energy efficiency measures that have a TRC BCR equal to or less than 1.04? If so, for each such measure, please identify the measure, when the measure was installed, and for which member of PPLICA in this proceeding the measure was installed.
- (b) Have any members of PPLICA in this proceeding installed any peak demand reduction measures that have a TRC BCR equal to or less than 1.04? If so, for each such measure, please identify the measure, when the measure was installed, and for which member of PPLICA in this proceeding the measure was installed.

Response: Mr. Pollock does not have knowledge of whether PPLICA members have installed energy efficiency or peak demand measures with a TRC BCR equal to or less than 1.04.

Response Provided by: Jeffrey Pollock, J. Pollock, Inc.

Date: February 2, 2021

**Petition of PPL Electric Utilities Corporation
for Approval of Its Act 129 Phase IV Energy Efficiency and Conservation Plan
Docket No. M-2020-3020824**

**RESPONSES OF PP&L INDUSTRIAL CUSTOMER ALLIANCE TO
PPL ELECTRIC UTILITIES CORPORATION'S INTERROGATORIES SET I**

PPL to PPLICA-I-14: Re: PPLICA Statement No. 1, p. 11. Mr. Pollock recommends that the Commission “either reject or pare back the programs” for Large C&I customers “by *at least 50%*.”

- (a) Please explain in detail how PPL Electric can achieve its Commission-required energy savings target within budget if the programs for Large C&I customers are rejected in full or “pare[d] back” by “*at least 50%*.”
- (b) Please explain in detail how PPL Electric can achieve its Commission-required peak demand reduction target within budget if the programs for Large C&I customers are rejected in full or “pare[d] back” by “*at least 50%*.”
- (c) Please provide all documents, studies, reports, and workpapers relied upon by Mr. Pollock in response to subparts (a) and (b).

Response:

- (a) Mr. Pollock’s recommendation is conditioned upon the Commission approving a modification of PPL’s energy savings target that would facilitate the reduction to Large C&I program costs.
- (b) Mr. Pollock’s recommendation is conditioned upon the Commission approving a modification of PPL’s demand reduction target that would facilitate the reduction to Large C&I program costs.
- (c) Not applicable.

Response Provided by: Jeffrey Pollock, J. Pollock, Inc.

Date: February 2, 2021


COMMONWEALTH OF PENNSYLVANIA



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January 13, 2021

Via Electronic Mail Only

The Honorable Mark A. Hoyer
The Honorable Emily I. DeVoe
Office of Administrative Law Judge
Pennsylvania Public Utility Commission
Piatt Place
301 Fifth Avenue, Suite 220
Pittsburgh, PA 15222

Re: Petition of PPL Electric Utilities Corporation
for Approval of its Act 129 Phase IV Energy
Efficiency and Conservation Plan
Docket No. M-2020-3020824

Dear Judge Hoyer and Judge DeVoe:

Enclosed please find a copy of the Direct Testimony being submitted on behalf of the Office of Consumer Advocate in the above-referenced proceeding, as follows:

Direct Testimony of Stacy L. Sherwood, OCA Statement 1

Copies have been served on the parties as indicated on the enclosed Certificate of Service. Due to the ongoing emergency period, hard copies of the OCA's testimony cannot be provided at this time. Hard copies can be provided as normal operations resume. The OCA appreciates your understanding of this matter.

Respectfully submitted,

/s/ Aron J. Beatty
Aron J. Beatty
Senior Assistant Consumer Advocate
PA Attorney I.D. # 86625
E-Mail: ABeatty@paoca.org

Enclosures:

cc: PUC Secretary Rosemary Chiavetta (Letter and Certificate of Service only)
Certificate of Service

*302315

OCA Statement

1

CERTIFICATE OF SERVICE

Re: Petition of PPL Electric Utilities Corporation :
for Approval of its Act 129 Phase IV Energy : Docket No. M-2020-3020824
Efficiency and Conservation Plan :

I hereby certify that I have this day served a true copy of the following document, the Office of Consumer Advocate's Direct Testimony as follows:

Direct Testimony of Stacy L. Sherwood, OCA Statement 1

upon parties of record in this proceeding in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant), in the manner and upon the persons listed below:

Dated this 13th day of January 2021.

SERVICE BY E-MAIL ONLY

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Dated: January 13, 2021
*302024

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**PETITION OF PPL ELECTRIC)
UTILITIES FOR APPROVAL OF)
ITS ACT 129 PHASE IV ENERGY) DOCKET NO. M-2020-3020824
EFFICIENCY AND)
CONSERVATION PLAN)**

DIRECT TESTIMONY

OF

STACY L. SHERWOOD

**ON BEHALF OF
PENNSYLVANIA OFFICE OF CONSUMER ADVOCATE**

JANUARY 13, 2021

EXETER

ASSOCIATES, INC.

10480 Little Patuxent Parkway Suite 300
Columbia, Maryland 21044

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1 **I. INTRODUCTION**

2 Q. WOULD YOU PLEASE STATE YOUR NAME AND BUSINESS
3 ADDRESS?

4 A. My name is Stacy L. Sherwood. I am an Economist with Exeter Associates, Inc.
5 (“Exeter”). Our offices are located at 10480 Little Patuxent Parkway, Suite 300,
6 Columbia, Maryland 21044. Exeter is a firm of consulting economists specializing in
7 issues pertaining to public utilities.

8 Q. PLEASE DESCRIBE YOUR QUALIFICATIONS, WORK EXPERIENCE,
9 AND EDUCATIONAL BACKGROUND.

10 A. I have 11 years of experience in the energy sector, related specifically to the review
11 and development of energy efficiency and demand response programs and policies for
12 the use of advanced technologies for pollution prevention and energy efficiency. With
13 Exeter, I provide technical support and analysis to state and federal clients on energy
14 efficiency, distributed resources, demand response, and renewable energy. While
15 serving as Assistant Director of the Energy Analysis and Planning Division of the
16 Maryland Public Service Commission, I oversaw the utilities energy efficiency and
17 demand response programs, participated in smart grid work groups, and assisted with
18 the composition of Maryland’s Ten Year Plan regarding the state’s energy outlook. I
19 hold a Bachelor’s Degree in Accounting, Business and Economics from McDaniel
20 College (2009). My qualifications are detailed in my resume, included with this
21 Testimony as Attachment A.

22 Q. HAVE YOU PREVIOUSLY TESTIFIED IN REGULATORY
23 PROCEEDINGS ON UTILITY ISSUES?

24 A. Yes. A complete list is provided in Attachment A.

25 Q. ON WHOSE BEHALF ARE YOU APPEARING?

1 A. I am presenting testimony on behalf of the Pennsylvania Office of Consumer
2 Advocate (“OCA”).

3 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

4 A. On November 30, 2020, PPL Electric Utilities Corporation (“PPL” or “Company”)
5 filed its *Petition of PPL Electric Utilities for Approval of its Act 129 Phase IV Energy*
6 *Efficiency and Conservation Plan* (“Phase IV Plan” or “Plan”) with the Commission.
7 Exeter was retained by the OCA to assist in the review of the Plan. I will address the
8 Plan’s compliance with the Commission’s *Phase IV Final Implementation Order*
9 which includes requirements for the Phase IV Energy Efficiency and Conservation
10 (“EE&C”) plans including comprehensive program requirements, limited income
11 carve-outs, and the bidding of demand savings into the PJM Interconnection, LLC
12 (“PJM”) Forward Capacity Market (“FCM”).¹ Additionally, I discuss the
13 reasonableness and achievability of the programs for residential ratepayers.

14 Q. HAVE YOU PREPARED EXHIBITS TO ACCOMPANY YOUR
15 TESTIMONY?

16 A. Yes. Exhibit SLS-1 provides a summary of how PPL’s Plan meets the Commission’s
17 *Phase IV Implementation Order*, which is discussed further in Section 2.

18 Q. PLEASE DESCRIBE THE MAIN COMPONENTS OF THE COMPANY’S
19 PLAN.

20 A. PPL’s Phase IV Plan consists of three energy efficiency programs, with nine
21 components, that are designed to achieve an average annual energy reduction of
22 308,137 megawatt-hours (“MWh”) over the five years of the program.² Combined
23 with an estimated 200,000 MWh in carryover savings from Phase III, PPL projects

¹ Docket No. M-2020-3015228 *Phase IV Final Implementation Order* adopted June 18, 2020.

² *PPL Electric Utilities’ Act 129 Phase IV Plan*, November 30, 2020, Table 4. Pa PUC Table 2 - Summary of Portfolio Energy and Demand Savings, p. 13.

1 that it will accumulate 1,740,687 MWh of energy savings for Phase IV.³ As a result
2 of its EE&C programs, PPL anticipates that it will achieve 248.03 megawatts (“MW”)
3 of demand savings.⁴ PPL plans to competitively select a third-party vendor to
4 nominate 1% to 20% of its peak demand reductions into the PJM FCM.⁵ The Company
5 forecasts that it will fully expend its annual expenditure cap of \$61.5 million, including
6 the \$5 million allocated for the statewide evaluator (“SWE”), equating to a total Phase
7 IV budget of \$312.5 million.⁶

8 The three energy efficiency programs include the Residential Program, Low-
9 Income Program, and Non-Residential Program. The Residential Program includes
10 the following components: Appliance Recycling; Efficient Lighting – Specialty Bulbs
11 Component; Energy Efficient Homes; and Student Energy Efficiency Education. The
12 Low-Income Program consists of one component, the Low-Income Assessment,
13 designed to meet the Phase IV Low-Income Carveout. The Non-Residential Program
14 consists of four components: Efficient Equipment for Small Commercial and
15 Industrial (“C&I”); Custom for Small C&I; and Efficient Equipment for Large C&I;
16 and Custom for Large C&I.

17 The breakdown of the total estimated savings and costs between programs as
18 proposed by the Company is provided in Tables 1 and 2 below, respectively.

³ Ibid.

⁴ Ibid, Table 5. Pa PUC Table 3 – Summary of Portfolio Energy and Demand Savings, p. 14.

⁵ Ibid, p. 31.

⁶ Direct Testimony of Dirk S. Chiles, p. 4, lines 19-20.

1 **Table 1. Phase IV Total Projected Energy and Demand Savings, by Program**

Program	Total Projected Savings (MWh)	Percent of Total MWh Savings	Total Projected Savings (MW)	Percent of Total MW Savings
Residential	199,312	13%	47.79	19%
Low-Income	74,793	5	9.86	4
Non-Residential	1,266,582	82	190.37	77
Total:	1,540,687	100%	248.02	100%

2 **Table 2. Phase IV Total Projected Expenditures, by Program**

Program	Total Direct Costs	Total Common Costs	Total Costs	Percent of Total Cost
Residential	\$64,746,517	\$10,022,820	\$74,769,337	24%
Low Income	41,899,997	6,486,210	48,386,207	15
Non-Residential	162,744,843	26,590,970	189,335,813	61
Total:	\$269,391,357	\$43,100,000	\$312,491,357	100%

3 Q. PLEASE SUMMARIZE YOUR FINDINGS AND RECOMMENDATIONS.

4 A. Based on the results of my review and analysis, I have reached the following
5 conclusions:

- 6 • As part of its rebuttal, the Company should provide market evidence or a
7 marketing plan to support the level of Ductless Mini-Split Heat Pumps
8 forecasted in the Efficient Home component. If the Company cannot provide
9 reasonable support of this projection, then it should file a revised plan with the
10 Commission. If the Company properly addresses this issue, I recommend the
11 Commission approve PPL’s Phase IV Plan.
- 12 • The Company should continue to innovate its Phase IV portfolio throughout the
13 implementation of the Plan to consider offering measures that increase cost-
14 effectiveness of the residential portfolio to offset the maturity of the programs
15 and the decrease in lighting measures.
- 16 • The Company should develop a methodology to allocate and track the savings
17 captured under the Low-Income Program when it leverages funding from the
18 Low-Income Usage Reduction Program (“LIURP”).
- 19 • The Commission should require PPL to file its plan for nominating demand
20 response into the PJM FCM, which should include the following details:

- 1 o Delivery year for the first nomination;
- 2 o Measures that will provide demand reductions, by customer class;
- 3 o Methodology to determine which rate classes have delivered demand
- 4 reductions; and
- 5 o Details on how PPL will limit ratepayer exposure to penalties,
- 6 including a sensitivity analysis of the impact to the Act 129
- 7 Compliance Rider – Phase IV (“ACR-IV”).

8 Q. HOW IS THE REMAINDER OF YOUR TESTIMONY ORGANIZED?

9 A. Following this introductory section, my testimony is divided into four sections:
10 Compliance with *Phase IV Implementation Order*; Residential Program; Low-Income
11 Program; and PJM Forward Capacity market.

12

13 **II. COMPLIANCE WITH PHASE IV IMPLEMENTATION ORDER**

14 Q. HAVE YOU REVIEWED THE PHASE IV PLAN?

15 A. Yes. I have reviewed the material filed in the Company’s Plan, including the Direct
16 Testimonies of Dirk S. Chiles, Terry Fry, and Scott R. Koch. In addition, I have
17 reviewed the Company’s responses to OCA Interrogatory Set I. The Company’s filing
18 describes the programs to be implemented in accordance with the requirements
19 established in Act 129 of 2008 for plan years (“PYs”) 13-17, which will begin in 2021
20 and end in 2026.

21 Q. DOES THE PLAN MEET THE REQUIREMENTS OF THE
22 COMMISSION’S *PHASE IV IMPLEMENTATION ORDER*?

23 A. Yes. I found that, as proposed by the Company, the Plan meets or exceeds each of the
24 Phase IV requirements from the Phase IV Implementation Order. A checklist
25 summarizing each of the requirements and whether they have been met is provided in
26 Exhibit SLS-1.

1 Q. WITH REFERENCE TO THE COMPANY’S PROPOSED PLAN, PLEASE
2 COMPARE THE LEVEL OF INVESTMENT IN THE EE&C PROGRAMS,
3 THE PROJECTED ENERGY SAVINGS, AND TOTAL PPL REVENUES
4 FOR BOTH RESIDENTIAL AND NON-RESIDENTIAL CUSTOMERS.

A. A comparison of the contributions based on Residential (including Low-Income) and Non-Residential customers is provided in Table 3. The difference between the ratios of investment and energy savings when compared to the revenues contributed by customer class is significant. As noted in Table 3, although the annual revenue is almost even between residential and non-residential classes, the investment and projected energy savings through PPL’s Plan is higher for non-residential customers.

5 **Table 3. Phase IV Total Contributions, by Customer Class**

	Residential	Non-Residential
Phase IV Budget	39%	61%
Total Annual Revenue	52%	48%
Phase IV Energy Reductions	23%	77%
Total EE&C MWh Sales	39%	61%

6 Q. ARE YOU CONCERNED ABOUT THE SIGNIFICANT INVESTMENT
7 IN NON-RESIDENTIAL RATE CLASS COMPARED TO RESIDENTIAL
8 RATE CLASS?

9 A. No. In prior phases, lighting measures have provided significant low-cost energy
10 reductions in residential programs. However, as noted in the next section, Phase IV
11 will have a limited offering of residential lighting measures due to the Energy
12 Independence and Security Act of 2007 (“EISA”). As a result of this change, the level
13 of energy savings from the residential sector will decrease and the acquisition cost for
14 that energy savings will increase. Therefore, it is reasonable to expect that the increase
15 in acquisition cost to achieve savings from the residential sector would result in PPL

1 designing an EE&C portfolio that achieves the majority of its Phase IV energy savings
2 target through the non-residential sector, which does not face similar barriers.

3 Q. IS THE PLAN PROJECTED TO BE COST-EFFECTIVE?

4 A. A total resource cost (“TRC”) above 1.0 indicates that the Plan provide benefits that
5 exceed the costs invested in the program, indicating that ratepayers, including non-
6 participants, should receive a return on the investment in energy efficiency. Overall,
7 the proposed Plan is projected to be cost-effective, with a gross TRC of 1.24 over the
8 five-year period. The individual programs are projected to be cost-effective, with the
9 exception of the Low-Income Program. However, it is typical of low-income programs
10 to not be cost-effective on their own due to the additional programmatic costs to
11 eliminate cost barriers for qualified participants.

12 Q. HAVE YOU DETERMINED THE COMPANY’S PLAN TO BE
13 REASONABLE AND WELL-BALANCED?

14 A. To determine whether the Company’s Plan is reasonable and well-balanced, I
15 examined the features of the programs to identify whether the Plan includes accessible
16 program options for all ratepayers, and I evaluated the return on investment to
17 ratepayers. The Plan proposed by the Company provides programs that are sufficiently
18 diverse to allow all ratepayers an opportunity to participate in at least one program and
19 offers a comprehensive program to both residential ratepayers, including low-income
20 ratepayers, and non-residential ratepayers. The programs offered under the Plan are
21 considered the best practices among other utility energy efficiency programs
22 nationwide, as well as offers COVID-friendly alternatives by offering remote
23 assessments for residential customers. Additionally, the measures included in the
24 programs have been evaluated through the SWE.

1 Q. HAVE YOU REVIEWED THE COMPANY'S PROPOSED RECOVERY
2 METHOD IN THE ACR-IV?

3 A. Yes. The proposed ACR-IV recovery calculation follows the same method as Phase
4 III, with separate surcharge calculations for three major customer classes—
5 Residential, Small C&I, and Large C&I. In calculating the rates, the Company should
6 be cognizant of programs, such as the Appliance Rebate program, that may have
7 participation from multiple customer classes so that no customer class is subsidizing
8 a particular program. The Plan indicates that PPL will track participation in such
9 programs and will assign costs accordingly.

10 The ACR-IV will vary from the surcharge for Phase III as there will be a
11 reconciliation mechanism to identify proceeds and deficiency charges from the PJM
12 FCM. This reconciliation mechanism will be applied to the three surcharge calculations
13 to reflect each rate class' PJM FCM proceeds or deficiency charges, with proceeds
14 offsetting the cost of the EE&C programs and any deficiency charges increasing the
15 surcharge for the appropriate rate class.

16

17 **III. RESIDENTIAL PROGRAM**

18 Q. HAVE YOU DETERMINED THAT THE RESIDENTIAL PROGRAM
19 DESCRIBED IN PPL'S PLAN ALLOWS FOR ALL RESIDENTIAL
20 RATEPAYERS TO PARTICIPATE?

21 A. Yes. The Residential Program is open to all residential customers, including those on
22 master-metered accounts. Through the four components of the Residential Program,
23 ratepayers can receive appliance recycling, home audits, weatherization measures, and
24 rebates for lighting; appliances; pool pumps; and heating, ventilation and air
25 conditioning ("HVAC") measures. The Residential Program offers a comprehensive

1 program through the Energy Efficient Homes component, which provides in-home
2 audits to identify energy efficiency measures to be implemented and rebated under
3 that component.

4 Q. PLEASE DISCUSS THE COST-EFFECTIVENESS OF THE PROPOSED
5 RESIDENTIAL PROGRAM.

6 A. The Residential Program, exclusive of the Low-Income programs, is cost-effective
7 when evaluated under the TRC test formula for measuring cost-effectiveness. The
8 Company's forecasted program costs and energy savings levels produce a gross TRC
9 of 1.21.

10 Q. ARE YOU CONCERNED ABOUT THE TRC FOR THE RESIDENTIAL
11 PROGRAM?

12 A. Yes. The level of discounted net lifetime benefits from this program are low, only
13 \$17,699; leaving limited leeway for underperformance of the Residential Program
14 components. The Residential Program's components are mature and established in
15 Phase III, if not earlier. The positive result of that is that the Residential Program
16 should experience lower administrative costs, as the programs are already established
17 and the marketing is in place to continue the promotion of the program. The negative
18 side of the Residential Program being mature is that the low-hanging fruit has been
19 captured in the prior phases, which makes reaching new or repeat participants
20 potentially more challenging and costly. Furthermore, the Residential Program lacks
21 new and innovative measures compared to those offered in Phase III, which may
22 encourage repeat participation or reduce the cost to achieve energy savings.

23 Q. DO YOU HAVE A RECOMMENDATION THAT MAY PROVIDE MORE
24 ASSURANCE AS TO THE COST-EFFECTIVENESS OF THE
25 RESIDENTIAL PROGRAM?

1 A. Yes. I recommend that the Company continue to innovate its Residential Portfolio
2 throughout Phase IV. The innovation could be a research and development effort,
3 which could expand the measure offerings beyond best practice measures, or could be
4 the implementation of newer measures and programs that are not currently adopted as
5 a best practice. As the program components mature, it is important for the portfolios
6 to develop new offerings as a way to continue to garner participation, including from
7 those that have previously participated in other programs. One programs that could be
8 researched by the Company could be rebates for electric vehicle charging stations.

9 This is particularly important for the Residential Program during Phase IV, as
10 the residential portfolio has historically been reliant on the highly cost-effective energy
11 savings from the lighting program. However, as the result of compliance with EISA,
12 the level of savings projected in Phase IV from lighting is a fraction of what has been
13 experienced in prior phases. As a result of the loss of projected lighting savings, the
14 acquisition of the savings from the residential sector is approximately three times what
15 has been achieved in the past. The residential portfolio for PY8 through PY10 had an
16 acquisition cost of \$0.12 per kilowatt-hour (“kWh”).⁷ Comparatively, the Phase IV
17 Residential Program, as proposed, is expected to have an acquisition cost of
18 \$0.32/kWh. As measures and programs mature and newer energy and building codes
19 are adopted in the state, the level of energy savings from the currently offered measures
20 will decrease due to the decrease in incremental savings. An innovative portfolio will
21 help to provide continued levels of energy savings and allow for past participants to
22 continue to participate in the program.

23 Q. DO YOU BELIEVE THAT THE PROPOSED PLAN IS ACHIEVABLE
24 BASED UPON PRIOR PROGRAM PERFORMANCE?

⁷ This excludes common costs and Low-Income Program costs.

1 A. With the exception of the Efficient Home component, I believe that the Residential
2 Program is achievable and that the projected savings are realistic, given prior
3 performance. As PY11 results have not been verified, it is unclear what impact
4 COVID-19 may have on the early years of Phase IV. Therefore, while the savings seem
5 achievable based on Phase III verified savings, measures that require contractors to be
6 within a residence may experience lower participation rates at the beginning of Phase
7 IV.

8 Q. IS THERE A PROGRAM IN PARTICULAR WITH WHICH YOU HAVE
9 CONCERNS REGARDING THE FORECASTED ENERGY SAVINGS?

10 A. I believe that the Company may have difficulty achieving the forecasted savings levels
11 under the Efficient Home component. The level of savings over five years averages an
12 annual first-year savings of 24,560 MWh. Comparatively, the verified energy savings
13 in PY8 through PY10 ranged from approximately 10,000-18,800 MWh.

14 Beyond the fact that the component's projected energy saving is expected to
15 increase by approximately 23% over the highest verified savings in Phase III, there is
16 one measure that is projected to significantly increase. The Ductless Mini-Split Heat
17 Pump is expected to provide an average of 16,077 MWh of savings per year in Phase
18 IV, for a total savings of 80,386 MWh. In comparison, in PY10, this measure was
19 offered under the Efficient Equipment Component along with other measures. The total
20 Efficient Equipment Component provided verified savings of 12,264 MWh, which is
21 less than the annual savings projected from Ductless Mini-Split Heat Pump. The
22 Company has not provided a reason for the increased savings projected for this
23 measure. The total savings of 80,386 MWh for this measure accounts for 65% of the
24 total Efficient Home Component in Phase IV. It is unclear how the Plan will achieve

1 the drastic increase in savings without significant programmatic changes to its
2 marketing, which is not indicated in the Plan.

3 Q. WHAT DO YOU BELIEVE WOULD BE A MORE REASONABLE
4 FORECAST OF SAVINGS BASED ON THE EXPERIENCE OF PY8
5 THROUGH PY10?

6 A. A more realistic forecast would project a ramp-up or increase in savings throughout
7 Phase IV from levels experienced in Phase III, rather than a significant jump beginning
8 in PY 13. Additionally, PPL should provide a more comprehensive marketing plan to
9 indicate how the Company plans to increase program participation. A ramp-up of
10 energy savings would allow for the marketing plans to be put into place and provide a
11 more realistic uptick in participation that will likely result from the marketing efforts
12 to raise program awareness.

13 Q. WHAT IS YOUR RECOMMENDATION FOR THE EFFICIENT HOME
14 COMPONENT?

15 A. The Residential Program's TRC is close to 1.0. Coupled with the concern regarding
16 the level of savings projected from the Efficient Home component, there is potential
17 for the TRC to decrease to below 1.0. Therefore, I recommend that the Company either
18 provide market evidence to support that level of participation for the Ductless Mini-
19 Split Heat Pump or provide a marketing plan to support the significant increase from
20 Phase III as part of its rebuttal testimony. If the Company is unable to provide support
21 for that level of participation for this component, then it should submit a revised plan
22 with Commission. I recommend a revised plan filing, as it is unclear how a reduced
23 level of savings produced from the Efficient Home Program may impact the cost-
24 effectiveness of the Residential Program, which currently has a gross TRC of 1.21. As
25 part of a revised plan, some of the funding from the Ductless Mini-Split Heat Pump

1 could be redirected to current residential program offerings/measures or for the
2 inclusion of additional measures, such as a do-it-yourself install rebate for certain
3 measures.

4 Q. DO YOU HAVE ANY OTHER CONCERNS WITH COMPONENTS
5 OFFERED UNDER THE RESIDENTIAL PROGRAM?

6 A. Yes. The Student Energy Efficient Education component provides lesson plans to
7 teachers, as well as energy efficiency kits with direct install measure for students to
8 take home in grades 2-3, 5-7, and 9-12. Although the measures provided in the kits
9 vary depending on the grade level, there is potential for households to receive multiple
10 kits from having more than one child enrolled in one of the corresponding grade levels
11 and it is possible for households to receive a kit in consecutive years. Energy
12 efficiency kits tends to have lower install rates for the included measures because they
13 are generic kits and not specific to a household's needs, as well as for other reasons.
14 As a result, ratepayer funded kits may have some or all measures discarded and,
15 therefore, may not realize the level of projected energy savings.

16 Q. DO YOU HAVE ANY RECOMMENDATIONS TO ADDRESS
17 CONCERNS ABOUT ENERGY EFFICIENCY KITS MEASURES NOT
18 BEING UTILIZED?

19 A. Yes. I recommend that the Company revise its offerings of the kits to a limited number
20 of grade levels to eliminate a saturation of measures. Limiting the program to one
21 grade in each elementary, middle, and high school will lower the potential for
22 households to receive multiple kits in one year or receive kits in sequential years.
23 Lower saturation levels of the kits will also increase the likelihood that the measures
24 will be installed and render energy savings.
25

1 **IV. LOW-INCOME PROGRAM**

2 Q. WHAT IS THE LOW-INCOME PROGRAM PROPOSED BY THE
3 COMPANY?

4 A. The Company's Low-Income Program offers a comprehensive low-income
5 assessment, which is a mature program continued from Phase III. The program is
6 offered to qualified ratepayers residing in single-family homes, individually metered
7 multifamily units, and manufactured homes. To recruit customers for the
8 comprehensive assessment, the Company plans to offer a welcome kit which includes
9 water-saving measures. In addition to the welcome kit, the Company will conduct
10 neighborhood sweeps, community and town hall events, and door-to-door canvassing
11 to create program awareness. Once qualified, a low-income participant will receive the
12 direct installation of efficiency measures for lighting, water aeration, and
13 weatherization. The assessment can be delivered through in-home and remotely, the
14 latter of which will be beneficial to counter the impacts of COVID-19. In addition to
15 the direct-install measures, more comprehensive measures such as HVAC, thermostats,
16 and water heaters are available for no additional cost. The Low-Income Program
17 intends to provide 45,150 remote assessments and 30,000 in-home assessments,
18 averaging 15,000 participants annually.⁸

19 Q. DO YOU BELIEVE THAT THE LOW-INCOME PROGRAM PROVIDES
20 OPPORTUNITIES FOR PPL'S LOW-INCOME CUSTOMERS?

21 A. Yes. With the addition of the remote assessment, qualified customers will have an
22 opportunity to participate in the energy efficiency programs through this Program.
23 PPL is providing a comprehensive weatherization program through the Low-Income
24 Program at no cost to the participant. In addition to cost, PPL's program removes the

⁸ The 30,000 in-home assessments are based upon the participants listed for the Welcome Kit On-site provided in Table 35: PA PUC Table 8-Low-Income Assessment Projected Participation on page 65 of the Plan.

1 barrier of homeownership by allowing multifamily units to be eligible for all
2 measures, but noting that some measures may require landlord approval. Furthermore,
3 common space measures in multi-family buildings, while not addressed under the
4 Low-Income Program, can be addressed through the Non-Residential Program.
5 Finally, those customers not interested in receiving weatherization may still receive
6 energy efficiency measures and/or energy education through kits offered through the
7 program.

8 Q. IS THE LOW-INCOME PROGRAM COST-EFFECTIVE?

9 A. The Low-Income Program on its own is not projected to be cost-effective, with a gross
10 TRC of 0.50. However, when combined with the other two programs, Residential and
11 Non-Residential, the overall portfolio is cost-effective.

12 Q. DO YOU BELIEVE THAT THE COMMISSION SHOULD APPROVE
13 THE LOW-INCOME PROGRAM EVEN THOUGH THE PROGRAM IS
14 NOT COST-EFFECTIVE?

15 A. Yes. Although the Low-Income Program is not cost-effective, comprehensive low-
16 income programs tend to be less cost-effective due to the absorption of the participant
17 costs in an effort to offer a program at no additional cost to qualified participants. In
18 an effort to ensure that low-income customers may participate in the EE&C programs
19 that generate deeper savings, the Commission should approve the Low-Income
20 Program that are part of an overall portfolio that is cost-effective.

21 Q. DOES THE COMPANY PLAN ON LEVERAGING THE PHASE IV LOW-
22 INCOME PROGRAM WITH ITS LOW-INCOME USAGE REDUCTION
23 PROGRAM (“LIURP”)?

24 A. Yes. PPL indicates in its filing that it will coordinate the assessments between the two
25 programs. If a home meets the requirements outlined in PPL’s Plan to receive funding

1 from both LIURP and the Low-Income Program, some measures could be covered
2 through both funding sources.

3 Q. DO YOU HAVE ANY RECOMMENDATIONS REGARDING THE LOW-
4 INCOME PROGRAM?

5 A. Yes. I recommend that PPL develop a methodology for tracking savings when there
6 is funding leverage from outside sources, such as LIURP, to avoid double-counting of
7 energy savings. For projects that receive leveraged funding, all measures paid in full
8 by one funding source should be allocated to that funding source. If a measure is
9 funded by both programs, the energy savings should be allocated based upon the
10 amount paid by each funding source. For illustrative purposes, if a home receives a
11 \$4,000 heat pump, of which the Low-Income Program funds \$2,500 of the measure
12 and the LIURP WRAP funds the remaining \$1,500, then the Low-Income Program
13 would recognize 63% of the energy and demand savings and the LIURP WRAP would
14 recognize 37% of the energy and demand savings.

15
16 **V. PJM FORWARD CAPACITY MARKET**

17 Q. DOES THE COMPANY HAVE PLANS TO NOMINATE PEAK
18 DEMAND REDUCTIONS INTO THE PJM FORWARD CAPACITY
19 MARKET?

20 A. Yes. As detailed in its Plan, the Company will competitively solicit bids from third-
21 party vendors that provide technical support to nominate a portion of its peak demand
22 reduction as a capacity resource into PJM's FCM. The peak demand reduction is
23 expected to come from energy efficiency measures such as lighting and cooling. PPL
24 anticipates that it will nominate 1% to 20% of its peak demand reduction from each
25 program into the FCM. To properly reflect the proceeds and/or penalties for cost

1 recovery, PPL has opted to update its annual report template to clearly show the results
2 of the FCM. Cost recovery will be assigned by the customer class that provides the
3 capacity.

4 Q. DO YOU HAVE ANY CONCERNS REGARDING THE NOMINATION
5 OF PEAK DEMAND REDUCTION INTO THE PJM FCM?

6 A. Yes. There is a concern regarding how underperformance on a peak demand
7 nomination may impact ratepayers, as penalties would be recouped through the ACR-
8 IV from the rate class where demand reductions were not realized. Until there is a
9 penalty assessed, the extent of the impact from a penalty is unclear.

10 Q. WHAT ARE YOUR RECOMMENDATIONS REGARDING PPL'S
11 PARTICIPATION IN THE PJM FCM?

12 A. The Company should file its plan for nominating demand reductions with the
13 Commission. Currently, the Company's approach lacks details, such as which
14 measures will be bid in and how PPL will bid to shield ratepayers from realizing
15 penalties. In addition to providing those details, PPL should identify what delivery
16 year will be the first year it will bid into the PJM FCM and how it will identify which
17 ratepayer class under delivered demand reduction. Furthermore, the Company should
18 identify how it will limit ratepayer exposure to penalties. This should include a
19 sensitivity analysis of the impact on the ACR-IV by ratepayer class if various levels
20 of penalties are assessed. The Company's PJM FCM plan should be filed with the
21 Commission to allow for stakeholders to comment on the plan before PPL begins
22 bidding into the FCM. By filing this plan, it can quell some concerns stakeholders may
23 have about the potential negative impact to ratepayers.

1 **VI. CONCLUSION**

2 Q. BASED UPON YOUR REVIEW OF PPL'S PHASE IV PLAN, DO YOU
3 RECOMMEND THE COMMISSION APPROVE THE PLAN?

4 A. Through my review, I determined that the Phase IV plan is in compliance with the
5 Commission's Phase IV requirements and is in the public interest. However, as
6 indicated in this testimony, I am concerned about whether PPL will be able to achieve
7 the savings under the Efficient Home component of the Residential Program.
8 Therefore, I cannot recommend at this time that the Commission approve PPL's Phase
9 IV Plan. Below is a summary of the recommendations that I propose the Commission
10 adopt if it approves PPL's Phase IV Plan, including:

- 11 • As part of its rebuttal, the Company should provide market evidence or a
12 marketing plan to support the level of Ductless Mini-Split Heat Pumps
13 forecasted in the Efficient Home component. If the Company cannot provide
14 reasonable support of this projection, then it should file a revised plan with the
15 Commission. If the Company properly addresses this issue, I recommend the
16 Commission approve PPL's Phase IV Plan.
- 17 • The Company should continue to innovate its Phase IV portfolio throughout the
18 implementation of the Plan to consider offering measures that increase cost-
19 effectiveness of the residential portfolio to offset the maturity of the programs
20 and the decrease in lighting measures.
- 21 • The Company should develop a methodology to allocate and track the savings
22 captured under the Low-Income Program when it leverages funding from the
23 Low-Income Usage Reduction Program ("LIURP").
- 24 • The Commission should require PPL to file its plan for nominating demand
25 response into the PJM FCM, which should include the following details:
 - 26 ○ Delivery year for the first nomination;
 - 27 ○ Measures that will provide demand reductions, by customer class;
 - 28 ○ Methodology to determine which rate classes have delivered demand
29 reductions; and
 - 30 ○ Details on how PPL will limit ratepayer exposure to penalties,
31 including a sensitivity analysis of the impact to the Act 129
32 Compliance Rider – Phase IV ("ACR-IV").

1 Q. DOES THIS COMPLETE YOUR DIRECT TESTIMONY?

2 A. Yes, it does.

Exhibit A:
PPL Phase IV Implementation Order Compliance Checklist

PHASE IV Implementation Order Requirement	Requirement Addressed	Comments
A.1. Recommended: Comprehensive focus on longer-lived, deep savings measures	Yes	While not required, the plan focuses on measures and does not include behavior reports, thus providing longer-lived, deep savings measures
A.2(b) Report consumption reduction (CR) at meter level without line loss factor	Yes	
A.2(c) Achieve at least 15% of CR target (MWh) in each program year for 6/1/2021-5/31/2026 period	Yes	Plan designed to exceed compliance target by 39%, 23% without Phase III carryover
A.2(d) At least 1 comprehensive program for residential and non-residential customers each	Yes	PPL is offering a comprehensive audit program for residential ratepayers, as well as one for designed specifically for low-income ratepayers. For non-residential ratepayers, prescriptive and custom measures are available.
A.3(1) Specific measures for households at or below 150% of FPIG proportionate to sectors total usage in EDC territory	Yes	Share of total energy usage in territory is 12.5% (see Table 61 p.152)
A.3(2) 5.8% minimum of total CR target from low-income sector	Yes	Plan designed to achieve the threshold of 5.8%, or 72,509 MWh
A.4 Report GNI sector savings and highlight how it will be served	Yes	Served through Non-Residential Program
A.5 Consumption Reduction ("CR") Carryover only from Phase III savings allowed if any	Yes	Designed with carryover of 200,000 MWh/year from Phase III (not included in predicted overall energy reductions)
A.7 Annual CR measured using savings approach	Yes	Same requirement as in Phase II and Phase III

Exhibit A:
PPL Phase IV Implementation Order Compliance Checklist

B.5 Achieve minimum 15% of PDR (MW) target each program year exclusively through efficiency measures	Yes	Annually, the plan is designed to achieve between 16 and 24X percent and the overall Plan is designed to exceed the five-year compliance target by 39%
B.7 No PDR target carryover from Phase III to Phase IV	Yes	
C.3 Each customer class offered at least 1 program, and programs that include measures for all customer classes	Yes	Programs are designed to reach residential customers, with a specific program component for low-income customers, and the non-residential program is designed to reach both small and large commercial and industrial (“C&I”) customers.
D.1 SWE funded by EDC	Yes	PPL has designated \$5 million for the SWE
D.3 Annual reports to be filed 9/20 each year, include savings for GNI, low income carve out multi-family housing, and for multifamily portfolio	Yes	Plan states CSP will conduct annual determination of cost-effectiveness through TRC test, multi-family customers included in program design
E.2(1) Continue NTG research and planning and report both net and gross TRC ratios in plan	Yes	NTG Adjustment handled as proposed in tentative order
E.2(2) Plan is cost-effective based on gross TRC ratio	Yes	Overall plan TRC of 1.17. Residential Program TRC of 1.13. Low-Income Program TRC of 0.44; which is typical of low-income programs that offer measures at no cost. Non-Residential Program Small C&I TRC of 1.56. Non-Residential Program Large C&I TRC of 1.04.
F.1 Must include final year Phase IV report information for program period by class of customer equal to CR target	Yes	As shown in plan’s quantitative summary tables

<p>G.1 Competitive Bidding for CSP (Commission must comment within 15 days of filing, otherwise approved)</p>	<p style="text-align: center;">Yes</p>	<p>(Same minimum criteria for review process in Phase IV as in Phase III, EDC can use Phase III CSP competitive bidding process if desired) Issued competitive RFPs on 7/2/2020 (p.130) RFP for technical CSP to handle PJM FCM expected to be issued 2/2021</p>
<p>G. 2 Contract approval (Same minimum criteria in Phase IV as used in Phase III)</p>	<p style="text-align: center;">Yes</p>	<p>Plan includes contracts with one or more CSP providers. The CSP contract for EM&V services was filed with the commission on 11/30/2020</p>
<p>H.1 CSP participation</p>	<p style="text-align: center;">Yes</p>	<p>Conditions and processes for Phase IV are the same as listed in 7/16/2013 and 5/8/2015 commission orders. Plan designed to use 2 CSPs, 1 for low-income, and 1 for residential and non-residential</p>
<p>I.1(1) Reasonable and prudent cost recovery for plan management up to 2% of EDC total 2006 annual revenue (SWE expense and low-income CR program excluded)</p>	<p style="text-align: center;">Yes</p>	<p>Phase IV Plan is projected to fully expend its \$56.5 million on its EE&C programs. This amount excludes \$5 million for the SWE. Cost recovery will occur via the ACR-IV surcharge, which has three calculated charges. The three charges will vary depending upon the rate class, which are assessed for residential, small C&I, and large C&I ratepayers.</p>
<p>I.1(2) All program costs classified as either incentive or administrative</p>	<p style="text-align: center;">Yes</p>	
<p>I.1(3) Plan shows at least 50% of all spending allocated to incentives and less than 50% allocated to non-incentive cost categories</p>	<p style="text-align: center;">Yes</p>	
<p>I.1(4) Total cost of plan as annual amount rather than full proposed 5-year period</p>	<p style="text-align: center;">Yes</p>	

Exhibit A:
PPL Phase IV Implementation Order Compliance Checklist

I.2(1) Phase IV PDR target met completely with projects installed and funded during Phase IV	Yes	
I.2(2) Phase III budget used to close out program delivery on 6/1/2021 and report measures installed and commercially operable before 5/31/2021	Yes	
I.3 Clear deadlines between measure in-service date and rebate application date included on all rebate forms and applications	Yes	See p. 100 of plan. Rebate application website and portal to state deadline for final submission not to exceed 180 days from installment of measure
I.4 Cost allocated to customer class appropriately, no class excluded from surcharge, and used general cost of service principles for administrative costs	Yes	See p.144 (Section 7.5) proposed allocate such costs using an allocation factor equal to percentage of total actual EE&C costs of each customer class
I.5 Nominate portion of expected peak demand savings into PJM FCM	Yes	Plan designed to rely on efficiency measures only such as lighting and cooling in all sector-level programs, specific measures unknown at this time. For each program (Residential, Low-Income, and Non-Residential), PPL plans to bid from 1-20% of the demand reductions, with an overall plan to bid approximately 25% into FCM. PPL will competitively solicit a third-party CSP to nominate its bid into the FCM.
I.6(1) Include proposed CR tariff mechanism	Yes	Proposed in accordance with 66 Pa. C.S. Section 1307
I.6(2) Annual surcharge based on projected program costs over surcharge application year	Yes	See p.143 or attached tariff
I.6(3) No interest levied on over or under recoveries and PJM FCM proceeds/penalties carried through	Yes	p.6 PPL Electric Statement No. 3 (Koch Direct Testimony)

Exhibit A:
PPL Phase IV Implementation Order Compliance Checklist

<p>I.6(4) On 6/1/2021 reconcile total actual recoverable plan expenditures and revenues incurred through 3/1/2021</p>	<p>Yes</p>	
<p>I.6(5) As part of calculation for Phase IV rates, included clear separate line items for projections of expenses to finalize Phase III contracts, finalize any measures installed and commercially operable before 5/31/2021, and any other Phase III administrative obligations.</p>	<p>Yes</p>	<p>See p.144 Section 7.7 of plan, PPL Electric Statement No. 3 (Koch Direct Testimony)</p>
<p><i>Note: Numbering is direct reference to the Commission Implementation order adopted June 18, 2020 Docket No. M-2020-3015228</i></p>		

ATTACHMENT A

**QUALIFICATIONS OF
STACY L. SHERWOOD**

STACY L. SHERWOOD

Ms. Sherwood is an Economist at Exeter Associates, Inc. At Exeter, Ms. Sherwood develops utility service assessments, provides bill and rate analysis, and assesses and evaluates the effectiveness of energy conservation and efficiency programs and smart meter implementation plans. She also conducts analysis on renewable energy initiatives and life-cycle cost analysis of renewable energy projects. Prior to joining Exeter, Ms. Sherwood worked on energy efficiency with the State of Maryland.

Education

B.A. (Economics, Business, and Accounting) – McDaniel College, 2009

Previous Employment

2013-2015	Assistant Director Maryland Public Service Commission Baltimore, Maryland
2011-2013	Regulatory Economist II Maryland Public Service Commission Baltimore, Maryland
2009-2011	Regulatory Economist I Maryland Public Service Commission Baltimore, Maryland

Professional Experience

Ms. Sherwood's work at Exeter is primarily related to energy efficiency, renewable energy, automated metering infrastructure, cost recovery, and revenue requirements. Ms. Sherwood has successfully worked with utilities, state energy offices, attorney general's offices, consumer advocates, and commission staffs. Ms. Sherwood provides ongoing support to the Arkansas Office of the Attorney General and the Pennsylvania Office of Consumer Advocates regarding their respective states' utility energy efficiency programs, including analysis of utility energy efficiency plans and proposed plan amendments; analysis of issues raised during stakeholder meetings; review of riders and surcharges related to cost-recovery; and provide recommendations on technical and policy-related matters. She has contributed to several publications issued by the Maryland Power Plant Research Program regarding electricity in Maryland, including load forecasting, analysis of policy impacts, and inclusion of renewable resources. Additionally, Ms. Sherwood has worked with the Department of Defense to study the demand response potential at various Army Garrisons throughout the United States by conducting on-site visits and performing analysis of electric bills.

At the Maryland Public Service Commission, Ms. Sherwood performed analysis on the EmPOWER Maryland energy efficiency and demand response programs, the Exelon Customer Investment Fund, and served as lead analyst for the EmPOWER Maryland limited income programs implemented by the Maryland Department of Housing and Community Development. For those initiatives, she developed reporting templates and guidelines; oversaw evaluation, measurement, and verification of program results; and recommended and ensured compliance with policies. Additionally, Ms. Sherwood assisted with the development of regulations proposed before the Commission to implement the 2013 Maryland Offshore Wind Energy Act.

Publications and Consulting Reports

Fort Riley Assessment of Utility Contracts and Costs, on behalf of the U.S. Army Installation Management Command and Army Commercial Utilities Program, April 2019 (with Steven Estomin of Exeter Associates, Inc.).

Sierra Army Depot Assessment of Utility Contracts and Costs, on behalf of the U.S. Army Installation Management Command and Army Commercial Utilities Program, March 2019 (with Steven Estomin of Exeter Associates, Inc.).

Fort Riley Assessment of Demand Response Opportunities, on behalf of the U.S. Army Office Chief of Staff for Installation Management, January 2018 (with Christina Mudd of Exeter Associates, Inc. and Jim Clark of Clark Energy, Inc.).

Fort Gordon Assessment of Demand Response Opportunities, on behalf of the U.S. Army Office Chief of Staff for Installation Management, June 2017 (with Christina Mudd of Exeter Associates, Inc. and Jim Clark of Clark Energy, Inc.).

Cumulative Environmental Impact Report, on behalf of the Power Plant Research Program, Maryland Department of Natural Resources, December 2016 (with Steven Estomin, Kevin Porter, Rebecca Widiss, and Nicholas DiSanti of Exeter Associates, Inc.; Environmental Resources Management, Inc.; Versar, Inc.; Metametrics, Inc.; Spectrum Environmental Services, Inc.; and RGM Incorporated).

Long-Term Electricity Report for Maryland, on behalf of the Power Plant Research Program, Maryland Department of Natural Resources, December 2016 (with Steven Estomin, Kevin Porter, Rebecca Widiss, Nicholas DiSanti, Cali Clark, and Laura Miller of Exeter Associates, Inc.).

Fort Stewart Assessment of Demand Response Opportunities, on behalf of the U.S. Army Office Chief of Staff for Installation Management, September 2016 (with Christina Mudd and Felipe Salcedo of Exeter Associates, Inc. and Jim Clark of Clark Energy, Inc.).

Edwards Air Force Base Feasibility of a Geothermal Project, on behalf of the U.S. Air Force Civil Engineer Center, April 2016 (with Christina Mudd and Kevin Porter of Exeter Associates, Inc.).

Expert Testimony

Before the Pennsylvania Public Utilities Commission, Docket No. R-2020-3020919
Pennsylvania Public Utility Commission v. Audubon Water Company, November 2020, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase. (Pending)

Before the Pennsylvania Public Utilities Commission, Docket No. R-2020-3020256
Pennsylvania Public Utility Commission v. City of Bethlehem – Water Department, November 2020, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase. (Pending)

Before the Louisiana Public Service Commission, Docket No. U-35456 *Application for Certification of a Replacement Advanced Metering System and Approval of Related Financing*, November 2020, for the Louisiana Public Service Commission Staff. Testified regarding the implementation of automated metering infrastructure to replace current meters. (Pending)

Before the Pennsylvania Public Utilities Commission, Docket No. R-2020-3019612
Pennsylvania Public Utility Commission v. Reynolds Disposal Company, October 2020, for the Pennsylvania Office of Consumer Advocate. Participated in mediation regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3010955
Pennsylvania Public Utility Commission v. City of Lancaster – Sewer Fund, October 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3008208
Pennsylvania Public Utility Commission v. Wellsboro Electric Company, October 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3008209
Pennsylvania Public Utility Commission v. Valley Energy, Inc., October 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3008212, *Pennsylvania Public Utility Commission v. Citizens' Electric Company of Lewisburg, PA*, October 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3009559, *Pennsylvania Public Utility Commission v. Eaton Sewer & Water Company, Inc. – Wastewater Division*, August 2019, for the Pennsylvania Office of Consumer Advocate. Participate in mediation regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3009567, *Pennsylvania Public Utility Commission v. Eaton Sewer & Water Company, Inc. – Water Division*, August 2019, for the Pennsylvania Office of Consumer Advocate. Participate in mediation regarding reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3008947, *Pennsylvania Public Utility Commission v. Community Utilities of Pennsylvania Inc. Water Division*, July 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3008948, *Pennsylvania Public Utility Commission v. Community Utilities of Pennsylvania Inc. Wastewater Division*, July 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. R-2019-3006904, *Pennsylvania Public Utility Commission v. The Newtown Artesian Water Company (Supplement No. 136 to Tariff Water – Pa. P.U.C. No. 9)*, March 2019, for the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the overall revenue increase. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. R-2018-3006814, *Pennsylvania Public Utility Commission v. UGI Utilities, Inc – Gas Division (Utility Code 123100, Filed Tariff Gas- Pa. P.U.C. Nos. 7 and 7S)*, January 2019, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of its proposed consolidated natural gas energy efficiency plan. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. M-2018-3004144, *Petition of UGI Utilities, Inc. – Electric Division for Approval of Phase III of its Energy Efficiency and Conservation Plan*, August 2018, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of proposed Plan. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. R-2018-3001307, *Pennsylvania Public Utility Commission v. Hidden Valley Utility Services, L.P. – Wastewater (General Rate Increase Filed Pursuant to 66 PS. CS 1308, Including Answers to 52 PA. Code 53.52)*, April 2018, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding the reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. R-2018-3001306, *Pennsylvania Public Utility Commission v. Hidden Valley Utility Services, L.P. – Water (General Rate Increase Filed Pursuant to 66 PS. CS 1308, Including Answers to 52 PA. Code 53.52)*, April 2018, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding the reasonableness of the overall revenue increase.

Before the Pennsylvania Public Utilities Commission, Docket No. P-2015-2497267, *Petition of Duquesne Light Company for Approval of its Smart Meter Procurement and Installation Plan*, February 2016, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding the inclusion of additional costs related to the Plan's implementation.

Before the Pennsylvania Public Utilities Commission, Docket No. M-2015-2477174, *Petition of UGI Utilities, Inc. – Electric Division for Approval of Phase II of its Energy Efficiency and Conservation Plan*, February 2016, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of proposed Plan. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. M-2015-2515642, *Petition of PPL Electric Utilities for Approval of its Energy Efficiency and Conservation Phase II Plan*, January 2016, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the proposed Plan and its compliance with Pennsylvania Act 129. (Case settled prior to cross-examination.)

Before the Pennsylvania Public Utilities Commission, Docket No. M-2015-2515375, *Petition of Duquesne Light Company for Approval of its Energy Efficiency and Conservation Phase II Plan*, January 2016, on behalf of the Pennsylvania Office of Consumer Advocate. Testified regarding reasonableness of the proposed Plan and its compliance with Pennsylvania Act 129. (Case settled prior to cross-examination.)

Before the Public Utilities Commission of Rhode Island, Docket No. 4595, *Newport Water Division – Rate Application to Collect Additional Revenues of \$1,304,595 for a Total Cost of Service of \$20,151,440*, December 2015, on behalf of the Division of Public Utilities and Carriers. Testified regarding reasonableness of the overall rate revenue increase.

Before the Maryland Public Service Commission, Case No. 9311, *In the Matter of the Application of Potomac Electric Power Company for an Increase in its Retail Rates For the Distribution of Electric Energy*, April 2013, on behalf of the Maryland Public Service Commission Staff. Testified regarding the inclusion of advanced metering infrastructure meters and energy advisor and engineer positions in rates.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of PPL Electric Utilities Corporation :
for Approval of its Act 129 Phase IV Energy : Docket No. M-2020-3020824
Efficiency and Conservation Plan :

VERIFICATION

I, Stacy L. Sherwood, hereby state that the facts set forth in my Direct Testimony, OCA Statement 1, are true and correct (or are true and correct to the best of my knowledge, information, and belief) and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities).



DATED: January 13, 2021
*302311

Signature:

Stacy L. Sherwood

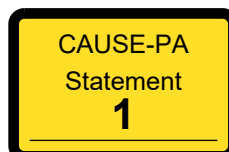
Consultant Address: Exeter Associates, Inc.
10480 Little Patuxent Parkway
Suite 300
Columbia, MD 21044-3575

BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of PPL Electric Utilities Corporation for :
Approval of its Act 129 Phase IV Energy : Docket No. M-2020-3020824
Efficiency and Conservation Plan :

**DIRECT TESTIMONY OF MITCHELL MILLER
ON BEHALF OF
THE COALITION FOR AFFORDABLE UTILITY SERVICES AND ENERGY
EFFICIENCY IN PENNSYLVANIA
("CAUSE-PA")**

January 13, 2021



1 **PREPARED DIRECT TESTIMONY OF MITCHELL MILLER**

2 **I. INTRODUCTION**

3 **Q: Please state your name, occupation, and business address.**

4 A: Mitchell Miller. I provide consulting services regarding utility programs that
5 promote the public interest with a focus on low-income households. My address is 60
6 Geisel Road, Harrisburg, PA 17112.

7 **Q: Briefly outline your education and professional background.**

8 A: As my attached resume shows, I received a B.S. in Community Development from
9 Pennsylvania State University, where I graduated *cum laude* in 1974, and an M.A. in Public
10 Administration from Shippensburg University in 1984. I have over 35 years of experience
11 in the development, implementation, and evaluation of program design for residential
12 utility consumers. The focus of my work has concerned education, energy efficiency,
13 credit and collections, and customer assistance programs.

14 After serving as a research analyst at both the Pennsylvania Governors Action
15 Center and the Pennsylvania Public Utility Commission (“Commission”), I was appointed
16 Chief of the Commission’s Division of Research and Planning in 1978 and, in 1992, I was
17 designated as the Director of the Bureau of Consumer Services, where I served until my
18 retirement from the Commission in 2009.

19 Following my retirement from the Commission in 2009, I served for over three
20 years as a consultant to the Pennsylvania Department of Community and Economic
21 Development (“DCED”) on weatherization and energy efficiency for the Pennsylvania
22 Weatherization Assistance Program (WAP). My resume is attached as Appendix A.

23

1 **Q: Please describe the focus of your work over the past thirty-five years.**

2 A: During my tenure at the Commission, I was primarily engaged in activities relating
3 to regulatory policy involving residential customer service, complaint handling, credit and
4 collections, and universal service - including customer assistance programs and low-
5 income energy efficiency and conservation programs. The Bureau of Consumer Services
6 has regulatory authority and responsibility for policy development for all areas of consumer
7 services, including resolving consumer complaints and problems; enforcing consumer
8 regulations; developing, implementing, and evaluating programs involving complaint
9 handling, complaint analysis, and collections; enforcement of consumer regulations; and
10 design and implementation of customer assistance and conservation programs. My focus
11 at DCED was the creation of a performance-based Weatherization Assistance Program
12 system, dedicated to a high standard of quality, compliance, and production.

13 **Q: What is your relevant experience on issues of low-income utility affordability?**

14 A: During my tenure, the Commission emerged as a national leader in research,
15 development, and oversight of programs addressing credit and collection issues affecting
16 low-income utility consumers. I was responsible for evaluating utility and Commission
17 customer service programs, identifying problems, and making recommendations for
18 change. These activities led to the recognition of the need for development of integrated
19 programs for low-income consumers. As director of BCS, I was responsible for the
20 development, oversight, and monitoring of the initial pilot and then the statutorily required
21 low-income Universal Service Programs. Each of these programs is structured to provide
22 a different form of assistance to low-income customers to enable those customers to afford
23 and maintain basic service. For example, the Customer Assistance Program (CAP)

1 provides alternatives to traditional collection methods for low-income, payment troubled
2 utility customers, and the Low-Income Usage Reduction Program (LIURP) is a targeted
3 weatherization program designed to assist low-income households with high consumption,
4 payment problems, and arrearages. These programs work in tandem and are designed to
5 assist low-income households have affordable utility services and safe living environments
6 while reducing utility collection and therefore benefitting other ratepayers.

7 As director of BCS, I supervised the review and determination of thousands of low-
8 income consumer complaints and inquiries, as well as the reviews of utility performance
9 at handling these complaints and inquires.

10 I directed the creation, development, and evaluation of the effectiveness and the
11 expansion of the Universal Service Programs in Pennsylvania that are targeted toward low-
12 income households. These programs included CAP and LIURP, as well as the Customer
13 Assistance Referral Evaluation (CARES) and Hardship Fund programs. From the
14 inception of these programs and through my retirement in 2009, the Bureau of Consumer
15 Services – under my direction – was responsible for Commission oversight of these
16 programs. This oversight responsibility was codified and formalized after the passage of
17 the Electricity Generation and the Natural Gas Customer Choice and Competition Acts,
18 which explicitly require that the Commission ensure universal service and energy
19 conservation services are appropriately funded and available in each utility distribution
20 territory.

21 Further, upon my retirement from the Commission, I served as a consultant on
22 weatherization and energy efficiency for the Pennsylvania Weatherization Assistance
23 Program (WAP), which is administered by the Department of Community and Economic

1 Development (DCED). I helped transform WAP by creating a performance-based system,
2 dedicated to a high standard of quality, compliance, and production. Innovations included
3 introducing performance standards for production, quality, and compliance, as well as
4 implementation of independent state certification and training for all state WAP workers.
5 I was also responsible for coordinating DCED's WAP program with the Commission's
6 LIURP and Act 129 low-income programs. In addition to consulting on WAP, I also served
7 as a policy consultant for the Philadelphia Water Department from 2013 to 2016. In this
8 role, I assisted the Department to improve the informal dispute and hearing process, and to
9 develop deferred payment agreements.

10 I have participated at the National Association of Regulatory Utility
11 Commissioners (NARUC), the National Low-income Energy Consortium and the National
12 Energy Utility Affordability Conference meetings, and have presented numerous sessions
13 related to low-income utility affordability. I also previously served on the board of directors
14 of the Keystone Energy Efficiency Alliance (KEEA) and as co-chair of the KEEA annual
15 conferences, and I am currently a member of the WAP Policy Advisory Council.

16 **Q: Have you testified in any proceeding before the Pennsylvania PUC?**

17 A: Yes. I have presented testimony in many proceedings before the PUC. A complete
18 list is included in my resume, which is attached as Appendix A.

19 **Q: Have you provided litigation support for the Commission?**

20 A: Although I did not testify in any proceeding during my tenure at the Commission,
21 I directed the Bureau's activities in policy development and enforcement litigation to
22 ensure compliance with customer service regulations and statutes.

1 **Q: For whom are you testifying in this proceeding?**

2 A: I am testifying on behalf of the Coalition for Affordable Utility Services and Energy
3 Efficiency in Pennsylvania (CAUSE-PA).

4 **Q: What is the purpose of your testimony?**

5 A. The purpose of my testimony is to comment on PPL Electric Utilities Corporation's
6 (PPL or the Company) Energy Efficiency and Conservation Plan for Act 129, Phase IV
7 (Phase IV Plan or Plan), filed on November 30, 2020 with the Pennsylvania Public Utility
8 Commission (Commission or PUC). PPL filed its Phase IV Plan pursuant to the
9 requirements of Act 129 of 2008¹ and the Commission's Phase IV Energy Efficiency and
10 Conservation Implementation Order² (Phase IV Implementation Order).

11 I will focus my testimony on those parts of PPL's Plan affecting households with
12 income at or below 150% of the federal poverty income level. Throughout this testimony,
13 the term "low-income" persons or households will refer to those individuals and/or
14 households whose income is at or below 150% of the federal poverty income guidelines.

15 **II. BACKGROUND OF ACT 129 PROGRAMMING**

16 **Q. Please summarize the low-income energy savings requirements for Phases I,
17 II, III, and IV of Act 129.**

18 A. Act 129 requires that each Electric Distribution Company (EDC) include in its
19 Energy Efficiency and Conservation Plan specific energy efficiency measures for low
20 income households in proportion to that sector's share of the total energy usage in a given
21 service territory.³ The Commission enforced this statutory requirement for all Phase I EDC

¹ 66 Pa. C.S. § 2806.1(b)(1)(i)(G).

² Energy Efficiency and Conservation Program, Implementation Order, Docket No. M-2014-242864, (June 18, 2015) (hereinafter Phase III Implementation Order).

³ 66 Pa. C.S. §2806.1(b)(1)(i)(G).

1 Plans, but did not require EDCs to achieve a specific percentage of overall consumption
2 savings from the low income sector.

3 In Phase II, the Commission continued to require that each plan include specific
4 measures for low income households in proportion to the sector’s percentage of usage. In
5 addition, the Commission required that each EDC obtain a minimum of four-and-a-half
6 percent (4.5%) of its overall consumption reduction requirements from the low-income
7 sector.⁴ Eligibility for the Phase II low-income sector programs was limited to low-income
8 households; however, low-income customers could participate in any general residential
9 program. To determine whether an EDC met its 4.5% target, the Commission allowed
10 EDCs to include all savings achieved through dedicated low income programs, as well as
11 a portion of savings achieved through non-low income programs based on estimated low
12 income participation.⁵

13 In Phase III, the Commission again continued implementation of the statutory
14 measure requirement, and increased the low-income consumption reduction requirement
15 from four-and-a-half percent (4.5%) to five-and-a-half percent (5.5%) of the overall
16 savings achieved.⁶ In calculation of Phase III compliance, the Commission provided:
17 “Savings counted towards the 5.5% target may only come from specific low-income
18 programs or low-income verified participants in multifamily housing programs. Savings
19 from non-low-income programs will not be counted for compliance.”⁷ In addition to the
20 specific savings carve-out, the Commission further directed that “low-income savings

⁴ Phase II Implementation Order at 55.

⁵ Phase II Implementation Order at 58.

⁶ Phase III Implementation Order at 69.

⁷ Phase III Implementation Order at 69.

1 should primarily come from measures that are directly provided to low-income
2 households.”⁸

3 For Phase IV, the Commission again increased the minimum low income savings
4 requirement from 5.5% to 5.8% of total consumption reduction, and maintained its
5 requirement from Phase III that low income savings be derived from programs “solely
6 directed at low-income customers or low-income-verified participants in multifamily
7 housing programs.”⁹ In setting the low-income savings requirement, the Commission
8 reiterated that the 5.8% savings requirement is drawn from the Statewide Evaluator’s
9 assessment of program potential, “which is significantly below the maximum achievable
10 potential.”¹⁰ For PPL, the percentage low income savings requirement equates to 72,509
11 MWh.¹¹

12 Notably, while the 5.8% savings requirement is higher in terms of the percentage
13 of overall savings, the actual MWh savings requirement from the low income customer
14 segment is lower than in Phase III “due to the higher portfolio-level acquisition costs used
15 to set the Phase IV targets.”¹² This is an important point to keep in mind generally in
16 assessing the adequacy of PPL’s proposed Phase IV Plan as a whole, and specifically the
17 adequacy of PPL’s proposed low income program. Indeed, the Commission explained that
18 the overall portfolio savings requirements were established based on higher acquisition
19 costs for two primary reasons:

20 First, a sizeable share of low-cost savings in prior phases have been driven
21 by residential lighting measures, which are expected to play a very limited
22 role in Phase IV and were modeled as such. Second, though the

⁸ Phase III Implementation Order at 69.

⁹ Phase IV Implementation Order at 28.

¹⁰ Phase IV Implementation Order at 33.

¹¹ Phase IV Implementation Order at 35.

¹² Phase IV Implementation Order at 36.

1 Commission acknowledges it is possible to design programs that capture
2 savings at a lower average acquisition cost in Phase IV than modeled by the
3 results of the [potential study], directing the EDCs to do so would be in
4 contravention of the Commission’s stated encouragement for EDCs to
5 pursue comprehensive portfolios with a greater focus on longer-lived,
6 deeper-savings measures. The [potential study] included a comprehensive
7 mix of measures to reflect this Commission position.”¹³

8 On this last point encouraging EDCs to pursue “comprehensive portfolios with a
9 greater focus on longer-lived, deeper-savings measures,” the Commission
10 explained that it “strongly encourages EDCs to submit EE&C plans that adhere to
11 this recommendation and encourages stakeholders to engage in proceedings related
12 to those plans.”¹⁴

13 Regarding coordination of Act 129 and the utilities’ Low Income Usage Reduction
14 Programs, the Commission “encourages stakeholders to consider more comprehensive
15 proposals describing the nature, structure, and implications of potential alternate
16 approaches to coordination in future proceedings.”¹⁵ I take that to mean proposals for
17 enhanced coordination of Act 129 and LIURP should be considered in the instant
18 proceeding.

19 With regard to multifamily savings, the Commission declined to require a specific
20 multifamily savings carve-out, but directed the EDCs “to report savings achieved in
21 multifamily housing, both for the low-income carve-out and for their portfolio
22 programs.”¹⁶ The Commission reiterated its direction from Phase III “that savings from

¹³ Phase IV Implementation Order at 15.

¹⁴ Phase IV Implementation Order at 15.

¹⁵ Phase IV Implementation Order at 37.

¹⁶ Phase IV Implementation Order at 37.

1 multifamily housing, up to the percentage of verified low-income households living in the
2 multifamily housing, are eligible for the low-income carve-out.”¹⁷

3 **III. OVERVIEW OF PPL PHASE IV LOW INCOME**
4 **PROGRAMS**

5 **Q. Please summarize PPL’s low-income offerings in its proposed Phase IV Plan.**

6 A: PPL is proposing to meet its low income savings requirement for Phase IV through
7 a single program, the Low Income Assessment Program, which will be managed by a
8 Conservation Service Provider (CSP) that has yet to be disclosed by PPL.¹⁸ The selected
9 CSP will be responsible for outreach, customer recruitment, assessments, education, and
10 equipment installation, as well as overall administrative and operational management of
11 the program, including marketing, call center, and tracking activities.¹⁹ PPL staff will
12 provide general oversight and program direction.²⁰

13 The Low Income Assessment Program will provide virtual²¹ or in-home energy
14 efficiency audits, and various measures will be provided either through an initial audit
15 welcome kit or as identified after the audit is complete.²² Following a virtual audit, basic
16 measures – including water aerators, power strips, light bulbs – will be provided for self-
17 installation.²³ Following in-home energy audits, basic measures will be directly installed
18 by the Conservation Service Provider (CSP).²⁴ PPL may also provide more comprehensive
19 measures, such as heat pumps, heat pump water heaters, and smart thermostats following

¹⁷ Phase IV Implementation Order at 37.

¹⁸ CAUSE-PA to PPL I-8. All cited interrogatory responses are included in Appendix B.

¹⁹ Phase IV Plan at 58.

²⁰ Phase IV Plan at 58.

²¹ PPL’s Plan refers to virtual audits as “Remote Energy Audits” or “REA”.

²² Phase IV Plan at 57

²³ Phase IV Plan at 57-63.

²⁴ Phase IV Plan at 57-63.

1 an in-home audit, though the availability of these more comprehensive measures is
2 extremely limited.²⁵ Education will also be provided to audit participants.²⁶

3 Low income customers who reside in single-family homes, individually metered
4 multifamily units, and manufactured homes will all be eligible to participate in the Low
5 Income Assessment program, and will have access to the same measures regardless of
6 housing type.²⁷ In turn, both homeowners and tenants will be eligible to participate, though
7 tenants must first obtain landlord approval to receive measures following an initial audit.²⁸

8 **Q: In addition to the Low Income Assessment program, which is targeted at**
9 **PPL's low-income customers, does PPL propose to offer energy-efficiency savings to**
10 **low-income customers in any other ways?**

11 A: Yes. In addition to the Low Income Assessment Program, low-income households
12 that reside in single family or individually metered multifamily buildings will be eligible
13 for general residential programs.²⁹ However, low income households typically lack the
14 financial resources to participate in programs that require a participant contribution. Low-
15 income master-metered multifamily building owners which house low income residents
16 will be eligible for the general nonresidential programs, as well as the residential appliance
17 recycling program.³⁰

18 **Q: What is your overall opinion of PPL's Phase IV Plan for low-income**
19 **customers?**

²⁵ Phase IV Plan at 64-69 T. 35; CAUSE-PA Exhibits MM-1-8.

²⁶ Phase IV Plan at 66, 69 T.35 (indicating that the remote and in-person assessment will include energy education).

²⁷ Phase IV Plan at 57.

²⁸ CAUSE-PA to PPL I-24, I-25, I-26.

²⁹ Phase IV Plan at 32.

³⁰ Phase IV Plan at 32, 69.

1 A: Based on the limited available information and the limited time with which to
2 review, PPL’s Plan appears to propose a solid delivery model for its Low Income
3 Assessment Program, which offers flexibility for consumers to receive virtual or in-person
4 audits followed by the provision or direct installation of identified measures.³¹ Flexibility
5 for in-person and virtual program participation is important, given the challenges
6 associated with the COVID-19 pandemic that may continue to pose a challenge for in-
7 person service delivery well into Phase IV. However, there are many aspects of the
8 programs and offered measures which should be addressed to ensure full compliance with
9 the intent, purpose, and stated priorities of Act 129 and the Commission’s Phase IV
10 Implementation Order.³²

11 Specifically, with regard to the targeted Low Income Assessment Program, I am
12 concerned that the program relies far too heavily on low-cost and low-savings measures
13 that will not produce meaningful, long-term bill savings for program participants. This is
14 contrary to the Commission’s directives in its Implementation Order that EDCs design the
15 proposed Plans “with a greater focus on longer-lived, deeper savings measures.”³³ Rather
16 than increase the comprehensiveness of available measures over Phase III, it appears PPL
17 has proposed fewer measures for Phase IV that will offer low income participants deep,
18 lasting savings – eliminating building shell measures such as air sealing and insulation, and
19 reducing the availability of HVAC repair or replacement and other heating-related
20 measures.³⁴

³¹ Note that additional questions remain regarding PPL’s planned coordination

³² See Phase IV Implementation Order at 15.

³³ Phase IV Implementation Order at 15.

³⁴ I will discuss this shortcoming in greater detail below. See CAUSE-PA Exhibits MM-1-8.

1 I am also concerned that PPL’s proposed Low Income Assessment Program may
2 not equitably serve all housing types, including single-family, multifamily, and
3 manufactured housing. Multifamily and manufactured housing are unique building types,
4 and require targeted and persistent outreach.

5 Moreover, I am concerned with certain aspects of PPL’s plans (or lack thereof) to
6 coordinate its Low Income Assessment program with other low income energy efficiency
7 programs, including PPL’s Low Income Usage Reduction Program (LIURP), as well as its
8 Customer Assistance Program, the federal Weatherization Assistance Program, and other
9 available energy efficiency programs that operate within its service territory. While PPL’s
10 Plan proposes to coordinate its Act 129 and Low Income Usage Reduction Program, there
11 are a number of important aspects to PPL’s planned coordination with LIURP that remain
12 unclear.³⁵ I am very supportive of coordination efforts to leverage low income
13 programming to maximize benefits to low income households, but not if coordination
14 supplants the availability of assistance rather than enhances it. Coordination is a critical
15 aspect of Act 129, and should be much more detailed in PPL’s Plan to ensure its
16 programming will deliver meaningful cost and energy savings for the benefit of low income
17 households and ratepayers as a whole.

18 I am also concerned about the lack of detail in the proposed budget for the Low
19 Income Assessment program, and note that it appears from PPL’s proposal that the CSP
20 administrative and delivery costs make up an inordinately high percentage of the overall
21 program budget.³⁶ PPL has indicated that its CSP contracts are still under negotiation, so I

³⁵ See Phase IV Plan at 63.

³⁶ Phase IV Plan at 56 T.30.

1 was not able to review the details of the proposed costs in my review of the proposed Plan.³⁷
2 Nevertheless, this remains a point of concern, and I reserve the right to supplement my
3 testimony and recommendations once additional information about these proposed budget
4 items are reviewed.

5 Finally, I am concerned with PPL’s plan to serve master-metered low income
6 multifamily properties – as well as common areas of single-metered multifamily properties
7 - through its general non-residential programming. Affordable housing across the state is
8 in desperate need of energy efficiency upgrades, and it is well documented that this
9 building type is difficult to serve through traditional programs.³⁸ Successful program
10 delivery for low income multifamily housing requires the use of an administrator that is
11 able to work across residential and commercial sectors – and with specific expertise in low
12 income program delivery.

13 I will provide more detailed observations and recommendations with respect to
14 each of these identified concerns below, in section V, but first believe that it is important
15 to provide information about PPL’s low-income population and to explain the realities that
16 they face in affording energy and accessing energy efficiency and weatherization services.

³⁷ See CAUSE-PA to PPL I-8.

³⁸ See, e.g., ACEEE, Stefan Samarripas & Dan York, Closing the Gap in Energy Efficiency Programs for Affordable Multifamily Housing (April 2019), <https://www.aceee.org/sites/default/files/publications/researchreports/u1903.pdf>; see also Heather L. Schwartz, Aimee E. Curtright, COrdaye Ogletree, Elizabeth Thornton, Lisa Jonsson, Energy Efficiency as a Tool for Preservation of Affordable Rental Housing (2018), https://www.rand.org/pubs/research_reports/RR2293.html.

1 **IV. OVERVIEW OF PPL LOW INCOME POPULATION**

2 **Q: Can you please describe the low income population in PPL’s service territory?**

3 A: PPL has a significant low-income population, though it is difficult to identify an
4 exact number of low income households for a number of reasons, including issues with
5 low income customer tracking and the current economic crisis associated with the COVID-
6 19 pandemic, which has pushed many households into poverty – some for the first time.³⁹

7 According to the Bureau of Consumer Services’ most recent *Report on Universal*
8 *Service Programs & Collections Performance of the Pennsylvania Electric Distribution*
9 *Companies & Natural Gas Distribution Companies*, PPL reported to the Commission that
10 15.4% of its residential customers in 2019 were *confirmed* by PPL to have income that is
11 at or below 150% of the Federal Poverty Level (FPL).⁴⁰ In raw numbers, this is
12 approximately 189,683 households out of approximately 1.2 million residential
13 customers.⁴¹ But the number of estimated low-income households is much higher: 21.8%,
14 or 269,535 households, are estimated low-income households within PPL’s service
15 territory.⁴² Again, these figures are from 2019, before the pandemic caused widespread
16 economic devastation – especially for low wage, hourly workers who have suffered the
17 greatest loss of jobs and wages throughout the pandemic.⁴³

³⁹ See Center on Budget and Policy Priorities, [Tracking the COVID-19 Recession’s Effects on Food, Housing and Employment Hardships](https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-recessions-effects-on-food-housing-and-employment-hardships) (updated Jan. 8, 2021), <https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-recessions-effects-on-food-housing-and-employment-hardships>.

⁴⁰ Pa. PUC, Bureau of Consumer Services, [2019 Report on Universal Service Programs & Collections Performance of the Pennsylvania Electric Distribution Companies & Natural Gas Distribution Companies](https://www.puc.pa.gov/General/publications_reports/pdf/EDC_NGDC_UniServ_Rpt2019.pdf), at 5 (2020), available at https://www.puc.pa.gov/General/publications_reports/pdf/EDC_NGDC_UniServ_Rpt2019.pdf (hereinafter 2019 Universal Service Report).

⁴¹ Id. at 4, 5.

⁴² Id. at 6.

⁴³ See Center on Budget and Policy Priorities, [Tracking the COVID-19 Recession’s Effects on Food, Housing and Employment Hardships](https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-recessions-effects-on-food-housing-and-employment-hardships) (updated Jan. 8, 2021), <https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-recessions-effects-on-food-housing-and-employment-hardships>; John C. Austin & Brad

1 **Q: How much income must a household earn each month to be considered low-**
 2 **income?**

3 A: With some exceptions, most utility assistance programs require households to have
 4 income that is not greater than 150% of the federal poverty level (“FPL”) to qualify. The
 5 FPL is a measure of poverty based exclusively on the size of the household, but not the
 6 composition of the household (i.e., whether the household consists of adults or children)
 7 or geography. Under current federal guidelines, a family of four at 150% FPL would have
 8 a gross annual income of just \$39,300, while for a family of four at 50% FPL the number
 9 would be just \$13,100.⁴⁴ For context, a full time (40 hour/week) worker making minimum
 10 wage (\$7.25/hour) would have a gross annual income of \$15,080, assuming no time off.
 11 This is substantially less than a household needs to meet their basic expenses.⁴⁵

12 The Self-Sufficiency Standard, published in Pennsylvania by the nonprofit
 13 Pathways PA, is an important benchmark to help contextualize the depth of poverty.⁴⁶ The
 14 Self-Sufficiency Standard is a tool developed to provide fact-based picture of the true cost
 15 of living for families of different sizes, living in different geographic regions of the country,
 16 and measures the amount of income a family needs to meet their basic expenses without

Hershbein, [In Many Communities, COVID-19 Will Permanently Kill Jobs. Here’s How They Can Respond](#), Brookings (Sept. 17, 2020); see also David Autor, Elizabeth Reynolds, [The Nature of Work After the COVID Crisis: Too Few Low-Wage Jobs](#) (July 16, 2020, https://www.hamiltonproject.org/papers/the_nature_of_work_after_the_covid_crisis_too_few_low_wage_jobs?_ga=2.234444569.601280638.1608005876-803488704.1608005876); Stephanie Aaronson & Wendy Edelberg, [Tracking the Mounting Challenges Among Those Who Have Lost Their Jobs](#), Brookings (Nov. 5, 2020), <https://www.brookings.edu/blog/up-front/2020/11/05/tracking-the-mounting-challenges-among-those-who-have-lost-their-jobs/>.

⁴⁴ U.S. Dept. of Health and Human Services, 2020 U.S. Federal Poverty Guidelines, available at <https://aspe.hhs.gov/2020-poverty-guidelines>.

⁴⁵ See Pathways PA, *Overlooked and Undercounted 2019 Brief: Struggling to Make Ends Meet in Pennsylvania*, available at: <http://www.selfsufficiencystandard.org/Pennsylvania>

⁴⁶ <http://www.pathwayspa.org>

1 assistance.⁴⁷ In PPL’s service territory, the Self-Sufficiency Standard for a family with
2 two adults, one infant, and a preschool aged child ranges between \$60,749 in Schuylkill
3 County to \$79,877 in Lancaster County.⁴⁸ By all realistic measures, a household must have
4 income that is substantially higher than the federal poverty level to meet their basic needs.
5 PPL’s confirmed low-income customers certainly have insufficient resources and are
6 financially unable to pay for energy efficiency and conservation services without
7 substantial assistance.

8 **Q: Is there specific evidence that PPL’s low income customers are unable to**
9 **afford utility service?**

10 A: Yes. Households with income below 150% of the federal poverty guidelines face
11 extreme poverty, both in PPL’s service territory and across the state, and routinely run
12 out of money before all the bills are paid. According to the US Energy Information
13 Administration, roughly 1 in 5 households in 2015 – when the economy was experiencing
14 a relatively prosperous economic period – reported that they reduce or forego other
15 critical necessities like food and medicine to afford their home energy costs, and more
16 than 1 in 10 reported keeping their home at an unsafe or unhealthy temperature.⁴⁹

17 In 2019, approximately 63,709 confirmed low income households in PPL’s service
18 territory were “payment troubled” – meaning they “failed to maintain one or more payment
19 agreements in a 1-year period.”⁵⁰ Low income households also have a significantly higher

⁴⁷ The current version is The Self Sufficiency Standard for Pennsylvania as a percentage of the federal poverty level for year 2020 is available on Pathway PA’s website at: https://pathwayspa.org/wp-content/uploads/2020/01/PA2019_OverlookedUndercounted_Web.pdf.

⁴⁸ Id.

⁴⁹ US EIA, Residential Energy Consumption Survey (2015), <https://www.eia.gov/consumption/residential/reports/2015/energybills/>; see also NEADA, 2018 National Energy Assistance Survey, at 17, 20 (Dec. 2018), <http://neada.org/wp-content/uploads/2015/03/liheapsurvey2018.pdf>.

⁵⁰ Id. at 8, 18.

1 termination rate compared to residential customers as a whole. **In 2019, the termination**
2 **rate for PPL’s confirmed low-income customers was 18.8%.**⁵¹ In other words, nearly
3 one in five confirmed low income households was involuntarily terminated in 2019
4 because they could not afford to pay for service. In comparison, 4.3% of all residential
5 customers (including confirmed low income customers) were terminated in 2019.⁵²

6 **Q. How has the pandemic further impacted the financial stability of low income**
7 **households, and their ability to maintain service to their home?**

8 A. Residential utility arrearages in PPL’s service territory has grown substantially
9 since the onset of the COVID-19 pandemic – reaching \$145.7 million by November 30,
10 2020, up 80% year over year.⁵³ In turn, 121,898 residential customers in PPL’s service
11 territory were eligible for termination by the same date. These figures are not unique to
12 PPL, but they are stark – and help to illustrate the tremendous scale of the economic
13 challenges low income families face as a result of the pandemic.

14 As I mentioned previously, low income communities and communities of color
15 have been particularly hard hit by the pandemic, and have undeniably suffered the greatest
16 loss in jobs and wages.⁵⁴ Also, as a result of the deep economic impact of the pandemic,
17 energy usage patterns in the short term have changed and may continue to change. Many
18 Pennsylvanians who used to go to work and school every day are using more energy as
19 they attend work and school from home. The increase in energy usage is particularly acute

⁵¹ Id. at 13.

⁵² Id.

⁵³ See Public Utility Service Termination Moratorium – Modification of March 13, 2020 Emergency Order, Letter of PPL Electric Utilities, Docket No. M-2020-3019244 (filed Dec. 11, 2020).

⁵⁴ Center on Budget and Policy Priorities, Tracking the COVID-19 Recession’s Effects on Food, Housing, and Employment Hardships (updated January 8, 2021), <https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-recessions-effects-on-food-housing-and>.

1 for many low income households through winter, as low income families are more likely
2 to live in energy inefficient housing.

3 While we do not yet know the extent of the impact on electric consumption and the
4 state's economy, energy efficiency programming is even more important for low-income
5 families, who struggled to afford services even before the pandemic.

6 **V. ANALYSIS OF PPL PHASE IV LOW INCOME PROGRAMS**

7 **Q: Please explain how this section of your testimony is organized.**

8 **A:** In this section, I will discuss each of the concerns I identified above.

9 I will first discuss issues identified with PPL's Low Income Assessment Program.

10 Specifically, I will address the following issues with this program:

- 11 (1) The comprehensiveness of available measures and projected participation rates.
- 12 (2) The accessibility of programming for low income customers who reside in various
13 housing types, including single family, multifamily, and manufactured housing.
- 14 (3) The disparity in access for homeowners and renters.
- 15 (4) The appropriateness of PPL's planned coordination between the Low Income
16 Assessment Program and LIURP, and the lack of additional planned coordination
17 between Act 129 and federal, state, local, and utility-administered programming.
- 18 (5) The proposed administrative costs included in the program budget.

19 After discussion of the Low Income Assessment Program, I will expand on my
20 concerns about PPL's plan to serve affordable master-meter multifamily buildings –
21 including tenant units and common areas – through its non-residential programming.

1 **A. Low Income Assessment Program**

2 *i. Program Comprehensiveness*

3 **Q: Please explain your concerns regarding the comprehensiveness of available**
4 **measures and projected participation rates in PPL’s Low Income Assessment**
5 **Program.**

6 A: As I explained at the outset of my testimony, the Commission set a clear expectation
7 that Phase IV include “a greater focus on longer-lived, deeper savings measures.”⁵⁵ To
8 allow for greater comprehensiveness and deeper measures, the Commission set lower
9 savings requirements in each sector, including the low income sector.

10 In reviewing PPL’s Phase IV Plan, it appears PPL has done the opposite, at least
11 for its Low Income Assessment Program. Unlike its Phase III Plan, PPL’s Low Income
12 Assessment Program includes no building shell measures, and very few comprehensive
13 heating measures.⁵⁶ The vast majority of the available measures have an acquisition cost
14 of less than \$15.00.⁵⁷ In total, based on PPL’s projected participation rates, 24.5% of
15 savings will be derived from low flow water devices like faucet aerators and shower heads;
16 48.26% of savings will be derived from lighting; 15.37% of savings will be derived from
17 smart strips; and 9.69% of savings will be derived from education and welcome kits.⁵⁸

⁵⁵ Phase IV Implementation Order at 15.

⁵⁶ Phase IV Plan at 64, T.35; CAUSE-PA Exhibit MM-1-8. Note that in response to discovery, PPL indicated that it “may” offer weatherization measures in Phase IV, depending on negotiations with its Low Income Assessment Program CSP. NRDC to PPL I-11. However, PPL has not included any such weatherization measures in its Plan – even at a “zero” participation rate. As such, I assume for the purposes of my review that PPL will not be providing these types of comprehensive services.

⁵⁷ CAUSE-PA Exhibit MM-8.

⁵⁸ CAUSE-PA Exhibit MM-1.

1 **TABLE 1: PPL Low Income Assessment Program, Projected Savings by Measure⁵⁹**

Measure Type	Energy Savings (MWh/yr)	% Low Income Assessment Program Savings
Water - Low Flow Devices	18,324	24.50%
Water - Heat Pump / Maintenance	1,236	1.65%
Space Heating	352	0.47%
Education / Welcome Kits	7,245	9.69%
Lighting	36,092	48.26%
Appliance Recycling	50	0.07%
Smart Strips	11,492	15.37%
Total	74,791	100.00%

2
 3 Less than one half of one percent of program savings will be derived from space heating
 4 measures, including furnace whistles, smart thermostats, heat pump maintenance, and heat
 5 pump installation.⁶⁰ Notably, PPL’s reliance on lighting measures to drive savings for its
 6 Low Income Assessment Program has increased significantly from Phase III to Phase IV.⁶¹
 7 In comparison, PPL projects a substantial *decrease* in its reliance on lighting measures to
 8 drive savings for its general residential programming.⁶²

9 PPL’s reliance on low-cost, low-savings measures to drive savings for its Low
 10 Income Assessment Program stands in stark contrast to the Statewide Evaluator’s projected
 11 savings by end use for PPL’s low-income Phase IV programming:⁶³

Appliances	7.9%
Cooling	7.9%
Exterior Lighting	0.1%
Interior Lighting	0.2%
Other	1.7%
Refrigeration	16.3%

⁵⁹ CAUSE-PA Exhibit MM-1. Table compiled from data in CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation.

⁶⁰ *Id.*

⁶¹ NRDC to PPL I-5.

⁶² NRDC to PPL I-4.

⁶³ See Phase IV Implementation Order at 27, T.9 (PPL Low-Income Phase IV Incremental Annual Electric Energy Percent Savings by End Use, 2021-2025 Total).

Space Heating	21.2%
Whole Building	29.5%
Water Heating	15.0%

1

2 This more comprehensive mix of measures, capable of driving more durable savings,
 3 formed the basis of the more moderate savings requirements established for Phase IV.
 4 Quite clearly, the Commission did not anticipate that PPL would propose that a majority
 5 of savings in its low income program would be derived from light bulbs and water aerators
 6 alone.

7 In the *2018 Pennsylvania Statewide Act 129 Residential Baseline Study*, the
 8 Statewide Evaluator found that PPL “has significantly higher saturation of LEDs than all
 9 other EDCs”, and that low income households statewide have higher saturation rates for
 10 efficient lighting than non-low income residential consumers.⁶⁴ These findings further
 11 underscore my concern with PPL’s proposal to derive nearly half (48.26%) of all low
 12 income savings exclusively from LED lighting.⁶⁵ Other more comprehensive measures,
 13 with long-term savings potential, have substantially lower penetration rates compared to
 14 lighting measures, and offer a better opportunity to provide deeper, longer-lasting energy
 15 efficiency savings for low income households.

⁶⁴ See NMR Group, 2018 Pennsylvania Statewide Act 129 Residential Baseline Study, at 8-9, 123-132 (Feb. 12, 2019), https://www.puc.pa.gov/Electric/pdf/Act129/SWE-Phase3_Res_Baseline_Study_Rpt021219.pdf (hereinafter PA Act 129 Residential Baseline Study). Given the availability of this report on the Commission’s website, I am advised by counsel that I do not need to attach it to my testimony, but may nevertheless incorporate the full Report by reference herein.

⁶⁵ Phase IV Plan at 64, T.35; CAUSE-PA Exhibit MM-1. Note that in response to discovery, PPL estimates that a slightly higher percentage of its Low Income Assessment Program savings (51.1%) will be derived from lighting measures in Phase IV. See NRDC to PPL I-5. There was insufficient time in this proceeding to investigate the assumptions built into PPL’s projection.

1 **Q: Do you have any recommendations for how PPL can improve the**
2 **comprehensiveness of measures and projected participation rates in PPL’s Low**
3 **Income Assessment Program?**

4 A: Yes. I recommend that PPL revise its Plan to increase the availability of measures
5 that will produce deeper, more durable energy and bill savings for households. Improved
6 measure availability should include increased availability of water heating measures and
7 HVAC maintenance, repair, or replacement; inefficient appliance replacement; and
8 comprehensive building shell measures, such as insulation and air sealing. I am of course
9 aware that there is a higher cost associated with these types of measures. But these
10 measures provide the most meaningful energy savings and bill impacts for low-income
11 households, and should be provided wherever possible to reduce low income household
12 usage and bills over the longer term.

13 PPL could create room in its budget to incorporate deeper, more comprehensive
14 measures by reducing the number of water aerators, smart strips, and light bulbs in its Low
15 Income Assessment Program; redirecting the \$6 million budgeted for “experimental
16 equipment or devices”⁶⁶; and reducing the budget for residential and commercial programs,
17 which are projected to substantially exceed PPL’s savings targets.⁶⁷ Notably, PPL has not
18 factored in *any* of its low income Phase III carry-over savings, which are projected to be
19 approximately 20,000 MWh/year – approximately 27.5% of its Phase IV low income

⁶⁶ Phase IV Plan at 152; CAUSE-PA to PPL I-38. In response to discovery, PPL explained that the only pilot program currently under development is an “energy analyzer” program that is in the early phases of development. I believe that this \$6 million budget is more appropriately used to provide deeper, more comprehensive measures for low income households.

⁶⁷ PPL’s Phase IV Plan is projected to exceed the MWh compliance target by 39% overall, or 23% without accounting for carryover savings from Phase III. Phase IV Plan at 3.

1 savings requirement.⁶⁸ In short, PPL has plenty of room in its Plan to include measures that
 2 will produce deeper, longer-lasting savings for Act 129 program participants.

3 I note that it is not enough for PPL to simply list additional available measures in
 4 its Phase IV Plan, as this would not ensure that PPL will actually install these deeper
 5 measures in customer homes – as opposed to continuing reliance on low cost water
 6 aerators, lightbulbs, and smart strips. Therefore, in addition to including deeper, more
 7 comprehensive measures in its list of available measures, I also recommend that PPL
 8 provide additional projections for its Low Income Assessment Program, including:

- 9 • The estimated number of low income customers it will serve each program year,
- 10 • The number of customers that will receive baseload, low-cost, or full cost
 11 services,⁶⁹ and
- 12 • The projected average job cost for baseload, low-cost, or full cost services.⁷⁰

13 PPL’s progress in meeting these additional projections should be included its reports to the
 14 Commission and shared with its periodic stakeholders at its Act 129 stakeholder meetings.

15 As discussed further below with regard to program coordination, PPL’s proposal to
 16 defer higher-cost, comprehensive jobs for treatment through its LIURP is not new, and has
 17 not resulted in an equal uptick in full cost jobs through LIURP in Phases II and III.⁷¹

18 Additional metrics are therefore warranted to ensure that customers participating in Act

⁶⁸ Phase IV Plan at 24, T.10; see also Phase IV Implementation Order at 44-46.

⁶⁹ The phrases “full cost jobs”, “low cost jobs”, and “baseload jobs” are used here to generally mean jobs where the majority of spending is for heating, water heating, and non-water/non-heating measures, respectfully. See Pa PUC, 2019 Report on Universal Service and Collections Performance, at 46 (Sept. 2020), https://www.puc.pa.gov/General/publications_reports/pdf/EDC_NGDC_UniServ_Rpt2019.pdf. Note that these definitions can carry dramatically different meaning. Thus, in making these additional projections, I recommend that PPL be specific about the measures included in each job type. It should not be enough to consider a job to be “full cost” if a furnace whistle is installed – even though a furnace whistle may be considered a heating measure.

⁷⁰ See Phase IV Plan at 63; CAUSE-PA to PPL I-12.

⁷¹ See Section V.A.iv, below, discussing PPL’s Act 129 and LIURP program coordination.

1 129 are provided with measures that will produce deep, lasting savings consistent with the
2 Commission's directives.

3 *ii. Accessibility of Programming by Housing Type*

4 **Q: Please explain your concerns regarding the accessibility of programming by**
5 **housing type.**

6 A: Multifamily and manufactured housing types can be difficult to reach and serve,
7 which often results in disproportionate level of services to these unique housing types.

8 Based on PPL's projected participation rates for Phase IV, I am concerned that
9 PPL's Low Income Assessment Program will not provide equitable services to consumers
10 who reside in multifamily housing. PPL's Phase IV Plan provides a breakdown of
11 projected water measures by housing type (single family versus multifamily). When
12 isolated by housing type, approximately 95.15% of water measures are projected for
13 installation in single family homes, and just 4.85% are projected for installation in
14 multifamily homes.⁷² In contrast, the Statewide Evaluator projected 81.3% of low income
15 energy savings potential from single family homes and 18.7% of low income energy
16 savings potential from multifamily homes in PPL's service territory.⁷³

17 PPL appears to have made improvements in reaching individuals who reside in
18 manufactured housing through its Phase III low income programming.⁷⁴ But PPL's past
19 performance is not a guarantee that it will continue to improve its reach for this unique
20 housing type. In Phase III, PPL had a specific program component focused on
21 manufactured housing, which is likely responsible for its improved reach through Phase

⁷² CAUSE-PA Exhibit MM-9.

⁷³ Phase IV Implementation Order at 26 (Table 8: PPL Low-Income Phase IV Incremental Annual Electric Energy Percent Savings by Building Type, 2021-2025 Total).

⁷⁴ See CAUSE-PA to PPL I-1, I-3.

1 III.⁷⁵ Additional targeting will be important to continue serving manufactured housing at
2 its Phase III rates.

3 **Q: Do you have any recommendations to improve PPL’s program reach for**
4 **multifamily and manufactured housing types?**

5 A: Yes. First, PPL should adjust its projected participation rates for single family and
6 multifamily measures to match the projections in the Commission’s Phase IV
7 Implementation Order, and should include a breakdown of all measures installed in various
8 housing types, including single family, multifamily (individual and single metered), and
9 manufactured housing in its reporting to the Commission. PPL should also work closely
10 with its CSP, as well as members of its Universal Service Advisory Committee, to target
11 outreach to individuals in affordable multifamily and manufactured housing.

12 *iii. Accessibility of Programming by Renters and Homeowners*

13 **Q: Please explain your concern that PPL’s Low Income Assessment Program will**
14 **be disproportionately provided to homeowners, leaving tenants without equitable**
15 **access to energy efficiency services.**

16 A: While PPL allows both homeowners and tenants to participate in its Low Income
17 Assessment Program, it requires tenants to obtain landlord approval before it proceeds with
18 installation of certain measures. In my experience, the landlord approval process can be
19 cumbersome, and often results in tenants being underserved compared to homeowners.

20 For PPL’s Act 129 Low Income Assessment Program, landlord approval is required
21 for installation of “[m]easures that involve structural changes, changes to building fixtures,
22 or involve landlord owned personal property.”⁷⁶ This is a very broad definition, and could

⁷⁵ See CAUSE-PA to PPL I-39.

⁷⁶ Phase IV Plan at 57; CAUSE-PA to PPL I-24.

1 include even the most basic measures, such as smart strips and lightbulbs, which
2 technically involve “changes to building fixtures” – but which can be easily installed and
3 removed by the tenant. Review of PPL’s landlord consent form confirms this is likely the
4 case, as it specifically lists these basic measures on the form as potential measures for
5 installation in a tenant unit.⁷⁷

6 In response to discovery, PPL explained the process it generally uses to obtain
7 landlord approval:

8 PPL Electric will generally start with its in-home or remote assessment
9 process. If the unit is deemed eligible for measures that would require
10 landlord consent, the CSP will send a letter seeking written approval with
11 landlord signature. The CSP will follow up with the landlord several times
12 over 3 to 4 months if the CSP does not hear back from the landlord after the
13 first letter. PPL Electric and the CSP are also looking at the possibility of
14 blanket property consent for those landlords with multiple properties.⁷⁸

15 **Q: Do you have any recommendations for how PPL could improve service for low**
16 **income tenants?**

17 A: Yes. PPL should not require landlord approval for basic measures like lightbulbs,
18 smart strips, and other measures that are easily installed and removed. Moreover, PPL
19 should amend its landlord approval form to further highlight the benefits of the program,
20 and to make it more apparent that the form is not a solicitation and that services are free to
21 the tenant and the landlord. As it stands, Pennsylvanians are bombarded by offers from
22 competitive suppliers, and it can sometimes be difficult to distinguish whether the offers
23 originated with PPL or a competitive electric supplier. This makes it all the more important
24 that PPL’s outreach efforts are clear and easily distinguished from solicitations and offers

⁷⁷ CAUSE-PA to PPL I-26, Attachment 1.

⁷⁸ CAUSE-PA to PPL I-25.

1 for paid services. I recommend that PPL work with members of its Universal Service
2 Advisory Committee to review the document and recommend changes based on members'
3 experience working with low income tenants.

4 PPL should also provide a copy of the landlord approval form directly to the tenant,
5 and should permit the tenant to obtain and return the form on the behalf of their landlord.
6 In many cases, tenants pay rent directly to their landlord each month – and may have more
7 success obtaining a signature required to proceed with the provision of Act 129 services.

8 *iv. Program Coordination*

9 **Q: Please summarize how PPL proposes to coordinate its Low Income**
10 **Assessment Program with other low income efficiency programs.**

11 A: As I noted above, PPL proposes to coordinate its Act 129 Low Income Assessment
12 Program with its Low Income Usage Reduction Program (LIURP). However, as a
13 preliminary matter, I note that PPL has no intent to coordinate its programming with other
14 low income assistance programs offered by PPL or otherwise provided to low income
15 consumers within PPL's service territory.⁷⁹

16 With respect to LIURP coordination, PPL is proposing to provide some measures
17 through its Low Income Assessment program and others through its LIURP⁸⁰ – though it
18 is unclear how this division will occur or which program administrator will actually deliver
19 the services. PPL has provided conflicting information regarding reporting and
20 administration of its Act 129 Low Income Assessment program and its LIURP.⁸¹

⁷⁹ See Phase IV Plan at 63, 127; CAUSE-PA to PPL I-9, I-13, I-32.

⁸⁰ Phase IV Plan at 63.

⁸¹ Phase IV Plan at 63.

1 In its Plan, PPL explains:

2 Some measures provided in a home will be covered by Low-Income Assessment
3 and others by LIURP Assessment. PPL Electric Utilities intends to increase the
4 coordination and provide additional efficiencies between the Low Income
5 Assessment and LIURP Assessment, including:

- 6 • Single source for coordinated marketing campaigns
- 7 • Reduced customer acquisition cost.
- 8 • Integrated intake and customer eligibility screening.
- 9 • Additional LIURP pre-screening opportunities for enhanced deliver of the
10 program.
- 11 • Streamlined administrative and management processes.
- 12 • Consistent QA/QC procedures.

13 Potential LIURP Assessment measures will be identified during the Low Income
14 Assessment. If eligibility is determined, a Personal Energy Guide will refer the
15 customer to a Preferred Partner for installation of the LIURP measures.⁸²

16 The term “Preferred Partner” is defined as “service providers with whom the CSP has an
17 agreement to perform services for a specific program component.”⁸³

18 Based on this description, it appears as though PPL intends for its CSPs to
19 administer its LIURP, at least in part, and contemplates that its CSP will take on LIURP
20 marketing and enrollment, and will subcontract with “preferred partners” to perform
21 LIURP services. However, in response to discovery, PPL clarified that “The Low Income
22 Program CSP may enter into sub-contracts, but those contracts will only involve Act 129
23 funding.”⁸⁴ That said, when asked directly – and in multiple ways – whether it is PPL’s
24 intent for its Act 129 CSP to also administer Low Income Usage Reduction program
25 services, PPL was repeatedly vague in its response – indicating that PPL “coordinates
26 cooperation between Act 129 low income and LIURP work internally” and “routinely
27 evaluates its programs and contractors to achieve efficiencies and operational flexibility.”⁸⁵

⁸² Phase IV Plan at 63.

⁸³ Phase IV Plan at 127.

⁸⁴ CEO to PPL I-4.

⁸⁵ CAUSE-PA to PPL I-32; see also CEO to PPL I-2 and I-3.

1 PPL’s Plan further explains that the Low Income Assessment program “will
2 provide baseload measures for LIURP Assessment customers whose income is less than
3 150% of the FPIG, allowing more of the LIURP budget to focus on comprehensive
4 measures.”⁸⁶ For those with income between 150-200% FPL, baseload measures “will be
5 funded through the LIURP budget.”⁸⁷ For homes eligible for “full cost treatment,” PPL
6 proposes to install measures through its LIURP or Low Income Assessment budget,
7 provided the household meets the following criteria:

- 8 • The customer receives landlord approval, as appropriate.
- 9 • The customer has installed electric heat in at least 50% of the home.
- 10 • The customer’s home did not previously receive full cost services through
11 the Low Income Winter Relief Assistance Program (WRAP) in Phase III.
- 12 • The customer’s home has no health or safety concerns that prevent the
13 installation of full cost measures.
- 14 • The cost of the full cost measures can be accommodated in the LIURP
15 Assessment or Low Income Assessment budget.

16 Notably, when served through Act 129, “full cost treatment” only includes those measures
17 listed in PPL’s proposed Plan, which does not include the full range of measures available
18 through LIURP.⁸⁸

19 In response to questions regarding how PPL will track jobs that are split between
20 Act 129 and LIURP, PPL indicates that “individual aspects of the work performed on each
21 job is credited to the program which funded the measure.”⁸⁹ Unlike Act 129, LIURP
22 performance is not tracked by measure, it is tracked by the number of completed jobs and

⁸⁶ Phase IV Plan at 63-64.

⁸⁷ Phase IV Plan at 64.

⁸⁸ CAUSE-PA to PPL I-12.

⁸⁹ CAUSE-PA to PPL I-13.

1 assessed based on per-job spending and savings. If PPL splits measures for an individual
2 household across the two programs, this could inflate per-job savings achieved.

3 Finally, it remains unclear at this time whether PPL intends to send multiple
4 contractors to complete services under both its Act 129 Low Income Assessment and
5 LIURP. It appears as though PPL either intends – as noted above – to allow its CSP to
6 administer its LIURP, or it plans to send multiple contractors to the same residence to
7 perform work through two separate programs. As I will explain below, either result would
8 be troubling.

9 **Q: Please explain your concerns regarding PPL’s proposals for coordination.**

10 A: I have three primary concerns with PPL’s proposals (or lack thereof) for
11 coordination of its Low Income Assessment Program with other low income assistance
12 programs, including LIURP, CAP, and other available programs in PPL’s service territory.

13 First, I am concerned that PPL does not have any plans to coordinate Act 129
14 services with other low income assistance programs (apart from LIURP) – both within PPL
15 and with external programs that offer complimentary or overlapping services. I note that
16 PPL was instructed to explain in its Plan how it intended to “harmonize Act 129 program
17 delivery with Low Income Usage Reduction Programs *and other external energy*
18 *efficiency, conservation, and healthy housing programs*” in section 9.1.3 of its proposed
19 Phase IV Plan, but it did not include this description.⁹⁰

20 Coordination between LIURP and Act 129 is a start, but PPL’s energy efficiency
21 programs should be coordinated on a far broader scale, both internally across PPL’s

⁹⁰ Implementation of Act 129 of 2008 – Phase IV Energy Efficiency and Conservation Plan Template, Secretarial Letter, Docket No. M-2020-3015228, at 6 (Sept. 9, 2020).

1 universal service programs and externally with other programs that operate within PPL's
2 service territory. PPL's Customer Assistance Program, known as OnTrack, provides a
3 plethora of information that would allow PPL to target households in need of energy
4 efficiency services. In addition to targeting high usage customers, PPL could identify and
5 target energy efficiency services to those in danger of exceeding their maximum CAP
6 credit limit or those with usage patterns that suggest the household may be using electric
7 space heaters or other inefficient seasonal appliances such as a dehumidifier or window air
8 conditioner. In turn, those who receive Act 129 services that are not enrolled in CAP
9 should be referred to the program to help further improve bill affordability.

10 In delivering Act 129 services, PPL is often in a person's home, which places PPL
11 in a unique position to provide holistic services to low income households – especially
12 when health and safety issues are identified which may prevent PPL from providing
13 services through its Act 129 Low Income Assessment Program. PPL should not walk away
14 from homes with health and safety concerns, especially after it has devoted program
15 resources to assess the home for efficiency opportunities. Rather, it should identify
16 available assistance programs that can help resolve identified health and safety issues and
17 should follow up to provide energy efficiency services once those issues have been
18 remediated.

19 Second, I am concerned that PPL will not clearly indicate whether and to what
20 extent its Act 129 CSP will also deliver or subcontract for the delivery of LIURP services.
21 This is important, as there is an explicit statutory preferences for the delivery of LIURP
22 services through Community Based Organizations.⁹¹ This is for good reason, and is

⁹¹ 66 Pa. C.S. § 2804(9).

1 intended to assist with coordination of a multitude of low income programming that local
2 CBOs provide to low income consumers.⁹² On the other hand, it is important to be clear
3 how jobs are shared, and whether customers will be required to receive multiple visits from
4 multiple contractors to obtain all measures for which the household is eligible. As it stands,
5 PPL's proposal is insufficiently detailed to understand how services will be provided across
6 programs.

7 Third, I am concerned with PPL's proposal to provide baseload services primarily
8 through Act 129, and full cost jobs primarily through LIURP. As I indicated at the outset
9 of my testimony, I am very supportive of efforts to coordinate Act 129 and LIURP, but not
10 if coordination supplants the availability of assistance rather than enhances it.

11 The Commission has in the past raised concerns with PPL's coordination across
12 Act 129 and LIURP programs, noting "that some customers who are eligible for more
13 extensive measures (e.g. full cost WRAP jobs) may not receive them."⁹³ While PPL's
14 planned coordination was ultimately approved, PPL was required to meet with the
15 Commission's Bureau of Consumer Services (BCS) and the Bureau of Technical Utility
16 Services (TUS) to resolve further details about its intended coordination and accounting.
17 The Commission also ordered BCS and TUS to continue monitoring PPL's Act 129 low
18 income program "to ensure that eligible customers receive the maximum benefit from these
19 programs, and that PPL continues to follow proper program coordination and accounting
20 practices."⁹⁴

⁹² Id.

⁹³ Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase II Energy Efficiency and Conservation Plan, Opinion and Order, M-2012-2334388 (July 11, 2013) (approving PPL's Revised Phase II Energy Efficiency and Conservation Plan).

⁹⁴ Id.

1 Conceivably, coordination across Act 129 and LIURP as PPL proposes should
 2 increase the number of full cost jobs completed through LIURP. However, a review of
 3 PPL’s LIURP jobs since 2011 reveals that PPL’s coordination between Act 129 and LIURP
 4 through Phases II and III did not result in an increase of full-cost jobs through LIURP –
 5 nor did it measurably decrease the number of baseload jobs it completed through LIURP.
 6 To the contrary, with little exception, PPL consistently – year after year – provides more
 7 baseload jobs and fewer full cost jobs than originally projected.

8 **TABLE 2: PPL LIURP Production, Actual vs. Projected – 2011-2020⁹⁵**

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseload – Actual	1,431	1,192	1,284	1,098	807	1,271	1,029	1,196	1,101	-
Baseload – Projected	1,050	1,450	800	400	700	650	715	1,029	1,100	950
Water Heat – Actual	528	644	665	645	519	706	803	932	822	-
Water Heat - Projected	300	500	650	800	800	600	575	803	750	725
Heating - Actual	1,397	1,384	1,340	1,614	1,579	1,480	1,970	1,822	1,556	-
Heating - Projected	1,300	1,400	1,600	1,900	1,800	1,800	2,010	1,970	2,050	1,575

9

10 PPL should not be providing baseload services to households that would otherwise
 11 qualify for low-cost (water heat) or full-cost (heating) jobs. Instead, PPL should be
 12 required to leverage LIURP to provide the deepest benefit to the greatest number of
 13 households. While it may be an effective approach from a Company perspective to
 14 prioritize baseload jobs through Act 129 Low Income Assessment Program, and low-cost
 15 and full-cost jobs through LIURP, this coordination should not lead to a reduction in the
 16 number of households receiving low-cost and high cost services as it has through Phases
 17 II and III.

⁹⁵ See Universal Service Reports for 2010-2019, <https://www.puc.pa.gov/filing-resources/reports/universal-service-reports/>.

1 **Q: Do you have any recommendations with regard to PPL’s coordination between**
2 **Act 129, LIURP, and other available assistance programs?**

3 A: Yes. PPL should be required to provide additional clarity for how it intends to
4 coordinate services provided through its Act 129 Low Income Assessment Program with
5 other low income programs operated by PPL or within PPL’s service territory.

6 Specifically, PPL should improve coordination internally across its universal
7 service programs and externally with programs operated within its service territory. As
8 discussed above, PPL should utilize data from its CAP to target customers for energy
9 efficiency services. PPL should also keep a list of available assistance programs in each
10 county that it can provide to households served through the program. The list should
11 contain a range of available services in the county or region, and should specifically include
12 information about services that could help consumers to address identified health and
13 safety issues in the home. I recommend that PPL work with its Community Based
14 Organizations (CBOs) and other members of its Universal Service Advisory Committee to
15 help create these resource lists for use by its low income CSP.

16 Regarding health and safety remediation, I recommend that PPL first attempt to
17 provide health and safety remediation through its LIURP to help streamline service
18 delivery. PPL should track households deferred for health and safety reasons,⁹⁶ and should
19 follow up with those households within 3 months to determine whether the issues that
20 prevented service delivery have been remediated. Finally, on the issue of health and safety,
21 I recommend that PPL devote \$1 million (\$200,000 per year) of its \$3 million experimental

⁹⁶ See CAUSE-PA to PPL I-4, indicating that PPL does not track households who are unable to receive energy efficiency services as a result of health and safety issues with the property.

1 budget to develop a health and safety pilot program.⁹⁷ Specifically, the program should
2 remediate home health and safety issues that would enable PPL to provide comprehensive
3 energy efficiency services in the home.

4 PPL should also be required to indicate whether and to what extent its Act 129 CSP
5 will deliver any portion of LIURP services. As I explained above, I am concerned that
6 PPL may be sending multiple contractors to the same residence to provide services. This
7 does not leverage services, it duplicates them – adding stress and complication to the
8 participant, who may need to take time off work on multiple days in order to accommodate
9 repeat visits from PPL’s Act 129 and LIURP providers. PPL’s screening and referral
10 process should be streamlined to ensure that those eligible for LIURP are appropriately
11 referred to LIURP at intake, rather than requiring consumers to go through multiple
12 programs and contractors to obtain full energy efficiency and usage reduction services. On
13 the other hand, if it is PPL’s intent to allow its CSP to administer its LIURP, then PPL
14 should be explicit about this intent and should explain how it will continue to fulfill the
15 statutory preference for the use of Community Based Organizations in its program delivery.

16 Finally, and to the extent PPL is permitted to split the delivery of services across
17 its LIURP and Act 129 Programs as proposed, PPL should be required to explain how it
18 intends to track these jobs to ensure that it is not over-reporting its job rates or the per-job
19 savings achieved through its LIURP.

⁹⁷ Phase IV Plan at 152.

1 reserve the right to provide additional analysis and/or recommendations on this matter in
2 my rebuttal testimony should additional information become available.

3 **B. Master-Meter Multifamily Programming**

4 **Q: How does PPL propose to serve master-metered low income multifamily**
5 **housing through its Phase IV program?**

6 A: PPL is proposing to serve master metered low income multifamily buildings
7 through its general Non-Residential Programs – including its Efficient Equipment and
8 Custom Components.¹⁰² PPL will also allow owners of these building types to participate
9 in its Residential Appliance Recycling Program.¹⁰³

10 Through the Efficient Equipment Component, PPL will offer low income
11 multifamily building owners a rebate and performance incentive based on avoided or
12 reduced energy savings from the project.¹⁰⁴ Through the Custom Component, PPL’s non-
13 residential CSP will work with customers to identify and pre-qualify custom projects.
14 Unlike in Phase III, PPL does not appear to propose any enhanced incentives or improved
15 cost sharing for low income multifamily buildings to ensure that low income housing
16 providers can reasonably participate in its energy efficiency programming.

17 **Q: Above, you noted concerns about the manner in which PPL intends to serve**
18 **master-metered affordable multifamily housing through its Phase IV Plan. Please**
19 **explain.**

20 A: Yes, I am concerned with PPL’s plan to serve affordable, master-metered properties
21 – as well as common areas of single-metered properties – through its general non-

¹⁰² Phase IV Plan at 69.

¹⁰³ Phase IV Plan at 32.

¹⁰⁴ Phase IV Plan at 76.

1 residential programming, with no apparent connection or coordination with its low income
2 or residential programs. The lack of any planned coordination across PPL's low income
3 and non-residential programs to reach low income multifamily housing providers and serve
4 low income residents will likely frustrate participation in the programs. Successful program
5 delivery requires the use of an administrator that is able to work effectively across
6 residential and commercial sectors to offer specialized expertise and technical
7 assistance.¹⁰⁵

8 In addition to program delivery, I am concerned that PPL's program does not
9 properly incentivize low income multifamily building owners to enable their participation
10 in its general Non-Residential program. Housing authorities, transitional housing
11 providers, and low income housing providers most often operate on razor-thin budgets that
12 do not leave room for investment in energy efficiency services.¹⁰⁶ While the Commission
13 did not include a specific savings requirement for multifamily programs in its Phase IV
14 Implementation Order, PPL's plan must still provide its programming equitably to all
15 classes of customers, as required in Act 129.¹⁰⁷ In my opinion, PPL's proposed Non-
16 Residential Program does not offer programming for low income residents of multifamily
17 housing in parity with other customer classes.

18 In light of the current economic crisis precipitated by the global COVID-19
19 pandemic, and the resulting housing and eviction crisis that is emerging across

¹⁰⁵ ACEEE, Stefen Samarripas & Dan York, Closing the Gap in Energy Efficiency Programs for Affordable Multifamily Housing, at 24 (April 2019) <https://www.aceee.org/sites/default/files/publications/researchreports/u1903.pdf>.

¹⁰⁶ Heather L. Schwartz, Aimee E. Curtright, Cordaye Ogletree, Elizabeth Thornton, & Lisa Jonsson, Energy Efficiency as a Tool for Preservation of Affordable Rental Housing, at iii (2018), https://www.rand.org/pubs/research_reports/RR2293.html; Joint Center for Housing Studies of Harvard University, America's Rental Housing Evolving Markets and Needs, at 31 (2013).

¹⁰⁷ 66 Pa. C.S. § 2806.1(a)(5).

1 Pennsylvania and the nation,¹⁰⁸ it is especially critical to ensure that low income housing
2 providers have access to low or no cost energy efficiency services to help reduce energy
3 usage, stabilize operating costs, and preserve already-scarce affordable multifamily
4 housing.

5 **Q: Do you have any recommendations for how PPL should improve its offerings**
6 **to ensure efficiency services are accessible to low income housing providers?**

7 A: Yes. First, I recommend that PPL establish a “one-stop” program administration
8 model for affordable multifamily housing providers to ensure that these unique building
9 types are able to be served holistically – with the expertise and assistance necessary to
10 assist multifamily building owners to navigate the program requirements, identify
11 appropriate measures, and schedule installation. This is likely best housed within PPL’s
12 Low Income Assessment Program to help streamline service delivery and coordinate
13 services to individual units and common areas in both single and master metered properties.

14 In addition, PPL should further define the criteria for participation and available
15 measures for low income master metered properties, and should include an audit
16 component to help low income building owners and operators to identify efficiency
17 opportunities. Low income master-metered multifamily building owners and operators
18 should not be required to navigate multiple CSPs to piece together vague and undefined
19 programming options, as it will frustrate current program participation and will discourage
20 participation in the future. Again, low income housing providers often operate with razor

¹⁰⁸ See US Census Bureau, Household Pulse Survey, <https://www.census.gov/data-tools/demo/hhp/#/?measures=EVR>. According to the United States Census Bureau Household Pulse Survey, as of December 21, 2020, 35.7% of adults in Pennsylvania lived in a households that was not current on rent or mortgage, and eviction or foreclosure in the next two months is either very likely or somewhat likely. Id.

1 thin operating budgets, and do not have the resources or expertise to identify and pursue
2 an appropriate mix of efficiency measures.

3 In identifying available measures, PPL should ensure that the measures are
4 compatible with the building efficiency requirements imposed on low income housing
5 providers in other sectors. For example, PPL should ensure that its available measures
6 align with the measures contained in the Pennsylvania Housing Finance Agency (PHFA)
7 Qualified Allocation Plan (QAP).¹⁰⁹ This will help to ensure that low income housing
8 providers are able to leverage additional incentive structures that will promote the
9 availability of long-term affordable housing.

10 Finally, PPL should ensure that low income multifamily buildings are eligible for
11 enhanced incentives that account for the lack of capital available for investment in
12 infrastructure upgrades. Consistent with PPL's Phase III Plan, PPL should continue to
13 provide free audits, lighting, and other low-cost measures in master metered low income
14 tenant units through its Low Income Assessment Program.¹¹⁰ For higher cost measures,
15 PPL should set a maximum customer contribution level of 20%, and should reduce or
16 waive that contribution threshold if projects do not move forward.

¹⁰⁹ The QAP is PHFA's Plan for how it will finance and/or distribute tax credits to applicants each year to build or rehab affordable multifamily housing across the state. See Pennsylvania Housing Finance Agency Allocation Plan for Program Year 2021: Low Income Housing Tax Credit Program, at 13-14 (Approved Nov. 12, 2020), https://www.phfa.org/forms/multifamily_program_notices/qap/2021/2021-lihtc-allocation-plan.pdf.

¹¹⁰ See Phase IV Plan at 57, 69. I note that, because master-metered buildings are in the commercial and industrial class, the costs for providing services to low income master metered buildings should be covered by the commercial and industrial program budget.

1 **VI. SUMMARY OF RECOMMENDATIONS**

2 Q: Please summarize the recommendation you made throughout your testimony.

3 A: I made the following recommendations to improve the reach and
4 comprehensiveness of PPL’s proposed Phase IV Act 129 programming:

5 **Low Income Assessment Program**

- 6 • Increase the availability of measures that will produce deeper, more durable energy
7 and bill savings for households.
- 8 • Provide additional projections for participation, including:
 - 9 ○ The estimated number of low income customers it will serve each year.
 - 10 ○ The number of customers that will receive baseload, low cost, or full cost
11 services.
 - 12 ○ The projected average job cost for baseload, low cost or full cost services
- 13 • Report on progress in meeting additional per-customer job completion.
- 14 • Adjust projected participation rates for single family and multifamily measures to
15 match the projections in the Commission’s Phase IV Implementation Order.
- 16 • In reporting, include a breakdown of all measures installed in various housing types
17 (single family, individually metered multifamily, master metered multifamily, and
18 manufactured)
- 19 • Work closely with the Low Income CSP and members of PPL’s Universal Service
20 Advisory Committee to target outreach to individuals in affordable multifamily and
21 manufactured housing.
- 22 • Do not require landlord approval for installation of basic measures that are easily
23 installed and removed.
- 24 • Amend the landlord approval form to further highlight the benefits of the program,
25 in consultation with members of PPL’s Universal Service Advisory Committee.
- 26 • Provide a copy of the landlord approval form to tenants, and permit tenants to obtain
27 approval and submit the form on behalf of the landlord.
- 28 • Clarify how PPL intends to coordinate services provided through its Act 129 Low
29 Income Assessment Program and other low income programs operated by PPL or
30 within PPL’s service territory, including:
 - 31 ○ Improve coordination internally across universal service programs to ensure
32 streamlined referrals are made to available programming for all program
33 participants.
 - 34 ○ Utilize data from its CAP to target customers for energy efficiency.
 - 35 ○ Develop a list of available assistance programs in each county to provide to
36 households served through the program, in consultation with its Community
37 Based Organizations and members of its Universal Service Advisory
38 Committee.

- 1 • Comprehensively address health and safety issues that serve as a barrier to service
2 delivery in the following ways:
 - 3 ○ Refer appropriate cases to LIURP for comprehensive services, including
4 remediation of incidental health and safety issues in the home.
 - 5 ○ Provide referrals to the federal Weatherization Assistance Program or other
6 home remediation and repair programs available in the county or city.
 - 7 ○ Develop a pilot health and safety program, funded with \$1 million of its \$3
8 million experimental budget, to remediate home health and safety issues
9 that would enable PPL to provide comprehensive energy efficiency services
10 in the home.
- 11 • Clarify how PPL intends to split the delivery of services across its LIURP and Act
12 129 Low Income Assessment Program, and explain how it will track measures and
13 jobs to ensure that it does not over-report on its delivered services for either
14 program.
- 15 • Further investigate the proposed low income CSP administrative and delivery costs.

16 Master-Metered Multifamily Buildings

- 17 • Establish a “one stop” program administration model for affordable multifamily
18 housing providers that can assist multifamily building owners to navigate program
19 requirements, identify appropriate measures, and schedule installation
- 20 • Further define the criteria for participation and available measures for low income
21 master metered buildings – including common areas and tenant units.
 - 22 ○ Ensure that measures are coordinated and compatible with the building
23 efficiency requirements imposed on low income housing providers in other
24 sectors.
- 25 • Include an audit component to help low income building owners and operators to
26 identify efficiency opportunities.
- 27 • Improve the incentives available to low income master metered building owners to
28 participate in the program.
 - 29 ○ Provide free audits, lighting, and low-cost measures for master metered low
30 income tenant units through its Low Income Assessment Program.
 - 31 ○ For higher cost measures, establish a maximum customer contribution level
32 of 20%, with flexibility to reduce or waive that contribution threshold if
33 projects do not move forward.

34 **Q: Does this conclude your testimony?**

35 A: Yes.

LOW INCOME ASSESSMENT PROGRAM - SAVINGS SUMMARY BY MEASURE TYPE

Measure Type	Energy Savings (MWh/yr)	% Low Income Assessment Program Savings
Water	19560	26.15%
Heat	352	0.47%
Education / Welcome Kits	7245	9.69%
Lighting	36092	48.26%
Appliance Recycling	50	0.07%
Smart Strips	11492	15.37%
Total	74791	100.00%

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - WATER MEASURES

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Water Kit SF REA	NO: \$10.19 Per Kit	107	670	water
Low Income	LI Assessment	Water Kit MF REA	NO: \$10.19 Per Kit	5	35	water
Low Income	LI Assessment	Water Kit SF On-site	NO: \$10.19 Per Kit	46	287	water
Low Income	LI Assessment	Water Kit MF On-site	NO: \$10.19 Per Kit	2	15	water
Low Income	LI Assessment	Kitchen Aerator SF REA	NO: \$2.90 Per Product	3578	20151	water
Low Income	LI Assessment	Kitchen Aerator MF REA	NO: \$2.90 Per Product	141	1061	water
Low Income	LI Assessment	Bath Aerator SF REA	NO: \$2.03 Per Product	2411	31616	water
Low Income	LI Assessment	Bath Aerator MF REA	NO: \$2.03 Per Product	158	1664	water
Low Income	LI Assessment	Water Heater Pipe Insulation REA	NO: \$1.32 Per Foot	0	0	water
Low Income	LI Assessment	Low Flow Showerhead SF REA	NO: \$7.06 Per Product	1338	4632	water
Low Income	LI Assessment	Low Flow Showerhead MF REA	NO: \$7.06 Per Product	70	244	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held SF REA	NO: \$11.45 Per Product	4684	16213	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held MF REA	NO: \$11.45 Per Product	244	853	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve SF REA	NO: \$19.86 Per Product	0	0	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve MF REA	NO: \$19.86 Per Product	0	0	water
Low Income	LI Assessment	Kitchen Aerator SF On-site	NO: \$3.87 Per Product	1586	8934	water
Low Income	LI Assessment	Kitchen Aerator MF On-site	NO: \$3.87 Per Product	62	470	water
Low Income	LI Assessment	Bath Aerator SF On-site	NO: \$2.71 Per Product	1022	13401	water
Low Income	LI Assessment	Bath Aerator MF On-site	NO: \$2.71 Per Product	67	705	water
Low Income	LI Assessment	Water Heater Pipe Insulation On-site	NO: \$1.76 Per Foot	68	8708	water
Low Income	LI Assessment	Low Flow Showerhead SF On-site	NO: \$9.41 Per Product	574	1985	water
Low Income	LI Assessment	Low Flow Showerhead MF On-site	NO: \$9.41 Per Product	30	104	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held SF On-site	NO: \$15.26 Per Product	2007	6949	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held MF On-site	NO: \$15.26 Per Product	105	366	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve SF On-site	NO: \$26.48 Per Product	83	1429	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve MF On-site	NO: \$26.48 Per Product	4	75	water
Low Income	LI Assessment	Water Heater Temperature Setback On-site	NO: \$10 Per Product	365	3657	water
Low Income	LI Assessment	Heat Pump Water Heater Replacement On-site	NO: \$2,768 Per Project	803	439	water
TOTAL				19560	124663	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - HEAT RELATED MEASURES

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Furnace Whistle REA	NO: \$2.78 Per Product	0	0	heat
Low Income	LI Assessment	Furnace Whistle On-site	NO: \$3.7 Per Product	8	629	heat
Low Income	LI Assessment	Smart Thermostat Heat Pump On-site	NO: \$320 Per Product	75	129	heat
Low Income	LI Assessment	Smart Thermostat Electric Furnace On-site	NO: \$320 Per Product	104	71	heat
Low Income	LI Assessment	Heat Pump Maintenance On-site	NO: \$250 Per Product	55	255	heat
Low Income	LI Assessment	Ductless Mini-split Heat Pumps On-site	NO: \$8,000 Per Product	110	50	heat
TOTAL				352	1134	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - KITS AND EDUCATION

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Welcome Kit REA	NO: \$9 Per Kit	1,495	70,000	kit
Low Income	LI Assessment	Welcome Kit On-site	NO: \$9 Per Kit	641	30,000	kit
Low Income	LI Assessment	Remote assessment & Energy Education REA	NO: \$70 Per Project	3,576	45,150	education
Low Income	LI Assessment	On-site assessment & Energy Education On-site	NO: \$100 Per Product	1,533	19,350	education
TOTAL				7,245	164,500	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - LIGHTING MEASURES

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	LED Night Light REA	NO: \$1.88 Per Product	1,340	56,438	light
Low Income	LI Assessment	LED Specialty (Globe / Candelabra) REA	NO: \$5.87 Per Bulb	4,219	158,025	light
Low Income	LI Assessment	LED GSL A-Line (9 Watt or other) REA	NO: \$5.87 Per Bulb	19,770	541,800	light
Low Income	LI Assessment	LED Reflector (Par / BR / R / downlight) REA	NO: \$5.87 Per Bulb	924	22,575	light
Low Income	LI Assessment	LED Night Light On-site	NO: \$2.5 Per Product	574	24,188	light
Low Income	LI Assessment	LED Specialty (Globe / Candelabra) On-site	NO: \$7.83 Per Bulb	1,808	67,725	light
Low Income	LI Assessment	LED A-Line (9 Watt or other) On-site	NO: \$7.83 Per Bulb	7,061	193,500	light
Low Income	LI Assessment	LED Reflector (Par / BR / R / downlight) On-site	NO: \$7.83 Per Bulb	396	9,675	light
TOTAL				36,092	1,073,926	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - APPLIANCE MEASURES

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Recycle and Replace Refrigerator REA	NO: \$923.13 Per Product	0	0	appliance
Low Income	LI Assessment	Removal/Disposal of Extra Refrigeration Unit REA	NO: \$50 Per Product	0	0	appliance
Low Income	LI Assessment	Recycle and Replace Freezer REA	NO: \$696.02 Per Product	0	0	appliance
Low Income	LI Assessment	ES Dehumidifier REA	NO: \$285 Per Product	0	0	appliance
Low Income	LI Assessment	Recycle and Replace Refrigerator On-site	NO: \$923.13 Per Product	0	0	appliance
Low Income	LI Assessment	Removal/Disposal of Extra Refrigeration Unit On-site	NO: \$50 Per Product	5	6	appliance
Low Income	LI Assessment	Recycle and Replace Freezer On-site	NO: \$696.02 Per Product	45	97	appliance
Low Income	LI Assessment	Energy Star Dehumidifier On-site	NO: \$285 Per Product	0	0	appliance
TOTAL				50	103	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - SMART STRIPS

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Smart Strips - Tier 2 On-site	NO: \$60.47 Per Product			smart strip
Low Income	LI Assessment	Smart Strips - Tier 1 On-site	NO: \$25 Per Product	3142	35307	smart strip
Low Income	LI Assessment	Smart Strips - Tier 2 REA	NO: \$45.35 Per Product	0	0	smart strip
Low Income	LI Assessment	Smart Strips - Tier 1 REA	NO: \$18.75 Per Product	8350	93815	smart strip
TOTAL				11492	129122	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - ALL MEASURES

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Welcome Kit REA	NO: \$9 Per Kit	1495	70000	kit
Low Income	LI Assessment	Welcome Kit On-site	NO: \$9 Per Kit	641	30000	kit
Low Income	LI Assessment	Water Kit SF REA	NO: \$10.19 Per Kit	107	670	water
Low Income	LI Assessment	Water Kit MF REA	NO: \$10.19 Per Kit	5	35	water
Low Income	LI Assessment	Water Kit SF On-site	NO: \$10.19 Per Kit	46	287	water
Low Income	LI Assessment	Water Kit MF On-site	NO: \$10.19 Per Kit	2	15	water
Low Income	LI Assessment	Kitchen Aerator SF REA	NO: \$2.90 Per Product	3578	20151	water
Low Income	LI Assessment	Kitchen Aerator MF REA	NO: \$2.90 Per Product	141	1061	water
Low Income	LI Assessment	Bath Aerator SF REA	NO: \$2.03 Per Product	2411	31616	water
Low Income	LI Assessment	Bath Aerator MF REA	NO: \$2.03 Per Product	158	1664	water
Low Income	LI Assessment	Water Heater Pipe Insulation REA	NO: \$1.32 Per Foot	0	0	water
Low Income	LI Assessment	Low Flow Showerhead SF REA	NO: \$7.06 Per Product	1338	4632	water
Low Income	LI Assessment	Low Flow Showerhead MF REA	NO: \$7.06 Per Product	70	244	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held SF REA	NO: \$11.45 Per Product	4684	16213	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held MF REA	NO: \$11.45 Per Product	244	853	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve SF REA	NO: \$19.86 Per Product	0	0	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve MF REA	NO: \$19.86 Per Product	0	0	water
Low Income	LI Assessment	Furnace Whistle REA	NO: \$2.78 Per Product	0	0	heat
Low Income	LI Assessment	LED Night Light REA	NO: \$1.88 Per Product	1340	56438	light
Low Income	LI Assessment	LED Specialty (Globe / Candelabra) REA	NO: \$5.87 Per Bulb	4219	158025	light
Low Income	LI Assessment	LED GSL A-Line (9 Watt or other) REA	NO: \$5.87 Per Bulb	19770	541800	light
Low Income	LI Assessment	LED Reflector (Par / BR / R / downlight) REA	NO: \$5.87 Per Bulb	924	22575	light
Low Income	LI Assessment	Recycle and Replace Refrigerator REA	NO: \$923.13 Per Product	0	0	appliance
Low Income	LI Assessment	Removal/Disposal of Extra Refrigeration Unit REA	NO: \$50 Per Product	0	0	appliance
Low Income	LI Assessment	Recycle and Replace Freezer REA	NO: \$696.02 Per Product	0	0	appliance
Low Income	LI Assessment	Smart Strips - Tier 2 REA	NO: \$45.35 Per Product	0	0	smart strip
Low Income	LI Assessment	Smart Strips - Tier 1 REA	NO: \$18.75 Per Product	8350	93815	smart strip
Low Income	LI Assessment	Remote assessment & Energy Education REA	NO: \$70 Per Project	3576	45150	education
Low Income	LI Assessment	ES Dehumidifier REA	NO: \$285 Per Product	0	0	appliance
Low Income	LI Assessment	Kitchen Aerator SF On-site	NO: \$3.87 Per Product	1586	8934	water
Low Income	LI Assessment	Kitchen Aerator MF On-site	NO: \$3.87 Per Product	62	470	water
Low Income	LI Assessment	Bath Aerator SF On-site	NO: \$2.71 Per Product	1022	13401	water
Low Income	LI Assessment	Bath Aerator MF On-site	NO: \$2.71 Per Product	67	705	water
Low Income	LI Assessment	Water Heater Pipe Insulation On-site	NO: \$1.76 Per Foot	68	8708	water
Low Income	LI Assessment	Low Flow Showerhead SF On-site	NO: \$9.41 Per Product	574	1985	water

Low Income	LI Assessment	Low Flow Showerhead MF On-site	NO: \$9.41 Per Product	30	104	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held SF On-site	NO: \$15.26 Per Product	2007	6949	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held MF On-site	NO: \$15.26 Per Product	105	366	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve SF On-site	NO: \$26.48 Per Product	83	1429	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve MF On-site	NO: \$26.48 Per Product	4	75	water
Low Income	LI Assessment	Water Heater Temperature Setback On-site	NO: \$10 Per Product	365	3657	water
Low Income	LI Assessment	Heat Pump Water Heater Replacement On-site	NO: \$2,768 Per Project	803	439	water
Low Income	LI Assessment	Furnace Whistle On-site	NO: \$3.7 Per Product	8	629	heat
Low Income	LI Assessment	LED Night Light On-site	NO: \$2.5 Per Product	574	24188	light
Low Income	LI Assessment	LED Specialty (Globe / Candelabra) On-site	NO: \$7.83 Per Bulb	1808	67725	light
Low Income	LI Assessment	LED A-Line (9 Watt or other) On-site	NO: \$7.83 Per Bulb	7061	193500	light
Low Income	LI Assessment	LED Reflector (Par / BR / R / downlight) On-site	NO: \$7.83 Per Bulb	396	9675	light
Low Income	LI Assessment	Recycle and Replace Refrigerator On-site	NO: \$923.13 Per Product	0	0	appliance
Low Income	LI Assessment	Removal/Disposal of Extra Refrigeration Unit On-site	NO: \$50 Per Product	5	6	appliance
Low Income	LI Assessment	Recycle and Replace Freezer On-site	NO: \$696.02 Per Product	45	97	appliance
Low Income	LI Assessment	Smart Strips - Tier 2 On-site	NO: \$60.47 Per Product			smart strip
Low Income	LI Assessment	Smart Strips - Tier 1 On-site	NO: \$25 Per Product	3142	35307	smart strip
Low Income	LI Assessment	Energy Star Dehumidifier On-site	NO: \$285 Per Product			appliance
Low Income	LI Assessment	Smart Thermostat Heat Pump On-site	NO: \$320 Per Product	75	129	heat
Low Income	LI Assessment	Smart Thermostat Electric Furnace On-site	NO: \$320 Per Product	104	71	heat
Low Income	LI Assessment	Heat Pump Maintenance On-site	NO: \$250 Per Product	55	255	heat
Low Income	LI Assessment	On-site assessment & Energy Education On-site	NO: \$100 Per Product	1533	19350	education
Low Income	LI Assessment	Ductless Mini-split Heat Pumps On-site	NO: \$8,000 Per Product	110	50	heat
TOTAL				74791	1493448	

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

LOW INCOME ASSESSMENT PROGRAM - WATER MEASURES BY HOUSING TYPE

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Water Kit SF REA	NO: \$10.19 Per Kit	107	670	water
Low Income	LI Assessment	Water Kit SF On-site	NO: \$10.19 Per Kit	46	287	water
Low Income	LI Assessment	Kitchen Aerator SF REA	NO: \$2.90 Per Product	3578	20151	water
Low Income	LI Assessment	Bath Aerator SF REA	NO: \$2.03 Per Product	2411	31616	water
Low Income	LI Assessment	Low Flow Showerhead SF REA	NO: \$7.06 Per Product	1338	4632	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held SF REA	NO: \$11.45 Per Product	4684	16213	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve SF REA	NO: \$19.86 Per Product	0	0	water
Low Income	LI Assessment	Kitchen Aerator SF On-site	NO: \$3.87 Per Product	1586	8934	water
Low Income	LI Assessment	Bath Aerator SF On-site	NO: \$2.71 Per Product	1022	13401	water
Low Income	LI Assessment	Low Flow Showerhead SF On-site	NO: \$9.41 Per Product	574	1985	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held SF On-site	NO: \$15.26 Per Product	2007	6949	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve SF On-site	NO: \$26.48 Per Product	83	1429	water
TOTAL				17436	106267	
			% of Total MF/SF	95.15%	95.00%	

Program	Program Component	Measure Name	Measure Cost - TRM	Energy Savings (MWh/year)	Projected Participation	Measure Type
Low Income	LI Assessment	Water Kit MF REA	NO: \$10.19 Per Kit	5	35	water
Low Income	LI Assessment	Water Kit MF On-site	NO: \$10.19 Per Kit	2	15	water
Low Income	LI Assessment	Kitchen Aerator MF REA	NO: \$2.90 Per Product	141	1061	water
Low Income	LI Assessment	Bath Aerator MF REA	NO: \$2.03 Per Product	158	1664	water
Low Income	LI Assessment	Low Flow Showerhead MF REA	NO: \$7.06 Per Product	70	244	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held MF REA	NO: \$11.45 Per Product	244	853	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve MF REA	NO: \$19.86 Per Product	0	0	water
Low Income	LI Assessment	Kitchen Aerator MF On-site	NO: \$3.87 Per Product	62	470	water
Low Income	LI Assessment	Bath Aerator MF On-site	NO: \$2.71 Per Product	67	705	water
Low Income	LI Assessment	Low Flow Showerhead MF On-site	NO: \$9.41 Per Product	30	104	water
Low Income	LI Assessment	Low Flow Showerhead Hand Held MF On-site	NO: \$15.26 Per Product	105	366	water
Low Income	LI Assessment	Thermostatic Shower Restriction Valve MF On-site	NO: \$26.48 Per Product	4	75	water
TOTAL				888	5592	
			% of Total MF/SF	4.85%	5.00%	
			Total	18324	111859	

*Does not include water measures that are not specifically designated for SF or MF Households

*Compiled from CAUSE-PA I-16 and PPL Proposed EE&C Plan, Table 35. Pa PUC Table 8 Low-Income Assessment Projected Participation

APPENDIX A
Resume of Mitchell Miller

MITCHELL MILLER
60 GEISEL Road
Harrisburg, PA 17112
Home: (717) 599-5510 Mobile: (717) 903-2196
Mitchmiller77@hotmail.com

EMPLOYMENT

2009-Present Mitch Miller Consulting, LLC

Practice provides consulting services that promote the public interest with a focus on low income households. Specifically over 35 years of expertise is applied to the evaluation of regulatory policy involving customer service, complaint handling, credit and collections and universal service. Objective is to promote public policy development, program design, and implementation of programs for consumer education, energy efficiency, credit and collections, and customer assistance.

2009-2012 Pennsylvania Department of Community and Economic Development Consultant

Served as a Consultant on weatherization and energy efficiency for the Pennsylvania Weatherization Assistance Program (WAP) at PA DCED. Was instrumental in transforming the WAP program by creating a performance-based system, dedicated to a high standard of quality, compliance and production. Innovations include introducing performance standards for production, quality and compliance and independent certification and training for all state WAP workers. Also responsible for coordinating the states WAP program with the PUC, utilities and other efficiency programs.

1992-2009 Pennsylvania Public Utility Commission Director, Bureau of Consumer Services

Until his retirement from state service Mr. Miller was director of Consumer Services and PA PUC. His bureau has regulatory authority and responsibility for policy development for all areas of consumer services including resolving consumer complaints and problems, enforcing consumer regulations, developing, implementing and evaluating programs involving complaint handling, complaint analysis collections, enforcement of consumer regulations, utility customer assistance programs and low income conservation. He also directed BCS responsibilities for implementing the Pennsylvania Electric, Gas and Telephone Customer Choice Programs. Specific areas under his Direction include:

Program Evaluation and Regulation

- Monitoring and evaluating the customer service practices and programs of utilities
- Promulgating regulations, implementing procedures to meet regulatory requirement and taking enforcement action to assure compliance
- Field reviews and audits of utilities' operations and advice the Commission regarding issues of interest and concern of utility consumers
- Compliance enforcement including informal investigations and prosecution of formal cases

- Track trends in the number and type of consumer complaints and inquiries, utility performance at handling customer complaints and payment arrangement requests. Other databases utilized to track utility termination activity, collection of delinquent accounts, compliance with customer service regulations and other areas critical to evaluating utility customer service performance.
- Produce utility performance and evaluative reports for the PUC, utilities and the public

Universal Service Programs

- The LIURP is targeted toward low-income households with the highest energy consumption, payment problems, and high arrearages. Since the program's inception to 2009, the major electric and gas companies required to participate in LIURP have spent over \$530 million to provide weatherization treatments to more than 350,000 low-income households in Pennsylvania. The budgets for 2008 were 22 million for electric utilities and 9 million for gas utilities
- Customer Assistance Programs (CAPs) provide an alternative to traditional collection methods for low income, payment troubled utility customers. Customers make regular monthly payments, which may be for an amount that is less than the current bill for utility service. Budgets for CAP programs in 2008 were 189 million for electric companies and 174 million for gas companies. Utility companies have spent over 2 billion dollars for CAP through 1998.

Utility Complaint Handling and Regulation

- Responsible for establishing procedures and directing 90 staff in investigating annually over 100,000 informal consumer complaints for regulated fixed utilities, payment arrangement requests and responding to over 70,000 inquiries.
- Arbitrate billing, credit and other informal complaints and issue binding decisions to resolve informal disputes expeditiously. Investigators also issue decisions regarding the amortization of overdue electric, gas, steam heat, water, wastewater and basic telephone bills.

1978-1992

Pennsylvania Public Utility Commission

PA Chief, Division of Research and Planning

Reported to Director of Bureau of Consumer Services with direct responsibility for the direction, supervision and planning of a Division of 15 professionals who are delegated program responsibilities for regulation enforcement, utility program evaluation, customer assistance programs and consumer education. As the first Division Chief he was instrumental in creating these activities

- Bureau's compliance program in enforcing customer service regulations and statues through regulator interpretations, citations and litigation; including preparing with legal staff formal records, briefs, motions, interrogatories, reviewing utility responses and negotiating equitable settlements.
- Development and implementation of computer information evaluation systems for evaluation of utility customer service programs; systematic performance problems are identified through statistical analysis and observation and correction actions recommended via public reports, formal rate cases and consumer services audit programs.
- Managed the development of Commission's first consumer education program including proposing annual plans, statewide networking, supervising staff in conducting of workshops and conferences, and preparation of consumer education materials.

- Supervised the development of an integrated program for low income consumers; through program evaluation, leading to testimony, preparation of policy recommendations, interdepartmental coordination, regulation promulgation and establishing evaluation criteria

1977-1978 Pennsylvania Public Utility Commission Harrisburg, PA Research Analyst

Responsible for evaluating existing utility and Commission customer service programs and identifying problems and recommendations for change, which led to Division's current programs.

1974-1977 Governor's Action Center Harrisburg, PA Research Supervisor

Office supervisor for a research and information unit. Duties included the modification and maintenance of an information and evaluation system, writing technical and topical reports, quality control review and staff training. Responsible for the supervision of five case evaluator and student interns.

EDUCATION

M.S., Shippensburg University, 1984
Major: Public Administration
G.P.A. 3.9/4.0

B.S., Pennsylvania State University, 1974
Major: Community Development
Cum Laude

ADDITIONAL AFFILIATIONS

Member, Pennsylvania WAP Policy Advisory Council
Member, Keystone Energy Efficiency Alliance
Past Co-Chair Keystone Energy Efficiency Alliance Conference
Past Co-Chair National Energy and Utility Affordability Conference

EXPERT TESTIMONY

- Pa. PUC v. Pennsylvania American Water Co., Docket Nos. R-2020-3019269, -3019371
- Pa. PUC v. Columbia Gas of Pennsylvania, Docket No. R-2020-3018835
- Pa. PUC v. UGI Gas of Pennsylvania, Inc., Docket No. R-2019-3015162
- Pa. PUC v. UGI Gas of Pennsylvania, Inc., Docket No. R-2018-3006814
- Implementation of Chapter 32 of the Public Utility Code Re Pittsburgh Water and Sewer Authority, Docket Nos. M-2018-2640802, M-2018-2640803
- Pa. PUC v. Pittsburgh Water and Sewer Authority, Docket No. R-2018-3002645; R-2018-3002647
- Pa. PUC v. PECO Energy Co., Docket No. R-2018-30000164
- Pa. PUC v. Columbia Gas of Pennsylvania, Inc., Docket No. R-2018-2647577
- PECO Energy Company's Pilot Plan for an Advance Payments Program and Temporary Waiver of Portions of the Commissions Regulations, Docket No. P-2016-2573023
- Pa. PUC v. UGI Penn Electric, Inc., Docket R- 2016-2580030
- Pa. PUC v. Metropolitan Edison Company, Docket No. R-2016-2537349
- Pa. PUC v. Pennsylvania Electric Co., Docket No. R-2016-2537352
- Pa. PUC v. Pennsylvania Power Co., Docket No. R-2016-2537355
- Pa. PUC v. West Penn Power, Docket No. R-2016-2537953
- Pa. PUC v. UGI Utilities, Inc. – Gas Division, Docket No. R-2015-2518438
- Petition of Duquesne Light for Approval its Act 129 Phase III Energy Efficiency and Conservation Plan, Docket No. M-2015-2515375
- Petition of PECO Energy Co. for Approval its Act 129 Phase III Energy Efficiency and Conservation Plan, Docket No. M-2015-2515619
- Consolidated Petition of First Energy Companies for Approval its Act 129 Phase III Energy Efficiency and Conservation Plan, Docket Nos. M-2015-2514767, -2514768, -2514769, 2514772
- Petition of Philadelphia Gas Works for Approval of its Phase II Demand Side Management Plan, Docket No. P-2014-2459362
- Pa. PUC v. PECO Gas of Pa., Inc., Docket No. R-2015-2468056
- Pa. PUC v. PPL Electric Utilities Corporation, Docket No. R-2015-2469275
- Pa. PUC v. PECO Gas of Pa., Inc., Docket No. R-2014-2406274
- Verizon Pa., LLC, and Verizon North, LLC, Petition for Competitive Classification, Docket Nos. P-2014-2446303, P-2014-2446304
- Petition of PECO Energy Co. for Approval its Act 129 Phase II Energy Efficiency and Conservation Plan, Docket No. M-2012-2333992
- Petition of PECO Energy Co. for Approval of its Default Service Program II, Docket No. P-2012-2283641
- Petition of PECO Energy Co. for Approval of its Universal Service and Energy Conservation Plan, Docket No. M-2012-2290911.

Appendix B
Cited Responses to Interrogatories

Interrogatories of CAUSE-PA to PPL

CAUSE-PA to PPL I-1
CAUSE-PA to PPL I-3
CAUSE-PA to PPL I-4
CAUSE-PA to PPL I-8
CAUSE-PA to PPL I-12
CAUSE-PA to PPL I-13
CAUSE-PA to PPL I-16
CAUSE-PA to PPL I-23
CAUSE-PA to PPL I-24
CAUSE-PA to PPL I-25
CAUSE-PA to PPL I-26
CAUSE-PA to PPL I-32
CAUSE-PA to PPL I-38
CAUSE-PA to PPL I-39

Interrogatories of the Commission on Economic Opportunity to PPL

CEO to PPL I-2
CEO to PPL I-3
CEO to PPL I-4

Interrogatories of the Natural Resources Defense Council to PPL

NRDC to PPL I-4
NRDC to PPL I-5

**PPL Electric Utilities Corporation
Response to Interrogatories of the
Coalition for Affordable Utility Services and Energy Efficiency
in Pennsylvania (CAUSE-PA), Set I
Date December 31, 2020**

Docket No. M-2020-3020824

Q. CAUSE-PA-I-1. Please identify the number of customers who received an energy audit through PPL's Act 129 low income programming in Phase III, disaggregated by program year, for each of the following segmentations:

- (a) Homeowners
- (b) Tenants
- (c) Manufactured Homes
- (d) Single Family Homes
- (e) Multifamily Residential Units
- (f) Multifamily Master Metered Common Areas

A. CAUSE-PA-I-1. The table below summarizes customers who received an energy audit through PPL's Act 129 low-income programming in Phase III, disaggregated by program year, for each of the following segmentations.

	PY8 (V)	PY9 (V)	PY10 (V)	PY11 (R)
Homeowners	N/A	N/A	N/A	N/A
Tenants	N/A	N/A	N/A	N/A
Manufactured Homes	57	963	1,621	1,216
Single Family Homes	1,521	5,356	6,352	4,863
Multi-Family Residential Units (includes MMMF)	1,140	7,709	7,253	3,377
Multifamily Master Metered Common Areas	N/A	N/A	N/A	N/A
Total	2,718	14,028	15,226	9,456

Note: PPL Electric does not track homeowners, tenants and did not perform common space work in the Act 129 low-income program.

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Q. CAUSE-PA-I-3. Of the customers identified in CAUSE-PA I-1, please identify the number of customers in each segmentation who received comprehensive energy efficiency measures and services following an energy audit in Phase III, and identify the average number of measures installed per job.

A. CAUSE-PA-I-3. The table below summarizes the number of customers who received comprehensive energy efficiency measures and services through PPL’s Act 129 low-income programming in Phase III and the average number of measures installed per job.

	PY8 (V)		PY9 (V)		PY10 (V)		PY11 (R)	
	Participants Receiving Comprehensive Measures	Avg. # of Measures	Participants Receiving Comprehensive Measures	Avg. # of Measures	Participants Receiving Comprehensive Measures	Avg. # of Measures	Participants Receiving Comprehensive Measures	Avg. # of Measures
Homeowners	N/A		N/A		N/A		N/A	N/A
Tenants	N/A		N/A		N/A		N/A	N/A
Manufactured Homes	21	8	680	9	148	8	36	8
Single Family Homes	68	7	987	6	5	6	86	4
Multi-Family Residential Units (includes MMMF)	16	6	447	7	2	5	34	2
Multifamily Master Metered Common Areas	N/A		N/A		N/A		N/A	

Note: Comprehensive measures in individual units of Master Metered Multi-Family are not tracked.

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Q. CAUSE-PA-I-4. Of the customers identified in CAUSE-PA I-1, please identify the number of customers in each segmentation who were unable to receive comprehensive energy efficiency services or who received only partial services following an energy audit in Phase III due to health and safety issues with the property.

A. CAUSE-PA-I-4. The Company does not track this information.

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- Q. CAUSE-PA-I-8. See PPL Statement 1, at 13:4-5. Please identify the Conservation Service Provider selected to administer each of its programs, and provide a copy of any contract, memorandum of understanding, or other agreement entered into between PPL and the CSP for Act 129 program administration. If any of the CSPs were contracted for services in Phase, please also provide a copy of those contracts.
- A. CAUSE-PA-I-8. PPL Electric's Conservation Service Provider ("CSP") Contracts are filed confidentially with the Pennsylvania Public Utility Commission ("Commission") because they contain competitively-sensitive information. They are not publicly available, and the names of the CSPs are not disclosed until the CSP Contracts are approved. The Company also notes that in the Commission's Phase IV Implementation Order, the Commission declined to adopt a recommendation that "the CSP contract review process be public." Energy Efficiency and Conservation Program, Docket No. M-2020-3015228, p. 117 (Implementation Order entered June 18, 2020). To date, PPL Electric has filed and received approval of one CSP Contract: the Evaluation, Measurement, and Verification CSP Contract with The Cadmus Group LLC.

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Q. CAUSE-PA-I-12. See PPL Proposed EE&C Plan at 63, regarding “full cost treatment.” Does full cost treatment include measures not included in Table 33, Pa. PUC Table 7? Please provide a list of possible measures provided through “full cost treatment”, and identify the number of “full cost treatment” jobs in Phase III.

A. CAUSE-PA-I-12. Act 129 full cost treatment measures only include measures that are listed in Table 33. Customers may be referred to LIURP and receive other full cost measures which are not listed in Table 33.

In Phase III, there were 147 Full Costs jobs completed as part of Act 129.

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Q. CAUSE-PA-I-13. If PPL provides services to a customer through both its Act 129 Low Income Assessment and Low Income Usage Reduction Program, how does it categorize the shared job for reporting purposes?

A. CAUSE-PA-I-13. PPL Electric does not report shared job information, and individual aspects of the work performed on each job is credited to the program which funded the measure.

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- Q. CAUSE-PA-I-16. See PPL Statement 2 at 7:17-20. For each program, please provide a list of new measures not found in the TRM, identify the estimated savings, incremental cost, and measure life applied, and provide a citation to the secondary source relied on to identify the estimated savings.
- A. CAUSE-PA-I-16. As described in the Phase IV EEC Plan Appendix C: Calculations Methods and Assumptions, for most instances, the sector-level CSPs based their Phase IV savings calculations on the current TRM algorithms and industry practices. For measures that were not in the TRM, PPL Electric Utilities worked with the sector-level CSPs or used its experience gained from delivering programs in prior phases to calculate measure- and program-level savings, such as the average savings per lighting retrofit or custom project. In some cases, measures were found in the TRM but not all inputs could be sourced from the TRM directly. Please see CAUSE-PA-16_Non-TRM List for a complete list of measures, assumptions, and source assumptions that do not rely directly on the TRM.

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Q. CAUSE-PA-I-23. See PPL Proposed EE&C Plan at 56, Table 30, Pa. PUC Table 9, Low-Income Costs and Benefits by Program Year. Please explain the difference between “Direct Install Materials and Labor” and “CSP Delivery Fees.”

A. CAUSE-PA-I-23. The difference between “Direct Install Materials and Labor” and “CSP Delivery Fees” are the following:

Direct Install Materials and Labor – The cost of labor, educational materials, and measures.

CSP Delivery Fees – Fee paid to CSP when certain performance metrics are met.

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Q. CAUSE-PA-I-24. See PPL Proposed EE&C Plan at 57. Please identify the measures which require landlord approval.

A. CAUSE-PA-I-24. Measures that involve structural changes, changes to building fixtures, or involve landlord owned personal property would require landlord approval.

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Q. CAUSE-PA-I-25. See PPL Proposed EE&C Plan at 57. Please explain the process PPL and/or its CSP intends to use to obtain approval from landlords, specifically explaining the timing and the type of outreach PPL will perform to assist tenants to communicate program details with the landlord.

A. CAUSE-PA-I-25. PPL Electric will generally start with its in-home or remote assessment process. If the unit is deemed eligible for measures that would require landlord consent, the CSP will send a letter seeking written approval with landlord signature. The CSP will follow up with the landlord several times over 3 to 4 months if the CSP does not hear back from the landlord after the first letter. PPL Electric and the CSP are also looking at the possibility of blanket property consent for those landlords with multiple properties.

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Q. CAUSE-PA-I-26. Please provide a copy of any landlord approval forms and/or communications used to obtain landlord approval in Phase III and/or any such materials which are planned to be used in Phase IV.

A. CAUSE-PA-I-26. See CAUSE-PA-I-26 Attachment 1.



Landlord Name
Landlord Address
Landlord Address

Dear Landlord Name:

Tenants of your property(ies) may qualify for PPL Act 129 Electric Utilities' Winter Relief Assistance Program (WRAP). The purpose of WRAP is to help qualified customers reduce electric usage and improve their comfort. To proceed, we need your consent.

Depending on the results of an energy audit, we may provide your unit with some, but not necessarily all, of the following at no cost to you or your tenant.

- Appliance replacement if, after testing, the appliance proves to be a high user of electricity
- Electric water heater replacement
- Water heater pipe insulation
- Installation of aerators and energy efficient showerheads
- Caulking, weather-stripping, and door sweeps
- Insulation
- Electric heating equipment service (including thermostats)
- Energy-efficient light bulbs

Qualified and approved contractors will do the work. After completing the installation of weatherization measures, the contractors will remove all debris, including inefficient appliances replaced through WRAP.

Please indicate your consent to have measures installed by signing the enclosed Consent Form and returning it by mail to PPL WRAP Program c/o CMC Energy Services, PO Box 601, Dresher, PA 19025-9981 in the enclosed postage-paid envelope, by email to pplwrap@cmcenergy.com or by fax to 215-540-5887.

If your property is a multi-family building, and a significant portion of the tenants apply and qualify for WRAP, the entire building may be eligible for energy efficiency services.

If you have any questions, please call our toll-free number at 1-888-232-6302 between 8:00 a.m. and 6:00 p.m., Monday through Friday.

Sincerely,

PPL WRAP Program

Enclosure(s)



PPL Electric Utilities

PPL Electric Utilities
827 Hausman Road
Allentown, PA 18104-9392

www.pplelectric.com

PPL Act 129 WRAP Landlord Consent Form

I have read and understand the above letter explaining PPL's Winter Relief Assistance Program (WRAP). I consent to the installation of weatherization materials recommended in the energy survey(s) at the below address. I understand that the materials are installed as part of WRAP and constitute an effort by the company to assist their customers in the wise use of energy.

I consent to the removal of any existing appliances that meet PPL's replacement guidelines in exchange for a new, energy-efficient appliance. If the previously-existing appliance was owned by the tenant, I understand that the new, replacement appliance may not remain at the existing location.

Property Name: _____

Property Address: _____

Landlord Name: _____

Landlord Address: _____

Landlord Phone: _____

Landlord Email: _____

Tenant Name: _____ Phone: _____

Date: _____ Authorized Signature: _____

PPL WRAP Landlord Blanket Consent

If you have multiple tenants at the above location or other location that may qualify, please indicate your blanket consent for your property(ies) and provide the names and contact information of the other tenants so that we may contact them to provide similar services.

Property Name: _____

Property Address: _____

Tenant Name: _____ Phone: _____

Tenant Name: _____ Phone: _____

Tenant Name: _____ Phone: _____

Tenant Name: _____ Phone: _____

Tenant Name: _____ Phone: _____

Date: _____ Authorized Signature: _____

(Please use additional sheets if necessary)

**PPL Electric Utilities Corporation
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Q. CAUSE-PA-I-32. Does PPL intend to use its Act 129 CSP to also administer Low Income Usage Reduction program services? Please explain.

A. CAUSE-PA-I-32. PPL Electric coordinates cooperation between Act 129 low income and LIURP work internally. LIURP is run independent of Act 129 and follows its own program guidelines. The Company routinely evaluates its programs and contractors to achieve efficiencies and operational flexibility to better serve its customers.

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- Q. CAUSE-PA-I-38. See PPL Proposed EE&C Plan at 152. Is PPL currently considering any pilot programs, new technology, or experimental equipment for Phase IV? If so, please describe each pilot program under consideration.
- A. CAUSE-PA-I-38. PPL Electric Utilities has funds allocated for pilot programs, new technology, and experimental equipment in Phase IV, but only one specific initiative has been identified thus far. This initiative is an energy analyzer that helps customers make the right energy efficiency choices for their home or business. This pilot is still in the early development phase, but additional details should be available by the end of PY13.

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Date December 31, 2020**

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Q. CAUSE-PA-I-39. Please provide a list of all pilot programs, new technology, or experimental equipment deployed in Phases I through III, and identify whether the pilot, technology, or equipment was adopted as an available measure in any of its programs after the pilot period. Please provide any available written assessment of the pilot program, new technology, or experimental equipment.

A. CAUSE-PA-I-39. PPL Electric Utilities has deployed several pilot programs in Phases I through III. The table below indicates the pilot program or technology, the phase it was tested, a short summary, and the outcome. Assessments done through the annual evaluation process can be found in the Company's annual reports posted on the PaPUC's website:
<https://www.puc.pa.gov/filing-resources/issues-laws-regulations/act-129/electric-distribution-company-act-129-reporting/>

Name	Phase Deployed	Summary	Outcome
Low Income E-Power Wise	Phase I	In PY3, PPL Electric Utilities planned a pilot delivery channel, mailing the energy kits to customers.	This was implemented in Phase II (E-Power Wise) and Phase III (Energy Efficiency Kits and Education).
De Facto Heating Pilot	Phase II	The PY7 De Facto Heating Pilot targets low-income households that use an inefficient or unsafe electric heat source, such as portable electric space heaters or an electric stove, in place of their inoperable fossil fuel heating system. Through the pilot, PPL Electric Utilities replaced the inoperable heating system of participants with an efficient heat pump system. Some participants were also eligible to receive a heat pump water heater and full-cost products and services through the Winter Relief Assistance Program (WRAP).	PPL Electric Utilities decided to terminate the pilot in PY7 and not carry it forward into PY8
Wise Home Pilot	Phase II	This PY7 pilot offered two kinds of weatherization: a full treatment that included air sealing and duct sealing and a partial treatment that included air sealing but not duct sealing. Both treatment types included the direct installation of weather strips, window insulation, door caddies, outlet gaskets, pipe	The Act 129 Winter Relief Assistance Program (WRAP) provides weatherization to income qualified customers, using Act 129 funding to expand the existing Low-Income Usage Reduction

		insulation, window air conditioner covers, LEDs, and advanced power strips. Technicians also installed aerators and showerheads in homes with electric water heaters.	Program. This was adapted into Phase III as part of the manufactured homes component of WRAP.
Fuel-switching Pilot Program	Phase II	In PY7, PPL Electric Utilities continued the fuel-switching pilot program, which was offered for the first time in PY5. This program offered rebates to customers who used electric space or water heat and installed new efficient non-electric space or water heating equipment. Three programs in PPL Electric Utilities' Phase II portfolio included equipment that could involve fuel-switching—Residential Home Comfort, Residential Retail, and Prescriptive Equipment. Only customers in the Residential Retail and Residential Home Comfort Programs participated in PY7.	These technologies continued to be offered in Phase III.
Smart Thermostats (new tech IMP development)	Phase III	PPL Electric Utilities' evaluation CSP developed the interim measure protocol for smart thermostats for Phase III.	This protocol was approved and adopted by the commission. PPL Electric Utilities adopted this technology in Phase III.
Showerstart Pilot	Phase III	This pilot involved installing and monitoring thermostatically controlled shower heads (Showerstart). Research results discussed water and energy savings. Surveys and in-home observations offered process-related findings.	The pilot was completed and the technology was included in WRAP in Phase III.
Baseboard Heating Pilot	Phase III	PPL Electric Utilities and the residential CSP initiated recruiting for the pilot that would install smart thermostats in homes with baseboard heating. Each baseboard heater control could potentially be replaced with a smart thermostat.	The pilot was completed but PPL Electric Utilities did not move forward with this technology.

**PPL Electric Utilities Corporation
Response to Interrogatories of the
Commission on Economic Opportunity (CEO), Set I
Date January 4, 2021
Docket No. M-2020-3020824**

Q. CEO-I-2. Please explain whether the Conservation Service Provider that will administer/operate the low-income component of PPL Phase IV, or its sub-contractors, will provide any services funded with LIURP funding.

A. CEO-I-2. When performing services under the Phase IV EE&C Plan's Low-Income Program, the Low-Income CSP will only use Act 129 funding as laid out in the Phase IV EE&C Plan.

**PPL Electric Utilities Corporation
Response to Interrogatories of the
Commission on Economic Opportunity (CEO), Set I
Date January 4, 2021
Docket No. M-2020-3020824**

Q. CEO-I-3. If PPL provides services to a customer through both its Act 129 Low Income Assessment and Low-Income Usage Reduction Program, will the CBOs who currently perform LIURP services for PPL continue to perform the services funded with LIURP funding.

A. CEO-I-3. The contractor(s) who perform LIURP services are controlled by the Company's Universal Services and Energy Conservation Plan, not its Energy Efficiency and Conservation Plan. Therefore, a customer's participation in Act 129 Low Income Assessment would not affect which contractor(s) may perform services under LIURP. The Company routinely evaluates its programs and contractors to achieve efficiencies and operational flexibility to better serve its customers.

**PPL Electric Utilities Corporation
Response to Interrogatories of the
Commission on Economic Opportunity (CEO), Set I
Date January 4, 2021
Docket No. M-2020-3020824**

Q. CEO-I-4. Will the Conservation Service Provider that administers/operates the low-income component of PPL Phase IV perform or enter into subcontracts with other entities for work that will be funded with LIURP funds?

A. CEO-I-4. No. The Low-Income Program CSP may enter into sub-contracts, but those contracts will only involve Act 129 funding.

**PPL Electric Utilities Corporation
Response to Interrogatories of the
Natural Resources Defense Council (NRDC), Set I
Date December 31, 2020**

Docket No. M-2020-3020824

Q. NRDC-I-4. What percentage of the Residential Program savings as included in the Phase III and Phase IV plans have and are projected to come from lighting measures? Please provide for each year of the Phase III and IV plans.

A. NRDC-I-4. For Phase III, please reference Table 7. Pa PUC Table 4 - Program Summary Residential.

Please reference Table 8. Pa PUC Table 5 - Residential, C&I Small, and C&I Large Portfolio Summaries and Table 21. Pa PUC Table 8-Efficient Lighting Projected Participation in the Phase IV plan.

Phase	Year 1	Year 2	Year 3	Year 4	Year 5
III	69.96%	65.71%	58.73%	43.79%	*
IV	11.20%	10.55%	5.78%	2.88%	1.30%

**PPL Electric Utilities Corporation
Response to Interrogatories of the
Natural Resources Defense Council (NRDC), Set I
Date December 31, 2020**

Docket No. M-2020-3020824

Q. NRDC-I-5. What percentage of the Low-Income Program savings as included in the Phase III and Phase IV plans have and are projected to come from lighting measures? Please provide for each year of the Phase III and IV plans.

A. NRDC-I-5. For Phase III, the plan did not project lighting measures savings in the Low-Income sector programs. For Phase IV, please reference Table 35. Pa PUC Table 8-Low-Income Assessment Projected Participation.

BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

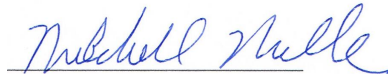
Petition of PPL Electric Utilities :
Corporation of its Act 129 Phase IV : Docket No. M-2020-3020824
Energy Efficiency and Conservation Plan :

VERIFICATION

I, Mitchell Miller, verify that the following testimony was prepared by me or under my direct supervision, and is true and correct to the best of my knowledge, information, and belief:

- CAUSE-PA Statement 1: Direct Testimony of Mitchell Miller on Behalf of the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania, and attached Exhibits MM-1 through MM-9 and Appendices A and B

I understand that statements made herein are made subject to the penalties of 18 Pa. C.S. §4904 (relating to unsworn falsification to authorities).



Mitchell Miller
Witness for CAUSE-PA

Date: February 5, 2021

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of PPL Electric Utilities :
Corporation for Approval of its Act 129 :
Phase IV Energy Efficiency and : Docket No.: M-2020-3020824
Conservation Plan :

**DIRECT TESTIMONY
OF JOHN COSTLOW**

DATED: January 13, 2021



DIRECT TESTIMONY OF JOHN M. COSTLOW

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Q. Please state your full name and business address?

A. My name is John M. Costlow. My business address is 4250 Independence Drive Suite 100 Schnecksville, PA 18078.

Q. By whom are you employed and in what capacity?

A. I am the President and Chief Executive Officer of the Sustainable Energy Fund (“SEF”). I was previously employed by Florida Public Utilities as Manager, Marketing and Energy Conservation.

Q. What are your duties as President of SEF?

A. As President and Chief Executive Officer for SEF, I am responsible for managing the ongoing operations of the organization whose mission is to promote, research, and invest in clean and renewable energy technologies, energy conservation, energy efficiency and sustainable energy enterprises that provide opportunities and benefits for PPL Electric ratepayers.

Q. What is your educational background?

A. I received a Bachelor of Science Degree in Organizational Management from Palm Beach Atlantic University and I am a graduate of the U.S. Navy Nuclear Power School where my studies focused on nuclear physics, reactor principles, electrical power generation, electronic monitoring and controls. I am currently a graduate student at Liberty University where I will graduate next semester.

1 **Q. What professional certification or positions do you hold?**

2 A. I have received professional certifications as a Certified Carbon Reduction Manager, a
3 Certified Sustainable Development Professional, a Performance Contracting and Funding
4 Professional, a Certified Passive House Consultant and a Certified Renewable Energy
5 Professional.

6

7 **Q. Have you previously testified or provided comment before the PUC?**

8 A. Yes. I entered comments to the working group discussion at Docket No. M-2008-2069887
9 relating to the implementation of ACT 129 and entered comments at Docket No. M-2012-
10 2289411 and M-2014-2424864 concerning the design and implementation of any future
11 Act 129 EE&C program. In addition, I have participated in and entered comments to the
12 Commission's Low Income Working Group and Fuel Switching Working Group. I
13 testified in the proceeding that established PPL Electric Utilities Corporation's ("PPL
14 Electric" or "Company") EE&C Plan (at Docket No. M-2009-2093216). I also testified in
15 PPL Electric's Time of Use Rate proceedings at Docket Numbers R-2009-2122718, R-
16 2011-2264771, P-2013-2389572, and M-2016-2578051. Rate increase proceedings at
17 Docket Numbers R-2010-2161694 and R-2012-229057, R-2015-246275 and the default
18 service proceedings at Docket No. P-2012-2302074 and P-2014-2417909. AEC
19 proceeding Docket at R-2008-2060309. Distributed Energy Resource Management Plan at
20 Docket No. P-2019-3010128 In addition, I testified in the proceeding that established UGI
21 Utilities – Electric Division's Energy Efficiency and Conservation Plan (at Docket No. M-
22 2010-2210316). I have also submitted comments and testimony on PPL's EE&C Phase II

1 Plan at Docket No. M-2012-2334388, PPL’s EE&C Phase III Plan at Docket M-2015-
2 2515642 as well as comments in the present proceeding.

3
4 **Q. Mr. Costlow, please describe the subject matter of your testimony in this proceeding?**

5 A. My testimony concerns PPL Electric’s proposed Act 129¹ Phase IV Energy Efficiency and
6 Conservation Plan (“Plan”), insofar as it relates to the proposed rebate incentives for the
7 Small Commercial and Industrial Customers (“Small C&I Customers”), the lack of
8 substantive and specific details on the educational programs for those same customers, and
9 the Plan’s lack of details as to how PPL intends to measure the savings attained by the
10 Government, Non-Profit, and Educational (“GNE”) customer class.

11
12 **Q. In your opinion, is PPL Electric’s EE&C plan as filed in the best interest of the**
13 **ratepayers?**

14 A. Many of PPL’s initiatives are congruent with the goals of Act 129, but my comments
15 specifically relate to improvements to the Plan. Currently the plan relies too heavily on the
16 energy reduction among Small C&I Customers without having a more concrete plan of
17 how to bring awareness and education to this customer base. Also, the plan offers too low
18 and too uncertain of an incentive to garner the participation of PPL’s Small C&I
19 Customers. Finally, although the Commission is not requiring a specific level of savings
20 from the GNE customer class as it has in past phases of Act 129, the Commission is still
21 requiring EDCs to include in its annual reports the level of savings actually attained by the

¹ 2008, Oct. 15, P.L. §592, No. 129 (66 Pa. C.S. §2806.1) (“Act 129”).

1 GNE customer class and it is important that PPL establish a defined procedure to record
2 those savings on day one to ensure an accurate account.

3

4 **Q. Does the Plan offer efficiency programs or measures that are targeted to Small
5 Commercial and Industrial Customers?**

6 A. Yes. In addition to a Demand Response program that is offered to both Small and Large
7 C&I customers, PPL's Plan offers two (2) programs to Small C&I Customers.

8

9 **Q. Is it important for PPL that Small C&I Customers participate in the PPL Plan?**

10 A. Yes, the Small C&I Customers are vital to PPL meeting its Act 129 compliance target of
11 reducing the energy demand of its customers by 1,250,157 MWh/year. According to PPL's
12 Plan, the Small C&I Customers, which now includes customers previously categorized as
13 Government, Non-Profit, and Educational customers, will be called upon to account for the
14 reduction of 545,004 MWh/year, or about 35%% of the total energy reduction, per year,
15 under the PPL Plan.

16

17 **Q. What programs or measures are offered to the Small C&I Customers?**

18 A. The Small C&I Customers are eligible to participate in Efficient Equipment and a Custom
19 program. Under each eligible program, PPL proposes to offer incentives to become energy
20 efficient.

21

1 **Q. What concern(s) do you have with regards to the programs being offered?**

2 A. I have three concerns with the Plan. My first two concerns are the same concerns that were
3 the subject of my testimony in PPL's Phase III Plan and which continue to be problematic
4 in PPL's proposed Phase IV Plan.

5 My first concern is the awareness of the programs offered and the knowledge of how to
6 navigate the process of taking advantage of the incentives offered to Small C&I customers.

7 My second concern is that the range of incentives for Small C&I customers, \$0.02 - \$0.22
8 per kWh saved, is too low to incentivize Small C&I Customers to make wholesale changes
9 to their business operation, which PPL is counting on to meet its Act 129 compliance target.

10 And my third concern is the lack of detail PPL provided to ensure that savings attained by
11 GNE customers are accurately tracked for inclusion in the Company's annual reports.

12 **Education and Awareness**

13 **Q. With respect to your first concern, regarding education, can you be more specific**
14 **about your concerns?**

15 A. Yes. For both the Efficient Equipment and Custom programs that PPL intends to offer to
16 Small C&I customers, PPL identifies three concerns it has for the success of each
17 respective program: 1) the owner of the property does not prioritize energy efficiency, 2)
18 customers only replace energy consuming appliances or fixtures upon failure, and 3)
19 customers are unaware of the benefits. These three concerns are troubling because they all
20 revolve around the third concern that PPL identifies, unawareness. I believe that upon being
21 made aware of the incentives offered by PPL under the Plan, the first two concerns dissipate
22 because property owners will come to realize the many benefits that come with prioritizing

1 energy efficiency, which in turn will motivate customers to replace outdated, inefficient
2 devices with energy efficient fixtures prior to these fixtures' complete failure.

3 And although PPL proposes an extensive, albeit vague, list of marketing efforts it will
4 undertake to promote these programs, I am concerned that they are not sufficiently targeted
5 to meet the Company's projected savings for the Small C&I customer classes.

6
7 **Q. With respect to your first concern, regarding education, what do you recommend be
8 done to resolve your concerns?**

9 A. I recommend that PPL engage an independent third party ("ITP") who will set up
10 educational seminars with the goal of educating Small C&I customers on the spectrum of
11 possible energy efficient initiatives. These seminars will train representatives of Small
12 C&I customers on all types of energy efficiency actions as well as the cost reductions,
13 incentives, and other benefits that come along with energy efficiency initiatives. This ITP
14 will also be responsible for the creation and implementation of the marketing program to
15 solicit Small C&I Customer participation in the educational seminars.

16
17 **Q. What type of ITP would be best to address this lack of education and awareness
18 among Small C&I customers?**

19 A. First the ITP must be knowledgeable in PPL's Act 129 requirements as well as the
20 programs offered within the Plan. Second, the ITP must have the ability to hold educational
21 seminars throughout the PPL territory. Third, the ITP must have the ability to hold creative,
22 engaging, and informative seminars that succinctly and effectively convey: (1) what
23 initiatives are available under the Plan; (2) what incentives are offered to customers for

1 implementing the initiatives; and (3) what guidelines, and where to find them, are required
2 in order to earn the maximum incentives and benefits under the Plan.

3 Rebates

4 **Q. Please describe your second concern with PPL's Plan regarding the rebates being**
5 **offered to Small C&I Customers.**

6 A. The programs offered to Small C&I Customers are based upon the number of annual kWh
7 saved. The proposed incentives range, for both Small C&I customers, from \$0.02 - \$0.22
8 depending on certain eligibility requirements. The incentive range offered in PPL's Phase
9 IV Plan is broader, with a lower floor incentive, and therefore more uncertain than the
10 range that was offered in PPL's Phase III Plan, \$0.05 - \$0.14. And while it may be true
11 that, in some cases, energy efficiency can be achieved by updating certain electrical
12 equipment, in many cases true energy efficiency requires behavioral changes. I am
13 concerned that offering a wider range of incentives that leaves a customer with more
14 uncertainty about the value of the incentive, while up-front prices for energy efficient
15 equipment has increased, will result in many Small C&I Customers resisting a shift to a
16 more energy efficient operation.

17
18 **Q. What changes do you recommend?**

19 A. I recommend that the incentive range be both increased and more narrowly defined. I
20 believe that an incentive range of \$0.13 - \$0.22 be offered to Small C&I customers. This
21 range will, I believe, incentivize Small C&I customers to opt for more energy efficient
22 practices and operations. In my opinion, such a range will be needed for Small C&I
23 customers to participate in PPL's programs; and such participation of the Small C&I

1 customers is required given that about 36% of PPL's energy reduction per year is attributed
2 to this class of customers.

3
4 **Tracking and reporting GNE savings**

5 **Q. Please describe your concern regarding tracking the GNE customers.**

6 A. The Commission declined to include a specific GNE carveout for Phase IV because it
7 determined that this customer class would realize savings in Phase IV through programs
8 offered to other non-residential customers; however, the Commission is requiring PPL to
9 track GNE savings so that it can be reported in the annual report. Although the
10 Implementation Order does not specifically indicate the rationale as to why PPL is required
11 to report GNE savings in its annual report, it is presumably to measure whether the GNE
12 customer class realizes the projected savings without a specific carveout that can be
13 considered in implementing a potential Phase V of Act 129.

14 My concern is that PPL has not outlined a plan to track GNE savings in its proposed Plan.
15 Because this is the first time that GNE customer savings have not been tracked as a separate
16 customer class, it is of paramount importance that savings derived from this class is
17 accurately tracked so the effect(s) of eliminating a specific GNE carveout can be evaluated
18 moving forward.

19
20 **Q. What changes do you recommend?**

21 A. I recommend that prior to PPL's Plan being approved, PPL provide a detailed proposal, to
22 which stakeholders can comment on, as to how it will ensure that savings attained by
23 customers categorized as GNE are separately tracked from Small and Large C&I customers

1 so that GNE-specific savings can be reported in PPL's annual report. I further propose that
2 PPL be required to separately track and report savings attained from small GNE customers
3 and large GNE customers so that it is evident from the annual reports of whether the GNE
4 savings are being achieved from small or large GNE customers.

5

6 **Q. Does this conclude your testimony?**

7 **A.** Yes. However, I reserve the right to supplement my testimony.

8

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of PPL Electric Utilities :
Corporation for Approval of its Act 129 :
Phase IV Energy Efficiency and : Docket No.: M-2020-3020824
Conservation Plan :

**SUPPLEMENTAL DIRECT TESTIMONY
OF JOHN COSTLOW**

SEF Statement

1-SD

DATED: January 27, 2021

1 **Q. Please state your name and on whose behalf you are testifying.**

2 **A.** I am John M. Costlow, the President and Chief Executive Officer of the Sustainable Energy
3 Fund of Central Eastern Pennsylvania (“SEF”), and offer this Supplemental Direct
4 testimony on its behalf.

5

6 **Q. Did you file direct testimony in this proceeding?**

7 **A.** Yes.

8

9 **Q. What is the subject of your Supplemental Direct testimony?**

10 **A.** I believe it is necessary for the Commission to take a hard look at the savings target for
11 Small C&I Customers. My testimony here is consistent with my previously filed direct
12 testimony, and is offered here to provide a more complete picture of my direct testimony
13 as influenced by the comments filed with the Commission.

14 In short, I believe PPL is unrealistically optimistic with regards to its savings targets for its
15 Small C&I customer class.

16

17 **Q. Specifically, what is your concern with PPL’s savings target for its Small C&I
18 customer class?**

19 **A.** My concern is that PPL has projected a savings target for Small C&I customers (545,004
20 MWh per year) that is not realistic given PPL’s recent history with respect to this customer
21 class.

22 Under PPL’s initial Phase III EE&C Plan, PPL had an original savings target of 462,861
23 MWh for Small C&I customers. It forecasted that acquisition costs for non-residential

1 customers would be approximately \$0.21 per annual kWh saved, a lower acquisition cost
2 than the company’s Phase II program acquisition costs.¹ However, in 2018, PPL petitioned,
3 and the Commission approved, more than a 25% reduction (nearly 117,500 MWh per year)
4 from the initial savings targets to a new savings target of 342,861 MWh per year. In its
5 petition seeking this reduction PPL asserted that such a reduction was necessary because
6 “the program acquisition cost of the Small C&I sector will increase from approximately
7 \$0.15 per annual kWh saved to \$0.23 per annual kWh saved.”²

8 Given that PPL has stated that “Phase IV programs have a slightly higher acquisition cost
9 than Phase III programs”³, I have a real concern that PPL will not be able to achieve this
10 savings target and will thus petition to reduce its Small C&I savings target in the future.
11 Additionally, because the Small C&I savings target may be inflated, PPL’s overall
12 projections might also be inflated.

13
14 **Q. Do you have a recommendation concerning your testimony?**

15 A. I do not have a specific recommendation. If PPL is able to achieve its ambitious Small C&I
16 savings targets, then it should be applauded. However, unless and until PPL provides some
17 details regarding how it will achieve a Phase IV savings target that has increased by
18 202,143 MWh over the revised and reduced Phase III target despite “slightly higher [Phase

¹ *PPL Electric Corporation for Approval of its Act 129 Phase III Energy Efficiency and Conservation Plan*, Docket No. M-2015-2515642, (Nov. 30, 2015) at EE&C Plan p. 11.

² *Petition of PPL Electric Utilities Corporation for Approval of Changes to Its Act 129 Phase III Energy Efficiency and Conservation Plan*, Docket No. M-2015-2515642, (July 20, 2018) p. 11.

³ *PPL Electric Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan*, Docket No. M-2020-3020824, (Nov. 30, 2020) at p. 5.

1 IV] acquisition costs”, I remain skeptical of PPL’s ability to actually attain that goal and
2 believe that it warrants a close examination of PPL’s overall savings targets to ensure it
3 can achieve the Commission’s mandated 1,250,157 MWh per year verified savings.

4

5 **Q. Does this conclude your testimony?**

6 A. Yes, but I reserve the right to revise or supplement this testimony in the future.

7

8

COMMISSION ON ECONOMIC OPPORTUNITY

CEO Statement No. 1

Direct Testimony of Eugene M. Brady

In Re: PPL Electric Utilities Corporation -
Petition for Approval of Act 129 Phase IV
Energy Efficiency & Conservation Plan

Docket Number: R-2020-3020824



Q. Please state your full name and business address.

A. Eugene M. Brady, 165 Amber Lane, PO Box 1127, Wilkes-Barre, Pennsylvania 18703-1127.

Q. By whom are you employed and in what capacity?

A. I am employed by the Commission on Economic Opportunity (CEO) as Executive Director.

Q. What are the interests of the Commission on Economic Opportunity in this proceeding?

A. The Commission on Economic Opportunity is a non-profit organization serving the low income and elderly in Luzerne County, PA. In a typical year, the Commission serves more than 20,000 Luzerne County residents, of which 98% are at or below 150% of the poverty level. It is part of our responsibility to our constituency to advocate for their interests in regulatory proceedings.

Q. What background and experience in energy issues qualify you and the Commission on Economic Opportunity to participate in this case?

A. I have served as the Executive Director of the Commission since 1978. During my tenure CEO's experience and the expertise of its staff in energy programs has been recognized on state and national levels. CEO's energy related programs have been acknowledged by receipt of a Superior Achievement Award from the United States Department of Energy. The Commission has weatherized more than 25,000 homes under the U.S. Department of Energy Weatherization

Assistance Program. The organization also serves as a subcontractor for the PPL Electric Utilities' WRAP Program (LIURP) and the Low-Income Usage Reduction Programs operated by the UGI Gas and Electric Divisions. In addition to energy conservation, the CEO is the contracted operator of Customer Assistance Programs sponsored by PPL and UGI and operates the hardship assistance funds for each of those utility companies. CEO is also the PA Department of Public Welfare's contracted operator of the crisis component of the Low-Income Home Energy Assistance Program (LIHEAP) in Luzerne and Wyoming Counties. CEO was also a major contractor for PPL in the Low-Income Renewable Energy Pilot, and secured funding and installed several solar thermal water heating systems for the former PG Energy and UGI Gas Division.

Throughout my career I have served on numerous Boards, Committees and Task Forces in the energy field under the auspices of the US Department of Energy, The PA Department of Community & Economic Development and the PA Public Utility Commission. Presently, I serve on the Board of Directors of the National Center for Appropriate Technology; I am on the Board of the National Community Action Foundation, the Chair of the Pennsylvania Weatherization Providers Task Force, and Chair of the Department of Community & Economic Development Weatherization Policy Advisory Council.

Additionally, CEO has been an active party in many restructuring and rate cases before the PUC including both PG Energy's (R-00994783) and UGI's (R-00994786) restructuring cases, and prior PPL Electric rate proceedings and participated in those matters to address universal service issues. CEO was also an active party in UGI's application to purchase PG Energy (A-120011F2000) and both PG Energy's and PPL Gas' prior rate cases (R-00061365, R-00061398). CEO was also an active party in this Company's last rate case.

Q. Has CEO been involved in prior Act 129 proceedings?

A. Yes. CEO submitted comments and reply comments in regard to the Commission's most recent Phase IV proceeding. **(No. M-2020-3015228)**. Our comments addressed the low-income carve out, low-income measures and the need to coordinate those Act 129 measures with a company's LIURP program.

Q. Please describe the areas of your testimony.

A. My testimony will address the low-income portion of the Company's Plan. Specifically, I will address the need to coordinate low-income energy efficiency measures under the Plan with the Company's existing LIURP program. I will also address the need for the Company's assurance to expend its committed LIURP funding and to continue to use the community-based organizations it currently uses in the implementation of its LIURP program.

Q. In its Act 129 Phase IV Implementation Order did the Commission address the need to coordinate Act 129 measures with LIURP?

A. Yes. In its Implementation Order the Commission encouraged "stakeholders to consider more comprehensive proposals describing the nature, structure, and implementations of potential alternate approaches to coordination in future proceedings." **(Implementation Order, p. 37)**.

Q. How does the Company address coordination between Act 129 and LIURP?

A. In a discovery response the Company indicated it "coordinates cooperation between Act 129 low income and LIURP work internally. LIURP is run independent of Act 129 and follows its own program guidelines. The Company routinely evaluates its programs and contractors to achieve efficiencies and operational flexibility to better serve its customers." **(Response to CAUSE-PA-I-32)**.

The Company has also indicated that it plans to have its Act 129 low-income Conservation Service Provider (CSP), and its subcontractors, perform baseload and other

measures that would also be part of the LIURP program, though that work would be funded with Act 129 funding. It is my understanding that full-cost LIURP measures would be referred to and funded under the LIURP program.

Q. Do you have a proposal regarding coordination of those low-income Act 129 measures and LIURP?

A. Yes. I believe that income eligible customers should be referred to the community-based organizations (CBOs) that perform the Company's LIURP work for the installations of Act 129 measures.

CBOs have the expertise in developing and operating programs that benefit people and communities. These organizations serve thousands of low income and disadvantaged members of the community; they have direct knowledge of the barriers and impediments to self-sufficiency, and continually innovate and evolve the service delivery system to better meet the needs of the population they serve.

Taking CEO as an example, from the background set forth above one can see the large number of low-income customers it has served over the decades of operating various programs for low-income customers. These include both utility operated universal service programs as well as weatherization under LIHEAP and the DOE Weatherization Assistance Program. Certainly, using CBOs with this experience will provide greater coordination between Act 129 services and other energy reduction services provided to low-income customers.

Q. How would you propose this be put into effect?

A. The Company has indicated that it has not finalized its contract with its low-income CSP. I know in the case of CEO it has a contract with the Company to install LIURP measures and I would presume that other CBOs have similar contracts. I propose that the LIURP measures that

would be provided under the Act 129 Plan be referred to those CBOs under the terms of those existing contracts.

Q. Is there any other matter you would like to address?

A. Yes. CEO has always enjoyed a good working relationship with the Company and appreciates its commitment to its universal service programs, including LIURP. Under its existing Universal Service and Energy Conservation Plan (USP) the Company has committed to annual LIURP funding levels and has set forth the entities involved in delivering those LIURP measures. CEO is one of those entities.

During this past year the Company suspended its LIURP work for a time due to the COVID-19 pandemic. Further, in this proceeding the Company has indicated in discovery that “it routinely evaluates its programs and contractors to achieve efficiencies and operational flexibility to better serve its customers.” **(Resp. to CEO-I-3)**.

As indicated in its Act 129 Plan there is connectivity between the Company’s Act 129 program and its LIURP program; each is important to the other. Accordingly, it is important to its Act 129 Plan that the Company continue with the commitments contained in its Universal Service Plan.

Q. Do you have a proposal in this regard?

A. Yes. Because of its importance to its Act 129 Plan, I am suggesting that the Company commit to the LIURP annual funding set forth in its Universal Service and Energy Conservation Plan, with any unspent funds being carried over to the subsequent year. I am also requesting that the Company commit to using those CBOs that it has traditionally used in its USP absent any performance issues on the part of those CBOs.

Q. Can you summarize your recommendations?

A. I am recommending the following:

1. That the LIURP measures that would be provided under the Act 129 Plan be referred to those CBOs currently engaged in the Company's LIURP program under the terms of their existing contracts;

2. That the Company commit to the LIURP annual funding set forth in its Universal Service and Energy Conservation Plan, with any unspent funds being carried over to the subsequent year;

3. That the Company commit to using those CBOs that it has traditionally used in its LIURP program absent any performance issues on the part of those CBOs.

Q. Does this conclude your testimony?

A. Yes.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

PPL Electric Utilities Corporation – Petition :
For Approval of Act 129 Phase IV Energy : Docket No. M-2020-3020824
Efficiency & Conservation Plan :

The undersigned certified that he served a copy of the foregoing Commission on Economic Opportunity’s Statement No. 1 – Direct Testimony of Eugene M. Brady upon the following participants this 13th day of January, 2021, via electronic mail only:

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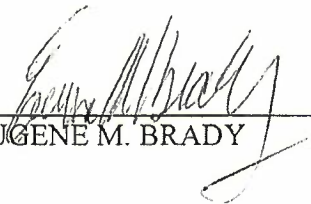
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VERIFICATION

I, **EUGENE M. BRADY**, hereby state and verify the following:

1. I am the Executive Director of the Commission on Economic Opportunity.
2. I have submitted in this proceeding, through counsel, written direct testimony, CEO Statement No. 1.
3. In lieu of my appearance at hearing in this matter, I am offering CEO Statement No. 1 into evidence at hearing through the statements set forth in this Verification.
4. If I were called to testify at hearing, the answers to the questions I gave in CEO Statement No. 1 would be the answers given by me at hearing in response to those same questions.
5. The facts set forth in my answers contained in CEO Statement No. 1 are true and correct and represent my answers to those questions.
6. There are no additions, corrections or deletions I would propose to CEO Statement No. 1.



EUGENE M. BRADY

Date: February 5, 2021

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of PPL Electric Utilities Corporation :
for Approval of its Act 129 Phase IV Energy : M-2020-3020824
Efficiency and Conservation Plan :

REVISED DIRECT TESTIMONY OF

ALICE NAPOLEON

AND

KENJI TAKAHASHI

ON BEHALF OF

NATURAL RESOURCES DEFENSE COUNCIL

January 19, 2021

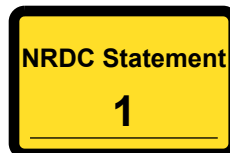


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1. INTRODUCTION AND QUALIFICATIONS

2 **Q. Please state your name, title, and employer.**

3 A. **Ms. Napoleon:** My name is Alice Napoleon. I am a Senior Associate at Synapse Energy
4 Economics, Inc. (“Synapse Energy Economics”) located at 485 Massachusetts Avenue,
5 Suite 3, Cambridge, MA 02139.

6 A. **Mr. Takahashi:** My name is Kenji Takahashi. I am a Senior Associate at Synapse
7 Energy Economics, Inc. (“Synapse Energy Economics”) located at 485 Massachusetts
8 Avenue, Suite 3, Cambridge, MA 02139.

9 **Q. Please describe Synapse Energy Economics.**

10 A. Synapse Energy Economics is a research and consulting firm specializing in electricity
11 and gas industry regulation, planning, and analysis. Our work covers a range of issues,
12 including economic and technical assessments of demand-side and supply-side energy
13 resources, energy efficiency policies and programs, integrated resource planning,
14 electricity market modeling and assessment, renewable resource technologies and
15 policies, and climate change strategies. Synapse works for a wide range of clients,
16 including state attorneys general, offices of consumer advocates, trade associations,
17 public utility commissions, environmental advocates, the U.S. Environmental Protection
18 Agency, U.S. Department of Energy, U.S. Department of Justice, the Federal Trade
19 Commission, and the National Association of Regulatory Utility Commissioners.
20 Synapse has over 30 professional staff with extensive experience in the electricity
21 industry.

1 **Q. Please summarize your professional and educational experience.**

2 A. **Ms. Napoleon:** Since joining Synapse in 2005, I have provided economic and policy
3 analysis of electric and natural gas systems and emissions regulations, with a focus on
4 energy efficiency policies and programs, on behalf of a diverse set of clients throughout
5 the United States and in Canada. On the national level, I led a team that developed tools
6 that help utilities integrate the U.S. Department of Energy’s Superior Energy
7 Performance and 50001 Ready strategic energy management platforms into their energy
8 efficiency portfolios. I co-authored seminal works regarding designing performance
9 incentive mechanisms and assessing the benefits of clean energy resources.

10 At the state level, I was co-author of reports and comments on the role of energy
11 efficiency in New York State in meeting its Reforming the Energy Vision (“REV”)
12 objectives, as well as a white paper on natural gas regulatory reforms needed for New
13 York to meet its decarbonization targets. In Colorado, Maryland, and South Carolina, I
14 facilitated and provided expert analysis on program costs and benefits for demand-side
15 resource policy working groups. Since 2009, I have provided extensive and ongoing
16 expert analysis and support for the State of New Jersey regarding its state- and utility-
17 administered energy efficiency and combined heat and power programs. I have also
18 provided expert advice on demand-side management programs in Nova Scotia regarding
19 a range of issues including incentive-setting methodologies, cost-benefit analysis,
20 incentive setting, avoided costs, and locational demand-side management.

21 Before joining Synapse, I worked at Resource Insight, Inc., where I supported
22 investigations of electric, gas, steam, and water resource issues, primarily in the context
23 of reviews by state utility regulatory commissions.

1 I hold a Master's in Public Administration from the University of Massachusetts at
2 Amherst and a Bachelor's in Economics from Rutgers University. My resume is attached
3 as Exhibit AN/KT-1.

4 A. **Mr. Takahashi:** I conduct economic, environmental, and policy analysis of energy
5 system technologies and regulations associated with both supply- and demand-side
6 resources. Over the past 15 years, I have assessed the design and impact of utility energy
7 efficiency and distributed energy resources policies and programs in over 40 jurisdictions
8 across North America for a variety of clients. These include environmental groups,
9 municipal and state governments, and federal agencies such as the U.S. Environmental
10 Protection Agency and the U.S. Department of Energy. For many of these clients, I
11 provided testimony and testimony assistance before public utility commissions. I have
12 also analyzed the performance, costs, benefits, and potential of clean energy measures
13 and resources, including state-of-the-art measures such as cold climate heat pumps,
14 thermal storage demand response, dynamic windows, deep energy retrofits, net zero
15 energy buildings, and strategic energy management. Further, I co-authored several
16 reports and comments on the role and value of energy efficiency in New York State in
17 meeting its Reforming the Energy Vision (“REV”) objectives.

1 Another area of my focus has been technological, resource, economic, and policy
2 assessments of strategic electrification. This includes my analyses for the Northeast
3 region for the Northeast Energy Efficiency Partnerships, New York for New York State
4 Energy Research and Development Authority, Rhode Island for the Office of Energy
5 Resources, the Southwest region for the Southwest Energy Efficiency Partnership, and
6 California for the Natural Resources Defense Council.

7 In addition, I have in-depth experience with the natural gas distribution planning process,
8 in particular natural gas load forecasts and non-pipeline alternatives. Recently, I co-
9 authored a whitepaper on gas regulatory reforms toward a decarbonized future in New
10 York and wrote chapters on gas load forecast methodology and non-pipeline alternatives
11 screening process. I also assessed the potential of natural gas demand savings measures
12 as solutions to the gas moratorium placed by Berkshire Gas Company and testified before
13 Massachusetts Department of Public Utilities.

14 I hold a Master's in Urban Affairs and Public Policy with a concentration in Energy and
15 Environmental Policy from the Biden School of Public Policy and Administration at the
16 University of Delaware, and a Bachelor's in Law with a concentration in Public
17 Administration from Kansai University in Osaka, Japan. My resume is attached as
18 Exhibit AN/KT-2.

19 **Q. On whose behalf are you testifying in this case?**

20 **A.** We are testifying on behalf of the Natural Resources Defense Council ("NRDC").

1 **Q. Have you previously testified before a state or provincial commission?**

2 A. **Ms. Napoleon:** Yes. I have testified before the California Public Utilities Commission,
3 the Nova Scotia Utility and Review Board, the New York Public Service Commission,
4 the New Brunswick Energy and Utilities Board, and the Public Service Commission of
5 South Carolina.

6 A. **Mr. Takahashi:** Yes. I have testified before the New Jersey Board of Public Utilities, the
7 Massachusetts Department of Public Utilities, the Ontario Energy Board, and the New
8 York Public Service Commission.

9 **Q. Have you testified before the Pennsylvania Public Utility Commission?**

10 A. **Ms. Napoleon:** No.

11 A. **Mr. Takahashi:** No.

12 **Q. What is the purpose of your testimony?**

13 A. The purpose of our testimony is to review and critique PPL Electric Utilities'
14 ("Company" or "PPL") proposed Act 129 Phase IV Energy Efficiency and Conservation
15 Plan ("Phase IV Plan" or "Plan").

16 **Q. Are you sponsoring any exhibits with your testimony?**

17 A. Yes. We are sponsoring the following exhibits:

- 18 • Resume of Alice Napoleon: Exhibit AN/KT-1
19 • Resume of Kenji Takahashi: Exhibit AN/KT-2

1 **2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS**

2 **2.1. Summary of Conclusions**

3 **Q. Please summarize your conclusions.**

4 A. Our conclusions are summarized as follows:

- 5 • PPL can do more to facilitate customer adoption of more holistic energy saving solutions.
- 6 • PPL does not provide financing offerings such as low- or no-interest loans or on-bill
7 repayment options to customers participating in its Act 129 programs, despite that
8 incentives alone may not be sufficient to drive customers to invest in deeper, more
9 comprehensive energy savings.
- 10 • PPL does not commit to tiered incentive structures, and those incentives that it is
11 considering are not designed to support comprehensive efficiency investments.
- 12 • PPL does not indicate it will monitor its progress towards comprehensive savings goals.
- 13 • Promoting fossil fuel-based equipment, even efficient equipment, today will make it
14 harder for the state to achieve its long-term climate goals.
- 15 • PPL does not address barriers to the adoption of heat pumps and heat pump water heaters.
- 16 • Energy efficiency will likely figure prominently in Pennsylvania’s strategy for reducing
17 emissions for Regional Greenhouse Gas Initiative (RGGI) compliance, and it will almost
18 certainly play a larger role than it has in the past.

19 **2.2. Summary of recommendations**

20 **Q. Please summarize your recommendations.**

21 A. We recommend the following:

- 22 • PPL should provide more comprehensive savings opportunities by doing the following:
 - 23 ▪ PPL should seek to provide more energy audits and weatherization
24 measures to residential and non-residential customers;

- 1 ▪ PPL should provide financing opportunities to residential customers to
2 address the cost-barrier to customer adoption of comprehensive energy
3 solutions;
- 4 ▪ PPL should include additional offerings within its Residential and Non-
5 residential programs to provide more opportunities for deeper savings,
6 including pilots for deep energy retrofits and net zero energy buildings;
- 7 ▪ PPL should commit to implementing well-designed tiered incentives to
8 send the appropriate signal to customers to take a more comprehensive
9 whole-building approach and install multiple measures; and,
- 10 ▪ PPL should track its performance related to achievement of
11 comprehensive energy savings.
- 12 • PPL should provide more detail on the projected savings and costs for the
13 Energy Efficient Homes program.
- 14 • Electric-to-gas fuel switching measures should be removed from PPL’s Phase IV
15 Plan.
- 16 • PPL should encourage heat pump adoption by doing the following: structuring
17 incentives to adequately address higher upfront costs; creating optimal delivery
18 channels; expanding customer education and outreach channels to increase
19 awareness of the technology and importance of weatherization; providing post-
20 installation training on proper use of heat pumps; and facilitating programs to
21 train installers and builders on right-sizing and proper installation.
- 22 • PPL should provide its estimate of Phase IV peak demand reductions, by
23 proposed program component and measure, that it plans to bid into PJM’s
24 capacity market, its assumptions about the market, and an estimate of related
25 auction proceeds.
- 26 • To the extent that hourly savings profiles and marginal emissions factors have
27 not been analyzed, we recommend that the utilities conduct both of these studies.

- The PUC should consider whether the current energy efficiency and conservation (EE&C) framework can support the expansion in energy efficiency that RGGI is likely to require, and what changes would be needed to better support energy efficiency.

3. PHASE IV PLAN

3.1. Overview

Q. Please describe PPL’s proposed Phase IV Act 129 Plan.

A. With its Phase IV EE&C Plan, PPL proposes a portfolio of energy efficiency and energy education initiatives consisting of the programs and components shown in Table 1.

Table 1. PPL’s proposed Phase IV programs and components

#	Programs and Components
1. Residential Program	
1.1	Appliance Recycling
1.2	Efficient Lighting – Specialty Bulbs
1.3	Energy Efficient Homes
1.4	Student Energy Efficient Education
2. Low-Income Program	
2.1	Low-Income Assessment
3. Non-Residential Program	
3.1	Small Commercial and Industrial Efficient Equipment Prescriptive Rebate
3.2	Large Commercial and Industrial Efficient Equipment Prescriptive Rebate
3.3	Small Commercial and Industrial Custom
3.4	Large Commercial and Industrial Custom

Source: PPL Plan at 1.

As shown in Table 2, PPL projects that this portfolio would exceed compliance targets set in the Implementation Order.

Table 2. Summary of Compliance Targets and PPL’s Plan

	Compliance Target	EE&C Plan
Overall Energy Reductions (MWh/year)	1,250,157	1,540,687
Overall Peak Demand Reductions (MW)	229	248
Low-Income Energy Reductions (MWh/year)	72,509	74,793
Budget Cap (excluding SWE costs)	\$307,506,880	\$307,491,356
Cost-Effectiveness (per TRC)	1.0	1.17

1 *Source: PPL Plan at 2.*

2

3 PPL indicates that the primary objectives of the plan are “to meet the requirements of Act

4 129 and encourage more efficient use of electric power by PPL Electric Utilities’

5 customers.” (PPL Plan at 26). PPL proposes to track its progress in meeting these

6 objectives using the set of performance indicators and metrics shown in Table 3.

7 **Table 3. PPL proposed metrics for measuring and tracking efficiency program performance**

Key Indicator	Metrics
Market Response	<ul style="list-style-type: none">• Number of participants• Number of measures installed per participant• Participation benchmarked against industry norms• Feedback from trade allies
Impacts	<ul style="list-style-type: none">• kWh/year savings• kW/year saving• Average project size
Customer and Trade Ally Satisfaction	<ul style="list-style-type: none">• Responses to participant surveys administered as part of QA and/or EM&V• Feedback from trade allies
Operating Efficiency	<ul style="list-style-type: none">• Application processing time• Incentive processing time• Expenditures in each category• Acquisition cost (\$/kWh saved)• Levelized cost (\$/kWh saved)
Cost-Effectiveness	<ul style="list-style-type: none">• TRC benefit/cost ratio

8 *Source: PPL Plan at 26.*

1 **3.2. Assessment and critique**

2 *PPL's Plan misses opportunities for cost-effective savings*

3 **Q. Please summarize the Commission's recommendation for comprehensive programs**
4 **in its Phase IV Implementation Order.**

5 A. The Commission requires the electric distribution companies (EDCs) to include at least
6 one comprehensive program for residential customers and at least one comprehensive
7 program for non-residential customers.¹

8 **Q. Does the Commission define the term "comprehensive"?**

9 A. While the Commission declined to adopt a strict definition of "comprehensive" in its
10 Implementation Order, it does encourage "EDCs to pursue comprehensive portfolios with
11 a greater focus on longer-lived, deeper-savings measures."² This implies that Phase IV
12 programs should seek to move beyond incentivizing individual appliances and equipment
13 to offering more comprehensive whole-building solutions where multiple measures are
14 installed in a building in order to maximize energy savings.

15 **Q. How does PPL propose to meet this requirement?**

16 A. PPL indicates its Residential Program and Low-Income Program will provide a
17 comprehensive mix of energy efficiency measures for all building types and these
18 programs will encourage customers to implement multiple measures and to take a
19 comprehensive approach to energy efficiency. Further PPL proposes a Non-Residential
20 Program that will target business customers of all sizes and in every segment,

¹ Energy Efficiency and Conservation Program, Docket No. M-2020-3015228 (Implementation Order Entered June 18, 2020) (Implementation Order) at pgs. 23-24.

² Implementation Order at pg. 15.

1 government and educational institutions, and master metered low-income multifamily
2 buildings with a comprehensive range of prescriptive measures and opportunities to
3 implement custom efficiency projects.³ PPL also indicates that its redesigned portfolio
4 will offer multiple savings opportunities for each program and promote the benefits of
5 multiple-measure, comprehensive projects (whole-home and whole-building
6 approaches).⁴

7 **Q. Do you find PPL’s proposal to be sufficient to encourage the adoption of longer-**
8 **lived and deeper energy savings?**

9 A. Only in part. While we are encouraged by PPL’s commitment to providing each target
10 customer sector with comprehensive solutions, PPL can do more to facilitate customer
11 adoption of more holistic energy saving solutions. We recommend several improvements
12 to PPL’s Plan, including:

- 13 • PPL should seek to provide more energy audits and weatherization measures to
14 residential and non-residential customers;
- 15 • PPL should provide residential financing opportunities to residential customers to
16 address the cost-barrier to customer adoption of comprehensive energy solutions;
- 17 • PPL should include additional offerings within its Residential and Non-
18 residential programs to provide more opportunities for deeper savings;

³ Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan - Docket No. M-2020-3020824, November 30, 2020, at pg. 13.

⁴ *Id.* Attachment A: PPL Electric Exhibit 1- Phase IV EE&C Plan, at pg. 6.

- PPL should commit to implementing tiered incentives to send the appropriate signal to customers to take a more comprehensive whole-building approach and install multiple measures; and,
- PPL should track its performance related to achievement of comprehensive energy savings.

Q. Why should PPL provide more energy audits and weatherization measures to its customers?

A. Energy audits and weatherization measures are crucial components of a comprehensive energy efficiency program. However, when such comprehensive measures are offered only to a very limited number of customers, the overall portfolio cannot be deemed comprehensive. Our review of PPL’s proposed plan finds that it lacks emphasis on comprehensive measures and audits for both the residential and non-residential programs. In particular, our review found that PPL’s projected number of program participants for energy audits and weatherization measures is substantially lower than the level of those measures that leading jurisdictions have been offering. PPL projects to provide approximately 180 in-home energy audits each year with a total of 916 through the five-year term under the Phase IV program (PPL’s response to NRDC-I-8 and PPL filing, Table 25). As shown in Table 4, the total number of planned energy audits represents just 0.07 percent of total residential customers, based on a residential customer count of 1.26 million for PPL according to the U.S. Energy Information Administration’s (EIA) 861 database on utility customer data.

Table 4. Projected Residential Energy Audits by PPL under Phase IV

	PY13	PY14	PY15	PY16	PY17	Total

In-Home Audit Incentive (Elec Heat + AC)	50	51	52	53	54	260
In-Home Audit Incentive (Elec Heat or Central AC)	26	26	27	27	28	134
Comprehensive Retrofit Bonus- Tier 1	75	77	78	80	81	391
Comprehensive Retrofit Bonus- Tier 2	25	26	26	27	27	131
Total	176	180	183	187	190	916
% of total RES customers	0.014%	0.014%	0.014%	0.015%	0.015%	0.07%

1 *Source: PPL response to NRDC-I-8, EIA 861 database.*

2 In addition, PPL is projecting to provide weatherization measures to about 400 customers
3 per year for a total of 1,992 customers or projects during the Phase IV program period.

4 These total participants represent just about 0.16 percent of the total customers.

5 In contrast, leading jurisdictions are providing audits and weatherization measures to
6 many more customers. For example, National Grid and Eversource in Massachusetts
7 provided energy audits to between 1.1 to 2.4 percent of residential customers per year
8 from 2014 through 2018 with the five-year total audits ranging from 6.4 percent to 10.4
9 percent, as shown in Table below. These penetration rates represent over 90 times more
10 residential customers than what PPL is projecting to achieve over the next five years. It is
11 also notable that, at roughly 1.2 million customers, the total residential customer counts
12 for these two utilities are comparable to PPL's customer counts.

13 **Table 5. Historical Residential Energy Audits provided by National Grid and**
14 **Eversource in Massachusetts**

	2014	2015	2016	2017	2018	5-Year Total
Full Home Energy Assessments						
National Grid MA	24,852	26,659	19,094	22,384	28,247	144,428
Eversource MA	16,590	18,542	14,710	13,575	16,459	96,417
% of 2019 customer counts						
National Grid MA	2.1%	2.3%	1.6%	1.9%	2.4%	10.4%
Eversource MA	1.3%	1.5%	1.2%	1.1%	1.3%	6.4%

1 Source: EIA 861 database; Mass Save Data, “Home Energy Services Report,” Available at
2 <https://www.masssavedata.com/Public/HESActivity>.

3 As shown in Table , these two utilities in Massachusetts also provided weatherization
4 measures to a large number of customers over the past 5 years. The total number of
5 program participants range from roughly 32,000 to 49,000 or 2.2 to 3.6 percent of the
6 total residential customers. On the other hand, PPL is projecting to provide
7 weatherization measures to just about 2,000 customers or 0.16 percent of its residential
8 customers.

9 **Table 6. Historical Weatherization Measures provided by National Grid and**
10 **Eversource in Massachusetts**

	2014	2015	2016	2017	2018	5-Year Total
Unique customers with Weatherization installations						
National Grid MA	9,279	9,520	7,249	6,251	9,475	48,944
Eversource MA	5,810	6,447	5,506	4,322	4,740	32,431
% of 2019 customer counts						
National Grid MA	0.8%	0.8%	0.6%	0.5%	0.8%	3.6%
Eversource MA	0.5%	0.5%	0.4%	0.3%	0.4%	2.2%

11 Source: EIA 861 database; Mass Save Data, “Home Energy Services Report,” Available at
12 <https://www.masssavedata.com/Public/HESActivity>.

13 For non-residential programs, PPL stated that “[t]he Non-Residential Program does not
14 include on-site energy audits” in response to our data request (NRDC-I-12-a). PPL does
15 not plan to promote building envelope measures in the Non-Residential program in the
16 early part of Phase IV but may promote these later as Phase IV progresses (NRDC-I-12-
17 c). As mentioned above, these components are essential for comprehensive programs.

1 **Q. What is your recommendation on energy audits and weatherization measures?**

2 A. We recommend PPL increase the number of residential energy audits and weatherization
3 measures. We further recommend PPL provide energy audits and weatherization
4 measures for non-residential customers as well.

5 **Q. Does PPL propose to offer any financing offerings for its residential customers?**

6 A. PPL indicated it does not provide financing offerings such as low- or no-interest loans or
7 on-bill repayment options to customers participating in its Act 129 programs because it
8 finds that financial institutions are better suited to manage the risks and lending laws
9 associated with such offerings.⁵

10 **Q. Do you agree with PPL's determination regarding financing offerings?**

11 A. We do not. There are proven mechanisms in place in other jurisdictions that can increase
12 customer access to financing for energy efficiency improvements while mitigating risk to
13 the utility. One type of mechanism is the use of utility program funds to buy-down
14 interest rates to facilitate customer access to zero or low-interest loans. There are several
15 examples of interest buy-down programs shown to be beneficial and a cost-effective use
16 of program funds.

17 • National Grid Rhode Island HEAT Loan program: This loan program works in
18 conjunction with National Grid's EnergyWise Program. The EnergyWise
19 program is similar to PPL's Energy Efficient Homes Audit and Weatherization
20 offering. Customers that receive recommendations for weatherization measures,

⁵ PPL Response to NRDC 1-17.

1 efficient heating systems, and domestic hot water systems from their EnergyWise
2 audit can borrow up to \$25,000 for a period of up to seven years at zero-percent
3 interest to finance these improvements. To fund the program, National Grid works
4 with six local financial institution partners in Rhode Island and uses program
5 funds to buy down the interest rate to zero percent. A recent evaluation concluded
6 that the HEAT Loan generated energy efficiency savings for National Grid that
7 would not have otherwise occurred and that the availability of the loan was very
8 important in customers' decisions to install measures following their home energy
9 assessment. The evaluation found that without the HEAT Loan, three-quarters of
10 loan recipients would have canceled, postponed, or reduced their home energy
11 project scope.⁶

- 12 • Mass Save® HEAT Loan: This HEAT Loan program mirrors the one offered in
13 Rhode Island. The utilities participating in the administration of the Mass Save
14 program use program funds to buy down the interest due on the loan and the cost
15 to administer the loans. The Mass Save HEAT Loan was recently expanded to
16 cover pre-weatherization safety work and battery storage, if customers agree to
17 participate in an active demand program.⁷

⁶ Research Into Action, Inc. HEAT Loan Assessment. November 19, 2018. Available at: http://rieermc.ri.gov/wp-content/uploads/2019/05/heat-loan-assessment-final-report_111918.pdf.

⁷ D.P.U. 18-110 – D.P.U. 18-119. Three-Year Plan 2019-2021. October 31, 2018.

1 **Q. What is your recommendation for a residential financing program in PPL's Phase**
2 **IV Plan?**

3 A. Experience indicates that incentives alone are not sufficient to drive customers to invest
4 in deeper, more comprehensive energy savings. The customer contribution required to
5 make the initial investment in more holistic energy solutions can be a significant barrier
6 to participation. Financing programs have shown to be effective in addressing the barrier
7 to lack of upfront capital. For PPL to adequately encourage deeper energy efficiency
8 enhancements per customer, it needs to address this barrier to participation.

9 We therefore recommend that PPL carve out funding within its Phase IV Residential
10 Program to facilitate customer access to zero-percent interest financing to fund
11 comprehensive improvements as part of its Energy Efficient Homes offering. PPL should
12 commit to reaching out to local financial institutions to examine partnerships to buy-
13 down interest rates to increase access to financing.

14 **Q. Are there other comprehensive savings measures and program offerings that PPL**
15 **has not included in its Phase IV Plan?**

16 A. Yes. PPL's plan does not include the following offerings and designs:

- 17 • Utilization of AMI technology to enhance program offerings;
- 18 • Additional measures such as linear LED and troffer LED lights for non-residential
19 buildings and high efficiency clothes dryer (e.g., heat pump dryer) for residential
20 and small commercial customers;
- 21 • A deep energy retrofit pilot for residential and non-residential buildings; and
- 22 • A zero net energy pilot for new construction.

1 **Q. Does PPL propose to use its advanced metering infrastructure within its Phase IV**
2 **Plan?**

3 A. PPL states that it will utilize advanced AMI data for evaluation purposes, but any use
4 beyond that has not yet been determined.⁸

5 **Q. Are there additional opportunities for PPL to utilize AMI to drive additional energy**
6 **savings?**

7 A. Yes. In addition to use for evaluation, AMI is also a valuable tool for enhancing delivery
8 of energy savings to customers. AMI allows for more granular, transparent, and
9 connected energy data that can enable PPL to personalize savings opportunities for its
10 customers.

11 For residential customers, AMI can help PPL better understand usage patterns and create
12 more personalized energy usage alerts and recommendations for measures. AMI can be
13 used alongside Home Energy Reports to create more real-time customer engagement and
14 can be incorporated with smart home devices. AMI can also be leveraged alongside the
15 Energy Efficient Homes offering to provide energy optimization integrated audits.

16 For the Non-Residential sector, PPL can use AMI to obtain disaggregated load profiles
17 that can allow for programs that offer customers continuous commissioning of facilities,
18 smart energy management, and offsite energy management.

⁸ PPL Response to NRDC 1-19.

1 **Q. What is your recommendation regarding use of AMI?**

2 Due to the fact that AMI technology is already available within PPL’s territory, the
3 Company should take advantage of its capabilities to support new efficiency offerings.

4 **Q. Are there other types of programs or measures that PPL is not planning to**
5 **implement?**

6 A. Yes. PPL does not include advanced energy efficiency measures and programs such as
7 linear LED and troffer LED lights and high efficiency clothes dryer (e.g., heat pump
8 dryer). PPL also does not include offerings for deep energy retrofits or zero net energy
9 homes in its Phase IV proposed plan.

10 **Q. Please describe high efficiency clothes dryer and linear LED and troffer LED lights.**

11 A. Energy efficiency programs are increasingly providing incentives for high efficiency
12 clothes dryers. For example, in Massachusetts, utilities provide rebates on efficient
13 electric clothes dryers.⁹ Both the Northwest Energy Efficiency Alliance and the Northeast
14 Energy Efficiency Partnerships launched initiatives to promote advanced clothes dryers
15 in the North American market several years ago.^{10,11} We also note the PECO is
16 proposing to offer incentives for heat pump clothes dryers.¹²

17 LED linear tube and troffers have also become a standard measure in energy efficiency
18 programs in other jurisdictions. This technology can be used to replace linear fluorescent

⁹ MassSave. <https://www.masssave.com/shop/appliances/clothes-dryers>. Accessed January 12, 2021.

¹⁰ Northwest Energy Efficiency Alliance. NEEA Launches Super-Efficient Dryer Initiative. <https://neea.org/news/neea-launches-super-efficient-dryer-initiative>. Accessed January 12, 2021.

¹¹ Northeast Energy Efficiency Partnerships. Hanging Underwear Out to Dry? <https://neep.org/blog/hanging-underwear-out-dry>. Accessed January 12, 2021.

¹² PECO PY 13 – PY 17 Act 129 – Phase IV Energy Efficiency and Conservation Plan, Table 7A.

1 lighting in commercial buildings and is now readily available in the market.¹³ PPL's
2 Phase IV plan does not include this measure for existing buildings, even though the state
3 wide evaluator (SWE) potential study included this measure as "LED Linear Fixtures."¹⁴
4 The SWE potential study describes this technology as follows:

5 "LED linear fixtures are an energy efficient alternative to linear fluorescent fixtures. The
6 LED integrated fixtures offer similar light output with a reduction of energy
7 consumption. Integrated LED fixtures also offer controllability beyond capabilities of
8 linear fluorescent technology and integration with many complex control systems."¹⁵

9 **Q. What is your recommendation regarding high efficiency dryers and LED linear and**
10 **troffer lights?**

11 A. Because these technologies are readily available in the market, we recommend PPL
12 include these measures in the Phase IV programs.

13 **Q. Please describe deep energy retrofits.**

14 A. A deep energy retrofit is a whole-building approach to energy efficiency and typically
15 creates a reduction in 50 percent or more of a building's total energy usage.¹⁶ While this
16 measure requires a substantial amount of investment on building envelope measures, it
17 could be cost-effective in some instances, such as when a building uses electric resistance
18 heating.

¹³ For example, see the lighting offering for Massachusetts and Rhode Island Bright Opportunities Lighting Program, available at <https://www.masssave.com/learn/partners/upstream-lighting>

¹⁴ SWE potential study, Appendix D1, Table 2.

¹⁵ SWE potential study, Appendix D1, Table 2.

¹⁶ ACEEE. 2014. Residential Deep Energy Retrofits, Available at <https://www.aceee.org/sites/default/files/publications/researchreports/a1401.pdf>

1 If a goal of Act 129 Phase IV is to drive more comprehensive energy savings, it is
2 important to test deep energy retrofit approaches in a pilot program so that PPL can
3 consider incorporating such an approach into its portfolio as a standard measure in the
4 future. This pilot can evaluate the cost and performance of such approaches and find
5 ways to improve costs and performance.

6 **Q. What is a zero net energy building?**

7 A. The U.S. Department of Energy defines zero-net energy building as “an energy-efficient
8 building where, on a source energy basis, the actual annual delivered energy is less than
9 or equal to the on-site renewable exported energy.”¹⁷ As distributed energy resources and
10 electrification measures such as cold-climate heat pumps and electric vehicles become
11 more economical and widespread it will become increasingly important to create
12 integration of these resources into PPL’s new construction programs. A recent report by
13 the American Council for an Energy-Efficient Economy (ACEEE) recently identified 20
14 programs (13 residential and 7 commercial) that promote zero-energy and zero-energy-
15 ready homes and buildings.¹⁸

¹⁷ U.S. Department of Energy. September 2015. *A Common Definition for Zero Energy Buildings*.

¹⁸ Nadel, S. 2020. *Programs to Promote Zero-Energy New Homes and Buildings*. American Council for an Energy-Efficient Economy.

1 **Q. What do you recommend with respect to deep energy retrofits and zero net energy**
2 **offerings?**

3 A. We recommend that PPL include pilots for both deep energy retrofits and zero net energy
4 buildings in its Phase IV Plan that provides incentives for the achievement of a per
5 building savings goal.

6 **Q. Does PPL propose tiered incentives for its Residential Program in its Phase IV**
7 **Plan?**

8 A. PPL indicates that it may offer tiered incentives that encourage the installation of
9 multiple measures or a more comprehensive, whole-facility approach. For the Residential
10 Program, PPL further describes that it may provide a Comprehensive Retrofit Bonus
11 Incentive in relation to the implementation of multiple measures offered individually
12 under its Energy Efficient Homes component. This Bonus Incentive would involve two
13 tiers; Tier 1 would offer a \$250 bonus rebate for customers that have at least two “major
14 measures” and Tier 2 would offer a \$350 bonus rebate for installing three or more “major
15 measures.” There is also a requirement that one installed measure must be a building
16 envelope measure (Insulation or Air sealing).¹⁹

17 **Q. Do you support this proposal?**

18 A. Yes. We recommend that PPL commit to implementing the Comprehensive Retrofit
19 Bonus within the Energy Efficient Homes offering.

¹⁹ PPL Response to NRDC 1-9.

1 Tiered incentive structures send important financial signals to customers to adopt
2 comprehensive energy efficiency strategies during the small windows in time when they
3 are considering improvements to their homes and facilities. Because there are limited
4 opportunities for utilities to create meaningful touchpoints with customers, once a
5 customer invests in a measure it could be years before they consider making another
6 investment. This creates a lost opportunity to engage the customer in more holistic
7 solutions. Structuring utility programs to incentivize the installation of multiple measures
8 can avoid these lost opportunities.

9 **Q. Does PPL propose similar tiered incentives for the Non-Residential Program?**

10 A. While PPL indicates it may offer tiered incentives for its Non-Residential Program, there
11 is no detail regarding the structure or if the Company is committing to fully implementing
12 this structure.

13 For the reasons stated above, tiered incentives are a critical piece in encouraging
14 customers to install multiple and more comprehensive measures. We recommend that
15 PPL consider tiered incentives similar to those offered in Connecticut and New York.

16 In Connecticut, Connecticut Light and Power Company and United Illuminating
17 administer the Energy Opportunities Program. This program includes tiered incentives to
18 encourage deeper energy saving retrofits. The per-kWh incentive increases as more
19 measures are bundled together. For example, in 2020 a single non-lighting end-use
20 measure had a per-kWh incentive of \$0.50 with a cap of 50 percent of the installed cost.
21 This increased to \$0.60 per kWh for two end-use measures with a cap of 60 percent of the

1 installed cost and to \$0.75 per kWh for three or more end-use measures with a cap of 75
2 percent.²⁰

3 In New York, National Grid offers a Tiered Incentive Program for Large Commercial and
4 Industrial (C&I) customers in its Upstate New York electric and gas service territories.
5 C&I customers can earn bonus incentives above traditional incentive offerings for three
6 tiers. For Tier 1, if a customer completes three projects, the customer receives a 15-
7 percent bonus incentive. Tier 2 pertains to the completion of four projects and includes a
8 20-percent bonus incentive. Tier 3 is for customers that complete five projects and has a
9 25-percent bonus incentive. National Grid allows for flexibility in the timing of these
10 programs to also facilitate the adoption of multiple measures. Customers have two years
11 to complete the projects.²¹

12 **Q. Please explain why PPL should track its performance related to achievement of**
13 **comprehensive energy savings.**

14 A. Throughout its Phase IV Plan, PPL indicates the importance of achieving deeper, more
15 comprehensive savings. For example, on page 4 of its Plan, PPL states that it “recognizes
16 the need to increase the amount of savings per customer interaction to meet its Phase IV
17 goals.” Further, PPL indicates that it has tasked its implementation conservation service
18 providers (CSP) with educating customers on the benefits of holistic energy efficiency
19 strategies and with cross-promoting appropriate solutions that result in more complete

²⁰ https://www.uinet.com/wps/wcm/connect/www.uinet.com-7188/b4cf87e1-541b-4ea2-89a9-496a5a6bbbcc/C0075-Exisiting-Building-Cap-Sheet-Final-6-2020.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE.Z18_J092I2G0N01BF0A7QAR8BK20A3-b4cf87e1-541b-4ea2-89a9-496a5a6bbbcc-nb3yjxC.

²¹ https://www.nationalgridus.com/media/pdfs/bus-ways-to-save/ee7198-uny-tiered-incentive-worksheet_fillable.pdf.

1 retrofits and higher energy and peak demand savings per participant. PPL further states
2 there will be incentives to CSPs for delivery these outcomes.²² However, PPL does not
3 indicate it will monitor progress towards these goals.

4 Table 11 of PPL's Plan identifies several performance indicators and metrics it will use to
5 measure program and component success. Given that comprehensive solutions appear to
6 be a new priority within the Company's Phase IV Plan, it would seem critical to track
7 how well this objective is being met.

8 We recommend that PPL track the following performance indicators: lifetime kWh, per
9 customer kWh savings, and percentage of energy audits resulting in weatherization (air
10 sealing and insulation). Reporting on these metrics will demonstrate the level of
11 effectiveness of PPL's enhanced Phase IV Plan in delivering more comprehensive
12 savings.

13 *PPL's planning and reporting format obscures program performance*

14 **Q. Is there an issue with the way PPL summarized its projected savings and costs?**

15 A. Yes. PPL's summary of projected savings and costs for the Energy Efficient Homes
16 program does not allow us to meaningfully review and evaluate the performance of this
17 program because the data for typical home retrofit measures such as insulation and
18 appliance and equipment rebates are combined together.

²² PPL Plan at page 25.

1 **Q Please explain this issue in detail.**

2 A. The Energy Efficient Homes program component is composed of three distinct energy
3 efficiency measure and delivery types, namely (a) new homes, (b) audit and
4 weatherization, and (c) energy efficient equipment. Combining these elements through
5 one program component channel streamlines the process for consumers to access these
6 different energy efficiency measures. However, in order to assess the performance of this
7 program component, especially the cost-effectiveness of efficiency measures, consumer
8 uptake, and progress to the targets, it is essential to report and track savings and costs
9 separately for those three separate energy efficiency measure categories. This is because
10 the types of measures and consumers uptake of the measures are likely to be markedly
11 different among those three categories.

1 **Q What is your recommendation for Energy Efficient Homes component?**

2 A. We recommend that PPL provide both costs and energy savings estimates separately for
3 (a) new homes, (b) audit and weatherization, and (c) energy efficient equipment under
4 this program component. We further recommend that PPL provide program achievements
5 in its annual program report separately for each of these categories within the Energy
6 Efficient Homes component.

7

8 *PPL's incentives for equipment that burns gas and delivered fuel are unnecessary and an*
9 *inefficient use of ratepayer funds*

10 **Q. Please summarize the Commission's Implementation Order pertaining to electric-**
11 **to-fossil fuel switching.**

12 A. The Commission indicated it would not prevent electric-to-fossil fuel switching. The
13 Commission cites the fact that these measures were adopted as part of the 2021 Technical
14 Reference Manual and are therefore eligible for inclusion in Phase IV. The Commission
15 further noted that such measures were rarely adopted in past years, only accounting for
16 less than one-quarter of 1 percent of verified savings through Program Year 10 of Act
17 129 Phase III.²³

18 **Q. Does PPL's Phase IV Plan include electric-to-fossil fuel switching measures?**

19 A. Yes. The table below summarizes PPL's planned electric-to-fossil fuel switching
20 measures for Phase IV.

²³ Implementation Order at pg. 99.

1

Table 7. Summary of PPL Phase IV Electric-to-Fossil Fuel Switching Measures

Measure	Unit	Incremental Cost (\$/unit)	Estimated Useful Life	Incentive Amount (\$/unit)	Incentive Amount or Incentive Range (\$/unit)	Total Phase IV Planned Savings (MWh/year)	Total Phase IV Participation
Efficient Homes							
Fuel Switching - Central Heating (downstream)	Per Project	\$8,600	15	\$200	Up to \$300	1,135	177
Fuel Switching - DHW (downstream)	Per Project	\$1,416	11	\$200	Up to \$300	301	109
Large C&I Efficient Equipment Rebates							
Fuel Switching	Per Product	N/A	N/A	N/A	Up to \$0.22/kWh and/or up to \$1,200/kWh first year savings	N/A	N/A
Fuel Switching: electric water heaters to gas/propane	Per Product	N/A	N/A	N/A		N/A	N/A

2 *Source: Table 23. Pa PUC Table 7-Energy Efficient Homes Eligible Measures and Incentives*

3 **Q. What are your concerns with PPL’s Plan related to electric-to-fossil fuel switching**
 4 **measures?**

5 A. While we understand the Commission has determined it is acceptable for these measures
 6 to be included in Phase IV and that planned savings are a small percentage of planned
 7 total savings for the residential customer segment,²⁴ we are concerned that the inclusion
 8 of such measures is misaligned with Pennsylvania’s long-term climate goals and will
 9 result in higher costs to ratepayers.

10 **Q. Please summarize Pennsylvania’s climate policies.**

11 A. Over the past several years, Pennsylvania has made increasing commitments to
 12 addressing climate change through reduction in greenhouse gas (“GHG”) emissions. In
 13 January 2019, Governor Wolf issued Executive Order 2019-01 that set GHG reduction

²⁴ There are no values for C&I savings and participation projections for fuel-switching measures so no assessment can be made to the contribution of these measures to planned Phase IV savings.

1 targets for the Commonwealth of 26 percent reduction of net GHG emissions statewide
2 by 2025 from 2005 levels, and an 80 percent reduction of GHG emissions by 2050.²⁵

3 Later that year, Governor Wolf announced that Pennsylvania would join the U.S. Climate
4 Alliance, which commits the Commonwealth to implementing policies that advance the
5 goals of the Paris Agreement. He also released the Pennsylvania Climate Action Plan
6 2018. This new state climate plan includes over 100 actions to meet the new statewide
7 GHG emissions targets. These recommendations include the expansion of energy
8 efficiency and the replacement of high carbon and GHG-producing fuels or energy
9 sources with less environmentally impactful options.²⁶

10 Further, in October 2019, the Governor issued Executive Order 2019-07, which directs
11 the Pennsylvania Department of Environmental Protection (“DEP”) to join RGGI and
12 develop a rulemaking package to abate, control, or limit carbon dioxide emissions from
13 fossil-fueled electric power generators.²⁷

14 **Q. Does investment in electric-to-fossil fuel switching measures align with these state**
15 **climate goals?**

16 A. No, they do not. The new fossil fuel heating and hot water systems incented by these
17 programs are long-lived measures. While the Act 129 Technical Reference Manual
18 artificially caps measure lives at 15 years, it is not uncommon for such systems to last
19 upwards of 20 years. Therefore, when PPL incentivizes the installation of a new fossil

²⁵ Executive Order: 2019-01 – Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance. January 08, 2019.

²⁶ Pennsylvania Climate Action Plan 2018 at pg. 56.

²⁷ Executive Order-2019-07- Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions. October 2019.

1 fuel-based appliance for heating, venting, and air conditioning (HVAC) equipment at a
2 property, that property is essentially locked into using that fuel for the next 10 to 20
3 years. As indicated by Electric Power Research Institute, consumers only replace their
4 water heater every 10–15 years and their space heating every 20 years.²⁸ This creates an
5 outcome in which a more carbon-intensive fuel source is used over the long term,
6 compared to a scenario in which these systems were instead replaced by high-efficiency
7 cold climate heat pumps or heat pump hot water heaters. Promoting fossil fuel-based
8 equipment today will make it harder for the state to achieve its long-term climate goals.

9 **Q. Please explain how continued investment in electric-to-fossil fuel switching measures**
10 **will increase the overall cost of achieving the state’s decarbonization goals.**

11 A. Converting a customer from fossil fuel to electric heating and cooling near the end of the
12 gas equipment’s useful life is far more cost-effective compared to converting that
13 customer’s equipment when it is relatively new. If PPL’s programs continue to invest in
14 long-lasting natural gas, oil, and propane measures, this may lead to a scenario where
15 early retirement conversion is needed for Pennsylvania to achieve its GHG goals. This
16 will cost more than if a customer’s equipment was converted at the end of its useful life.
17 In essence, Pennsylvania ratepayers could be paying for the same end-use twice: once
18 with the initial in-kind replacement, and again to switch to electric equipment before the
19 end of the in-kind unit’s useful life. If the customer does not switch from fossil-fueled
20 equipment to efficient electric equipment, then other potentially more expensive
21 measures will be needed to reduce GHGs. Either way, the costs are higher.

²⁸ Electric Power Research Institute (EPRI). 2018. U.S. National Electrification Assessment.

1 **Q. What is your recommendation for treatment of electric-to-fossil fuel switching**
2 **measures?**

3 A. As other parties commented in response to the Commission’s Phase IV Tentative
4 Implementation Order, there is significant potential for savings from measures that
5 reduce electricity without having to increase consumption of carbon emitting fuels.²⁹ Due
6 to the fact these measures are not needed to meet PPL’s Phase IV savings goals, are not
7 aligned with Pennsylvania’s GHG goals, and can increase the costs of decarbonization
8 for ratepayers in the state, we recommend these measures be removed from PPL’s Phase
9 IV Plan. In their place, PPL should focus its incentives on the deployment of high-
10 efficiency heat pump water heaters and cold climate heat pumps for its electric
11 customers. High-efficiency heat pumps are approximately 1.5 times more efficient than a
12 natural gas furnace in a particularly cold region and up to more than three times as
13 efficient in a warmer region.³⁰ NYSERDA also reports that cold climate heat pumps can
14 operate down to a temperature of 5 degrees Fahrenheit while also maintaining an
15 efficiency factor of 1.75 or greater.”³¹ Such measures are highly cost-effective for
16 customers switching from electric resistance heat and should be the first choice for Act
17 129 programs.

²⁹ Comments of the Environmental Stakeholders and the Keystone Energy Efficiency Alliance (KEEA) on the Phase IV Tentative Implementation Order.

³⁰ EPRI at 31.

³¹ NYSERDA. 2017. Renewable Heating and Cooling Policy Framework: Options to Advance Industry Growth and Markets in New York. page 15, available at <https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/NYSERDA/RHC-Framework.pdf>.

1 **Q. What can PPL do to increase adoption of cold climate heat pumps and other high-**
2 **efficiency electric measures?**

3 A. Advancements in heat pump technology have improved control and comfort for
4 homeowners.³²When weatherization is conducted along with installation of heat pumps,
5 customers can reduce the system size and the cost of the heat pump. This will make it
6 easier for heat pumps to serve all or most of the heating load for a building. A recent
7 survey by the American Council for an Energy Efficient Economy (ACEEE) found eight
8 energy efficiency programs require weatherization as part of heat pump installations and
9 encourages such an approach.³³

10 Due to the superior performance of cold climate heat pumps mentioned above, several
11 states are creating targets for deployment of heat pumps. Maine has a target of 245,000
12 homes (48 percent of the housing stock) with heat pumps installed by 2030;
13 Massachusetts is examining the potential for a target of converting one million homes (40
14 percent of the housing stock) to heat pumps by 2030; and Colorado's GHG Plan has a
15 target of installing heat pumps in 200,000 homes by 2030.³⁴

16 Advancements notwithstanding, PPL customers face barriers to the adoption of heat
17 pumps and heat pump water heaters. PPL can address these barriers in its Phase IV Plan
18 in several ways. PPL can structure incentives to adequately address higher upfront costs
19 and create optimal delivery channels. It can expand customer education and outreach

³² https://www.aceee.org/sites/default/files/pdfs/programs_to_electrify_space_heating_brief_final_6-23-20.pdf

³³ Steven Nadel. Programs to Electrify Space Heating in Homes and Buildings, ACEEE, available at
https://www.aceee.org/sites/default/files/pdfs/programs_to_electrify_space_heating_brief_final_6-23-20.pdf

³⁴ Gartman, M. and Shah, A. 2020. *Heat Pumps: A Practical Solution for Cold Climates*. Rocky Mountain Institute.

1 channels to increase awareness of the technology and importance of weatherization. PPL
2 can also provide post-installation training on proper use of heat pumps, and it can also
3 facilitate programs to train installers and builders on right-sizing and proper installation.
4 It can take time for consumers to embrace a new technology and it is therefore critical
5 that PPL seek to increase adoption and market transformation of heat pump measures
6 during its Phase IV Plan.

7 *PPL does not provide clarity on its plans to bid into PJM market*

8 **Q. Please describe the Commission’s guidance regarding bidding EE&C resources into**
9 **the PJM capacity market.**

10 A. The Phase IV implementation order calls for the EDCs to nominate a portion of the
11 projected peak demand resources in their EE&C Plans into PJM’s capacity market.³⁵

12 **Q. Has PPL provided this information?**

13 A. No, although PPL does describe its approach for managing the bidding process. PPL
14 plans to use competitive procurement to select a vendor who can help assist bidding
15 capacity into the PJM market.

16 **Q. Do you have any comments on this approach?**

17 A. Yes. PJM suspended its capacity market auction for the 2022/2023 and 2023/2024
18 Delivery Years while the Federal Energy Regulatory Commission considers new rules for
19 the PJM capacity market construct.³⁶ Given the uncertainties around when the next

³⁵ Phase IV order, page 70.

³⁶ PJM. PJM Message Regarding Suspension of Reliability Pricing Model Base Residual Auction Activities and Deadlines Until Further Notice. <https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2022->

1 auction will be held, PPL’s approach, i.e., competitive procurement of services to manage
2 bidding, is reasonable. However, we note that the uncertainty regarding the PJM capacity
3 auction does not prevent PPL from providing an estimate of peak reductions to be bid
4 under a reasonable set of assumptions.

5 **Q. What do you recommend?**

6 A. We recommend that PPL provide its estimate of Phase IV peak demand reductions, by
7 proposed program component and measure, that it plans to bid into PJM’s capacity
8 market, its assumptions about the market, and an estimate of related auction proceeds.
9 Further, when there is more clarity about the changes to the capacity market, we
10 recommend that PPL consider Reliability Pricing Model (RPM) requirements when it
11 designs its programs, in order to optimize these proceeds.

12
13 **4. ALIGNING EE&C WITH POLICY GOALS**

14
15 **Q. Please describe recent climate policy developments in Pennsylvania.**

16 A. As noted above, Governor Wolf’s EO 19-07 charged the Pennsylvania DEP with
17 developing a proposed rulemaking package to abate, control, or limit carbon dioxide
18 emissions from fossil-fuel-fired electric power generators. EO 19-07 specified that the
19 proposed rulemaking should include auctions of emission allowances and align with
20 RGGI, a cooperative regional cap-and-invest program of 10 participating New England

2023/2022-2023-pjm-message-regarding-suspension-of-rpm-base-residual-auction-activities-and-deadlines-
until-further-
notice.ashx#:~:text=As%20such%2C%20PJM%20is%20suspending,2024%20Delivery%20Years%20(DYs).&te
xt=ashx)%20directing%20PJM%20not%20to,FERC%20establishes%20the%20new%20rules.

1 and Mid-Atlantic states. Pursuant to EO 19-07, DEP developed its proposed rulemaking
2 to establish a program to limit carbon dioxide emissions from fossil-fired electric
3 generating units with a nameplate capacity of 25 megawatts or greater starting in
4 2022.^{37,38} DEP presented this proposed rulemaking to the Pennsylvania Environmental
5 Quality Board (“EQB”). The EQB adopted the proposed rulemaking on September 15,
6 2020.³⁹

7 **Q. What is the current status of the proposed rulemaking?**

8 A. The EQB is currently accepting public comments on its proposed rulemaking. The
9 comment period is open through January 14, 2021.⁴⁰

10 **Q. How will Pennsylvania’s entering RGGI impact the role of energy efficiency?**

11 A. While it has not been determined how auction proceeds will be used, energy efficiency is
12 likely to play a major role in the Commonwealth’s approach to RGGI compliance. It is
13 also likely that energy efficiency will receive RGGI allowance revenues. Energy
14 efficiency is highly cost-effective and one of the lowest cost means of curbing GHG
15 emissions. Consequently, energy efficiency will likely figure prominently in
16 Pennsylvania’s strategy for reducing emissions for RGGI compliance, and it will almost

³⁷ Pennsylvania Environmental Quality Board. Proposed Rulemaking: CO2 Budget Trading Program. [25 PA. CODE CH. 145]. Available at <https://www.dep.pa.gov/PublicParticipation/EnvironmentalQuality/Pages/default.aspx>.

³⁸ Pennsylvania Department of Environmental Protection. Proposed Rulemaking Annex A: Title 25. Environmental Protection, Part I. Department of Environmental Protection, Subpart C. Protection of Natural Resources, Article III. Air Resources, Chapter 145. Interstate Pollution Transport Reduction, Subchapter E. CO2 Budget Trading Program. Available at <https://www.dep.pa.gov/PublicParticipation/EnvironmentalQuality/Pages/default.aspx>.

³⁹ Environmental Quality Board, Meeting Minutes, September 15 2020. Available at: http://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2020/November%2017/9.15.20%20EQB%20Minutes_FINAL.pdf.

⁴⁰ Pennsylvania Department of Environmental Protection. Regional Greenhouse Gas Initiative. Available at <https://www.dep.pa.gov/Citizens/climate/Pages/RGGI.aspx>, accessed January 11, 2021.

1 certainly play a larger role than it has in the past. The proposed rulemaking calls for
2 establishing a strategic set-aside for funding to “encourage and foster promotion of
3 energy efficiency measures, promote renewable or noncarbon-emitting energy
4 technologies, and stimulate or reward investment in the development of innovative
5 carbon emissions abatement technologies.”⁴¹ Moreover, the modeling for the proposed
6 rulemaking assumed that a portion of statewide average annual allowance revenues,
7 estimated at \$261 million per year, would be invested in energy efficiency.⁴² In the
8 modeling, the investment in energy efficiency ranged from 10 to 31 percent, or \$26
9 million to over \$80 million, of annual allowance revenues *every year*. For comparison, if
10 we assume the higher end of the range used in the RGGI modeling and that the share of
11 these funds directed toward PPL’s service area will be similar to the service area’s share
12 of Act 129 funding, there would be \$20 million additional funds every year for energy
13 efficiency in PPL’s territory. For comparison, PPL’s proposed annual budget for the
14 EE&C programs is ranges from \$60.6 million to \$64.1 million for the Phase IV period.⁴³

⁴¹ Pennsylvania Environmental Quality Board. Proposed Rulemaking: CO2 Budget Trading Program. [25 PA. CODE CH. 145]. Available at <https://www.dep.pa.gov/PublicParticipation/EnvironmentalQuality/Pages/default.aspx>.

⁴² PA DEP and ICF. 2020. Pennsylvania RGGI Modeling Report. Available at http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/RGGI/PA_RGGI_Modeling_Report.pdf.

⁴³ PPL Plan, p. 14.

1 **Q. Should the Commission wait for the next program cycle to consider these issues?**

2 A. No. The Commission rightly notes that some parameters for Pennsylvania’s participation
3 have yet to be determined.⁴⁴ However, the current timeline for entry into RGGI is before
4 the end of the Phase IV period. As noted above, the DEP’s proposed rulemaking calls for
5 carbon dioxide requirements starting in 2022, well before the end of the five-year
6 program period for Phase IV. This timeline calls for proactive, careful planning. The
7 PUC can begin laying the groundwork for these changes now, so that the state is in a
8 better position to implement them once more is known about the specifics. The sooner
9 the state implements changes to address RGGI, the better for ratepayers.

10 **Q. Does the modeling reflect a commitment to provide RGGI auction proceeds to**
11 **energy efficiency?**

12 A. No. However, such a commitment would be consistent with how other RGGI states use
13 their allowance revenues. Across all RGGI states, 38 percent of 2018 allowance revenues
14 were invested in energy efficiency.⁴⁵

15 **Q. Will the rulemaking process impact how Act 129 EE&C programs should be**
16 **implemented?**

17 A. Mostly likely. The decision about how to use RGGI funds is under the purview of the
18 DEP. To leverage the existing energy efficiency infrastructure, it is likely that DEP’s
19 approach will involve expanding or supplementing the utilities’ efforts under the EE&C
20 programs, rather than duplicating or recreating these programs. Whether the utilities’

⁴⁴ TRC Test Order, p. 72-72.

⁴⁵ Regional Greenhouse Gas Initiative, Inc. 2020. The Investment of RGGI Proceeds in 2018.
https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2018.pdf.

1 EE&C programs shift in focus or increase under RGGI, the commonwealth's entrance
2 into RGGI will have important implications for the Act 129 programs.

3 **Q. What information will stakeholders need for assessing and developing an approach**
4 **to energy efficiency under RGGI?**

5 A. The design and mix of energy efficiency programs should be informed by the emissions
6 that they are likely to displace. This requires understanding when energy efficiency
7 measures save energy on an hourly basis throughout the year (typically called hourly
8 savings profiles). Hourly savings profiles would present information for a typical use
9 pattern for participants in relevant efficiency programs. Data on all measures (or groups
10 of measures) currently offered by the EE&C programs and for all technically feasible
11 measures would be needed to shed light on an optimal measure mix.

12 Optimizing energy efficiency under RGGI also requires understanding whether and to
13 what extent energy efficiency resources are likely to reduce electricity production by
14 fossil-fired power plants. This involves identifying what resources are dispatched to meet
15 the electricity needs of customers in Pennsylvania at different times of the day and of the
16 year, the plants that are highest cost and are therefore most likely to be displaced by
17 energy efficiency, and the emissions of these units. These can be compiled into marginal
18 emissions rates per MWh of energy reduced.

19 **Q. Are there existing studies addressing hourly efficiency savings or emissions rates?**

20 A. We are not aware of such studies for Pennsylvania. While the SWE Potential Study
21 provides a good foundation for planning for an expansion of energy efficiency, it does
22 not appear to have used or developed hourly measure savings profiles.

1 PJM conducts marginal emissions analyses, which look at the emissions for the PJM
2 system as a whole. To support planning for participation in RGGI, Pennsylvania should
3 study the emissions from units that serve customers in the commonwealth.

4 If these data have not yet been analyzed, we recommend that PPL, in coordination with
5 the other EDCs, conduct both of these studies.

6 **Q. Does this conclude your direct testimony?**

7 A. Yes, it does.



Alice Napoleon, Senior Associate

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PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. *Senior Associate*, June 2013 – present; *Associate*, July 2008 – June 2013; *Research Associate*, April 2005 – July 2008.

- Provide expert analysis, ongoing stakeholder support, and consulting services in regulatory proceedings regarding energy efficiency program design and performance, funding and incentive mechanisms, evaluation, cost-effectiveness screening, avoided costs, potential studies, and plans. Develop and sponsor testimony and formal comments on electric and natural gas energy efficiency plans, advanced metering infrastructure (AMI) proposals, and innovative programs and regulatory structures.
- Develop a cost-effectiveness tool, program designs, and case studies to facilitate incorporating strategic energy management programs into energy efficiency program administrators' portfolios for commercial and industrial customers.
- Design research approach, manage team, and conduct a sweeping analysis of energy efficiency potential studies from utilities, states, and regions across the U.S.
- Conduct extensive research on low-income energy efficiency efforts in U.S. states. Analyze energy burden differences between low-income and non-low-income households, and across factors that can impact participation in and efficacy of energy efficiency programs, to inform efficiency program design and targeting efforts. Provide consulting services and testimony on low-income energy efficiency programs and proposals.
- Facilitate residential, commercial, and industrial policy working groups and manage technical analysis of working group recommendations to reduce greenhouse gas (GHG) emissions in Colorado, South Carolina, and Maryland.
- Research and analyze historical emissions of criteria and hazardous air pollutants, greenhouse gases, and coal combustion wastes. Research and develop potential state and local emissions mitigation strategies, such as strategies for reducing ambient fine particulates in New York City.
- Conduct surveys of regional, state, and utility policies and practices regarding ratemaking for energy efficiency, power procurement, risk management, and fuel diversity. Research federal, regional, and state policies and case histories on integrated resource planning, power procurement, power plant operations, renewable portfolio standards, and market power.
- Conduct research for modelling macroeconomic impacts of policies that reduce oil production.

Resource Insight, Inc., Arlington, MA. *Research Assistant*, 2003-2005.

Responsible for conducting research and analysis of electric, gas, steam, and water resource issues. Conducted discounted cash flow analysis for asset valuation. Developed market-price benchmarks for analysis of power-supply bids including energy, capacity, ancillary services, transmission, ISO services, losses, and adjustment for load shape. Prepared discovery responses, formal objections, comments, and testimony; collaboratively wrote and edited reports; created and formatted exhibits. Participated in drafting an Energy Plan for New York City. Edited solicitation for competitive power supply to serve aggregated municipal load.

University of Massachusetts, Amherst, MA. *Teaching Assistant*, 2001-2002.

Developed and taught lessons on applied math to a diverse group of incoming graduates; tutored students in microeconomic theory and cost benefit analysis; graded problem sets and memoranda.

International Council for Local Environmental Initiatives, Berkeley, CA. *Cities for Climate Protection Intern for the City of Northampton, MA*, 2001.

Compiled primary and secondary source data on energy consumption and solid waste generation by the municipal government, city residents, and businesses; applied emissions coefficients to calculate total GHG emissions; identified current and planned municipal policies that impact GHG emissions; researched the predicted local effects of global warming ; gathered public feedback to provide acceptable and proactive policy alternatives. Composed a GHG emissions inventory describing research findings; wrote and distributed a policy report and press releases; gave newspaper and radio interviews; addressed public officials and the public during a televised meeting.

University of Massachusetts, Amherst, MA. *Research Assistant*, 2000-2001.

Located federal data sources, identified changes, and updated a research database to evaluate the Habitat Conservation Program; proofread articles and white papers; composed a literature review on land use modelling. Collaboratively administered, tested, and proposed interface enhancements for a web-based data warehouse of regional habitat change research; formally presented the system to an independent research group.

Court Square Data Group, Inc., Springfield, MA. *Administration Manager*, 1998-2000; *Project Administrator*, 1996-1998.

As Administration Manager, analysed profitability and diversity of income sources; managed cash flow, expense, and income data; created budgets; devised and implemented procedures to increase administrative efficiency; implemented new accounting system with minimal disruption to workflow.

As Project Administrator, coordinated implementation of software features; identified opportunities for future development; monitored problem resolution; wrote and coordinated production of a user's manual and questionnaires; edited technical proposals and a business plan.

EDUCATION

University of Massachusetts, Amherst, MA
Master of Public Administration, 2002

Rutgers University, New Brunswick, NJ
Bachelor of Arts in Economics, 1995

Syracuse University, Syracuse, NY, 1994

PUBLICATIONS

Hopkins, A. S., A. Napoleon, K. Takahashi. 2020. *Gas Regulation for a Decarbonized New York: Recommendations for Updating New York Gas Utility Regulation*. Synapse Energy Economics for Natural Resources Defense Council.

Takahashi, K., A. Napoleon. 2020. *Synapse Comments on EfficiencyOne Performance Alignment Study - M09096*. Questions and comments regarding the EfficiencyOne Performance Alignment Study filed on April 21, 2020. Synapse Energy Economics for the Nova Scotia Utility and Review Board.

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Napoleon, A., J. Kallay, K. Takahashi. 2020. *Utility Energy Efficiency and Building Electrification Portfolios Through 2025: A Brief on the New York Public Service Commission's Recent Order*. Synapse Energy Economics for the Natural Resources Defense Council.

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Kallay, J., A. Hopkins, J. Frost, A. Napoleon, K. Takahashi, J. Slason, G. Freeman, D. Grover, B. Swanson. 2019. *Net Zero Energy Roadmap for the City of Burlington, Vermont*. Synapse Energy Economics and Resource Systems Group for Burlington Electric Department.

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Napoleon, A., D. Goldberg, K. Takahashi, T. Woolf. 2019. *An Assessment of Prince Edward Island Energy Corporations' 2018 - 2021 Energy Efficiency and Conservation Plan*. Synapse Energy Economics for Carr, Stevenson and MacKay as Counsel to the Island Regulatory and Appeals Commission.

Takahashi, K., A. Napoleon. 2018. *Synapse Comments on EfficiencyOne's 2019 Rate and Bill Impact Analysis and Model - M09471*. Comments regarding the revised 2019 Rate and Bill Impact Analysis filed by EfficiencyOne on November 1, 2019. Synapse Energy Economics for the Nova Scotia Utility and Review Board.

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White, D., K. Takahashi, A. Napoleon, T. Woolf. 2018. *Value of Energy Efficiency in New York: Assessment of the Range of Benefits of Energy Efficiency Programs*. Synapse Energy Economics for Natural Resources Defense Council.

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Kallay, J., A. Napoleon, M. Chang. 2016. *Opportunities to Ramp Up Low-Income Energy Efficiency to Meet States and National Climate Policy Goals*. Synapse Energy Economics.

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- Napoleon, A., K. Takahashi, J. Kallay, T. Woolf. 2016. "Evaluation, Measurement, and Verification in Virginia." Memorandum prepared by Synapse Energy Economics for Clean Energy Solutions Inc., Virginia Energy Efficiency Council, and Virginia Department of Mines, Minerals and Energy.
- Woolf, T., A. Napoleon, M. Whited. 2015-2016. *Comments and Reply Comments in the New York Public Service Commission Case 14-M-0101: Reforming the Energy Vision*. Comments related to Staff's (a) a benefit-costs analysis framework white paper, (b) ratemaking and utility business models white paper, and (c) Distributed System Implementation Plan guide. Prepared by Synapse Energy Economics on behalf of Natural Resources Defense Council and Pace Energy and Climate Center.
- Kallay, J., K. Takahashi, A. Napoleon, T. Woolf. 2015. *Fair, Abundant, and Low-Cost: A Handbook for Using Energy Efficiency in Clean Power Plan Compliance*. Synapse Energy Economics for the Energy Foundation.
- Woolf, T., K. Takahashi, E. Malone, A. Napoleon, J. Kallay. 2015. *Ontario Gas Demand-Side Management 2016-2020 Plan Review*. Synapse Energy Economics for the Ontario Energy Board.
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- Keith, G., S. Jackson, A. Napoleon, T. Comings, J. Ramey. 2012. *The Hidden Costs of Electricity: Comparing the Hidden Costs of Power Generation Fuels*. Synapse Energy Economics for Civil Society Institute.
- Keith, G., B. Biewald, K. Takahashi, A. Napoleon, N. Hughes, L. Mancinelli, E. Brandt. 2010. *Beyond Business as Usual: Investigating a Future without Coal and Nuclear Power in the US*. Synapse Energy Economics for Civil Society Institute.
- Napoleon, A., W. Steinhurst, M. Chang, K. Takahashi, R. Fagan. 2010. *Assessing the Multiple Benefits of Clean Energy: A Resource for States*. US Environmental Protection Agency with research and editorial

support from Stratus Consulting, Synapse Energy Economics, Summit Blue, Energy and Environmental Economics, Inc., Demand Research LLC, Abt Associates, Inc., and ICF International.

Napoleon, A., D. Schlissel. 2009. *Economic Impacts of Restricting Mountaintop/Valley Fill Coal Mining in Central Appalachia*. Synapse Energy Economics for Sierra Club, and Appalachian Center for the Economy and the Environment.

Napoleon, A., J. Fisher, W. Steinhurst, M. Wilson, F. Ackerman, M. Resnikoff. 2008. *The Real Costs of Cleaning Up Nuclear Waste: A Full Cost Accounting of Cleanup Options for the West Valley Nuclear Waste Site*. Synapse Energy Economics for Citizens' Environmental Coalition.

Napoleon, A., G. Keith, C. Komanoff, D. Gutman, P. Silva, D. Schlissel, A. Sommer, C. Chen, A. Roschelle, J. Levy, P. Kinney. 2007. *Quantifying and Controlling Fine Particulate Matter in New York City*. Synapse Energy Economics for Coalition Helping Organize a Kleaner Environment, Natural Resources Defense Council (NRDC), Reliant Energy.

Drunic, M., A. Napoleon, E. Hausman, R. Hornby. 2007. *Arkansas Electric Generation Fuel Diversity: Implementation of EPC Act 2005 Amendments to PURPA Section 111 (d)*. Synapse Energy Economics for Arkansas Public Service Commission Staff.

Hausman, E., R. Fagan, D. White, K. Takahashi, A. Napoleon. 2007. *LMP Electricity Markets: Market Operations, Market Power, and Value for Consumers*. Synapse Energy Economics for American Public Power Association.

Synapse Energy Economics. 2006. *Portfolio Management: Tools and Practices for Regulators*. Prepared for National Association of Regulatory Utility Commissioners.

Steinhurst, W., A. Napoleon, K. Takahashi. 2006. *Energy in the Northern Forest Region: A Situation Analysis*. Synapse Energy Economics for Northern Forest Center and The North Country Council.

Synapse Energy Economics. 2006. *Ensuring Delaware's Energy Future: A Response to Executive Order Number 82*. Synapse Energy Economics for Delaware Public Service Commission Staff by the Delaware Cabinet Committee on Energy and others.

Fagan, R., A. Napoleon, A. Rochelle, A. Sommer, W. Steinhurst, D. White. K. Takahashi. 2006. *Mohave Alternatives and Complements Study: Assessment of Carbon Sequestration Feasibility and Markets*. Sargent & Lundy and Synapse Energy Economics, Inc. for Southern California Edison.

TESTIMONY

New York Public Service Commission (Cases 20-E-0380 and 20-G-0381): Direct testimony of Alice Napoleon and Kenji Takahashi regarding proposed earnings adjustment mechanisms in a proceeding on Rates, Charges, Rules, and Regulations related to Niagara Mohawk Power Corporation d/b/a National Grid for Electric Service and National Grid for Gas Service. On behalf of the Natural Resources Defense Council. November 25, 2020.

California Public Utilities Commission (Application Nos. 19-11-003, 19-11-004, 19-11-005, 19-11-006):

Prepared Testimony of Alice Napoleon addressing proposals of Pacific Gas and Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, and Southern California Gas Company related to the Energy Savings Assistance (ESA) Program and Budgets for Program Years 2021-2026. On behalf of The Utility Reform Network. September 4, 2020.

California Public Utilities Commission (Application Nos. 19-11-003, 19-11-004, 19-11-005, 19-11-006, 19-11-007): Comments of The Utility Reform Network on the Energy Division Staff Proposal and Utility Applications. On behalf of The Utility Reform Network. July 24, 2020.

Nova Scotia Utility and Review Board (Matter No. M09096): Evidence of Alice Napoleon regarding EfficiencyOne's 2020-2022 DSM Plan. On behalf of Counsel to the Nova Scotia Utility and Review Board. May 28, 2019.

New York Public Service Commission (Cases 19-E-0065 and 19-G-0066): Direct testimony of Tim Woolf and Alice Napoleon regarding energy efficiency targets and incentives in Con Edison rate case. On behalf of the Natural Resources Defense Council. May 24, 2019.

Nova Scotia Utility and Review Board (Matter No. M08604): Evidence of Alice Napoleon regarding the 2019 Demand Side Management Resource Plan. On behalf of Counsel to the Nova Scotia Utility and Review Board. June 13, 2018.

Nova Scotia Utility and Review Board (Matter No. M08349): Evidence of Alice Napoleon regarding Nova Scotia Power's Advanced Meter Infrastructure Proposal. On behalf of Counsel to the Nova Scotia Utility and Review Board. January 18, 2018.

Nova Scotia Utility and Review Board (Case No. M07767): Direct evidence in the matter of the Nova Scotia Power Advanced Meter Infrastructure Pilot. On behalf of Counsel to the Nova Scotia Utility and Review Board. February 16, 2017.

Public Service Commission of South Carolina (Docket No. 2016-223-E): Direct Testimony of Alice Napoleon regarding South Carolina Electric and Gas Energy Efficiency Efforts. On behalf of South Carolina Coastal Conservation League. September 1, 2016.

Nova Scotia Utility and Review Board (Case No. M06247): Direct evidence in the matter of an application by Efficiency Nova Scotia Corporation for approval of its electricity demand-side management plan for 2015. On behalf of Counsel to the Nova Scotia Utility and Review Board. July 14, 2014.

TESTIMONY ASSISTANCE

Public Service Commission of South Carolina (Docket No. 2017-2-E): Direct Testimony of Thomas Vitolo, PhD regarding Avoided Cost Calculations and the Costs and Benefits of Solar Net Energy Metering for South Carolina Electric & Gas Company. On behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. March 22, 2017.

State of New Jersey Board of Public Utilities (Docket No. ER16060524): Direct testimony of Tim Woolf regarding the Petition of Rockland Electric Company for Approval of an Advanced Metering Program, and for Other Relief. On behalf of New Jersey Division of the Ratepayer Advocate. September 9, 2016.

Nova Scotia Utility and Review Board (Matter No. M06733): Direct testimony of Tim Woolf regarding EfficiencyOne's 2016-2018 demand-side management plan. On behalf of the Nova Scotia Utility and Review Board. June 2, 2015.

Missouri Public Service Commission (File No. EO-2015-0055): Rebuttal and surrebuttal of Tim Woolf on the topic of Ameren Missouri's 2016-2018 Energy Efficiency Plan. On behalf of Sierra Club. March 20, 2015 and April 27, 2015.

State of New Jersey Board of Public Utilities (Docket No. EO14080897): Direct testimony of Kenji Takahashi regarding the Petition of Public Service Electric & Gas Company to continue its Energy Efficiency Economic Extension Program on a Regulated Basis (EEE Extension II). On behalf of New Jersey Division of the Ratepayer Advocate. November 7, 2014.

Kentucky Public Service Commission (Case No. 2014-00003): Direct testimony of Tim Woolf regarding Louisville Gas and Electric Company and Kentucky Utilities Company's proposed 2015-2018 demand-side management and energy efficiency program plan. On behalf of Wallace McMullen and the Sierra Club. April 14, 2014.

State of New Jersey Board of Public Utilities (Docket No. GO12050363): Direct testimony of Maximilian Chang regarding South Jersey Gas Company's proposal to extend and modify its energy-efficiency programs. On behalf of New Jersey Division of the Ratepayer Advocate. November 9, 2012.

State of New Jersey Board of Public Utilities (Docket No. GO12070640): Direct testimony of Robert Fagan regarding New Jersey Natural Gas Company's petition for approval of the extension of the SAVEGREEN energy efficiency programs. On behalf of the New Jersey Division of the Ratepayer Advocate. October 26, 2012.

State of New Jersey Board of Public Utilities (Docket No. GO11070399): Direct testimony of Robert Fagan regarding Elizabethtown Gas Company's Proposed Energy Efficiency Program. On behalf of New Jersey Division of the Ratepayer Advocate. December 16, 2011.

State of New Jersey Board of Public Utilities (Docket No. GR11070425): Direct testimony of Robert Fagan regarding New Jersey Natural Gas Company's petition for approval of the extension of the SAVEGREEN energy efficiency programs. On behalf of the New Jersey Division of the Ratepayer Advocate. November 16, 2011.

State of New Jersey Board of Public Utilities (Docket No. GR10030225): Direct testimony of David Nichols regarding New Jersey Natural Gas Company's Proposed Energy Efficiency Program. On behalf of New Jersey Division of the Ratepayer Advocate. July 9, 2010.

Virginia State Corporation Commission (Case No. PUE-2009-00097): Direct testimony of William Steinhurst regarding Appalachian Power Company's Integrated Resource Plan filing pursuant to Va. Code

§ 56-597 et seq. On behalf of the Southern Environmental Law Center, Chesapeake Climate Action Network, Appalachian Voices, and the Virginia Chapter of The Sierra Club. March 23, 2010.

Delaware Public Service Commission (Docket No. 07-20): Jointly authored an expert report, with Robert Fagan, William Steinhurst, David White, and Kenji Takahashi, In the Matter of Integrated Resource Planning for the Provision of Standard Offer Service by Delmarva Power & Light Company Under 26 DEL. C. §1007 (c) & (d). On behalf of the Staff of Delaware Public Service Commission. April 2, 2009.

State of New Jersey Board of Public Utilities (BPU Docket EM05020106): Direct and surrebuttal testimony of Bruce Biewald, Robert Fagan, and David Schlissel regarding the Joint Petition Of Public Service Electric and Gas Company And Exelon Corporation For Approval of a Change in Control Of Public Service Electric and Gas Company And Related Authorizations. On behalf of New Jersey Division of the Ratepayer Advocate. November 14, 2005 and December 27, 2005.

Illinois Commerce Commission (Dockets 05-0160, 05-0161, 05-0162): Direct testimony of William Steinhurst regarding Ameren's proposed competitive procurement auction (CPA). On behalf of Illinois Citizens Utility Board. June 15, 2005 and August 10, 2005.

Illinois Commerce Commission (Docket 05-0159): Direct testimony of William Steinhurst regarding Commonwealth Edison's Proposal to implement a competitive procurement process. On behalf of Illinois Citizens Utility Board and Cook County State's Attorney's Office. June 8, 2005 and August 3, 2005.

Resume updated January 2021



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PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc, Cambridge, MA. Senior Associate, 2015–present; Associate, 2004–2015.

Analyzes technologies, policies, and regulations associated with supply- and demand-side energy resources. Assesses the performance, costs, and potential of energy efficiency measures, renewable energy resources, and building decarbonization and electrification measures. Examines economic and environmental implications of clean energy policies and programs associated with energy efficiency, demand response, distributed generation, and renewable energy. Analyzes ratemaking issues such as standby rates and time of use rates for distributed generation, and decoupling rate mechanisms for energy efficiency measures. Investigates electricity and natural gas market price trends and fluctuations. Prepares expert testimony and reports for regulatory proceedings.

Center for Energy and Environmental Policy, University of Delaware, Newark, DE. Research Associate, 2002 – 2004.

Researched the market potential of distributed resources under different electric distribution rate designs (report prepared for Conectiv Power Delivery Company). Investigated the potential of the Clean Development Mechanisms (CDM) in Asian developing countries and the Japanese government’s policy for CDM. Contributed to a market penetration study for photovoltaic technologies in comparison with the predicted oil production from the oil reservoirs in the Arctic National Wildlife Refuge (report prepared for Astropower, Inc.). Analyzed the installation of PV and generation-set options for the Assateague Beach Coastal Guard Station at the Assateague Island National Seashore in Maryland (report prepared for the U.S. National Park Service).

Delaware Division of Public Advocate, Wilmington, DE. Research Intern, 2003.

Researched and wrote reports on states’ policies regarding (1) energy efficiency/load management programs in order to identify cost-effective programs for implementation in Delaware; (2) electric standard offer service/default service (rate designs) for those who do not choose alternative suppliers under the deregulation process; (3) electric universal service and system benefit charges for protecting consumers from risks associated with electricity restructuring; and (4) Contributions and Advances-in-Aid-of-Construction for water supply extensions.

Resources for the Future, Washington DC. Research Intern, 2002.

Investigated current and planned wind power capacity for the United States. Analyzed the EPA and EIA market models to estimate technical and economic potential of wind power in the United States.

Researched the status of renewable energy supply in Japan's electricity sector for the Economic and Social Research Institute, Cabinet Office, Government of Japan.

Citizens' Alliance for Saving the Atmosphere and the Earth (CASA), Osaka, Japan. *Volunteer and Researcher*, 1999 – 2001.

Worked as a newsletter writer, editor, and event organizer. Wrote a report on the first experimental biomass energy facility in Japan and the photovoltaic system at Yagi Junior High School in Kyoto, Japan. Participated in a research project to investigate renewable energy potential and policies in Japan. Wrote a report on problems of nuclear power plants affecting communities in Fukui prefecture, Japan.

EDUCATION

University of Delaware, Center for Energy and Environmental Policy, Joseph R. Biden, Jr School of Public Policy and Administration, Newark, DE

Master of Arts in Urban Affairs and Public Policy with a focus on Energy and Environmental Policy, 2003. Master's thesis: *Policies to Support Distributed Resources under Different Electricity Restructuring Models*. Courses in energy economics, energy and environmental policy, electricity policy and planning, political economy of environment, solar electric technology, cost-benefit and decision-making analyses, and geographic information system.

Kansai University, Osaka, Japan

Bachelor of Arts in Law with a concentration in Public Administration, 2000.

AWARDS AND SCHOLARSHIPS

- Director's Citation, Joseph R. Biden, Jr School of Public Policy and Administration, University of Delaware. May 2003.
- NEC scholarship for an environmental education leader-training program funded by one of the leading Japanese computer companies, NEC. November 2000.

ADDITIONAL SKILLS

Software: MS Office, Minitab, Analytica, RETScreen, and REM/Rate™

Language: Japanese, Cantonese, and Spanish

OTHER RELEVANT WORK

- Currently assessing Puget Sound Energy's Energize Eastside project proposal on behalf of the City of Newcastle. The focus of this assessment is on (a) the reasonableness of the utility's historical loads and load forecasts including energy efficiency, demand response, and distributed energy resources; and (b) whether there is a need to build new

transmission infrastructure as proposed under the company's Energize Eastside project proposal.

- Assisted NYSERDA with developing (a) a database of renewable heating and cooling (RH&C) technologies, (b) an Excel-based tool to analyze benefits and costs of RH&C, and (c) a state RH&C Policy Framework titled "Renewable Heating and Cooling Policy Framework: Options to Advance Industry Growth and Markets in New York."
- Assisted U.S. EPA with its analysis for and preparation for technical support documents on energy efficiency associated with U.S. EPA's Clean Power Plan under 111(d) regulation
- Assisted New Jersey Division of Rate Counsel with reviewing and commenting on various energy related proposals and documents in New Jersey including utility and the state energy efficiency programs and the state's energy plans. 2009 to present.
- Assisted Nova Scotia Utility and Review Board with a review of energy efficiency potential and integrated resource planning for Nova Scotia Power's jurisdiction. 2013
- Assisted the Hawaii Division of Consumer Advocacy in proceedings to develop and review IRPs for three electric companies and to review the state's energy efficiency programs. 2012 to 2014.
- Assisted the Arkansas Public Service Commission staff with (a) reviewing and assessing utility integrated resource planning and energy efficiency program proposals and (b) drafting regulatory orders on comprehensive energy efficiency program designs and reporting methods. 2012 to 2013.
- Assessed on behalf of Sierra Club energy efficiency and demand response potential estimates by the Cadmus Group for Puget Sound Energy, September 2012.
- Assumed a general contractor role for renovating an existing multi-family house into an ultra-low energy use house equipped with state-of-art energy efficiency measures (such as R-7 windows, R-70 roof insulation, a 95 percent efficient energy recovery ventilation system, cold climate heat pumps) and a 5 kW solar photovoltaic system. December 2012.
- Assessed on behalf of Sierra Club energy efficiency goals proposed in the Los Angeles Department of Water and Power's 2010 integrated resource plan.
- Assisted Nova Scotia Utility and Review Board with developing Community Based Feed-In Tariffs (COMFITs) for five different technologies: small wind projects, medium-sized wind projects, small hydro, small tidal, and biomass CHP projects. April 2011.
- Analyzed existing deep energy retrofit (DER) project data and analyzed potential energy savings from model partial DER projects (e.g., attic, above-grade wall, windows, basement wall) using REM/Rate building energy software and Synapse's own spreadsheet building energy model developed for this research project. The results from the analysis were used to project energy savings from and to set incentive levels for partial DER projects as part of National Grid's 2013-2015 efficiency program filing.
- Assisted several states, including Alaska, Colorado, Florida, Maryland, Massachusetts, and South Carolina with developing and analyzing their state climate change action plans;

evaluated costs and benefits of demand and supply-side policy options, including quantifying expected greenhouse emission reductions. 2007 to 2010.

- Arranged meetings for Union Fenosa/Gas Natural, a Spanish electric and gas company, with Japanese and Korean organizations to study energy efficiency technologies, programs and policies in those countries; Visited Japanese organizations with the delegates of Union Fenosa, provided them technical and translation assistance on energy efficiency in Japan. July 26 to July 31, 2009.

PUBLICATIONS

Hopkins, A. S., A. Napoleon, K. Takahashi. 2020. *Gas Regulation for a Decarbonized New York: Recommendations for Updating New York Gas Utility Regulation*. Synapse Energy Economics for Natural Resources Defense Council.

Takahashi, K., A. Napoleon. 2020. *Synapse Comments on EfficiencyOne Performance Alignment Study - M09096*. Questions and comments regarding the EfficiencyOne Performance Alignment Study filed on April 21, 2020. Synapse Energy Economics for the Nova Scotia Utility and Review Board.

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Havumaki, B., J. Kallay, K. Takahashi, T. Woolf. 2019. *All-Electric Solid Oxide Fuel Cells as an Energy Efficiency Measure*. Synapse Energy Economics for Bloom Energy.

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Resume updated January 2021

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of PPL Electric Utilities Corporation)
For Approval of is Act 129 Phase IV Energy) Docket No.: M-2020-3020824
Efficiency and Conservation Plan)

Supplemental Direct Testimony
and Exhibits

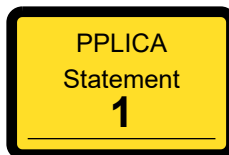
of

JEFFRY POLLOCK

On Behalf of

PP&L Industrial Customer Alliance

January 27, 2021



BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of PPL Electric Utilities Corporation)
For Approval of is Act 129 Phase IV Energy) Docket No.: M-2020-3020824
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GLOSSARY OF ACRONYMS

Term	Definition
ACR	Act 129 Compliance Rider
Application	Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan
C&I	Commercial and Industrial
EECP	Energy Efficiency and Conservation Plan
Implementation Order	Docket No. M-2020-3015228, Implementation Order Entered June 18, 2020
MW / MWh	Megawatt / Megawatt-Hour
Phase III Compliance Filing	Docket No. M-2015-2515642, Compliance Filing filed December 2017
PPL or Company	PPL Electric Utilities Corporation
PPLICA	PP&L Industrial Customer Alliance
TRC	Total Resource Cost Test
TSC	Transmission Service Charge

SUPPLEMENTAL DIRECT TESTIMONY OF JEFFRY POLLOCK

1 **Introduction and Qualifications**

2 **Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A My name is Jeffry Pollock. My business address is 12647 Olive Blvd., Suite 585, St.
4 Louis, Missouri 63141.

5 **Q WHAT IS YOUR OCCUPATION AND BY WHOM ARE YOU EMPLOYED?**

6 A I am an energy advisor and President of J. Pollock, Incorporated.

7 **Q PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.**

8 A I have a Bachelor of Science Degree in Electrical Engineering and a Master's in
9 Business Administration both from Washington University. Since graduation in 1975,
10 I have been engaged in a variety of consulting assignments including energy
11 procurement and regulatory matters in both the United States and several Canadian
12 provinces. More details are provided in **Exhibit ___ (JP-1)**. A partial list of my
13 appearances is provided in **Exhibit ___ (JP-2)**.

14 **Q PLEASE EXPLAIN EXHIBIT ___ (JP-3).**

15 A **Exhibit ___ (JP-3)** is a copy of PPL's discovery responses that I relied upon in my
16 testimony.

17 **Q ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?**

18 A I am testifying on behalf of the PP&L Industrial Customer Alliance (PPLICA). PPLICA
19 members purchase delivery services from PPL Electric Utilities Corporation (PPL or
20 Company).

1 Q DID YOU SUBMIT DIRECT TESTIMONY ON BEHALF OF PP&L INDUSTRIAL
2 CUSTOMER ALLIANCE IN THIS PROCEEDING?

3 A No.

4 Q WHAT IS THE PURPOSE OF YOUR SUPPLEMENTAL DIRECT TESTIMONY?

5 A My testimony will apprise the Commission of the severe impact that PPL's proposed
6 Phase IV Energy Efficiency and Conservation Plan (EECP) will have on all customers,
7 and particularly, on its Large Commercial and Industrial (C&I) customers for whom the
8 Act 129 Compliance Rider (ACR) rate would more than double.¹ To mitigate the
9 severe impact, particularly on the Large C&I class, I recommend that the Commission
10 either reject or significantly reduce the proposed Phase IV peak demand reduction
11 targets.

12 **Phase IV Plan**

13 Q WHAT TARGETS IS PPL PROPOSING TO SET IN PHASE IV?

14 A The Phase IV reduction targets are summarized in Table 1.

Metric	Implementation Order	PPL EECP	Margin
Energy (MWh)	1,250,157	1,540,687	39%
Peak Demand (MW)	229	248	8%

¹ The Large C&I class includes customers taking service on Rates LP-4, LP-5 and LPEP. Rate LP-4 customers take delivery service at primary distribution, while Rate LP-5 and Rate LPEP take service at transmission voltages.

² Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase IV Energy Efficiency and Conservation Plan (hereinafter referred to as "Application") at 5, 15 and PPL Electric Exhibit 1, Table 2; *Energy Efficiency and Conservation Program*; Docket No. M-2020-3015228, Implementation Order dated Jun. 18, 2020 (hereinafter referred to as "Implementation Order").

1 Table 1 presents the Phase IV reduction targets both as approved in the Commission's
2 Implementation Order, as well as in PPL's EECF. As compared with the
3 Implementation Order, PPL is proposing to overachieve on both the target energy (by
4 39%) and target peak demand (by 8%) reductions. Setting much higher targets will
5 exacerbate the Phase IV costs and the associated rate impacts.

6 **Q HOW DO PPL'S PROPOSED PHASE IV REDUCTION TARGETS COMPARE WITH**
7 **THE CORRESPONDING PHASE III REDUCTION TARGETS?**

8 **A** Table 2 provides a comparison between PPL's Phase III and Phase IV target
9 reductions.

Table 2 Phase III Vs. Phase IV Reduction Targets³			
Metric	Phase III	Phase IV	Change
Energy (MWh)	1,587,984	1,540,687	-3%
Peak Demand (MW)	115	248	116%

10 As Table 2 demonstrates, PPL's Phase IV peak demand reduction target would be
11 more than double the corresponding Phase III target, while the Phase IV energy
12 reduction target would be slightly lower. Thus, PPL's Phase IV Plan would place
13 substantially greater emphasis on peak demand reduction, and somewhat less
14 emphasis on energy reduction than its Phase III Plan.

³ Application, PPL Electric Exhibit 1, Table 2; *Petition of PPL Electric Utilities Corporation for Approval of its Act 129 Phase III Energy Efficiency and Conservation Plan*; Docket No. M-2015-2515642, Revised Compliance Filing dated December 2017 at 2, Table 2 (hereinafter referred to as "Phase III Compliance Filing").

1 **Q ARE THE TYPES OF PEAK DEMAND REDUCTION MEASURES SIMILAR IN**
2 **PHASE IV AS IN PHASE III?**

3 A No. The proposed Phase IV target is based primarily on achieving demand reductions
4 through energy efficiency measures, such as lighting improvements, custom process
5 improvements, and HVAC.⁴ This is in stark contrast to Phase III, which targeted
6 primarily demand response programs in addition to peak demand reductions from
7 energy efficiency programs.⁵ Thus, both the amount and the type of peak demand
8 reduction measures would be substantially different in Phase IV.

9 **Q WHY IS PPL'S GREATER EMPHASIS ON PEAK DEMAND REDUCTION**
10 **THROUGH ENERGY EFFICIENCY MEASURES OF CONCERN?**

11 A First, demand response is much more cost-effective than achieving peak demand
12 reductions through energy efficiency measures. In Phase III, for example, C&I
13 demand response had a TRC benefit-to-cost ratio of 1.9 whereas other Large C&I
14 energy efficiency programs had an average TRC of 1.45.⁶ In Phase IV, however, the
15 Large C&I energy efficiency programs have a TRC of only 1.04.⁷ Thus, they are only
16 marginally beneficial. This is in stark contrast with a 1.56 TRC benefit/cost ratio for
17 the Phase IV Small C&I programs.⁸ As discussed later, given the nature of the
18 benefit/cost analysis used in applying the TRC test, the Commission should not
19 approve programs that are only marginally beneficial and would require more than
20 doubling the ACR rate.

⁴ Application, PPL Electric Exhibit 1, Tables 44 and 50.

⁵ Phase III Compliance Filing, Tables 85 and 86.

⁶ Phase III Compliance Filing, Table 55 and Table 67.

⁷ Application, PPL Electric Exhibit 1, Table 38.

⁸ Application, PPL Electric Exhibit 1, Table 39.

1 Second, to accomplish the target energy and peak demand reductions, PPL
2 must shift its emphasis to Large C&I programs. This is demonstrated in Table 3, which
3 compares the target Large C&I energy and peak demand reductions between Phase
4 III and Phase IV.

Table 3 Phase III Vs. Phase IV Large C&I Reduction Targets⁹			
Metric	Phase III	Phase IV	Change
Energy (MWh)	67,635	721,578	967%
Peak Demand (MW)	66.7	101.5	52%

5 As Table 3 demonstrates, the Large C&I class's Phase IV energy reduction target
6 would be 967% or more than 10 times higher than the corresponding Phase III target,
7 while the Phase IV demand reduction target would be 52% or 1.5 times higher than
8 the corresponding Phase III target.

9 **Q WERE THE VERY LOW TRC RATIOS FOR THE LARGE C&I PROGRAMS KNOWN**
10 **WHEN THE IMPLEMENTATION ORDER WAS ENTERED?**

11 A No.

12 **Q WHAT IS THE IMPACT OF THE MORE AMBITIOUS PEAK DEMAND REDUCTION**
13 **GOAL?**

14 A PPL's current obligation to achieve this more ambitious peak demand reduction goal
15 would result in a substantial realignment of costs between Phase III and Phase IV.

16 This is shown in Table 4. Table 4 compares the expected Phase III costs with the

⁹ Phase III Compliance Filing, Table 85; Application, PPL Electric Exhibit 1, Tables 4 and 5.

1 corresponding Phase IV budget by customer class. The expected Phase III costs
2 include costs actually incurred through December 2020 and the costs PPL projects
3 will be incurred through the end of Phase III (in May 2021).

Table 4 Expected Phase III Vs. Proposed Phase IV Costs by Customer Class¹⁰ (\$Thousands)					
Customer Class	Phase III	Phase IV	Percent of Total		Percent Increase
			Phase III	Phase IV	
Residential (incl. LI)	\$139,209	\$123,156	53%	39%	-12%
Sm. C&I (incl. GNE)	\$66,041	\$89,392	25%	29%	35%
Lg. C&I (incl. GNE)	\$55,455	\$99,944	21%	32%	80%
Total	\$260,704	\$312,491	100%	100%	20%

4 **Q WHAT DOES TABLE 4 DEMONSTRATE?**

5 A First, the proposed Phase IV budget would be \$312.5 million, which is 20% higher than
6 the expected Phase III costs. Second, the Large C&I class's share of the total EEC
7 costs would increase from 21% to 32%. The Residential class, by contrast, would
8 move in the opposite direction, comprising only 39% of the total Phase IV costs instead
9 of 53% of the Phase III costs. Even the Small C&I class would not be unscathed. Its
10 cost share would increase from 25% to 29%.

11 As a result of this massive cost realignment, the Phase IV budget would be
12 35% higher for Small C&I customers and 80% higher for Large C&I customers. The
13 Residential class's share of EEC costs would decrease by 12%.

¹⁰ PPL Corrected Response (as filed on Jan. 28, 2020) to PPLICA 1-4 (see Exhibit ____ (JP-3); Application, PPL Electric Exhibit 1, Table 56.

1 **Q HAS PPL CONFIRMED THE PRIMARY CAUSE OF THE INCREASE TO LARGE**
2 **C&I CLASS COSTS?**

3 A Yes. In response to discovery propounded by PPLICA, PPL confirmed that “The
4 increase to the Large C&I budget is necessary to support the peak demand savings
5 target identified in the Commission’s Final Implementation Order.”¹¹

6 **Q HOW WOULD THIS MASSIVE COST REALIGNMENT IMPACT THE ACR RATE?**

7 A The projected rate impacts are shown in Table 5.

Customer Class	ACR-3	ACR-4	Percent Increase
Residential (per kWh)	0.129¢	0.192¢	49%
Sm. C&I (per kWh)	0.131¢	0.179¢	37%
Lg. C&I (per kW)	\$0.505	\$1.021	102%

8 All classes would experience significant increases. However, the massive cost
9 realignment under PPL’s Phase IV EECF would more than double the ACR rate
10 applicable to each Large C&I customer.

11 **Q WERE THE RATE IMPACTS OF THE COMMISSION’S ESTABLISHED PHASE IV**
12 **PEAK DEMAND AND ENERGY REDUCTION TARGET KNOWN AT THE TIME IT**
13 **ISSUED THE FINAL IMPLEMENTATION ORDER?**

14 A No. Because the mechanics of PPL’s program are developed after the Commission
15 establishes the Phase IV targets, neither the Commission nor PPL’s customers had
16 the benefit of assessing program rate impacts during the implementation phase.

¹¹ PPL Response to PPLICA I-5 (see **Exhibit ____ (JP-3)**).

¹² PPL Electric Utilities Corporation, Electric Pa. P.U.C. No. 201, Supplement No. 293, Fifth Revised Page No. 19Z.10F (Eff. Jun. 1, 2020); PPL Response to PPLICA 1-6 (see **Exhibit ____ (JP-3)**). The rates do not reflect adjustments for over- or under-collected costs.

1 Q SHOULD THE COMMISSION APPROVE A 102% INCREASE IN THE LARGE C&I
2 ACR RATE?

3 A No. Although raising rates during a pandemic is both questionable policy and
4 problematic, the disproportionate impact on Large C&I customers that would result
5 from implementing programs that are only marginally beneficial is particularly
6 egregious.

7 Q IS IT REASONABLE TO APPROVE ENERGY EFFICIENCY PROGRAMS THAT
8 BARELY PASS THE TOTAL RESOURCE COST TEST?

9 A No. The cost/benefit analysis used in applying the TRC test is based entirely on
10 projections of future costs. Such projections necessarily require numerous
11 assumptions and judgments about future costs, including commodity prices that are
12 often volatile and difficult to predict. Thus, such projections are inherently inaccurate.

13 Given these inherent inaccuracies, the Commission should not authorize
14 programs when the TRC results are within a reasonable margin of error. In my opinion,
15 a 1.04 TRC is within a reasonable margin of error. Accordingly, the proposed Phase
16 IV Large C&I programs fail.

17 Q HOW CAN THE COMMISSION AVOID AUTHORIZING A 102% INCREASE IN THE
18 ACR RATE APPLICABLE TO LARGE C&I CUSTOMERS?

19 A The only ways for the Commission to avoid this massive rate increase are either to
20 significantly scale back the mandated Large C&I peak demand reduction target or
21 reject the proposed Phase IV Large C&I programs. These programs, in total, are only
22 marginally cost-effective, with a projected TRC benefit/cost ratio of only 1.04 (versus
23 1.56 for Small C&I programs), as previously stated, and would require more than
24 doubling the applicable ACR rate. Finally, as discussed below, I question the need for

1 large scale energy efficiency and peak demand reduction programs for Large C&I
2 customers. In no event should the Commission allow PPL to set higher target energy
3 and peak demand reductions than were approved in the Implementation Order.

4 **Need For Large C&I Programs**

5 **Q WHY DO YOU QUESTION THE NEED FOR PPL TO IMPLEMENT LARGE SCALE**
6 **ENERGY AND PEAK DEMAND REDUCTION MEASURES FOR LARGE C&I**
7 **CUSTOMERS?**

8 A First, although the Baseline studies have determined that, in general, peak demand
9 reduction measures are cost effective, I question spending tens of millions of dollars
10 to incentivize Large C&I customers to implement measures that are projected to be
11 only marginally beneficial. Programs with a TRC benefit/cost ratio of only 1.04, which
12 is within a reasonable margin of error, are neither reasonable nor necessary at this
13 time.

14 Second, the economy is slowly recovering from the pandemic. All customers
15 have been effected by the pandemic. Large C&I customers are not immune from its
16 impacts.

17 Third, Rates LP-5 and LPEP customers already receive strong price signals to
18 manage their peak demands. For example, under PPL's Transmission Service
19 Charge (TSC), Rates LP-5 and LPEP customers, who are served entirely at
20 transmission voltages, are charged based on the total monthly contributions of all
21 customers in the class to the Company's five coincident peaks used by PJM to
22 establish such demand related charges.¹³ Rates LP-5 and LPEP customers account
23 for approximately 50% of the Large C&I class TSCs.

¹³ PPL Electric Utilities Corporation, Electric Pa. P.U.C. No. 201, Supplement No. 237, Eighth Revised Page No. 19Z.1 (Eff. Oct. 13, 2017).

1 Further, most of the energy purchases by Rate LP-4 customers, and all energy
2 purchases by Rates LP-5 and LPEP customers, occur in the wholesale markets. Thus,
3 these purchases are subject to variable energy pricing and capacity payments, which
4 provide strong price signals to avoid energy usage during the critical peak hours and
5 during periods of high energy prices. Thus, the combination of the exposure to
6 wholesale market pricing and the TSC already provide very effective price signals for
7 Large C&I customers to manage their peak demand.

8 **Q IS THERE ANY EVIDENCE THAT LARGE C&I CUSTOMERS ARE ALREADY**
9 **MORE AWARE OF AND PRACTICE SOUND ENERGY AND LOAD**
10 **MANAGEMENT?**

11 A Yes. First, according to the Statewide Evaluation Team, Large C&I customers are
12 already more aware of and practice energy and load management than Small C&I
13 customers.¹⁴ This finding confirms my general knowledge and understanding that
14 larger customers, particularly those competing in commodity industries, are more cost
15 conscious because they face ever-growing domestic and foreign competition. For
16 these firms, electricity is a significant operating cost, and for some industries, electricity
17 is the highest operating cost. Thus, minimizing electricity cost is essential to achieving
18 a competitive advantage, thereby ensuring a sustainable operation for the long term.

19 **Q DO CUSTOMERS WHO FACE SUBSTANTIAL DOMESTIC AND GLOBAL**
20 **COMPETITION REQUIRE THEIR UTILITIES TO PROVIDE INCENTIVES TO**
21 **PRACTICE ENERGY AND PEAK LOAD MANAGEMENT?**

22 A No.

¹⁴ Demand Side Analytics, *2018 Non-Residential Baseline Study* at 13 (Feb. 2019).

1 **Conclusion**

2 **Q WHAT DO YOU RECOMMEND?**

3 A The only ways to avoid more than doubling the Large C&I ACR rate are for the
4 Commission to substantially reduce PPL's peak demand reduction target or reject the
5 proposed Phase IV Large C&I programs. The programs are too expensive and would
6 provide only a marginal benefit. Thus, I urge the Commission to weigh the marginal
7 benefits against the questionable need (when many of these customers already have
8 strong incentives to practice energy and peak load management) and the significant
9 rate impact of PPL's Phase IV EECP on Large C&I customers. If the Commission
10 agrees that the marginal benefits do not justify more than doubling the ACR rate, it
11 should either reject or pare back the programs by *at least* 50%.

12 In no event should PPL be allowed to exceed the target Large C&I energy and
13 peak demand reductions established in the Implementation Order. While I understand
14 that PPL could face significant penalties for any failure to achieve mandated energy
15 and peak demand reductions, the five-year plan preserves ample opportunity for mid-
16 stream adjustments to address any shortfalls. Allowing PPL to collect rates based on
17 the as-filed Phase IV targets would unnecessarily exacerbate the rate impact upon
18 Large C&I customers.

19 **Q DOES THIS CONCLUDE YOUR SUPPLEMENTAL DIRECT TESTIMONY?**

20 A Yes.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of PPL Electric Utilities Corporation)
For Approval of is Act 129 Phase IV Energy) Docket No.: M-2020-3020824
Efficiency and Conservation Plan)

Supplemental Direct Exhibits

of

JEFFRY POLLOCK

On Behalf of

PPL Industrial Customer Alliance

January 27, 2021



J . P O L L O C K
I N C O R P O R A T E D

Qualifications of Jeffry Pollock

1 **Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A Jeffry Pollock. My business mailing address is 12647 Olive Blvd., Suite 585, St. Louis,
3 Missouri 63141.

4 **Q WHAT IS YOUR OCCUPATION AND BY WHOM ARE YOU EMPLOYED?**

5 A I am an energy advisor and President of J. Pollock, Incorporated.

6 **Q PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.**

7 A I have a Bachelor of Science Degree in Electrical Engineering and a Master's Degree in
8 Business Administration from Washington University. I have also completed a Utility
9 Finance and Accounting course.

10 Upon graduation in June 1975, I joined Drazen-Brubaker & Associates, Inc. (DBA).
11 DBA was incorporated in 1972 assuming the utility rate and economic consulting activities
12 of Drazen Associates, Inc., active since 1937. From April 1995 to November 2004, I was
13 a managing principal at Brubaker & Associates (BAI).

14 During my career, I have been engaged in a wide range of consulting assignments
15 including energy and regulatory matters in both the United States and several Canadian
16 provinces. This includes preparing financial and economic studies of investor-owned,
17 cooperative and municipal utilities on revenue requirements, cost of service and rate
18 design, tariff review and analysis, conducting site evaluations, advising clients on electric
19 restructuring issues, assisting clients to procure and manage electricity in both competitive
20 and regulated markets, developing and issuing requests for proposals (RFPs), evaluating
21 RFP responses and contract negotiation and developing and presenting seminars on
22 electricity issues.

1 I have worked on various projects in 28 states and several Canadian provinces,
2 and have testified before the Federal Energy Regulatory Commission, the Ontario Energy
3 Board, and the state regulatory commissions of Alabama, Arizona, Arkansas, Colorado,
4 Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana,
5 Michigan, Minnesota, Mississippi, Missouri, Montana, New Jersey, New Mexico, New
6 York, Ohio, Pennsylvania, South Carolina, Texas, Virginia, Washington, and Wyoming. I
7 have also appeared before the City of Austin Electric Utility Commission, the Board of
8 Public Utilities of Kansas City, Kansas, the Board of Directors of the South Carolina Public
9 Service Authority (a.k.a. Santee Cooper), the Bonneville Power Administration, Travis
10 County (Texas) District Court, and the U.S. Federal District Court.

11 **Q PLEASE DESCRIBE J. POLLOCK, INCORPORATED.**

12 A J. Pollock assists clients to procure and manage energy in both regulated and competitive
13 markets. The J. Pollock team also advises clients on energy and regulatory issues. Our
14 clients include commercial, industrial and institutional energy consumers. J. Pollock is a
15 registered broker and Class I aggregator in the State of Texas.

**Testimony Filed in Regulatory Proceedings
by Jeffrey Pollock**

UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
CENTRAL HUDSON GAS & ELECTRIC	Multiple Intervenors	20-E-0428 / 20-G-0429	Rebuttal	NY	Distribution cost classification; revised Electric Embedded Cost-of-Service Study; revised Distribution Mains Study	1/22/2020
MIDAMERICAN ENERGY COMPANY	Tech Customers	EPB-2020-0156	Reply	IA	Emissions Plan	1/21/2021
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	50997	Direct	TX	Disallowance of Unreasonable Mine Development Costs; Amortization of Mine Closure Costs; Imputed Capacity	1/7/2021
CENTRAL HUDSON GAS & ELECTRIC	Multiple Intervenors	20-E-0428 / 20-G-0429	Direct	NY	Electric and Gas Embedded Cost of Service; Class Revenue Allocation; Rate Design; Revenue Decoupling Mechanism	12/22/2020
NIAGARA MOHAWK POWER CORP.	Multiple Intervenors	20-E-0380 / 20-G-0381	Rebuttal	NY	AMI Cost Allocation Framework	12/16/2020
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	51381	Direct	TX	Generation Cost Recovery Rider	12/8/2020
NIAGARA MOHAWK POWER CORP.	Multiple Intervenors	20-E-0380 / 20-G-0381	Direct	NY	Electric and Gas Embedded Cost of Service; Class Revenue Allocation; Rate Design; Earnings Adjustment Mechanism; Advanced Metering Infrastructure Cost Allocation	11/25/2020
LUBBOCK POWER & LIGHT	Texas Industrial Energy Consumers	51100	Direct	TX	Test Year; Wholesale Transmission Cost of Service and Rate Design	11/6/2020
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20889	Direct	MI	Scheduled Lives, Cost Allocation and Rate Design of Securitization Bonds	10/30/2020
CHEYENNE LIGHT, FUEL AND POWER COMPANY	HollyFrontier Cheyenne Refining LLC	20003-194-EM-20	Cross-Answer	WY	PCA Tariff	10/16/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	20-00143	Direct	NM	RPS Incentives; Reassignment of non-jurisdictional PPAs	9/11/2020
ROCKY MOUNTAIN POWER	Wyoming Industrial Energy Consumers	20000-578-ER-20	Cross	WY	Time-of-Use period definitions; ECAM Tracking of Large Customer Pilot Programs	9/11/2020
ROCKY MOUNTAIN POWER	Wyoming Industrial Energy Consumers	20000-578-ER-20	Direct	WY	Class Cost-of-Service Study; Time-of-Use period definitions; Interruptible Service and Real-Time Day Ahead Pricing pilot programs	8/7/2020
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	50790	Direct	TX	Hardin Facility Acquisition	7/27/2020
PHILADELPHIA GAS WORKS	Philadelphia Industrial and Commercial Gas Users Group	2020-3017206	Surrebuttal	PA	Interruptible transportation tariff; Allocation of Distribution Mains; Universal Service and Energy Conservations; Gradualism	7/24/2020
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20697	Rebuttal	MI	Energy Weighting, Treatment of Interruptible Load; Allocation of Distribution Capacity Costs; Allocation of CVR Costs	7/14/2020

**Testimony Filed in Regulatory Proceedings
by Jeffry Pollock**

UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
PHILADELPHIA GAS WORKS	Philadelphia Industrial and Commercial Gas Users Group	2020-3017206	Rebuttal	PA	Distribution Main Allocation; Design Day Demand; Class Revenue Allocation; Balancing Provisions	7/13/2020
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2020-3019290	Rebuttal	PA	Network Integration Transmission Service Costs	7/9/2020
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20697	Direct	MI	Class Cost-of-Service Study; Financial Compensation Method; General Interruptible Service Credit	6/24/2020
PHILADELPHIA GAS WORKS	Philadelphia Industrial and Commercial Gas Users Group	2020-3017206	Direct	PA	Class Cost-of-Service Study; Class Revenue Allocation; Rate Design	6/15/2020
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20650	Rebuttal	MI	Distribution Mains Classification and Allocation	5/5/2020
GEORGIA POWER COMPANY	Georgia Association of Manufacturers and Georgia Industrial Group	43011	Direct	GA	Fuel Cost Recovery Natural Gas Price Assumptions	5/1/2020
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20650	Direct	MI	Class Cost-of-Service Study; Transportation Rate Design; Gas Demand Response Pilot Program; Industry Association Dues	4/14/2020
ROCKY MOUNTAIN POWER	Wyoming Industrial Energy Consumers	90000-144-XI-19	Direct	WY	Coal Retirement Studies and IRP Scenarios	4/1/2020
DTE GAS COMPANY	Association of Businesses Advocating Tariff Equity	U-20642	Direct	MI	Class Cost-of-Service Study; Class Revenue Allocation; Infrastructure Recovery Mechanism; Industry Association Dues	3/24/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	49831	Cross	TX	Radial Transmission Lines; Allocation of Transmission Costs; SPP Administrative Fees; Load Dispatching Expenses; Uncollectible Expense	3/10/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	19-00315-UT	Direct	NM	Time-Differentiated Fuel Factor	3/6/2020
SOUTHERN PIONEER ELECTRIC COMPANY	Western Kansas Industrial Electric Consumers	20-SPEE-169-RTS	Direct	KS	Class Revenue Allocation	3/2/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	49831	Direct	TX	Schedule 11 Expenses; Depreciation Expense (Rev. Req. Phase Testimony)	2/10/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	49831	Direct	TX	Class-Cost-of-Service Study; Class Revenue Allocation; Rate Design (Rate Design Phase Testimony)	2/10/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	19-00134-UT	Direct	NM	Renewable Portfolio Standard Rider	2/5/2020
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	19-00170-UT	Settlement	NM	Settlement Support of Rate Design, Cost Allocation and Revenue Requirement	1/20/2020
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	49737	Direct	TX	Certificate of Convenience and Necessity	1/14/2020

Testimony Filed in Regulatory Proceedings by Jeffry Pollock

UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	19-00170-UT	Rebuttal	NM	Class Cost-of-Service Study; Class Revenue Allocation	12/20/2019
ALABAMA POWER COMPANY	Alabama Industrial Energy Consumers	32953	Direct	AL	Certificate of Convenience and Necessity	12/4/2019
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	19-00170-UT	Direct	NM	Class Cost-of-Service Study; Class Revenue Allocation; Rate Design	11/22/2019
GEORGIA POWER COMPANY	Georgia Association of Manufacturers and Georgia Industrial Group	42516	Direct	GA	Return on Equity; Capital Structure; Coal Combustion Residuals Recovery; Class Revenue Allocation; Rate Design	10/17/2019
NEW YORK STATE ELECTRIC & GAS CORPORATION and ROCHESTER GAS AND ELECTRIC CORPORATION	Multiple Intervenors	19-E-0378 / 19-G-0379 19-E-0380 / 19-G-0381	Rebuttal	NY	Electric and Gas Embedded Cost of Service; Class Revenue Allocation; Rate Design	10/15/2019
NEW YORK STATE ELECTRIC & GAS CORPORATION and ROCHESTER GAS AND ELECTRIC CORPORATION	Multiple Intervenors	19-E-0378 / 19-G-0379 19-E-0380 / 19-G-0381	Direct	NY	Electric and Gas Embedded Cost of Service; Class Revenue Allocation; Rate Design; Amortization of Regulatory Liabilities; AMI Cost Allocation	9/20/2019
AEP TEXAS INC.	Texas Industrial Energy Consumers	49494	Cross-Rebuttal	TX	ERCOT 4CPs; Class Revenue Allocation; Customer Support Costs	8/13/2019
AEP TEXAS INC.	Texas Industrial Energy Consumers	49494	Direct	TX	Class Cost-of-Service Study; Class Revenue Allocation; Rate Design; Transmission Line Extensions	7/25/2019
CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC	Texas Industrial Energy Consumers	49421	Cross-Rebuttal	TX	Class Cost-of-Service Study	6/19/2019
CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC	Texas Industrial Energy Consumers	49421	Direct	TX	Class Cost-of-Service Study; Rate Design; Transmission Service Facilities Extensions	6/6/2019
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	48973	Direct	TX	Prudence of Solar PPAs, Imputed Capacity, treatment of margins from Off-System Sales	5/21/2019
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20322	Rebuttal	MI	Classification of Distribution Mains; Allocation of Working Gas in Storage and Storage	4/29/2019
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20322	Direct	MI	Class Cost-of-Service Study; Transportation Rate Design	4/5/2019
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	49042	Cross-Rebuttal	TX	Transmission Cost Recovery Factor	3/21/2019
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	49057	Direct	TX	Transmission Cost Recovery Factor	3/18/2019
DUKE ENERGY PROGRESS, LLC	Nucor Steel - South Carolina	2018-318-E	Direct	SC	Class Cost-of-Service Study, Class Revenue Allocation, LGS Rate Design, Depreciation Expense	3/4/2019
ENTERGY ARKANSAS, LLC	Arkansas Electric Energy Consumers, Inc.	18-037	Settlement	AR	Testimony in Support of Settlement	3/1/2019
ENERGY+ INC.	Toyota Motor Manufacturing Canada	EB-2018-0028	Updated Evidence	ON	Class Cost-of-Service Study, Distribution and Standby Distribution Rate Design	2/15/2019

**Testimony Filed in Regulatory Proceedings
by Jeffry Pollock**

UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
ENTERGY ARKANSAS, LLC	Arkansas Electric Energy Consumers, Inc.	18-037	Surrebuttal	AR	Solar Energy Purchase Option Tariff	2/14/2019
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	48847	Direct	TX	Fuel Factor Formulas	1/11/2019
ENTERGY ARKANSAS, LLC	Arkansas Electric Energy Consumers, Inc.	18-037	Direct	AR	Solar Energy Purchase Option Tariff	1/10/2019
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20165	Direct	MI	Integrated Resources Plan; Projected Rate Impact, Risk Assessment; Early Retirement of Coal Units; Financial Compensation Mechanism	10/15/2018
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20134	Rebuttal	MI	Class Cost-of-Service Study; Average Historical Profile; Distribution Cost Classification and Allocation; Rate Design	10/1/2018
ENERGY+ INC.	Toyota Motor Manufacturing Canada	EB-2018-0028	Initial Evidence	ON	Class Cost-of-Service Study, Distribution and Standby Distribution Rate Design	9/27/2018
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-20134	Direct	MI	Investment Recovery Mechanism, Litigation surcharge, Class Cost-of-Service Study, Class Revenue Allocation, Rate Design	9/10/2018
KANSAS GAS AND ELECTRIC COMPANY	Occidental Chemical Corporation	18-KG&E-303-CON	Rebuttal	KS	Benefits of the Interruptible Load Provided in the Special Contract	8/29/2018
TEXAS-NEW MEXICO POWER COMPANY	Texas Industrial Energy Consumers	48401	Cross-Rebuttal	TX	4CP Moderation Adjustment	8/28/2018
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	48371	Cross-Rebuttal	TX	Class Cost-of-Service Study; Schedule FERC	8/16/2018
TEXAS-NEW MEXICO POWER COMPANY	Texas Industrial Energy Consumers	48401	Direct	TX	Tax Cuts and Jobs Act; Rider TCRF; 4CP Moderation Adjustment	8/13/2018
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2018-3000164	Surrebuttal	PA	Post Test-Year Adjustment; Tax Cuts and Jobs Act; Class Cost-of-Service Study; Distribution System Improvement Charge	8/8/2018
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	48371	Direct	TX	Revenue Requirements; Tax Cuts and Jobs Act; Riders	8/1/2018
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	48371	Direct	TX	Class Cost-of-Service Study; Firm, Interruptible and Standby Rate Design	8/1/2018
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2018-3000164	Rebuttal	PA	Class Cost-of-Service Study; Class Revenue Allocation	7/24/2018
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	48233	Cross-Rebuttal	TX	Allocation of TCJA reduction	7/19/2018
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	48233	Direct	TX	Allocation of TCJA reduction	7/5/2018
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2018-3000164	Direct	PA	Post Test-Year Adjustment; Tax Cuts and Jobs Act; Class Cost-of-Service Study; Class Revenue Allocation	6/26/2018

Testimony Filed in Regulatory Proceedings by Jeffry Pollock

UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	47527	Cross-Rebuttal	TX	Class Cost-of-Service Study; Revenue Allocation	5/22/2018
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	17-00255-UT	Rebuttal	NM	Class Cost-of-Service Study; Revenue Allocation	5/2/2018
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	17-041	Stipulation	AR	Support of Stipulation	4/27/2018
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	47527	Direct	TX	Present Base Revenues Class Cost-of-Service Study; Class Revenue Allocation; Rate Design	4/25/2018
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	47527	Direct	TX	Tax Cuts and Jobs Act; SPP Transmission and Wheeling Costs; Depreciation Rate; LLPPAs; Imputed Capacity; Off-System Sales Margins	4/25/2018
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	17-00255-UT	Direct	NM	Class Cost-of-Service Study; Revenue Requirements; Revenue Allocation	4/13/2018
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	17-041	Surrebuttal	AR	Certificate of Convenience and Necessity	4/6/2018
METROPOLITAN EDISON COMPANY; PENNSYLVANIA ELECTRIC COMPANY, PENNSYLVANIA POWER COMPANY AND WEST PENN POWER COMPANY	MEIUG, PICA and WPPII	2017-2637855 2017-2637857 2017-2637858 2017-2637866	Rebuttal	PA	Recovery of NITS Charges	3/22/2018
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	46936	2nd Supplemental Direct	TX	Support of Stipulation	3/2/2018
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-18424	Direct	MI	Class Cost of Service	2/28/2018
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	17-041	Direct	AR	Certificate of Convenience and Necessity	2/23/2018
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	47553	Direct	TX	Off-System Sales Margins; Renewable Energy Credits	2/20/2018
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	47461	2nd Supplemental Direct	TX	Certificate of Convenience and Necessity	2/7/2018
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	47461	Supplemental Direct	TX	Certificate of Convenience and Necessity	1/4/2018
CENTRAL HUDSON GAS & ELECTRIC	Multiple Intervenors	17-E-0459/G-0460	Rebuttal	NY	Electric and Gas Embedded Class Cost of Service; Class Revenue Allocation; Gas Rate Design; Revenue Decoupling Mechanism	12/18/2017
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	17-00044-UT	Supplemental Direct	NM	Support of Unanimous Comprehensive Stipulation	12/11/2017
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	47461	Direct	TX	Certificate of Convenience and Necessity	12/4/2017

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by Jeffrey Pollock**

UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
CENTRAL HUDSON GAS & ELECTRIC	Multiple Intervenors	17-E-0459/G-0460	Direct	NY	Electric and Gas Embedded Class Cost of Service; Class Revenue Allocation; Customer Charges; Revenue Decoupling Mechanism; Carbon Program and EAM	11/21/2017
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	17-00044-UT	Direct	NM	Certificate of Convenience and Necessity	10/24/2017
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	46936	Cross-Rebuttal	TX	Certificate of Convenience and Necessity	10/23/2017
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	46936	Supplemental Direct	TX	Certificate of Convenience and Necessity	10/6/2017
KENTUCKY POWER COMPANY	Kentucky League of Cities	2017-00179	Direct	KY	Class Cost-of-Service Study; Class Revenue Allocation	10/3/2017
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	46936	Direct	TX	Certificate of Convenience and Necessity	10/2/2017
NIAGARA MOHAWK POWER CORP.	Multiple Intervenors	17-E-0238 / 17-G-0239	Rebuttal	NY	Electric/Gas Embedded Class Cost of Service; Class Revenue Allocation; Electric/Gas Rate Design	9/15/2017
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-18322	Rebuttal	MI	Class Cost-of-Service Study, Rate Design	9/7/2017
PENNSYLVANIA-AMERICAN WATER COMPANY	Pennsylvania-American Water Large Users Group	R-2017-2595853	Rebuttal	PA	Rate Design	8/31/2017
NIAGARA MOHAWK POWER CORP.	Multiple Intervenors	17-E-0238 / 17-G-0239	Direct	NY	Electric/Gas Embedded Class Cost of Service; Class Revenue Allocation; Electric/Gas Rate Design, Electric/Gas Rate Modifiers, AMI Cost Allocation	8/25/2017
CONSUMERS ENERGY COMPANY	Association of Businesses Advocating Tariff Equity	U-18322	Direct	MI	Revenue Requirement, Class Cost-of-Service Study, Rate Design	8/10/2017
FLORIDA POWER & LIGHT COMPANY, DUKE ENERGY FLORIDA, LLC, AND TAMPA ELECTRIC COMPANY	Florida Industrial Power Users Group	170057	Direct	FL	Fuel Hedging Practices	8/10/2017
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	46449	Cross-Rebuttal	TX	Class Revenue Allocation and Rate Design	5/19/2017
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	46449	Direct	TX	Revenue Requirement, Class Cost-of-Service Study, Class Revenue Allocation and Rate Design	4/25/2017
KENTUCKY UTILITIES COMPANY	Kentucky League of Cities	2016-00370	Supplemental Direct	KY	Class Cost-of-Service Study; Class Revenue Allocation	4/14/2017
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	46416	Direct	TX	Certificate of Convenience and Necessity - Montgomery County Power Station	3/31/2017
SHARYLAND UTILITIES, L.P.	Texas Industrial Energy Consumers	45414	Cross-Rebuttal	TX	Cost Allocation Issues; Class Revenue Allocation	3/16/2017

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UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
ENTERGY LOUISIANA, LLC	Occidental Chemical Corporation	U-34283	Direct*	LA	Approval to Construct Lake Charles Power Station	3/13/2017
LOUISVILLE GAS AND ELECTRIC COMPANY	Louisville/Jefferson Metro Government	2016-00371	Direct	KY	Revenue Requirement Issues; Class Cost-of-Service Study Electric/Gas; Class Revenue Allocation Electric/Gas	3/3/2017
KENTUCKY UTILITIES COMPANY	Kentucky League of Cities	2016-00370	Direct	KY	Revenue Requirement Issues; Class Cost-of-Service Study; Class Revenue Allocation	3/3/2017
SHARYLAND UTILITIES, L.P.	Texas Industrial Energy Consumers	45414	Direct	TX	Class Cost-of-Service Study; Class Revenue Allocation; Rate Design; TCRF Allocation Factors; McAllen Division Deferrals	2/28/2017
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	46025	Direct	TX	Long-Term Purchased Power Agreements	12/12/2016
NORTHERN STATES POWER COMPANY	Xcel Large Industrials	15-826	Surrebuttal	MN	Settlement, Cost-of-Service Study, Class Revenue Allocation, Interruptible Rates, Renew-A-Source	10/18/2016
NORTHERN STATES POWER COMPANY	Xcel Large Industrials	15-826	Rebuttal	MN	Class Cost-of-Service Study, Class Revenue Allocation	9/23/2016
VICTORY ELECTRIC COOPERATION ASSOCIATION, INC.	Western Kansas Industrial Electric Consumers	16-VICE-494-TAR	Surrebuttal	KS	Formula-Based Rate Plan	9/22/2016
NATIONAL FUEL GAS DISTRIBUTION CORPORATION	Multiple Intervenors	16-G-0257	Rebuttal	NY	Embedded Class Cost of Service; Class Revenue Allocation; Rate Design	9/16/2016
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	45524	Cross-Rebuttal	TX	Class Cost-of-Service Study;	9/7/2016
METROPOLITAN EDISON COMPANY; PENNSYLVANIA ELECTRIC COMPANY AND WEST PENN POWER	MEIUG, PICA and WPPII	2016-2537349 2016-2537352 2016-2537359	Surrebuttal	PA	Post-Test Year Sales Adjustment; Class Cost-of-Service Study; Class Revenue Allocation; Rate Design	8/31/2016
VICTORY ELECTRIC COOPERATION ASSOCIATION, INC.	Western Kansas Industrial Electric Consumers	16-VICE-494-TAR	Direct	KS	Formula-Based Rate Plan	8/30/2016
WESTERN COOPERATIVE ELECTRIC ASSOCIATION, INC.	Western Kansas Industrial Electric Consumers	16-WSTE-496-TAR	Direct	KS	Formula-Based Rate Plan and Debt Service Payments	8/30/2016
NATIONAL FUEL GAS DISTRIBUTION CORPORATION	Multiple Intervenors	16-G-0257	Direct	NY	Embedded Class Cost of Service; Class Revenue Allocation; Rate Design	8/26/2016
METROPOLITAN EDISON COMPANY; PENNSYLVANIA ELECTRIC COMPANY AND WEST PENN POWER	MEIUG, PICA and WPPII	2016-2537349 2016-2537352 2016-2537359	Rebuttal	PA	Class Cost-of-Service; Class Revenue Allocation	8/17/2016

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UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	45524	Direct	TX	Revenue Requirement; Class Cost-of-Service; Revenue Allocation; Rate Design	8/16/2016
METROPOLITAN EDISON COMPANY; PENNSYLVANIA ELECTRIC COMPANY AND WEST PENN POWER	MEIUG, PICA and WPPII	2016-2537349 2016-2537352 2016-2537359	Direct	PA	Post-Test Year Sales Adjustment; Class Cost-of-Service Study; Class Revenue Allocation; Rate Design	7/22/2016
FLORIDA POWER & LIGHT COMPANY	Florida Industrial Power Users Group	160021	Direct	FL	Multi-Year Rate Plan, Construction Work in Progress; Cost of Capital; Class Revenue Allocation; Class Cost-of-Service Study; Rate Design	7/7/2016
CENTERPOINT ENERGY ARKANSAS GAS	Arkansas Gas Consumers, Inc.	15-098-U	Supplemental	AR	Support for Settlement Stipulation	7/1/2016
MIDAMERICAN ENERGY COMPANY	Tech Customers	RPU-2016-0001	Direct	IA	Application of Advanced Ratemaking Principles to Wind XI	6/21/2016
NORTHERN STATES POWER COMPANY	Xcel Large Industrials	15-826	Direct	MN	Class Cost-of-Service Study, Class Revenue Allocation, Multi-Year Rate Plan, Rate Design	6/14/2016
CENTERPOINT ENERGY ARKANSAS GAS	Arkansas Gas Consumers, Inc.	15-098-U	Surrebuttal	AR	Incentive Compensation, Class Cost-of-Service Study, Class Revenue Allocation, LCS-1 Rate Design	6/7/2016
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	15-00296-UT	Direct	NM	Support of Stipulation	5/13/2016
CHEYENNE LIGHT, FUEL AND POWER COMPANY	Dyno Nobel, Inc. and HollyFrontier Cheyenne Refining LLC	20003-146-ET-15	Cross	WY	Large Power Contract Service Tariff	4/15/2016
CENTERPOINT ENERGY ARKANSAS GAS	Arkansas Gas Consumers, Inc.	15-098-U	Direct	AR	Incentive Compensation, Class Cost-of-Service Study, Class Revenue Allocation, Act 725, Formula Rate Plan	4/14/2016
CHEYENNE LIGHT, FUEL AND POWER COMPANY	Dyno Nobel, Inc. and HollyFrontier Cheyenne Refining LLC	20003-146-ET-15	Direct	WY	Large Power Contract Service Tariff	3/18/2016
ENTERGY LOUISIANA, LLC, ENTERGY GULF STATES LOUISIANA, L.L.C., AND ENTERGY LOUISIANA POWER, LLC	Occidental Chemical Corporation	U-33770	Cross-Answering	LA	Approval to Construct St. Charles Power Station	2/26/2016
NORTHERN INDIANA PUBLIC SERVICE COMPANY	NLMK-Indiana	44688	Cross-Answering	IN	Cost-of-Service Study, Rider 775	2/16/2016
ENTERGY LOUISIANA, LLC, ENTERGY GULF STATES LOUISIANA, L.L.C., AND ENTERGY LOUISIANA POWER, LLC	Occidental Chemical Corporation	U-33770	Direct	LA	Approval to Construct St. Charles Power Station	1/21/2016
EL PASO ELECTRIC COMPANY	Freeport-McMoRan Copper & Gold, Inc.	44941	Cross-Rebuttal	TX	Class Cost-of-Service Study, Class Revenue Allocation; Rate Design	1/15/2016
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	15-015	Supplemental	AR	Support for Settlement Stipulation	12/31/2015
EL PASO ELECTRIC COMPANY	Freeport-McMoRan Copper & Gold, Inc.	44941	Direct	TX	Class Cost-of-Service Study, Class Revenue Allocation; Rate Design	12/11/2015

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UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	15-015	Surrebuttal	AR	Post-Test-Year Additions; Class Cost-of-Service Study; Class Revenue Allocation; Rate Design; Riders; Formula Rate Plan	11/24/2015
MID-KANSAS ELECTRIC COMPANY, LLC, PRAIRIE LAND ELECTRIC COOPERATIVE, INC., SOUTHERN PIONEER ELECTRIC COMPANY, THE VICTORY ELECTRIC COOPERATIVE ASSOCIATION, INC., AND WESTERN COOPERATIVE ELECTRIC ASSOCIATION, INC.	Western Kansas Industrial Electric Consumers	16-MKEE-023	Direct	KS	Formula Rate Plan for Distribution Utility	11/17/2015
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	45084	Direct	TX	Transmission Cost Recovery Factor Revenue Increase.	11/17/2015
GEORGIA POWER COMPANY	Georgia Industrial Group and Georgia Association of Manufacturers	39638	Direct	GA	Natural Gas Price Assumptions, IFR Mechanism, Seasonal FCR-24 Rates, Imputed Capacity	11/4/2015
NEW YORK STATE ELECTRIC & GAS CORPORATION and ROCHESTER GAS AND ELECTRIC CORPORATION	Multiple Intervenors	15-E-0283 15-G-0284 15-E-0285 15-G-0286	Rebuttal	NY	Electric and Gas Embedded Class Cost-of-Service Studies, Class Revenue Allocation	10/13/2015
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	15-015	Direct	AR	Post-Test-Year Additions; Class Cost-of-Service Study; Class Revenue Allocation; Rate Design; Riders; Formula Rate Plan	9/29/2015
NEW YORK STATE ELECTRIC & GAS CORPORATION and ROCHESTER GAS AND ELECTRIC CORPORATION	Multiple Intervenors	15-E-0283 15-G-0284 15-E-0285 15-G-0286	Direct	NY	Electric and Gas Embedded Class Cost-of-Service Studies, Class Revenue Allocation, Electric Rate Design	9/15/2015
SHARYLAND UTILITIES	Texas Industrial Energy Consumers	44620	Cross-Rebuttal	TX	Transmission Cost Recovery Factor Class Allocation Factors.	9/8/2015
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	14-118	Surrebuttal	AR	Proposed Acquisition of Union Power Station Power Block 2 and Cost Recovery	8/21/2015
SHARYLAND UTILITIES	Texas Industrial Energy Consumers	44620	Direct	TX	Transmission Cost Recovery Factor Class Allocation Factors	8/7/2015
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2015-2468981	Surrebuttal	PA	Class Cost-of-Service, Capacity Reservation Rider	8/4/2015
WESTAR ENERGY INC. and KANSAS GAS & ELECTRIC CO.	Occidental Chemical Corporation	15-WSEE-115-RTS	Cross-Answering	KS	Class Cost-of-Service Study, Revenue Allocation	7/22/2015
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2015-2468981	Rebuttal	PA	Class Cost-of-Service, Class Revenue Allocation, Rate Design, Capacity Reservation Rider, Revenue Decoupling	7/21/2015
SOUTHWESTERN PUBLIC SERVICE COMPANY	Occidental Permian Ltd.	15-00083	Direct	NM	Long-Term Purchased Power Agreements	7/10/2015

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UTILITY	ON BEHALF OF	DOCKET	TYPE	STATE / PROVINCE	SUBJECT	DATE
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	15-014	Surrebuttal	AR	Solar Power Purchase Agreement	7/10/2015
WESTAR ENERGY INC. and KANSAS GAS & ELECTRIC CO.	Occidental Chemical Corporation	15-WSEE-115-RTS	Direct	KS	Class Cost-of-Service and Electric Distribution Grid Resiliency Program	7/9/2015
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	43958	Supplemental Direct	TX	Certificate of Need for Union Power Station Power Block 1	7/7/2015
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	14-118	Direct	AR	Proposed Acquisition of Union Power Station Power Block 2 and Cost Recovery	7/2/2015
PECO ENERGY COMPANY	Philadelphia Area Industrial Energy Users Group	2015-2468981	Direct	PA	Class Cost-of-Service, Class Revenue Allocation, Rate Design, Capacity Reservation Rider	6/23/2015
ENTERGY ARKANSAS, INC.	Arkansas Electric Energy Consumers, Inc.	15-014-U	Direct	AR	Solar Power Purchase Agreement	6/19/2015
FLORIDA POWER & LIGHT COMPANY	Florida Industrial Power Users Group	150075	Direct	FL	Cedar Bay Power Purchase Agreement	6/8/2015
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	43695	Cross-Rebuttal	TX	Class Cost of Service Study; Class Revenue Allocation	6/8/2015
FLORIDA POWER AND LIGHT COMPANY, DUKE ENERGY FLORIDA, GULF POWER COMPANY, TAMPA ELECTRIC COMPANY	Florida Industrial Power Users Group	140226	Surrebuttal	FL	Opt-Out Provision	5/20/2015
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	43695	Direct	TX	Post-Test Year Adjustments; Weather Normalization	5/15/2015
SOUTHWESTERN PUBLIC SERVICE COMPANY	Texas Industrial Energy Consumers	43695	Direct	TX	Class Cost of Service Study; Class Revenue Allocation	5/15/2015
ENTERGY TEXAS, INC.	Texas Industrial Energy Consumers	43958	Direct	TX	Certificate of Need for Union Power Station Power Block 1	4/29/2015
SOUTHWESTERN ELECTRIC POWER COMPANY	Texas Industrial Energy Consumers	42370	Cross-Rebuttal	TX	Allocation and recovery of Municipal Rate Case Expenses and the proposed Rate-Case-Expense Surcharge Tariff.	1/27/2015
WEST PENN POWER COMPANY	West Penn Power Industrial Intervenors	2014-2428742	Surrebuttal	PA	Class Cost-of-Service Study; Class Revenue Allocation; Large Commercial and Industrial Rate Design; Storm Damage Charge Rider	1/6/2015
PENNSYLVANIA ELECTRIC COMPANY	Penelec Industrial Customer Alliance	2014-2428743	Surrebuttal	PA	Class Cost-of-Service Study; Class Revenue Allocation; Large Commercial and Industrial Rate Design; Storm Damage Charge Rider	1/6/2015
METROPOLITAN EDISON COMPANY	Med-Ed Industrial Users Group	2014-2428745	Surrebuttal	PA	Class Cost-of-Service Study; Class Revenue Allocation; Large Commercial and Industrial Rate Design; Storm Damage Charge Rider	1/6/2015

**PPL Electric Utilities Corporation
Response to Interrogatories of the
PP&L Industrial Customer Alliance (PPLICA), Set I
Date January 8, 2021**

Docket No. M-2020-3020824

Q.
PPLICA-I-4. To the extent not provided in response to 3 and 4 above, please provide the total Phase III EE&C Plan customer class costs, including both actual and projected costs and customer class allocations for GNE program sector costs.

A.
PPLICA-I-4.

Phase 3 Actual and Forecasted Costs by Customer Class - June 1, 2016 thru May 31, 2021				
	Residential (incl LI)	Sm. C&I (incl GNE)	Lg. C&I (incl GNE)	Total
Total Cost	\$139,208,559	\$66,040,618	\$55,454,897	\$260,704,074

By way of further response, see responses to PPLICA-I-2 and 3.

PPL Electric Utilities Corporation
Response to Interrogatories of the
PP&L Industrial Customer Alliance (PPLICA), Set I
Date January 8, 2021
Docket No. M-2020-3020824

- Q. PPLICA-I-5. For the Phase IV EE&C Plan please provide an explanation for the approximately 50% increase in the cost allocated or budgeted for Large C&I customers from 21% of the total program budget in Phase III to 32% of the total program budget in Phase IV. Please also provide any supporting workpapers.
- A. PPLICA-I-5. The increase to the Large C&I budget is necessary to support the peak demand savings target identified in the Commission's Final Implementation Order. Additionally, in Phase III, GNE costs were excluded from Large C&I, whereas in Phase IV they are included. As stated in the Company's comments to the Tentative Implementation Order the peak demand reduction target in the SWEs market potential findings require that a larger percentage of total Act 129 costs be shifted to the Non-Residential Program.

PPL Electric Utilities Corporation
Response to Interrogatories of the
PP&L Industrial Customer Alliance (PPLICA), Set I
Date January 8, 2021
Docket No. M-2020-3020824

Q. PPLICA-I-6. For the Phase IV EE&C Plan, please provide a projection of the ACR-4 program rates for each customer class to be effective June 1, 2021.

A. PPLICA-I-6.


	Estimate June 2021 - May 2022 Rate		
	Residential	Small C&I	Large C&I
Rate (kWh/ICAP)	0.00192	0.00179	1.021

VERIFICATION

I, Jeffry Pollock, President of J. Pollock, Incorporated, hereby state that the facts contained in the Supplemental Direct Testimony and Exhibits of Jeffry Pollock (PPLICA Statement No. 1) are true and correct to the best of my knowledge, information, and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa. C.S. § 4904, relating to unsworn falsification to authorities.

2/8/21

Date


Jeffry Pollock