PECO ENERGY COMPANY
STATEMENT NO. 5

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

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

DOCKET NO. R-2020-3018929

DIRECT TESTIMONY

WITNESS: PAUL R. MOUL

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

DATED: SEPTEMBER 30, 2020

Table of Contents

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 Approach
Commission	Pennsylvania Public Utility Commission
Company	PECO Energy Company
CWIP	Construction Work in Progress
DCF	Discounted Cash Flow
FOMC	Federal Open Market Committee
g	Growth rate
IGF	Internally Generated Funds
LDC	Local Distribution Company
Lev	Leverage modification
LT	Long Term
M&M	Modigliani & Miller
OCI	Other Comprehensive Income
PECO Energy	PECO Energy Company
PUHCA	Public Utility Holding Company Act
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
TCJA	Tax Cut and Jobs Act of 2017
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 direct 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 ("Commission") should recognize in determining the revenues that PECO Energy Company's ("PECO Energy" or the "Company") Gas Division will be authorized to realize at the conclusion 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 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 of 10.95%. The 10.95% rate of return on common equity is composed of a 10.70% cost of equity determined from the results of my proxy group analysis and 0.25% in recognition of the exemplary performance of the Company's management. My analysis of the Company and its superior performance is based upon the direct testimony of Mr. Ronald A. Bradley, the Company's Vice President of Gas, and the direct testimony of other Company witnesses. As shown on Schedule 1, I have calculated a 7.70% overall cost of capital for the Company estimated at June 30, 2022. This return, which is the product of weighting the individual capital costs by the proportion of each respective type of capital, should establish 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. Are there unusual factors that you included in your analysis of the cost of equity for PECO that make this case unique?

A. Yes. My cost of equity analysis reflects the impact of the coronavirus pandemic and the collapse of crude oil prices that occurred in the first quarter of 2020. These events have had a significant impact on the capital markets -- both debt and equity. Extraordinary events around the COVID-19 pandemic have produced significant turmoil that has rocked the stock and bond markets beginning in the

February-March 2020 time frame. During this period, we saw abrupt reaction to the coronavirus pandemic and declines in the price of crude oil. These events led to the end of the record-setting 128-month economic expansion. As we entered a recession in February 2020, extraordinary actions were taken by the Federal Open Market Committee ("FOMC") to address these disruptions, such as asset purchase and credit programs that increased its balance sheet by trillions of dollars. How these events are fully resolved is yet to be determined.

I have considered these events as they impact the inputs that I used in the various models of the cost of equity. I have analyzed the cost of equity models using input data that follows the beginning of the economic recession. I have taken steps to avoid mixing expansion data with recession market data in my analysis, such as by using a 3-month average period in the DCF and Risk Premium models. In the post expansion period, using a 3-month average period in those models is far more representative of what the prospective cost of capital will be than the data prior to the coronavirus outbreak. I have taken this approach specifically for the case and I am not departing from my long-standing approach of using six-month data. By looking at the recent three-month period, I have concluded that the current financial and economic data has materially increased the cost of common equity, as I will demonstrate in my testimony.

5. Q. What background information have you considered in reaching a 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 Nasdaq Global Select Market.

Exelon is a component of the S&P 500 Composite Index. The Company provides natural gas distribution service to approximately 534,000 retail customers and to 730 transportation customers located in the suburban counties surrounding the City of Philadelphia. PECO Energy also provides electric delivery service to more than 1,600,000 electric customers in both the City of Philadelphia and the surrounding counties. Throughput to the Company's gas customers in 2019 was comprised of approximately 45% to residential customers, approximately 29% to small commercial and industrial customers, and 26% to large commercial and industrial customers. With about 360 large commercial and industrial customers, the energy needs of a few customers can have a significant impact on the Company's operations. PECO Energy obtains its gas supplies from producers and marketers with transportation arrangements through interconnections with three interstate pipelines. The Company has storage arrangements with pipeline service providers and owns liquefied natural gas and propane facilities to supplement flowing gas. Since the restructuring of the gas utility industry in Pennsylvania, PECO Energy has been the supplier of last resort ("SOLR") for customers that do not obtain their own supply.

6. 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 that investors reply upon to assess the relative risk, and hence the cost of equity for a natural gas utility. In this regard, I employed four well-recognized measures of the cost of equity: (1) the Discounted Cash Flow ("DCF") model; (2)

the Risk Premium ("RP") analysis; (3) the Capital Asset Pricing Model ("CAPM"); and (4) the Comparable Earnings ("CE") approach.

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

A. The Commission's rate of return allowance must be set 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.

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

A. To run the models that I used to measure the Company's cost of common equity, I employed market and financial data obtained from a group of nine gas companies listed on Schedule 3, page 2, which I refer to throughout my testimony as the "Gas Group." I began with the ten gas utilities in The Value Line Investment Survey. Value Line is an investment advisory service that is a widely used source

[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).

of data in public utility rate cases. I eliminated UGI Corporation from the Value Line group because it is more diversified outside of the gas distribution business than the other companies in the Gas Group. Specifically, UGI Corporation reports its financial results for six separate segments consisting of propane sales, two international liquefied petroleum gas businesses, energy services and electric generation, in addition to its natural gas utility business. The nine companies in my Gas Group are the same as those the Commission's Bureau of Technical Utility Services ("TUS") used in the cost of equity models it employed in the Quarterly Earnings Report (Docket No. M-2020-3020940) approved by the Commission on August 6, 2020.

9. Q. How have you performed your cost of equity analysis with the market data for the Gas Group?

A. I have applied the models/methods for estimating the cost of equity using the average data for the Gas Group. I have not measured separately the cost of equity for the individual companies within the Gas Group because the determination of the cost of equity for an individual company has become increasingly problematic. By employing group average data, I have helped to minimize the effect of extraneous influences on the market data for an individual company.

10. 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 depending upon extraneous factors that may influence market sentiment. 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.

	Gas Group
DCF	12.74%
Risk Premium	10.25%
CAPM	12.33%
Comparable Earnings	12.90%

Based on the foregoing and a 25 basis point addition for superior management performance, as discussed in the testimony of other PECO Energy witnesses, I recommend that the Commission allow the Company the opportunity to earn a rate of return on common equity of 10.95%.

11. Q. With most of the results of the models of the cost of equity being above 12% as shown above, how have you reached the conclusion that the cost of equity for PECO is 10.95%, which includes a 0.25% increment for exemplary management performance?

A. I reached the conclusion that the cost of equity in this case should be near the lower end of the range of results shown by the market based models (i.e., DCF, Risk Premium and CAPM) due to the uncertainty associated with the COVID-19 pandemic. The range of the market-based model results is 10.25% to 12.74%. A 10.70% cost of equity, prior to management performance recognition, rests

between the lower end of the range (i.e., 10.25%) and midpoint of the range (i.e., 11.50%) of these models. The reason that I focused on this point in the range is my opinion that the unusual circumstances currently affecting the capital markets due to the economic dislocations associated with the COVID-19 pandemic will eventually be resolved. Ratesetting should be based on normalized conditions that exclude extraordinary and non-recurring events that while present today may not exist for the rate effect period of the proposed rates. My recommendation that focuses on the lower end of the range is intended to normalize the effects of these events. There is always the potential that the Company may not actually achieve its allowed rate of return due in the current environment. All the while, unanticipated increases in operating and maintenance expenses, the impact of the business cycle on commercial and industrial sales especially during this recession, and the effect of warmer-than-normal temperatures on weather-sensitive load continues to weigh on the uncertainty of achieving an appropriate return. My recommendation should be viewed as the minimum necessary to satisfy investors' expectations. It is important that the Company have a reasonable opportunity to earn is cost of capital and, in that way, sustain its ability to attract and retain capital at the level needed to support the increased demand for capital investment that I discuss in more detail in Section II, below.

II. NATURAL GAS RISK FACTORS

12. Q. What factors currently affect the business risk of natural gas utilities?

A. Gas utilities face risks arising from competition from other energy sources, the

purveyors of those sources and natural gas, economic regulation, the business cycle, and customer usage patterns. Natural gas utilities have focused increased attention on safety and reliability issues and on conservation. In order to address these issues natural gas companies are now allocating more of their resources to addressing aging infrastructure issues.

13. Q. Are there other features of the Company's business that should be considered when assessing the Company's risk?

A. Yes. Most of the Company's residential customers use natural gas for space heating purposes. Indeed, 92% of residential throughput is to customers with natural gas space heating. This indicates that the energy requirements of a large proportion of the Company's residential customers are significantly influenced by temperature conditions over which the Company has absolutely no control. It is noteworthy that all of the companies that comprise the Gas Group have some form of weather normalization feature in their tariffs. As PECO Energy has no such provision in its gas tariff, the Company is exposed to more risk than the Gas Group. With more risk, its return on equity should be higher than that indicated for the Gas Group because investors' expectations for the components of the group include the attributes of weather normalization.

In addition, PECO Energy's ten largest volume customers, which account for 9.9 million cubic feet of throughput, are engaged in the manufacturing, pharmaceuticals, food processing, and electric generation (including cogeneration) businesses. Changes in the business environment can negatively affect these companies, and, in that way, cause material reductions in

throughput on PECO Energy's distribution system. This risk is especially apparent in this time of economic recession. Additionally, large volume users, which predominantly use transportation service, may be located close enough to interstate pipelines to take gas directly from those sources and bypass the local distribution company ("LDC") entirely. The Company has identified customers with combined annual throughput of approximately 7.1 million cubic feet ("MCF") of gas that have the potential to bypass the Company's distribution system. Because a large part of PECO Energy's distribution revenue recovers fixed costs, which the Company continues to bear even if a customer leaves the system, the loss of 7.1 million MCF of throughput would impose a significant amount of uncompensated fixed costs that PECO Energy would not have the opportunity to recover until it could complete another base rate case.

14. Q. Can the Company's construction program affect its risk profile?

A. Yes. The Company must undertake substantial investments to maintain and upgrade existing facilities in its service territory to ensure safe and reliable service to its customers. In particular, the rehabilitation of the Company's infrastructure requires it to invest capital without adding any new customers and without increasing sales to existing customers. In short, infrastructure rehabilitation increases fixed costs without an attendant increase in revenues. Moreover, the Company is confronting significant levels of infrastructure investment. For example, at year-end 2019, 915 miles (or approximately 13%) of the Company's distribution system consisted of cast iron and ductile iron pipe and steel pipe that is not cathodically protected and, therefore, susceptible to corrosion. These are all

considered vulnerable materials that will need to be replaced. Also, 19,050 (or approximately 4%) of the Company's services were constructed of unprotected steel. The Company projects its Gas Division's construction expenditures will approximate $1,482 million during the period of July 1, 2019 to June 30, 2024, which represents approximately 66% ($1,482 million ÷ $2,257 million) of its net gas utility plant at June 30, 2020.

15. Q. How should the Commission respond to the issues facing natural gas utilities in general and PECO Energy in particular?

A. The Commission should recognize and take into account the high-risk profile of PECO Energy's Gas Division and its future capital requirements in determining the cost of equity for the Company. A fair rate of return is key to PECO Energy maintaining a financial profile that will provide it with the ability to raise the capital necessary to meet its capital needs on reasonable terms.

III. FUNDAMENTAL RISK ANALYSIS

16. Q. Is it necessary to conduct a fundamental risk analysis to provide a framework for a determination of 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. For this purpose, I compared PECO Energy to the S&P Public Utilities Index and to the Gas Group.

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

A. The S&P Public Utilities Index is widely recognized by investors as a proxy for the regulated utility industry (excluding telecommunications). The index comprises electric power companies, natural gas companies and the largest investor-owned water utility in the United States. These companies are identified on Schedule 4, page 3.

18. 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 is important because the cost of each type of capital is a function of investors' perception of the risks associated with an investment in the firm. A company's credit quality is measured by the ratings assigned to its bonds and the yield investors demand if they are to purchase those bonds. However, credit ratings and bond yields are also important inputs in assessing the overall risk of a company because a firm's cost of equity consists of its cost to borrow money (i.e., the cost of debt, as measured by bond yields) plus the additional compensation investors demand to recognize the higher risk to which an investment in equity is exposed as compared to an investment in debt.[2]

[2] Investors in debt obtain a preference in the payment of interest and principal and in the return of their capital in the event of a bankruptcy. Equity investors are the last in line for the payment of dividends and for the return of their capital in the event of bankruptcy. Additionally, debt holders are entitled to the specific level of interest set forth in the debt instruments they purchase. On the other hand, a company can decide to reduce or eliminate dividends to common stockholders based on its actual or projected financial performance, which places an added level of uncertainty (an associated risk) on the returns available to investors in common equity.

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

A. Presently, the corporate credit rating ("CCR") for PECO Energy is BBB+ (A- on First Mortgage Bonds) from Standard and Poor's Corporation ("S&P") and the Long Term ("LT") issuer rating is A2 (Aa3 on First Mortgage Bonds) from Moody's Investors Services ("Moody's"). The CCR designation by S&P and LT issuer rating by Moody's focus upon the credit quality of the issuer of the debt, rather than upon the debt obligation itself. The average credit quality of the Gas Group is an A- from S&P and A2 from Moody's. For the S&P Public Utilities, the average composite rating is A- by S&P and A3 by Moody's. Most of the financial indicators that I will subsequently discuss are considered by rating agencies in reaching their decisions about the ratings they will assign to issuers.

20. Q. How do the financial data compare for the Company, the Gas 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 2015-2019. I obtained financial data for PECO Energy from the S&P Utility Compustat data base, which, in turn, was based on the financial statements in PECO Energy's SEC Forms 10-K. Those data include the results of operations of the Company's natural gas distribution, electric distribution and transmission businesses. While it is possible to analyze the operations of the Gas Division for items "above the line" (i.e., net operating income), most of the financial data that I considered involved ratios that

include interest expense, investor-provided capitalization, and cash-flow components that are not separately reported for the Gas Division. Hence, my fundamental analysis is based on PECO Energy's combined operations. The important categories of relative risk may be summarized as follows:

Size. In terms of capitalization, the Company is somewhat larger than the average size of the Gas Group, but smaller than the average size of 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. As I will demonstrate later, the size of a firm can impact its cost of equity.

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.[3]

There are no market ratios available for the Company because its stock is owned by Exelon. The five-year average price-earnings multiple was somewhat higher for the Gas Group as compared to the S&P Public Utilities. The five-year average dividend yield was lower for the Gas Group as compared to the

[3] 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).

S&P Public Utilities. The five-year average market-to-book ratio was slightly higher for the Gas Group as compared to 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 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 54.1% for PECO Energy, 52.6% for the Gas Group, and 42.2% for the S&P Public Utilities. The Company's common equity ratio was fairly similar to the Gas Group, thereby indicating similar financial risk.

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 0.048 (0.6% ÷ 12.6%) for the Company, 0.089 (0.8% ÷ 9.0%) for the Gas Group, and 0.049 (0.5% ÷ 10.2%) for the S&P Public Utilities. The variability of the Company's rates of return was lower than the Gas Group and close to that of the S&P Public Utilities.

Operating Ratios. I have also compared operating ratios (the percentage of revenues consumed by operating expense, depreciation, and taxes other than

income).[4] The five-year average operating ratios were 78.0% for the Company, 84.1% for the Gas Group, and 78.8% for the S&P Public Utilities. The Company's operating ratios were somewhat lower than the Gas Group and close to the S&P Public Utilities, thereby making the Company's operating risk similar to the S&P Public Utilities and lower than the Gas Group.

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. Excluding Allowance for Funds Used During Construction ("AFUDC"), the five-year average pre-tax interest coverage was 5.14 times for the Company, 4.23 times for the Gas Group, and 3.22 times for the S&P Public Utilities. The interest coverages for the Company were higher than for the Gas Group and S&P Public Utilities, thereby indicating lower credit risk for lenders.

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 poor quality of earnings would not generate high levels of cash flow. Quality of earnings has not been a significant concern for the Company, the Gas Group and the S&P

[4] 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.

Public Utilities. In 2019 and 2018, the effective income tax rate declined after implementation of the TCJA.

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 71.5% for the Company, 59.5% for the Gas Group and 74.1% for the S&P Public Utilities. The Company's average IGF to construction percentage has been slightly stronger than that of the Gas Group, although it declined in 2017, 2018 and 2019 from stronger levels in earlier years. The IGF to construction generally declined with the implementation of the new lower federal income tax rate. The Company's IGF to construction expenditures will be under pressure in future years as its construction expenditures will increase.

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.[5] 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 0.84 as the average for the Gas Group (see

[5] Beta is a measure of the historical sensitivity of the stock's price relative to overall fluctuations in the New York Stock Exchange Composite Index. The ''Beta coefficient'' is derived from a regression analysis of the relationship between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. The betas are adjusted for their long-term tendency to converge toward 1.00. 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.

Schedule 3, page 2) and 0.60 as the average for the S&P Public Utilities (see Schedule 4, page 3).

21. Q. Based on your analysis, does the Gas 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 Gas Group provides a reasonable basis for measuring the Company's cost of equity.

IV. CAPITAL STRUCTURE RATIOS

22. 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. If the operating public utility raises its own debt directly in the capital markets, as PECO Energy does, the operating public utility's own capital structure ratios should be used to determine its overall rate of return. Additionally, if the Company's actual capital structure ratios are used, as they should be, then consistency requires that the embedded cost rates associated with the senior securities reflected in those capital structure ratios should also be employed.

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

A. Yes. The capitalization and capital structure ratios at June 30, 2020, 2021 and 2022 correspond with the end of the historic ("HTY"), future ("FTY") and fully projected future test years ("FPFTY") in this case. The capitalization and capital structure ratios for the FTY and FPFTY reflect the Company's plan to issue $300 million of new long-term debt in March of 2021, $375 million in September of 2021, and $350 million in March of 2022. A $300 million debt maturity will also occur in September of 2021. Future equity financings include $303.988 million in the FTY and $321.666 million in the FPFTY. The build-up of retained earnings is also reflected. In presenting the Company's capital structure on Schedule 5, I have removed the call premiums on the early redemption of high-cost long-term debt and preferred stock.

24. Q. Please describe the adjustment for the call premiums paid to redeem high-cost debt and preferred stock.

A. I have adjusted the principal amounts of long-term debt to exclude the amounts used to finance premiums paid for the early redemption of long-term debt and preferred stock previously redeemed. To do otherwise would deny PECO Energy the opportunity to recover the costs (i.e., a return on and of the money used to fund the call premiums) it incurred solely to redeem high-cost capital. The additional debt PECO issued to finance the call premiums does not increase the Company's rate base. That is to say, no additional rate base was created as a

consequence of issuing additional debt and preferred stock to finance the redemptions. Therefore, an adjustment to the capitalization is required to provide the return necessary to service the additional capital PECO Energy issued to fund the call premiums. Thus, while rate base does not change, the return component of the overall cost of capital reflects an adjustment that, when applied to the rate base, furnishes the return necessary to pay the cost of the incremental capitalization that supported the call premiums paid by PECO Energy.

The adjustment for call premiums is appropriate because customers receive all of the cost savings, in the form of a lower overall rate of return, produced by refinancing higher-cost debt and preferred stock, while PECO Energy is simply made whole by recovering the actual costs it incurred to provide these benefits to its customers. In order to produce the savings that resulted from redeeming higher-cost debt and preferred stock, the Company paid to the holders of that debt and preferred stock a premium to surrender their securities prior to maturity. Those 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 proper that the Company recover the costs incurred to produce these savings, which consist of a return of and a return on the unamortized premiums. Adjusting the principal amounts in the capital structure provides for the appropriate cost recovery by providing a return on the funds used to pay the premiums, which is reflected as an increment included in the embedded cost rates of PECO's total capital.

25. 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 did not have any short-term debt at the end of the HTY and does not project having any short-term debt at the end of the FTY or the FPFTY. 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.

26. Q. What capital structure ratios do you recommend for determining PECO Energy's overall cost of capital in this proceeding?

A. Because rate-setting 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 FPFTY capital structure ratios of 46.62% long-term debt and 53.38% common equity.

V. COSTS OF SENIOR CAPITAL

27. 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 Schedule 6, pages 1, 2 and 3, I have computed the weighted average embedded cost rates of

long-term debt as of the end of the HTY, FTY and FPFTY, respectively. For the planned new issues of debt, the Company has budgeted 3.35% as the coupon rate for the two debt issues in March and September 2021 and 3.40% for the one debt issue in March 2022. 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 Schedule 6, page 4. 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.

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

A. I will adopt the 3.97% embedded cost of long-term debt at June 30, 2022, as shown on Schedule 6, page 3. This rate is related to the amount of long-term debt shown in the last three columns of Schedule 5, which provides the basis for the 46.62% long-term debt ratio.

VI. COST OF EQUITY – GENERAL APPROACH

29. 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 Gas Group, and the S&P Public Utilities, the cost of equity must be measured by standard financial models

that I identified above. Differences in factors that bear on risk, 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 of analysis 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. For this reason, I 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 populated each of the methods with data taken from the Gas 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

30. 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-determined 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, which assumes that 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.[6] My DCF results are provided on Schedule 1, page 2, for the Gas Group. The DCF return is 12.74% for the Gas Group.

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.

31. 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 the dividends an investor receives. 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 June 2020, the monthly dividend yields are

[6] 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.

shown on Schedule 7. The month-end prices were adjusted 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 June 2020 the average dividend yield was 2.82% for the Gas Group based upon a calculation using annualized dividend payments and adjusted month-end stock prices. The dividend yields for the more recent six-month and three-month periods were 3.06% and 3.16%, respectively, for each group. For applying the DCF model, I have used the three-month average dividend yield of 3.16% for the Gas Group for reasons previously explained. 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 investors' anticipated cash flows. 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 twelve basis points to the three-month average historical yield, thus producing the 3.28% adjusted dividend yield for the Gas Group.

32. 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 is the DCF model's primary focus because, under the model's assumption that the price-earnings multiple remains constant, the price per share of stock will grow at the same rate as earnings per share. A growth rate analysis considers a variety of variables to reach a consensus of prospective growth, including historical data and widely available analysts' forecasts of earnings, dividends, book value, and cash flow (all stated on a per-share basis). A fundamental growth rate analysis is frequently based upon internal growth ("b x r"), where "r" is the expected rate of return on common equity and "b" is the retention rate (a fraction representing the proportion of earnings not paid out as dividends). To be complete, the internal growth rate should be modified to account for sales of new common stock (external growth), which is represented by the formula s x v, where "s" is the number of new common shares the firm expects to issue and "v" is the value that accrues to existing shareholders from selling stock at a price above book value. Fundamental growth, which combines internal and external growth, encompasses 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.

33. 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 should be evaluated using a variety of techniques when formulating a judgment of investor-expected growth.

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

A. I considered the growth in the financial variables shown on Schedules 8 and 9, which reflect historical (Schedule 8) and projected (Schedule 9) rates of growth in earnings per share, dividends per share, book value per share, and cash flow per share for the Gas Group. While analysts will review all measures of growth, as I have done, earnings per share growth directly influences the expectations of investors for the future performance of utility stocks. Forecasts of earnings growth are required because the DCF model is forward-looking, and, with the constant price-earnings multiple and constant payout ratio that the DCF model assumes, all other measures of growth will mirror earnings growth. The historical growth rates were obtained from the Value Line publication that provides those data. While historical data cannot be ignored, it is much less significant in applying the DCF model than projections of future growth. Investors cannot purchase the past earnings of a utility. To the contrary, they are only entitled to future earnings, which are the focus of growth projections. Furthermore, if significant weight is assigned to historical performance, the historical data are double counted because they are already factored into analysts' forecasts of earnings growth.

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

A. Yes, it is. Although the constant form of the DCF model assumes an infinite stream of cash flows, 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 investors' expected return. The growth in the price per share will equal the growth in earnings per share if, as the DCF model assumes, there is no change in the price-earnings ("P-E") multiple. 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 investors' expectations of their actual total return. Moreover, academic research focuses also on five-year growth rates specifically because market outcomes occurring over that investment horizon are what influence stock prices. Indeed, if investors required forecasts beyond five years in order to properly value common stocks, then it would be reasonable to expect that some investment advisory service would begin publishing that information for individual stocks in order to meet the demands of the marketplace. The absence of such a publication suggests that there is no market for this information because investors do not require forecasts for an infinite series of future data points in order to make informed decisions to purchase and sell stocks.

36. 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, and Value Line. These are all reliable authorities of projected growth that investors use to make buy, sell and hold decisions. The IBES/First Call, and Zacks estimates are obtained from the Internet and are widely available to investors. The growth rates reported by IBES/First Call and Zacks are consensus forecasts taken from a survey of analysts that make growth projections for these companies. Notably, First Call's earnings forecasts are frequently quoted in the financial press. 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, and Zacks 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 for the Gas Group are also included on Schedule 9.

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

A. Schedule 9 shows the prospective five-year earnings per share growth rates projected for the Gas Group by IBES/First Call (5.99%), Zacks (6.00%), and Value Line (10.06%).

38. Q. Are certain growth rate forecasts entitled to greater weight in developing a growth rate for use in the DCF model?

A. Yes. While a variety of factors should be examined to reach a reasonable conclusion on the DCF growth rate, growth in earnings per share should receive the greatest emphasis. Growth in earnings per share is the primary determinant of investors' expectations of the total returns they will obtain from stocks because the capital gains yield (i.e., price appreciation) will track earnings growth if the P-E multiple remains constant, as the DCF model assumes. 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 fact, Professor Myron Gordon, the foremost proponent of the use of the DCF model in setting utility rates, concluded that the best measure of growth for use in the DCF model is a forecast of earnings per-share growth.[7] Consistent with Professor Gordon's findings, projections of earnings per share growth, such as those published by IBES/First Call, Zacks, Morningstar, and Value Line, provide the best indication of investor expectations.

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

A. The forecasts shown on Schedule 9 for the Gas Group exhibit a range of average earnings per share growth rates from 5.99% to 10.06%. DCF growth rates should

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

not be established by mathematical formulation, and I have not done so. In my opinion, a growth rate of 7.50% is a reasonable estimate of investor-expected growth for the Gas Group. This value is within the array of analysts' forecasts of five-year earnings per share growth rates and is below the midpoint of that data set. The reasonableness of this growth rate is also supported by the expected continuation of gas utility infrastructure spending.

40. Q. Are the dividend yield and growth components of the DCF adequate to accurately depict the rate of return on common equity when it is used to calculate a utility's weighted average overall cost of capital?

A. The components of the DCF model are adequate for that purpose only if the capital structure ratios are measured by the market value of debt and equity. In the case of the Gas Group, average capital structure ratios are 33.04% long-term debt, 0.00% preferred stock, and 66.96% common equity, as shown on Schedule 10. If book values are used to compute the capital structure ratios, then a leverage adjustment is required.

41. Q. What is a leverage adjustment?

A. If a firm's capitalization, as measured by its stock price, diverges from its capitalization, measured at book value, the potential exists for a financial risk difference. Such a risk difference arises because a market-valued capitalization contains more equity and less debt than a book-value capitalization and, therefore, has less risk than the book-value capitalization. A leverage adjustment properly

accounts for the risk differential between market-value and book-value capital structures.

42. 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 from the capital structure indicated by the market price (P). From the market perspective, the financial risk of the Gas Group is accurately measured by the capital structure ratios calculated from the market-valued 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 ratios calculated from a firm's book value capitalization, further analysis is required to synchronize the financial risk of the book capitalization with the required return on the book value of the firm's 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 8.63% when applicable to a capital structure with 100% common equity.

43. Q. Are there specific factors that influence market-to-book ratios that 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 market prices relative to book are not on point. The leverage adjustment deals with the issue of financial risk and does not transform the DCF result to 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. Stock prices above book value are common

for utility stocks, and indeed the stock prices of non-regulated companies exceed book values by even greater margins. 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 actually existed.

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: when the market capitalization declines, the leverage adjustment also declines as the simple yield (D/P) plus growth (g) result increases.

44. 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. What I label 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) when the DCF return applies to a capital structure used for ratemaking that is computed with book-value weighting rather than market-value weighting. Although I specify a separate factor, which I call the leverage adjustment, there is no need to do so other than to identify this factor. If I expressed my return solely in the context of the book value weighting that we use to calculate the weighted average cost of capital and ignore the familiar D/P + g expression entirely, then a separate element in the DCF cost of equity

determination would not be needed to reflect the differential in financial leverage between a market-value and 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 8.63%, which is the return for the Gas Group appropriate for a capital structure with no debt (i.e., a 100% equity ratio) plus 4.11% to compensate investors for the risk of a 48.57% debt ratio. (There is no adjustment for preferred stock because none of the Gas Group has preferred stock in its capital structure.). Under this approach, the parts sum to 12.74% (8.63% + 4.11% + 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 3.28% dividend yield, the 7.50% growth rate, and 1.96% for the leverage adjustment in order to arrive at the same 12.74% (3.28% + 7.50% + 1.96%) return. I know of no means to mathematically solve for the 1.96% leverage adjustment by expressing it in terms of any particular relationship of market price to book value. The 1.96% adjustment is merely a convenient way to compare the 12.74% return computed using the Modigliani & Miller formulas to the 10.78% return generated by the DCF model (i.e., $D_1/P_0 + g$, or the traditional form of the DCF shown on Schedule 7, page 1) based on a market-value capital structure. A 10.78% 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.

45. Q. Please provide the DCF return based upon your preceding discussion of dividend yield, growth, and leverage.

A. As explained previously, I have utilized a three-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. The resulting DCF cost rate is 12.74%, computed as follows:

	D_1/P_0	+	g	+	$lev.$	=	k
Gas Group	3.28%	+	7.50%	+	1.96%	=	12.74%

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 the results of other models when determining a company's cost of equity.

VIII. RISK PREMIUM ANALYSIS

46. 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 Schedule 1, page 2. That result is 10.25%.

47. 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 3.50% yield represents a reasonable estimate of the prospective yield on long-term A-rated public utility bonds.

48. Q. What historical data are shown by the Moody's data?

A. I have analyzed the historical yields on the Moody's index of long-term public utility debt as shown on Schedule 11, page 1. For the twelve months ended June 2020, the average monthly yield on Moody's index of A-rated public utility bonds was 3.32%. For the six and three-month periods ended June 2020, the yields were 3.22% and 3.13%, respectively. During the twelve-months ended June 2020, the range of the yields on A-rated public utility bonds was 3.07% to 3.69%. 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 1.37% on a twelve-month average basis, 1.59% on a six-month average basis, and 1.75% on a three-month average basis. Giving greater emphasis to the more recent spreads averages, 1.75% represents a reasonable spread for the yield on A-rated public utility bonds over Treasury bonds.

49. 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 July 1, 2020, and a yield spread of 1.75%, derived from historical data.

50. 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
2020	Third	2.6%	3.9%	1.5%	1.75%	3.25%
2020	Fourth	2.6%	4.0%	1.6%	1.75%	3.35%
2021	First	2.7%	4.0%	1.7%	1.75%	3.45%
2021	Second	2.8%	4.0%	1.8%	1.75%	3.55%
2021	Third	2.8%	4.1%	1.8%	1.75%	3.55%
2021	Fourth	2.9%	4.1%	1.9%	1.75%	3.65%

51. 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 June 1, 2020 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
2022-2026		3.9%	5.0%	3.0%
2027-2031		4.6%	5.7%	3.8%

The longer-term forecasts by Blue Chip suggest that interest rates will move up from the levels revealed by the near-term forecasts. A 3.50% yield on A-rated public utility bonds represents a reasonable benchmark for measuring the cost of equity in this case. All the data I used to formulate my conclusion as to a prospective yield on A-rated public utility debt are available to investors, who regularly rely upon those data to make investment decisions.

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

A. To develop an appropriate equity risk premium, I analyzed the results from 2020 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 Schedule 12, page 1.

Common Equity Risk Premiums

Low Interest Rates	6.70%
Average Across All Interest Rates	5.69%
High Interest Rates	4.69%

Based on my analysis of the historical data, the equity risk premium was 6.70% when the marginal cost of long-term government bonds was low (i.e., 2.88%, which was the average yield during periods of low rates). Conversely, when the yield on long-term government bonds was high (i.e., 7.09% on average during periods of high interest rates), the spread narrowed to 4.69%. Over the entire spectrum of interest rates, the equity risk premium was 5.69% when the average government bond yield was 4.99%. I have utilized a 6.75% equity risk premium. The equity risk premium of 6.75% that I employed is near the risk premiums associated with low interest rates.

53. 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 10.25%, computed as follows:

	i	+	*RP*	=	*k*
Gas Group	3.50%	+	6.75%	=	10.25%

IX. CAPITAL ASSET PRICING MODEL

54. 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 12.33% for the Gas Group. 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.

55. 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 0.84 for the Gas Group.

56. 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,[8] 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 0.60 for the Gas Group if it employed no leverage and was 100% equity financed.

[8] 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.

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 1.05 for the book value capital structure of the Gas Group.

57. 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 June 2020, the average yield on 30-year Treasury bonds was 1.95%. For the six- and three-months ended June 2020, the yields on 30-year Treasury bonds were 1.63% and 1.38%, respectively. During the twelve-months ended June 2020, the range of the yields on 30-year Treasury bonds was 1.27% to 2.57%. 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, the Federal Reserve's large expansion of its balance sheet through the purchase of Treasury obligations and mortgage-backed securities (also known as QEI, QEII, and QEIII), the reinvestment of the proceeds from maturing obligations, and lengthening of the maturity of the Fed's bond portfolio by selling short-term Treasuries and purchasing long-term Treasury obligations (also known as "operation twist").

As noted previously, 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 policy meeting on October 29, 2014. 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 federal funds rate by one-quarter percentage point. The FOMC also used this occasion to signal 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 federal 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. At its policy meetings on March 21, 2018, June 13, 2018, September 26, 2018, and December 19, 2018, the FOMC acted again to increase the federal funds rate by one-quarter percentage point in each instance. There have been nine (9) one-quarter percentage point increases in the Fed Funds rate since the FOMC began to normalize interest rates following the financial crisis and the Great Recession.

Recently, the FOMC has reversed course based on its perception of lower measures of inflation and began to reduce the Fed Funds rate (i.e., one-quarter percentage point reductions occurred on July 31, 2019, September 18, 2019, and October 30, 2019). These reductions were attributed to a perceived weakening of the global economy due in part to the trade war with China. The FOMC has specifically noted weakness in business fixed investment and exports. These increases have been offset by the decline in the risk-free rate of return. That decline was a response to the FOMC that began to reduce the federal funds rate (i.e., the FOMC had indicated 0.25 percentage point reductions to the federal

funds rate on July 31, 2019, September 18, 2019, and October 30, 2019), in response to a perceived weakening of the global economy due in part to the U.S.'s trade war with China. The FOMC specifically noted weakness in business fixed investment and exports. Further action was taken by the FOMC to support the money and capital markets during the coronavirus pandemic. This brought the Fed Funds rate to near zero.

As shown on page 2 of Schedule 13, forecasts published by Blue Chip on July 1, 2020 indicate that the yields on long-term Treasury bonds are expected to be in the range of 1.5% to 1.9% during the next six quarters. The longer-term forecasts described previously show that the yields on 30-year Treasury bonds will average 3.0% from 2022 through 2026 and 3.8% from 2027 to 2031. 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 1.75% risk-free rate of return for CAPM purposes, which considers the Blue Chip forecasts.

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

A. As shown in the lower panel of data presented on Schedule 13, page 2 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 Schedule 12, page 1. On that schedule, the market return was 11.92% on large stocks during periods of low interest rates. During those periods, the yield on long-term government bonds was 2.88% when interest rates were low. As such, I carried over to Schedule 13, page 2, the average large

common stock returns of 11.92% and the average yield on long-term government bonds of 2.88%. 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 9.04% (11.92% - 2.88%) based on historical data, as shown on Schedule 13, page 2. As also shown on Schedule 13, page 2, I calculated the forecast returns, which show a 15.74% total market return from the Value Line data and a DCF return of 6.07% for the S&P 500. With the average forecast return of 10.91% (15.74% + 6.07% = 21.81% ÷ 2), I calculated a market premium of 9.16% (10.91% - 1.75%) using forecast data. The market premium applicable to the CAPM derived from these sources equals 9.10% (9.16% + 9.04% = 18.20% ÷ 2).

59. Q. Are there adjustments to the CAPM that are necessary to fully reflect the rate of return on common equity?

A. Yes. The technical literature supports an adjustment relating to the size of the company or portfolio for which the calculation is performed. As the size of a firm decreases, its risk and required return increases. Moreover, in his discussion of the cost of capital, Professor Brigham has indicated that smaller firms have higher capital costs than otherwise similar larger firms. Also, the Fama/French study (see "The Cross-Section of Expected Stock Returns"; The Journal of Finance, June 1992) established that the size of a firm helps explain stock returns. In an October 15, 1995 article in Public Utility Fortnightly, entitled “Equity and the Small-Stock Effect,” it was demonstrated that the CAPM could understate the cost of equity significantly according to a company’s size. Indeed, it was

demonstrated in the SBBI Yearbook that the returns for stocks in lower deciles (i.e., smaller stocks) had returns in excess of those shown by the simple CAPM. In this regard, the Gas Group has a market-based average equity capitalization of $5,348 million. For my CAPM analysis, I have adopted a mid-cap adjustment of 1.02%, as shown on Schedule 13, page 3.

60. Q. What does your CAPM analysis show?

A. Using the 1.75% risk-free rate of return, the leverage adjusted beta of 1.05 for the Gas Group, the 9.10% market premium, and the 1.02% size adjustment, the following result is indicated.

	Rf	+	*ß*	*x (Rm-Rf)*	+	*size*	=	*k*
Gas Group	1.75%	+	1.05	x (9.10%)	+	1.02%	=	12.33%

X. COMPARABLE EARNINGS APPROACH

61. 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. Bluefield Water Works vs. Public Service Commission, 262 U.S. 668 (1923).

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.

62. 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 Gas Group. These screening criteria were based upon the range as defined by the rankings of the companies in the Gas Group. The items considered were: Timeliness Rank, Safety Rank, Financial Strength, Price Stability, Value Line betas, and Technical Rank. The definition for these parameters is provided on Schedule 14, page 3. The identities of the companies comprising the Comparable Earnings group and their associated rankings within the ranges are identified on Schedule 14, page 1.

I relied upon Value Line data because they provide 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 Schedule 14, page 2, 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.

63. 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 misspecification contained 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 12.9% using only the returns that were less than 20%, as shown on Schedule 14, page 2. The average forecasted rate of return as published by Value Line is 12.9% also using values less than 20%, as provided on Schedule 14, page 2. Using the average of these data my Comparable Earnings result is 12.90%, as shown on Schedule 1, page 2.

XI. CONCLUSION ON COST OF EQUITY

64. 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 25 basis points or 0.25% for recognition of the Company's strong management performance. My cost of equity recommendation is within the range of results and should be considered in the context of the Company's risk characteristics relative to the barometer group companies. 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. In summary, the Company should be provided an opportunity to realize a 10.95% rate of return on common equity so that it can compete in the capital markets, attain reasonable credit quality, sustain its cash flow in the context of the its high levels of capital expenditures, and receive recognition of the significant accomplishments that management has achieved.

65. Q. Does this complete your direct testimony?

A. Yes. However, I reserve the right to supplement my testimony, if necessary, and to respond to witnesses presented by other parties.

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.

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).