

**PECO ENERGY COMPANY  
STATEMENT NO. 3**

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

ENERGY EFFICIENCY AND CONSERVATION PROGRAM

DOCKET NO. M-2015-

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DIRECT TESTIMONY  
SUPPORTING PECO'S PETITION FOR APPROVAL  
OF ITS PHASE III EE&C PLAN

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WITNESS: TOBEN E. GALVIN

SUBJECT: DEVELOPMENT OF PECO ENERGY  
COMPANY'S ACT 129 ENERGY EFFICIENCY  
AND CONSERVATION PLAN AND SUMMARY  
OF PRINCIPAL FINDINGS

DATED: NOVEMBER 30, 2015

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1 **DIRECT TESTIMONY**  
2 **OF**  
3 **TOBEN E. GALVIN**

4 **I. INTRODUCTION AND PURPOSE OF TESTIMONY**

5 **1. Q. Please state your name and business address.**

6 A. My name is Toben E. Galvin. My business address is 255 S. Champlain Street, Suite  
7 10, Burlington, VT 05401.

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

9 A. I am employed by Navigant Consulting Inc. ("Navigant") as Director in the Energy  
10 Practice.

11 **3. Q. Please state your educational background.**

12 A. I received a BA degree in Anthropology from Grinnell College in 1995 and a MS  
13 degree in Resource Economics from the University of Florida in 2000.

14 **4. Q. Please describe your current and prior work experience.**

15 A. My resume is set forth in Exhibit TEG-1. In summary, for the past 13 years I have  
16 been employed as a consultant to the utility industry on matters related to demand-  
17 side management ("DSM") program planning, design and evaluation. I currently  
18 work for Navigant's Energy Practice. My work covers topics such as energy  
19 efficiency portfolio design planning, implementation support, potential studies,  
20 benchmarking studies, and portfolio evaluation management. Recently, I have  
21 specialized in assisting electric and natural gas utilities with portfolio design planning

1 and cost-effectiveness analysis to meet energy efficiency resource standards in  
2 Pennsylvania, Michigan, Arizona, Ohio, and Nova Scotia. I started my career in the  
3 energy efficiency industry at the Vermont Energy Investment Corporation where I  
4 worked on DSM program planning, measure characterization, and Technical  
5 Reference Manual development for Efficiency Vermont and other utilities in the  
6 northeast. I have also worked as Deputy Director of Energy Programs for the Maine  
7 Public Utilities Commission, in which capacity I helped to manage Efficiency  
8 Maine's \$13 million annual portfolio of energy efficiency programs.

9 **5. Q. Have you previously testified in any regulatory proceedings?**

10 A. Yes, in 2012 I provided written testimony in support of PECO Energy Company's  
11 ("PECO") Phase II EE&C plan. I have also presented live testimony in several DSM  
12 regulatory proceedings. In February 2007, as Deputy Director of Energy Programs at  
13 the Maine Public Utilities Commission, I presented summary findings and  
14 recommendations to the Maine Public Utilities Commission with respect to "Draft  
15 Staff Report Docket No. 2006- 446: Inquiry into New Conservation Programs and  
16 Developing a Plan for Using Increases in the Conservation Fund". In November  
17 2008, on behalf of the Southern Maryland Electric Cooperative, I presented live  
18 testimony to the Maryland Public Service Commission with respect to providing a  
19 summary overview of Southern Maryland Electric Cooperative Demand Side  
20 Management Plan for 2009-2015 as part of the EmPower Maryland Case No. 9157.  
21 In January 2010, on behalf of the Maine Public Utilities Commission, I presented live  
22 testimony to the Maine Public Utilities Commission on a research project titled  
23 "Summary Report of Recently Completed Potential Studies and Extrapolation of

1 Achievable Potential for Maine (2010-2019)”, followed by additional live testimony  
2 in June 2010 on the “Review of the Efficiency Maine Trust Triennial Plan 2011-  
3 2013”.

4 **6. Q. What is the purpose of your direct testimony in this case?**

5 A. Navigant was retained by PECO to assist it in the development of its Act 129 Phase  
6 III Energy Efficiency and Conservation Plan (the “Phase III Plan” or “Plan”) for the  
7 period from June 1, 2016 to May 31, 2021. The purpose of my testimony is: (1) to  
8 describe the process by which PECO and Navigant identified, evaluated, and selected  
9 energy efficiency and demand response technologies and services; bundled them into  
10 comprehensive customer-focused solution offerings; and included them in the Phase  
11 III Plan; and (2) to summarize our principal findings in terms of projected energy and  
12 demand savings, program expenditures and Total Resource Cost (“TRC”) net  
13 benefits.

14 **7. Q. How is your testimony organized?**

15 A. I first describe the process employed in developing the Phase III Plan. Next, I discuss  
16 the results of preparing the key inputs to the portfolio benefit-cost screening model  
17 and the iterative discussions with PECO to design a comprehensive plan that is  
18 customer-focused and provides a wide array of opportunities for customers to take  
19 advantage of energy efficiency and demand response programs. I then identify the  
20 Phase III programs that PECO is proposing to implement and discuss common  
21 barriers to participation in energy efficiency and demand response programs. I  
22 conclude by offering my observations of the reasons I believe PECO’s Plan

1 represents a balanced, comprehensive and diverse portfolio of energy efficiency and  
2 demand response programs.

3 **II. PROCESS FOR DEVELOPING THE PHASE III PLAN**

4 **8. Q. Please describe the process employed in developing the Phase III Plan.**

5 A. Five primary elements were employed in developing PECO's Plan, all of which were  
6 based on practices and approaches that are well-established in the industry. First we  
7 conducted a thorough review of the Phase III Implementation Order and established a  
8 set of design principles which informed our initial scope of work and set specific plan  
9 guidelines and constraints around savings and budgets. Then, Navigant had  
10 numerous planning and design meetings with PECO to discuss past experience from  
11 Phase I & II delivery, and identify new strategies and enhancements for Phase III.  
12 Navigant engaged in design data verification in which we prepared a comprehensive  
13 list of DSM programs and corresponding measure level savings and cost estimates.  
14 Navigant engaged in design and market characterization assessment, which included  
15 assessing lessons learned from the Phase II evaluation reports, benchmarking  
16 analysis, the Statewide Evaluator baseline studies, PECO's supplemental baseline  
17 study, and findings from the Statewide Evaluator market potential study (energy  
18 efficiency and demand response). Finally, we considered findings from PECO's  
19 internal potential study to help inform our final program and measure selection  
20 priorities. We next populated our benefit-cost screening tool with the measure level  
21 data, forecasted incentive and non-incentive costs, and conducted an extensive  
22 iterative process of assessing numerous program design scenarios and cost-

1 effectiveness results to provide an optimal mix of the most comprehensive DSM  
2 programs possible given the savings targets and budget constraints. The final step  
3 was preparing the overall narrative plan and supporting tables and figures.

4 **9. Q. Did you utilize the Technical Reference Manual (“TRM”) adopted by the**  
5 **Pennsylvania Public Utility Commission (“Commission” or “PUC”) in**  
6 **quantifying program savings?**

7 A. Yes. We considered energy and demand savings values as calculated from the most  
8 recently revised 2016 TRM. Some measures included in PECO’s proposed portfolio  
9 are not currently characterized in the Pennsylvania TRM. In those instances,  
10 Navigant used weather-adjusted savings estimates from other published industry  
11 sources, including California’s Database of Energy Efficiency Resources (“DEER”),  
12 Illinois’ TRM, the Mid-Atlantic TRM, Efficiency Vermont’s TRM, Ohio’s TRM,  
13 Arkansas’ TRM, and Navigant engineering estimates.

14 **10. Q. How were the other necessary supporting data developed?**

15 A. The development of additional necessary supporting data consisted of multiple  
16 components. First, we collected all available relevant secondary data and then  
17 supplemented that effort with primary data collection where necessary. The types of  
18 secondary data that we assembled included reviews of other recently filed energy  
19 efficiency and demand response portfolio plans to ensure we were cognizant of the  
20 evolution of portfolio designs, programs, and measures being promoted across the  
21 industry. The primary data comprised PECO-specific load forecasts, historical  
22 customer billing records, avoided cost information, discount rates, previous market

1 research studies, previous PECO Phase II program evaluation studies, and a multi-  
2 utility benchmarking analysis which compared program costs and delivery  
3 approaches. We also used the Statewide Evaluator’s incremental cost databases and  
4 metering studies.

5 **11. Q. Was it at this point in your analysis that you identified the various**  
6 **programmatic measures that might be considered for inclusion in PECO’s Phase**  
7 **III Plan?**

8 A. Yes. Based on the information we had assembled and on our professional experience,  
9 we conducted a thorough assessment of the various energy efficiency and demand  
10 response programs and measures that could be included in the portfolio. We began  
11 this effort by reviewing all of the current Phase II measures and the full list of  
12 measures included in the 2016 TRM and the supporting Statewide Evaluator energy  
13 efficiency and demand response potential studies. We then identified an additional  
14 list of measures based on our experience in the industry, review of TRMs from other  
15 jurisdictions and review of measures included in similar large utility energy  
16 efficiency portfolios. The resulting list of measures was supplemented by the input  
17 and feedback that we received during numerous meetings with PECO staff,  
18 conservation service providers (“CSPs”), and input from stakeholder groups. We  
19 then ran those measures through a series of qualitative screens to eliminate measures  
20 that either were not applicable to PECO and/or would be too expensive to implement.  
21 We assessed the benefits of each individual measure relative to that measure’s cost  
22 with our benefit-cost screening tool and used this information to assist with measure  
23 selection and participation forecasting. The resulting measure list was further



1 adjusted to ensure the final set of included measures provide a comprehensive set of  
2 opportunities, crossing all end-uses, so that PECO can offer all of their customers a  
3 chance to participate.

4 **12. Q. How were specific Phase III Plan programs selected?**

5 A. Once we finished our review of possible measures, we transitioned to determining the  
6 best combinations of programs to maximize portfolio success, focused on identifying  
7 the correct mix of measures and programs to provide the most comprehensive  
8 offering of participation channels, given the overall savings target and budget limit.  
9 As a starting point, we assessed PECO's existing Phase II programs and considered  
10 what aspects of the current portfolio were working well and should be continued,  
11 and/or which program components were in need of modification. We then layered  
12 into this review new programs that were intended to broaden and diversify the range  
13 of efficiency opportunities available to all customers. This process involved  
14 numerous meetings and discussions with PECO staff and was further informed by a  
15 review of energy efficiency and demand response programs from other parts of the  
16 country. Our overall findings resulted in offering broader and more comprehensive  
17 programs, providing customers the flexibility to participate in any number of  
18 "solutions" within the program or the customer sector. Changing the structure of the  
19 programs is purposeful and indicative of PECO's strategy to move customers from  
20 individual measure based participation to an emphasis on trying to achieve broader  
21 and deeper participation at their business or home in order to minimize lost  
22 opportunities.

1   **13.   Q.   How involved was PECO in the process of developing the programs?**

2           A.   PECO was involved at every step in the process. Navigant had frequent and  
3           extensive meetings with PECO staff to strategize on best practice program design,  
4           eligibility, measure selection, incentive level ranges, estimated non-incentive costs  
5           and participation forecasts. Together, we started with a wide approach to program  
6           and measure selection, and then narrowed the selection process to identify the  
7           preferred mix of programs to suit the uniqueness of PECO’s customer base. Program  
8           development was focused on addressing Act 129 and PUC requirements, including:  
9           (1) PECO’s Phase III consumption reduction target of 1,962,659 MWh from June 1,  
10          2016 through May 31, 2021; (2) the requirement that at least 5.5% of PECO’s overall  
11          savings target (107,946 MWh) come from a dedicated program focused on low  
12          income customers<sup>1</sup>; (3) the requirement that 3.5% of PECO’s overall savings target  
13          (68,693 MWh) come from Government, Educational and Non-Profit (“G/E/NP”)  
14          customers; (4) the expansion of comprehensive energy efficiency program  
15          opportunities for residential and small commercial customers; and (5) the requirement  
16          to achieve an average annual potential savings of 161 MW for program years 2017  
17          through 2020.

18   **14.   Q.   Please describe the PECO stakeholder process.**

19          A.   Throughout the Phase III portfolio planning process, PECO participated in various  
20          stakeholder meetings. The meetings were intended to inform the stakeholders of the  
21          process that PECO was utilizing in developing its Phase III Plan, to share the Plan

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<sup>1</sup> Low income customers are those with a household income at or below 150% of the Federal Poverty Income Guidelines. See 66 Pa.C.S. § 2806.1(b)(1)(i)(G).

1 design being considered, and, more importantly, to solicit their opinions and input on  
2 the overall framework and potential energy efficiency and demand response  
3 programs. As a result of this process, the Phase III plan, by design, focuses on  
4 delivering comprehensive program offerings to customers via four main marketing  
5 and delivery channels: (1) retail (e.g., lighting rebates at a hardware store); (2)  
6 participant-initiated (e.g., customers who pursue energy savings directly and apply for  
7 rebates through PECO); (3) direct action (e.g., a CSP picking up an appliance for  
8 recycling); and (4) trade ally (e.g., a contractor implementing measures during major  
9 renovations).

10 **15. Q. Please describe further the analysis of specific programs.**

11 A. Initial steps included developing the various parameters that would enable us to  
12 conduct a detailed cost-effectiveness analysis. These parameters included identifying  
13 the specific energy efficiency and demand response measures for each program, the  
14 number of customers that might participate in the program each year, the total  
15 incremental cost of each measure, the amount of rebate or incentive that would be  
16 offered to offset that cost, and the costs to administer the program. In addition to  
17 these factors, we reviewed the ways that customers may participate in each program  
18 through various channels, which we call “pathways” to ensure all customers have an  
19 opportunity to participate.

20 **16. Q. How did you determine customer participation rates?**

21 A. Our forecast of customer participation rates was informed by a multi-step process.  
22 First, we considered the participation rates observed by PECO during the Phase II

1 period for energy efficiency and demand response programs. Then we extrapolated  
2 the probability of on-going levels of sustained or increased participation for existing  
3 programs based on our planned incentive levels, market outreach strategy, and  
4 estimated remaining market potential. For new or revised measures and programs,  
5 we calibrated our estimated participation for PECO by normalizing estimated units  
6 rebated per customer through a review of similar programs elsewhere, review of  
7 PECO market baseline data, and estimated remaining market potential, as well as  
8 performance for similar measures in PECO's Phase II programs. We then considered  
9 customer acceptance rates for PECO for each individual measure based largely on our  
10 observation of the experience of other comparable programs and informed by recently  
11 completed potential studies. Adjustments to these forecasted participation rates were  
12 then made based on discussions with PECO staff and its experience working with  
13 customers in the greater Philadelphia area.

14 **17. Q. How certain are you that these participation rates can be achieved?**

15 A. I am confident that these participation forecasts can be achieved based on PECO's  
16 experience from Phase II, complemented by insights gained from the Statewide  
17 Evaluator and PECO's own potential studies and the comparative review we  
18 completed of utility performance of similar programs being delivered in other states.  
19 Nonetheless, market forecasting of any type remains an inexact process.

1    **18.    Q.    You mentioned that once the parameters were developed, you then conducted a**  
2                   **cost-effectiveness analysis. How was that done?**

3            A.    We followed the Commission’s guidance in the 2016 TRC Order on how to calculate  
4                   the TRC test as the basis for judging the economic viability of the Phase III Plan. To  
5                   this end, we worked with PECO to determine representative avoided costs for energy  
6                   and capacity, avoided costs for fossil fuel and water reductions, as well as other  
7                   important drivers including system loss factors, discount rates, and cost escalation  
8                   rates. Where appropriate we also estimated costs for avoided operations and  
9                   maintenance, and for future equipment replacement in the cases of early replacement  
10                  measures. The TRC test was calculated and reviewed using both gross savings  
11                  estimates and net savings estimates. We incorporated the following specific  
12                  modifications to the TRC test to comply with Commission guidance:

- 13                    a) Measure lifetime was capped at 15 years;
- 14                    b) Energy savings were calculated at the meter, without line losses, while  
15                        demand savings were calculated at the generator, with line losses;
- 16                    c) Estimated net-to-gross ratios (“NTG”) from previous PECO Phase II  
17                        evaluation findings were applied as appropriate to measures. For new  
18                        measures with no previous PECO evaluation experience or for existing  
19                        measures with anticipated program modifications, we applied an estimated  
20                        NTG either from other recent evaluation reports of similar programs  
21                        elsewhere that are at approximately the same stage of market maturity or  
22                        from professional judgment based on expected changes to the marketplace  
23                        and program; and

1 d) Costs associated with the free provision of efficient equipment and  
2 installation labor costs (e.g., low income, multifamily and single family  
3 direct install, small business direct install) are all treated as non-incentive  
4 costs.

5 It is important to note that these specific Commission requirements for the TRC test  
6 (specifically capping measure life at 15 years and the treatment of direct install costs)  
7 result in lower benefit-cost ratios than if these Commission-stipulated modifications  
8 to the TRC test were not required.

9 **19. Q. How many programs did PECO select for inclusion in its Phase III Plan?**

10 A. PECO selected eight programs, one geared toward residential energy efficiency  
11 savings, one geared toward energy efficiency savings for low-income customers,  
12 three geared toward commercial and industrial (“C&I”) energy efficiency savings,  
13 and three geared toward demand response savings of the different customer rate  
14 classes (residential, small C&I and large C&I). While these eight programs contain  
15 many of the same implementation components as PECO’s Phase II portfolio, they  
16 represent a reorganization of the portfolio to minimize lost opportunities for  
17 customers of all rate classes and demographics to save energy and participate. This  
18 program structure enhances PECO’s ability to better serve its customers while  
19 providing a comprehensive portfolio with the widest and most diverse opportunities  
20 for participation by customers. The eight programs are listed below.

- 21 1. Residential Energy Efficiency Program
- 22 2. Low-Income Energy Efficiency Program
- 23 3. Small Commercial and Industrial Energy Efficiency Program

- 1 4. Large Commercial and Industrial Energy Efficiency Program
- 2 5. Combined Heat and Power for both Small Commercial and Industrial and
- 3 Large Commercial and Industrial Customers
- 4 6. Residential Demand Response Program
- 5 7. Small Commercial and Industrial Demand Response Program
- 6 8. Large Commercial and Industrial Demand Response Program

7 **20. Q. Does PECO's filing contain more detailed descriptions of the proposed energy**  
8 **efficiency programs?**

9 A. Yes. Consistent with the filing template issued by the PUC<sup>2</sup>, detailed descriptions of  
10 the programs are set forth in Section 3 of the Phase III Plan and provide the following  
11 information:

- 12 • Program Title and Years of Operation
- 13 • Objectives and Savings
- 14 • Target Market
- 15 • Program Description
- 16 • Implementation Strategy
- 17 • Program Issues, Risks, and Risk Management Strategies
- 18 • Marketing Strategy
- 19 • Eligible Measures and Incentives
- 20 • Ramp Up Strategy / Program Start Date and Key Milestones
- 21 • Evaluation, Measurement, and Verification Requirements

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<sup>2</sup> *Implementation of Act 129 of 2008 – Phase III Energy Efficiency and Conservation Plan Template*, Docket No. M-2014-2424864 (Issued September 22, 2015).

- 1                   • Administrative Requirements
- 2                   • Estimated Participation
- 3                   • Estimated Program Budget and Percent of Sector
- 4                   • Anticipated Costs to Participating Customers
- 5                   • Projected Energy Savings and Demand Reduction
- 6                   • Cost-Effectiveness

7   **21. Q. Please summarize the total energy savings projected for the Plan.**

8           A. Overall, PECO anticipates saving a total of 2,100,875 MWh in Phase III, which  
9           represents approximately 107% of PECO’s required 5.0% minimum savings target.  
10           Table 1 presents the gross annual energy savings by program for each year of the  
11           Phase III Plan. PECO does not anticipate carrying over any Phase II banked savings  
12           into Phase III. Overall, approximately 41% of the MWh savings come from the  
13           residential sector, and 59% from the C&I sector. Roughly 6% of overall forecasted  
14           savings come from the low-income customer segment representing roughly 6.3% of  
15           PECO’s Phase III target which exceeds the required 5.5% of savings coming from  
16           low income customers. Approximately 13% of the portfolio forecasted savings come  
17           from the G/E/NP customers representing roughly 14% of PECO’s Phase III target  
18           which exceeds the required 3.5% of savings coming from G/E/NP customers.

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**Table 1: PECO’s Projected Annual Gross Energy Savings by Program**

Programs	Annual Energy Savings (MWh)					5 Year Total
	PY 2016	PY 2017	PY 2018	PY 2019	PY 2020	
Residential EE (Exclusive of Low-Income)	128,166	139,740	148,876	154,269	156,144	727,195
Low-Income EE	22,627	23,244	24,314	25,866	27,941	123,991
Small C&I EE	73,843	79,613	85,681	86,907	79,236	405,280
Large C&I EE	94,954	95,444	96,067	96,841	97,568	480,875
CHP	78,710	81,806	85,057	88,471	29,490	363,535
Residential DR	0	0	0	0	0	0
Small C&I DR	0	0	0	0	0	0
Large C&I DR	0	0	0	0	0	0
<b>Grand Total – All Phase III Programs</b>	<b>398,299</b>	<b>419,848</b>	<b>439,995</b>	<b>452,355</b>	<b>390,378</b>	<b>2,100,875</b>

**22. Q. What are the total peak demand savings projected for the Plan from demand response programs specifically?**

A. With respect to demand savings from dedicated demand response programs, PECO forecasts a Phase III four year average (PY 2017 – PY 2020) annual peak demand reduction of 171.0 MW, exceeding the required four year average peak demand reductions of 161 MW. Table 2 summarizes the projected summer peak demand savings for each of the dedicated demand response programs.

**Table 2: PECO’s Demand Response Projected Annual Gross Peak Demand Savings**

Program	Peak Demand Savings (MW)				
	PY 2016 <sup>3</sup>	PY 2017	PY 2018	PY 2019	PY 2020
<b>Demand Response Programs</b>					
Residential DR	39	43	44	45	46
Small C&I DR	1	1	1	1	1
Large C&I DR	0	126	126	125	124
<b>Grand Total – Demand Response Programs</b>	<b>40</b>	<b>170</b>	<b>171</b>	<b>171</b>	<b>171</b>

23. **Q. What are the annual and cumulative program expenditures projected for the Plan?**

A. PECO expects to spend \$427.4 million over the five year plan period in order to achieve the energy savings represented in Table 1 and the peak demand reductions represented in Table 2. This represents 100% of PECO’s spending cap under Act 129 Phase III. Of that total, PECO expects to spend 32% of the program delivery budget for residential energy efficiency programming, 11% on small C&I energy efficiency programming, 18% on large C&I energy efficiency programming, 10% on demand response programming, and 29% for cross-cutting common costs. Table 3 lists the anticipated annual and total expenditures by program. Projected costs by program represent all anticipated costs to be incurred by PECO and competitively-selected CSPs for program implementation. The Common Costs category includes all PECO staff and material costs and third party contractor costs to be incurred by PECO for overall portfolio and program management, data tracking, education and awareness,

<sup>3</sup> PECO is not required to obtain peak demand reductions in the first program year of Phase III (PY2016). *See* Implementation Order, *Energy Efficiency and Conservation Program*, Docket No. M-2014-2424864 (Order entered June 19, 2015), p. 35. As explained in the testimony of Mr. DeDominicis, the Company proposes to implement residential and small C&I direct load control (“DLC”) solutions during PY 2016 to prevent its existing Phase II DLC programs from “going dark” for a year and losing participants.

1 various technical support and program design needs, research and development and  
 2 third party evaluation, measurement, and verification.

3 **Table 3: PECO’s Projected Yearly Expenditure by Program**

Program	Budget (Million \$)						Average Annual
	PY 2016	PY 2017	PY 2018	PY 2019	PY 2020	5 Year Total	
<b>Energy Efficiency/Demand Response Programs</b>							
<b>Residential</b>							
Residential (Exclusive of Low-Income)	\$19.7	\$19.7	\$19.9	\$20.3	\$20.4	\$100.1	\$20.0
Low-Income	\$7.0	\$7.0	\$7.1	\$7.4	\$7.7	\$36.1	\$7.2
Residential DR	\$2.3	\$2.7	\$2.8	\$2.9	\$3.0	\$13.7	\$2.7
<b>Subtotal Residential EE/DR Programs</b>	<b>\$29.0</b>	<b>\$29.4</b>	<b>\$29.9</b>	<b>\$30.5</b>	<b>\$31.1</b>	<b>\$149.9</b>	<b>\$30.0</b>
<b>Commercial &amp; Industrial</b>							
Small C&I	\$8.9	\$9.0	\$9.0	\$9.0	\$8.6	\$44.5	\$8.9
Large C&I	\$10.7	\$10.8	\$11.0	\$11.2	\$11.4	\$55.1	\$11.0
CHP	\$5.3	\$5.6	\$5.8	\$6.1	\$2.2	\$25.0	\$5.0
Small C&I DR	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.9	\$0.2
Large C&I DR	\$0.2	\$6.8	\$6.8	\$6.7	\$6.7	\$27.1	\$5.4
<b>Subtotal Commercial &amp; Industrial EE/DR Programs</b>	<b>\$25.3</b>	<b>\$32.4</b>	<b>\$32.8</b>	<b>\$33.2</b>	<b>\$29.0</b>	<b>\$152.6</b>	<b>\$30.5</b>
<b>Common Costs</b>	<b>\$31.2</b>	<b>\$23.7</b>	<b>\$22.8</b>	<b>\$21.8</b>	<b>\$25.4</b>	<b>\$124.8</b>	<b>\$25.0</b>
<b>Grand Total – All EE/DR Programs</b>	<b>\$85.5</b>	<b>\$85.5</b>	<b>\$85.5</b>	<b>\$85.5</b>	<b>\$85.5</b>	<b>\$427.4</b>	<b>\$85.5</b>

1   **24.   Q.   How does the Plan fare under the TRC test?**

2           A.   For the Plan as a whole over Phase III, the gross TRC benefit to cost ratio is 1.4  
3           yielding total net benefits based on gross savings of \$272.6 million. The net TRC  
4           benefit cost ratio is 1.3 yielding total net benefits based on net savings of \$138.2  
5           million. Table 4 summarizes the results of the TRC analysis by program. Of the  
6           eight programs, only two, the CHP with a score of 0.9, and small C&I demand  
7           response program with a TRC score of 0.7, fail to pass the TRC test. The key reasons  
8           for the CHP having a TRC of less than 1.0 are: (1) the significant customer  
9           investment in construction costs; and (2) the fact that the long-term benefits of CHP  
10          investments are not fully captured by the TRC, which limits measure life to 15 years.  
11          The small C&I DR program does not pass the TRC test primarily because of fixed  
12          costs for delivery and the relatively low number of participants. Nevertheless, we  
13          believe these programs should be included in the Plan because it allows PECO to  
14          mitigate lost energy savings opportunities for both small and large C&I customers  
15          and their inclusion contributes to a well-rounded portfolio of programs overall.

**Table 4: PECO's Estimated TRC Results by Program PY 2016-2020**

Program	TRC Analysis				
	Discounted Benefits (Million \$)	Discounted Costs (Million \$)	Net Benefits (Million \$)	B/C Ratio (Gross)	B/C Ratio (Net)
<b>Energy Efficiency/Demand Response Programs</b>					
<b>Residential</b>					
Residential (Exclusive of Low-Income)	\$304.44	\$132.83	\$171.61	2.3	2.3
Low-Income	\$68.53	\$38.29	\$30.24	1.8	1.6
Residential DR	\$17.32	\$10.10	\$7.21	1.7	1.7
<b>Subtotal Residential EE/DR Programs</b>	<b>\$390.29</b>	<b>\$181.23</b>	<b>\$209.07</b>		
<b>Commercial &amp; Industrial</b>					
Small C&I	\$180.24	\$92.58	\$87.65	1.9	1.8
Large C&I	\$241.30	\$166.52	\$74.79	1.4	1.3
CHP	\$103.84	\$113.49	-\$9.65	0.9	0.9
Small C&I DR	\$0.51	\$0.77	-\$0.26	0.7	0.7
Large C&I DR	\$38.89	\$18.59	\$20.31	2.1	2.1
<b>Subtotal Commercial &amp; Industrial EE/DR Programs</b>	<b>\$564.78</b>	<b>\$391.93</b>	<b>\$172.83</b>		
<b>Common Costs</b>		<b>\$109.29</b>			
<b>Grand Total – All EE/DR Programs</b>	<b>\$955.07</b>	<b>\$682.45</b>	<b>\$272.61</b>	<b>1.4</b>	<b>1.3</b>

2 **25. Q. Do you believe that the savings projections set forth in PECO's Phase III Plan**  
3 **are achievable?**

4 A. Yes. PECO has developed a comprehensive and diversified portfolio of programs  
5 that provides opportunities for participation across all customer classes. The program  
6 administration experience PECO developed in Phase I and II provides a solid  
7 foundation to support Phase III program implementation. Customer awareness of  
8 PECO's energy efficiency initiatives, in general, is higher today than at the start of  
9 Phase II and PECO's existing programs have yielded a high degree of customer  
10 satisfaction. The adjustments that have been made to the portfolio program structure

1 for Phase III and the continued investment in customer awareness and education will  
2 help meet the Phase III savings requirements established by the PUC.

3 **III. COMMON BARRIERS IN ENERGY EFFICIENCY**  
4 **AND DEMAND RESPONSE PROGRAMS**

5 **26. Q. What are some of the common barriers to participation in energy efficiency and**  
6 **demand response programs?**

7 A. Experience points to a number of barriers that could impede achieving energy  
8 efficiency and demand response targets. First, consumers are often poorly informed  
9 about technology characteristics and energy efficiency opportunities. It is my  
10 experience that “word-of-mouth” is the main avenue for customers to learn about  
11 energy efficiency options and be convinced to take action. It can take many years to  
12 inform and educate a large majority of households and businesses about energy  
13 efficiency technology and the details of energy efficiency programs. Second, for  
14 customers who don’t own the property they are using (e.g., business or housing unit),  
15 a split incentive exists between the cost of the efficiency upgrade which would be the  
16 responsibility of the property owner, and the tenant who pays the monthly electric  
17 bill. Finally, convincing customers to adopt energy efficiency products requires  
18 voluntary participation and, in most instances, a significant customer up-front  
19 financial commitment, even after accounting for the utility incentives. With respect  
20 to demand response, initial challenges include customer recruitment and enrollment,  
21 followed by customer retention. Challenges may include customer complaints and  
22 fatigue if the demand response events are called too frequently or for too long of a  
23 period.

1    **27. Q. How will PECO’s Phase III Plan work to overcome common barriers to**  
2           **program participation and help ensure overall savings goals are achieved?**

3           A. To help ensure that overall portfolio savings and demand targets are met, PECO has  
4           designed a set of programs that minimizes overall performance risk by providing a  
5           comprehensive list of measures and pathways with enough flexibility so that each  
6           customer can participate in a way that meets his or her individual needs and  
7           circumstances. When PECO’s programs are able to meet their customers’ needs in a  
8           positive manner, the customers are much more likely to tell their neighbors or  
9           coworkers about their experience, thus overcoming the barrier of knowledge of  
10          energy efficiency and demand response technology options and the programs  
11          themselves. For example, in response to a small number of customers that indicated  
12          an inability to participate if only the most efficient options were included in the  
13          programs, some measures now include a plan for tiered incentives based on efficiency  
14          levels to encourage customer participation in the most efficient options, but still offer  
15          a means to participate for those customers that may only be able to afford a slightly  
16          lower efficiency level. Building on the lessons learned from the implementation of  
17          Phases I and II, individual program design features include: robust education and  
18          awareness plans; incentives to off-set the higher first costs of more efficient  
19          equipment; and reasonable incentive ranges to allow PECO to rapidly respond to the  
20          marketplace if measure participation is significantly different than forecast. For  
21          customers that cannot afford to participate at all (i.e., low-income sector), PECO has  
22          included a robust set of direct install and giveaway measures and no-cost participation  
23          solutions so that such customers can participate in the program in a meaningful way.

1 PECO has included residential single family and multifamily solutions which pair  
2 low/no cost direct install measures with higher cost partially incented measures to  
3 encourage participation in deeper saving, longer lasting measures, and which are  
4 intended to minimize the split-incentive barrier discussed previously. For C&I  
5 customers, incentive ranges were selected with the goal of buying down measure  
6 costs to a financially acceptable simple payback period for the customer rather than  
7 assigning incentives based on a set percent of incremental cost which in some cases  
8 may not be enough to spur action and in others more than is required. PECO's  
9 strategy for achieving the demand response savings is based on acquiring savings  
10 across all customer types, with a variety of mechanisms, primarily from direct load  
11 control and demand response aggregation with larger customers. Customer education  
12 and incentives to compensate for the disruption will be emphasized. Customer  
13 education is a primary component of every program and PECO is also focused on  
14 raising trade ally awareness of the efficiency programs and providing training as  
15 needed to encourage their participation. Finally, in the event that a program in one  
16 sector is struggling to meet a savings goal, the broader diversified portfolio design  
17 will help to compensate.

#### 18 IV. CONCLUSION

19 **28. Q. Do you have any concluding thoughts about PECO's Phase III Plan?**

20 A. Yes. First, I believe that PECO is proposing a broad and diverse portfolio of proven  
21 energy efficiency and demand response programs that will satisfy the Phase III  
22 savings requirements established by the PUC and offer customers a wide variety of



1 options to actively participate in the implementation of Act 129. Second, I believe  
2 that PECO's Phase III Plan will provide significant benefits to residents and  
3 businesses of the Philadelphia metropolitan area. Third, PECO was inclusive in the  
4 development of this Plan, holding stakeholder meetings and numerous other informal  
5 meetings with interested parties, which demonstrated to me that PECO was sincerely  
6 committed to incorporating the ideas and feedback of all interested parties.

7 **29. Q. Does this conclude your direct testimony?**

8 A. Yes.