PECO ENERGY COMPANY
STATEMENT NO. 5

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY COMMISSION

v.

PECO ENERGY COMPANY – ELECTRIC DIVISION

DOCKET NO. R-2018-3000164

DIRECT TESTIMONY

WITNESS: PAUL R. MOUL

SUBJECT: PECO'S OVERALL RATE OF RETURN INCLUDING CAPITAL STRUCTURE RATIOS, EMBEDDED COST OF DEBT, AND THE COST OF EQUITY

DATED: MARCH 29, 2018

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GLOSSARY OF ACRONYMS AND DEFINED TERMS	
ACRONYM	**DEFINED TERM**
AFUDC	Allowance for Funds Used During Construction
β	Beta
b	Represents the retention rate that consists of the fraction of earnings that are not paid out as dividends
b x r	Represents internal growth
CAPM	Capital Asset Pricing Model
CCR	Corporate Credit Rating
CE	Comparable Earnings
Company	PECO Energy Company
CTC	Competitive Transition Charge
CWIP	Construction Work in Progress
DCF	Discounted Cash Flow
FERC	Federal Energy Regulatory Commission
FOMC	Federal Open Market Committee
g	Growth rate
IGF	Internally Generated Funds
ITC	Intangible Transition Charge
Lev	Leverage modification
LT	Long Term
MLP	Master Limited Partnerships
OCI	Other Comprehensive Income
PECO	PECO Energy Company
PUC	Pennsylvania Public Utility Commission
r	Represents the expected rate of return on common equity
Rf	Risk-free rate of return
Rm	Market risk premium
RP	Risk Premium
s	Represents the new common shares expected to be issued by a firm
s x v	Represents external growth

GLOSSARY OF ACRONYMS AND DEFINED TERMS	
ACRONYM	**DEFINED TERM**
S&P	Standard & Poor's
v	Represents the value that accrues to existing shareholders from selling stock at a price different from book value
ytm	Yield to maturity

DIRECT TESTIMONY
OF
PAUL R. MOUL

I. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

1. Q. Please state your name, occupation and business address.

A. My name is Paul Ronald Moul. My business address is 251 Hopkins Road, Haddonfield, New Jersey 08033-3062. I am Managing Consultant at the firm P. Moul & Associates, an independent financial and regulatory consulting firm. My educational background, business experience and qualifications are provided in Appendix A, which follows my direct testimony.

2. Q. What is the purpose of your testimony?

A. My testimony presents evidence, analysis, and a recommendation concerning the appropriate cost of common equity and overall rate of return that the Pennsylvania Public Utility Commission ("PUC" or the "Commission") should recognize in the determination of the revenues that PECO Energy Company ("PECO Energy" or the "Company") should realize as a result of this proceeding. My analysis and recommendation are supported by the detailed financial data contained in PECO Energy Exhibit PRM-1, which is a multi-page document divided into fourteen (14) schedules. My testimony is based upon my first-hand knowledge of PECO Energy, consisting of information obtained from meetings with the Company's management and

Company-specific data that is widely disseminated within the financial community.

3. Q. Based upon your analysis, what is your conclusion concerning the appropriate rate of return on common equity for the Company in this case?

A. My conclusion is that the Company should be afforded an opportunity to earn a rate of return on common equity in the range of 10.16% to 11.25%. From this range, a 10.95% rate of return on common equity is proposed for the Company in this case. My 10.95% cost of equity recommendation is established using capital market and financial data relied upon by investors when assessing the relative risk, and hence cost of capital for the Company. My cost of equity determination should be viewed in the context of increasing capital costs revealed by rising interest rates and the need for supportive regulation at a time of increased infrastructure improvements now underway for the Company. Moreover, as I will describe below, there will be more risk faced by the Company with the changes to tax law recently passed by the U.S. Congress and signed into law by the President on December 22, 2017. My analysis of the Company and its superior performance, as described in the testimony of Mr. Michael A. Innocenzo, the Company's Senior Vice President and Chief Operating Officer, and other Company witnesses justify a rate of return near the top of the range. As shown on Schedule 1, I have calculated a 7.79% overall cost of capital for the Company at December 31, 2019. This figure, which is the product of weighting the individual capital costs by the

proportion of each respective type of capital, will set a compensatory level of return for the use of capital and provide the Company with the ability to attract capital on reasonable terms.

4. Q. What background information have you considered in reaching your conclusion concerning the Company's cost of capital?

A. The Company is a wholly owned subsidiary of Exelon Corporation ("Exelon"). The common stock of Exelon is traded on the New York Stock Exchange. Exelon is a component of the S&P 500 Composite Index. PECO Energy provides electric delivery service to approximately 1,624,000 residential, commercial and industrial electric customers in both the City of Philadelphia and the surrounding counties. The Company also provides natural gas distribution service to approximately 522,000 customers located in the suburban counties surrounding the City of Philadelphia. Deliveries of electricity to the Company's customers through December 2017 were comprised of approximately 35% to residential customers, approximately 21% to commercial customers, approximately 41% to industrial customers, and approximately 2% to street lighting, railroads, and sales for resale. With industrial customers representing 41% of sales, the energy needs of just 0.2% of all customers can have a significant impact on the Company's operations. PECO Energy obtains all of its electric energy for default service from third parties.

5. Q. How have you determined the cost of common equity in this case?

A. The cost of common equity is established using capital-market and financial data relied upon by investors to assess the relative risk, and hence the cost of equity, for an electric-delivery utility. In this regard, I have considered four (4) well-recognized models. These methods include: The Discounted Cash Flow ("DCF") model, the Risk Premium ("RP") analysis, the Capital Asset Pricing Model ("CAPM"), and the Comparable Earnings ("CE") approach.

6. Q. In your opinion, what factors should the Commission consider when determining the Company's cost of capital in this proceeding?

A. The rate of return utilized by the Commission to set rates must be sufficient to cover the Company's interest and dividend payments, provide a reasonable level of earnings retention, produce an adequate level of internally generated funds to meet capital requirements, be commensurate with the risk to which the Company's capital is exposed, assure confidence in the financial integrity of the Company, support reasonable credit quality, and allow the Company to raise capital on reasonable terms. The return that I propose fulfills these established standards of a fair rate of return set forth by the landmark Bluefield and Hope cases.[1] That is to say, my proposed rate of return is commensurate with returns available on investments having corresponding risks.

[1] Bluefield Water Works & Improvement Co. v. P.S.C. of West Virginia, 262 U.S. 679 (1923) and F.P.C. v. Hope Natural Gas Co., 320 U.S. 591 (1944).

7. Q. How have you measured the cost of equity in this case?

A. The models that I used to measure the cost of common equity for the Company were applied with market and financial data developed from my proxy group of ten (10) electric and combination utility companies. The proxy group consists of electric companies that: (i) have publicly-traded common stock, (ii) are contained in The Value Line Investment Survey and are classified in the Electric Utility East group, (iii) are not currently the target of an announced merger or acquisition, and (iv) are not engaged in the construction of a nuclear generating plant or have not recently cancelled the construction of a nuclear generating plant. The companies that comprise the proxy group are identified on page 2 of Schedule 3. I will refer to these companies as the "Electric Group" throughout my testimony.

8. Q. How have you performed your cost-of-equity analysis with the market data for the Electric Group?

A. I have applied the models/methods for estimating the cost of equity using the average data for the Electric Group. I have not measured separately the cost of equity for the individual companies within the Electric Group because the determination of the cost of equity for an individual company can be problematic. My approach of using average data for a portfolio of companies reduces the possibility that anomalous results might be shown by the models of the cost of equity if individual companies are employed separately. By employing group average data, rather than analyzing individual companies, I

have helped to minimize the effect of extraneous influences on the market data for an individual company.

9. Q. Please summarize your cost-of-equity analysis.

A. My cost of equity determination was derived from the results of the methods/models identified above. In general, the use of more than one method provides a superior foundation to arrive at the cost of equity. At any point in time, any single method can provide an incomplete measure of the cost of equity. The specific application of these methods/models will be described later in my testimony. The following table provides a summary of the indicated costs of equity using each of these approaches.

DCF	10.71%
Risk Premium	11.25%
CAPM	10.16%
Comparable Earnings	12.35%

Based on various combinations of the model results shown above, the average of the market based models (i.e., DCF, RP, CAPM) is 10.71% (10.71% + 11.25% + 10.16% = 32.12% ÷ 3) and the average of all methods is 11.12% (10.71% + 11.25% + 10.16% + 12.35% = 44.47% ÷ 4). I have used these measures of central tendency to arrive at a range of the cost of equity of 10.16% to 11.25%. Therefore, I recommend that the Commission set the Company's rate of return on common equity near the top of the range, which

for this case I recommend as 10.95%. My recommendation of 10.95% reflects the exemplary performance of the Company's management. As described in the testimony of Company witness Michael Innocenzo and other Company witnesses, PECO Energy has undertaken many initiatives that have produced high-quality service. To obtain new capital and retain existing capital, the rate of return on common equity must be high enough to satisfy investors' requirements.

II. ELECTRIC UTILITY RISK FACTORS

10. Q. Please identify some of the factors that make the electric utility industry generally different today than it was in the past.

A. Utilities continue to face the risks associated with their traditional responsibilities to maintain distribution system reliability under all weather conditions, including major storm events, and to comply with the mandates of their regulators. In addition, a different set of risks now exists for the electric delivery business in Pennsylvania. The potential expansion of distributed generation will have an increasing influence on the business of electric-delivery utilities. The obligation to serve represents a key risk factor for the local delivery of electricity. The risks facing the electric utilities are clearly different from those that existed in the past. Investors generally are risk-averse, and with increased uncertainty will require compensation for higher risk.

11. Q. What are the primary risk factors facing the electric-utility industry?

A. Electric utilities generally are faced with meaningful changes in the fundamentals that affect their operations, while retaining the obligation to serve under cost of service pricing that continues to dominate its business profile. The risk of distributed generation is a concern, and could have an increasing influence on the business of electric delivery utilities. With technological advances in micro-turbines, potential commercialization of fuel cells, development of wind and solar power, and the creation of micro-grids, utilities face the potential for bypass and the resulting declines in transmission and distribution revenues. That is to say, the development of distributed generation and local alternative energy has the potential to displace delivery revenue that can impact the incumbent utility's financial profile. This risk is exacerbated by net metering rules that require offsets against distribution rates even though distribution costs may not be reduced as a result of the installation of distributed generation.

Utilities also face cybersecurity risks, which require increased expenditures to harden their information technology and data transmission systems. They also face potential liability if a cyberattack or similar unforeseen intrusions were to occur.

The cost to replace aging infrastructure and to enhance reliability and resiliency also adds to the risk of electric delivery utilities, such as PECO Energy, because these expenditures increase costs without any concomitant

increase in revenues, except through regulatory agency-approved rate increases, such as the Distribution System Improvement Charge ("DSIC"). The Company continues to make substantial investments to harden its system and expand its vegetation management practices to reduce the number and duration of storm-related outages experienced by customers. The DSIC contains a variety of limitations that will not eliminate the need for periodic rate cases to cover the significant new investment that is being made by PECO Energy. Since 2011, PECO Energy has also been engaged in an energy efficiency and conservation ("EE&C") program, pursuant to the programs mandated by Act 129 of 2008, P.L. 1592 ("Act 129"). Reductions in revenues resulting from reductions in usage and demand the Company is required to achieve under its Commission-mandated EE&C program can be reflected only on a prospective basis in base rate cases.

12. Q. Are there other specific risk issues facing the Company?

A. Yes. Industrial customers, which account for 41% of the Company's energy deliveries, are usually thought to be of higher risk than residential customers. Indeed, the energy requirements of the Company's ten largest customers of 4.5 GWh represent approximately 16% of its total energy deliveries for the year 2017. This represents a significant concentration of deliveries to a few customers that increases the Company's risk. Success in this segment of the Company's market is subject to the business cycle and pressures from alternative providers. Moreover, external factors can influence deliveries to

these customers, which face competitive pressure on their own operations from other facilities outside the utility's service territory.

13. Q. Please indicate how the Company's risk profile is affected by its construction program.

A. The Company must undertake substantial investments to maintain, upgrade and expand existing facilities in its service territory to ensure safe and reliable service to its customers. In particular, the rehabilitation of the Company's infrastructure represents a non-revenue producing use of capital. The Company projects its construction expenditures for its electric distribution business will be approximately $2.508 billion during the period 2018-2022, which represents approximately 55% ($2.508 billion ÷ $4.565 billion) of its net distribution plant at December 31, 2017.

14. Q. You indicated previously that the recent federal income tax law changes will add to the Company's risk. Please explain.

A. There are several major financial consequences that flow from the recent changes in the federal income tax law that will negatively affect the Company. First, a lower federal income tax rate (21% versus 35%) will lower the Company's pre-tax interest coverage and, therefore, will reduce its credit quality and increase risk. For example, page 1 of Schedule 1 shows that with a 21% marginal federal corporate income tax rate, the Company's pre-tax interest coverage will be 5.24 times at its proposed distribution rates. Under the pre-2019 marginal federal corporate income tax rate of 35%, the

Company's pre-tax interest coverage would have been 6.15 times. That difference in coverage ratios does not reflect other changes driven by the tax law changes that may also impact the Company's financial condition and credit quality, such as the flow-back of so-called "excess" accumulated deferred income taxes ("ADIT"). Second, with a lower marginal federal corporate income tax rate, the variability of the Company's returns will increase, which also increases its business risk. When the federal corporate income tax rate was 35%, investors only needed to absorb 65% of any changes in revenues and expenses. This happens because the Company had a tax benefit equal to 35% of any increase in deductible expenses or 35% of any decrease in taxable revenue. At the current federal corporate income tax rate, the tax benefit is reduced to 21% and, therefore, investors will need to absorb 79% of any increase in expenses or reduction in revenue. As a result, lower federal income taxes will make investor returns more volatile than before the tax rate change occurred, and volatility translates into increased risk to the Company. Third, utilities will require more investor-supplied capital to fund construction programs because the level of deferred taxes will decline, the new tax law eliminates bonus depreciation, and "excess" ADIT created by the reduction in the federal corporate income tax rate will have to be flowed back to customers. This will also impact another credit metric that is important to capital-intensive industries such as electric utilities, namely, internally generated funds as a percentage of construction expenditures. This percentage will decline because of the new lower income tax rate. In response to these

financial challenges caused by the new lower federal corporate income tax rate, there may be a need to reduce the percentage of debt in a utility's capital structure to respond to higher business risk and weaker credit quality measures.

15. Q. How should the Commission respond to the evolving business environment facing the Company?

A. In the situation where additional capital is required, as shown by the projected construction expenditures indicated above, the regulatory process must establish a return on equity that provides a reasonable opportunity for the Company to actually achieve its cost of capital. Where ongoing capital investment is required to meet the high quality of service that customers demand, supportive regulation is essential.

III. FUNDAMENTAL RISK ANALYSIS

16. Q. Is it necessary to conduct a fundamental risk analysis to provide a framework for determining a utility's cost of equity?

A. Yes. It is necessary to establish a company's relative risk position within its industry through a fundamental analysis of various quantitative and qualitative factors that bear upon investors' assessment of overall risk. The qualitative factors that bear upon the Company's risk have already been discussed. The quantitative risk analysis follows. The items that influence investors' evaluation of risk and their required returns were described above. For this

purpose, I compared PECO Energy to the S&P Public Utilities, an industry-wide proxy consisting of various regulated businesses, and to the Electric Group.

17. Q. What are the components of the S&P Public Utilities?

A. The S&P Public Utilities is a widely recognized index that is comprised of electric power and natural gas companies. These companies are identified on page 3 of Schedule 4.

18. Q. What companies comprise your Electric Group?

A. My Electric Group obtained from the Value Line Investment Survey consists of the following companies: AVANGRID, Inc., Consolidated Edison, Dominion Energy, Duke Energy, Eversource Energy, Exelon Corp., FirstEnergy Corp., NextEra Energy, PPL Corp., and Public Service Enterprise Group.

19. Q. Is knowledge of a utility's bond rating an important factor in assessing its risk and cost of capital?

A. Yes. Knowledge of a company’s credit-quality rating is important because the cost of each type of capital is directly related to the associated risk of the firm. So, while a company’s credit-quality risk is shown directly by the rating and yield on its bonds, these relative risk assessments also bear upon the cost of equity. This is because a firm's cost of equity is represented by its borrowing

cost plus compensation to recognize the higher risk of an equity investment compared to debt.

20. Q. How do the bond ratings compare for PECO Energy, the Electric Group, and the S&P Public Utilities?

A. Currently, the Long Term ("LT") issuer rating for PECO Energy is A2 from Moody's Investors Services ("Moody's") and the corporate credit rating ("CCR") is BBB from Standard and Poor's Corporation ("S&P"). The LT issuer rating by Moody's and CCR designation by S&P focus upon the credit quality of the issuer of the debt, rather than upon the debt obligation itself. The average credit quality of the Electric Group is Baa1 from Moody's and BBB+ from S&P. For the S&P Public Utilities, the average composite rating is A3 by Moody's and BBB+ by S&P. Many of the financial indicators that I will subsequently discuss are considered during the rating process.

21. Q. How do the financial data compare for PECO Energy, the Electric Group, and the S&P Public Utilities?

A. The broad categories of financial data that I will discuss are shown on Schedules 2, 3, and 4. The data cover the five-year period 2012-2016. For PECO Energy, the financial statements contained in SEC Form 10-K, which is the source used by S&P Utility Compustat, include both its natural gas distribution and electric delivery and transmission businesses. The important categories of relative risk may be summarized as follows:

Size. In terms of capitalization, PECO Energy is smaller than the average size of the Electric Group and the S&P Public Utilities. All other things being equal, a smaller company is riskier than a larger company because a given change in revenue and expense has a proportionately greater impact on a small firm.

Market Ratios. Market-based financial ratios, such as earnings/price ratios and dividend yields, provide a partial measure of the investor-required cost of equity. If all other factors are equal, investors will require a higher rate of return for companies that exhibit greater risk, in order to compensate for that risk. That is to say, a firm that investors perceive to have higher risks will experience a lower price per share in relation to expected earnings.[2]

There are no market ratios available for PECO Energy because Exelon owns its stock. The five-year average price-earnings multiple was higher for the Electric Group than for the S&P Public Utilities. The five-year average dividend yield for the Electric Group was also somewhat higher than the S&P Public Utilities. The average market-to-book ratios were somewhat lower for the Electric Group than the S&P Public Utilities.

Common-Equity Ratio. The level of financial risk is measured by the proportion of long-term debt and other senior capital that is contained in a company's capitalization. Financial risk is also analyzed by comparing

[2] For example, two otherwise similarly situated firms each reporting $1.00 in earnings per share would have different market prices at varying levels of risk (i.e., the firm with a higher level of risk will have a lower share value, while the firm with a lower risk profile will have a higher share value).

common-equity ratios (the complement of the ratio of debt and other senior capital). That is to say, a firm with a high common-equity ratio has lower financial risk, while a firm with a low common equity ratio has higher financial risk. The five-year average common-equity ratios, based on permanent capital, were 55.8% for PECO Energy, 48.2% for the Electric Group, and 44.3% for the S&P Public Utilities. For the purpose of calculating the weighted average cost of capital for this case, the Company is proposing a 53.39% common equity ratio.

Return on Book Equity. Greater variability (*i.e.*, uncertainty) of a firm's earned returns signifies relatively greater levels of risk, as shown by the coefficient of variation (standard deviation ÷ mean) of the rate of return on book common equity. The higher the coefficients of variation, the greater degree of variability. For the five-year period, the coefficients of variation were 0.056 (0.7% ÷ 12.4%) for PECO Energy, 0.046 (0.4% ÷ 8.7%) for the Electric Group, and 0.022 (0.2% ÷ 9.2%) for the S&P Public Utilities. Here, PECO Energy displays somewhat more risk due to its higher coefficient of variation than the Electric Group. Also, its coefficient of variation is higher than the S&P Public Utilities. This signifies higher risk for PECO Energy compared to the Electric Group. And, as I indicated previously, the recent changes in the federal income tax law will likely make these variability statistics higher in the future.

Operating Ratios. I have also compared operating ratios (the percentage of revenues consumed by operating expense, depreciation, and taxes other than income).[3] The five-year average operating ratios were 79.1% for PECO Energy, 77.8% for the Electric Group, and 80.4% for the S&P Public Utilities. The operating ratio for PECO Energy is fairly close to the Electric Group, which indicates similar risk.

Coverage. The level of fixed-charge coverage (*i.e.*, the multiple by which available earnings cover fixed charges, such as interest expense) provides an indication of the earnings protection for creditors. Higher levels of coverage, and hence earnings protection for fixed charges, are usually associated with superior grades of creditworthiness. The five-year average interest coverage (excluding Allowance for Funds Used During Construction ("AFUDC")) was 5.34 times for PECO Energy, 3.56 times for the Electric Group, and 3.15 times for the S&P Public Utilities. The higher interest coverage for PECO Energy suggests lower credit risk. Again, these indicators will decline prospectively with the implementation of the pending federal income tax changes.

Quality of Earnings. Measures of earnings quality usually are revealed by the percentage of AFUDC related to income available for common equity, the effective income tax rate, and other cost deferrals. These measures of earnings quality usually influence a firm's internally generated funds because

[3] The complement of the operating ratio is the operating margin which provides a measure of profitability. The higher the operating ratio, the lower the operating margin.

poor quality of earnings would not generate high levels of cash flow. Quality of earnings has not been a significant concern for PECO Energy, the Electric Group, or the S&P Public Utilities.

Internally Generated Funds. Internally generated funds ("IGF") provide an important source of new investment capital for a utility and represent a key measure of credit strength. Historically, the five-year average percentage of IGF to capital expenditures was 82.7% for PECO Energy, 81.3% for the Electric Group, and 70.5% for the S&P Public Utilities. This indicates a fairly comparable risk for the Company and the reference groups. As noted previously, the IGF to construction expenditures will decline with the new lower federal income tax rate.

Betas. The financial data that I have been discussing relate primarily to company-specific risks. Market risk for firms with publicly traded stock is measured by beta coefficients. Beta coefficients attempt to identify systematic risk, *i.e.*, the risk associated with changes in the overall market for common equities.[4] Value Line publishes such a statistical measure of a stock's relative historical volatility to the rest of the market. A comparison of market risk is shown by the Value Line beta of .66 as the average for the Electric Group (see page 2 of Schedule 3), and .75 as the average for the S&P Public Utilities (see page 3 of Schedule 4).

[4] The procedure used to calculate the beta coefficient published by Value Line is described in Appendix H. A common stock that has a beta less than 1.0 is considered to have less systematic risk than the market as a whole and would be expected to rise and fall more slowly than the rest of the market. A stock with a beta above 1.0 would have more systematic risk.

22. Q. Based on your analysis, does the Electric Group provide a reasonable basis to measure the Company's cost of equity for this case?

A. Yes. Some risk indicators are higher for the Company, some are lower, and others are about the same. On balance, the risk factors average out, indicating that the cost of equity for the Electric Group provides a reasonable basis for measuring the Company's cost of equity.

IV. CAPITAL STRUCTURE RATIOS

23. Q. Please explain the selection of capital structure ratios for PECO Energy.

A. The capital structure ratios of PECO Energy should be employed for rate of return purposes. In the situation where the operating public utility raises its own debt directly in the capital markets, as is the case for the Company, it is proper to employ the capital structure ratios and senior capital cost rates of the regulated public utility for rate-of-return purposes. Furthermore, consistency requires that the embedded cost rates of the Company's senior securities also be employed. This procedure is consistent with the ratesetting procedures used by the Commission in prior rate cases for PECO Energy.

24. Q. Does Schedule 5 provide the Company's capitalization and capital structure ratios?

A. Yes. The December 31, 2017 capitalization corresponds with the end of the historic test year in this case, December 31, 2018 date corresponds with the end of the future test year, and December 31, 2019 date corresponds with the

end of the fully projected test year. In the future test year, the Company plans to issue $700 million of new long-term debt. This will consist of a $325 million bond issue that was actually issued February 23, 2018, a $325 million bond issue planned for September 2018, and $50 million of debt to be issued to the Philadelphia Industrial Development Corporation ("PIDC") also in September 2018. For the fully projected test year, there is a $250 million bond issue planned in September 2019. Future equity financings include $75.159 million in the future test year and $151.856 million in the fully projected test year. The build-up of retained savings is also reflected. In presenting the Company's capital structure on Schedule 5, I have removed several items for ratesetting purposes, including the treatment of the call premiums on the early redemption of high-cost long-term debt and preferred stock, which has been redeemed, and the accumulated Other Comprehensive Income ("OCI").

25. Q. Please describe the adjustment for the call premiums paid to redeem the high-cost debt.

A. I have adjusted the principal amounts of long-term debt and preferred stock to exclude the amounts used to finance premiums on the early redemption of these securities. To do otherwise would deny PECO Energy the full return on the premiums paid to redeem this high-cost capital since additional amounts of capital were issued to pay the call premiums. The amounts issued to finance the call premiums do not increase the Company's rate base. That is to say, no additional rate base was created through additional debt and preferred stock

necessary to finance this transaction, and therefore an adjustment is required to provide the return necessary to service this additional capital. Hence, PECO Energy's long-term debt and preferred stock amounts must be adjusted for this disparity in order that the return necessary to service the capitalization is produced from rate base investment times the overall rate of return.

This adjustment is equitable because customers receive the cost savings resulting from these refinancings in the form of a lower overall rate of return, and PECO Energy recovers all costs incurred in providing these benefits to customers. To produce these savings, the Company paid to the debt and preferred stock holders a premium for surrendering their securities prior to maturity. These premiums represented an investment made by PECO Energy to reduce its overall cost of capital. Because the reduced interest costs and preferred stock dividends are reflected in the lower cost of capital to customers, it is appropriate that the Company recover the costs incurred to produce these savings. This includes both a return of and return on the unamortized premiums. Adjusting the principal amounts in the capital structure provides a return on the premium as a part of the embedded cost rates of capital.

26. Q. Please describe the OCI adjustment.

A. I have removed the accumulated OCI from the capital structure for ratesetting purposes. OCI arises from a variety of sources, including: minimum pension liability, foreign-currency hedges, unrealized gains and losses on securities

available for sale, interest-rate swaps, and other cash-flow hedges. For PECO Energy, its OCI is represented by Unrealized Gains and Losses on Available-for-Sale Securities. The accounting entries that relate to accumulated OCI are unrelated to the Company's rate base determination and must be excluded from the common-equity balance. That is to say, these accounting entries neither produce nor consume cash, and hence they cannot impact the rate base valuation.

27. Q. Should short-term debt be included in the capital structure for rate of return purposes?

A. There is no need to consider short-term debt in the capital structure because PECO Energy does not have any short-term debt at the end of the historical and future test years and for the fully projected test year. Moreover, short-term debt is typically assumed to finance construction work in progress ("CWIP"), and the cost of short-term debt is reflected in the AFUDC rate.

28. Q. What capital structure ratios do you recommend be adopted for rate of return purposes in this proceeding?

A. Since ratesetting is prospective, the rate of return should, at a minimum, reflect known or reasonably foreseeable changes which will occur during the course of the test year. As a result, I will adopt the Company's fully projected test year-end capital structure ratios of 46.61% long-term debt and 53.39% common equity.

V. COSTS OF SENIOR CAPITAL

29. Q. What cost rate have you assigned to the debt portion of PECO Energy's capital structure?

A. The determination of the long-term debt cost rate is essentially an arithmetic exercise. This is because the Company has contracted for the use of this capital for a specific period of time at a specified cost rate. As shown on pages 1, 2 and 3 of Schedule 6, I have computed the embedded cost rate of long-term debt at the end of each test year. On page 3 of Schedule 6, I have shown the estimated embedded cost rate of long-term debt at December 31, 2019. The actual effective cost for the new issue that was sold on February 23, 2018 was 3.99%, including issuance costs. For the planned new issues of debt, the Company has budgeted 4.08% including issuance costs for the First Mortgage Bonds to be sold in September 2018, 2.24% including issuance costs for the PIDC issue in September 2018, and 4.15% including issuance cost for the First Mortgage Bond scheduled for September 2019. The development of the individual effective cost rates for each series of long-term debt, using the cost rate to maturity technique, is shown on page 4 of Schedule 6. The cost rate, or yield to maturity ("ytm"), is the rate of discount that equates the present value of all future interest and principal payments with the net proceeds of the bond. In my calculation of the embedded cost of long-term debt, I have recognized the costs associated with the Company's early redemption of high cost debt. As previously explained, it is necessary to compensate PECO Energy for the costs incurred to lower the embedded debt

cost rate, which reduces the cost of capital charged to customers.

30. Q. What cost rate have you determined for the Company's long-term debt?

A. I will adopt the 4.16% embedded cost of long-term debt at December 31, 2019, as shown on page 3 of Schedule 6. This rate is related to the amount of long-term debt shown on Schedule 5 which provides the basis for the 46.61% long-term debt ratio.

VI. COST OF EQUITY – GENERAL APPROACH

31. Q. Please describe how you determined the cost of equity for the Company.

A. Although my fundamental financial analysis provides the required framework to establish the risk relationships among PECO Energy, the Electric Group, and the S&P Public Utilities, the cost of equity must be measured by standard financial models that I identified above. Differences in risk traits, such as size, business diversification, geographical diversity, regulatory policy, financial leverage, and bond ratings must be considered when analyzing the cost of equity.

It is also important to reiterate that no one method or model of the cost of equity can be applied in an isolated manner. Rather, informed judgment must be used to take into consideration the relative risk traits of the firm. It is for this reason that I have used more than one method to measure the Company's cost of equity. As I describe below, each of the methods used to measure the cost of equity contains certain incomplete and/or overly restrictive

assumptions and constraints that are not optimal. Therefore, I favor considering the results from a variety of methods. In this regard, I applied each of the methods with data taken from the Electric Group and arrived at a cost of equity of 10.95% for PECO Energy, which includes recognition of strong management performance.

VII. DISCOUNTED CASH FLOW ANALYSIS

32. Q. Please describe the Discounted Cash Flow model.

A. The DCF model seeks to explain the value of an asset as the present value of future expected cash flows discounted at the appropriate risk-adjusted rate of return. In its simplest form, the DCF return on common stock consists of a current cash (dividend) yield and future price appreciation (growth) of the investment. The dividend discount equation is the familiar DCF valuation model and assumes future dividends are systematically related to one another by a constant growth rate. The DCF formula is derived from the standard valuation model: $P = D/(k-g)$, where P = price, D = dividend, k = the cost of equity, and g = growth in cash flows. By rearranging the terms, we obtain the familiar DCF equation: $k= D/P + g$. All of the terms in the DCF equation represent investors' assessment of expected future cash flows that they will receive in relation to the value that they set for a share of stock (P). The DCF equation is sometimes referred to as the "Gordon" model.[5] My DCF results

[5] Although the popular application of the DCF model is often attributed to the work of Myron J. Gordon in the mid-1950's, J. B. Williams exposited the DCF model in its present form nearly two decades earlier.

are provided on page 2 of Schedule 1 for the Electric Group. The DCF return is 10.71%.

Among other limitations of the model, there is a certain element of circularity in the DCF method when applied in rate cases. This is because investors' expectations for the future depend upon regulatory decisions. In turn, when regulators depend upon the DCF model to set the cost of equity, they rely upon investor expectations that include an assessment of how regulators will decide rate cases. Due to this circularity, the DCF model may not fully reflect the true risk of a utility.

33. Q. What is the dividend yield component of a DCF analysis?

A. The dividend yield reveals the portion of investors' cash flow that is generated by the return provided by dividend receipts. It is measured by the dividends per share relative to the price per share. The DCF methodology requires the use of an expected dividend yield to establish the investor-required cost of equity. For the twelve months ended December 2017, the monthly dividend yields are shown on Schedule 7 and reflect an adjustment to the month-end prices to reflect the buildup of the dividend in the price that has occurred since the last ex-dividend date (i.e., the date by which a shareholder must own the shares to be entitled to the dividend payment – usually about two to three weeks prior to the actual payment).

For the twelve months ended December 2017 the average dividend yield was 3.73% for the Electric Group based upon a calculation using annualized

dividend payments and adjusted month-end stock prices. The dividend yields for the more recent six- and three-month periods were 3.62% and 3.56%, respectively. I have used, for the purpose of the DCF model, the six-month average dividend yield of 3.62% for the Electric Group. The use of this dividend yield will reflect current capital costs, while avoiding spot yields. For the purpose of a DCF calculation, the average dividend yield must be adjusted to reflect the prospective nature of the dividend payments, i.e., the higher expected dividends for the future. Recall that the DCF is an expectational model that must reflect investor-anticipated cash flows for the Electric Group. I have adjusted the six-month average dividend yield in three different, but generally accepted, manners and used the average of the three adjusted values as calculated in the lower panel of data presented on Schedule 7. This adjustment adds eleven basis points to the six-month average historical yield, thus producing the 3.73% adjusted dividend yield for the Electric Group.

34. Q. What factors influence investors' growth expectations?

A. As noted previously, investors are interested principally in the dividend yield and future growth of their investment (i.e., the price per share of the stock). Future growth in earnings per share represents the DCF model's primary focus because, under the model's assumption of a constant price-earnings multiple, the price per share of stock will grow at the same rate as earnings per share. In conducting a growth rate analysis, a wide variety of variables can be considered when reaching a consensus of prospective growth, including:

earnings, dividends, book value, and cash flow stated on a per share basis. Historical values for these variables can be considered, as well as analysts' forecasts that are widely available to investors. A fundamental growth rate analysis is sometimes represented by the internal growth ("b x r"), where "r" represents the expected rate of return on common equity and "b" is the retention rate that consists of the fraction of earnings that are not paid out as dividends. To be complete, the internal growth rate should be modified to account for sales of new common stock -- this is called external growth ("s x v"), where "s" represents the new common shares expected to be issued by a firm and "v" represents the value that accrues to existing shareholders from selling stock at a price different from book value. Fundamental growth, which combines internal and external growth, provides an explanation of the factors that cause book value per share to grow over time.

Growth also can be expressed in multiple stages. This expression of growth consists of an initial "growth" stage where a firm enjoys rapidly expanding markets, high profit margins, and abnormally high growth in earnings per share. Thereafter, a firm enters a "transition" stage where fewer technological advances and increased product saturation begin to reduce the growth rate and profit margins come under pressure. During the "transition" phase, investment opportunities begin to mature, capital requirements decline, and a firm begins to pay out a larger percentage of earnings to shareholders. Finally, the mature or "steady-state" stage is reached when a firm's earnings growth, payout ratio, and return on equity stabilize at levels where they

remain for the life of a firm. The three stages of growth assume a step-down of high initial growth to lower sustainable growth. Even if these three stages of growth can be envisioned for a firm, the third "steady-state" growth stage, which is assumed to remain fixed in perpetuity, represents an unrealistic expectation because the three stages of growth can be repeated. That is to say, the stages can be repeated where growth for a firm ramps-up and ramps-down in cycles over time. For these reasons, there is no need to analyze growth rates individually for each cycle, but rather to rely upon analysts' growth forecasts, which are those used by investors when pricing common stocks.

35. Q. What investor-expected growth rate is appropriate in a DCF calculation?

A. Investors consider both company-specific variables and overall market sentiment (i.e., level of inflation rates, interest rates, economic conditions, etc.) when balancing their capital gains expectations with their dividend yield requirements. I follow an approach that is not rigidly formatted because investors are not influenced by a single set of company-specific variables weighted in a formulaic manner.

36. Q. How did you determine an appropriate growth rate?

A. The growth rate used in a DCF calculation should measure investor expectations. Investors consider both company-specific variables and overall market sentiment (i.e., level of inflation rates, interest rates, economic conditions, etc.) when balancing their capital gains expectations with their dividend yield requirements. Investors are not influenced solely by a single set

of company-specific variables weighted in a formulaic manner. Therefore, all relevant growth rate indicators using a variety of techniques must be evaluated when formulating a judgment of investor-expected growth.

37. Q. What data for the Electric Group have you considered in your growth rate analysis?

A. I have considered the growth in the financial variables shown on Schedules 8 and 9. In this regard, I have considered both historical and projected growth rates in earnings per share, dividends per share, book value per share, and cash flow per share for the Electric Group. While analysts will review all measures of growth as I have done, it is earnings per share growth that influences directly the expectations of investors for utility stocks. Forecasts of earnings growth are required within the context of the DCF because the model is a forward-looking concept and, with a constant price-earnings multiple and payout ratio, all other measures of growth will mirror earnings growth. So, with the assumptions underlying the DCF, all forward-looking projections should be similar with a constant price-earnings multiple, earned return, and payout ratio. The historical growth rates were taken from the Value Line publication that provides this data. As to the issue of historical data, investors cannot purchase past earnings of a utility, rather they are only entitled to future earnings. In addition, assigning significant weight to historical performance results in double counting of the historical data. While history cannot be ignored, it is already factored into the analysts' forecasts of earnings growth. In developing a forecast of future earnings growth, an analyst would

first apprise himself/herself of the historical performance of a company. Hence, there is no need to count historical growth rates a second time, because historical performance is already reflected in analysts' forecasts which reflect an assessment of how the future will diverge from historical performance. As shown on Schedule 8, the historical growth of earnings per share was in the range of -0.06% to 3.33% for the Electric Group. Negative growth that occurred in the past is not reflective of investor expectations for the future that encompass positive returns.

38. Q. Is a five-year investment horizon associated with the analysts' forecasts consistent with the traditional DCF model?

A. Yes. The constant form of the DCF assumes an infinite stream of cash flows, but investors do not expect to hold an investment indefinitely. Rather than viewing the DCF in the context of an endless stream of growing dividends (e.g., a century of cash flows), the growth in the share value (i.e., capital appreciation, or capital gains yield) is most relevant to investors' total return expectations. Hence, the sale price of a stock can be viewed as a liquidating dividend that can be discounted along with the annual dividend receipts during the investment-holding period to arrive at the investor expected return. The growth in the price per share will equal the growth in earnings per share absent any change in price-earnings ("P-E") multiple -- a necessary assumption of the DCF. As such, my company-specific growth analysis, which focuses principally upon five-year forecasts of earnings per share growth, conforms with the type of analysis that influences the actual total

return expectation of investors. Moreover, academic research focuses on five-year growth rates as they influence stock prices. Indeed, if investors really required forecasts which extended beyond five years in order to properly value common stocks, then I am sure that some investment advisory service would begin publishing that information for individual stocks in order to meet the demands of investors. The absence of such a publication suggests that there is no market for this information, because investors do not require infinite forecasts in order to purchase and sell stocks in the marketplace.

39. Q. What are the analysts' forecasts of future growth that you considered?

A. Schedule 9 provides projected earnings per share growth rates taken from analysts' five-year forecasts compiled by IBES/First Call, Zacks, Morningstar, SNL, and Value Line. IBES/First Call, Zacks, Morningstar, and SNL represent reliable authorities of projected growth upon which investors rely. The IBES/First Call, Zacks, and SNL growth rates are consensus forecasts taken from a survey of analysts that make projections of growth for these companies. The IBES/First Call, Zacks, Morningstar, and SNL estimates are obtained from the Internet and are widely available to investors. First Call probably is quoted most frequently in the financial press when reporting on earnings forecasts. The Value Line forecasts also are widely available to investors and can be obtained by subscription or free-of-charge at most public and collegiate libraries. The IBES/First Call, Zacks, Morningstar, and SNL forecasts are limited to earnings per share growth, while Value Line makes projections of other financial variables. The Value Line forecasts of dividends

per share, book value per share, and cash flow per share have also been included on Schedule 9 for the Electric Group.

40. Q. What are the projected growth rates published by the sources you discussed?

A. As to the five-year forecast growth rates, Schedule 9 indicates that the projected earnings per share growth rates for the Electric Group are 4.27% by IBES/First Call, 5.24% by Zacks, 5.75% by Morningstar, 4.78% by SNL and 6.06%% by Value Line. As noted earlier, with the constant price-earnings multiple assumption of the DCF model, growth for these companies will occur at the higher earnings per share growth rate, thus producing the capital gains yield expected by investors.

41. Q. What other factors did you consider in developing a growth rate?

A. A variety of factors should be examined to reach a conclusion on the DCF growth rate. However, certain growth rate variables should be emphasized when reaching a conclusion on an appropriate growth rate. From the various alternative measures of growth identified above, earnings per share should receive greatest emphasis. Growth in earnings per share is the primary determinant of investors' expectations regarding their total returns in the stock market. This is because the capital gains yield (i.e., price appreciation) will track earnings growth with a constant price earnings multiple (a key assumption of the DCF model). Moreover, earnings per share (derived from net income) are the source of dividend payments and are the primary driver of

retention growth and its surrogate, i.e., book value per share growth. As such, under these circumstances, greater emphasis must be placed upon projected earnings per share growth. In this regard, it is worthwhile to note that Professor Myron Gordon, the foremost proponent of the DCF model in rate cases, concluded that the best measure of growth in the DCF model is a forecast of earnings per share growth.[6] Hence, to follow Professor Gordon's findings, projections of earnings per share growth, such as those published by IBES/First Call, Zacks, Morningstar, SNL, and Value Line, represent a reasonable assessment of investor expectations.

42. Q. What growth rate do you use in your DCF model?

A. The forecasts of earnings per share growth, as shown on Schedule 9, provide a range of average growth rates of 4.27% to 6.06%. Although the DCF growth rates cannot be established solely with a mathematical formulation, it is my opinion that an investor-expected growth rate of 5.75% is a reasonable estimate of investor expected growth within the array of earnings per share growth rates shown by the analysts' forecasts. Indeed, my 5.75% growth rate is obtained from the analysts' growth forecasts that cover a five-year period, which are the growth rates that investors employ for DCF purposes. Improved economic growth supports a DCF growth rate near the high end of the range. Economic growth is expected to accelerate as a result of the stimulus provided by the recent federal corporate income tax changes.

[6] Gordon, Gordon & Gould, "Choice Among Methods of Estimating Share Yield," The Journal of Portfolio Management (Spring 1989).

43. Q. Are the dividend yield and growth components of the DCF adequate to explain the rate of return on common equity when it is used in the calculation of the weighted average cost of capital?

A. Only if the capital structure ratios are measured with the market value of debt and equity. In the case of the Electric Group, those average capital structure ratios are 42.95% long-term debt, 0.06% preferred stock, and 56.99% common equity, as shown on Schedule 10. If book values are used to compute the capital structure ratios, then a leverage adjustment is required.

44. Q. What is a leverage adjustment?

A. Where a firm's capitalization, as measured by its stock price, diverges from its book value capitalization, the potential exists for a financial risk difference, because the capitalization of a utility measured at its market value contains more equity, less debt and therefore less risk than the capitalization measured at its book value. A leverage adjustment accounts for this difference between market value and book value capital structures.

45. Q. Why is a leverage adjustment necessary?

A. In order to make the DCF results relevant to the capitalization measured at book value (as is done for rate setting purposes) the market-derived cost rate must be adjusted to account for this difference in financial risk. The only perspective that is important to investors is the return that they can realize on the market value of their investment. As I have measured the DCF, the simple

yield (D/P) plus growth (g) provides a return applicable strictly to the price (P) that an investor is willing to pay for a share of stock. The need for the leverage adjustment arises when the results of the DCF model (k) are to be applied to a capital structure that is different than indicated by the market price (P). From the market perspective, the financial risk of the Electric Group is accurately measured by the capital structure ratios calculated from the market capitalization of a firm. If the rate setting process utilized the market capitalization ratios, then no additional analysis or adjustment would be required, and the simple yield (D/P) plus growth (g) components of the DCF would satisfy the financial risk associated with the market value of the equity capitalization. Because the rate setting process uses a different set of ratios calculated from the book value capitalization, then further analysis is required to synchronize the financial risk of the book capitalization with the required return on the book value of the equity. This adjustment is developed through precise mathematical calculations, using well recognized analytical procedures that are widely accepted in the financial literature. To arrive at that return, the rate of return on common equity is the unleveraged cost of capital (or equity return at 100% equity) plus one or more terms reflecting the increase in financial risk resulting from the use of leverage in the capital structure. The calculations presented in the lower panel of data shown on Schedule 10, under the heading "M&M," provides a return of 7.39% when applicable to a capital structure with 100% common equity.

46. Q. Are there specific factors that influence market-to-book ratios that need to be taken into account in order to determine whether the leverage adjustment should be made?

A. No. The leverage adjustment is not intended, nor was it designed, to address the reasons that stock prices vary from book value. Hence, any observations concerning variations of market prices relative to book value are not relevant. The leverage adjustment deals with the issue of financial risk and does not transform the DCF result into a book value return through a market-to-book adjustment. Again, the leverage adjustment that I propose is based on the fundamental financial precept that the cost of equity is equal to the rate of return for an unleveraged firm (i.e., where the overall rate of return equates to the cost of equity with a capital structure that contains 100% equity) plus the additional return required for introducing debt and/or preferred stock leverage into the capital structure.

Further, as noted previously, the relatively high market prices of utility stocks cannot be attributed solely to the notion that these companies are expected to earn a return on the book value of equity that differs from their cost of equity determined from stock market prices. While stock prices above book value are common for utility stocks, the stock prices of non-regulated companies exceed book values by even greater margins. In this regard, according to the Barron's issue of January 22, 2018, the major market indices' market-to-book ratios are well above unity. The Dow Jones Utility index traded at a multiple of 1.98 times book value, which is below the market multiple of other indices.

For example, the S&P Industrial index was at 4.82 times book value, and the Dow Jones Industrial index was at 4.50 times book value. It is difficult to accept that the vast majority of all firms operating in our economy are generating returns far in excess of their cost of capital. Certainly, in our free-market economy, competition should contain such "excesses" if they indeed exist.

Finally, the leverage adjustment adds stability to the final DCF cost rate. That is to say, as the market capitalization increases relative to its book value, the leverage adjustment increases while the simple yield (D/P) plus growth (g) result declines. The reverse is also true that when the market capitalization declines, the leverage adjustment also declines as the simple yield (D/P) plus growth (g) result increases.

47. Q. Is the leverage adjustment that you propose designed to transform the market return into one that is designed to produce a particular market-to-book ratio?

A. No, it is not. The adjustment that I label as a "leverage adjustment" is merely a convenient way of showing the amount that must be added to (or subtracted from) the result of the simple DCF model (i.e., D/P + g), in the context of a return that applies to the capital structure used in ratemaking, which is computed with book value weights rather than market value weights, in order to arrive at the utility's total cost of equity. I specify a separate factor, which I call the leverage adjustment, but there is no need to do so other than providing

identification for this factor. If I expressed my return solely in the context of the book value weights that we use to calculate the weighted average cost of capital, and ignore the familiar D/P + g expression entirely, then there would be no separate element to reflect the financial leverage change from market value to book value capitalization. As shown in the bottom panel of data on Schedule 10, the equity return applicable to the book value common equity ratio is equal to 7.39%, which is the return for the Electric Group applicable to its equity with no debt in its capital structure (i.e., the cost of capital is equal to the cost of equity with a 100% equity ratio) plus 3.32% compensation for having a 54.49% debt ratio, plus 0.00% for having a 0.08% preferred stock ratio. The sum of the parts is 10.71% (7.39% + 3.32% + 0.00%) and there is no need to even address the cost of equity in terms of D/P + g. To express this same return in the context of the familiar DCF model, I summed the 3.73% dividend yield, the 5.75% growth rate, and the 1.23% for the leverage adjustment in order to arrive at the same 10.71% (3.73% + 5.75% + 1.23%) return. I know of no means to mathematically solve for the 1.23% leverage adjustment by expressing it in the terms of any particular relationship of market price to book value. The 1.23% adjustment is merely a convenient way to compare the 10.71% return computed directly with the Modigliani & Miller formulas to the 9.48% return generated by the DCF model (i.e., D_1/P_0 + g, or the traditional form of the DCF -- see page 1 of Schedule 7) based on a market value capital structure. A 9.48% return assigned to anything other than the market value of equity cannot equate to a reasonable return on book

value that has higher financial risk. My point is that when we use a market-determined cost of equity developed from the DCF model, it reflects a level of financial risk that is different (in this case, lower) from the capital structure stated at book value. This process has nothing to do with targeting any particular market-to-book ratio.

48. Q. What does your DCF analysis show?

A. As explained previously, I have utilized a six-month average dividend yield ("D_1/P_0") adjusted in a forward-looking manner for my DCF calculation. This dividend yield is used in conjunction with the growth rate ("g") previously developed. The DCF also includes the leverage modification ("lev.") required when the book value equity ratio is used in determining the weighted average cost of capital in the rate setting process rather than the market value equity ratio related to the price of stock.

	D_1/P_0	+	g	+	*lev.*	=	k
Electric Group	3.73%	+	5.75%	+	1.23%	=	10.71%

The DCF result shown above represents the simplified (i.e., Gordon) form of the model that contains a constant growth assumption. I should reiterate, however, that the DCF-indicated cost rate provides an explanation of the rate of return on common stock market prices without regard to the prospect of a change in the price-earnings multiple. An assumption that there will be no change in the price-earnings multiple is not supported by the realities of the equity market, because price-earnings multiples do not remain constant. This

is one of the constraints of this model that makes it important to consider other model results when determining a company's cost of equity. In the current environment of rising interest rates, the DCF method tends to be less responsive to (i.e., lags) changes in those rates. As such, other methods for measuring the cost of equity, e.g., Risk Premium and CAPM, should be emphasized because they respond promptly to change in interest rates.

VIII. RISK PREMIUM ANALYSIS

49. Q. Please describe your use of the risk premium approach to determine the cost of equity.

A. With the Risk Premium approach, the cost of equity capital is determined by corporate bond yields plus a premium to account for the fact that common equity is exposed to greater investment risk than debt capital. The result of my Risk Premium study is shown on page 2 of Schedule 1. That result is 11.25%.

50. Q. What long-term public utility debt cost rate did you use in your risk premium analysis?

A. In my opinion, and as I will explain in more detail further in my testimony, a 4.75% yield represents a reasonable estimate of the prospective yield on long-term A-rated public utility bonds.

51. Q. Please explain what is shown in Schedule 11.

A. I have analyzed the historical yields on the Moody's index of long-term public utility debt as shown on page 1 of Schedule 11. For the twelve months ended December 2017, the average monthly yield on Moody's index of A-rated public utility bonds was 4.00%. For the six and three-month periods ended December 2017, the yields were 3.88% and 3.84%, respectively. During the twelve-months ended December 2017, the range of the yields on A-rated public utility bonds was 3.79% to 4.23%. Page 2 of Schedule 11 shows the long-run spread in yields between A-rated public utility bonds and long-term Treasury bonds. As shown on page 3 of Schedule 11, the yields on A-rated public utility bonds have exceeded those on Treasury bonds by 1.10% on a twelve-month average basis, 1.06% on a six-month average basis, and 1.03% on a three-month average basis. From these averages, 1.00% represents a conservative spread for the yield on A-rated public utility bonds over Treasury bonds.

52. Q. What forecasts of interest rates have you considered in your analysis?

A. I have determined the prospective yield on A-rated public utility debt by using the Blue Chip Financial Forecasts ("Blue Chip") along with the spread in the yields that I describe below. Blue Chip is a reliable authority and contains consensus forecasts of a variety of interest rates compiled from a panel of banking, brokerage, and investment advisory services. In early 1999, Blue Chip stopped publishing forecasts of yields on A-rated public utility bonds

because the Federal Reserve deleted these yields from its Statistical Release H.15. To independently project a forecast of the yields on A-rated public utility bonds, I have combined the forecast yields on long-term Treasury bonds published on January 1, 2018, and a yield spread of 1.00%, derived from historical data.

53. Q. How have you used these data to project the yield on A-rated public utility bonds for the purpose of your Risk Premium analyses?

A. Shown below is my calculation of the prospective yield on A-rated public utility bonds using the building blocks discussed above, i.e., the Blue Chip forecast of Treasury bond yields and the public utility bond yield spread. For comparative purposes, I also have shown the Blue Chip forecasts of Aaa-rated and Baa-rated corporate bonds. These forecasts are:

		Blue Chip Financial Forecasts				
		Corporate		30-Year	A-rated Public Utility	
Year	Quarter	Aaa-rated	Baa-rated	Treasury	Spread	Yield
2018	First	3.8%	4.5%	3.0%	1.00%	4.00%
2018	Second	4.0%	4.7%	3.1%	1.00%	4.10%
2018	Third	4.2%	4.9%	3.3%	1.00%	4.30%
2018	Fourth	4.4%	5.1%	3.4%	1.00%	4.40%
2019	First	4.5%	5.2%	3.5%	1.00%	4.50%
2019	Second	4.6%	5.4%	3.6%	1.00%	4.60%

54. Q. Are there additional forecasts of interest rates that extend beyond those shown above?

A. Yes. Twice yearly, Blue Chip provides long-term forecasts of interest rates. In its December 1, 2017 publication, Blue Chip published longer-term forecasts of interest rates, which were reported to be:

	Blue Chip Financial Forecasts		
	Corporate		30-Year
Averages	Aaa-rated	Baa-rated	Treasury
2019-2023	5.1%	6.0%	4.1%
2024-2028	5.4%	6.2%	4.3%

The longer-term forecasts by Blue Chip suggest that interest rates will move up from the levels revealed by the near-term forecasts. By focusing more on these forecasts, a 4.75% yield on A-rated public utility bonds represents a reasonable benchmark for measuring the cost of equity in this case. In reaching my conclusion as to a prospectively yield on A-rated public utility debt, I have considered the data relied upon by investors.

55. Q. What equity risk premium have you determined for public utilities?

A. To develop an appropriate equity risk premium, I analyzed the results from 2017 SBBI Yearbook, Stocks, Bonds, Bills and Inflation. My investigation reveals that the equity risk premium varies according to the level of interest rates. That is to say, the equity risk premium increases as interest rates decline and it declines as interest rates increase. This inverse relationship is revealed by the summary data presented below and shown on page 1 of Schedule 12.

Common Equity Risk Premiums		
Low Interest Rates		7.08%
Average Across All Interest Rates		5.64%
High Interest Rates		4.18%

Based on my analysis of the historical data, the equity risk premium was 7.08% when the marginal cost of long-term government bonds was low (i.e., 2.96%, which was the average yield during periods of low rates). Conversely, when the yield on long-term government bonds was high (i.e., 7.22% on average during periods of high interest rates) the spread narrowed to 4.18%. Over the entire spectrum of interest rates, the equity risk premium was 5.64% when the average government bond yield was 5.07%. With the forecast indicating an upward movement of interest rates that I described above from historically low levels, I have utilized a 6.50% equity risk premium. This equity risk premium is between the 7.08% premium related to periods of low interest rates and the 5.64% premium related to average interest rates across all levels.

56. Q. What common equity cost rate did you determine based on your risk premium analysis?

A. The cost of equity (i.e., "k") is represented by the sum of the prospective yield for long-term public utility debt (i.e., "i") and the equity risk premium (i.e., "RP"). The Risk Premium approach provides a cost of equity of:

$$i + RP = k$$

Electric Group	4.75%	+	6.50%	= 11.25%

Indeed, in an environment of rising interest rates, the Risk Premium model provides a direct reflection of the cost of equity that captures higher interest rates.

IX. CAPITAL ASSET PRICING MODEL

57. Q. How is the CAPM used to measure the cost of equity?

A. The CAPM uses the yield on a risk-free interest-bearing obligation plus a rate of return premium that is proportional to the systematic risk of an investment. As shown on page 2 of Schedule 1, the result of the CAPM is 10.00%. To compute the cost of equity with the CAPM, three components are necessary: a risk-free rate of return ("Rf"), the beta measure of systematic risk ("β"), and the market risk premium ("Rm-Rf") derived from the total return on the market of equities reduced by the risk-free rate of return. The CAPM specifically accounts for differences in systematic risk (i.e., market risk as measured by the beta) between an individual firm or group of firms and the entire market of equities.

58. Q. What betas have you considered in the CAPM?

A. For my CAPM analysis, I initially considered the Value Line betas. As shown on page 2 of Schedule 3, the average beta is 0.66 for the Electric Group.

59. Q. Did you use the Value Line betas in the CAPM determined cost of equity?

A. I used the Value Line betas as a foundation for the leverage adjusted betas that I used in the CAPM. The betas must be reflective of the financial risk associated with the rate setting capital structure that is measured at book value. Therefore, Value Line betas cannot be used directly in the CAPM, unless the cost rate developed using those betas is applied to a capital

structure measured with market values. To develop a CAPM cost rate applicable to a book-value capital structure, the Value Line (market value) betas have been unleveraged and re-leveraged for the book value common equity ratios using the Hamada formula,[7] as follows:

$$\beta l = \beta u \, [1 + (1 - t) \, D/E + P/E]$$

where ßl = the leveraged beta, ßu = the unleveraged beta, t = income tax rate, D = debt ratio, P = preferred stock ratio, and E = common equity ratio. The betas published by Value Line have been calculated with the market price of stock and are related to the market value capitalization. By using the formula shown above and the capital structure ratios measured at market value, the beta would become 0.44 for the Electric Group if it employed no leverage and was 100% equity financed. Those calculations are shown on Schedule 10 under the section labeled "Hamada" who is credited with developing those formulas. With the unleveraged beta as a base, I calculated the leveraged beta of 0.78 for the book value capital structure of the Electric Group. The book value leveraged beta that I will employ in the CAPM cost of equity is 0.78 for the Electric Group.

60. Q. What risk-free rate have you used in the CAPM?

A. As shown on page 1 of Schedule 13, I provided the historical yields on Treasury notes and bonds. For the twelve months ended December 2017, the

[7] Robert S. Hamada, "The Effects of the Firm's Capital Structure on the Systematic Risk of Common Stocks" *The Journal of Finance* Vol. 27, No. 2, Papers and Proceedings of the Thirtieth Annual Meeting of the American Finance Association, New Orleans, Louisiana, December 27-29, 1971. (May 1972), pp. 435-452.

average yield on 30-year Treasury bonds was 2.90%. For the six- and three-months ended December 2017, the yields on 30-year Treasury bonds were 2.82% and 2.82%, respectively. During the twelve-months ended December 2017, the range of the yields on 30-year Treasury bonds was 2.77% to 3.08%. The low yields that existed during recent periods can be traced to the financial crisis and its aftermath commonly referred to as the Great Recession. The resulting decline in the yields on Treasury obligations was attributed to a number of factors, including: the sovereign debt crisis in the euro zone, concern over a possible double dip recession, the potential for deflation, and the Federal Reserve's large balance sheet that was expanded through the purchase of Treasury obligations and mortgage-backed securities (also known as QEI, QEII, and QEIII), and the reinvestment of the proceeds from maturing obligations and the lengthening of the maturity of the Fed's bond portfolio through the sale of short-term Treasuries and the purchase of long-term Treasury obligations (also known as "operation twist"). Essentially, low interest rates were the product of the policy of the Federal Open Market Committee ("FOMC") in its attempt to deal with stagnant job growth, which is part of its dual mandate. The FOMC ended its bond purchasing program. At its December 16, 2015 meeting, the FOMC increased the federal funds rate range by 0.25 percentage points. On December 14, 2016, the FOMC acted again by raising the Fed Funds rate by one-quarter percentage point. The FOMC also used this occasion to express a more aggressive approach to future increases in interest rates. In addition, the Fed has indicated that it will

reduce the size of its balance sheet. FOMC increased the fed funds rate on three occasions in 2017 (i.e., March 15, 2017, June 14, 2017 and December 13, 2017) by one-quarter percentage point each. The Wall Street Journal has also reported that three one-quarter percentage point rate increases are anticipated for 2018 and two one-quarter percentage point rate increases will likely follow in each of the years 2019 and 2020. This buttresses the prospect that higher interest rates are on the horizon.

As shown on page 2 of Schedule 13, forecasts published by Blue Chip on January 1, 2018 indicate that the yields on long-term Treasury bonds are expected to be in the range of 3.0% to 3.6% during the next six quarters. The longer-term forecasts described previously show that the yields on 30-year Treasury bonds will average 4.1% from 2019 through 2023 and 4.3% from 2024 to 2028. For the reasons explained previously, forecasts of interest rates should be emphasized at this time in selecting the risk-free rate of return in CAPM. Hence, I have used a 3.75% risk-free rate of return for CAPM purposes, which considers the Blue Chip forecasts.

61. Q. What market premium have you used in the CAPM?

A. As shown in the lower panel of data presented on page 2 of Schedule 13, the market premium is derived from historical data and the forecast returns. For the historically based market premium, I have used the arithmetic mean obtained from the data presented on page 1 of Schedule 12. On that schedule, the market return was 11.97% on large stocks during periods of low interest

rates. During those periods, the yield on long-term government bonds was 2.96% when interest rates were low. As I describe above, interest rates are forecast to trend upward in the future. To recognize that trend, I have given weight to the average returns and yields that existed across all interest rate levels. As such, I carried over to page 2 of Schedule 13 the average large common stock returns of 11.96% (11.97% + 11.95% = 23.92% ÷ 2) and the average yield on long-term government bonds of 4.02% (2.96% + 5.07% = 8.03% ÷ 2). These financial returns rest between those experienced during periods of low interest rates and those experienced across all levels of interest rates. The resulting market premium is 7.94% (11.96% - 4.02%) based on historical data, as shown on page 2 of Schedule 13. For the forecast returns, I calculated an 11.83% DCF return for the S&P 500. Normally, I would also include the Value Line forecast data as part of the market premium calculation. But in this instance, the Value Line result of 7.64% is clearly anomalous. I say this because those forecasts are established by Value Line in a hypothesized economic environment three to five years in the future. However, given when the Value Line forecasts were made, they would have hypothesized an economic environment with real GDP growth of approximately 2.5%. With the recent changes in the federal tax law, GDP is expected to increase from that level. As such, I have suspended the use of the Value Line forecast for the purpose of this case. With the forecast return of 11.80%, I calculated a market premium of 8.08% (11.83% - 3.75%) using the S&P 500 forecast data. Indeed, this forecast market premium is more in-line

with historical evidence. The market premium applicable to the CAPM derived from these sources equals 8.01% (8.08% + 7.94% = 16.02% ÷ 2).

62. Q. What does your CAPM analysis show?

A. Using the 3.75% risk-free rate of return, the leverage adjusted beta of 0.78 for the Electric Group, and the 8.00% market premium, the following result is indicated.

	Rf	+	*ß*	*x* (	*Rm-Rf*	)	=	*k*
Electric Group	3.75%	+	0.78	x (	8.01%	)	=	10.00%

X. COMPARABLE EARNINGS APPROACH

63. Q. What is the Comparable Earnings approach?

A. The Comparable Earnings approach estimates a fair return on equity by comparing returns realized by non-regulated companies to returns that a public utility with similar risks characteristics would need to realize in order to compete for capital. Because regulation is a substitute for competitively determined prices, the returns realized by non-regulated firms with comparable risks to a public utility provide useful insight into investor expectations for public utility returns. The firms selected for the Comparable Earnings approach should be companies whose prices are not subject to cost-based price ceilings (i.e., non-regulated firms) so that circularity is avoided.

There are two avenues available to implement the Comparable Earnings approach. One method involves the selection of another industry (or

industries) with comparable risks to the public utility in question, and the results for all companies within that industry serve as a benchmark. The second approach requires the selection of parameters that represent similar risk traits for the public utility and the comparable risk companies. Using this approach, the business lines of the comparable companies become unimportant. The latter approach is preferable with the further qualification that the comparable risk companies exclude regulated firms in order to avoid the circular reasoning implicit in the use of the achieved earnings/book ratios of other regulated firms. The United States Supreme Court has held that:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[8]

It is important to identify the returns earned by firms that compete for capital with a public utility. This can be accomplished by analyzing the returns of non-regulated firms that are subject to the competitive forces of the marketplace.

[8] Bluefield Water Works & Improvement Co., 262 U.S. at 692-93.

64. Q. Did you compare the results of your DCF and CAPM analyses to the results indicated by a Comparable Earnings approach?

A. Yes. I selected companies from The Value Line Investment Survey for Windows that have six categories of comparability designed to reflect the risk of the Electric Group. These screening criteria were based upon the range as defined by the rankings of the companies in the Electric Group. The items considered were: Timeliness Rank, Safety Rank, Financial Strength, Price Stability, Value Line betas, and Technical Rank. The definitions for these parameters are provided on page 3 of Schedule 14. The identities of the companies comprising the Comparable Earnings group and their associated rankings within the ranges are identified on page 1 of Schedule 14.

Value Line data was relied upon because it provides a comprehensive basis for evaluating the risks of the comparable firms. As to the returns calculated by Value Line for these companies, there is some downward bias in the figures shown on page 2 of Schedule 14, because Value Line computes the returns on year-end rather than average book value. If average book values had been employed, the rates of return would have been slightly higher. Nevertheless, these are the returns considered by investors when taking positions in these stocks. Because many of the comparability factors, as well as the published returns, are used by investors in selecting stocks, and the fact that investors rely on the Value Line service to gauge returns, it is an appropriate database for measuring comparable return opportunities.

65. Q. What data did you consider in your Comparable Earnings analysis?

A. I used both historical realized returns and forecasted returns for non-utility companies. As noted previously, I have not used returns for utility companies in order to avoid the circularity that arises from using regulatory-influenced returns to determine a regulated return. It is appropriate to consider a relatively long measurement period in the Comparable Earnings approach in order to cover conditions over an entire business cycle. A ten-year period (five historical years and five projected years) is sufficient to cover an average business cycle. Unlike the DCF and CAPM, the results of the Comparable Earnings method can be applied directly to the book value capitalization. In other words, the Comparable Earnings approach does not contain the potential for improper specification inherent in market models when the market capitalization and book value capitalization diverge significantly. A point of demarcation was chosen to eliminate the results of highly profitable enterprises, which the Bluefield case stated were not the type of returns that a utility was entitled to earn. For this purpose, I used 20% as the point where those returns could be viewed as highly profitable and should be excluded from the Comparable Earnings approach. The average historical rate of return on book common equity was 11.7% using only the returns that were less than 20%, as shown on page 2 of Schedule 14. The average forecasted rate of return as published by Value Line is 13.0% also using values less than 20%, as provided on page 2 of Schedule 15. Using the average of these data my Comparable Earnings result is 12.35%, as shown on page 2 of Schedule 1.

XI. CONCLUSION

66. Q. What is your conclusion regarding the Company's cost of common equity?

A. Based upon the application of a variety of methods and models described previously, it is my opinion that a reasonable rate of return on common equity is 10.95% for PECO Energy, which includes recognition of the Company's strong performance in the area of management performance. My cost of equity recommendation is obtained from a range of results (i.e., 10.60% to 11.00%) and should be considered in the context of the Company's risk characteristics, as well as the general condition of the capital markets, and the strong performance of the Company's management. It is essential that the Commission employ a variety of techniques to measure the Company's cost of equity because of the limitations/infirmities that are inherent in each method.

67. Q. Does this complete your direct testimony at this time?

A. Yes, it does.

APPENDIX A TO DIRECT TESTIMONY OF PAUL R. MOUL

EDUCATIONAL BACKGROUND, BUSINESS EXPERIENCE AND QUALIFICATIONS

I was awarded a degree of Bachelor of Science in Business Administration by Drexel University in 1971. While at Drexel, I participated in the Cooperative Education Program which included employment, for one year, with American Water Works Service Company, Inc., as an internal auditor, where I was involved in the audits of several operating water companies of the American Water Works System and participated in the preparation of annual reports to regulatory agencies and assisted in other general accounting matters.

Upon graduation from Drexel University, I was employed by American Water Works Service Company, Inc., in the Eastern Regional Treasury Department where my duties included preparation of rate case exhibits for submission to regulatory agencies, as well as responsibility for various treasury functions of the thirteen New England operating subsidiaries.

In 1973, I joined the Municipal Financial Services Department of Betz Environmental Engineers, a consulting engineering firm, where I specialized in financial studies for municipal water and wastewater systems.

In 1974, I joined Associated Utility Services, Inc., now known as AUS Consultants. I held various positions with the Utility Services Group of AUS Consultants, concluding my employment there as a Senior Vice President.

APPENDIX A TO DIRECT TESTIMONY OF PAUL R. MOUL

In 1994, I formed P. Moul & Associates, an independent financial and regulatory consulting firm. In my capacity as Managing Consultant and for the past twenty-nine years, I have continuously studied the rate of return requirements for cost of service-regulated firms. In this regard, I have supervised the preparation of rate of return studies, which were employed, in connection with my testimony and in the past for other individuals. I have presented direct testimony on the subject of fair rate of return, evaluated rate of return testimony of other witnesses, and presented rebuttal testimony.

My studies and prepared direct testimony have been presented before thirty-seven (37) federal, state and municipal regulatory commissions, consisting of: the Federal Energy Regulatory Commission; state public utility commissions in Alabama, Alaska, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Virginia, West Virginia, Wisconsin, and the Philadelphia Gas Commission, and the Texas Commission on Environmental Quality. My testimony has been offered in over 200 rate cases involving electric power, natural gas distribution and transmission, resource recovery, solid waste collection and disposal, telephone, wastewater, and water service utility companies. While my testimony has involved principally fair rate of return and financial matters, I have also testified on capital allocations, capital recovery, cash working capital, income taxes, factoring of accounts receivable, and take-or-pay expense recovery. My testimony has been offered on behalf of municipal and investor-owned public utilities and for the

staff of a regulatory commission. I have also testified at an Executive Session of the State of New Jersey Commission of Investigation concerning the BPU regulation of solid waste collection and disposal.

I was a co-author of a verified statement submitted to the Interstate Commerce Commission concerning the 1983 Railroad Cost of Capital (Ex Parte No. 452). I was also co-author of comments submitted to the Federal Energy Regulatory Commission regarding the Generic Determination of Rate of Return on Common Equity for Public Utilities in 1985, 1986 and 1987 (Docket Nos. RM85-19-000, RM86-12-000, RM87-35-000 and RM88-25-000). Further, I have been the consultant to the New York Chapter of the National Association of Water Companies, which represented the water utility group in the Proceeding on Motion of the Commission to Consider Financial Regulatory Policies for New York Utilities (Case 91-M-0509). I have also submitted comments to the Federal Energy Regulatory Commission in its Notice of Proposed Rulemaking (Docket No. RM99-2-000) concerning Regional Transmission Organizations and on behalf of the Edison Electric Institute in its intervention in the case of Southern California Edison Company (Docket No. ER97-2355-000). Also, I was a member of the panel of participants at the Technical Conference in Docket No. PL07-2 on the Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity.

In late 1978, I arranged for the private placement of bonds on behalf of an investor-owned public utility. I have assisted in the preparation of a report to the Delaware Public Service Commission relative to the operations of the Lincoln and Ellendale Electric Company. I was also engaged by the Delaware P.S.C. to review and report on the

proposed financing and disposition of certain assets of Sussex Shores Water Company (P.S.C. Docket Nos. 24-79 and 47-79). I was a co-author of a Report on Proposed Mandatory Solid Waste Collection Ordinance prepared for the Board of County Commissioners of Collier County, Florida.

I have been a consultant to the Bucks County Water and Sewer Authority concerning rates and charges for wholesale contract service with the City of Philadelphia. My municipal consulting experience also included an assignment for Baltimore County, Maryland, regarding the City/County Water Agreement for Metropolitan District customers (Circuit Court for Baltimore County in Case 34/153/87-CSP-2636).