

**PECO ENERGY COMPANY
STATEMENT NO. 2**

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**PETITION OF PECO ENERGY COMPANY
FOR APPROVAL OF ITS
SMART METER TECHNOLOGY PROCUREMENT AND
INSTALLATION PLAN**

DOCKET NO. M-2009-2123944

**DIRECT TESTIMONY
SUPPORTING PECO'S PETITION FOR APPROVAL
OF ITS INITIAL DYNAMIC PRICING AND
CUSTOMER ACCEPTANCE PLAN**

WITNESS: DR. STEPHEN S. GEORGE

**SUBJECT: DEVELOPMENT AND KEY
COMPONENTS OF PECO'S
INITIAL DYNAMIC PRICING
AND CUSTOMER ACCEPTANCE
PLAN**

DATED: OCTOBER 28, 2010

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**DIRECT TESTIMONY
OF
DR. STEPHEN S. GEORGE**

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I. INTRODUCTION AND PURPOSE OF TESTIMONY

6 **1. Q. Please state your full name and business address.**

7 A. My name is Stephen S. George. My business address is Freeman, Sullivan & Co.,
8 101 Montgomery Street, 15th Floor, San Francisco, California 94105.

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

10 A. I am a Partner, Principal Consultant and Head of the Energy Practice at Freeman,
11 Sullivan & Co. ("FSC").

12 **3. Q. What are your current duties and responsibilities?**

13 A. As Energy Practice Head, I am ultimately responsible for managing and growing the
14 energy practice at FSC and for ensuring that FSC's work products meet our client's
15 needs. In addition, I spend the majority of my time working on client projects.

16 **4. Q. Please summarize your professional experience.**

17 A. I have more than 30 years of experience providing consulting service to electric and
18 gas utilities and regulatory agencies, and 34 years of experience in the energy field.
19 My areas of expertise include pricing strategy, demand response analysis, demand-
20 side management program design and evaluation, electric industry restructuring,
21 strategic and marketing planning, market research, and energy demand modeling.
22 Recently, I have worked extensively on issues associated with electricity pricing and

1 advanced metering including the design and evaluation of California's Statewide
2 Pricing Pilot. I have provided analysis and/or testimony on the benefits of time-based
3 pricing for San Diego Gas & Electric Company ("SDG&E"), Pacific Gas & Electric
4 Company ("PG&E"), Xcel Energy, Rochester Gas & Electric, New York State
5 Electric & Gas, Central Maine Power Company ("CMP") and the State of Vermont's
6 Department of Public Service. I am currently a technical advisor to the United States
7 Department of Energy ("DOE") concerning research design for the consumer
8 behavior studies funded under the federal government's Smart Grid Grant program,
9 and I am also working for several utilities to develop research plans for similar
10 studies. I have extensive experience on the impact of time-based pricing and on
11 customer acceptance of time varying pricing.

12 **5. Q. What is your educational background?**

13 A. I have an undergraduate degree in economics from Santa Clara University and a
14 Ph.D. in economics from the University of California, Davis.

15 **6. Q. Have you testified previously in any regulatory proceeding?**

16 A. Yes, I have testified in several regulatory proceedings, including three proceedings
17 involving advanced metering applications and time-based pricing. I was the primary
18 demand response witness for Commonwealth Edison Company ("ComEd"), CMP
19 and SDG&E in their advanced metering applications. I also testified for PG&E in its
20 request for approval to upgrade its advanced metering investment.

21 **7. Q. What is the purpose of your testimony?**

1 A. The purpose of my testimony is to describe the development and key components of
2 PECO Energy Company's ("PECO's") Initial Dynamic Pricing and Customer
3 Acceptance Plan ("Dynamic Pricing Plan" or "Plan").

4 **II. SUMMARY OF TESTIMONY**

5 **8. Q. Please summarize your testimony.**

6 A. My testimony is divided into four parts. I first provide an introduction to the current
7 state of deployment of dynamic rates and what has been learned to date from
8 analyzing such programs and pilots. I then discuss the development of PECO's
9 Dynamic Pricing Plan and the ways in which FSC assisted PECO. I next review the
10 key features of PECO's Plan and discuss how the "test and learn" approach will
11 provide PECO with valuable insight into the best strategies for broad scale
12 deployment of these rates throughout its service territory. Finally, I explain why
13 PECO's Plan is a reasonable and prudent approach to implementing Act 129's
14 dynamic pricing requirements.

1 **III. STATE OF DYNAMIC RATE DEPLOYMENT**

2 **9. Q. Please provide an overview of the current deployment of dynamic rates in the**
3 **United States.**

4 A. Time-varying rate options¹ are not widely available to residential customers or small
5 and medium commercial and industrial (“S/MC&I”) customers in the United States at
6 this time. The rapid deployment of advanced metering, however, is creating a large
7 customer population that could be served by time-varying rates. As discussed in Dr.
8 Faruqui’s testimony, there have been roughly 17 pricing pilots implemented in the
9 last decade that collectively have tested a wide variety of rate options. However, to
10 date, few utilities have made such tariffs widely available to these customer segments.
11 ComEd and Ameren Corporation each have similar real time pricing (“RTP”) tariffs
12 available for residential customers, and Gulf Power has had critical peak period
13 (“CPP”) and time-of-use (“TOU”) rates available to residential customers for many
14 years. Each of these tariff options has fewer than 10,000 enrolled customers. PG&E
15 has the largest dynamic pricing tariff program for residential customers in North
16 America, with roughly 25,000 enrolled accounts.

17 California is leading the nation in the implementation of dynamic pricing. By the end
18 of 2012, all non-residential electricity consumers served by the three major investor
19 owned utilities in California (PG&E, Southern California Edison and SDG&E) will
20 receive service on a time-varying tariff. The “default” rate will be a CPP or TOU
21 “dynamic” rate, and the opt-out rate will be a “static” TOU rate. In May 2008,

¹ The full spectrum of potential time-varying rate options is discussed in Dr. Faruqui’s testimony (see PECO Exhibit AF-1 for a brief summary of rate types).

1 SDG&E began defaulting all of its non-residential customers that have smart meters
2 to a dynamic rate. Additionally, each of the three utilities has filed a petition to offer
3 residential customers peak time rebates on a default basis, and PG&E has been
4 directed by the California Public Utilities Commission to file a default critical peak
5 period/time-of-use tariff to be implemented in 2014.

6 **10. Q. What conclusions can be drawn from the existing studies and pilots?**

7 A. There are several general conclusions that can be drawn from evaluating the pilots
8 and completed tariff programs, but it is important to note that many key issues have
9 not been the subject of much investigation. The general findings with which most
10 objective observers would agree include:

- 11 • On average, customers that are exposed to dynamic rates reduce electricity use
12 during peak periods.
- 13 • Even among volunteers, there is significant variation across customers in the
14 magnitude of demand response, in both percentage and absolute terms, with
15 many customers providing little, if any, demand reduction and ten to twenty
16 percent of customers providing the majority of aggregate demand reduction.
- 17 • Customers with large loads, often correlated with central air conditioning usage,
18 provide greater demand reduction, in both absolute and percentage terms, than
19 do customers with smaller loads.

- 1 • Residential customers are more price responsive than S/MC&I customers, but
2 the magnitude of demand response among S/MC&I customers may be larger
3 because they have larger average loads than residential customers.
- 4 • On average, enabling technology, such as control switches and programmable
5 communicating thermostats, increases demand response relative to consumers
6 who do not have such enabling technology.
- 7 • Satisfaction ratings among customers who experience time-based pricing are
8 typically quite high, and many customers that experience such rates prefer them
9 to flat rates.
- 10 • Customers are risk averse when it comes to signing up for dynamic rates and
11 often focus on the downside risk of high peak-period prices rather than the
12 upside potential of lower off-peak prices. Combined with typical inertia and
13 other market barriers, getting customers to sign up for time-varying rates is
14 challenging.

15 **11. Q. You mentioned above that there are still some key issues that have not been**
16 **investigated very thoroughly. Please elaborate on that statement.**

17 A. Without a doubt, the most important issue requiring more investigation is
18 understanding the best way to get customers to sign up for time-varying rates. This is
19 an understudied area that is vitally important to designing good pricing policies and to
20 implementing successful pricing and demand response programs. Predicting the
21 aggregate impact of dynamic tariffs and other demand response programs requires
22 estimates of the average response associated with customers who enroll in these

1 programs as well as estimates of the number of customers who are likely to enroll.
2 The 17 pilot programs mentioned above have focused almost exclusively on
3 estimating average dynamic rate impacts and hardly at all on understanding customer
4 preferences for such rates and how to effectively enroll consumers in these programs.
5 PECO's desire to focus on understanding customer acceptance of dynamic rates was
6 one of the key reasons I was extremely interested in this assignment.

7 **12. Q. Are there other areas where additional research is important to developing**
8 **effective pricing and demand response ("DR") programs?**

9 A. Yes, there are several. First, the electric industry is in the very early stages of
10 understanding the degree to which information feedback affects usage behavior. It is
11 difficult for electricity consumers to make informed decisions about energy use
12 because there is a significant lag between when usage decisions are made and when
13 the costs associated with those decisions are known (through monthly bills).
14 Furthermore, most consumers do not have a good understanding of the relative cost of
15 using various appliances in the home or the cost of modifying the use of individual
16 appliances (for example, the cost impact of adjusting thermostat settings up or down).
17 Information feedback programs, such as the deployment of near real-time-feedback
18 devices (e.g., dedicated in-home displays, or "IHDs"), may lead to modifications in
19 energy use behavior, but the research that has been done to date on this topic has
20 often suffered from poor design, small customer samples or other problems that make
21 it difficult to determine whether observed changes are actually caused by the
22 information feedback provided. Customer education and communication are also
23 important topics for additional study. Quantitative estimates of the impact of

1 different communication messages and channels on customer acceptance of DR
2 programs are rare. Estimates of the impact of different educational campaigns in
3 conjunction with dynamic pricing are also rare.

4 **13. Q. Will PECO's Dynamic Pricing Plan address any of these important areas of**
5 **uncertainty?**

6 A. Yes. As mentioned above, a primary focus of PECO's Dynamic Pricing Plan is to
7 better understand how to effectively enroll customers in voluntary dynamic rate
8 programs and related program offerings, especially those consumers who will provide
9 substantial demand reductions during peak periods. PECO plans to employ a "test
10 and learn" strategy that will provide different offers to different groups of customers
11 in a scientifically controlled manner that will allow PECO to understand the effect on
12 enrollment of various features of a marketing offer, various communication messages
13 and channels, different educational offerings, different rate options and different
14 forms of enabling technology. Another important focus of the Plan is to examine and
15 understand the load impact of different rates and technology options. Insights gained
16 from this test and learn strategy will be incorporated into future marketing plans and
17 rate offerings so that there will be continuous improvement in PECO's dynamic rate
18 strategy over time. This approach will not only lead to an effective strategy for
19 development of demand response resources at PECO, but will make a significant
20 contribution to the state of knowledge concerning how best to deploy dynamic rates
21 throughout the industry.

22

1 **IV. DEVELOPMENT OF PECO’S DYNAMIC PRICING PLAN**

2 **14. Q. Please describe the process employed in developing PECO’s Plan.**

3 A. As explained in Dr. Faruqui’s testimony in PECO Statement No. 3, PECO worked
4 with The Brattle Group to screen a wide variety of rate options and selected the two
5 options that will initially be offered to residential and S/MC&I customers. FSC’s job
6 was to work with PECO to develop a strategy for rolling out these rates and
7 complementary options, such as enabling technology, in a manner that will allow for
8 systematic and continuous improvement in the options being offered and the manner
9 in which they will be marketed and deployed. We began the project by working with
10 key internal and external stakeholders to understand the primary objectives of the
11 Dynamic Pricing Plan.

12 **15. Q. What objectives helped guide the approach to the Plan?**

13 A. The primary objectives that guided plan development were:

14 • To comply with Act 129’s requirements;

15 • To understand customer preferences for rate and technology options and identify
16 the combination of rates, technologies and education that will help customers
17 better manage their energy costs;

18 • To understand how to educate, and communicate with, customers about new
19 options; and

20 • To determine an effective combination of rates, technologies, education and
21 promotional strategies for PECO stakeholders.

1 16. Q. **Once the objectives were well understood, what was the next step in plan**
2 **development?**

3 A. FSC worked closely with PECO staff to develop a set of guiding principles for use in
4 creating the plan, as follows:

- 5 • The best way to learn about customer preferences is to make actual offers using
6 different promotional strategies and see what customers choose. Customers who
7 respond to surveys asking if they will choose specific options significantly
8 overstate what those customers will actually do. There is no substitute for using
9 actual choice data.
- 10 • Product improvement, or innovation, happens by testing and learning, i.e.,
11 employing a systematic process of experimentation in which better products,
12 services or promotional strategies are discovered by trying different options,
13 quickly abandoning those that do not work well, and improving those that do to
14 make them even better.
- 15 • Because a lot of research is currently underway or on the drawing board, and
16 new technologies are being developed and refined, it is important to maintain
17 flexibility in the Plan concerning precisely what will be tested when the initial
18 offers are made in early fall 2012. In addition, given the test and learn
19 philosophy underlying the Plan, offers in the second year should be based on
20 what is learned in the first year.

- PECO does not want to reinvent the wheel. If there are data about promotional strategies or service offerings that can be utilized from prior research, they should be used as a starting point for the test and learn strategy.
- PECO recognizes that dynamic rates will not provide financial benefits to every individual customer. Therefore, PECO will develop screening safeguards during the enrollment process such as scripted questions about the risks involved to caution certain customers from adopting a rate structure that could adversely impact their bills.

9 **17. Q. How did FSC help PECO evaluate strategies for deploying and testing dynamic**
10 **rates in its service territory?**

11 A. Together, PECO and FSC recognized that the combination of Act 129 requirements
12 and the availability of DOE grant funding gave PECO a large test bed of 600,000
13 customers with which to assess in a rigorous manner a wide variety of tariff,
14 technology, education and promotional options. Based on this opportunity and the
15 objectives and principles outlined above, FSC worked closely with PECO to develop
16 an initial plan and to vet it with internal and external stakeholders. Plan development
17 began with a two-and-a-half day working meeting involving key PECO and FSC
18 staff. PECO staff outlined its objectives and, in particular, its focus on better
19 understanding customer acceptance of time-based pricing. FSC provided an
20 overview of key findings from prior research related to dynamic pricing impacts and
21 enrollment and also provided a brief tutorial on experimental design and
22 product/service innovation. Having established a common understanding of PECO's
23 interests and of the current state of knowledge provided by prior research, PECO and

1 FSC began outlining a high level strategy at this initial meeting. This initial strategy
2 was refined through data analysis, weekly conference calls, interactions with The
3 Brattle Group and key PECO staff members, stakeholder input and ongoing
4 monitoring of industry research and developments.

5 **18. Q. How did PECO obtain stakeholder input as it developed the Dynamic Pricing**
6 **Plan?**

7 A. As described in the direct testimony of Mr. Jiruska in PECO Statement No. 1, PECO
8 conducted a series of stakeholder meetings, beginning in the fall of 2009, which
9 focused, at least in part, on dynamic pricing matters. The conceptual approach to the
10 Plan was vetted initially with stakeholders on April 27, 2010. A second meeting with
11 stakeholders was held on August 12, 2010 to present, and receive feedback on, a
12 more comprehensive dynamic pricing proposal. Most recently, on October 20, 2010,
13 PECO presented to stakeholders its revised proposal for the Plan.

14 **V. OVERVIEW OF PECO'S DYNAMIC PRICING PLAN**

15 **19. Q. Please describe the major elements of PECO's Plan.**

16 A. PECO's Dynamic Pricing Plan comprises the following key components:

- 17 • Proposed rates and the reasons why those rates were selected over other rate
18 options;
- 19 • The test and learn approach that will be used to test, learn and adapt across
20 several dimensions, including rate preferences, promotional offers, customer
21 education and enabling technology;

- 1 • Measurement and evaluation processes designed to learn what is working and
2 what is not and to assess the impact of various options on energy usage patterns;
3 and
- 4 • PECO's budget and cost recovery proposal.

5 **20. Q. Which of the above components are addressed in your testimony?**

6 A. I will address the design of the test and learn strategy and the measurement and
7 evaluation plans. The proposed rates and the logic behind their design are discussed
8 by Dr. Faruqui in PECO Statement No. 3, and the Plan budget and cost recovery
9 proposal are addressed by Mr. Patterer in PECO Statement No. 4.

10 **21. Q. What rate options will PECO test under the Plan?**

11 A. PECO is proposing to test two different rate options for residential customers and a
12 single rate option for S/MC&I customers. The two residential rate options are: (1) a
13 CPP rate; and (2) a TOU rate. The CPP rate features a discounted flat rate for all
14 kWh used at all times other than during a four-hour peak period on "critical days"
15 called by PECO (critical days will be called 15 days per summer). During the 4-hour
16 peak period on critical days, customers will pay a premium for all kWh used. Under
17 the TOU rate, each weekday is divided into peak and off-peak periods, and customers
18 pay a discounted rate for off-peak usage and a higher rate for peak period usage
19 relative to PECO's standard, non-time varying tariff. For S/MC&I customers, only
20 the CPP rate will be offered. Dr. Faruqui provides more detailed descriptions of these
21 rates in his direct testimony.

1 22. Q. Will PECO offer customers any particular technologies as part of the Plan?

2 A. Yes. Technology is a potentially important complement to time-varying pricing and
3 can be used in several ways:

4 • To automate demand response by controlling appliances in the home or business
5 (e.g., direct load control switches and/or programmable communicating
6 thermostats);

7 • To provide information feedback concerning the impact of behavioral changes or
8 to aid in goal setting and “what if” analysis (e.g., through dedicated devices such
9 as IHDs or by pushing information to other devices such as personal computers,
10 Smart Phones, TVs, etc.); and

11 • To provide notification of high price periods (e.g., through dedicated devices
12 such as an Energy Orb or through multi-use devices such as smart phones, text
13 messaging, email, personal computers, programmable communicating
14 thermostats (“PCTs”) IHDs, etc.).

15 Technology options are evolving rapidly in the industry. It is premature to lock into a
16 specific technology at this time because PECO is almost two years away from actual
17 presentations of options to customers in the fall of 2012. In addition, substantial
18 research is still underway on the impact of various technologies on demand response
19 and enrollment, and new findings may become available that would influence
20 PECO’s decisions about what to test. As such, PECO will not finalize its technology
21 option selections until much closer to implementation.

1 23. Q. Can you provide any insight at this time concerning PECO's planned technology
2 strategy?

3 A. Yes. PECO plans to test multiple options for notifying customers such as telephone,
4 e-mail, text messaging and internet social networks such as Twitter. Given the
5 plethora of multi-use options that exist and are used by consumers all the time, it is
6 unlikely that dedicated devices such as the Energy Orb will be necessary or cost
7 effective compared with other options. The importance of notification cannot be
8 overestimated. Recent research by FSC found that the more ways there are to reach
9 people to provide event notification for dynamic rates, the higher the demand
10 response. Indeed, FSC found that participants who could be reached by four different
11 methods provided load reductions for a CPP rate that were more than three times
12 greater (in percentage terms) than the load impacts for customers who had only one
13 notification option.²

14 For automating demand response, PECO will offer some residential and S/MC&I
15 customers a PCT if they sign up for the CPP rate. In addition, residential customers
16 who have enrolled in PECO's direct load control program will be eligible to also
17 enroll in the CPP rate. These offers will allow PECO to evaluate the incremental
18 effect of PCTs on price response under a CPP tariff for residential and S/MC&I
19 customers and the incremental effect of the CPP rate on DR for customers enrolled in
20 the residential direct load control program.

² See 2009 Load Impact Evaluation for Pacific Gas and Electric Company's Residential SmartRate—Peak Day Pricing and TOU Tariffs and SmartAC Program, Volume 1: Ex-post Load Impacts. Freeman, Sullivan & Co., 2009.

1 To evaluate the effect of information feedback, PECO will provide near real time
2 information feedback to four groups of residential customers through IHDs or
3 perhaps through some other multi-purpose device such as a personal computer or
4 smart phone. One group will consist of customers who are enrolled in the Customer
5 Assistance Program (“CAP”). A second group will consist of Rate R customers. The
6 remaining two groups will consist of customers who accept the CPP or TOU tariffs.
7 These offers will allow PECO to understand the impact that near real-time feedback
8 has on overall energy use for both CAP and non-CAP customers, and the impact of
9 feedback on DR for CPP and TOU customers.

10 **24. Q. What promotional strategies will PECO test as part of the Dynamic Pricing**
11 **Plan?**

12 A. Convincing customers to sign up for time-varying rates is a challenging and complex
13 undertaking and, as indicated previously, one about which the electricity industry has
14 limited experience and knowledge. For those reasons, PECO will use the test and
15 learn approach to understand the impact of various promotional combinations on
16 enrollment. There are numerous promotional options that could be tested, including:

- 17 • Promotional messages (e.g., energy savings, reliability, control, etc.);
- 18 • Educational content of promotional material (e.g., how you explain time varying
19 rates and benefits);
- 20 • Modes (e.g., direct mail, telephone, in person, community organization, web
21 portal, etc.);

- 1 • Number of contacts per person (e.g., how many times you market the same
- 2 option to a specific customer);
- 3 • Timing (e.g., pre-summer, summer, fall, etc.);
- 4 • Format of promotional material (e.g., business letter, three-fold glossy brochure,
- 5 etc.);
- 6 • Whether or not a sign-up incentive is offered;
- 7 • Whether or not first year bill protection is provided; and
- 8 • Targeting (the characteristics of customers who will receive an offer).

9 Recent research by FSC³ indicates that several of these factors can significantly
10 influence customer acceptance rates. This important research is providing a strong
11 foundation for the base offers that will be provided to customers. However, there is
12 much more to learn, and some of these findings may not be transferable to PECO's
13 customer base. A primary focus of the Dynamic Pricing Plan is to assess the relative
14 effectiveness of various promotional options through the rigorous strategy outlined
15 below.

16 **25. Q. Please summarize the Plan's "test and learn" approach.**

17 A. As previously discussed, a key component of PECO's Dynamic Pricing Plan involves
18 making actual offers to random samples of customers in a controlled manner that
19 allows for a clear determination of which price/technology/education options are

³ Stephen S. George, Josh Bode, Mike Perry and Andrew Goett. *2009 Load Impact Evaluation for Pacific Gas and Electric Company's Residential SmartRate™—Peak Day Pricing and TOU Tariffs and SmartAC Program—Volume 2: Ex Ante Load Impacts*, Freeman, Sullivan & Co., 2009.

1 preferred by customers and which promotional strategies are most effective. A key
2 feature of the approach is to deploy a relatively large number of test cells in which
3 customers will be offered a single rate/technology/education package based on a
4 specific promotional approach. Ideally, only a single feature of the offer or
5 promotional package will vary across cells so that the impact of each feature or option
6 can be determined without worrying about confounding effects of other changes
7 across test cells. The various options and promotional strategies can be categorized
8 into four different research tracks, as follows:

- 9 • **The customer preference track** will examine residential customer preferences
10 for each rate option by offering each rate to a separate group of customers
11 randomly chosen from the target population while holding differences in
12 promotional features constant across test cells. A comparison of the enrollment
13 rates for the CPP and TOU groups using a common promotional strategy will
14 provide an effective measure of the relative preferences of residential customers
15 for the two primary rate options under consideration. A comparison of the load
16 impacts associated with each tariff will also be made.
- 17 • **The technology track** will examine the impact of enabling technology on both
18 customer acceptance and demand response for selected market segments.
19 Potential technologies include, but may not be limited to, IHDs, PCTs and load
20 control devices. These options will allow for an assessment of the differential
21 impact of control technology on both enrollment in and response to dynamic
22 rates.

- 1 • **The promotional effectiveness track** will vary features of the promotional
2 package across test cells while holding rate features constant. Promotional
3 strategies are comprised of a variety of features, including, but not limited to, the
4 message used to promote a tariff, communication mode, the number of times each
5 customer is contacted, timing, whether or not a sign-up incentive is offered,
6 whether or not first-year bill protection is provided to overcome consumers' risk
7 aversion, and the targeting strategy used (e.g., to whom the offer is made).
8 Various combinations of these promotional features will be offered to some
9 customers and not others, and statistical models will be used to determine the
10 relative effectiveness of each feature in determining customer enrollment.
- 11 • **The customer education track** will test different types of enhanced information
12 for selected customers that have signed up for a dynamic rate to determine
13 whether such information increases demand response.

14 The Dynamic Pricing Plan, filed in conjunction with this testimony, provides
15 significantly more detail concerning the various research tracks summarized above.

16 **26. Q. How many customers will be included in the test and learn tracks?**

17 A. The overall number of customers included in the test and learn groups will be
18 determined later when all of the tariff/technology/education options and promotional
19 combinations of interest are determined. For planning purposes, PECO is currently
20 expecting to include somewhere between 150,000 and 200,000 customers in test-and-
21 learn cells over a two-year, intensive research period. This is the number of
22 customers who may receive an offer, not the number of customers who accept an

1 offer. While one of the main purposes of the research is to determine acceptance
2 rates, it is reasonable to assume that approximately 5% of offers will be accepted. As
3 such, the total number of customers who will accept offers may range from roughly
4 7,500 to 10,000. It is important to note that PECO intends to work with stakeholders
5 to develop screening measures that may include, among other things, scripts to be
6 used during the customer enrollment process that explain the price risks of the
7 dynamic rates.

8 **27. Q. Over what time period will the Plan be implemented?**

9 A. The initial offers will be made in the fall of 2012, when PECO is expected to have as
10 many as 100,000 smart meters in place, and will continue through the summer of
11 2013. Following these initial offers, analysis will be conducted to determine what is
12 working best, what is not working well, and what new combinations of rates,
13 technology, education and promotional strategies should be formed. Based on the
14 lessons learned, new offers will be made in the fall of 2013 and spring of 2014. Load
15 impact estimates will be based on analysis of usage data covering the period from the
16 fall of 2012 through the fall of 2014.

17 **28. Q. Why is it necessary to include so many customers and to consider so many
18 different option combinations?**

19 A. PECO is proposing to implement a rigorous, scientifically sound exploration of the
20 key drivers of customer acceptance of dynamic rates and related technologies based
21 on actual choice data, and not just data developed through surveys. This approach
22 requires a systematic comparison of enrollment rates and/or load impacts across

1 multiple options that vary along a single dimension. If multiple features vary across
2 options, it is impossible to determine which of the feature differences cause the
3 observed changes in enrollment or load impacts. Since there is a relatively large
4 number of features that could drive enrollment and/or load impacts, this systematic
5 methodology leads to a large number of test cells. Furthermore, because enrollment
6 rates are relatively small, each option must be offered to a relatively large number of
7 customers in order to obtain enrollment rates that are large enough to measure
8 statistically significant load impacts and/or differences in enrollment rates across test
9 cells.

10 **29. Q. What will PECO learn through the strategy outlined above?**

11 A. It is difficult to summarize all of the things that are likely to be learned, in part
12 because PECO is seeking some flexibility with respect to the specific features of the
13 offers that will be made over the roughly two-year test and learn period from late
14 2012 through the summer of 2014. This flexibility is particularly important with
15 regard to the offers that will be made in the second year of the Plan, which will be
16 based on the insights gained from analyzing the initial offers. Having said that, the
17 types of key findings that are likely to be obtained include:

- 18 • Residential customer preferences between CPP and TOU tariffs;
- 19 • Differential enrollment rates across multiple customer segments, including
20 customers enrolled in the direct load control program, electric space heating
21 customers, and customers with various characteristics (e.g., based on ex post

1 analysis of enrollment by usage stratum, appliance holdings using survey data,
2 income, etc.);

- 3 • The incremental effect of a sign-up incentive on enrollment;
- 4 • The effect of first year bill protection on enrollment and demand response;
- 5 • The relative effectiveness of various messages concerning the benefits of time-
6 varying pricing;
- 7 • The relative effectiveness of direct mail, telemarketing and community-based
8 marketing for residential customers;
- 9 • Differential enrollment rates between marketing in the early summer compared
10 with marketing in the fall (prior studies have shown that seasonality is an
11 important determinant of enrollment); and
- 12 • For S/MC&I customers, the impact on both enrollment and demand response of
13 combining PCTs with a dynamic rate, as well as the impact of a sign up
14 incentive.

15 **30. Q. Please describe PECO's measurement and evaluation plan.**

16 A. PECO's measurement and evaluation ("M&E") plan will be comprised of numerous
17 activities designed to gain insights regarding the load impacts and relative
18 effectiveness of various rate, technology and educational options and the promotional
19 strategies used to attract customers to the programs. Key components of the M&E
20 plan include:

- 21 • Load impact evaluations for each rate/technology option;

- 1 • Choice modeling based on evaluation of actual choice data from the test and
2 learn cells that will allow for estimation of the likelihood that a customer will
3 enroll on a rate as a function of rate characteristics, customer characteristics and
4 marketing features;
- 5 • Surveys to determine customer satisfaction with rates and technologies and the
6 actions they are taking in response to such rates. Surveys will also be used to
7 assess how customers provided with technology are using that technology;
- 8 • Post-event surveys to assess whether customers are experiencing any discomfort
9 or other inconveniences when critical peak events are called;
- 10 • Analysis to determine effective combinations of rates, technology, promotional
11 features and education; and
- 12 • Reporting activities that include holding periodic stakeholder meetings and
13 preparing an interim and final report to discuss Plan findings and
14 recommendations for next steps.

15 **31. Q. How will the results of these M&E activities affect PECO’s dynamic pricing**
16 **offerings in the future?**

17 A. The primary purpose of the M&E activities -- indeed, the purpose of the entire test
18 and learn strategy -- is to determine various combinations of rates, technologies,
19 education and promotional strategies that are effective for PECO and its customers.
20 The rigorous strategy outlined above is designed to test, learn about and improve
21 upon what is being offered to consumers and to provide the data needed to identify
22 effective rates and promotional strategies for the new options that will be possible

1 given PECO's investment in advanced metering. PECO's focus on gaining a better
2 understanding of what customers want and how best to enroll customers on time-
3 varying rate options is among the first in the industry and will enhance the
4 effectiveness of the dynamic rate packages that are ultimately offered throughout the
5 Company's service territory.

6 VI. REASONABLENESS OF PECO'S DYNAMIC PRICING PLAN

7 **32. Q. PECO has proposed to offer initial dynamic rate options to residential customers**
8 **and S/MC&I customers and utilize a "test and learn" strategy to refine those**
9 **offers. Do you believe this is a reasonable and prudent approach to**
10 **implementing Act 129's dynamic rate requirements?**

11 A. Yes, I do. Dr. Faruqui's testimony explains why the two rate options being filed,
12 CPP and TOU, are both reasonable and prudent. From my perspective, CPP and
13 TOU rates are more likely to obtain larger enrollment rates and greater aggregate
14 impacts on peak demand than more complex rates such as real time pricing. I believe
15 the tariff options that PECO is recommending strike a reasonable balance between
16 simplicity, customer acceptance, economic efficiency and operational tractability.

17 The test and learn strategy that PECO proposes to implement is grounded in sound
18 principles associated with product and service innovation practiced in other industries
19 and is designed to lead to continuous improvement in service offerings to customers.
20 Offering different "treatments" to randomly selected groups of customers and
21 comparing outcomes is based on a fundamental principle of sound experimental

1 design that will allow PECO to identify best practices for the full-scale deployment of
2 dynamic rates in the Company's territory.

3 **VII. CONCLUSION**

4 **33. Q. Does this conclude your direct testimony?**

5 A. Yes.