

**BEFORE THE  
PUBLIC SERVICE COMMISSION OF MARYLAND**

**IN THE MATTER OF THE APPLICATION  
OF POTOMAC ELECTRIC POWER COMPANY  
FOR ADJUSTMENTS TO ITS  
ELECTRIC AND GAS BASE RATES**

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**CASE NO. 9418**

**Direct Testimony of  
Maximilian Chang**

**On Behalf of  
Maryland Office of People's Counsel**

**July 6, 2016**

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

2 **Q Please state your name, business address, and position.**

3 **A** My name is Maximilian Chang. I am a Principal Associate with Synapse Energy  
4 Economics, an energy consulting company located at 485 Massachusetts Avenue,  
5 Cambridge, Massachusetts.

6 **Q Please summarize your work experience and educational background.**

7 **A** My experience is summarized in my resume, which is attached as **Attachment**  
8 **MPC 1**. I am an environmental engineer and energy economics analyst who has  
9 analyzed energy industry issues for more than seven years. In my current position  
10 at Synapse Energy Economics, I focus on economic and technical analysis of  
11 many aspects of the electric power industry, including: (1) utility reliability  
12 performance and distribution investments, (2) nuclear power, (3) wholesale and  
13 retail electricity markets, and (4) energy efficiency and demand response  
14 alternatives. I have been an author and project coordinator for the 2011 and 2013  
15 biennial New England Avoided Energy Supply Component reports used by  
16 energy efficiency program administrators in the six New England states to  
17 evaluate energy efficiency programs.

18 **Q Please describe Synapse Energy Economics.**

19 **A** Synapse Energy Economics is a research and consulting firm specializing in  
20 energy and environmental issues, including electric generation, transmission and  
21 distribution system reliability, ratemaking and rate design, electric industry  
22 restructuring and market power, electricity market prices, stranded costs,  
23 efficiency, renewable energy, environmental quality, and nuclear power.

24 Synapse's clients include state consumer advocates, public utilities commission  
25 staff, attorneys general, environmental organizations, federal government  
26 agencies, and utilities.

27 **Q On whose behalf are you testifying in this case?**

28 **A** I am testifying on behalf of the Maryland Office of People's Counsel (OPC).

1 **Q Have you submitted testimony in other recent regulatory proceedings?**

2 **A** Yes. I have previously testified before the District of Columbia Public Service  
3 Commission, the Massachusetts Department of Public Utilities, and the Maine  
4 Public Utilities Commission. I have also filed testimony before the Delaware  
5 Public Utilities Commission, Hawaii Public Utilities Commission, New Jersey  
6 Board of Public Utilities, and the United States District Court District of Maine.

7 **Q Have you testified in front of the Maryland Public Service Commission**  
8 **previously?**

9 **A** Yes, I have testified before the Commission in Case 9406 regarding Baltimore  
10 Gas and Electric's base rate case.

11 **Q What is the purpose of your direct testimony?**

12 **A** My direct testimony summarizes alternative assumptions and adjustments to  
13 Pepco's (the Company) benefit-to-cost analysis described in the direct testimony  
14 of Karen Lefkowitz and other company witnesses. My testimony also addresses  
15 issues raised in the Commission's Order 87591 in Case 9406, which I understand  
16 is the subject of requests for rehearing by both OPC and BGE. OPC Witness Paul  
17 Chernick analyzed other aspects of the Company's assumptions and provided me  
18 with adjustments to make in the calculations that are summarized in my  
19 testimony. The fact that I do not comment on every aspect of the Company's  
20 benefit-to-cost analysis and calculations should not be interpreted to mean that I  
21 agree with those aspects.

22 **Q What data did you rely upon to prepare your testimony and exhibits?**

23 **A** I relied primarily on the direct testimony, exhibits, and work papers of the  
24 Company witnesses. I also relied upon the document record established in the  
25 Commission's Case 9207 and the Company's responses to various data requests.

26 **Q Do you have any data responses to attach to your testimony?**

27 **A** Yes. I am attaching cited data responses provided by the Company as Attachment  
28 MPC 2.

1 **Q Was your testimony prepared by you or under your direct supervision?**

2 **A** Yes.

3 **II. CONCLUSIONS AND FINDINGS**

4 **Q Please summarize your conclusions and findings regarding the projected**  
5 **costs and benefits of the Company's Advanced Metering Infrastructure**  
6 **(AMI) Initiative.**

7 **A** The following summarizes my conclusions and findings:

- 8 ○ My analysis indicates that the Company's AMI Initiative has a present  
9 value benefit-cost ratio of 0.99 based on: 1) assumptions of benefits and  
10 costs described in detail in my testimony and in the testimony of OPC  
11 Witness Paul Chernick, and 2) the Commission's determination of cost  
12 categories in Case 9207. Adjusting the Company's analysis to include  
13 more reasonable assumptions and cost categories shows that the benefits  
14 from the Initiative are substantially less the Company's projections.
- 15 ○ The uncertainties in the assumptions of benefits in the Company's AMI  
16 Initiative are described in detail in Witness Chernick's testimonies.  
17 Approximately 52 percent (\$314 million) of the projected total benefits of  
18 the AMI Initiative hinge on the Company's assumptions regarding  
19 avoided energy and capacity costs, and energy and capacity price  
20 mitigation benefits. Approximately 56 percent (\$178 million) of the  
21 projected demand side benefits are attributed to the Company's Dynamic  
22 Pricing program and 24 percent (\$77 million) of the projected demand  
23 side benefits are attributed to the Company's Energy Management Tool  
24 program.
- 25 ○ Based on the findings from our benefit cost analysis showing that the  
26 Company's AMI Initiative is break-even, I recommend that the  
27 Commission require the Company to file quarterly reports and to provide  
28 the Commission with updates to ensure that the Company's AMI Initiative  
29 will cause no harm to ratepayers.

1 Following the Company's nomenclature, Witness Chernick's testimony provides  
2 a detailed analysis of the assumptions associated with elements of the Company's  
3 demand side benefits.

4 **III. HISTORY OF PEPSCO AMI DEPLOYMENT**

5 **Q Please describe your understanding of the history of Pepco's initial AMI**  
6 **Initiative.**

7 **A** In 2009, Pepco filed a petition (Case 9207) to deploy advanced metering  
8 infrastructure across its electric and gas service territory in order to qualify for  
9 Department of Energy (DOE) federal funding under the American Recovery and  
10 Reinvestment Act of 2009 (ARRA). In its 2009 filing, Pepco estimated that the  
11 benefit-to-cost ratio would be 1.74 on a present value revenue requirements  
12 (PVRR) basis without the DOE funding, and 2.96 with DOE funding of  
13 approximately \$74.5 million on a PVRR basis.<sup>1</sup>

14 In Order 83532, the Commission stated:

15 We will require Pepco to deploy and deliver to its customers a cost-  
16 effective AMI system. We will require Pepco to demonstrate that the  
17 system is cost-effective for its customers as a condition of recovery of its  
18 prudently incurred costs and an appropriate rate of return. The applicable  
19 standards of prudence and cost effectiveness that we stated in Order No.  
20 83531 for BGE shall apply equally to Pepco in connection with this  
21 Proposal It is with this foundation that I analyze the Company's benefit-  
22 cost analysis in this proceeding.<sup>2</sup>

23 In Order 83571, the Commission cautioned:

24 The Proposal's cost-effectiveness depends in part, however, upon other  
25 factors over which the Companies have far less control. The majority of  
26 AMI-enabled cost savings projected by the Companies arise from PHI's  
27 predictions about the degree to which the dynamic pricing options they  
28 propose will motivate customers to reduce electricity usage during  
29 Company-declared critical peak demand periods, and about the impact of  
30 that reduction on wholesale market prices. But the foundation for the

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<sup>1</sup> Direct Testimony of George Potts. Case 9207. September 1, 2009. Page 13.

<sup>2</sup> Maryland Public Service Commission. Order 83532. August 13, 2010. Page 2.

1 Companies' predictions about these "supply-side benefits" is far from  
2 certain, in our view.<sup>3</sup>

3 The Commission's approval of the Company's proposed AMI deployment noted:

4 These limitations in the Companies' business cases, as well as the  
5 technological risks associated with AMI adoption at this stage of its  
6 evolution, raise concerns about whether the Companies' proposed  
7 investment in AMI ultimately will prove cost-effective. In the case of  
8 Pepco, these concerns are mitigated, in part, by the United States  
9 Department of Energy's ("DOE") award to Pepco of a \$104.8 million  
10 Smart Grid Investment Grant, \$68.3 million of which will be used to  
11 partially offset the cost of AMI deployment. (footnote omitted)<sup>4</sup>

12 It is with this foundation that we view our analysis of the Company's AMI efforts.

13 **IV. COST BENEFIT ANALYSIS OF COMPANY'S CURRENT PETITION**

14 **Q Please summarize the Company's benefit-cost analysis presented in this**  
15 **proceeding.**

16 **A** Witness Lefkowitz summarizes the results of the Company's Advanced Meter  
17 Initiative benefit-cost analysis on Graph 1 of her direct testimony. The Company  
18 projects that its AMI provides a 3.54 benefit to cost ratio on a PVRR basis over  
19 the period 2010–2023.

20 **Q Please discuss the projected costs of the Company's AMI Initiative.**

21 **A** Witness Lefkowitz estimates the projected cost of the AMI Initiative will be  
22 \$175.5 million on a present value basis or \$211.6 million on a cumulative basis.<sup>5</sup>  
23 The amount consists of \$73.8 million in AMI system costs, \$66.6 million in  
24 deferred costs, \$27.1 million ongoing O&M expenses, and \$7.9 million in  
25 ongoing capital costs.<sup>6</sup>

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<sup>3</sup> Maryland Public Service Commission. Order 83571. September 2, 2010. Page 2.

<sup>4</sup> Maryland Public Service Commission. Order 83571. September 2, 2010. Page 3.

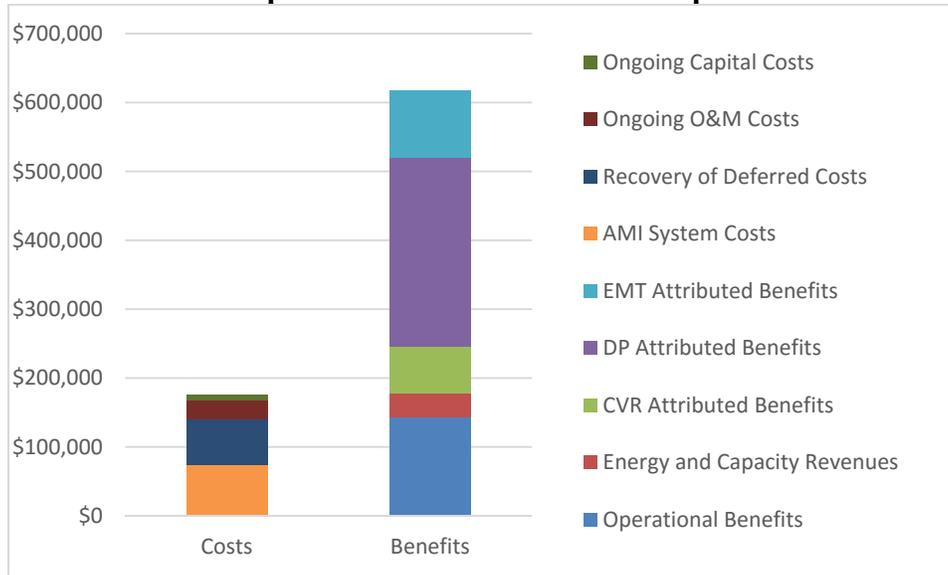
<sup>5</sup> Direct Testimony of Karen Lefkowitz. April 19, 2016. Table A.

<sup>6</sup> Ibid.

1 **Q How do the projected benefits compare to the projected costs in the**  
2 **Company’s petition?**

3 **A** Witness Lefkowitz estimates that the Company’s AMI Initiative will produce  
4 \$708 million in benefits, with a PVRR of \$617 million.<sup>7</sup> The initial projected  
5 benefits and costs produce a benefit-to-cost ratio of 3.52.<sup>8</sup> The Company’s  
6 estimate reflects 40 benefit and four cost categories. The PVRR of these  
7 projections are summarized in Exhibit MPC 1 below. The projected costs are  
8 presented in the first bar. The second bar shows the projected benefits attributed  
9 to the Company’s AMI Initiative.

10 **Exhibit MPC 1. Reported Costs and Benefits of Pepco AMI Initiative**



11

12 **Q Mr. Chang, you provide several benefit-cost ratios in your discussion of the**  
13 **history of the Company’s AMI Initiative. Please explain.**

14 **A** The Company’s presentation of its AMI program has changed based on input  
15 assumptions for projected costs and benefits, and actual costs and benefits  
16 experienced by the Company during installation. I do note that the Company’s  
17 estimate of the benefit-to-cost ratio has **increased** from 2.96 when the Company

<sup>7</sup> Ibid.

<sup>8</sup> Direct Testimony of Karen Lefkowitz. At 10:19. The Company’s initial testimony indicated a benefit cost ratio of 3.54. However, the benefit cost ratio drops to 3.52 based on the Company’s updated response to Staff DR 6-1 Attachment C.

1 first proposed its AMI initiative to 3.52 based on current costs and projections.  
2 OPC Witness Chernick's testimony addresses how and why the Company's  
3 projected avoided costs and benefits would be lower using different assumptions.

4 **V. BENEFITS**

5 **Q Please discuss the Company's projected AMI Initiative benefits.**

6 **A** As shown in Witness Lefkowitz's Table A, the Company categorizes its estimates  
7 of benefits into two main categories: 1) market-side benefits and 2) operational  
8 benefits.

9 **Q Please elaborate upon the Company's projected Advanced Meter  
10 Infrastructure Initiative demand-side benefits.**

11 **A** The market-side benefits are projected benefits attributed to savings in the future.  
12 The Company estimates that these benefits have a PVRR of \$314 million.<sup>9</sup> When  
13 compared to the Company's costs, the demand-side benefits, by themselves, result  
14 in a benefit-to-cost ratio of 1.79.<sup>10</sup> The Company's estimate of demand-side  
15 benefits represents approximately 51 percent of the overall total projected AMI  
16 Initiative benefits. The Company presents the demand side benefits in 15  
17 individual elements, but they can be consolidated into three main categories 1)  
18 conservation voltage reduction (CVR) related benefits, 2) Dynamic Pricing (DP)  
19 related benefits, and 3) Energy Management Tool (EMT) related benefits.<sup>11</sup> The  
20 Company estimates that the DP demand side benefits will provide \$178.6 million  
21 in benefits, the EMT demand side benefits will provide \$77.2 million in benefits,  
22 and the CVR demand side benefits will be \$11.6 million. These benefits are  
23 presented in Exhibit MPC 2.<sup>12</sup>

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<sup>9</sup> Staff DR 6-1 Attachment C.

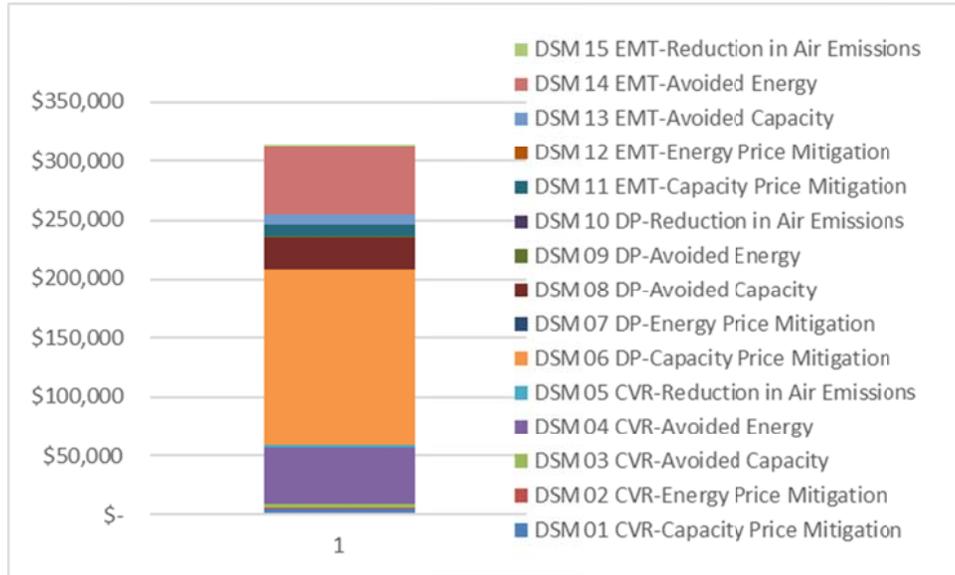
<sup>10</sup> Direct Testimony of Karen Lefkowitz. Graph 1.

<sup>11</sup> Direct Testimony of Karen Lefkowitz. Table A.

<sup>12</sup> Staff DR 6-1 Attachment C.

3  
4

**Exhibit MPC 2. Summary of Present Value of AMI Initiative Demand-Side Benefits**



4

5 **Q Is AMI necessary for some of the Company attributable benefits?**

15 **A** No, as I discuss in more detail below, AMI is not necessary for the Company to  
16 provide enhanced communication to customers regarding their energy usage. AMI  
17 enables the Company to provide hourly usage data, but information on energy  
18 efficiency and conservation do not necessarily require hourly information. In  
19 addition, the Company’s CVR program does not necessarily need to rely upon  
20 AMI. Utilities have been implementing or analyzing CVR program well before  
21 AMI.<sup>13</sup> The Company has not yet calculated how much CVR impact is due to the  
22 existence of AMI.<sup>14</sup> AMI provides more granularity to the Company’s CVR  
23 program. I understand that Witness Chernick provides adjustments to the  
24 Company’s CVR benefits in his testimony.

17 **Q Please elaborate upon the Company’s projected AMI Initiative operational-**  
18 **side benefits.**

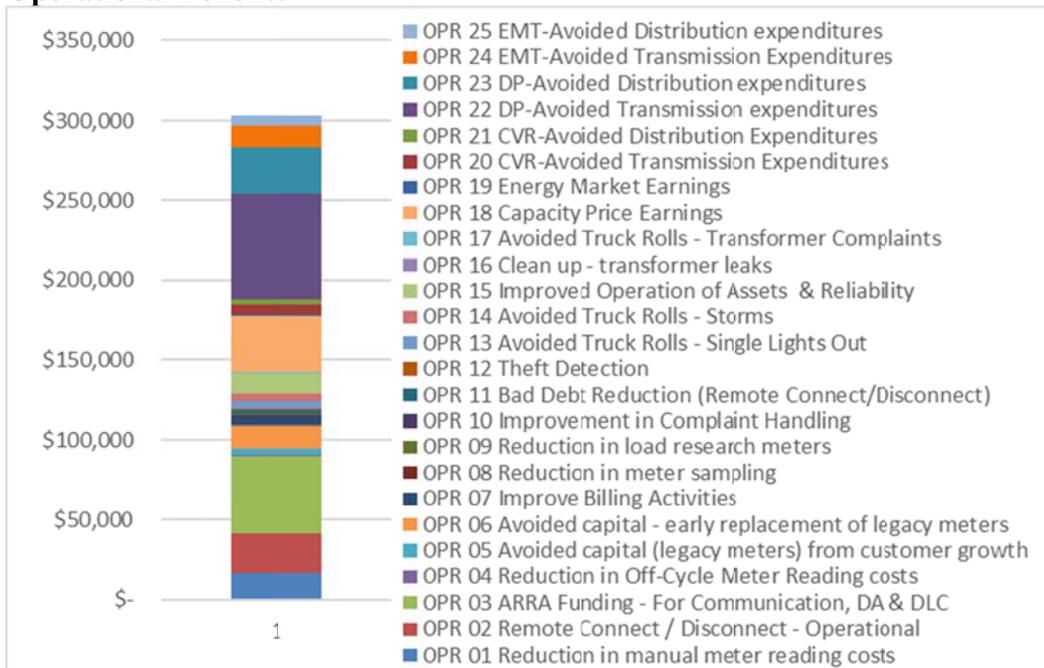
19 **A** The operational-side benefits are projected benefits attributed to savings in the  
20 future from avoided distribution service O&M expenses and avoided future

<sup>13</sup> OPC DR 4-33, Attachment B.

<sup>14</sup> OPC DR 5-3.

7 meter-related capital expenditures. The Company projects that its AMI Initiative  
 8 benefits have a present value of \$307 million (\$344.9 million cumulative). The  
 9 Company's projected operational-side benefits, by themselves, result in benefit-  
 10 to-cost ratio of 1.75 when compared to the Company's projected AMI Initiative  
 11 present value cost of \$175 million.<sup>15</sup> These benefits are presented in Exhibit MPC  
 12 3.

9 **Exhibit MPC 3 Summary of Present Value of AMI Initiative**  
 10 **Operational Benefits**



10  
 11 **VI. EMT Benefits Should not be Included**

13 **Q Please summarize why you recommend that the EMT benefits should not be**  
 14 **included in the Company's analysis.**

18 **A** While the EMT program has generated energy and capacity savings, these savings  
 19 should not be attributed to the Company's AMI initiative, since these savings  
 20 could have been achieved without any of the AMI investments made by the  
 21 Company. One of the primary components of the Company's EMT program is the  
 22 availability of customer information over the internet. The Company currently

<sup>15</sup> Direct testimony of Karen Lefkowitz. Graph 1.

1 provides customer comparisons through its EmPower Maryland behavioral  
2 program and provides other forms of customer information that does not  
3 necessarily require AMI. AMI only provides hourly information to customers.

4 **Q Does the Company contend that the EMT program result in energy savings?**

5 **A** Yes. The Company attributes approximately \$178 million of PVRR benefits to its  
6 EMT program that it contends is enabled by the installation of AMI meters across  
7 its territory. In fact, the Brattle Group report commissioned by the Company notes  
8 that in determining the savings attributable to the PEPCO EMT program in its  
9 regression analysis compared to the Delmarva Maryland service territory:

10 In the light of this finding, we conjecture that the customers reduced their  
11 electricity usage in response to multiple rounds of communication from  
12 Pepco starting with the deployment of AMI meters and being provided  
13 access to detailed information on their electricity use through My  
14 Account and on monthly electricity bills. Concurrent implementation of  
15 dynamic pricing may have also increased customers' awareness and  
16 value of the available energy usage information. Customers received a  
17 variety of messages related to saving energy and tips for doing so, during  
18 the time period.<sup>16</sup>

19 **Q Does the Company report the number of customers that log into the web-**  
20 **based EMT by quarter?**

21 **A** Yes, the Company noted in its response to OPC DR 3-11 and OPC DR 4-26 that it  
22 reports the number of customers that access the web-based EMT on a quarterly  
23 basis as part of the quarterly smart grid metrics under Case 9207.<sup>17, 18</sup> The exhibit  
24 below summarizes the number of “unique” customers that have accessed the web-  
25 based EMT and the number of customers that have received high usage reports  
26 for each quarter since 2013 as reported by the Company.

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<sup>16</sup> Schedule AF-2. Page 10.

<sup>17</sup> OPC DR 3-11.

<sup>18</sup> OPC DR 4-26.

1  
2

**Exhibit MPC 4 Number of customers accessing web-based EMT and receiving usage reports relative to number of AMI meters by quarter.**



3

4 **Q What does the exhibit show?**

5 **A** The exhibit shows that relative to the number of AMI meters deployed, on  
6 average the number of unique customers that access the web-based EMT is  
7 approximately 42,000 since 2013 and approximately 53,000 since 2015. The  
8 Company defines “unique visitors” as both new and returning customers, so that a  
9 customer that logs on at least once per quarter would show up in the chart.<sup>19</sup> In  
10 addition, the exhibit also shows that on average 27 customers per quarter receive  
11 high usage reports. Not shown in the exhibit, the Company also reports the  
12 approximate average amount of time spent on the EMT by both residential and  
13 business customers under Metric 40 and 41. In the last year, both metrics indicate  
14 that the average time spent on the website is one minute for the 10% of customers

<sup>19</sup> Pepco. *Quarterly Advanced Metering Infrastructure Performance Metrics Report*. Case 9207. Metric 37 definition.

1 that access the EMT.<sup>20</sup> The fact that approximately 90 percent of the Company's  
2 customers do not access and therefore do not spend time in the EMT website on a  
3 quarterly basis suggests that the web-based EMT is not the primary source of  
4 information for customers.

5 **Q Are there other forms of communication that the Company could implement**  
6 **in lieu of the Energy Management Tool?**

7 **A** Instead of the EMT, the Company could mail out home energy reports (HERs)  
8 that provide a comparison of a customer's usage relative to their peers. In fact,  
9 under the EmPower Maryland program, the Company does provide energy report  
10 information to 337,044 reported participants.<sup>21</sup>

11 The Behavior Program, which primarily consists of providing Home  
12 Energy Reports to customers, continues to provide energy savings. The  
13 Home Energy Reports are also used to promote other EmPOWER  
14 programs as well as deliver customer-oriented messaging.

15 In 2015, the Company reported mailing a total of 1.84 million home energy  
16 reports.<sup>22, 23</sup>

17 **Q Have Home Energy Reports been implemented where smart meters have not**  
18 **been installed?**

19 **A** Yes. Other utilities without smart meters frequently provide HERs to their  
20 customers. For example, Massachusetts has not yet installed smart meters, yet  
21 both National Grid and NSTAR (now Eversource) have implemented the same  
22 type of HERs as BGE. National Grid began implementing its program in 2009,  
23 while NSTAR began its program in 2010.<sup>24, 25</sup> Examples of other utilities that  
24 have implemented HERs without smart meters include Connecticut Power and

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<sup>20</sup> AMI quarterly reports.

<sup>21</sup> Pepco. Pepco EmPOWER Maryland- Second 2015 Semi-Annual EE&C and Demand Response Report July 1, 2015- December 31, 2015. Case 9155. Page A-2.

<sup>22</sup> Pepco. Pepco EmPOWER Maryland- First 2015 Semi-Annual EE&C and Demand Response Report January 1, 2015- June 30, 2015. Case 9155. Page 29.

<sup>23</sup> Pepco. Pepco EmPOWER Maryland- Second 2015 Semi-Annual EE&C and Demand Response Report July 1, 2015- December 31, 2015. Case 9155

<sup>24</sup> <https://ngma.opower.com/ei/app/index.html>.

<sup>25</sup> <https://energyreportsma.opower.com>.

1 Light, Southern Maryland Electric Cooperative (SMECO) and Potomac Edison  
2 (PE).

3 **Q What are savings seen in other utilities.**

4 In general, Pepco estimated EMT savings fall toward the high end of the typical  
5 range of savings from HERs of 1 to 2 percent.<sup>26</sup> The Company projects savings of  
6 1.73 percent that are attributable to the EMT program.<sup>27</sup> For example, the  
7 weighted average electricity savings rate for HERs in Massachusetts is 1.52  
8 percent, as shown in Exhibit MPC 5 below. As noted above, the Massachusetts  
9 utilities have not implemented widespread smart meters. Connecticut Light &  
10 Power's (now Eversource) pilot HER program generated 1.7 percent savings in  
11 the first year and 1.8 percent savings in the second year without smart meters.<sup>28</sup> In  
12 Maryland, SMECO and Potomac Edison have reported savings of approximately  
13 1.4 percent.<sup>29</sup>

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<sup>26</sup> *Id.*, page 3. "In other studies, this type of information has stimulated customers to reduce their energy use, creating average energy savings in the 1% to 2% range, depending on local energy use patterns."

<sup>27</sup> Staff 6-1. Attachment C.

<sup>28</sup> NMR Group, Inc., Tetra Tech, Hunt Allcott. *Evaluation of the Year 1 CL&P Pilot Customer Behavior Program Final Report*, March 4, 2013, available at <http://www.neep.org/sites/default/files/resources/FINAL%20CLP%20Behavioral%20Year%201%20Program%20Report%20030613.pdf> and NMR Group, Inc., Tetra Tech. *Evaluation of the Year 2 CL&P Pilot Customer Behavior Program (R2) Final Report*, August 8, 2014, available at [http://www.energizect.com/sites/default/files/Evaluation%20of%20Year%202%20CL%26P%20Pilot%20Behavior%20Pgm%20\(R2\),%20Final%20Report,%208-8-14.pdf](http://www.energizect.com/sites/default/files/Evaluation%20of%20Year%202%20CL%26P%20Pilot%20Behavior%20Pgm%20(R2),%20Final%20Report,%208-8-14.pdf).

<sup>29</sup> Calculations for SMECO based on reported sales from EIA form 861 and SMECO's Semi-Annual Q3/Q4 Report, (ML 164134). Potomac Edison reports 1.4 percent savings in its 2015 Semi-Annual EmPOWER Maryland Report for the period of January 1 – June 30 (Case No. 9153), dated July 31, 2015 (ML 172112).

1  
2

**Exhibit MPC 5. Savings Rates for Home Energy Reports in Massachusetts**

| <b>Cohort</b>           | <b>Percentage Savings*</b> | <b>Participants</b> |
|-------------------------|----------------------------|---------------------|
| NGRID Group 2009        | 2.37%                      | 24,005              |
| NGRID Group 2010        | 1.58%                      | 65,170              |
| NGRID Group 2010 Added  | 2.32%                      | 23,805              |
| NGRID Group 2011        | 2.51%                      | 99,446              |
| NGRID Group 2011 Added  | 1.57%                      | 60,605              |
| NGRID Group 2012        | 2.20%                      | 86,898              |
| NGRID Group 2012 Dual   | 1.56%                      | 12,621              |
| NGRID Group 2013        | 1.31%                      | 324,002             |
| NGRID Group 2013 Email  | 0.50%                      | 46,105              |
| NGRID Group 2014        | 0.90%                      | 94,874              |
| NSTAR Group 2010 Dual   | 0.20%                      | 18,660              |
| NSTAR Group 2011 Dual   | 0.56%                      | 8,451               |
| NSTAR Group 2012a       | 2.16%                      | 55,857              |
| NSTAR Group 2012b       | 2.06%                      | 17,033              |
| NSTAR Group 2013 Dual   | 1.29%                      | 37,801              |
| NSTAR Group 2013b       | 1.12%                      | 65,798              |
| NSTAR Group 2013 Dual   | 1.57%                      | 20,991              |
| NSTAR Group 2014        | 0.79%                      | 8,637               |
| <b>Average</b>          | <b>1.48%</b>               |                     |
| <b>Weighted Average</b> | <b>1.52%</b>               |                     |

\*All savings are after the channeling adjustment (which removes double-counting with other programs)

Source: Navigant Consulting, Inc. and Illume Advising, LLC, Memorandum to the Massachusetts Program Administrators and Energy Efficiency Advisory Council regarding the Massachusetts Cross-Cutting Behavioral Program Evaluation Opower Results, March 2015, available at <http://ma-eeac.org/wordpress/wp-content/uploads/Behavior-Program-Impact-Evaluation-Memo.pdf>.

3

4 **Q** **Have the AMI-enabled tools available through the Energy Management Tool**  
5 **platform enhanced energy savings?**

6 **A** No, it appears that the Company’s web-based online portal has low customer  
7 engagement levels as I have shown. Such low engagement numbers imply that the  
8 incremental impact of the AMI EMT on-line tools is small. Finally, other than

1 hourly energy usage data, the tools available on the Company's web portal do not  
2 appear to require AMI capabilities.

3 **Q If the savings from the EMT program could have been achieved without the**  
4 **AMI Initiative, should they be included in the Company's cost-effectiveness**  
5 **analysis?**

6 No. I recommend that both the costs and the benefits of the Company's EMT  
7 program be removed from the Company's cost-effectiveness analysis. This would  
8 reduce the EMT market-related benefits by \$97.2 million. In addition to removing  
9 these benefits, I recommend that the costs associated with the EMT program  
10 should also be removed.

11 **Q Have you estimated the costs attributable to the EMT that should be**  
12 **removed?**

13 **A** Yes. Since the Company's response to Staff DR 6-1 did not include detailed EMT  
14 specific historical and forward costs , I estimated the costs associated with the  
15 EMT program based on the cost of BGE's SEM program relative to BGE's total  
16 costs in Case 9406. In that case, the SEM program represented approximately  
17 7.44 percent of the total BGE Smart Grid Initiative cost. Therefore, I have applied  
18 the same percentage to Pepco in the absence of more detailed information. This  
19 adjustment reduces Pepco's AMI costs by \$15.8 million on a present value basis.

20 **VII. Additional Operational Benefit Adjustments**  
21

22 **Q Did you make adjustments to the Company's projection of benefits**  
23 **associated with avoided capital from avoiding the early replacement of legacy**  
24 **meters (OPR 06)?**

25 **A** Yes. I believe that the Company has over-stated savings in avoided capital from  
26 avoiding the early replacement of legacy meters. In response to Staff DR 4-4, the  
27 Company indicated that it does not need to replace all meters at the end of their  
28 estimated 34 year life cycle.<sup>30</sup> In addition, the Company provided the annual

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<sup>30</sup> Staff DR 4-4.

1 number of meter exchanges for failures, obsolescence, or damage in response to  
2 Staff 11-1.<sup>31</sup> The Company used an estimate of 16,225 legacy meters retired  
3 (twice the 8,089 meters actually exchanged in 2015). I adjusted the exchange rate  
4 in the Company's OPR 06 worksheet to reflect the average number of meter  
5 exchanges from 2012 through 2015, which was 8,113. This adjustment reduces  
6 the OPR benefits from \$14.7 million to \$7.4 million on a PV basis. Therefore, I  
7 make an adjustment of \$7.4 million (rounding) for OPR 06 in my analysis.

8 **Q Did you make adjustments to the Company's projection of benefits from**  
9 **improved billing activities (OPR 07)?**

10 **A** Yes. I believe that the Company may also be overstating the benefits associated  
11 with improved billing activities. The Company's actual FTEs involved in billing  
12 issues was provided in response to Staff DR 12-27.<sup>32</sup> The actual FTEs involved in  
13 billing are much lower than the estimated FTEs provided in the Company's Staff  
14 DR 6-1 Attachment C for the same years. When I modified the worksheet to  
15 incorporate actual FTEs for PEPCO, the result is a decrease in the PV benefits for  
16 OPR 07 from \$5.3 million to \$2.6 million on a PV basis. Therefore, I have  
17 reduced the PV benefits for OPR 07 by \$2.7 million.

18 **Q Do you make adjustments to the Company's projection of benefits from**  
19 **improved remote connect and disconnect procedures (OPR 02)?**

20 Yes. It appears that the Company may be overestimating the benefits associated  
21 with improved remote connect and disconnect activities from both operational and  
22 bad debt reduction perspectives by forecasting higher than normal levels of  
23 disconnects and reconnects per year. The Company projects the number of future  
24 disconnects to be approximately 32,000 per year.<sup>33</sup> The Company's own historical  
25 data shows that the total number of disconnects in 2014 and 2015 were much  
26 lower at approximately 17,000 and 22,000 events, respectively.<sup>34</sup> The Company

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<sup>31</sup> Staff DR 11-1.

<sup>32</sup> Staff DR 12-27.

<sup>33</sup> Staff DR 6-1. Attachment C. OPR 02 worksheet.

<sup>34</sup> Ibid.

1 does not explain why there is an anticipated increase in disconnect activity by  
2 10,000 between 2015 and 2016.<sup>35</sup> When I adjust the projected number of  
3 disconnect events to be at historical levels, this reduces overall benefits from  
4 \$24.3 million to \$17.4 million (PV basis). Therefore, I have reduced the PV  
5 benefits for OPR 02 by \$6.9 million.

6 **VIII. AMI Initiative Cost Details**

7 **Q Do you include legacy meters in your benefit-cost analysis of the AMI**  
8 **deployment?**

9 **A** No, we have not included the legacy meter costs in our benefit-cost analysis.  
10 However, Witness Brockway has filed testimony regarding the treatment of the  
11 legacy meters in the context of rate recovery.

12 **Q Do you have concerns regarding the treatment of the Company's bill credits**  
13 **paid to participants of the Dynamic Pricing program, but collected from**  
14 **ratepayers?**

15 **A** Yes, the Company states that bill credits are not included in its cost-effectiveness  
16 test since it considers the credits as transfer payments.<sup>36</sup> I understand that Witness  
17 Chernick's testimony also discusses the issue of bill credits. While all ratepayers  
18 pay for the credits, only participants in the SER program receive the benefit of the  
19 bill credits.

20 **Q Does the Company's analysis include participant costs?**

21 **A** No. The Company's analysis does not incorporate participant costs.<sup>37</sup>

22 **Q Should the Commission consider participant costs?**

23 **A** Yes. While it is true that the credits are collected from all ratepayers and then paid  
24 to a subset of ratepayers who then participate in the program, the program is not

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<sup>35</sup> It is my understanding that the Commission still requires a field technician to visit the premise at the time of disconnection. However, this visit should not change the number of disconnect activities. The visit is part of the disconnect process.

<sup>36</sup> OPC DR 8-10

<sup>37</sup> OPC DR 12-2.

1 costless. The bill credits are intended to compensate participants of the DP  
2 program who experience sacrifices during peak pricing periods through thermal  
3 discomfort or other changes in behavior. These participants are providing a  
4 service to the utility in the form of a load reduction, and consequently the  
5 Company is compensating them to provide the load reduction service.

6 **Q Have other Commissions used bill credits as a proxy for participant costs?**

7 **A** Yes. Both California and Pennsylvania commissions recognize that the  
8 participants in demand reduction programs make sacrifices to consume less  
9 electricity during peak periods. The Pennsylvania Commission recognized that the  
10 bill credits could be a monetary proxy for participant costs.<sup>38</sup> The California  
11 Commission recognized that the cost that a ratepayer must incur to participate in a  
12 demand response program include capital costs, transaction costs, and the value of  
13 services lost.<sup>39</sup> Further the California Commission also recognized that  
14 participant costs must be determined in calculating the TRC and participant test.<sup>40</sup>  
15 Both Commissions noted the difficulty in determining participant costs.

16 **Q What have California and Pennsylvania used for the participant cost proxy?**

17 **A** The Pennsylvania Commission initially used the full cost of bill credits as the  
18 proxy value for participant costs.<sup>41</sup> Ultimately, the Pennsylvania Commission  
19 determined that 75% of incentive costs represented a proxy for participant costs.<sup>42</sup>  
20 The California Commission determined that the maximum value for participant  
21 costs would be: incentives + bill reductions – capital costs.<sup>43</sup>

22 **Q In light of the precedent in other states, what is your recommendation?**

23 **A** In our adjustment, we also include the full amount bill incentives in our  
24 determination of cost effectiveness to be consistent with our recommendation in

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<sup>38</sup> Pennsylvania Public Utilities Commission. Order. Docket M-2015-2468992. June 11, 2015. Page 55.

<sup>39</sup> California Public Utilities Commission. Rulemaking 07-01-041. December 21, 2010. Page 38.

<sup>40</sup> Ibid.

<sup>41</sup> Pennsylvania Public Utilities Commission. Page 55.

<sup>42</sup> Ibid.

<sup>43</sup> California Public Utilities Commission. Page 39.

1 Case 9406. Our estimate of bill credits includes \$15.6 million in bill credits paid  
2 between 2012 and 2015.<sup>44</sup> In addition, we include our estimate of \$41 million of a  
3 PV basis for future bill credits based on the Company's estimate of \$9 million for  
4 bill credits in 2016.<sup>45</sup> In our analysis, we assume that the Company will maintain  
5 the \$9 million per year. On a PV basis, our adjustment for the bill credits as a  
6 proxy for participant costs results in an increase in costs by \$66 million.

7 **Q Do you have any other cost adjustments to make in your analysis?**

8 **A** Yes. As I mentioned earlier, I have reduced the Company's cost by removing my  
9 estimate of EMT costs of \$15.8 million on a present value basis from my analysis.

10 **IX. ALTERNATIVE COST-EFFECTIVENESS ESTIMATE**

11 **Q Have you developed an alternative cost-effectiveness estimate for the AMI**  
12 **projects based on OPC's alternative assumptions?**

13 **A** Yes. After adjusting the Company's estimates of benefits and costs based on  
14 alternative assumptions that OPC Witness Chernick and I have made; I have  
15 arrived at a benefit-cost ratio of 0.99. This means that the investments barely  
16 break-even under OPC's adjustments.

17 **Q What adjustments did you make to the Company's estimates of operational**  
18 **benefits?**

19 **A** In my alternative analysis I have adjusted the estimates of benefits in the  
20 following six items (shown in Exhibit MPC 6):

- 21 • I have assumed no benefits associated with DP avoided transmission and  
22 distribution, per the testimony of OPC Witness Chernick. This results in a  
23 **reduction of \$94.9 million** in present value of benefits.<sup>46</sup> This does not  
24 include the transmission and distribution reductions due to EMT,  
25 described above.

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<sup>44</sup> OPC DR 4-28.

<sup>45</sup> Ibid.

<sup>46</sup> Direct Testimony of Paul Chernick.

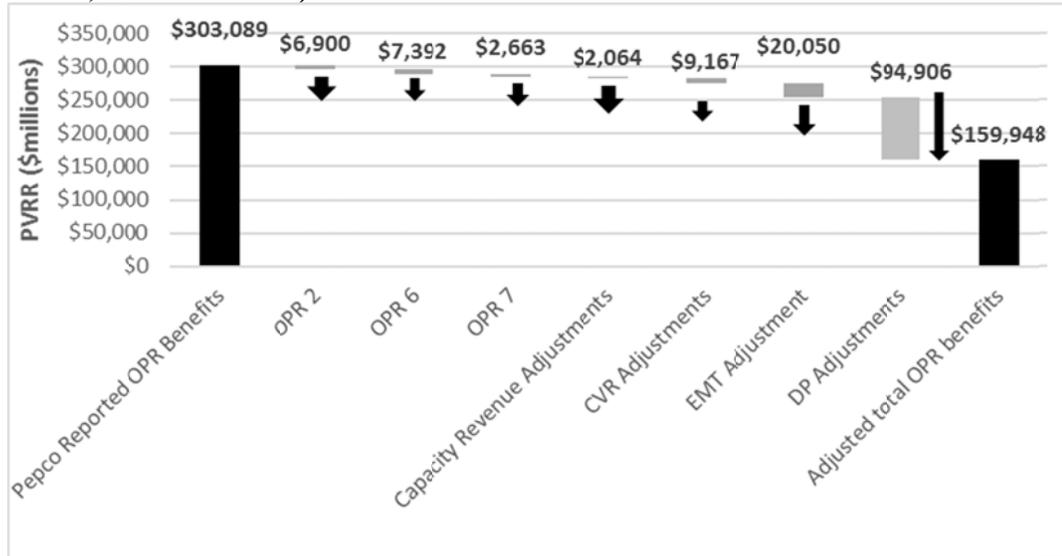
- 1           • I have assumed no benefits associated with the Energy Management Tool  
2           (EMT). This results in a **reduction of \$20 million** in present value of  
3           benefits for EMT related transmission and distribution benefits.
- 4           • I have included OPC Witness Chernick’s adjusted CVR benefits for  
5           avoided transmission and distribution described in his testimony. This  
6           results in a **reduction of \$9.1 million** in present value of benefits.<sup>47</sup>
- 7           • I have included an adjustment of **\$6.9 million** for an adjustment to account  
8           for reduced connect/disconnect benefits based on the number of historical  
9           disconnects discussed in my testimony.
- 10          • I have included an adjustment of **\$7.4 million** for an adjustment to account  
11          for reduced avoided capital for early replacement of legacy meters based  
12          on the historical number of disconnects discussed in my testimony.
- 13          • I have included an adjustment of **\$2.6 million** for an adjustment to account  
14          for reduced improvements in billing activities based on the number of  
15          FTEs involved in billing disputes discussed in my testimony.
- 16          • I have included Witness Chernick’s adjustment of **\$2.0 million** for reduced  
17          capacity revenues discussed in his testimony

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<sup>47</sup> *Id.*

4  
5

**Exhibit MPC 6. Adjusted Operational Benefit Estimates (Present Value, \$2015 millions)**



6

6 **Q** What adjustments did you make to the Company's estimates of demand side  
7 **benefits?**

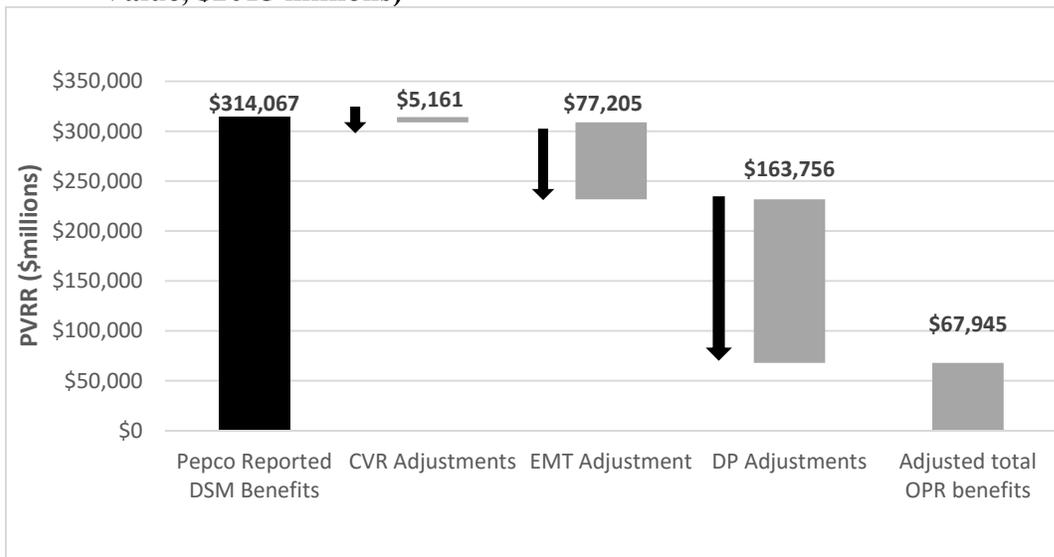
8 In my alternative analysis I have adjusted the estimates of benefits in the  
9 following ways in the following four items (shown in Exhibit MPC 7):

- 11 • I have included OPC Witness Chernick's adjusted CVR demand side  
12 benefits described in his testimony. This results in a **reduction of \$5.1**  
13 million in present value of benefits.<sup>48</sup>
- 14 • I have included my elimination of EMT DSM benefits described in my  
15 testimony. This results in a **reduction of \$77.2** million in present value of  
16 benefits.
- 20 • I have included Witness Chernick's adjustment for DP DSM benefits  
21 described in his testimony. This results in a **reduction of \$163.7** million in  
22 present value of benefits. This includes Witness Chernick's DP DSM  
23 benefit adjustments of \$26.3 million for reduced avoided capacity effects,  
24 of \$136 million for reduced avoided capacity price mitigation effects, and  
25 \$1.3 million for DP avoided energy and emission benefits.

<sup>48</sup> *Id.*

1  
2  
3

**Exhibit MPC 7 Adjusted Demand Side Benefit Estimates (Present Value, \$2015 millions)**



4

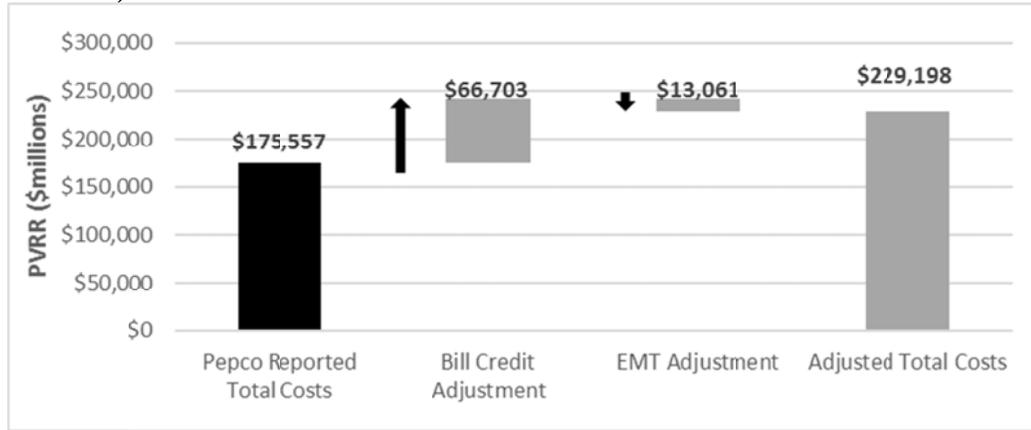
5 **Q What adjustments did you make to the Company's estimates of costs?**

6 **A** In my alternative analysis I have adjusted the estimates of costs in the following  
7 ways (shown in Exhibit MPC 8):

- 8
- I have included the cost of DP bill credits, as discussed in my testimony. This results in an increase of \$66.7 million in present value of costs.
- 9
- In order to be consistent with the exclusion of benefits from EMT, I have also removed the costs associated with the program. This results in a reduction of \$13.0 million in present value of costs.
- 10  
11  
12

4  
5

**Exhibit MPC 8: Adjusted Cost Estimates (Present Value, \$2015 millions)**



6

6 **Q How do your adjustments to benefits and costs affect the benefit-cost ratio of**  
7 **the AMI program?**

13 **A** Shown below in Exhibit MPC 9, my adjusted benefits of \$227.7 million are  
14 marginally higher than my adjusted cost estimate of \$229.1 million. This leads to  
15 an adjusted benefit-cost ratio of 0.99. This adjusted ratio is less than a third of the  
16 3.52 benefit-cost ratio produced by the Company.<sup>49</sup> Put differently, the Company  
17 claims that more than three dollars and fifty cents of benefits are produced for  
18 every dollar invested, whereas my adjustments show that the investments  
19 marginally break even.

14 **Exhibit MPC 9. Adjusted Benefits and Costs**

15

| Present Value (\$2015 mil) | <b>PEPCO</b> | <b>Adjusted estimate</b> |
|----------------------------|--------------|--------------------------|
| Costs                      | \$175.6      | \$229.1                  |
| Benefits                   | \$617.1      | \$227.8                  |
| Net Benefits               | \$441.5      | -\$1.3                   |
| Benefit-Cost Ratio         | 3.52         | 0.99                     |

16 **Q Is the Company’s AMI program beneficial to ratepayers?**

19 **A** It is essentially break-even based on our estimates of costs and benefits  
20 attributable to the AMI Initiative. Should the Company’s remaining benefits  
21 underperform, then the program may not be cost effective.

<sup>49</sup> Based on the Company’s adjusted benefits reported in Staff DR 6-1 Attachment C Update.

1 **X. FINDINGS AND RECOMMENDATIONS**

2 **Q What are your findings?**

3 **A** The benefit-cost analysis, as adjusted by OPC, is essentially break-even. The  
4 Company has overstated both market-side and operational benefits attributable to  
5 the AMI program based on the testimony of OPC Witness Paul Chernick and Pete  
6 Lanzalotta. When I use alternate inputs developed by OPC, the benefit-cost ratio  
7 of the Company's AMI Program is 0.99.

8 **Q What are your recommendations for the Commission?**

9 **A** I recommend, for the reasons explained in this testimony, that the Commission  
10 require Pepco to provide a revenue requirement impact assessment and continue  
11 to provide regular analyses of the cost-effectiveness of the AMI program going  
12 forward in order to insure that the Company's AMI is cost-effective.

13 **Q Does this conclude your testimony?**

14 **A** It does. However, I reserve my right to update my testimony based upon  
15 additional information from the Company.

## Maximilian Chang, Principal Associate

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### PROFESSIONAL EXPERIENCE

**Synapse Energy Economics Inc.**, Cambridge, MA. *Principal Associate*, 2013 – present, *Associate*, 2008 – 2013.

Consults and provides analysis of technologies and policies, electric policy modeling, evaluation of air emissions of electricity generation, and other topics including energy efficiency, consumer advocacy, environmental compliance, and technology strategy within the energy industry. Conducts analysis in utility rate-cases focusing on reliability metrics and infrastructure issues and analyzes the benefits and costs of electric and natural gas energy efficiency measures and programs.

**Environmental Health and Engineering**, Newton, MA. *Senior Scientist*, 2001 – 2008.

Managed complex EPA-mandated abatement projects involving polychlorinated biphenyls (PCBs) in building-related materials. Provided green building assessment services for new and existing construction projects. Communicated and interpreted environmental data for clients and building occupants. Initiated and implemented web-based health and safety awareness training system used by laboratories and property management companies.

**The Penobscot Group, Inc.**, Boston, MA. *Analyst*, 1994 – 2000.

Authored investment reports on Real Estate Investment Trusts (REITs) for buy-side research boutique. Advised institutional clients on REIT investment strategies and real estate asset exchanges for public equity transactions. Wrote and edited monthly publications of statistical and graphical comparison of coverage universe.

**Harvard University Extension School**, Cambridge, MA. *Teaching Assistant*, 1995 – 2002.

Teaching Assistant for Environmental Management I and Ocean Environments.

**Brigham and Women's Hospital**, Boston, MA. *Cancer Laboratory Technician*, 1992 – 1994.

Studied the biological mechanism of tumor eradication in mouse and human models. Organized and performed immunotherapy experiments for experimental cancer therapy. Analyzed and authored results in peer-reviewed scientific journals.

### EDUCATION

**Harvard University**, Cambridge, MA

Master of Science in Environmental Science and Engineering, 2000

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**Cornell University**, Ithaca, NY

Bachelor of Arts in Biology and Classics, 1992

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## TESTIMONY

**Maryland Public Service Commission (Docket No. 9406):** Direct testimony on Baltimore Gas and Electric Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. February 8, 2016.

**New Jersey Board of Public Utilities (Docket No. ER14030250):** Direct testimony on Rockland Electric Company's petition for investments in storm hardening measures. On behalf of the New Jersey Division of Rate Counsel. September 4, 2015.

**Hawaii Public Utilities Commission (Docket No. 2015-0022):** Direct testimony on reliability, clean energy, competition, and management and performance concerns related to the petition of NextEra Corporation and Hawaiian Electric Companies (HECO) for the acquisition of HECO by NextEra. On behalf of the Hawaii Division of Consumer Advocacy. August 10, 2015.

**Delaware Public Service Commission (Docket No. 14-193):** Direct testimony evaluating the benefits and commitments of the proposed Exelon-Pepco merger. On behalf of the Delaware Department of Natural Resources. December 12, 2014.

**State of New Jersey Board of Public Utilities (Docket No. EM14060581):** Direct testimony on the reliability commitments filed by Exelon Corporation and Pepco Holdings, Inc. in their joint petition for the merger of the two entities. On behalf of the New Jersey Division of Rate Counsel. November 14, 2014.

**District of Columbia Public Service Commission (Formal Case No. 1119):** Direct and answer testimony on the reliability, risk, and environmental impacts of the proposed Exelon-Pepco merger. On behalf of the District of Columbia Government. November 3, 2014 and March 20, 2015.

**United States District Court District of Maine (C.A. No. 1:11-cv-00038-GZS):** Declaration regarding the ability of the New England electric grid to absorb the impact of a spring seasonal turbine shutdown at four hydroelectric facilities. On behalf of Friends of Merrymeeting Bay and Environment Maine. March 4, 2013.

**State of Maine Public Utilities Commission (Docket 2012-00449):** Testimony regarding the Request for Approval of Review of Second Triennial Plan Pertaining to Efficiency Maine Trust. On behalf of the Maine Efficiency Trust. January 8, 2013.

**New Jersey Board of Public Utilities (Docket No. GO12050363):** Testimony regarding the petition of South Jersey Gas Company for approval of the extension of energy efficiency programs and the associated cost recovery mechanism pursuant to N.J.S.A 48:3-98:1. On behalf of the New Jersey Division of Rate Counsel. November 9, 2012.

*Resume dated December 2015*

## Briefing

Semitic policies. They are particularly anxious to hasten the fall of Pontryagin because the two mathematicians vying to succeed him, Nicolai N. Bogolyubov and Juri V. Procharov, are not considered anti-Semitic. It was in order to bring about such pressure that the émigrés wrote their white paper.

Of course, Russian anti-Semitism is nothing new. It dates back to the days before the Russian revolution and in fact was taught by the old Russian church Prava Slava. But anti-Semitism did not greatly affect the Soviet mathematical community until World War II. Anti-Semitism peaked in the last years of Stalin's life and then diminished somewhat under Khrushchev. Then, in the 1960's, anti-Semitism in mathematics began to increase again as a small group of mathematicians gained positions of power. The émigrés explain that the activities of this small group "permitted the spread of anti-Semitism into areas where purely bureaucratic control is insufficient and where the implementation of such policies requires an act of collusion by qualified mathematicians."

Such charges of anti-Semitism are often countered by observers who note that the Jews are a suspect community in the Soviet Union. Since so many have emigrated, those remaining behind are said to share guilt by association, an image of a group of people whose allegiance is elsewhere. Thus a number of Russians are in favor of denying Jews entrance into universities not because they are Jews per se but because they may eventually leave Russia. (In the Soviet Union, education is viewed as a state investment in individuals.) However, the discrimination against Jewish mathematicians predates the large-scale Jewish emigration from Russia which a number of observers feel is being used to rationalize anti-Semitism.

One of the most tragic aspects of the discrimination against Soviet Jewish mathematicians is its effect on Russian mathematics. Many scientists contend that there is no field of knowledge or culture to which Russians have contributed as much as mathematics. But the incredible respect paid to Russian mathematics is dissipating as it becomes apparent that Russians can rise in the mathematical community not because of their talent but because of their political beliefs.

As a promulgator of these discriminatory policies, Pontryagin himself is a tragic figure, one mathematician says. He was a truly great mathematician, and it is always tragic when a great mathematician becomes known not for his work but for his bigotry.—GINA BARI KOLATA

### Utility Industry Is Cool to Voltage Reduction Project

Some of the more expansive advocates of energy conservation hold that conservation opportunities can be found almost everywhere and that some are very easy pickings indeed. The California Public Utilities Commission (PUC) believes that it is making the most of one such opportunity through its program of conservation voltage reduction (CVR).

But utilities outside of California and the utility commissions of other states have been slow to embrace CVR. In fact, the utility industry tends to throw cold water on voltage reduction as a conservation measure.

The California CVR program, now nearing the end of its second year, is expected to achieve savings in 1978 of more than 2.8 billion kilowatt-hours of electricity, or the equivalent of 4 million barrels of low-sulfur oil worth about \$60 million. By 1985, the savings are expected to total more than 3.5 billion kilowatt-hours, equivalent to 5.3 million barrels of oil.

Moreover, according to the commission, CVR is being applied in a selective fashion which requires no capital investments that are not cost-effective. Also, properly applied, it does not degrade the quality of electric service, unlike the system-wide voltage reductions or "brown outs" sometimes resorted to by utilities in power emergencies. In fact, a PUC report issued last January said the program "has been highly successful both in conserving energy and allowing longer, cooler, and more dependable motor, lamp, and appliance service."

California utilities seem by and large to be embracing the program in good spirit even though it means a reduction in their potential electricity sales and revenues. In a letter to the head of the PUC early this year, Jack R. Horton, board chairman of the Southern California Edison Company, said that the system-wide savings from voltage reduction appeared to be twice what had been expected and that the company was in the process of "further increasing this significant energy savings [program]." For a general rule of thumb, PUC engineer George A. Amaroli says that there is a 1 percent energy saving for every 1 percent of voltage reduction.

What the CVR program involves is lowering the top of the voltage range in which lights, motors, and appliances operate efficiently. For many years, the utility industry has voluntarily observed as its standard the range of 114 to 126 volts prescribed by the American National Standard Institute, Inc. Under the CVR program, substation voltage regulators are recalibrated to reduce the maximum to 120 volts, at least for those distribution feeder lines where this can be done economically and without lowering the voltage for customers at the end of the line below 114.

In light of all the talk over the past 5 years about energy conservation, why has the CVR concept not been widely adopted? The fact is, many utility engineers believe that CVR is not cost-effective and does not actually produce a conservation effect as great as the one claimed by the PUC (a study made in 1974 by the American Electric Power Service Corporation showed relatively small energy savings). The utility industry trade group, the Edison Electric Institute, itself seems to dismiss CVR as having little promise. Some state utility commissions have indicated an interest in the California CVR project, but at least one such body, the Public Utility Commission of Pennsylvania, has rejected CVR as a conservation measure, doing so partly on the advice of the seven utilities which it regulates. "They [the California PUC] have not demonstrated any appreciable energy savings," says Richard E. Fuhrman, a supervisor of energy planning with the Pennsylvania agency. "Amaroli has an axe to grind. He is already on record as saying [CVR] is a good thing, and he is trying to back it up," Fuhrman adds.

The apparent acceptance of CVR by large, representative utilities in California and its apparent rejection by most of the rest of the industry is mystifying. But, for his part, the PUC hearing examiner who a few years ago brought the CVR concept to the fore during a rate case has an explanation for the common industry attitude. This official, Carol T. Coffey, observed in an opinion: "The sales pitch that raising voltages will increase revenues which can be used to purchase voltage regulation equipment has been made by electric industry manufacturers for many years, so that utility personnel are now well indoctrinated." Coffey cited in support of this assessment a General Electric Company data book which says, "When the average voltage on a feeder

is increased, the kilowatt-hour consumption is also increased."

What seems to be needed is for the Department of Energy and its Economic Regulatory Administration (ERA) to make its own study of the potential of CVR and then try to clear up the confusion by advising the state utility commissions what to believe.

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## Nader Queries Handler on Status of CONAES Study

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The long-awaited report of the National Academy of Sciences' Committee on Nuclear and Alternative Energy Systems (CONAES) is drawing critical fire even before its issuance, which is now scheduled for late February or early March. Commissioned in late 1975, the report has been in preparation since then under a \$3.6 million contract between the Academy and the Energy Research and Development Administration (ERDA) and its successor, the Department of Energy. Ralph Nader, in a recent letter to Academy president Philip Handler, deplors what he terms the committee's "inexcusable" and "deplorable" delay in contributing to the ongoing national debate on energy policy.

The letter, cosigned by Nader and Richard Pollack of the Critical Mass Energy Project, criticizes the Academy's approach to the study as well as the time being taken for its completion. Calling on Handler for a full and "straightforward" accounting, Nader and Pollack speak of "the Academy's attempt to secure some kind of 'consensus' whereby differences among [CONAES] members are stifled," and also refer vaguely to "suggestions from some quarters" that quantitative analysis has been emphasized in the study at the expense of "qualitative analysis involving differing value judgments."

Handler chose not to comment on the letter, but Micah H. Naftalin, executive director of the National Research Council's Assembly of Engineering, told *Science* that "it is nonsense for them to attack a report that they haven't read."

Naftalin said, moreover, that the demand for an accounting as to the status of the CONAES report is surprising inasmuch as only a few weeks ago he had responded fully to all of the questions

which Pollack had put to him on the subject.

The study contract first called for delivery of the report by 30 June 1977 but was later amended to postpone the time of delivery to the end of 1978. According to Naftalin, the study has taken longer than was first expected because the "subject was damn hard" and "we traded schedules for quality." The initial organizing of the study was itself quite time-consuming, he said, because it involved setting up four assessment panels and more than a score of subpanels (including one chaired by Laura Nader, a sister of Ralph Nader's); all told, some 250 persons were selected to participate.

At present, Naftalin said, 8 of the report's 11 chapters have been completed and approved by CONAES. The other three chapters have been approved "in principle" and are now undergoing final editing. These chapters and the report as a whole are expected to be approved by the committee in January and delivered to an Academy panel for final peer review, a process expected to take only a few weeks. Then, after CONAES has had a few days or weeks to respond to the peer review comments, the report should be issued by early March, Naftalin said.

Although saying he would not try to indicate to what degree a consensus has or has not been achieved, Naftalin suggested that there will be enough agreement among the members of CONAES for the report to contribute substantially to the nuclear debate and "reduce the range of controversial issues." Where the CONAES members remain in disagreement, as they do on a number of issues, this will be set out in the body of the report, he added.

There is an irony in Nader's suggestion that individual viewpoints are being suppressed in the study, for he was one of several leaders of the antinuclear movement who, 3 years ago, suggested that the Academy had prejudiced the study by stacking CONAES with a heavily pro-nuclear membership. Among the members are several nuclear scientists and engineers, including Harvey Brooks of Harvard University (a former dean of engineering and applied physics), but, according to Naftalin, there has been no imbalance whatever between members who came to the study well disposed toward nuclear development and those who questioned or opposed such development.

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## Energy Facility Siting Seen in Need of Reform

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Confusion still attends the siting of major energy facilities. This was pointed up again on 28 November when the chief of the U.S. Army Corps of Engineers, Lieutenant General John W. Morris, announced his decision in favor of construction of a large independent oil refinery at Portsmouth, Virginia, near Hampton Roads and the lower end of Chesapeake Bay (*Science*, 10 February).

The chief's decision, which Secretary of the Army Clifford Alexander could overrule, flies in the face of a site survey commissioned by the general himself. When issued last August, the survey report indicated that, of the 20 East Coast sites considered, the Portsmouth site was one of the worst from an environmental standpoint. Tankers and petroleum product barges traveling to and from the proposed refinery would pass within several miles of the lower James River seed oyster beds, a mainstay of the Chesapeake Bay's \$50-million-a-year oyster fishery.

The Department of the Interior, of which the Fish and Wildlife Service is a part, is likely to urge that the permit be denied and to raise the generic issue of whether refinery siting should not be reformed. Robert L. Herbst, assistant secretary of the Interior for fish, wildlife, and parks, is convinced on the basis of the Virginia project and the refinery proposed for Eastport, Maine (another site deemed to be among the worst), that this issue calls for a comprehensive study. ". . . it is a mistake for the federal government to consider permits for refineries on a one-by-one basis," Herbst said in a recent letter to Charles Warren, chairman of the Council on Environmental Quality (CEQ).

Warren told *Science* that he expects to take part in interagency discussions over the Portsmouth case and the possibility of energy facility siting reform. He noted that an approach now used in the siting of power plants in California (where Warren was formerly an influential state legislator) is to require that utilities, in applying to state permitting authorities, submit at least three sites for every plant proposed. Although still open-minded on the siting issue, Warren favors the California approach to a federally approved "site bank."

Luther J. Carter

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO OPC DATA REQUEST NO. 5

QUESTION NO. 3

PLEASE REFER TO THE DIRECT TESTIMONY OF AHMAD FARUQUI, PAGE 3, LINES 10-13.

- A. IS AMI REQUIRED TO ACHIEVE—RATHER THAN SIMPLY CALCULATE--THE “CONSERVATION IMPACT” FROM CVR?
  - I. IF SO, PLEASE EXPLAIN HOW AMI WILL DIRECTLY CAUSE THE CVR-RELATED “CONSERVATION IMPACT.”
  - II. IF SO, PLEASE ALSO PROVIDE ANY ANALYSIS ON HOW MUCH OF THE CVR-RELATED “CONSERVATION IMPACT” IS DUE TO THE EXISTENCE OF AMI.
- B. IS AMI REQUIRED TO ACHIEVE—RATHER THAN SIMPLY CALCULATE--THE “PEAK DEMAND SAVINGS” FROM CVR?
  - I. IF SO, PLEASE EXPLAIN HOW AMI WILL DIRECTLY CAUSE THE CVR RELATED “PEAK DEMAND SAVINGS.”
  - II. IF SO, PLEASE ALSO PROVIDE ANY ANALYSIS ON HOW MUCH OF THE CVR-RELATED “PEAK DEMAND SAVINGS” IS DUE TO THE EXISTENCE OF AMI.

RESPONSE:

- A. Yes, AMI is required to fully achieve the "conservation impact" from CVR.
  - I. Pepco would be hesitant to implement CVR without the benefit of the customer voltage readings that are provided by AMI. With the AMI voltage readings, Pepco can be sure that customers are receiving their electric service within the limits provided in the Code of Maryland Regulations COMAR 20.50.07.02.
  - II. Pepco has not performed this analysis.
- B. Yes, AMI is required to fully achieve the "peak demand savings" from CVR.
  - I. See OPC DR 5-3 A. I.
  - II. See OPC DR 5-3 A. II

SPONSOR: Karen R. Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO OPC DATA REQUEST NO. 3

QUESTION NO. 11

PLEASE REFER TO THE DIRECT TESTIMONY OF KAREN LEFKOWITZ, PAGE 20, LINES 6-8.

- A. PLEASE PROVIDE THE ANNUAL HISTORICAL NUMBER OF CUSTOMERS BY CUSTOMER TYPE ACCESSING THE COMPANY'S ENERGY MANAGEMENT TOOLS (EMT).
- B. PLEASE PROVIDE THE ANNUAL PROJECTED NUMBER OF CUSTOMERS BY CUSTOMER TYPE WHO ARE ANTICIPATED TO ACCESS THE COMPANY'S EMT.

RESPONSE:

- A. Pepco's EMTs are described in Company Witness Lefkowitz's testimony on p. 48, lines 5-19 and specific examples are shown on pp. 54 through 68. The number of customers who have accessed Pepco's web-based EMTs are provided through the Pepco Maryland AMI Metrics Report filed in Case No. 9207 on a quarterly basis, refer to Metrics #37, 38, and 41. The number of customers who have requested and received detailed energy use reports is provided in Metric #39 on a quarterly basis. The AMI EMTs also include a wide-range of educational materials such as detailed energy usage information available through bills and educational messaging through advertising and direct mail. It is difficult to identify the specific number of customers that access these materials.
- B. Virtually all of Pepco Maryland residential customers are expected to receive or access one or more of the Company's AMI-enabled EMTs each year. EMTs include a wide-range of information and tools related to energy management, including:
- Pepco's internet based "My Account" EMT provides customers with the ability to examine their energy use data on an hourly, daily, weekly and monthly basis. This tool also includes calculators that allow customers to identify the most impactful ways to save electricity and set personal energy saving goals. A variety of customized energy savings tips are available through "My Account".
  - Pepco's smart phone app - offers customers an ability to examine hourly AMI data to show to daily energy use data,
  - Customer bills - use AMI data to provide customers with their daily energy use and historical comparisons.
  - Customer service - customer service representatives and energy advisors provide customers with AMI data regarding their energy use, including explanations for the reasons that their bill may have gone up or down, or explaining when they use the most energy.
  - Educational messaging that includes direct mail, print ads and radio advertising - these targeted communications remind customers to save energy, and provide tips and information on accessing the full range of EMTs available. Customers also receive this information through community events.

SPONSOR: Karen R. Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO OPC DATA REQUEST NO. 4

QUESTION NO. 26

PLEASE REFER TO THE DIRECT TESTIMONY OF KAREN LEFKOWITZ, PAGE 48, LINES 12-16.

- A. PLEASE INDICATE THE YEAR THAT PEPCO MADE MY ACCOUNT AVAILABLE TO ITS CUSTOMERS.
- B. PLEASE INDICATE THE ANNUAL NUMBER OF CUSTOMERS ACCESSING THE MY ACCOUNT PORTAL SINCE THE YEAR THAT PEPCO MADE MY ACCOUNT AVAILABLE TO ITS CUSTOMERS.
- C. PLEASE INDICATE THE ANNUAL NUMBER OF UNIQUE CUSTOMERS ACCESSING THE MY ACCOUNT PORTAL SINCE THE YEAR THAT PEPCO MADE MY ACCOUNT AVAILABLE TO ITS CUSTOMERS.
- D. PLEASE INDICATE THE PROJECTED NUMBER OF UNIQUE CUSTOMERS ACCESSING THE MY ACCOUNT PORTAL IN THE COMPANY'S COST EFFECTIVENESS DETERMINATION.
- E. PLEASE INDICATE THE ANNUAL NUMBER OF CUSTOMERS REQUESTING PAPER ENERGY USAGE REPORTS.
- F. PLEASE INDICATE IF THE COMPANY'S OPOWER PROGRAM IN EMPOWER MARYLAND IS THE SAME PAPER ENERGY REPORT REFERENCED IN THE WITNESS LEFKOWITZ'S TESTIMONY. IF NOT, PLEASE EXPLAIN. IF SO, IS THE COMPANY CLAIMING OPOWER SAVINGS AS PART OF ITS AMI PROGRAM.

RESPONSE:

- A. December 2007.
- B. Please refer to Pepco's AMI Metrics Report for the available information. Data prior to this period are not available.
- C. Please refer to the Pepco Maryland AMI metrics for the available specific Maryland data. Data prior to this reporting period are not available.
- D. The Company has not made a projection.
- E. The Company began tracking this information as of February 2014. During the period of February 2014 through March 31, 2016, 361 customers had requested and been sent paper energy usage reports. Please refer to Pepco's AMI Metrics Report.
- F. No, the two reports are different. The Opower reports provide participating residential customers with a comparison of their energy use versus the energy use of customers with similar home types. The AMI-enabled paper energy usage report referenced in Witness Lefkowitz's testimony allows customers who do not have internet access to Pepco's My Account website to obtain a paper report that provides a detailed summary of their home's energy usage.

SPONSOR: Karen R. Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO STAFF DATA REQUEST NO. 4

QUESTION NO. 4

ARE ALL OF LEGACY METERS REQUIRED TO BE REPLACED AFTER ESTIMATED  
LIFE CYCLE OF 34 YEARS?

RESPONSE:

No.

SPONSOR: Karen R. Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO STAFF DATA REQUEST NO. 11

QUESTION NO. 1

FOR EACH YEAR FROM 2008 TO 2015 PROVIDE THE FOLLOWING INFORMATION:

- A. TOTAL METERS REPLACED DUE TO OBSOLESCENCE.
- B. TOTAL METERS REPLACED DUE TO DAMAGE.
- C. TOTAL METERS REPLACED DUE TO METER FAILURES.
- D. ONGOING OPERATIONAL & MAINTENANCE COST FOR MARYLAND METERS (DO NOT INCLUDE DC METERS COST). IF PEPCO DOES NOT HAVE SEPARATE ACCOUNTING FOR MARYLAND AND DC COST, THEN ALLOCATE COST PROPORTIONALLY TO DC AND MARYLAND NUMBERS OF METERS. PROVIDE DC METERS NUMBERS. PROVIDE A DETAILED COST BREAKDOWN FOR PEPCO'S RESPONSE TO STAFF DATA REQUEST NO. 4-7 BY COST CATEGORY AND INCLUDE ANY ADDITIONAL COST FOR AMI METERS. EXPLAIN WHY THE LEGACY METER O&M COST IS NOT APPLICABLE TO AMI. WHAT ARE THE ADDITIONAL COSTS FOR AMI METERS?
- E. NUMBERS OF CUSTOMERS' WITH HIGH BILL COMPLAINTS WHEN PEPCO WAS ABLE TO DETERMINE SPECIFIC CAUSE OF UNUSUAL HIGH ENERGY CONSUMPTIONS. IS PEPCO PROVIDING SIMILAR INVESTIGATION AS WAS GIVEN IN WITNESS LEFKOWITZ TESTIMONY P. 35-36 FOR ALL CUSTOMERS?
- F. TOTAL NUMBERS OF CUSTOMERS' WITH HIGH BILL COMPLAINTS.

**RESPONSE:**

- A. Refer to response in Staff DR 11-1(c) below.
- B. Refer to response in Staff DR 11-1(c) below.
- C. The Company doesn't track meter failures or replacement due to damage or obsolescence at this time. The meter exchanges by years are a combination of meter failures, meter obsolescence, meter damage, and miscellaneous meter exchange reasons.

**METER EXCHANGES PER YEAR - MD**

| 2008 | 2009  | 2010  | 2011  | 2012  | 2013   | 2014  | 2015  |
|------|-------|-------|-------|-------|--------|-------|-------|
| NA   | 1,461 | 2,418 | 2,129 | 6,888 | 10,971 | 6,884 | 8,089 |

- D. Refer to response in Staff DR 4-7.
- E. In 2015, the Pepco Energy Advisors received 1,613 customer cases in Pepco Maryland. 764 of those cases were from large apartment complexes that had asked the Energy

Engineers to survey individual apartments for efficiency problems. Of the remaining 894 cases, 725 were residential customers, while the rest were a mix of commercial or other. Of those 725 residential customers, 721 were referred to the Energy Engineers by the Energy Advisors.

While the Energy Advisors and Engineers do not specifically track "high bill;" the driver for almost all those residential referrals was customer concern over their bills. Causes vary widely from customer to customer. In almost all Energy Engineering cases a determination is found from energy profiling data. Either an equipment, lifestyle, or conservation issue.

Yes. Any customer can call into the customer service line and depending on their issue can be transferred to an Energy Advisor. If the Energy Advisor identifies something inexplicable in a customer's energy consumption, they will then refer the case to an Energy Engineer for further review or a field visit. In 2015 the Pepco Maryland Energy Advisors handled 4,551 customer inquiries of which 721 were referred to the Energy Engineers.

- F. In 2015 the Energy Advisers handled 4,551 customer inquiries and forwarded 721 residential cases for further review by the Energy Engineers. While the Energy Advisors and Engineers do not specifically track "high bill;" the driver for almost all those residential referrals was customer concern over their bills.

SPONSOR: Karen R. Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO STAFF DATA REQUEST NO. 12

QUESTION NO. 27

PLEASE PROVIDE THE ACTUAL NUMBER OF FTES INVOLVED IN CUSTOMER BILLING COMPLAINT INVESTIGATIONS FROM 2008 TO 2016.

RESPONSE:

| Year | BU   | Contractor |
|------|------|------------|
| 2008 | 3.75 | 0          |
| 2009 | 3.6  | 0          |
| 2010 | 4    | 0.6        |
| 2011 | 5.8  | 1          |
| 2012 | 7    | 1          |
| 2013 | 7    | 1          |
| 2014 | 7    | 0.4        |
| 2015 | 5.8  | 0          |
| 2016 | 6.6  | 0          |

In addition to these numbers, there was a supervisor over the department until the end of 2011.

SPONSOR: Karen R. Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO OPC DATA REQUEST NO. 8

QUESTION NO. 10

PLEASE REFERENCE THE DIRECT TESTIMONY OF GIOVANNINI, P. 9 AT 21–22. PLEASE EXPLAIN HOW THE COSTS OF THE REBATES PAID TO INDUCE CUSTOMERS TO PARTICIPATE IN THE DP PROGRAM ARE ACCOUNTED FOR IN THE COST BENEFIT ANALYSIS.

RESPONSE:

The costs of customer bill credits or “rebates” are treated as a transfer payment in the Company’s AMI cost-effectiveness analysis. The Commission recently affirmed this cost-effectiveness treatment in its BGE rate case Order No. 87591, p. 64.

SPONSOR: Mario Giovannini

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO OPC DATA REQUEST NO. 12

QUESTION NO. 2

WITH REFERENCE TO THE RESPONSE TO OPC 2-12, PLEASE STATE WHETHER THE COMPANY'S EVALUATION OF SMART GRID COST-EFFECTIVENESS (E.G., IN THE ATTACHMENTS TO STAFF DR 6-1) INCLUDES ANY PARTICIPANT COSTS FOR PEAK ENERGY SAVINGS EVENTS.

- A. IF SO, PLEASE IDENTIFY WHERE THOSE COSTS ARE INCLUDED.
- B. IF NOT, PLEASE EXPLAIN WHY PARTICIPANT COSTS ARE EXCLUDED AND EXPLAIN WHY PEPSCO DOES NOT BELIEVE THAT THE SER PARTICIPANTS EXPERIENCE ANY COSTS (E.G., A LOSS OF SERVICE). PLEASE PROVIDE SUPPORTING DOCUMENTATION AND/OR REPORTS FOR YOUR RESPONSE.

RESPONSE:

No.

- a) See above.
- b) The Company has assumed that customers will shift a portion of their energy use to other hours and thereby avoid the majority of participant costs. Additionally, participant costs are difficult to measure and would be de minimis due to the limited number of PESC event activations and their duration. It should be noted that customers will not participate in an event if the benefits they receive are lower than their costs.

SPONSOR: Karen Lefkowitz

POTOMAC ELECTRIC POWER COMPANY  
MARYLAND CASE NO. 9418  
RESPONSE TO OPC DATA REQUEST NO. 4

QUESTION NO. 28

PLEASE REFER TO THE DIRECT TESTIMONY OF KAREN LEFKOWITZ, PAGE 48, LINE 20 TO PAGE 49, LINE 7.

- A. PLEASE PROVIDE SUPPORTING DOCUMENTATION AND CALCULATIONS IN ELECTRONIC FORMAT WITH ALL FORMULAE INTACT USED BY THE COMPANY TO QUANTIFY THE BENEFITS AND COSTS ATTRIBUTABLE TO ITS DYNAMIC PRICING PROGRAM.
- B. PLEASE INDICATE THE DATES OF ALL PESC EVENTS SINCE THE SUMMER OF 2012.
- C. PLEASE INDICATE THE ANNUAL NUMBER OF ANTICIPATED PESC EVENTS USED IN THE COMPANY'S DETERMINATION OF PESC EVENTS.
- D. PLEASE PROVIDE THE ANNUAL AMOUNT OF BILL CREDITS PAID BY THE COMPANY FOR PESC EVENTS.
- E. PLEASE PROVIDE THE PROJECTED ANNUAL AMOUNT OF BILL CREDITS TO BE PAID BY THE COMPANY FOR FUTURE PESC EVENTS.
- F. PLEASE INDICATE IF THE COMPANY INCLUDED BILL CREDIT AMOUNTS IN DETERMINING THE COST-EFFECTIVENESS OF ITS DP PROGRAM. IF NOT, PLEASE EXPLAIN WHY NOT.
- G. PLEASE INDICATE NUMBER OF PARTICIPANTS FOR EACH PESC EVENT.
- H. PLEASE DEFINE PARTICIPANTS AND NON-PARTICIPANTS.
- I. PLEASE INDICATE IF THE COMPANY ADJUSTS FOR FREE-RIDERSHIP IN ITS PESC EVENTS. IF SO, PLEASE EXPLAIN AND QUANTIFY. IF NOT, PLEASE EXPLAIN WHY NOT.

RESPONSE:

- A. Please refer to Staff DR 6-1, Attachment C, Dynamic Pricing Benefits Tabs.
- B. Please refer to Pepco's AMI Metrics Report for this information.
- C. For AMI cost-effectiveness calculations, the Company has assumed that 16 hours of PESC events will be called annually.
- D. The PESC annual bill credits are provided below.

| <u>Year</u> | <u>2012</u> | <u>2013</u> | <u>2014</u> | <u>2015</u> | <u>Total</u> |
|-------------|-------------|-------------|-------------|-------------|--------------|
| PESC        |             |             |             |             |              |
| Bill Credit | \$113,969   | \$2,478,210 | \$4,132,803 | \$8,277,474 | \$15,002,456 |

- E. The forecast annual bill credits for 2016 are \$9 million. The Company has not forecasted the annual bill credits beyond 2016.
- F. Please refer to the response provided to OPC DR 2-12.

- G. Please refer to Pepco's AMI Metrics Report for this information.
- H. Participants are defined as customers who earned PESC bill credits for each event. Non-participants are defined as those customers who did not earn any bill credit for a specific event.
- I. Free ridership estimates are considered through regression panel modeling. Please refer to Staff DR 6-1, Attachment C, Dynamic Pricing Tab.

SPONSOR: Karen R. Lefkowitz