

**PECO ENERGY COMPANY  
STATEMENT NO. 6**

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION  
v.  
PECO ENERGY COMPANY – GAS DIVISION

DOCKET NO. R-2022-3031113

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DIRECT TESTIMONY

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WITNESS: JIANG DING

SUBJECT: CLASS COST-OF-SERVICE STUDY

DATED: MARCH 31, 2022

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**DIRECT TESTIMONY  
OF  
JIANG DING**

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**I. INTRODUCTION AND PURPOSE OF TESTIMONY**

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

6 A. My name is Jiang Ding. My business address is PECO Energy Company, 2301  
7 Market Street, Philadelphia, Pennsylvania 19103.

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

9 A. I am employed by PECO Energy Company (“PECO” or the “Company”) as  
10 Principal Regulatory & Rates Specialist.

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

12 A. I received a Bachelor’s Degree in Law from China University of Political Science  
13 and Law, and I received a Master of Science Degree in Finance from Texas A&M  
14 University.

15 **4. Q. Please describe your work experience with the energy industry.**

16 A. Upon graduation from Texas A&M University, I worked as an Accountant for  
17 Enron and as a Financial Analyst for Halliburton Energy Services. I was hired by  
18 Exelon Power as an Operational Area Analyst in 2002. I then worked for Exelon  
19 Generation and Exelon Corporation as a Senior Project Evaluation Analyst. I was  
20 appointed Principal Regulatory & Rates Specialist in PECO’s Regulatory Strategy  
21 and Revenue Policy Division in 2013. My main responsibilities include revenue

1 requirement modeling and analyses for regulatory initiatives, cost-of-service  
2 studies, and base rate case filings.

3 **5. Q. Please describe the purpose of your testimony.**

4 A. I will explain the cost-of-service principles underlying PECO's unbundled, fully  
5 allocated class cost-of-service study ("COSS") that I performed, the methods and  
6 procedures employed to perform such study, and the results produced by the  
7 COSS.

8 **6. Q. Have you prepared any exhibits to accompany your testimony?**

9 A. Yes. PECO Exhibits JD-1 through JD-7 were prepared by me or under my  
10 supervision and are described in detail in my testimony.

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

12 A. My testimony is divided into five parts. Section I serves as the introduction to my  
13 testimony and explains its purpose. In Section II, I provide some background  
14 information, identify the exhibits that I am sponsoring, and summarize the results  
15 of the COSS. In Section III, I introduce and discuss the COSS methodology. In  
16 Section IV, I explain the development of the revenue requirement for each rate  
17 class. Lastly, in Section V, I present the results of the COSS in detail and discuss  
18 the contents of the exhibits.

19 **8. Q. Please identify the exhibits that are included with your testimony.**

20 A. The following exhibits are included with my testimony. They are discussed in  
21 detail in Section V of my testimony.

PECO Exhibit JD-1	Summary of Results
PECO Exhibit JD-2	Allocation by Rate Class
PECO Exhibit JD-3	Allocation by Functional Classification
PECO Exhibit JD-4	Unitized Functionally Classified Revenue Requirement
PECO Exhibit JD-5	Customer-Related Costs
PECO Exhibit JD-6	External Allocation Factors
PECO Exhibit JD-7	Peak Day Demand (NARUC Manual, p. 48)

1 **II. BACKGROUND INFORMATION AND SUMMARY**  
2 **OF COST-OF-SERVICE STUDY RESULTS**

3 **9. Q. Please identify the distribution revenue requirement used for the fully**  
4 **projected future test year.**

5 A. I used the total distribution revenue requirement for the fully projected future test  
6 year (“FPFTY”) developed in PECO Exhibit MJT-1, which is sponsored by  
7 PECO witness Mr. Michael J. Trzaska and discussed in his direct testimony  
8 (PECO St. No. 3). The total distribution revenue requirement for the FPFTY is  
9 \$476 million (PECO Exhibit JD-1, line 81) excluding costs recovered under  
10 PECO’s Purchased Gas Cost adjustment (“PGC”) and \$731 million (PECO  
11 Exhibit JD-1, line 133), including costs recovered under the PGC. The total  
12 distribution revenues and distribution revenues by customer class for the FPFTY  
13 under existing rates that are used in the COSS were also obtained from PECO  
14 Exhibit MJT-1, and in the proof of revenues set forth in PECO Exhibit JAB-4.

15 **10. Q. What is a class cost-of-service study?**

16 A. A class cost-of-service study is a widely employed analytical tool used in

1 supporting a utility's recommendation for a rate design. Class cost-of-service  
2 studies are utilized to determine the costs that different classes of customers  
3 impose on the utility system and to quantify the revenue requirements for the  
4 services provided by the utility to each customer class. The purpose and the  
5 guiding principles in performing a class cost-of-service study are described  
6 further in Section III.

7 **11. Q. Please summarize the results of your work as they apply to PECO's COSS.**

8 A. The results of PECO's COSS and my conclusions based on those results are as  
9 follows:

10 (1) The current tariff rates produce the net income by rate class shown on line  
11 17 of PECO Exhibit JD-1, which yields the rates of return on rate base  
12 shown on line 26 of that exhibit.

13 (2) PECO's total distribution revenue requirement for the FPFTY has been  
14 allocated or assigned among the rate classes based on the results of the  
15 COSS. The results of the COSS are summarized on pages 1-3 of PECO  
16 Exhibit JD-1, which show the total distribution revenue requirement  
17 separately for distribution service including and excluding purchased gas  
18 costs and PGC revenues.

19 (3) The increases in revenue by rate class needed to produce rates of return by  
20 class equal to the Company's proposed overall rate of return are shown on  
21 line 140 of page 3 of PECO Exhibit JD-1. The increase in revenue shown  
22 on line 140 is shown separately in PECO Exhibit JD-1 for: (i) distribution

1 base rates (line 59), (ii) forfeited discounts revenues (line 63); and (iii) the  
2 non-fuel gas procurement costs recovered outside distribution base rates  
3 through the Gas Procurement Charge (“GPC”) (line 126), a component of  
4 the PGC. While the rate increases shown on line 140 are those necessary  
5 to move each rate class to the system average rate of return, the Company  
6 is not proposing rates that will take all classes to their indicated cost-of-  
7 service at this time, as explained in the direct testimony of Mr. Joseph A.  
8 Bisti (PECO Statement No. 7).

### 9 III. PECO’S COSS

10 **12. Q. Please describe the purpose of performing a cost-of-service study.**

11 A. The purpose of a cost-of-service study is to determine the cost to serve, expressed  
12 as revenue requirement, for each rate class served by a utility. The revenue  
13 requirement for a rate class is that portion of a utility’s total cost-of-service  
14 attributed to that rate class in accordance with principles of cost causation. In a  
15 cost-of-service study, all of the utility’s costs of providing service must be  
16 analyzed and assigned or allocated among the rate classes. A cost-of-service  
17 study is used, along with other factors discussed by Mr. Bisti, to design rates that  
18 fully recover a utility’s costs.

19 **13. Q. Please describe the guiding principles in performing a cost-of-service study.**

20 A. The central element in performing a cost-of-service study is the determination of  
21 allocation factors based on causal relationships between, on the one hand,  
22 customer demands, load profiles, and usage characteristics, and, on the other  
23 hand, the costs incurred by the Company to meet customers’ service requirements

1 imposed by those demands, load profiles, and usage characteristics. The primary  
2 goals in selecting allocation factors are: (1) the appropriate recognition of cost  
3 causality; (2) the stability of study methods and their consistent application over  
4 time, so that trends in the direction of class revenues relative to cost-of-service  
5 can be discerned properly from case to case; and (3) completeness, such that the  
6 cost-of-service study captures all of the costs that each class imposes on the  
7 distribution system.

8 **14. Q. Please summarize the approach that you followed in performing the COSS.**

9 A. As I previously explained, the most critical task in performing any cost-of-service  
10 study is establishing relationships between customer demands, load profiles and  
11 usage characteristics, and the costs incurred to meet those requirements. This  
12 requires an understanding of the utility system design and the relationship of that  
13 design to the characteristics of the customers that the system is designed to serve.

14 PECO, like most gas utilities, designs its gas distribution system to meet three  
15 primary objectives:

- 16 (1) To extend distribution service to all customers;
- 17 (2) To meet the aggregate design peak day capacity requirements of all  
18 customers entitled to receive service on the design peak day; and
- 19 (3) To deliver volumes of natural gas to those customers either on a sales or  
20 transportation service basis.

21 The allocation methods used in a cost-of-service study must take into account the  
22 objectives that the distribution system is designed to achieve so that the allocation  
23 of plant investment and operating expenses properly aligns with cost-causation  
24 factors. Other factors, such as incentives to influence customer behavior (e.g.,



1 conservation or demand reduction) or to temper the impact on customers of rate  
2 changes, are more appropriately considered in the revenue allocation and rate  
3 design phase.

4 The COSS I prepared was performed using the proprietary Gas Cost-of-Service  
5 Model (“Model”) developed by Management Applications Consulting, Inc.,  
6 which employs a Microsoft Excel platform. The Model facilitates the preparation  
7 of the COSS, accelerates computations, and develops appropriate documentation.  
8 The Model uses a three-step process to allocate or assign costs to rate classes, in  
9 accordance with general cost-of-service principles. These three steps consist of:  
10 (1) functionalizing rate base, purchased gas supply costs, and expenses to  
11 determine the particular rate schedules that should share responsibility for each of  
12 those assets and costs; (2) classifying functionalized costs into demand-related,  
13 commodity-related, and customer-related cost categories to facilitate allocating  
14 such costs to rate schedules in accordance with identifiable characteristics; and (3)  
15 allocating the functionalized, classified costs among rate classes. The Model  
16 provides functionalized, classified cost information by rate class, develops  
17 unbundled revenue requirements by functional classification and in total for each  
18 rate class, and calculates unit costs.

19 **15. Q. Please identify the rate classes that were included in the COSS.**

20 A. The following nine rate classes were included: (1) GR - General Service -  
21 Residential; (2) GC - General Service - Commercial and Industrial; (3) L - Large  
22 High Load Factor Service; (4) MV-F - Motor Vehicle Service-Firm; (5) MV-I -  
23 Motor Vehicle Service-Interruptible; (6) IS - Interruptible Service; (7) TCS -

1 Temperature Controlled Service; (8) TS-F - Gas Transportation Service-Firm; and  
2 (9) TS-I - Gas Transportation Service-Interruptible. In the COSS, the rate class in  
3 PECO's current tariff titled OL - Outdoor Lighting is combined with rate class  
4 GC because the usage of rate class OL is very small. In addition, customers  
5 participating in PECO's Customer Assistance Program ("CAP") are combined  
6 with rate class GR because their usage characteristics are the same as other rate  
7 class GR customers and because CAP rates were designed to reference rate class  
8 GR rates.

9 **16. Q. Please describe the functionalization step of the COSS.**

10 A. In the functionalization step, costs are separated by the utility's basic service  
11 characteristics, as stated below.

- 12 • **Production** function includes operation and management costs related to gas  
13 production, including production of liquid propane gas ("LPG").
- 14 • **Storage** function reflects costs incurred to ensure that firm customers' demand  
15 can be met on the design day. It includes the costs of operation and  
16 management of liquefied natural gas ("LNG") facilities.
- 17 • **Commodity** function includes PGC, balancing service cost, and gas storage  
18 inventory.
- 19 • **Service** function includes the investment in, and operating and maintenance  
20 expenses related to, the service lines from the Company's main to customer  
21 locations.

- 1           • *Meter* function includes the investment in meters and devices, including the  
2           installation of meters.
- 3           • *Customer Installation* function includes the expenses incurred in working on  
4           customers' premises.
- 5           • *Customer Service* function includes customer assistance and demonstrating  
6           and selling expenses.
- 7           • *Customer Accounts* function includes the costs of customer billing and  
8           records, call center, collection of customer accounts, and uncollectable  
9           accounts.
- 10          • *Distribution* function includes all other investments and costs, including  
11          investments in distribution plant, operating and maintenance expenses, and  
12          costs that are part of PECO's regulated utility function.

13   **17. Q. Please describe the classification step of the COSS.**

14           A. In the classification step, the previously functionalized costs are separated  
15           according to the system design or operating characteristics that cause those costs  
16           to be incurred in the first instance. In this step, each cost is determined to be  
17           incurred to serve customers, to supply the natural gas commodity, or to meet  
18           various capacity demands related to the customers' peak usage.

19   **18. Q. Please describe the class allocation step of the COSS.**

20           A. In the class allocation step, costs that have been functionalized and classified are  
21           allocated among the rate classes based on appropriate causal relationships. The

1 allocation phase takes into account the design of the utility system and how it is  
2 operated; cost data derived from the utility's accounting records; and usage and  
3 load data both for the system overall and for specific customer classes. Based on  
4 analysis of the relationship between costs and the factors driving the need to incur  
5 such costs, each component of the revenue requirement is either directly assigned  
6 to a rate class or an allocator is selected to apportion that component among rate  
7 classes.

8 **19. Q. What does "direct assignment" mean?**

9 A. The term "direct assignment" means identifying specific plant investments or  
10 specific expenses incurred exclusively to serve a specific customer or group of  
11 customers. Direct assignments reflect a direct causal connection between costs to  
12 serve and the customers being served. Therefore, if data are available to make a  
13 direct assignment, it is generally the preferred approach.

14 **20. Q. Are most plant and expenses directly assigned in a cost-of-service study?**

15 A. No, most costs must be allocated. Utility service is generally provided to  
16 customers by facilities that are used, and expenses that are incurred, in common  
17 by all, or many, classes of customers. In addition, even in instances where it  
18 might be possible to associate specific physical facilities with particular  
19 customers, the detailed cost information needed to make a direct assignment may  
20 not be reasonably available.

1 **21. Q. What is the role of allocation factors under the class allocation step of**  
2 **PECO's COSS?**

3 A. External and internal allocation factors are typically used to perform a cost-of-  
4 service study and, consequently, were employed in the Model.

5 An external allocation factor is a factor that is developed from an external source,  
6 outside the cost-of-service model. Examples of external allocators are number of  
7 customers (CUST) and estimated design day send-out (DPKDAY). PECO  
8 Exhibit JD-6 shows the development of the external allocators.

9 An internal allocation factor is one that is developed within the cost-of-service  
10 model using other allocated line items. Internal allocators are based on some  
11 combination of external allocators, directly assigned costs and other internal  
12 allocators. For example, the allocator for property insurance costs is based on  
13 plant investment amounts assigned to components of the rate base. It is necessary  
14 to compute the rate base before property insurance costs can be assigned.

15 Other examples of internal allocation factors include total operation and  
16 maintenance salaries and wages expense (SALWGES) and total gross gas  
17 distribution plant (DISTPLT). PECO Exhibit JD-2, pages 18 - 22, shows the  
18 internally developed allocation factors.

19 **22. Q. Have you changed any of the allocation methods used in PECO's 2020 gas**  
20 **base rate case COSS?**

21 A. No. PECO is using the same basic allocation methods it employed in its 2020 gas  
22 base rate filing, including its continued use of the Average and Excess Demand

1 method to classify and allocate the costs of mains. However, PECO revised the  
2 development of certain inputs that are used in applying two of those basic  
3 allocation methods. First, PECO has revised the calculation of peak day demand  
4 used to allocate the costs of capacity needed to meet maximum system load  
5 requirements for the GR, GC, L and MV-F rate classes. Second, PECO has  
6 expanded the scope of the data used to develop allocation factors to allocate the  
7 costs of service lines among customer classes. Each of these revisions is  
8 explained below.

9 **23. Q. How has PECO calculated peak day demand to allocate maximum load**  
10 **requirements for the GR, GC, L and MV-F rate classes in this case?**

11 A. To derive peak-day demand, PECO used the same basic procedure shown on page  
12 48 of the National Association of Regulatory Utility Commissioners (“NARUC”)  
13 Gas Distribution Rate Design Manual (NARUC Manual, June 1989 Edition),  
14 although PECO made a few relatively small modifications, which I will describe  
15 later. A copy of page 48 of the NARUC Manual is provided in PECO Exhibit JD-  
16 7. In summary, the method shown in the NARUC Manual and employed by  
17 PECO calculates the correlation, for each rate class, between customers’  
18 temperature-sensitive usage and heating degree days. The correlation relationship  
19 is used to determine each rate class’ peak-day demand based on the heating  
20 degree days for the system “design day.” The design day is the twenty-four hour  
21 period of demand that PECO uses in its PGC filings as a basis for planning its gas  
22 supply capacity requirements. Using the NARUC method, the peak-day usage  
23 and load factor are determined for each of the GR, GC, L and MV-F rate classes.

1 PECO then calibrated the class-specific peak demands to match, in aggregate, the  
2 design-day requirement PECO uses for its PGC gas supply planning. The  
3 detailed calculations for the class peak-day demand determinations are provided  
4 in PECO Exhibit JD-6, p. 18.

5 **24. Q. Please describe the modifications PECO made to the calculation method**  
6 **shown in the NARUC Manual.**

7 A. PECO made three modifications to the method illustrated in the NARUC Manual.  
8 First, PECO used five-year average data to calculate the correlation of heating  
9 degree days and peak-day usage instead of relying on only one year's data, as the  
10 NARUC Manual shows. Using a broader experience band reduces the possibility  
11 that contingencies occurring in a single year (such as COVID-related effects)  
12 could skew the results. The five-year period PECO selected includes data before  
13 and after the onset of the COVID emergency. Second, the NARUC Manual uses  
14 a single month (January) to identify peak temperature-sensitive loads and uses  
15 what it calls "summer" usage to identify non-temperature-sensitive loads (without  
16 specifying what months are included in the summer period). PECO used an  
17 average of January and February usage (and customer counts) to identify peak  
18 temperature-sensitive loads in order to capture the period when coldest  
19 temperatures may occur in our area and used an average of July and August usage  
20 (and customer counts) to determine non-temperature-sensitive usage. Third, as I  
21 previously mentioned, PECO calibrated the aggregate class peak demands to the  
22 system design day peak demand it employs for gas supply capacity planning in its  
23 PGC filing. This step properly aligns the allocation of maximum load

1 requirements used to allocate distribution system costs with the maximum load  
2 requirements used for supply capacity planning.

3 **25. Q. Why is PECO using the modified NARUC method in this case?**

4 A. In its 2020 gas rate case (as in its 2010 gas rate case), PECO obtained class  
5 demands directly from the design day peak requirements used in its most current  
6 PGC filing. However, the PGC data did not calculate peak day demand  
7 separately for the GR and GC classes nor did it separate Rate L customer usage  
8 from firm stand-by load. Therefore, PECO had to interpolate the separate class  
9 peak demands from the aggregate class demand data. PECO's prior approach  
10 drew criticism from the cost-of-service expert for the Office of Small Business  
11 Advocate, which PECO reviewed and carefully considered in preparing its COSS  
12 in this case. Although the prior method produced results that were reasonable for  
13 developing a COSS to be used as a guide in allocating class revenue increases,  
14 PECO recognized that the NARUC method, as modified by PECO, provides  
15 somewhat more precision in determining class peak demands and, for that reason,  
16 it made sense to adopt it for this case.

17 **26. Q. Please explain the procedure PECO uses to develop its allocation of the costs  
18 of services.**

19 A. Services connect a customer's service location to the Company's distribution  
20 mains. The original cost of services is recorded in FERC Account 380. PECO  
21 segregates the original cost of services by residential and non-residential  
22 customers, but does not further breakdown the non-residential services by  
23 customer classes. PECO allocates the cost of services among customer classes



1 using the current cost of services. The cost per unit or “CPU” is calculated based  
2 on the average cost of installing an individual service for residential and non-  
3 residential segments, that were incurred during the most recent historical five-year  
4 period. The CPU by segment is multiplied by the number of customers in the rate  
5 classes within each segment. The values calculated in this manner are used to  
6 develop class specific ratios, which are applied to the aggregate cost of services  
7 recorded in FERC Account 380 to determine the portion of the total original cost  
8 in FERC Account 380 to be allocated to each class. The development of the  
9 allocator used for services is shown on PECO Exhibit JD-6, page 8.

10 **27. Q. Please explain what portion of the data set PECO has revised for use in**  
11 **allocating the cost of services in this case.**

12 A. PECO has only changed the data set it uses to calculate the CPU for the non-  
13 residential segment.

14 **28. Q. By way of background, explain the data set PECO employs to calculate the**  
15 **CPU for the residential class.**

16 A. Most of the services on PECO’s system, and most of the costs (approximately  
17 80%) recorded in FERC Account 380, relate to residential services. As I noted  
18 above, PECO has not changed the data it uses to calculate the average CPU for  
19 the residential class, which consists of the costs incurred during the most recent  
20 five years to install residential services. The bulk of the data used to calculate the  
21 residential CPU was obtained from “blanket” projects, although a small portion of  
22 residential services are installed pursuant to unique projects, which were also  
23 included in the calculation. Blanket projects are used to record a large number of

1 recurring plant additions that are all of a similar nature and are individually  
2 relatively small in amount. Given the nature of those types of additions, it is  
3 impractical to create a unique project identification for each service installation.  
4 PECO employs blanket projects for high-volume additions (such as services) that  
5 have a relatively low cost and are capable of being completed in less than thirty  
6 days.

7 **29. Q. How has PECO changed the data set used to calculate the CPUs for non-**  
8 **residential classes?**

9 A. In its 2020 gas rate case, PECO used only unique projects for a historical five-  
10 year period to calculate average CPUs for small commercial and industrial  
11 (“SC&I”) customers and large commercial and industrial (“LC&I”) customers,  
12 respectively. In this case, PECO is obtaining the data to calculate CPUs for all  
13 non-residential customer classes from both unique and blanket projects for  
14 commercial and industrial (C&I) services installed during the period 2017-2021.  
15 The inclusion of blanket projects furnishes a much more robust data set as the  
16 basis for calculating CPUs. Additionally, the approach used in this case achieves  
17 greater consistency with the data set used to calculate residential CPUs.

18 **30. Q. What was the source of the data PECO used in its 2020 gas rate case to**  
19 **calculate SC&I and LC&I CPUs?**

20 A. In its 2020 gas rate case, PECO used only the costs of services that had been  
21 recorded for unique projects for the SC&I and LC&I classes, respectively. In  
22 preparing its COSS in this case, PECO determined that employing only unique  
23 projects imposed an unwarranted constraint on the data set that could be used to

1 calculate non-residential CPUs. In particular, the unique projects for the LC&I  
2 service installed during the entire 2017-2021 period included only two projects.  
3 In its 2020 case, the LC&I data set included twenty-one unique projects.  
4 However, detailed analysis performed for this case revealed that several of those  
5 projects had been coded as LC&I projects but should have been coded as SC&I  
6 projects. When the projects were properly classified and the most recent  
7 historical five-year period was applied, the two observations that remained for the  
8 LC&I class were not statistically significant and, in fact, would produce  
9 anomalous results for that class. Therefore, PECO determined that the calculation  
10 of all non-residential CPUs should be based on data obtained from both unique  
11 and blanket projects for non-residential customers for the 2017-2021 period. As I  
12 noted above, this change provides a much more substantial data set for the CPU  
13 calculation.

14 **31. Q. Did PECO make any other changes in its allocation of the cost of services for**  
15 **non-residential customers?**

16 A. Yes, it did. As I explained above, the CPU was calculated in aggregate for the  
17 non-residential segment based on data obtained from unique and blanket projects  
18 for the non-residential segment. PECO used the same CPU for SC&I and LC&I  
19 customers, which was then multiplied by the number of customers in each rate  
20 class. Given the limited data set for LC&I services, there is not a statistically  
21 valid basis to calculate a separate CPU for LC&I services. However, customers  
22 in the Rate GR and Rate GC classes constitute 551,072 of PECO's 551,768 total  
23 customers and approximately 99% of the service costs recorded in FERC Account

1 380. Therefore, using the CPUs PECO calculated for residential and non-  
2 residential segments, respectively, in the manner described above provides a  
3 reasonable basis for allocating total service costs among PECO's rate classes.

4 **32. Q. Turning to the components of PECO's revenue requirement that are**  
5 **assigned or allocated in the COSS, please explain what rate base consists of**  
6 **and how it affects the COSS.**

7 A. The rate base is the cost, net of accumulated depreciation, of PECO's investment  
8 in plant and other assets used to serve customers.

9 **33. Q. What is PECO's total rate base and what are its major components?**

10 A. The total rate base amount employed in the COSS is \$2.88 billion (PECO Exhibit  
11 JD-1, line 46) and is derived from PECO Exhibit MJT-1, page 1.

12 For purposes of discussing how I functionalized, classified, and allocated the rate  
13 base in the COSS and treated major rate base categories, I will refer to the  
14 following groupings of rate base items: production plant, storage plant,  
15 distribution plant, general plant, depreciation reserve, other rate base items and  
16 cash working capital.

- 17 • ***Production plant*** represents the investment in LPG production assets which  
18 are used to meet design peak day and short-term needs of firm sales  
19 customers. These assets have been functionalized to Production, classified to  
20 demand, and allocated among rate classes based on design peak day send-out.

- 1           • **Storage plant** represents the investment in LNG facilities which are used to  
2           meet design peak day and short-term needs of firm sales customers. These  
3           assets have been functionalized to Storage, classified to demand, and allocated  
4           among rate classes based on design peak day send-out.
- 5           • **Distribution plant** comprises mains, services, meters and meter installation,  
6           and other distribution plant. A description of each of those components is as  
7           follows:
- 8           ○ **Mains** were functionalized to Distribution and classified as capacity. A  
9           portion of mains costs was directly assigned. The balance of mains costs  
10          (approximately 99% of the total) was classified and allocated using the  
11          Average and Excess Demand method. In that method, the portion of  
12          mains costs equal to the system average load factor is allocated among the  
13          rate classes based on their average daily deliveries (annual deliveries  
14          divided by 365 days). The balance of mains costs is allocated based on  
15          excess demand, which is the excess of design peak demand over average  
16          demand. The excess demand is allocated among rate classes in  
17          proportion to each class' peak demand over its average demand (PECO  
18          Exhibit JD-6, page 5). This method was used by PECO in its 2010 gas  
19          base rate case (Docket R-2010-2161592), was recently approved by the  
20          Commission in PECO's 2020 gas base rate case (Docket R-2020-  
21          3018929), and has been recognized as an acceptable method by the  
22          American Gas Association's *Gas Rate Fundamentals*, 1987 Edition.

- 1                   ○ *Services* are functionalized to their own category, classified as customer-  
2                   related costs, and allocated among rate classes based on CPU calculations  
3                   and related ratios by class, that were described previously and are shown  
4                   in PECO Exhibit JD-6 at page 8.
- 5                   ○ *Meters and Meter installation* includes assets that have been  
6                   functionalized to their own category, classified as customer-related costs.  
7                   A portion of meter and meter installation costs was directly assigned.  
8                   The balance of meter and meter installation costs (approximately 99.8%  
9                   of the total) was allocated among rate classes based on the average cost of  
10                  meters of each type for each rate class, as determined from the  
11                  Company’s records (PECO Exhibit JD-6, pages 7 and 9).
- 12                  ○ *Other distribution plant* comprises primarily: (1) measuring and  
13                  regulating station equipment (“M&R”), a portion of which was directly  
14                  assigned, and the balance of which was functionalized to Distribution,  
15                  classified as demand-related, and allocated among the rate classes based  
16                  on the mains allocation; and (2) land and land rights and structures and  
17                  improvements, which were functionalized to Distribution, classified as  
18                  demand-related, and allocated among rate classes based on distribution  
19                  plant (mains and measuring and regulating station equipment).
- 20                  • *General plant* includes primarily structures and improvements, tools and shop  
21                  and garage equipment. These assets were functionalized, classified, and  
22                  allocated among rate classes based on direct labor content of operating

1 expenses, reflecting the nature of the assets and common cost-of-service  
2 practice.

- 3 • **Depreciation reserve** was based on each asset account. Each component of  
4 the depreciation reserve items was functionalized, classified, and allocated  
5 among rate classes in the same ratio as the related assets.
  
- 6 • **Other rate base items** include primarily gas storage inventory, accumulated  
7 deferred income taxes (“ADIT”), common plant, customer deposits, customer  
8 advances, cash working capital and pension, which are discussed below.
  - 9 ○ **Gas storage inventories** are used to support the planned winter heating  
10 requirements of the Company’s sales customers and the daily balancing  
11 requirements of all its customers. Gas storage inventories were  
12 functionalized and classified to commodity. The Company has identified  
13 2.3%<sup>1</sup> of its storage activity that relates to the daily balancing of its  
14 transportation service customers (PECO Exhibit JD-6, page 6).  
15 Therefore, 2.3% of PECO’s gas storage inventory costs were allocated  
16 among its transportation rate classes based on their annual volumes. The  
17 remainder of the Company’s storage activity was allocated among the  
18 firm sales rate classes based on the average excess of their winter  
19 (November-March) gas volumes over their average annual volumes.

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20  
<sup>1</sup> This value was approved by the Commission as part of the Company’s most recent PGC proceeding at Docket No. R-2021-3025629.

- 1                   ○ *ADIT* refers to tax liabilities that are deferred as a result of accelerated  
2                   depreciation and includes “excess” ADIT that has been removed from the  
3                   ADIT account and recorded as a regulatory liability. Those ADIT  
4                   liabilities were functionalized, classified, and allocated among rate classes  
5                   in proportion to plant in service.
- 6                   ○ *Common plant* contains assets similar to those customarily found in  
7                   general plant, and therefore, was functionalized, classified, and allocated  
8                   among rate classes based on direct labor content of operating expenses.
- 9                   ○ *Customer deposits and customer advances* were directly assigned to rate  
10                  classes based on information from the Company’s records (PECO Exhibit  
11                  JD-6, page 14).
- 12                  ○ *Cash working capital* represents PECO’s need for cash to keep the  
13                  business running until revenues are collected to pay the costs of providing  
14                  services. Cash working capital was calculated based on the results of the  
15                  lead-lag study prepared by Mr. Trzaska and described in PECO Statement  
16                  No. 3. Payroll and pension-related cash working capital were allocated  
17                  based on labor; commodity-related cash working capital was directly  
18                  assigned to commodity.

19 **34. Q. What are the other major categories of PECO’s costs?**

20 A. The major categories in PECO’s cost-of-service are:

- 21                  • Production costs;
- 22                  • Storage costs;



- 1 • Distribution costs;
- 2 • Customer accounts and customer service expenses;
- 3 • Administrative and general expenses;
- 4 • Depreciation and amortization expense;
- 5 • Taxes other than income taxes; and
- 6 • Income taxes.

7 **35. Q. In determining how you would treat these expenses in PECO's COSS, was**  
8 **there any other important category of costs that you considered?**

9 A. Yes, labor costs affect some cost categories. Consequently, certain cost  
10 categories are allocated based on the direct labor costs. For example,  
11 Administrative & General Salaries, Account 920, is allocated among rate classes  
12 based on the direct labor costs. In order to develop such labor cost allocators, the  
13 direct labor costs included in each expense account were obtained from data  
14 assembled by Mr. Trzaska.

15 **36. Q. What costs are included in PECO's production costs and how were these**  
16 **costs functionalized, classified, and allocated among the rate classes?**

17 A. Production costs include costs related to operating and maintaining of LPG  
18 production assets and natural gas operating costs. Costs related to LPG  
19 production have been functionalized to Production, classified to demand, and  
20 allocated among rate classes based on design peak day send-out.

1 37. Q. What costs are included in PECO's storage costs and how were these costs  
2 functionalized, classified, and allocated among the rate classes?

3 A. Storage costs are the costs of operating PECO's LNG facilities, which PECO  
4 maintains to meet the design peak day and short-term needs. Therefore, these  
5 costs were functionalized to Storage, classified as demand, and allocated among  
6 rate classes based on design peak day send-out.

7 38. Q. What costs are included in PECO's distribution costs and how were these  
8 costs functionalized, classified, and allocated among the rate classes?

9 A. Most of PECO's distribution costs are the costs of operating and maintaining  
10 PECO's mains, services, and meters, i.e., the gas delivery system. Some of these  
11 costs are functionalized to distribution and some to their own categories. To the  
12 extent possible, costs were directly assigned. The balance of the costs of  
13 operating and maintaining PECO's gas delivery system was analyzed to  
14 determine which assets they were incurred to operate or maintain, and were  
15 functionalized, classified, and allocated among rate classes in the same manner as  
16 the assets they were incurred to operate or maintain. In addition to the costs of  
17 operating and maintaining PECO's gas delivery system, distribution costs include:

- 18 • *Customer installation expenses* include field investigations for odors, high  
19 bill complaints, and potential and actual energy theft, and were allocated  
20 based on number of customers; and
- 21 • *Other Operating and Maintenance expenses* were allocated in proportion to  
22 total distribution plant.

1 **39. Q. What costs were included in PECO's customer accounts and customer**  
2 **service costs and how were these costs functionalized, classified, and**  
3 **allocated among the rate classes?**

4 A. PECO's customer accounts and customer service costs include meter reading  
5 expenses, customer records and collection expenses, uncollectible accounts  
6 expense, miscellaneous customer accounts expense, customer assistance expense,  
7 and demonstrating and selling expense.

8 • *Meter reading expenses* were functionalized to Customer Accounts, classified  
9 to the customer category, and allocated among rate classes based on the  
10 number of customers.

11 • *Customer records and collection expenses* include activities for billing, call  
12 center, payments processing, recoveries, and support for CAP customers.  
13 These costs were functionalized to Customer Accounts and classified to the  
14 customer category. The account was analyzed in detail to identify the  
15 activities included and each activity was allocated among the rate classes  
16 using an appropriate basis. For example, the costs of bill activities were  
17 allocated based on customer counts, and call center costs were allocated based  
18 on a study of calls over a twelve-month period (PECO Exhibit JD-6, page 10).  
19 A single customer allocation could not be used because some costs are  
20 specific to residential customers while others are specific to commercial and  
21 industrial customers. Therefore, a weighted allocator, based upon the analysis  
22 discussed above, was used for this account.

1 • *Uncollectible accounts expense*, or bad debt expense, was classified to the  
2 customer category. A portion of this amount was determined to be related to  
3 Pre-Program Arrearages and was directly assigned to residential customers.  
4 The balance of the expense was allocated among rate classes based on the  
5 Company’s write-off experience over a historical five-year period (2017-  
6 2021) (PECO Exhibit JD-6, page 13).

7 • *Miscellaneous customer accounts expenses* were functionalized to Customer  
8 Accounts and classified to the customer category. These expenses include  
9 primarily IT support costs and communication and marketing costs. Those  
10 costs were allocated among rate classes based on number of customers.

11 • *Customer assistance expense* comprises expenses incurred for the Low  
12 Income Usage Reduction Program (“LIURP”). The associated costs were  
13 directly assigned to residential customers (PECO Exhibit JD-6, page 11).

14 • *Demonstrating and selling expense* includes expenses incurred in  
15 demonstrating activities. The expense was functionalized to Customer  
16 Accounts, classified to the customer category, and directly assigned to  
17 different customer classes based on the Company’s records (PECO Exhibit  
18 JD-6, page 11).

19 **40. Q. How were administrative and general expenses functionalized, classified, and**  
20 **allocated among rate classes?**

21 A. Administrative and general (“A&G”) costs include administrative and general  
22 salaries, office supplies and expenses, outside services, injuries and damages,

1 employee benefits, property insurance costs, regulatory commission expenses,  
2 miscellaneous general expenses, and maintenance of general plant.

3 Except for items discussed immediately below, A&G costs are related to labor  
4 costs and therefore were functionalized, classified, and allocated among rate  
5 classes in the same ratio as direct labor content.

6 • *Property insurance costs* were functionalized, classified, and allocated among  
7 rate classes in the same ratio as plant in service.

8 • *Regulatory commission expenses* were functionalized, classified, and  
9 allocated among rate classes in proportion to claimed revenue.

10 • *Maintenance of general plant expenses* were functionalized, classified, and  
11 allocated among rate classes in the same ratio as general plant in service.

12 **41. Q. How was depreciation expense functionalized, classified, and allocated**  
13 **among the rate classes?**

14 A. Depreciation and amortization expenses were derived from PECO Exhibit CF-3,  
15 sponsored by Ms. Caroline Fulginiti, and PECO Exhibit No. MJT-1, sponsored by  
16 Mr. Michael J. Trzaska, which show depreciation expense by plant account. Each  
17 component of depreciation/amortization expense was functionalized, classified,  
18 and allocated among rate classes in the same ratio as the related assets.

19 **42. Q. How was Manufactured Gas Plant remediation expense functionalized,**  
20 **classified, and allocated among the rate classes?**

21 A. Manufactured Gas Plant (“MGP”) expense is the normalized level of expense for

1 remediating former MGP sites in the Company’s service territory. This cost was  
2 allocated among rate classes based on annual gas throughput volumes.

3 **43. Q. How was Safe & Efficient Heating Program expense functionalized,**  
4 **classified, and allocated among the rate classes?**

5 A. Qualifying low-income customers that participate in PECO’s Commission-  
6 approved Safe & Efficient Heating Program (“SEHP”) are eligible to receive, at  
7 no cost to them, various measures designed to improve the efficiency and safety  
8 of natural gas heating in their homes. The costs PECO incurs to administer and  
9 implement this program were directly assigned to the residential class.

10 **44. Q. How were taxes other than income taxes functionalized, classified, and**  
11 **allocated among the rate classes?**

12 A. Taxes other than income tax include payroll-related taxes, Public Utility Realty  
13 Tax Act (“PURTA”) taxes, local use taxes, and real estate taxes. Payroll-related  
14 taxes were functionalized, classified, and allocated among rate classes based on  
15 direct labor expenses. PURTA taxes and real estate taxes were allocated based on  
16 total plant in service, and local use taxes based on claimed revenue.

17 **45. Q. How was income tax expense functionalized, classified, and allocated among**  
18 **rate classes?**

19 A. Income tax expense was calculated on the basis of revenue at present rates using  
20 the same methodology employed by Mr. Trzaska in PECO Exhibit MJT-1,  
21 Schedule D-18. Income tax expense was functionalized, classified, and allocated  
22 among rate classes based on plant other than Regulatory Asset Programs M-1,

1 which was functionalized, classified and allocated among rate classes based on  
2 salaries and wages expense.

3 **46. Q. How were PECO's revenues at present rates computed and assigned among**  
4 **rate classes?**

5 A. The revenues were computed and assigned as follows:

6 • ***Distribution revenue*** at present rates is shown in PECO Exhibit MJT-1,  
7 Schedule D-5, and in the proof of revenues set forth in PECO Exhibit JAB-4.

8 The total was assigned to the rate classes based on the same revenue  
9 requirement exhibit and the proof of revenues. Distribution revenue at present  
10 rates for each rate class is shown on line 5 of PECO Exhibit JD-1.

11 • ***Purchased gas revenue*** consists of revenues collected under the applicable  
12 PGC tariff provisions for commodity and balancing service. Commodity  
13 revenue and balancing service revenue are determined and assigned based  
14 upon PECO's budget. For each rate class, and in total, purchased gas revenue  
15 equals the sum of the commodity cost, the balancing service cost, and the  
16 revenue requirement for cash working capital.

17 • ***Forfeited discount revenue*** is determined from PECO's budget, and was  
18 allocated among the rate classes based on an analysis of forfeited discount  
19 over a historical three-year period (2019-2021) (PECO Exhibit JD-6, page  
20 14).

21 • ***Other gas revenue*** consists of reimbursement revenues from contracting  
22 companies for their employees to conduct necessary operator qualification

1 testing to work on PECO's system, and was allocated among the rate classes  
2 based on salaries and wages expense.

3 **IV. DEVELOPMENT OF RATE CLASS**  
4 **REVENUE REQUIREMENT**

5 **47. Q. Please explain how you developed the revenue requirement for each class.**

6 A. The revenue requirement for each rate class was calculated using the same  
7 method employed by Company witness Mr. Trzaska to compute the overall  
8 revenue requirement for the FPFTY. Thus, the revenue requirement for each rate  
9 class is the sum of that class' forecasted revenue at present rates and change in  
10 revenue. The change in revenue for each rate class was computed by multiplying  
11 the change in operating income by a gross revenue conversion factor. The change  
12 in operating income for each rate class was computed by multiplying the rate  
13 class' rate base by the difference between the proposed system average rate of  
14 return, which is the same for all rate classes, and the present rate of return. PECO  
15 Exhibit JD-1, line 133, shows the total revenue requirement by rate class  
16 reflecting the fully allocated distribution cost-of-service at the proposed system  
17 average rate of return. PECO Exhibit JD-1, line 81, shows the portion of the total  
18 revenue requirement PECO proposes to collect in distribution rates.

19 **48. Q. Please explain how you determined the increase or decrease in revenue**  
20 **needed for each class to produce the system average rate of return.**

21 A. The increase or decrease needed for each rate class was calculated by comparing  
22 the revenue requirements for each rate class to the forecasted revenue at present  
23 rates for that class for the FPFTY. This is the same method used by Mr. Trzaska



1 in PECO Exhibit MJT-1, Schedule A-1, with respect to the overall revenue  
2 requirement and revenue deficiency. The increases or (decreases) in rate class  
3 revenue needed to produce a rate of return equal to the Company's proposed  
4 overall rate of return are shown in PECO Exhibit JD-1 at line 141, which total  
5 \$82.11 million. In addition, forfeited discounts (i.e., late payment charges) are  
6 expected to increase by \$0.16 million as a result of the increase in distribution  
7 revenue (PECO Exhibit JD-1 at line 63). The increases in class distribution  
8 revenue are shown on line 83, which total \$81.15 million. The increase in  
9 purchased gas revenue of \$1.12 million under the PGC is shown on line 126.

10 **V. RESULTS OF THE COST-OF-SERVICE STUDY**

11 **49. Q. Please describe the information in PECO Exhibit JD-1.**

12 A. PECO Exhibit JD-1, which sets forth the substance of the COSS, compares the  
13 revenue at current rates by rate class to the revenue requirement allocated on a  
14 cost-of-service basis to each rate class. Net income at present rates, shown on line  
15 17, is computed by subtracting operating expenses, depreciation and amortization,  
16 taxes other than income taxes, and income taxes (lines 10 to 14) from revenue at  
17 present rates (line 7). The return on rate base at present rates for each rate class is  
18 shown on line 26, and the relative rates of return are shown on line 27.

19 Line 133 shows each rate class' revenue requirement (including revenue from  
20 distribution charges and purchased gas) at the proposed overall rate of return.  
21 Line 68 shows operating expenses, line 69 shows depreciation and amortization  
22 expense. Lines 79 and 122 show operating income assuming each rate class pays  
23 its full cost-of-service. Line 140 shows the increase in revenue needed for each

1 rate class to produce revenues equal to its revenue requirement at full cost-of-  
2 service and produce the system average rate of return. Line 83 shows the increase  
3 (decrease) in distribution revenue for each rate class to produce revenue from  
4 distribution charges equal to its distribution revenue requirement at full cost-of-  
5 service.

6 **50. Q. Please describe the information in PECO Exhibit JD-2.**

7 A. PECO Exhibit JD-2 is the rate class cost-of-service and shows the allocation of  
8 each element of measures of value also known as rate base (RB schedules),  
9 operating expenses (E schedules), depreciation expense (D schedules), and taxes  
10 (TO and TI schedules) among the rate classes. This information is contained on  
11 the first 14 pages of the exhibit.

12 Also included in this exhibit are the external and internal allocators used for the  
13 rate case allocations, which are shown on pages 14-30 of the exhibit.

14 **51. Q. Please describe the information in PECO Exhibit JD-3.**

15 A. PECO Exhibit JD-3 contains the COSS by functional category and classification.  
16 The summary appears on pages 1 to 6 and the account-by-account allocation to  
17 functional category and classification is provided on pages 7 to 33. Pages 33 to  
18 66 of this exhibit provide the external and internal allocators used for the exhibit.

19 **52. Q. Please describe the information in PECO Exhibit JD-4.**

20 A. PECO Exhibit JD-4 presents unitized revenue requirement for each rate class.  
21 The unitized revenue requirements are the functionalized and classified revenue  
22 requirements allocated to each class of service divided by the appropriate units.

1 For example, capacity and commodity related cost are divided by Mcf and  
2 customer-related cost is divided by number of customers. The unit cost is  
3 provided by classification and functional area.

4 **53. Q. Please describe the costs considered in developing the proposed customer**  
5 **charges.**

6 A. The proposed customer charges are based on the specific customer-classified  
7 costs in the COSS that are approved by the Commission for recovery in customer  
8 charges. Customer-related costs include all costs incurred to attach a customer to  
9 the distribution system, for meter usage, and to maintain the customer's account.  
10 They include: (1) capital costs associated with services and meters, and general  
11 plant supporting the functions identified above; (2) operating and maintenance  
12 expenses related to those assets described in (1); and (3) associated administrative  
13 and general expense, metering and billing expenses, customer service and account  
14 expenses, appropriate pensions and benefits, payroll taxes that are part of the  
15 applicable labor expenses, and working capital. Total customer costs by rate class  
16 for the FPFTY are shown in PECO Exhibit JD-4, in the unit cost analysis. PECO  
17 Exhibit JD-5 provides a summary and each element of measures of value of  
18 customer charges.

19 **54. Q. Please describe the information in PECO Exhibit JD-6.**

20 A. PECO Exhibit JD-6 presents the development of the main external allocators that  
21 are described below and used in the COSS. Except where noted, all data are for  
22 the FPFTY.

1                   Index (page 1) – Table of External Allocators.

2                   Summary of External Allocator Values by Rate Class (page 2)

3                   Gas Deliveries (page 3) – Annual and monthly gas deliveries in Mcf, for each rate  
4 class.

5                   Customer Numbers (page 4) – Monthly and average annual number of customers  
6 for each rate class.

7                   Demand (page 5) – Average and Excess Demand allocator, which is used to  
8 allocate a portion of main, measuring and regulating station equipment costs.

9                   Storage (page 6) – Storage allocator based on usage of storage assets for  
10 balancing needs of firm sales customers and transportation customers.

11                  Mains, M&R and Meter Direct (page 7) – Data for customers with directly  
12 assigned mains, measuring and regulating station equipment, meter and meter  
13 installation. Data include cost, accumulated depreciation, depreciation expense,  
14 and annual usage as of December 31, 2021.

15                  Service Costs (page 8) – Computes investment in services for each rate class at  
16 average cost for the period 2017 to 2021. PECO does not account for services  
17 separately and, therefore, has used estimated cost to allocate the account to the  
18 classes of service.

19                  Meter Costs (page 9) – Computes investment in meters for each rate class at  
20 current costs for each meter type as of October 2021.

21                  Account 903 Allocator (page 10) – Allocates costs associated with each activity  
22 recorded in Account 903 (2020, Customer Records and Collection), by using an  
23 appropriate external allocator. Each activity, the cost of the activity, and the  
24 allocator assigned to each is shown in a separate row. Row 19 summarizes the  
25 costs by rate class. The weighted allocators are shown on row 20. The separate  
26 allocations are necessary because some costs are only applicable to specific rate  
27 classes.

28                  Account 908-916 Allocator (page 11) – Allocates the costs of each activity  
29 recorded in Account 908-916 (2020, including Customer Assistance and Sales  
30 Expenses), by using an appropriate external allocator. Rows 1-5 list each activity,  
31 the cost of the activity and the allocator assigned to it. Row 11 summarizes the  
32 costs by rate class. The weighted allocators are on row 12.

33                  Accounts Receivable Over 60-Day (page 12) – Computes the A/R Over 60-Day  
34 allocators. The column “Over 60-Day Allocator” shows the percentage of  
35 PECO’s total gas accounts receivable outstanding for more than two months for  
36 each rate class at each month-end in 2021.

1 Write-Offs (page 13) – Computes the write-off allocators by using net charge-offs  
2 for 2017 to 2021.

3 Directs (page 14) – Direct assignments for deposits, interest on deposits (2019 to  
4 2021), advances (as of 2021), and forfeited discounts (2019 to 2021), SEHP, Gas  
5 Customer Safety Program and Small Business Grant Program (Grant).

6 Purchased Gas Cost (page 15) – Annual costs for each rate class.

7 Balancing Service Cost (page 16) – Annual costs for each rate class.

8 Purchase of Receivables (page 17) – Annual costs for each rate class.

9 Design Day Demand (page 18) – Computes design day peak demand for rate  
10 classes GR, GC, L, MV-F and TS-F.  
11

## 12 VI. CONCLUSION

13 **55. Q. Please summarize your conclusion with respect to the COSS.**

14 A. The COSS was prepared using an appropriate and well-accepted cost-of-service  
15 method. The results of the COSS provide a reasonable allocation of PECO's cost-  
16 of-service among its rate classes and are an appropriate guide for use in designing  
17 PECO's proposed rates.

18 **56. Q. Does this complete your direct testimony at this time?**

19 A. Yes, it does.