BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Petition of PPL Electric Utilities Corporation for Approval of an Energy Efficiency and Conservation Plan

Docket No. M-2012-2334388

PPL Electric Utilities Corporation

Statement No. 2

Direct Testimony of M. Hossein Haeri, PhD.

Date: December 4, 2012

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Q. Please state your full name and business address.

A. My Name is Hossein Haeri, and my business address is 720 SW Washington Street, Suite 400 Portland, OR 97205.

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, Inc., as an executive director.

Q. What are your duties as a principal of The Cadmus Group?

A. I am responsible for providing technical leadership in utility planning and assessment and measurement and verification practice areas within the firm's Energy Services Group.

Q. What is your educational background?

A. I hold a doctoral degree in regional science from the School of Urban Studies and Planning at Portland State University, and a Bachelor's degree in social science research from the University of Oregon.

Q. Please describe your professional experience.

A. Since 1985, I have worked in the energy utility industry in various capacities, including as a researcher, consultant, teacher, and utility manager. With the assistance of my staff, I have provided technical advice and planning consultation to energy utilities on matters related to resource planning, load forecasting, load research, market assessment, energy efficiency, demand response, portfolio assessment, and performance measurement. Before joining The Cadmus Group, I was Vice President for consulting at KEMA Consulting. I served as the director of Energy Information Systems, responsible for measurement and verification at Chevron Energy Solutions (formerly PG&E Energy Services) from 1997 to 2000. Prior to that, I served as a principal in the consulting firm of Barakat & Chamberlin, where I led the firm's impact evaluation and assessment practice area. I also worked for four years as Manager of Planning and Assessment for Central Maine Power Company ("CMP"), where I was responsible for planning and evaluation of the company's DSM programs. While at Central Maine, I co-chaired the Maine Collaborative, representing investor-owned utilities in the state. Before joining CMP, I was the manager of Western Operations for ERC International, where I was responsible for utility DSM program evaluations. I was also an adjunct assistant professor at Portland State University from 2000 to 2005, where I co-founded the graduate program in Applied Energy Economics and taught courses in energy planning and regulation.

Q. Have you previously testified as a witness before the Pennsylvania Public Utility Commission ("PUC" or "Commission")?

A. Yes. I presented testimony in Docket No. M-2009-209316 in support of PPL Electric's Phase I Act 129 Energy Efficiency and Conservation ("EE&C") Plan.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide support for and information regarding PPL Electric's proposed Phase II Act 129 Energy Efficiency and Conservation Plan ("Phase II EE&C Plan"). Specifically, my testimony identifies the Company's performance requirements under Act 129 of 2008 ("Act 129") and the Implementation Order issued by the Commission on August 3, 2012, Energy Efficiency and Conservation Program, Docket Nos. M-2012-2289411, M-2008-2069887, 2012 Pa. PUC LEXIS 1259 (Implementation Order entered on August 3, 2012) ("*2012 Implementation Order*"); discusses how the proposed Phase II EE&C Plan will meet those requirements; describes how the proposed Phase II EE&C Plan was developed; and, finally, explains that the Phase II EE&C Plan is in full compliance with Act 129, and the Commission's related Orders

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

A. I, and the staff of The Cadmus Group working under my direct supervision, provided PPL Electric technical information regarding the design of some of the programs in the proposed Phase II EE&C Plan, helped PPL Electric to construct the portfolio including the tables and charts in the EE&C Plan, and I oversaw all technical analyses and

calculations for the benefit-cost analysis in accordance with the Commission Total Resource Cost Test Order.

Q. Are you sponsoring any exhibits in the filing?

A. Yes. As Ms. Thompson Grassi explains in her direct testimony, she and I are co-sponsoring PPL Electric's EE&C Plan, which has been identified as PPL Electric Exhibit No. 1. Within that exhibit, I am primarily responsible for and am sponsoring Section 8 of the exhibit.

Q. How is your testimony organized?

A. First, I provided an overview of PPL Electric's three-year consumption reduction target and will discuss how the Company's proposed Phase II EE&C Plan is designed achieve that target. Second, I describe how the Phase II EE&C Plan portfolio is cost-effective based on the Total Resource Cost Test ("TRC").

The Overall Energy Reduction

Q. Please describe how the Phase II EE&C Plan is designed to achieve 2.1% energy savings by May 31, 2016.

A. The *2012 Implementation Order* requires PPL Electric to achieve 2.1% energy savings by May 31, 2016. In PPL Electric's case, that target equates to approximately 821,072 MWh/yr. The Company's Phase II EE&C Plan is designed to achieve approximately 841,957 MWh/yr. by May 2016. The Phase II EE&C Plan's approximately 2.5% excess[1]

[1] The excess is approximately 16% including the estimated 110,000 MWh/yr carryover of excess compliance from Phase I.

is intended to comply with the Commission's and most stakeholders' expectations that EDCs expend their full Phase II funding and EDCs strive to exceed the Phase II compliance targets. The excess also provides the flexibility for PPL Electric to mitigate risks such as a realization rate that is lower than expected, changes in future Technical Reference Manuals ("TRM") that reduce the allowable savings for measures, lower than expected market penetration rates, the need to increase incentives to achieve desired participation levels, and other factors.

Q. Do you believe it is feasible for PPL Electric to reach the participation levels needed to meet the energy efficiency reduction target?

A. Yes. PPL Electric has made every effort to construct a robust and creative portfolio of energy efficiency programs, relying on lessons learned from the Company's excellent program performance in Phase I, results from the Commission's Market Potential Study, and energy efficiency program best practices in the industry. The proposed portfolio, once implemented, is expected to fully meet all of the requirements of Act 129 including the energy reduction compliance targets. In fact, the proposed portfolio currently exceeds the consumption reduction targets by approximately 16%, including the estimated 110,000 MWh/yr carryover of excess compliance from Phase 1 EE&C programs.

Cost-Effectiveness Based on the TRC

Q. Does the Phase II EE&C Plan contain a process for conducting an annual cost-effectiveness evaluation of the plan in accordance with the Commission's 2012 Total Resource Cost Test Order?[2]

A. Yes. The Phase II EE&C Plan outlines a process for conducting an annual cost-effectiveness evaluation of the Plan in accordance with the Commission's 201 Total Resource Cost Test Order. *See* Section 1.7.3 of the Phase II EE&C Plan.

Q. What method was used to estimate the cost effectiveness of the Phase II EE&C Plan and its individual programs?

A. For each program in the Phase II EE&C Plan and for the entire EE&C Plan (including portfolio-level common costs), cost effectiveness was estimated in accordance with the procedures for the modified California test[3] described in the Commission's Secretarial Letter concerning the implementation of Energy-efficiency and Conservation Program (Docket No. M-2008-2069887) and subsequent refinements introduced in the Commission's August 30, 2012 Order concerning the Total Resource Cost for Phase II of Act 129 (Docket No. M-2012-2300653).

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[2] *2012 PA Total Resource Cost (TRC) Test,* at Docket No. M-2012-2300653 (Order entered August 13, 2012) ("*TRC Order*").

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

Q. Is the proposed Phase II EE&C Plan cost effective, based on a TRC criterion?

A. Yes. PPL Electric's proposed Phase II Plan is cost effective, based on a TRC criterion. *See* Phase II EE&C Plan Section 8. Specifically, the TRC benefit-to-cost ratio for the overall Phase II EE&C Plan is 1.73. This significantly exceeds the value of 1.0 required by Act 129 and is consistent with the benefit-cost ratio of well-performing programs in other states, especially considering Pennsylvania's set-aside savings requirement for low-income. Phase II EE&C Plan Table 1; *see also*, Phase II EE&C Plan Tables 7- 7E (providing the TRC benefit-to-cost ratio by program per year and by customer sector). Cost effectiveness of the Phase II EE&C Plan is demonstrated in data presented in Section 3.2., Program Descriptions and Tables 7- 7E. PPL Electric determined the life-cycle costs, savings, and avoided cost benefits for each measure to compute the measure's cost effectiveness from a TRC perspective. Application of the TRC test identified some measures and programs that did not meet the cost-effectiveness threshold. However, to ensure a well-balanced and comprehensive mix of measures, and to meet the Commission's requirement to include "comprehensive" measures for customers, and to meet the Commission's requirement for low-income savings, certain measures and programs with a TRC lower than 1.0 are included in the Phase II EE&C Plan.

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

A. Assessment of cost-effectiveness for each program in the Phase II EE&C Plan began with a valuation of each conservation measure's net "total resource" benefits ("B_{TRC}") over the life of the conservation measure, for a maximum of 15 years as directed in the *TRC*

Order,[4] as well as the measure's total incremental installed costs ("C_{TRC}"). A measure (or program) was deemed cost-effective if its net "total resource" benefits were positive or the benefit-to-cost ratio was at least one, *i.e.*:

$$B_{TRC} - C_{TRC} \geq 0$$

Or

$$B_{TRC} / C_{TRC} \geq 1$$

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

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

A. The avoided costs of delivered electricity were calculated for a 15-year planning horizon in three segments, in accordance with the procedure prescribed in Section H of the Commission's August 30, 2012 TRC Order, as follows:

> **Years 1-4 (June 2013-May 2017):** PJM PPL Zone Off-Peak and On-Peak LMP[5] Swap futures are used through December 2015. PJM Western Hub Off-Peak and On-Peak LMP Swap futures are used from January 2016 through May 2017. These Western Hub values are adjusted by looking at the 2015 ratio between PJM PPL Zone LMP Swap futures and Western Hub futures, and applying this ratio to the Western Hub values for 2016 and the first five months of 2017.
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> **Years 5-10 (June 2007-May 2023):** Henry Hub Natural Gas Futures are used, and converted to electric prices through an on-peak and off-peak heat rate. Basis adjustments are included. Peak and off-peak spark price spreads are included.
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> **Years 11-15 (June 2023-May 2028):** Middle Atlantic Natural Gas Prices for Electric Power from the EIA AEO[6] Energy Prices by Sector and Source are used,

[4] *TRC Order* at 14.

[5] Locational Marginal Pricing

[6] U.S. Energy Information Administration's Annual Energy Outlook

converted to electric prices through the on-peak and off-peak heat rate. On-peak and off-peak spark price spreads are included.

Avoided capacity costs were estimated using PJM base residual auction results through 2015 and 2016. After 2016, prices were escalated using the consumer price index from the Bureau of Labor Statistics. Avoided costs for each sector were calculated by adjusting the 15-year avoided costs by PPL Electric's transmission and distribution costs. The assumptions used in calculation of avoided costs are summarized, by sector in Table Y of the Phase II EE&C Plan.

Q. How were the estimates of savings and information on measure life obtained?

A. Estimates of savings and information on measure life were obtained primarily from the draft of the 2013 Pennsylvania TRM and the May 2012 study, Electric Energy Efficiency Potential in Pennsylvania, conducted by the SWE. Data for new measures not found in the TRM were compiled from secondary sources, including the California Database for Energy Efficiency Resources ("DEER").

Q. What benefits were used in the TRC calculation?

A. The benefits used in the TRC calculation include the full value of time and seasonally differentiated generation, transmission and distribution, and capacity costs. Benefits also take into account avoided line losses. To capture the full value of time and seasonal impacts of each program measure, hourly (8,760) system-avoided costs were adjusted by the hourly load shape of the end user affected by the measure. Non-energy benefits such as water savings were not factored into the calculation because these benefits are typically difficult to quantify and too small to alter the outcomes of the analyses.

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

A. The cost component of the TRC analysis included the incremental measure costs and direct utility costs. Incremental measure costs are the expenses associated with the installation of energy-efficiency measures and ongoing operation and maintenance costs, where applicable. The incremental measure costs were obtained primarily from the Electric Energy Efficiency Potential in Pennsylvania. Incremental measure costs not included in this study were obtained from a variety of sources, including DEER and RSMeans,[7] PPL Electric's actual experience from Phase I (such as the actual project cost for an average C&I lighting retrofit project), among other sources. EDC costs consist of expenses associated with program development, delivery and ongoing operation, and fall into the following categories: (1) EDC Labor, Material, and Supplies; (2) Customer Incentives; (3) CSP Labor, Materials and Supplies; and (4) Marketing (excludes marketing by turnkey program CSPs).

PPL Electric also categorizes costs as follows:

Direct Costs: These are costs that are directly related and charged to a specific program. PPL Electric will assign costs directly to programs where possible.

Common Costs (also known as Portfolio-level Costs): These are costs that are applicable to more than one customer class, more than one program, or that provide portfolio-wide benefits.

EDC Costs: These are costs incurred by PPL Electric and include all direct costs and common costs. These are the costs that are in the Plan budget and subject to the funding cap (plus SWE costs that are not subject to the funding cap).

Participant Costs: These are costs incurred by the customer such as their material and installation of efficient measures. Often, participant cost is determined by subtracting Act 129 EE&C incentives from the incremental cost of the measure. Participant costs are used in the TRC evaluation only.

[7] RSMeans provides construction cost information.

In PPL Electric Statement No. 3, Mr. Kleha describes how the Company allocates the Common Costs and the EDC Costs to each customer class.

Q. Does this conclude your direct testimony?

A. Yes.