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October 22, 2024

VIA ELECTRONIC FILING

Hon. David Jones, Chairman
c/o Ectory Lawless, Docket Room Manager
Tennessee Public Utility Commission
502 Deaderick Street, 4th Floor
Nashville, TN 37243
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Electronically Filed in TPUC Docket Room
on October 22, 2024 at 2:22 p.m.

RE: ***Petition of Tennessee-American Water Company to Modify Tariff, Change and Increase Charges, Fees, and Rates, and for Approval of a General Rate Increase,*** **TPUC Docket No. 24-00032**

Dear Chairman Jones:

Attached for filing please find *Tennessee-American Water Company's Rebuttal Testimonies for (1) Heath Brooks; (2) Ann Bulkley; (3) Dominic J. DeGrazia; (4) Grant Evitts; (5) Nicholas Furia; (6) Larry Kennedy; (7) Bob Lane; (8) Robert V. Mustich; (9) Robert Prendergast; (10) Charles Rea; (11) Linda Schlessman; (12) Grady Stout; (13) Harold Walker, III; and (14) John Watkins* in the above-captioned matter.

As required, the original plus four (4) hard copies will follow. Should you have any questions concerning this filing, or require additional information, please do not hesitate to contact me.

Very truly yours,

BUTLER SNOW LLP

Melvin J. Malone

clw
Attachments
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TENNESSEE
AMERICAN WATER COMPANY, INC.

DOCKET NO. 24-00032

REBUTTAL TESTIMONY

OF

ANN BULKLEY

ON

COST OF CAPITAL AND CAPITAL STRUCTURE

SPONSORING PETITIONER'S EXHIBITS:

Rebuttal Exhibit AEB-1 - Summary of Results
Rebuttal Exhibit AEB-2 – Updated Constant DCF
Rebuttal Exhibit AEB-3 – Updated CAPM and ECAPM
Rebuttal Exhibit AEB-4 – Long-term Average Beta Estimate
Rebuttal Exhibit AEB-5 – Updated Market Return
Rebuttal Exhibit AEB-6 – Mr. Rothschild's Option-Implied Growth Rates and Betas
Rebuttal Exhibit AEB-7 – Mr. Rothschild's Adjusted Constant Growth DCF Analysis
Rebuttal Exhibit AEB-8 – Mr. Rothschild's Calculation of Beta – 2020-2024
Rebuttal Exhibit AEB-9 – Mr. Rothschild's Adjusted CAPM
Rebuttal Exhibit AEB-10 – Updated Capital Structure Analysis
Rebuttal Exhibit AEB-11 – Market Value of the Capital Structure of the Company's and CAD's Proxy Groups

REBUTTAL TESTIMONY
ANN BULKLEY
TENNESSEE AMERICAN WATER COMPANY
DOCKET NO. 24-00032

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Ann E. Bulkley. I am employed by The Brattle Group ("Brattle") as a Principal. My business address is One Beacon Street, Suite 2600, Boston, Massachusetts 02108.

Q. ON WHOSE BEHALF ARE YOU SUBMITTING THIS REBUTTAL TESTIMONY?

A. I am submitting this rebuttal testimony before the Tennessee Public Utility Commission ("Commission" or "TPUC") on behalf of Tennessee-American Water Company ("Tennessee-American", or the "Company"), a wholly-owned subsidiary of American Water Works Company, Inc. ("AWK" or "American Water").

Q. DID YOU PREVIOUSLY SUBMIT DIRECT TESTIMONY IN THIS PROCEEDING?

A. Yes. I filed direct testimony on May 1, 2024.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my rebuttal testimony is to respond to the testimony of Mr. Aaron Rothschild on behalf of the Office of the Tennessee Attorney General Consumer Advocate Division ("CAD")[1], and the testimony of Mr. Mark Garrett on behalf of the City of Chattanooga ("COC")[2], as their testimony relates to the just and reasonable ROE and the appropriate capital structure for Tennessee-American. If and to the extent that I do not

[1] Docket No. 24-00032, Testimony of Mr. Aaron L. Rothschild, September 17, 2024 ("Rothschild Testimony").
[2] Docket No. 24-00032, Testimony of Mr. Mark E. Garrett, September 17, 2024 ("Garrett Testimony").

address a particular issue raised by these witnesses in my rebuttal testimony, it is not acceptance of that issue.

Q. ARE YOU SPONSORING ANY EXHIBITS WITH YOUR TESTIMONY?

A. Yes, I am sponsoring the following exhibits, which have been prepared by me or under my direction:

- Rebuttal Exhibit AEB-1 - Summary of Results
- Rebuttal Exhibit AEB-2 – Updated Constant Growth DCF ("CGDCF")
- Rebuttal Exhibit AEB-3 – Updated CAPM and ECAPM
- Rebuttal Exhibit AEB-4 - Long-term Average Beta Estimate
- Rebuttal Exhibit AEB-5 – Updated Market Return
- Rebuttal Exhibit AEB-6 – Mr. Rothschild's Option-Implied Growth Rates and Betas
- Rebuttal Exhibit AEB-7 – Mr. Rothschild's Adjusted Constant Growth DCF Analysis
- Rebuttal Exhibit AEB-8 – Mr. Rothschild's Calculation of Beta – 2020-2024
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- Rebuttal Exhibit AEB-10 – Updated Capital Structure Analysis
- Rebuttal Exhibit AEB-11 – Market Value of the Capital Structure of the Company's and CAD's Proxy Groups

Q. HOW IS YOUR REBUTTAL TESTIMONY ORGANIZED?

A. My rebuttal testimony is organized as follows:

- Section II provides a summary and overview of my rebuttal testimony and the important factors to be considered in establishing the authorized ROE for Tennessee-American.
- Section III discusses the changes in capital market conditions since my direct testimony, their effect on the cost of equity, and the comparable return.
- Section IV provides the update to my cost of equity analyses based on market data as of August 31, 2024.
- Section V provides my response to Mr. Rothschild's testimony regarding his cost of equity analyses and ROE recommendation.
- Section VI provides my response to Mr. Rothschild and Mr. Garrett regarding their capital structure analyses and recommendations.

II. SUMMARY OF ANALYSIS AND CONCLUSIONS

Q. WHAT FACTORS SHOULD BE CONSIDERED IN EVALUATING THE RESULTS OF THE COST OF EQUITY ANALYSES AND ESTABLISHING THE AUTHORIZED ROE?

A. The primary factors that should be considered are: (1) the importance of providing a return that is comparable to returns on alternative investments with comparable risk; (2) the need for a return that supports a utility's ability to attract needed capital at reasonable terms; (3) the effect of current and expected capital market conditions; and (4) achieving a reasonable balance between the interests of investors and customers.

Q. WHAT ARE THE ROE AND CAPITAL STRUCTURE RECOMMENDATIONS OF THE OTHER WITNESSES IN THIS PROCEEDING?

A. As shown in Figure 1, Mr. Rothschild conducts a constant growth DCF analysis, a non-constant growth DCF analysis, and a CAPM analysis. Mr. Rothschild states that he has excluded the results of his non-constant growth DCF analysis because the results "are not sufficiently higher than the cost of debt".[3] To eliminate further model results that do not provide a sufficient risk premium above the cost of debt, Mr. Rothchild further limited his range of reasonableness to the middle 80 percent of his results.[4] Therefore, the low end of Mr. Rothschild's range is set equal to the 10th percentile of his DCF and CAPM results, while the high end of his range is set equal to the 90th percentile of his DCF and CAPM results. This results in a range of reasonableness according to Mr. Rothschild of 7.09

[3] Rothschild Testimony, at 13, footnote 12.

[4] *Id.* Mr. Rothchild incorrectly states that he relied on the middle 90 percent of his cost of equity results. However, in Exhibit ALR-2, Mr. Rothchild does not give weight to any of the model results that are above the 90th percentile or below the 10th percentile. In other words, Mr. Rothschild has only considered those results between the 90th percentile and the 10th percentile, which is 80 percent of his results.

percent to 8.28 percent. Mr. Rothschild recommends an ROE of 8.28 percent, which is the high end of his range.[5] Further, Mr. Rothschild concludes that Tennessee-American's proposed capital structure is not reasonable because the proposed common equity ratio is significantly above the proxy group average equity ratio that he calculates for his proxy group.[6] Instead, Mr. Rothschild recommends a capital structure of 50.90 percent common equity, 47.11 percent long-term debt and 1.99 percent short-term debt for Tennessee-American.[7] In addition, Mr. Rothschild notes that if Tennessee-American's proposed capital structure is approved, a downward adjustment of 15 basis points to his recommended ROE would be required to account for decreased financial risk associated with the Company's proposed equity.[8]

[5] *Id.*, at 12:8-9.
[6] *Id.*, at 78:9-11.
[7] *Id.*, at 15:7-8 (Table 3).
[8] *Id.*, at 11:13-18.

Figure 1: Summary of Mr. Rothschild's Cost of Equity Analyses and Recommended ROE[9]

	Low	High
Constant Growth DCF - Sustainable Growth	7.65%	7.69%
Constant Growth DCF - Option Implied Growth	8.03%	8.38%
Non-Constant Growth	5.89%	6.03%
CAPM		
Spot (August 31, 2024)		
Risk Free Rate: 3 Month Treasury Bill	7.35%	7.77%
Risk Free Rate: 30 yr Treasury Bond	7.07%	7.62%
3-Mo. Weighted Average (Jun. to Aug. 2024)		
Risk Free Rate: 3 Month Treasury Bill	7.39%	7.91%
Risk Free Rate: 30 yr Treasury Bond	7.14%	7.85%
Outer Percentile Range	7.09%	8.28%
Midpoint	7.68%	
Recommended ROE	**8.28%**	
Capital Structure Adjustment	0.14%	
Alternative Recommended ROE	**8.13%**	

Mr. Garrett did not develop any cost of equity estimates using any models nor did he conduct any analysis that compares Tennessee-American to a proxy group of risk comparable companies. Mr. Garrett's testimony simply states, without any analysis to support his positions, that he disagrees with my recommended ROE of 10.75 percent and blindly supports the ROE of 8.28 percent recommended by Mr. Rothschild (without reviewing his testimony or analysis and seemingly not knowing what ROE Mr. Rothschild was recommending). Mr. Garrett also opposes the Company's proposed equity ratio of 54.52 percent and instead recommends a capital structure consisting of 44.57 percent equity, 53.44 percent long-term debt and 1.99 percent short-term debt. Mr. Garrett claims, without support, that the Company's proposed capital structure benefits from "double

[9] Gray shading indicates model results that were Mr. Rothschild excluded from the determination of his range of reasonableness.

leverage" which means Tennessee-American's parent company, AWK, has a more leveraged capital structure and thus would be using debt to finance equity in its subsidiary, Tennessee-American.[10] To alleviate this concern, Mr. Garrett contends that Tennessee-American's capital structure should be set at a level similar to AWK's capital structure. As a result, he recommends an equity ratio of 44.57 percent which is the low end of the range of my analysis of the capital structures of the proxy group companies at the operating subsidiary level and consistent with AWK's equity ratio of 44.19 percent.

Q. WHAT ARE YOUR KEY CONCLUSIONS AND RECOMMENDATIONS REGARDING THE APPROPRIATE ROE AND CAPITAL STRUCTURE FOR TENNESSEE-AMERICAN WATER IN THIS PROCEEDING?

A. My key conclusion and recommendations are as follows:

Cost of Equity / Authorized ROE

- Updating the cost of equity estimation models that I relied upon in my direct testimony to reflect market data through August 31, 2024, demonstrates that my recommendation of 10.75 percent continues to fall well within the range of model results.
- Mr. Garrett incorrectly concludes that the cost of equity for Tennessee-American is currently lower than at the time of the Company's 2012 rate proceeding. In fact, the changes in capital market conditions since the Company's 2012 rate proceeding indicate that the cost of equity has increased not deceased as assumed by Mr. Garrett. Since the Commission's decision approving the settlement in the Company's 2012 rate proceeding:
    - Long-term interest rates have increased by approximately 138 basis points.
    - Short-term interest rates have increased by approximately 517 basis points.
    - The core inflation rate is approximately 131 basis points higher.
- While I disagree with various aspects of the cost of equity models conducted by Mr. Rothschild in this proceeding, a fundamental problem with his ROE recommendation is that it does not reflect or otherwise take into consideration the increase in the cost of equity indicated by the change in market conditions since the completion of the Company's 2012 rate proceeding.

[10] Garrett Testimony, at 36:13-38:5.

- Despite the increase in the cost of equity demonstrated by current market conditions, Mr. Rothschild's recommended ROE is inexplicably 172 basis points lower than the ROE of 10.00 percent that Tennessee-American was authorized in its last rate proceeding.
- Mr. Rothschild has not provided any support or justification for his ROE recommendation relative to the Company's currently authorized ROE of 10.00 percent given the change in market conditions and increase in the cost of equity relative to the market conditions that existed during the Company's last rate proceeding.

- Setting aside the issues that I identify with Mr. Rothschild's analyses that I address herein, Mr. Rothschild's ROE recommendation of 8.28 percent is clearly inconsistent with the comparable return standard. For example, Mr. Rothschild's recommendation is well below the low end of the range of authorized ROEs for water, natural gas, and electric utilities in the United States since 2021.
- When reasonable adjustments are applied to the DCF and CAPM analyses prepared by Mr. Rothschild to correct for the numerous internal inconsistencies and unconventional assumptions, his DCF and CAPM analyses produce a cost of equity range of 9.34 percent to 11.62 percent with a midpoint of 10.48 percent. Taking into consideration that Mr. Rothschild has acknowledged that Tennessee-American has greater risk than his proxy group by recommending an ROE at the high end of his range provides further support for my recommended ROE of 10.75 percent.
- Mr. Rothschild disagrees with the specific business risk factors that I evaluated for the Company relative to my proxy group; however, he has placed his recommended ROE of 8.28 percent at the high end of his recommended ROE range of 7.09 percent to 8.28 percent, as opposed to the midpoint. Thus, it is clear that Mr. Rothschild also believes that the Company has greater business risk relative to the companies included in his water proxy group.

Capital Structure

- The Company's proposed capital structure, which consists of 54.52 percent common equity, is reasonable for the following reasons:
  - The Company's proposed equity ratio is consistent with the average actual equity ratio of the utility *subsidiaries* of the proxy group companies (*i.e.,* utilities with risk profiles similar to the Company's risk profile).
  - While I disagree with Mr. Rothschild that the Company's proposed capital structure should be compared to the average equity ratios of the proxy group *holding* companies, if that analysis is performed correctly, it also demonstrates that the Company's proposed equity ratio is below the proxy group average equity ratios and is therefore reasonable.
- There is no basis for Mr. Garrett's conclusion that the Company's equity ratio in this proceeding should be consistent with the consolidated parent company capital structure.

- Mr. Garrett's recommendation essentially suggests that AWK has engaged in double leverage (using debt to finance equity in Tennessee-American), and he proposes the use of the consolidated capital structure as the remedy.
    - The double leverage argument suggests that the required return should be based on the source of funds, not the risk of the investment. The fundamental flaw in this theory is that it suggests that the required return for bearing the risk of holding equity in a company differs based on the investor's source of funds, which is illogical. For example, an investor who borrows funds to invest in a stock such as Apple Inc. would expect to achieve an equivalent return over the same investment period afforded to all investors of Apple, Inc. However, Mr. Garrett's proposal incorrectly suggests that the investor using debt to finance its Apple stock should only be afforded a return equivalent to the interest rate on the debt that the investor borrowed.
    - Mr. Garrett's capital structure recommendation ignores the substantial academic research that supports the view that the capital structure and the cost of capital should be determined on a stand-alone basis as they are intended to reflect the risks of the operations of the company, Tennessee-American.

III. CAPITAL MARKET CONDITIONS AND COMPARABLE RETURN

Q. DO EITHER MR. ROTHSCHILD OR MR. GARRETT ADDRESS THE CHANGE IN CAPITAL MARKET CONDITIONS SINCE THE COMPANY'S LAST RATE PROCEEDING?

A. Yes. While Mr. Rothschild does not address the change in market conditions since the Company's 2012 rate proceeding, Mr. Garrett concludes based on a misleading review of authorized return for natural gas utilities that the cost of equity is currently lower than at the time of the Company's 2012 rate proceeding. Based on this incorrect statement, Mr. Garrett contends that the Company's current authorized ROE of 10 percent "would be the absolute ceiling for cost of equity in this case, and a lower ROE would be more appropriate".[11]

[11] *Id.,* at 40:11-12.

Q. DO YOU AGREE WITH MR. GARRETT THAT CHANGES IN CAPITAL MARKET CONDITIONS SINCE THE COMPANY'S LAST RATE PROCEEDING INDICATE A DECREASE IN THE COST OF EQUITY?

A. No. Changes in long-term bond yields since the Company's last rate proceeding demonstrate an increase in the cost of capital. Specifically, as shown in Figure 2, both short-term and long-term interest rates have increased substantially since the Commission approved the settlement agreement authorizing an ROE of 10.00 percent for Tennessee-American in its last rate proceeding, which is indicative of an increase in the cost of equity. Additionally, core inflation is also currently higher than at the time of the Company's last rate proceeding and continues to remain above the Federal Reserve's long-term target value of 2.0 percent.

Figure 2: Change in Market Conditions Since Tennessee-American's Last Rate Proceeding[12]

Docket	Date	Federal Funds Rate	30-Day Avg of 30-Year Treasury Bond Yield	Core Inflation Rate
12-00049				
Decision Date	11/20/2012	0.16%	2.86%	1.95%
24-00032				
Company Direct	3/31/2024	5.33%	4.38%	3.80%
Company Rebuttal	8/31/2024	5.33%	4.23%	3.27%
Change from Nov-12 to Aug-24:		*5.17%*	*1.38%*	*1.31%*

Q. WHY IS MR. GARRETT'S REVIEW OF AUTHORIZED RETURNS FOR NATURAL GAS UTILITIES MISLEADING?

A. In his response to Discovery Request No. 3 from Tennessee-American, Mr. Garrett provided an attachment from the testimony of Mr. Bruce Fairchild in a recent rate case for West Texas Gas Utilities LLC which contained quarterly averages of authorized returns for natural gas utilities from 1980 through 2023. According to Mr. Garrett, the average authorized returns were higher in 2012 than in 2023, which is the basis for his conclusion that cost of equity is currently lower than at the time of the Company's last rate proceeding. However, his conclusion is misleading and incorrect for two reasons.

First, his review of authorized returns does not consider that there is a lag between when a Commission decision is issued and the analytical period relied on by the cost of equity witnesses in a rate proceeding. Since the duration of a typical rate case is between

[12] St. Louis Federal Reserve Bank; Bureau of Labor Statistics; Bloomberg Professional.

8 and 12 months, there can be a several month lag between the market data used to estimate the cost of equity and the decision date. This consideration is currently very important because as shown in Figure 3 of my direct testimony interest rates have increased substantially since the beginning of 2022. Therefore, the authorized returns referenced by Mr. Garrett in 2023 are likely based on market data that reflects interest rates that are lower than current levels.

Second, Mr. Garrett fails to acknowledge that Mr. Fairchild relied on the authorized returns for natural gas utilities from 1980 to 2023 to develop his risk premium analysis. To conduct his risk premium analysis, Mr. Fairchild developed a linear regression where the risk premium calculated as authorized returns minus utility bonds yield was the dependent variable and utility bonds yields were the independent variable.[13] The regression was developed to determine the historical relationship between the risk premium and utility bonds yields that could then be used to develop an estimate of the cost of equity using current utility bond yields. Mr. Fairchild showed that the estimated regression coefficients and current Baa-rated utility bond yields (as of May 2024) resulted in cost of equity range of 10.6 percent to 10.71 percent.[14] This return range is significantly greater than the average authorized return range for natural gas utilities of 9.63 to 10.09 percent that Mr. Garrett references from 2012.

As a result, had Mr. Garrett considered the analysis conducted by Mr. Fairchild, he would have concluded that the cost of equity is currently greater than at the time of the Company's last rate proceeding.

[13] Public Utility Comm. of Texas Case No. 00017816, Direct Testimony of Bruce H. Fairchild on Behalf of West Texas Gas Utility, LLC, July 16, 2024, at 71-72.

[14] *Id.,* at 73.

Q. DOES MR. ROTHSCHILD'S ROE RECOMMENDATION IN THIS PROCEEDING APPROPRIATELY REFLECT THE CHANGE IN MARKET CONDITIONS SINCE THE COMPANY'S 2012 RATE PROCEEDING?

A. No. Mr. Rothschild's recommendation in this proceeding is unreasonable when taking into consideration the changes in market conditions since the Company's last rate proceeding. For example, as shown in Figure 2, the yield on the 30-year Treasury bond has increased 138 basis points from 2.86 percent to 4.23 percent since the Commission's decision authorizing the settlement agreement in the Company's 2012 rate proceeding. Yet, despite the substantial increase in interest rates, Mr. Rothschild recommends *decreasing* the Company's authorized ROE by 172 basis points from 10.00 percent to 8.28 percent. This recommendation cannot be reconciled with the differences in market conditions since the Company's last rate proceeding when it was authorized a 10.00 percent ROE.

Q. WHAT IS THE EXPECTED PATH OF THE MONETARY POLICY OVER THE NEAR-TERM?

A. At the September Federal Open Market Committee ("FOMC") meeting, Chairman Powell noted that while over the past two years the risks associated with inflation have far exceeded the risks associated with the labor market, the FOMC's current view is that the risks associated with both inflation and the labor market have become more balanced given the effectiveness of restrictive monetary policy in combatting inflation. As a result, the FOMC indicated it was time to change monetary policy in order to continue to achieve the Federal Reserve's dual mandate of maximum employment and price stability and as a result decided to lower the target range for the federal funds rate by 50 basis points, to a range of

4.75 percent to 5.00 percent.[15] However, Chairman Powell stated that while there was a 50 basis point reduction at the September FOMC meeting that they "are not on any preset course" and will "continue to make our decisions meeting to meeting."[16] Chairman Powell further explained that reducing the federal funds rate too quickly could hinder the progress on inflation while too slowly could unduly weaken economic activity, leading the FOMC to conclude that they will carefully assess incoming data before making any further decisions on policy rate changes.

Q. DO YOU AGREE WITH MR. ROTHSCHILD THAT THE RECENT DECLINE IN THE FEDERAL FUNDS RATE AND INFLATION IS "LIKELY PUTTING MORE DOWNWARD PRESSURE ON TAWC'S COST OF EQUITY"?[17]

A. No, I do not. Mr. Rothschild references a decline in long-term government bond yields between October 2023 and August 2024; however, he does not discuss investors' expectations of long-term government bonds yields over the near-term. He appears to imply that because investors expect the federal funds rate and inflation to decline that the yields on long-term government bonds will also decline resulting in a decrease in the cost of equity for Tennessee-American. However, had Mr. Rothschild reviewed economists' forecasts of the yields on long-term government bonds, he would have concluded his assumption is contrary to the majority of professionals in this area.

Q. WHAT ARE ECONOMISTS' PROJECTIONS OF LONG-TERM GOVERNMENT BOND YIELDS OVER THE NEAR-TERM?

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[15] https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20240918.pdf, September 18, 2024.
[16] *Id.*
[17] Rothschild Testimony, at 25:12-15.

A. Economists consider the expected policy of the Federal Reserve in the development of their forecasts of long-term government bond yields and, prior to the FOMC's decision to reduce the federal funds rate at the September 2024 meeting, had projected a decrease in the federal funds rate. For example, *Blue Chip Financial Forecasts* provides a forecast of both the federal funds rate and the yield on the 30-year Treasury bond. In the most recent published *Blue Chip Financial Forecasts* report, economists projected the federal funds rate to decline from 5.2 percent in Q3/2024 to 3.6 percent in Q4/2025.[18] However, economists' consensus estimate of the yield on the 30-year Treasury bond is expected to remain relatively stable over the same time period. The yield on the 30-year Treasury bond as reported by *Blue Chip Financial Forecasts* is expected to range from 4.2 percent in Q3/2024 to 4.1 percent in Q4/2025.[19] Therefore, economists, who consider the expected policy of the Federal Reserve, expect the yield on the 30-year Treasury bond to remain elevated over the near-term and not decline as assumed by Mr. Rothschild.

Q. HAS MR. ROTHCHILD CONSIDERED INVESTORS' EXPECTATIONS REGARDING THE YIELDS ON LONG-TERM GOVERNMENT BONDS IN PRIOR PROCEEDINGS?

A. Yes, he has. In fact, in his recent testimony filed in Docket No. 23-11-02 for Connecticut Natural Gas Corporation ("CNG") and the Southern Connecticut Gas Company ("SCG"), Mr. Rothchild provided a chart that he claimed contained investors' expectations regarding the yield on the 10-year Treasury bond for the period of 2024-2043.[20] It is unclear why Mr.

[18] *Blue Chip Financial Forecasts*, Vol. 43, No. 9, August 30, 2024, at 2.
[19] *Id.*
[20] Connecticut Public Utilities Regulatory Authority, Docket No. 23-11-02, Rothschild Testimony, February 8, 2024, at 29:2-30:4.

Rothschild did not conduct a similar analysis in this proceeding to determine investors' expectations regarding long-term government bond yields.

Q. HAVE YOU UPDATED THE CHART THAT MR. ROTHCHILD DEVELOPED IN DOCKET NO. 23-11-02 FOR CNG AND SCG TO DETERMINE INVESTORS' EXPECTATIONS REGARDING THE YIELDS ON LONG-TERM GOVERNMENT BONDS?

A. Yes, I did. While I believe it is more appropriate to rely on the projections of long-term government bond yields provided by *Blue Chip Financial Forecasts*, I updated Mr. Rothschild's calculation of the expected yield on the 10-year Treasury bond over the next 20-years to include actual yields on the 10-year Treasury bond as of August 31, 2024. As shown in Figure 3, based the approach that Mr. Rothchild has relied on in prior proceedings, investors expect the yield on long-term government bonds to remain elevated over the next 20 years. Therefore, had Mr. Rothschild calculated the expected yield on the 10-year Treasury bond consistent with the approach he has relied on in prior proceedings, he would not have assumed that long-term government bond yields were expected to decline. Further, given that long-term government bond yields are expected to remain elevated, it is unreasonable for Mr. Rothschild to conclude that the cost of equity for Tennessee-American is expected to decline.

Figure 3: 10-year Treasury Yield – Actual (January 1, 1942 – August 31, 2024) and Expected (September 30, 2024 – August 31, 2044)[21]

Q. ARE AUTHORIZED RETURNS IN OTHER JURISDICTIONS A RELEVANT BENCHMARK TO EVALUATE THE REASONABLENESS OF MR. ROTHSCHILD'S ROE RECOMMENDATION?

A. Yes, they can be when the corresponding market conditions are considered. The *Hope* and *Bluefield* cases establish that authorized ROEs must be commensurate with other investments having corresponding risk. Therefore, the regulatory decisions of other utility regulatory commissions provide a range of reasonableness and a benchmark that investors consider in assessing the authorized ROE of one utility against the returns available from other regulated utilities with comparable risk.

Q. DOES MR. ROTHSCHILD AGREE THAT IT IS APPROPRIATE TO CONSIDER PREVIOUSLY AUTHORIZED ROES?

[21] Source: Connecticut Public Utilities Regulatory Authority, Docket No. 23-11-02, Rothschild Testimony, February 8, 2024, Workpaper titled: 2023.12 – Interest Rates and U.S. Department of the Treasury.

A. No. Mr. Rothschild contends that ROEs authorized in other proceedings should not be used to set the authorized ROE in this proceeding, because the market-to-book ratios of water utilities are significantly above 1.0, which indicates that their cost of equity is lower than their authorized ROE.[22]

Q. DO YOU AGREE WITH MR. ROTHSCHILD'S CLAIM THAT STATE UTILITY COMMISSIONS ACROSS THE U.S. HAVE CONSISTENTLY AUTHORIZED ROES FOR DECADES THAT EXCEED THE COST OF EQUITY?

A. No. I disagree with Mr. Rothschild's claim that regulators, including this Commission, have incorrectly and consistently erred in establishing utilities' authorized ROEs for years that are substantially higher than the cost of equity. There is no evidence that Mr. Rothschild's estimates of the cost of equity, which include results that are substantially lower than any ROE that has been authorized by a regulatory commission in the past, is in fact reasonable and that regulatory commissions have been consistently approving unjust and unreasonable rates.

Q. DO YOU AGREE WITH MR. ROTHSCHILD THAT UTILITY MARKET-TO-BOOK RATIOS EXCEEDING 1.0 DEMONSTRATES THAT PREVIOUSLY AUTHORIZED ROES EXCEED THE COST OF EQUITY?

A. No. There are several reasons why the market-to-book ratio for utilities may exceed 1.0 other than the ROE exceeding the cost of equity. First, Mr. Rothschild's position assumes that the Efficient Market Hypothesis ("EMH") holds true. The EMH theory contends that

[22] Rothschild Testimony, at 29:4-6, and Appendix A.

all information currently known by investors is already reflected in current stock prices.[23] For example, the theory of the DCF model is that the current share price is equal to the present value of all expected future dividends. Therefore, if markets were fully efficient as suggested by Mr. Rothschild, changes in share prices could only be explained by new information that results in a change to the expected dividends.

However, as Dr. Lawrence Kolbe and Dr. Michael Vilbert outlined in their 2016 presentation to the California Public Utilities Commission, there is no consensus among economists regarding whether the theory of the efficient market hypothesis holds true and share prices are rationally priced, and even assuming for the sake of argument that the efficient market hypothesis does in fact hold true, there is also no consensus regarding which model produces reasonable estimates of the cost of equity.[24] In fact, Nobel Prize-winning economist Dr. Robert Shiller and others have provided compelling evidence against the efficient market hypothesis, concluding that share prices are not rationally priced and that the DCF model does not fully explain changes in share prices and thus will not accurately estimate the required return of investors.[25] There are numerous practical examples supporting this position (*e.g.*, large sudden declines in the market such as Black Monday in 1987, the Great Recession of 2008/09, the COVID-19 crash in March 2020,

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[23] R. J. Shiller, *Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?,* The American Economic Review, Vol. 71, No. 3, at 421-436 (1981).

[24] A. Lawrence Kolbe, Ph.D. and Michael J. Vilbert, Ph.D., *Moving Toward Value in Utility Compensation Shareholder Value Concept,*" Presented to the California Public Utilities Commission (June 13, 2016). https://www.brattle.com/insights-events/publications/moving-toward-value-in-utility-compensation-shareholder-value-concept/

[25] R. J. Shiller, "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?," *The American Economic Review*, 1981, Vol. 71, No. 3, at 42-436.

and the "tech bubble" of the late 1990s) that cannot be explained by new information regarding dividends).[26]

If share prices are not necessarily rationally priced and cannot be explained by the DCF model, then a market-to-book ratio greater than 1.0 cannot be attributed to the ROE exceeding the cost of equity as Mr. Rothschild suggests (*i.e.,* the DCF model will not necessarily produce an accurate estimate of the return required by investors given the level of prices and, as a result, the resulting cost of equity estimate produced by the DCF model, if set as the authorized ROE, would not produce a market-to-book ratio of 1.0).

Second, as Drs. Kolbe and Vilbert also noted, even if one assumes that the theory of the EMH holds, there are several important conditions that must hold before one can assume that the ROE equals the cost of equity at a market-to-book ratio of 1.0 for regulated utilities. Those conditions include:

- A utility has to be regulated on rate base identical to its GAAP book value.
- A utility has to have 100 percent regulated operations.
- The regulatory system has to be in full equilibrium (*i.e.,* there cannot be a lag in the adjustment of the authorized ROE to the market cost of equity); and
- The ROE expected, on average, has to equal the authorized ROE.[27]

As Drs. Kolbe and Vilbert concluded, it is very unlikely that all of these conditions will be satisfied. For example, changes in cost trends or regulatory lag can cause a utility to earn more or less than the allowed return, and if the expected return deviates from the

[26] *See also* R. J. Shiller, "From Efficient Markets Theory to Behavioral Finance," *Journal of Economic Perspectives,* 2003, Vol. 17, No. 1, at 83–104. Dr. Shiller contended that there were "asset bubbles" such as the "tech boom" from 1994 to 2000 that resulted in substantial increases in share prices that could not be explained by market fundamentals.

[27] A. Lawrence Kolbe, Ph.D. and Michael J. Vilbert, Ph.D., *Moving Toward Value in Utility Compensation Shareholder Value Concept,*" Presented to the California Public Utilities Commission (June 13, 2016). https://www.brattle.com/insights-events/publications/moving-toward-value-in-utility-compensation-shareholder-value-concept/

allowed return, then the allowed return will not equal the cost of equity, and the market-to-book ratio will not equal 1.0.

Q. HAVE YOU REVIEWED RECENTLY AUTHORIZED ROES FOR UTILITIES?

A. Yes. I have analyzed the recently authorized returns for water, electric and natural gas utilities and applied the following screening criteria:

- I excluded rate cases for vertically integrated electric utilities because utilities that own generation have a different risk profile than water, natural gas and transmission and distribution only electric utilities.
- I excluded limited-issue rider cases because these cases address only a specific issue or issues, such as the construction of generation assets and the associated incremental risk, and not a utility's entire operations.
- I excluded jurisdictions that set ROEs using a formula as opposed to following an approach that is similar to what the Commission has typically considered in setting the ROE.
- I excluded returns awarded in Arizona, because the determinations in Arizona are based on fair value ratemaking adjustments. Therefore, the ROE that was established in the Arizona cases may have been set on a different basis.
- Lastly, I excluded authorized returns that reflect a utility-specific penalty, because an authorized ROE that includes a penalty is not indicative of a market-derived cost of equity.

As shown in Figure 4, since 2021, authorized ROEs for water, natural gas, and electric utilities have increased. However, Mr. Rothchild's recommended ROE of 8.28 percent is well below the low end of the range of authorized ROEs for water, natural gas, and electric utilities in the United States since 2021. Since the ROE recommended by Mr. Rothschild is well below the low end of the range of returns shown in Figure 4, it would be unreasonable to conclude that his recommendation reflects the investor-required return on equity for a water utility in current market conditions. In fact, given how much lower his ROE recommendation is relative the returns awarded to other water, electric and natural

gas utilities, it is clear that Mr. Rothschild's ROE recommendation would not meet the comparable return standard of *Hope* and *Bluefield*.

Figure 4: Average Annual Authorized ROEs for Water, Natural Gas, and Electric Utilities, 2021 – August 31, 2024[28]

Year	Mean	Low	High
2021	9.54%	8.80%	10.24%
2022	9.53%	9.00%	10.20%
2023	9.56%	8.70%	10.50%
2024	9.62%	9.10%	11.88%

Q. ARE YOU AWARE OF AN EXAMPLE WHERE CAPITAL ATTRACTION AND WILLINGNESS TO INVEST HAVE BEEN HAMPERED WHEN A REGULATORY JURISDICTION IS PERCEIVED AS NOT BEING CREDIT SUPPORTIVE?

A. Yes. Connecticut, which is viewed by research analysts, equity analysts, and investors as among the least credit supportive jurisdictions in the United States for utilities, is the most recent example of where capital attraction and a willingness to invest have been hampered. For example, Avangrid's utility operating subsidiaries in Connecticut (Connecticut Natural Gas Corporation ("CNG") and Southern Connecticut Gas Company ("SCG")) have recently experienced difficulty fully subscribing bond issuances, and while able to do so, the premiums were higher than anticipated. Specifically, Avangrid has indicated in its most recent rate proceeding that it experienced difficulties in attracting adequate subscription levels for debt issuances by its Connecticut utilities that closed in December 2023, and the bonds priced at a higher coupon rate than anticipated:[29]

> The debt issuance was a private offering in which four banks served as lead placement agents and worked with the Company to market the transaction to investors in advance of pricing. On the day of pricing, November 15th,

[28] S&P Capital IQ Pro.

[29] Public Utilities Regulatory Authority, Docket No. 23-11-02, Response of Connecticut Natural Gas Corporation to data request RRU-402 (Feb. 27, 2024).

> the subscriptions sought for CNG and SCG were only 65% and 50% fulfilled, respectively. This compares to the offering for one of the other Avangrid utilities which was more than two-times subscribed. After some additional negotiation, the banks were able to get one investor to fill the remaining portions of the issuance sought for CNG and SCG and the full transaction priced on the following day; however, the credit spreads were wider than anticipated across the Avangrid Connecticut utilities, raising the financing cost by approximately 10-15 basis points. *The bankers informed Avangrid that the difficulty in fulfilling the necessary subscription levels and the wider credit spreads attracted were caused in part by the limited interest to invest in Connecticut utilities due to concerns over the regulatory environment and potential impacts to current ratings*.[30]

IV. UPDATED ROE ANALYSES

Q. HAVE YOU UPDATED YOUR COST OF EQUITY ANALYSES?

A. Yes. As shown in Figure 5 (see also Rebuttal Exhibit AEB-1 through Rebuttal Exhibit AEB-5), I have updated the results of the constant growth DCF, CAPM, and ECAPM analyses based on market data through August 31, 2024, using the same methodologies as in my direct testimony.

Q. DOES YOUR RECOMMENDED ROE OF 10.75 PERCENT FALL WITHIN THE RANGE OF YOUR UPDATED MODEL RESULTS?

A. Yes. Specifically, the results of my DCF analyses are generally consistent with the results included in my direct testimony, with some scenarios higher and others slightly below the results filed at that time, while the results of my CAPM and ECAPM results have decreased slightly since the filing of my direct testimony. Therefore, my recommended ROE of 10.75 percent still falls well within the range of my updated cost of equity results.

[30] *Id*. (emphasis added).

Figure 5: Summary of Updated Cost of Equity Results[31]

	Minimum Growth Rate	Average Growth Rate	Maximum Growth Rate
Constant Growth DCF			
Mean Results:			
30-Day Average	8.99%	9.97%	10.86%
90-Day Average	9.18%	10.17%	11.05%
180-Day Average	9.29%	10.27%	11.16%
Average	9.15%	10.14%	11.02%
Median Results:			
30-Day Average	8.94%	9.77%	10.45%
90-Day Average	9.20%	10.03%	10.67%
180-Day Average	9.26%	10.05%	10.81%
Average	9.13%	9.95%	10.64%

	Current 30-day Average Treasury Bond Yield	Near-Term Blue Chip Forecast Yield	Long-Term Blue Chip Forecast Yield
CAPM:			
Current *Value Line* Beta	10.89%	10.88%	10.90%
Current Bloomberg Beta	10.13%	10.10%	10.14%
Long-term Avg. *Value Line* Beta	10.03%	10.00%	10.05%
ECAPM:			
Current *Value Line* Beta	11.19%	11.18%	11.20%
Current Bloomberg Beta	10.61%	10.59%	10.62%
Long-term Avg. *Value Line* Beta	10.54%	10.52%	10.55%

V. RESPONSE TO CAD WITNESS MR. ROTHSCHILD

Q. WHAT ARE YOUR PRINCIPAL AREAS OF DISAGREEMENT WITH MR. ROTHSCHILD'S COST OF EQUITY ANALYSES?

A. Specifically, Mr. Rothschild and I disagree on the following:

- the composition of the proxy group;
- the growth rates used in Mr. Rothschild's application of the constant growth DCF model;
- Mr. Rothschild's application of the non-constant growth DCF model;

[31] DCF results exclude the results for Middlesex Water Company because they do not provide a reasonable equity risk premium over the current yields on the Moody's A rated and Baa rated utility bond indices, which were 5.45 percent and 5.67 percent, respectively, based on a 30-day average ending August 31, 2024.

- the appropriate inputs to a forward-looking CAPM analysis and the reasonableness of the results of Mr. Rothschild's CAPM; and
- the appropriate capital structure for Tennessee-American.

Q. MR. ROTHSCHILD ATTEMPTS TO DISCREDIT YOUR TESTIMONY BECAUSE YOU HAVE RELIED ON "PROJECTIONS" AND NOT "CURRENT MARKET DATA."[32] IS MR. ROTHSCHILD'S CHARACTERIZATION OF THIS DIFFERENCE BETWEEN YOUR RESPECTIVE APPROACHES VALID?

A. No. Mr. Rothschild represents that the data I have relied upon is not "market data," and that it ignores "the behavior of millions of investors participating in capital markets," which is misleading and incorrect.[33] While Mr. Rothschild characterizes the use of projected data in my analyses as inappropriate and unrelated to the market, his constant growth DCF analysis that relies on sustainable growth is based on analysts' expectations of the earned return on a more limited number of water utilities. Further, Mr. Rothschild's use of options data in his DCF and CAPM analyses is: (1) only reflective of a small subset of the market that trades options; and (2) is based on the predictions for the market of these traders. Therefore, it is disingenuous of Mr. Rothschild to suggest that analysts' expectations are not "market data" when I use them but are proper foundational inputs when he uses them.

A. Proxy Group Composition

Q. WHAT IS THE COMPOSITION OF MR. ROTHCHILD'S PROXY GROUP FOR PURPOSES OF HIS COST OF EQUITY ANALYSES?

A. Mr. Rothschild's proxy group is comprised of just six water utilities selected from the *Value Line* Water Utility industry, of which five are also in my larger proxy group.

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[32] Rothschild Testimony, at 15:11-16:9.
[33] *Id.*

Q. WHY SHOULD AWK BE EXCLUDED FROM THE PROXY GROUP FOR TENNESSEE-AMERICAN?

A. As I discussed in my direct testimony, it is not appropriate to include AWK in the proxy group used to determine the authorized ROE for Tennessee-American because of the circular logic that would occur.[34] For example, in the current proceeding, the ROE for Tennessee-American is being determined, which in turn contributes to the ROE of its parent company, AWK. If AWK were included in the proxy group, AWK would be being used to determine its own subsidiary's ROE. Therefore, to avoid the circular logic, AWK should be excluded from the proxy group.

Q. IF AWK WERE EXCLUDED, HOW MANY COMPANIES WOULD BE INCLUDED IN MR. ROTHCHILD'S PROXY GROUP?

A. The proper exclusion of AWK, as discussed above, results in only five companies being included in Mr. Rothchild's proxy group.

Q. WHY DO YOU BELIEVE IT IS ALSO APPROPRIATE TO INCLUDE NATURAL GAS AND ELECTRIC UTILITIES IN THE PROXY GROUP FOR TENNESSEE-AMERICAN?

A. As discussed in my direct testimony, due to consolidation in the water industry, there are only a limited number of water utilities that can be included in the proxy group,[35] further reduced when AWK is appropriately excluded. The smaller the size of the proxy group, the greater the chance the proxy group average could be affected by the results of one company. For example, as noted above and discussed in my direct testimony, I excluded

[34] Bulkley Direct Testimony, at 30:9-15.

[35] *Id*., at 31:5-12.

the individual DCF results for Middlesex Water Company ("MSEX") because the results did not provide a sufficient risk premium over the cost of debt as measured by Moody's A-rated and Baa-rated utility bond indices.

In addition, as also discussed in my direct testimony, similar to the water utilities, the electric and natural gas utilities included in my proxy group generate a substantial portion of their operating income from regulated distribution operations.[36] Therefore, there are significant similarities between the business and operating risks of water and gas distribution companies, and so these companies are properly included in my proxy group.

Q. IS THERE OTHER MARKET EVIDENCE THAT IT IS APPROPRIATE TO INCLUDE ELECTRIC AND NATURAL GAS UTILITIES IN YOUR PROXY GROUP?

A. Yes. While consolidation has occurred among water utilities, there have been a few acquisitions in recent years that have involved the merger of a natural gas utility with a water utility and an electric utility with a water utility. One of the reasons cited for the purpose of the merger of a natural gas utility and a water utility was the similarity in operating characteristics and risk profiles of water and natural gas utilities. For example, in 2017, Northwest Natural Gas Company ("NWN") acquired Salmon Valley Water Company and Falls Water Company, two water utilities operating in the Pacific Northwest. In an interview regarding the transaction, the CEO of NWN noted that the water utility sector has a similar business model and risk profile as NWN's natural gas utilities.[37]

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[36] *Id*., at 32:5-13.

[37] Northwest Natural Gas Company Press Release, "NW Natural Expands into Regulated Water Utility Sector with Acquisitions in Oregon and Idaho," December 21, 2017.

Similarly, Essential Utilities Inc. ("WTRG") recently completed the acquisition of PNG Companies, LLC, a natural gas utility operating in Pennsylvania, West Virginia and Kentucky. In discussing the acquisition, Essential's CEO noted:

> Franklin said both gas and water utilities are underground utilities, and that the systems share a common burden of being old and in need of replacement. However, he said rates will not go up for "a number of years," and that any increase would require approval from the PUC.[38]

Finally, in 2017, Eversource Energy, which has both electric and natural gas utility operations, completed its acquisition of Aquarion Water Company, a water utility with operations in Connecticut, Massachusetts and New Hampshire.

Thus, the similar operating characteristics and risk profiles of the industries have been a catalyst for consolidation.

Q. HAVE OTHER REGULATORY COMMISSIONS RELIED ON PROXY GROUPS THAT INCLUDE NATURAL GAS AND ELECTRIC DISTRIBUTION UTILITIES?

A. Yes. Several regulatory commissions such as the Massachusetts Department of Public Utilities, the Florida Public Service Commission, the Illinois Commerce Commission and the Iowa Utilities Commission have considered the results of a proxy group that includes natural gas companies when determining the authorized ROE for water and wastewater utilities.[39]

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[38] Margaret J. Krauss, "Aqua America Will Buy Peoples Gas For $4.3 Billion," 90.5 WESA (NPR), January 16, 2020.

[39] Massachusetts Department of Public Utilities, Docket No. 17-90, Petition of Aquarion Water Company of Massachusetts, Inc., pursuant to G.L. c. 164, § 94, and G.L. c. 165, § 2, for Approval of a General Rate Increase as set forth in M.D.P.U. No. 3., October 31, 2018, p. 286-287. *See also*, Docket No. 20180006-WS, In re. Water and wastewater industry annual reestablishment of authorized range of return on common equity for water and wastewater utilities pursuant to Section 367.081(4)(f),F.S., Order No. PSC-2018-0327-PAA-WS, at 7. *See also*, Illinois Commerce Commission, Illinois-American Water Company Proposed Rate increases for Water and Sewer Service (tariffs filed February 10, 2022), Docket No. 22-0210, Order, December 15, 2022, at 102. *See also,* Iowa

Q. WHAT IS YOUR CONCLUSION REGARDING THE PROXY GROUP FOR TENNESSEE-AMERICAN?

A. I continue to support the use of the screening criteria outlined in my direct testimony to develop the proxy group for Tennessee-American. For the reasons I have discussed, my screening criteria results in a proxy group of 11 utilities that more appropriately balances the goal of establishing a sufficiently large proxy group while maintaining a proxy group that is generally comparable to the risk profile and operating characteristics of Tennessee-American. However, while I disagree Mr. Rothchild's proxy group, the differences in the results of our respective cost of equity models are largely not a function of proxy group differences, but rather methodological differences regarding the inputs to the cost of equity models. As a result, the focus should be on the model inputs as opposed to additional analysis of the proxy groups.

B. Constant Growth DCF Analysis

Q. PLEASE SUMMARIZE MR. ROTHSCHILD'S CONSTANT GROWTH DCF ANALYSES.

A. Mr. Rothschild specifies his constant growth DCF analysis using two forms of growth – retention growth rates and option-implied growth rates. The mean results produced by Mr. Rothschild's constant growth DCF analyses using retention growth rates are 7.65 percent (based on the average of the high and low stock price for the year ending August 31, 2024) and 7.69 percent (based on spot stock prices as of August 31, 2024), while the mean results

Utilities Commission, Iowa-American Water Company, Docket No. RPU-2020-0001, Final Decision and Order, June 28, 2021, at 24-27.

of Mr. Rothschild's constant growth DCF analyses relying on option-implied growth rates are 8.03 percent (based on the average of the high and low stock price for the year ending August 31, 2024) and 8.38 percent (based on spot stock prices as of August 31, 2024).[40]

1. Sustainable Growth Rates

Q. ARE THE RESULTS OF MR. ROTHSCHILD'S CONSTANT GROWTH DCF USING SUSTAINABLE GROWTH RATES REASONABLE?

A. No. As a threshold matter, Mr. Rothschild's constant growth DCF results using the sustainable growth rate, which range from 7.65 percent to 7.69 percent, are not reasonable and are below any comparable authorized return for either an electric, natural gas, or water utility company in decades, including even the lowest interest rate environments.[41] The *Hope* and *Bluefield* decisions, which Mr. Rothschild acknowledges are standards to be followed in setting a just and reasonable return, require the authorized return to be comparable to other returns available to investors in companies with similar risk. Mr. Rothschild's constant growth DCF results using the sustainable growth rate do not meet this standard.

Q. HOW DOES MR. ROTHSCHILD DEVELOP THE SUSTAINABLE GROWTH RATE USED IN HIS DCF ANALYSIS?

A. As shown in Exhibit ALR-3, Mr. Rothschild calculates his sustainable growth rate using the historical average dividend yield on book value and an expected ROE based on a two-thirds weighting of analysts' projected return on book value as reported by *Zacks* and *Value*

[40] Rothschild Testimony, at 53:7-9.
[41] S&P Capital IQ Pro.

Line, and a one-third weighting of the historical average return on book value for the period from 2021 through 2023. Mr. Rothschild's estimate of an expected ROE is 10.20 percent, and he calculates reinvestment growth as the product of his expected ROE of 10.20 percent and the retention ratio, and adds new financing growth to estimate investor anticipated growth rates of 5.10 percent (based on the average of the high and low stock price for the year ending August 31, 2024) and 5.26 percent (based on spot stock prices as of August 31, 2024).[42]

Q. DOES MR. ROTHSCHILD'S CALCULATION OF THE SUSTAINABLE GROWTH RATE INVALIDATE HIS PRIMARY CRITICISM OF YOUR ANALYSES?

A. Yes. As discussed previously, Mr. Rothschild claims his analysis is "superior" because it is "market based" and reflects "the behavior of millions of investors participating in capital markets."[43] However, Mr. Rothschild specifically relies on analyst projections in the calculation of his sustainable growth rate DCF, and therefore cannot credibly criticize the use of analysts' projections in my analyses. The expected return on equity that is used to calculate the sustainable growth rate used in Mr. Rothschild's constant DCF model does not consider "the behavior of millions of investors participating in capital markets." Rather, it relies on historical earned returns (accounting data) and analysts' projected equity returns for his proxy group as reported by *Value Line* and *Zacks*.

Q. DO YOU AGREE WITH MR. ROTHSCHILD THAT "A LEADING FINANCIAL TEXTBOOK", *PRINCIPLES OF CORPORATE FINANCE*, RECOMMENDS

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[42] Rothschild Testimony, Exhibit ALR-3, at 1.

[43] *Id.,* at 15:11-16:9.

USING THE SAME CALCULATION OF THE SUSTAINABLE GROWTH RATE THAT HE HAS RELIED ON TO ESTIMATE HIS CONSTANT GROWTH DCF MODEL?[44]

A. No, I do not. Mr. Rothschild's reference to *Principles of Corporate Finance* is very misleading. In fact, when discussing selecting the growth rate used in the constant growth DCF model, the authors of *Principles of Corporate Finance* first reference the use of analysts' projected earnings per share ("EPS") growth rates:

> The hard part is estimating the expected rate of dividend growth. One option is to consult the views of security analysts who study the prospects for each company. Analysts are rarely prepared to stick their necks out by forecasting dividends to kingdom come, but they often forecast growth rates over the next five years, and these estimates may provide an indication of the expected long-run growth path.[45]

Further, when displaying the estimates of the constant growth DCF model for a proxy group of gas utilities, the authors rely on analysts' projected EPS growth rates in the constant growth DCF model.[46]

The authors do reference the calculation of the sustainable growth rate relied on by Mr. Rothschild; however, the authors reference the sustainable growth rate as an "alternative approach to estimating long-run growth."[47] Therefore, Mr. Rothschild's reference to *Principles of Corporate Finance* is very misleading as the authors do not "recommend" using the sustainable growth rate in the constant growth DCF model as Mr. Rothschild contends.

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[44] *Id.,* at 13:12-14:3.
[45] Brealey, Myers, and Allen, *Principles of Corporate Finance*, at 86 (12th ed. 2017).
[46] *Id*., at 87.
[47] *Id*., at 86.

Q. BEYOND THE PROBLEMS YOU HAVE ALREADY IDENTIFIED WITH MR. ROTHSCHILD'S DCF ANALYSES, ARE THERE FUNDAMENTAL CONCERNS WITH THE RETENTION GROWTH RATE CALCULATION THAT MR. ROTHSCHILD HAS RELIED ON?

A. Yes. The retention growth rate calculation assumes that future earnings will increase as the retention ratio (*i.e.*, the portion of earnings not paid out in dividends) increases. As Mr. Rothschild notes:

> Retained earnings are funds that a company keeps in its treasury, so that they are available for future needs, such as capital expenditures, debt payments, and new investments. These retained earnings show investors whether the company is growing, which, in turn, is a measure of the future indicator of dividends and the value of a company's stock.[48]

However, the amount of earnings retained and not paid as dividends varies as a result of management decisions as opposed to earnings that are largely market-driven. For example, management may decide to: (1) conserve cash for capital investments; (2) manage the dividend payout for the purpose of minimizing future dividend reductions; (3) manage its capital structure; or (4) signal future earnings prospects. These decisions can and do influence the amount of earnings retained versus paid out as dividends, and such decisions have been seen recently in the market. For example, as a result of the economic effects of COVID-19, more than forty S&P 500 companies temporarily suspended their dividends.[49]

Q. IS THERE ACADEMIC RESEARCH THAT SUPPORTS YOUR CONCLUSION?

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[48] Rothschild Testimony, at 54:7-11.

[49] Karen Langley, "U.S. Companies Slashed Dividends at Fastest Pace in More Than a Decade," *The Wall Street Journal*, July 8, 2020.

A. Yes. Zhou and Ruland (2006), Gwilym, *et. al*. (2006) and Vivian (2006) discussed the theory that high dividend payouts (*i.e*., low retention ratios) are associated with low future earnings growth.[50] Each of these studies also cited Arnott and Asness (2003) that found, over the course of 130 years of data, future earnings growth is associated with high, rather than low payout ratios.[51] Specifically, Arnott and Asness (2003) concluded:

> Unlike optimistic new-paradigm advocates, we found that low payout ratios (high retention rates) historically precede low earnings growth. This relationship is statistically strong and robust. We found that the empirical facts conform to a world in which managers possess private information that causes them to pay out a large share of earnings when they are optimistic that dividend cuts will not be necessary and to pay out a small share when they are pessimistic, perhaps so that they can be confident of maintaining the dividend payouts. Alternatively, the facts also fit a world in which low payout ratios lead to, or come with, inefficient empire building and the funding of less than-ideal projects and investments, leading to poor subsequent growth, whereas high payout ratios lead to more carefully chosen projects. The empire-building story also fits the initial macroeconomic evidence quite well. At this point, these explanations are conjectures; more work on discriminating among competing stories is appropriate.[52]

All four studies found that there is a negative, not a positive, relationship between earnings growth rates and retention ratios. As such, Mr. Rothschild's reliance on retention growth rates in the constant growth DCF model is not appropriate.

Q. ARE THERE OTHER REASONS WHY YOU BELIEVE THAT RETENTION GROWTH RATES SHOULD NOT BE USED IN THE DCF MODEL?

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[50] Ping Zhou and William Ruland, "Dividend Payout and Future Earnings Growth," *Financial Analysts Journal*, Vol. 62, No. 3, 2006; Owain Gwilym, James Seaton, Karina Suddason, and Stephen Thomas, "International Evidence on the Payout Ratio, Earnings, Dividends and Returns," *Financial Analysts Journa*l, Vol. 62, No. 1, 2006; Vivian, A. (2006), The Payout Ratio, Earnings Growth Returns: UK Industry Evidence. Working Paper, School of Economics, Finance and Business, University of Durham.

[51] Robert Arnott and Clifford Asness, "Surprise: Higher Dividends = Higher Earnings Growth," *Financial Analysts Journal*, Vol. 59, No. 1, January/February 2003. Since the payout ratio is the inverse of the retention ratio, the authors found that future earnings growth is negatively related to the retention ratio.

[52] *Id*.

A. Yes. First, the use of the sustainable or retention growth rates involves estimating investor expectations for four separate variables over the near-term: (1) the retention ratio, reflected as the "b" variable; (2) the expected return on book equity, reflected as the "r" variable; (3) the growth in the number of shares of common equity, reflected as the "s" variable; and (4) the portion of the market-to-book ratio that exceeds unity, reflected as the "v" variable. This means that the growth estimate includes the forecasting error of the four separate variables.

Second, the use of retention growth rates ignores the extensive academic research demonstrating that earnings per share ("EPS") growth rates are most relevant in stock price valuation.[53]

2. Option Implied Growth Rates

Q. ARE THERE REASONS WHY THE COMMISSION SHOULD NOT CONSIDER THE RESULTS OF MR. ROTHSCHILD'S DCF ANALYSES USING HIS OPTION-IMPLIED GROWTH RATE?

A. Yes, there are several reasons why this analysis should not be relied upon to estimate the cost of equity:

[53] *See, e.g.*, Robert S. Harris, "Using Analysts' Growth Forecasts to Estimate Shareholder Required Rates of Return," *Financial Management*, Spring 1986, at 66; James H.Vander Weide and Willard T. Carleton, "Investor growth expectations: Analysts vs. history," *The Journal of Portfolio Management*, Spring, 1988; Robert S. Harris and Felicia C. Marston, "Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts," *Financial Management*, Summer, 1992; Advanced Research Center, "Investor Growth Expectations," Summer 2004; Eugene F. Brigham, Dilip K. Shome and Steve R. Vinson, "The Risk Premium Approach to Measuring a Utility's Cost of Equity," *Financial Management*, Vol. 14, No. 1, Spring, 1985; Dr. Roger A. Morin, *New Regulatory Finance*, Public Utilities Reports, Inc., 2006, at 299-303; Jing Liu, *et. al*., "Equity Valuation Using Multiples," *Journal of Accounting Research*, Vol. 40 No. 1, March 2002; C. A. Gleason, *et. al*., "Valuation Model Use and the Price Target Performance of Sell-Side Equity Analysts," *Contemporary Accounting Research*, September 2011; Bochun Jung, *et.. al*., "Do financial analysts' long-term growth forecasts matter? Evidence from stock recommendations and career outcomes," *Journal of Accounting and Economics*, Vol. 53 Issues 1-2, February-April 2012.

- *Lack of Academic Support*: Mr. Rothschild has provided no academic support for the use of option-implied growth rates in the constant growth DCF model, nor has he provided any evidence that investors would rely on option-implied growth in the DCF model to estimate their required return.

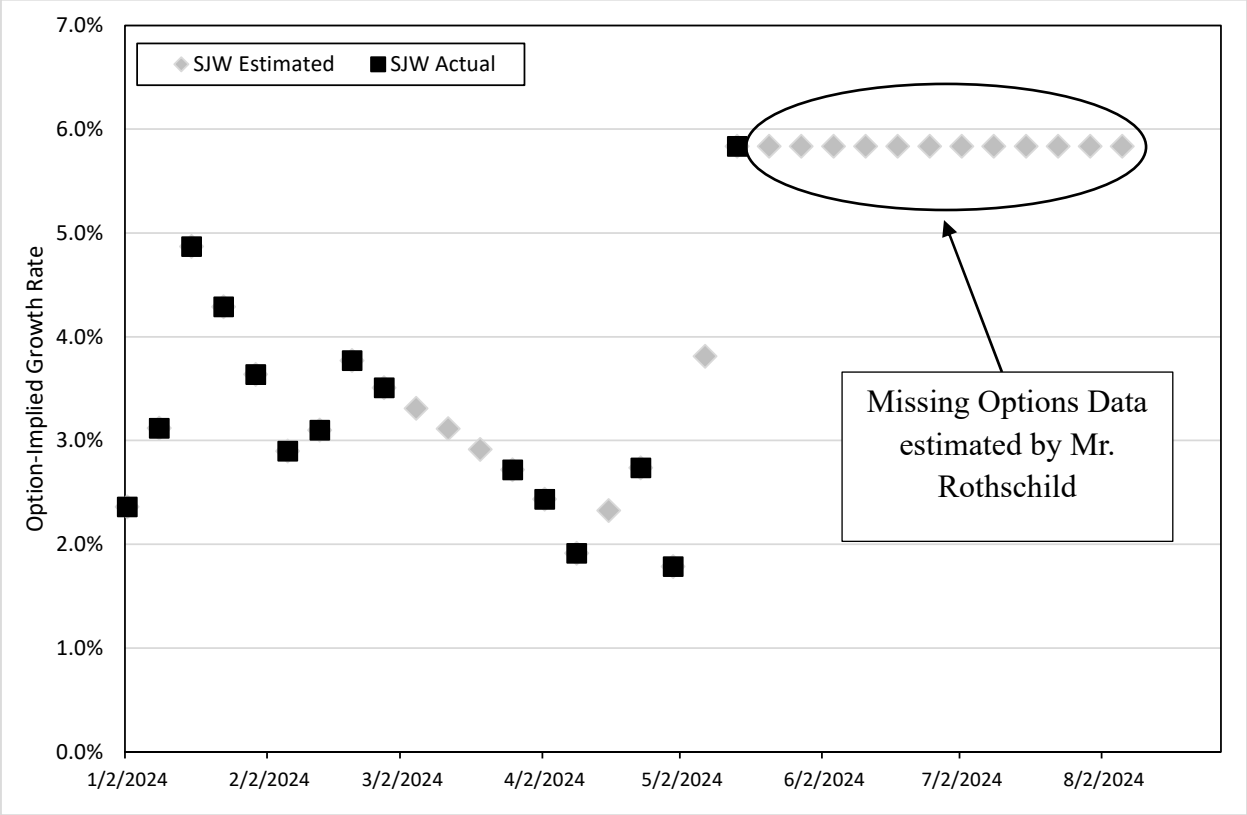
- *Scarcity of Options Data*: As shown in Rebuttal Exhibit AEB-6, given the limited options contract data for utilities, in certain weeks, Mr. Rothschild was unable to estimate an option-implied growth rate for five out of the six companies included in his proxy group. For the majority of the weeks included in his analyses, he was unable to estimate an option implied growth rate for four of the six companies included in his proxy group.[54] Further, in terms of the specific companies included in his proxy group, Mr. Rothchild was unable to estimate an option-implied growth rate for the entire three month period of May 28, 2024 through August 27, 2024 for both California Water Service Group ("CWT") and SJW Group (SJW) while he was only able to estimate an option-implied growth rate for one-week for MSEX.

- *Creation of data:* Mr. Rothschild simply creates data for weeks where options contract data is not available. Specifically, Mr. Rothschild relies on linear extrapolation to estimate the growth rates for the missing weeks using the actual option implied growth rates from before and after the missing observations. This is problematic for several reasons. First, there is no basis to assume that a linear extrapolation is appropriate for options data, and second, more importantly, Mr. Rothschild uses linear extrapolation to create data for a significant number of weeks where options contract data is missing.

  As shown in Figure 6 below, Mr. Rothschild was unable to calculate an option implied growth rate for SJW from May 21, 2024 through August 6, 2024 and thus set the growth rate over the period equal to the last actual growth rate on May 14, 2024. Further, it is unclear why he ended the extrapolation on August 6, 2024, as he assumed the growth rate was N/A from August 13, 2024 through August 27, 2024. It is evident from the actual data points that there is no basis for relying on a linear assumption as representative of investors' expectations.

[54] 2023.04.04-2024.08.27 - RFC Water Proxy Group OptIVA Results – D.xlsx.

Figure 6: Option Implied Growth Rate – SJW – January 2024 – August 2024[55]



- *Growth Rates Inconsistent with Constant Growth DCF Model*: Mr. Rothschild is relying on a constant growth DCF model. This form of the model requires a growth rate that can be considered sustainable in perpetuity. There is no basis to conclude that a growth rate estimated using options contracts that expire in six months is sustainable over the long-term. In fact, as shown in Figure 7 below, the estimated growth rate is very sensitive to the expiration date of the options contract. For example, MSEX had a growth rate of -1.2 percent using data for options contracts that expired in approximately seven months; however, the growth rate was 11.1 percent relying on data for options contracts that expired in approximately one month. Therefore, the selection of the options contract expiration date could have a meaningful effect on the growth rate and thus the DCF results.

[55] *Id.*

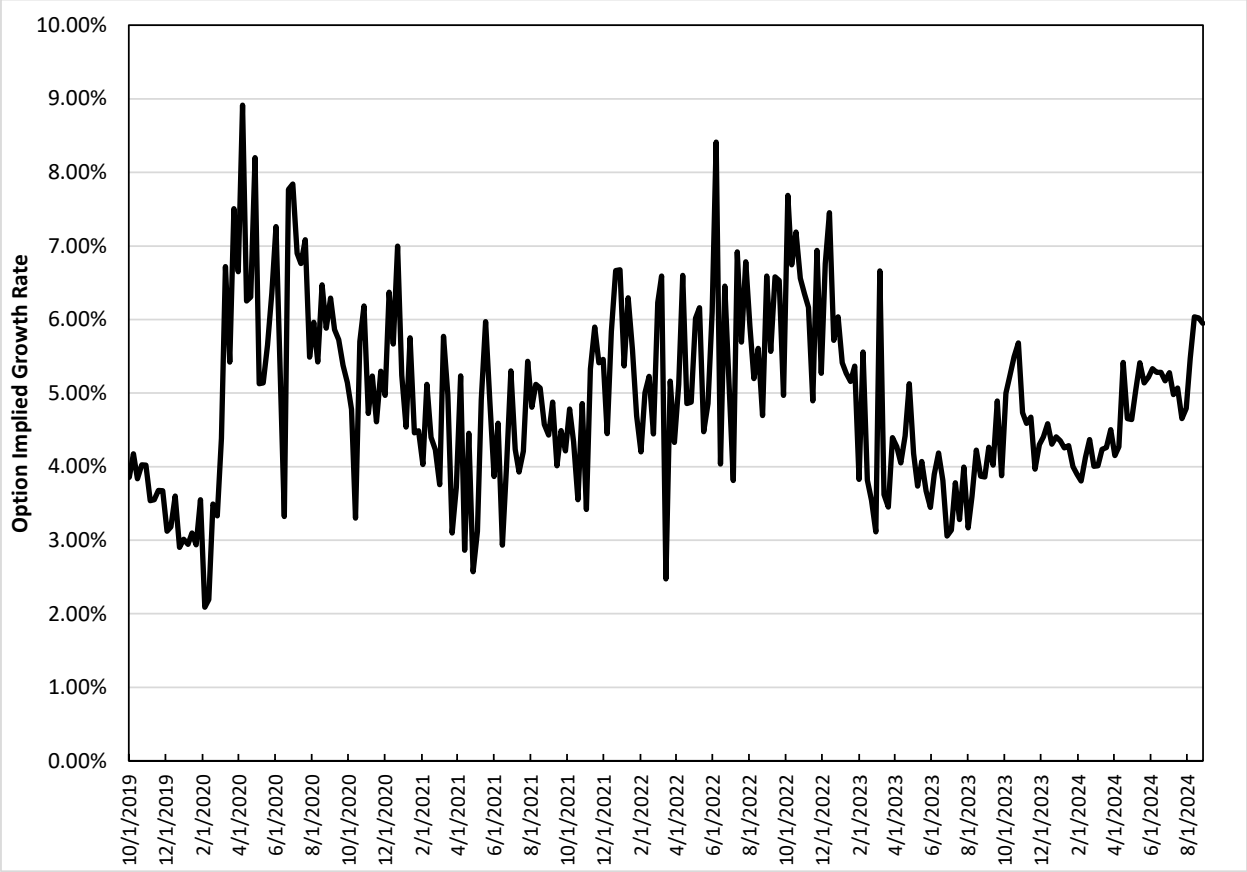
Figure 7: Option-Implied Growth Rate as of August 23, 2024[56]

Options Contract Expiration	Growth Rate		
	CWT	MSEX	SJW
0.90 Months	1.2%	11.1%	-0.2%
1.82 Months	-0.5%	4.6%	3.1%
3.89 Months	6.4%	1.8%	4.9%
6.88 Months	-2.7%	-1.2%	2.3%

- *Substantial Variability from Week-to-Week:* Mr. Rothschild estimates the option-implied growth rates weekly based on an average of the daily growth rates in the week. However, as shown in Figure 8, Mr. Rothschild's methodology results in a significant difference in the growth rate from week to week. Moreover, while Mr. Rothschild does also develop a constant growth DCF model using a weighted three-month average option-implied growth rate, as I will discuss in more detail below, Mr. Rothschild has provided no evidence for the weekly weighting factors he applies nor does his weighted average methodology significantly reduce the variation in the option-implied growth rate from week-to-week.

[56] 2024.08 - RFC Water Proxy Group OptIVA Results.xlsx

Figure 8: Option-Implied Growth Rates – Mr. Rothschild's Water Proxy Group – October 1, 2019 – August 31, 2024[57]



3. Mr. Rothschild's Criticisms of Projected EPS Growth Rates Fail to Consider Financial Theory and Recent Academic Research

Q. WHAT ARE MR. ROTHSCHILD'S CRITICISMS OF YOUR USE OF EPS GROWTH RATES IN THE CONSTANT GROWTH DCF MODEL?

A. Mr. Rothschild claims that projected EPS growth rates are: (1) not sustainable; (2) overly optimistic and upwardly biased; and (3) are not relied upon by financial institutions.[58]

[57] 2024.08.31 - TAWC Cost of Capital (RFC Water PG).xlsx.

[58] Rothschild Testimony, at 86:13-89:2.

Instead, Mr. Rothschild suggests that the sustainable growth rate would be more appropriate to be used in the constant growth DCF model.

Q. WHY IS IT APPROPRIATE TO RELY ON PROJECTED EPS GROWTH RATES IN THE DCF MODEL?

A. There are numerous reasons why projected EPS growth rates are the more appropriate growth rates to be relied upon in the DCF analysis:

- Earnings are the fundamental determinant of a company's ability to pay dividends, and over the long-term dividend growth can only be sustained by earnings growth.[59] Therefore, EPS should be relied on in the DCF analysis.
- As noted previously, there is significant academic research demonstrating that EPS growth rates are most relevant in stock price valuation. For example, Liu, *et. al.* (2002) examined "the valuation performance of a comprehensive list of value drivers" and found that "forward earnings explain stock prices remarkably well" and were generally superior to other value drivers analyzed. Gleason, *et. al*. (2012) found that the sell-side analysts with the most accurate stock price targets were those whom the researchers found to have more accurate earnings forecasts.
- Investment analysts report predominant reliance on EPS growth projections. In a survey completed by 297 members of the Association for Investment Management and Research, the majority of respondents ranked earnings as the most important variable in valuing a security (more important than cash flow, dividends, or book value).[60]
- Projected EPS growth rates such as those available from *Yahoo! Finance* and *Zacks* are based on consensus estimates from multiple sources and thus the results are less likely to be biased in one direction or another. Moreover, the fact that projected EPS growth estimates are available from multiple sources on a consensus basis attests to the importance of projected EPS growth rates to investors when developing long-term growth expectations.

Q. DO YOU AGREE WITH MR. ROTHSCHILD THAT ANALYSTS' PROJECTED EPS GROWTH RATES ARE BIASED?[61]

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[59] As noted by Brigham and Houston: "Growth in dividends occurs primarily as a result of growth in earnings per share (EPS). Earnings growth, in turn, results from a number of factors, including (1) inflation, (2) the amount of earnings the company retains and invests, and (3) the rate of return the company earns on its equity (ROE). Eugene F. Brigham and Joel F. Houston, *Fundamentals of Financial Management*, at 317 (Concise Fourth Edition, Thomson South-Western, 2004).

[60] Stanley B. Block, "A Study of Financial Analysts: Practice and Theory." *Financial Analysts Journal*, July/August 1999.

[61] Rothschild Testimony, at 87:7-88:8.

A. No. First, the 2003 Global Analysts Research Settlement (the "Global Settlement") served to significantly reduce the bias referred to by Mr. Rothschild. The Global Settlement required financial institutions to insulate investment banking from analysis, prohibited analysts from participating in "road shows," and required the settling financial institutions to fund independent third-party research. In addition, analysts covering the common stock of the proxy companies certify that their analyses and recommendations are not related, either directly or indirectly, to their compensation. Thus, it is unclear why the EPS growth rates for the proxy companies would be susceptible to an upward bias.

Furthermore, several studies have been conducted on data since the Global Settlement decision was issued and concluded that the bias that may have existed prior to the settlement was no longer of concern and that any issues related to analysts' forecast pertained to firms with characteristics very different from those of utilities. For example, Hovakimian and Saenyasiri (2010) found that analyst forecast bias declined significantly or disappeared entirely since the Global Settlement:

> Introduced in 2002, the Global Settlement and related regulations had an even bigger impact than Reg FD on analyst behavior. After the Global Settlement, the mean forecast bias declined significantly, whereas the median forecast bias essentially disappeared. Although disentangling the impact of the Global Settlement from that or related rules and regulations aimed at mitigating analysts' conflicts of interest is impossible, forecast bias clearly declined around the time the Global Settlement was announced. These results suggest that the recent efforts of regulators have helped neutralize analysts' conflicts of interest.[62]

[62] Armen Hovakimian and Ekkachai Saenyasiri, "Conflicts of Interest and Analyst Behavior: Evidence from Recent Changes in Regulation," *Financial Analysts Journal.* Volume 66, Number 4, July/August 2010, at 195.

Other studies such as Hribar and McInnis (2012)[63] and Michel and Pandes (2012)[64] found that analyst earnings forecasts turn out to be too optimistic for stocks that are more difficult to value, for instance, stocks of smaller firms, firms with high volatility or turnover, younger firms, or firms whose prospects are uncertain. These characteristics describe companies that are more volatile and/or less transparent than the average firm – none of which is applicable to the more mature and stable utility companies in the proxy group relied on by both Mr. Rothschild and I, where all companies had at least two analysts providing estimates and who, due to their regulated nature, have information transparency. Consequently, optimism bias is not expected to be an issue for utilities.

Q. HAVE YOU REVIEWED THE STUDY CITED BY MR. ROTHSCHILD THAT EXAMINED THE POTENTIAL BIAS IN ANALYSTS' GROWTH PROJECTIONS?

A. Yes. Mr. Rothschild references one study, published by McKinsey and Company in April 2010, that analyzed the period after the Global Settlement on October 31, 2003, which he asserts proves the potential bias in analysts' EPS projections.[65] The McKinsey and Company study notes:

> Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts actually hit the mark. This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases. So

[63] Paul Hribar and John M. McInnis. "Investor Sentiment and Analysts' Earnings Forecast Errors." *Management Science* (Special Issue on Behaviorial Economics and Finance). Vol. 58, No. 2, February 2012, at 293-307.

[64] Jean-Sebastien Michel and J. Ari Pandes. "Are Analysts Really Too Optimistic?," *Social Science Research Network*, March 15, 2012.

[65] Rothschild Testimony, at 87:7-18.

> as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006.[66]

The earnings reported by S&P 500 companies met and exceeded the growth rate projected by analysts between 2003 and 2006.[67] The period analyzed in the study extends through 2008, and analysts' projections did exceed actual earnings growth in 2007 and 2008. However, this time period reflected the start of the Great Recession and does not indicate analyst bias, but rather shows that analysts were unable to predict the severity and magnitude of the financial crisis, which is no different than any other recession or other unanticipated event (*e.g.*, the COVID-19 pandemic). Furthermore, the McKinsey study examines analysts' EPS forecasts for a given year at one, two and three years out. It does not review the 3- to 5-year EPS growth rates that I used in my constant growth DCF analysis, which are meant to represent average growth for a company over a longer period of time.

Q. IS THERE OTHER ACADEMIC RESEARCH THAT PROVIDES SUPPORT FOR YOUR CONCLUSION THAT THE ANALYSTS' GROWTH RATES FOR UTILITIES ARE NOT OVERLY OPTIMISTIC?

A. Yes. Behn, Choi and Kang (2008) examined the relationship between financial audit quality and the accuracy of earning growth projections. Ultimately, the authors concluded that the accuracy of analysts' earnings growth projections were higher if the company was audited by a "Big 5" accounting firm.[68] At the time of the study, the Big 5 account firms

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[66] Marc Goedhart, Rishi Raj, and Abhishek Saxena, "Equity analysts: Still too bullish," McKinsey and Company, April 1, 2010.

[67] *Id.*

[68] Bruce K. Behn, Jong-Hag Choi and Tony Kang, "Audit Quality and Properties of Analysts Earnings Forecasts," *The Accounting Review,* Vol. 83, No. 2, March 2008, at 327-349.

were Deloitte & Touche, Price Waterhouse, KPMG, Ernst and Young and Coopers and Lybrand. However, because of the merger of Price Waterhouse and Coopers and Lybrand, there are currently four big accounting firms. As shown in Figure 9, all but one of the companies included in my proxy group are audited by a "Big 4" accounting firm, thus indicating a higher forecast accuracy of earnings growth projections for the proxy group companies. Further, while MSEX was not audited by a "Big 4" accounting firm, MSEX was audited by Baker Tilly US, LLP, which is one of the ten largest accounting firms in the U.S.[69]

Figure 9: Auditors of the Proxy Group Companies

Company	Ticker	Accounting Firm
Atmos Energy Corporation	ATO	Ernst & Young
NiSource Inc.	NI	Deloitte & Touche LLP
Northwest Natural Gas Company	NWN	PricewaterhouseCoopers LLP
ONE Gas, Inc.	OGS	PricewaterhouseCoopers LLP
Spire, Inc.	SR	Deloitte & Touche LLP
Eversource Energy	ES	Deloitte & Touche LLP
American States Water Company	AWR	PricewaterhouseCoopers LLP
California Water Service Group	CWT	Deloitte & Touche LLP
Middlesex Water Company	MSEX	Baker Tilly US, LLP
SJW Group	SJW	Deloitte & Touche LLP
Essential Utilities, Inc.	WTRG	PricewaterhouseCoopers LLP

Q. IS MR. ROTHSCHILD'S CRITICISM OF THE USE OF 5-YEAR PROJECTED EPS GROWTH RATES INTERNALLY CONSISTENT WITH HIS OWN METHODOLOGY FOR ESTIMATING A SUSTAINABLE GROWTH RATE?

A. No. Despite his criticism that 5-year projected EPS growth rates can deviate from long-term EPS growth rates, Mr. Rothschild relies on projected data in the development of his sustainable growth rate that would suffer from this same criticism. In developing the sustainable growth rate, Mr. Rothschild relies on an estimate of the expected return on

[69] Source: https://insidepublicaccounting.com/ipa-top-500-firms/

equity that is based on 3- to 5-year forecasts from *Value Line* and *Zacks*, as well as historical actual returns for 2021-2023 as reported by *Value Line*, in his sustainable growth rate calculation. Therefore, the expected return on equity projections that Mr. Rothschild uses to develop his sustainable growth rate rely on the same time-period as the 5-year analysts' projected EPS growth rates that I relied in my constant growth DCF models and would be susceptible to the same criticism of bias that he offers of EPS growth rates.

Q. HAVE OTHER REGULATORY COMMISSIONS RELIED ON PROJECTED EPS GROWTH RATES AS THE ESTIMATE OF LONG-TERM GROWTH IN THE CONSTANT GROWTH DCF MODEL?

A. Yes. The Pennsylvania Public Utilities Commission ("PA PUC") has historically preferred the use of analysts' projected EPS growth rates in the constant growth DCF analysis.[70] In fact, the PA PUC has noted the following:

> Upon our consideration of the record evidence, we find that I&E's DCF calculation correctly used forecasted earnings growth rates instead of considering historical growth rates. The record indicates that growth rate forecasts are made by analysts who already factor historical data into their forecasts of earnings per share growth. Although past performance can yield valuable information, relying on it for a DCF analysis results in placing too much weight on past performance. ***Thus, the best measure of growth for use in the DCF model are forecasted earnings growth rates***.[71]

Q. HOW WOULD THE RESULTS OF MR. ROTHSCHILD'S CONSTANT GROWTH DCF CHANGE IF HE RELIED ON PROJECTED EPS GROWTH RATES?

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[70] *See, e.g.,* Pennsylvania Public Utility Commission, Opinion and Order, October 4, 2018, at 93. *See, also*, Docket No. M-2018-3006643, Public Meeting held January 17, 2018, at 16, in which the Commission discusses the method it uses to set the ROE for the Distribution System Improvement Charge.

[71] Pennsylvania Public Utility Commission, Docket No. Docket No. R-2020-3018929, Opinion and Order, June 17, 2021, at 160; emphasis added.

A. As shown in Rebuttal Exhibit AEB-7, modifying Mr. Rothschild's constant growth DCF analysis to rely on earnings growth rate projections from *Zacks*, *Yahoo! Finance* and *Value Line* as of August 31, 2024, results in a cost of equity of 9.46 percent using the average of the high and low stock price for the year ending August 31, 2024, and 9.33 percent using the stock prices as of August 31, 2024. Thus, Mr. Rothschild's constant growth DCF range would increase from 7.65 percent to 8.38 percent to 9.33 percent to 9.46 percent. These adjusted results demonstrate that Mr. Rothschild's use of sustainable growth rates and option-implied growth rates in the constant growth DCF model significantly understates the cost of equity.

C. Non-Constant Growth DCF Analysis

Q. PLEASE SUMMARIZE MR. ROTHSCHILD'S NON-CONSTANT GROWTH DCF ANALYSIS.

A. Similar to his constant growth DCF analysis, Mr. Rothschild also presents a non-constant growth DCF analysis using both spot market data and the average of the high and low stock prices through August 31, 2024. His non-constant growth model is based on projected capital appreciation, forecasted dividends per share ("DPS"), and projected book values for his proxy group as reported by *Value Line*. This analysis produces results ranging from 6.03 percent (based on the average of the high and low stock price for the year ending August 31, 2024) and 5.89 percent (based on spot stock prices as of August 31, 2024).[72] Mr. Rothschild does not rely on the results of his non-constant growth DCF analysis for

[72] Rothschild Testimony, at 61:5-6.

purposes of his recommended ROE because his non-constant growth DCF results "are not sufficiently higher than the cost of debt."[73]

Q. WHILE MR. ROTHSCHILD REJECTS THE RESULTS OF HIS NON-CONSTANT GROWTH DCF ANALYSIS, DOES HIS SPECIFICATION OF THIS MODEL ALSO INVALIDATE HIS CRITICISM OF YOUR USE OF ANALYSTS' PROJECTIONS?

A. Yes. Again, as shown on Exhibit ALR-3, page 3, the assumptions used in Mr. Rothschild's non-constant growth DCF model are entirely based on *Value Line*'s projections, including: (1) projected dividends per share; (2) a projected stock price based on *Value Line*'s projected book value; and (3) a projected cash flow resulting from the sale of stock based on *Value Line*'s projected stock price.

Q. DO YOU AGREE WITH MR. ROTHSCHILD'S USE OF THE NON-CONSTANT GROWTH DCF ANALYSIS?

A. No. The utility industry is considered a mature industry due to its regulated status and relatively stable demand. Thus, financial projections such as earnings growth rate projections are also likely to be relatively stable over the long term. The relative stability of the financial forecasts for utilities supports the use of a constant growth DCF model to estimate the cost of equity for a mature industry, and thus the constant growth DCF model is the more appropriate model to estimate the cost of equity for Tennessee-American.

Further, Mr. Rothschild's use of the non-constant growth DCF analysis is inconsistent with his own views on the utility industry. Specifically, Mr. Rothschild states:

[73] *Id.,* at 13, footnote 12.

> ***For a stable industry such as utility companies***, investors will typically look at actual earned returns on equity as one meaningful input into what can be expected for future earned returns on book equity.[74]

In addition, the non-constant growth DCF model increases the subjectivity of the DCF model by requiring two additional variables: (1) the introduction of a second stage growth rate; and (2) the selection of the time-period that the first stage growth rates will be in effect, both of which can have a significant effect on the results of the DCF model. Therefore, the use of the non-constant growth DCF model creates greater opportunity for an analyst to influence the results of the DCF model.

Q. IS MR. ROTHSCHILD'S USE OF THE NON-CONSTANT GROWTH DCF MODEL IN THIS CASE INCONSISTENT WITH HIS PRIOR TESTIMONY?

A. Yes. In testimony filed in July 2022 in a rate proceeding filed by Pennsylvania-American Water Company ("PAWC"), Mr. Rothschild did not rely on the results of his non-constant growth DCF and stated that it could understate the cost of equity:

> I did not rely on the results of my non-constant growth DCF model, which range between 6.08% and 6.21% because this method does not incorporate the growth from the sale of new common stock and **therefore could understate PAWC's cost of equity**.[75]

Mr. Rothschild relies on the same methodology and inputs to calculate his non-constant growth DCF model in the current proceeding. The fact that Mr. Rothschild acknowledges his non-constant growth DCF can understate the cost of equity is further support that it should not be used for determining the cost of equity for the Company in this proceeding.

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[74] *Id.,* at 57:5-7 (emphasis added).

[75] Pennsylvania Public Utilities Commission, Docket Nos. R-2022-3031672 R-2022-3031673, Rothschild Testimony, July 29, 2022, at 9; emphasis added.

D. CAPM Analyses

Q. PLEASE SUMMARIZE MR. ROTHSCHILD'S CAPM ANALYSIS.

A. Mr. Rothschild develops the CAPM using a weighted risk premium and a spot risk premium. His analysis produces cost of equity estimates ranging from 7.14 percent to 7.91 percent using a weighted risk premium, and 7.07 percent to 7.77 percent using the spot risk premium.[76]

Q. WHAT IS YOUR RESPONSE TO MR. ROTHSCHILD'S CHARACTERIZATION THAT HIS "CAPM METHOD HAS ALSO BEEN RECOGNIZED BY OTHER COMMISSIONS"?[77]

A. I disagree with his characterization of other commission decisions regarding his CAPM methodology. It is my understanding based on a review of his testimony, that Mr. Rothschild's reference to "other commissions" is limited to a decision by the South Carolina Public Service Commission ("SCPSC") for Blue Granite Water Company ("Blue Granite") and a decision by the California Public Utilities Commission ("CPUC") in the cost of capital proceeding for independent small telephone companies.

In the rate proceeding for Blue Granite, Mr. Rothschild claims the SCPSC adopted his recommended ROE of 7.46 percent because of his approach that reflects both historical and forward-looking inputs.[78] However, his reference to this decision has several inaccuracies. First, Mr. Rothschild did not recommend an ROE of 7.46 percent for Blue Granite, but rather Mr. Rothschild determined the cost of equity to be 8.75 percent and

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[76] Rothschild Testimony, at 13:8 (Table 2).

[77] *Id*., at 14:6-15:2.

[78] *Id*., at 14:7-13.

recommended an ROE of 8.65 percent, which was at the high end of his recommended range of 7.46 percent to 8.75 percent.[79] Mr. Rothschild selected the high end of his range in that case to account for the small size of Blue Granite and considering the business risks of Blue Granite.[80] Therefore, he cannot claim that the authorized ROE in that jurisdiction was based on his recommendations.

Further, the referenced 7.46 percent authorized ROE for Blue Granite is not an appropriate comparison for an authorized ROE in this proceeding because, as noted in the SCPSC decision, the ROE was determined in that proceeding, "considering the quality of service issues known to exist with Blue Granite and the setting of just and reasonable rates."[81] It appears that the SCPSC selected the low end of Mr. Rothschild's range to account for Blue Granite's service quality issues. As a result, the SCPSC's decision regarding Blue Granite was not an endorsement of Mr. Rothschild's methodology. Further, the ROE that was established in that proceeding is not reasonable or comparable to the ROE that should be considered when the Commission establishes the cost of equity for Tennessee-American in this proceeding.

Finally, in the CPUC's 2024 decision in the cost of capital proceeding for ten independent small telephone companies, the CPUC did rely on Mr. Rothschild's cost of equity range, but excluded his 16-basis-point downward adjustment for financial risk, which resulted in a range for the cost of equity of 8.49 percent to 11.04 percent. Ultimately,

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[79] South Carolina Public Service Commission, Docket No. 2019-290-WS, Rothschild Testimony, January 23, 2020, at 7.

[80] *Id*.

[81] South Carolina Public Service Commission, Docket No. 2019-290-WS, Order No. 2020-306, April 9, 2020, at 38; emphasis added.

the CPUC set the authorized ROE at the midpoint of the range of 9.77 percent.[82] However, it is important to note that the cost of equity range relied on by the CPUC of 8.49 percent to 11.04 percent is significantly greater than the cost of equity range proposed by Mr. Rothschild in the current proceeding for Tennessee-American of 7.09 percent to 8.28 percent. This fact is important because the CPUC, like this Commission, adheres to the legal standards for setting a fair rate of return outlined in the Supreme Court's decisions in both *Hope* and *Bluefield* and has also noted that "the Commission need not use a particular methodology in applying the Constitutional standard, as long as the Commission allows the utility a reasonable opportunity to earn a fair return on investments".[83] Therefore, the CPUC understands that it is not the methodology that is important but that the methodology relied on produces a fair rate of return.

As shown in Figure 4 above, Mr. Rothschild's cost of equity range of 7.09 percent to 8.28 percent in this proceeding is well below the low end of the range of comparable authorized ROEs for water, natural gas, and electric utilities in the United States since 2021. Given that the CPUC, like this Commission, adheres to the legal standards outlined in *Hope* and *Bluefield*, Mr. Rothschild has provided no evidence to assume that the CPUC would rely on his methodologies when they produce cost of equity estimates that are well below the returns awarded to other utilities of similar risk such as they have in the current proceeding for Tennessee-American. It is misleading for Mr. Rothschild to imply that the CPUC supports his cost of equity methodologies since the CPUC has been clear that when

[82] California Public Utilities Commission, Application No. 22-09-003, Decision No. 24-09-021, September 16, 2024, at 23.

[83] California Public Utilities Commission, Application No. 21-05-001, Decision No. 23-06-025, June 29, 2023, at 9.

applying the constitutional standards of *Hope* and *Bluefield* it is not the methodology but the ultimate result produced by the methodologies that matters most.

Q. HOW DOES MR. ROTHSCHILD SPECIFY THE RISK-FREE RATE IN HIS CAPM ANALYSIS?

A. Mr. Rothschild calculates the risk-free rate in his CAPM using the spot yields for the 3-month U.S. Treasury bill and the 30-year Treasury bond as of August 31, 2024, and weighted averages over the three months ending on that date for both yields.[84]

Q. HOW DOES MR. ROTHSCHILD SPECIFY THE BETA IN HIS CAPM?

A. Mr. Rothschild utilizes a "forward beta" and a "historical blended" beta.[85] Mr. Rothschild's forward beta is an option-implied beta calculated using options data with a maximum expiration period of six months for the companies in his proxy group and the S&P 500. Further, as discussed in more detail herein, the volume and open interest on the contracts that are available demonstrate that these instruments are illiquid and therefore should not be relied upon to estimate the betas for the proxy group companies.[86] Mr. Rothschild's historical blended beta is a weighted beta calculation where he weights historical betas that are calculated using data for historical periods of six months, two years, and five years. The weights applied to the historical betas to estimate a "historical blended beta" are 50 percent to the 6-month beta, 30 percent to the two-year beta and 20 percent to the five-year beta.[87]

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84 Rothschild Testimony, at 64:3-7.
85 *Id*., at 65:3-6.
86 2023.04.04-2024.08.27 - RFC Water Proxy Group OptIVA Results – D.xlsx.
87 Rothschild Testimony, at 67:11.

Q. HOW DOES MR. ROTHSCHILD CALCULATE THE MARKET RISK PREMIUM?

A. Mr. Rothschild calculates his expected return on the S&P 500 using stock options and the same unproven methodology he uses to calculate his option-implied beta. He approximates the expected growth for the S&P 500 using a cumulative probability of 50 percent, which he indicates is the median of his probability distribution and represents an "option-implied market consensus" regarding the growth in the S&P 500.[88] Mr. Rothschild adds the dividend yield to his option-implied growth rate to derive the estimated market return, and then subtracts the risk-free rate to derive the market risk premium. Mr. Rothschild calculates both a weighted (*i.e.*, three months as of August 31, 2024) and spot (as of August 31, 2024) market risk premium.[89]

1. Risk-Free Rate

Q. DO YOU AGREE WITH THE RISK-FREE RATE THAT MR. ROTHSCHILD RELIES ON IN HIS CAPM ANALYSES?

A. No. Mr. Rothschild incorrectly relies on the 3-month U.S. Treasury bill rate as the estimate of the risk-free in four of the eight versions of his CAPM analysis. In determining the security most relevant to the application of the CAPM, it is important to select the term (or maturity) that best matches the life of the underlying investment. As noted by *Morningstar*:

> The horizon of the chosen Treasury security should match the horizon of whatever is being valued… If an investor plans to hold stock in a company for only five years, the yield on a five-year Treasury note would not be appropriate since the company will continue to exist beyond those five years.[90]

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88 *Id*., at 125:12-16.

89 *Id*., at 76:8-12.

90 *Morningstar*, *Inc*., 2010 Ibbotson Stocks, Bonds, Bills and Inflation, Valuation Yearbook, at 44.

Because utility companies represent long-duration investments, the 30-year Treasury yield, not the 3-month Treasury bill, is the appropriate measure of the risk-free rate for the purpose of the CAPM. In addition, based on principles of prudent financial management, the term of the debt financing should match the useful life of the asset being financed. Utility plant assets generally have useful lives between 25 and 40 years, meaning that under prudent financial management, those assets should be financed with bonds of longer duration than three months.

Q. IS MR. ROTHSCHILD'S SELECTED RISK-FREE RATE CONSISTENT WITH HIS VIEWS ON ESTIMATING THE INVESTOR-REQUIRED RETURN ON EQUITY?

A. No. Mr. Rothschild's use of historical and spot data for the risk-free rate is inconsistent with his views regarding: (1) the forward-looking nature of the CAPM analysis; and (2) his reliance on projected market assumptions in other cost of equity analyses. First, Mr. Rothschild's use of historical and spot yields for the risk-free rate is inconsistent with the forward-looking nature of the CAPM given that he agrees the assumptions used in the cost of equity estimation methodologies should be forward-looking. As a result, Mr. Rothschild's CAPM analysis which relies on historical and spot yields as the estimate of the risk-free rate and not projections is inconsistent with the forward-looking nature of the analysis. I agree that the cost of equity being estimated is for the forward-looking period when the Company's rates will be in effect and therefore it is important for the Commission to consider projected risk-free rates in the CAPM.

Second, while Mr. Rothschild argues against the use of a projected risk-free rate in his CAPM analysis, as noted previously, his constant growth DCF using sustainable growth

rates and his non-constant growth rate DCF analysis both rely on forecasts for the development of many of the assumptions used in those analyses. Therefore, Mr. Rothschild's argument regarding the accuracy of projected interest rates is not compelling and inconsistent with his own use of projections elsewhere in his analyses.

While there are clearly inconsistencies with Mr. Rothschild's testimony, it is important to note that the risk-free rate assumption is not a major driver of the differences in the results of our analyses.

Q. DO YOU AGREE WITH MR. ROTHSCHILD'S CRITICISM OF THE USE OF THE CONSENSUS ESTIMATE PUBLISHED BY THE *BLUE CHIP FINANCIAL FORECAST* AS AN ESTIMATE OF THE RISK-FREE RATE? [91]

A. No. Mr. Rothschild fails to acknowledge that the *Blue Chip Financial Forecast* is not a so-called "expert" forecaster, but rather a consensus estimate based on estimates from major investment firms (*e.g.*, JP Morgan Chase, Goldman, Sachs & Co., Barclays, and Bank of America). In fact, the *Blue Chip Financial Forecast* relies on data from some of the same sources that Mr. Rothschild uses to support his criticisms of my analysis. A fundamental tenet in Mr. Rothschild's testimony is that he relies on market data based on the behavior of market participants, and it is undeniable that the opinions of these institutions are considered by equity investors and therefore can reasonably be relied upon as estimates of the risk-free rate in the CAPM.

[91] Rothschild Testimony, at 116:21-117:8.

2. Beta

Q. IS MR. ROTHSCHILD'S APPROACH IN ESTIMATING OPTION-IMPLIED BETA COEFFICIENTS IN THIS PROCEEDING REASONABLE?

A. No. There are several reasons why Mr. Rothschild's beta estimates are unreasonable:

- Mr. Rothschild's forward option-implied beta varies significantly from week-to-week.
- Mr. Rothschild's short-term beta analyses (*i.e.*, his forward option-implied beta using options contracts with expirations six months in the future and his 6-month historical beta) overemphasize market dislocations and show significant variation over very short time periods.
- Mr. Rothschild arbitrarily selects the weighting factors for the historical beta coefficients in his "historical blended" betas.

Q. WHY DO YOU DISAGREE WITH MR. ROTHSCHILD'S USE OF FORWARD OPTION-IMPLIED BETAS IN HIS CAPM?

A. Mr. Rothschild's calculates a weekly forward option-implied beta based on an average of the daily forward option-implied beta coefficients in a week. However, daily market volatility can be significant which affects his calculation of the weekly option-implied beta resulting in substantial variations in his option-implied betas from week-to-week. For example, as shown in Chart 11 of Mr. Rothschild's testimony, which is a graph of investors' stock price volatility expectations, expectations regarding volatility can vary significantly from day-to-day.

Q. DOES MR. ROTHSCHILD'S TESTIMONY DEMONSTRATE SIGNIFICANT WEEK-TO-WEEK VARIATION IN HIS OPTION-IMPLIED BETAS?

A. Yes. As shown on Schedule ALR-4, page 3, the forward option-implied beta for his proxy group ranged from 1.05 on June 4, 2024, to 0.86 on August 31, 2024. Moreover, the forward option-implied beta for his proxy group was 0.95 on August 20, 2024, while only

one week later on August 27, 2024, it was 0.86. These examples demonstrate that the approach Mr. Rothschild relies upon to estimate his option-implied beta used in the calculation of his forward betas is highly variable and dependent on daily volatility in the market.

Q. HOW DOES MR. ROTHSCHILD'S CALCULATION OF HISTORICAL BETAS OVEREMPHASIZE MARKET DISLOCATIONS?

A. Mr. Rothschild calculates betas over three time periods, 6 months, 2 years and 5 years. He places the greatest weight (50 percent) on his 6-month historical betas, despite recognizing that changes in market dynamics, such as macroeconomic events (*e.g.* COVID-19, international conflicts, trade wars) can have a larger effect on 6-month historical betas.[92]

While Mr. Rothschild acknowledges that changes in market dynamics have a larger effect on 6-month historical betas, he dismisses this fact by concluding that there are always numerous factors affecting markets and that "it is a good idea to use 6-month historical betas to measure recent and current market dynamics regardless of recent developments."[93]

Q. IS THERE WIDE VARIATION IN THE 6-MONTH BETA ESTIMATES CALCULATED BY MR. ROTHSCHILD?

A. Yes. As shown in Schedule ALR-4, page 3, the 6-month historical beta ranged from 0.63 to 0.83. Thus, short term fluctuations in the market have a significant effect on the 6-month historical beta from week-to-week. Given that a 6-month historical beta calculation can be greatly affected by short-term changes in the market, it is more reasonable to place greater weight on the historical betas calculated using 2 years and 5 years of market data.

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[92] *Id.,* at 69:12-17.

[93] *Id*., at 69:18-21.

Q. HOW DOES MR. ROTHSCHILD ARRIVE AT HIS FINAL BETA ESTIMATES?

A. Mr. Rothschild relies on the forward and historical blended betas for both the most recent week (August 27, 2024) and a weighted average three-month average (May 28, 2024, through August 27, 2024). For his weighted average, Mr. Rothschild calculates a weekly time series for both the option-implied betas and historical betas over the three-month period of May 28, 2024, through August 27, 2024. He weights the data points in the time series, giving the greatest weight to the more recent data in the series.

Q. IS THERE ANY EMPIRICAL OR ACADEMIC SUPPORT FOR WEIGHTING THE TIME SERIES OF BETA CALCULATIONS, AS MR. ROTHSCHILD HAS DONE?

A. No. Mr. Rothschild relies on the study by Chang, Christoffersen, Jacobs and Vainberg (2011), however this study does not discuss the use of a weighted time series. Further, Mr. Rothschild has provided no other empirical studies or academic support that suggests that calculating a 3-month weighted average of the time series will produce a more accurate estimate of beta to be used in a forward-looking CAPM analysis. Rather, this methodology is entirely Mr. Rothschild's own financial engineering.

Q. ARE MR. ROTHSCHILD'S OPTION-IMPLIED BETAS BIASED BY THE LIMITED AVAILABILITY OF DATA FOR HIS WATER PROXY GROUP?

A. Yes. Reviewing the underlying data relied upon by Mr. Rothschild, it is clear that the actual option data is sparse and that the trading of these contracts is limited. Further, the data is volatile. The combination of limited data, illiquid trading and volatility in settlements demonstrates that this data cannot reasonably be relied upon to estimate a forward-looking beta.

Q. PLEASE SUMMARIZE YOUR FINDINGS RELATED TO THE LIMITATIONS OF THE UNDERLYING DATA USED IN MR. ROTHSCHILD'S OPTION ANALYSIS.

A. Similar to his calculation of the option-implied growth rates, Mr. Rothschild calculates option-implied betas for his proxy group that are limited by the number of option contracts for each company and the duration of these contracts:

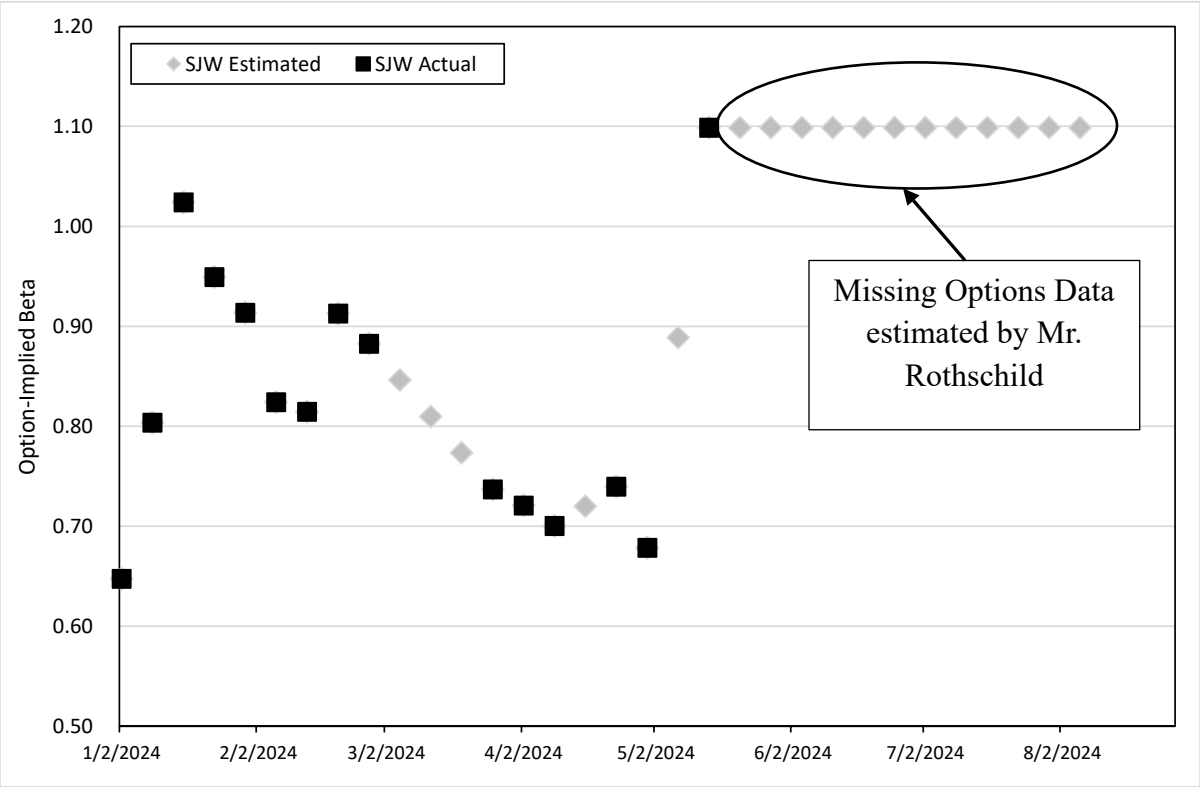
- The options contracts for Mr. Rothschild's water utility proxy group have expiration dates that are no longer than 9 months forward looking, whereas the S&P 500 has option contracts out approximately 5 years. It is unreasonable to rely on illiquid option data that is at a maximum 9 months forward in comparison with 5 years of S&P 500 options contracts to calculate a forward-looking beta for the individual company or the water utilities as an industry.

- As shown in Rebuttal Exhibit AEB-6, given the limited options contract data for utilities, from week to week, there are companies that do not have the options contract data necessary to calculate a beta coefficient. For example, Mr. Rothchild was unable to estimate an option-implied beta for the entire three-month period of May 28, 2024 through August 27, 2024 for both California Water Service Group ("CWT") and SJW Group (SJW) and he was only able to estimate an option-implied beta for one-week for MSEX. As a result, in certain weeks, Mr. Rothschild was unable to estimate an option-implied beta for five out of the six companies included in his proxy group. For the majority of the weeks included in his analyses, he was unable to estimate an option implied beta for four of the six companies included in his proxy group.[94]

- Similar to his option-implied growth rates, for weeks where options contract data was not available, Mr. Rothschild simply ***creates data*** by relying on linear extrapolation to estimate the betas for the missing weeks using the actual option implied betas from before and after the missing observations. As shown in Figure 10 below, Mr. Rothschild was unable to calculate an option implied beta for SJW from May 21, 2024 through August 6, 2024 and thus set the growth rate over the period equal to the last actual growth rate on May 14, 2024. Further, it is unclear why he ended the extrapolation on August 6, 2024, as he assumed beta was N/A from August 13, 2024 through August 27, 2024. It is clear that Mr. Rothschild has provided no basis to assume that a linear extrapolation is appropriate which is particularly important because of the significant number of weeks where options contract data is missing. Further, none of the data that has been created by Mr. Rothschild is market data.

[94] 2023.04.04-2024.08.27 - RFC Water Proxy Group OptIVA Results – D.xlsx.

Figure 10: Option Implied Beta – SJW – January 2024 – August 2024[95]



- Further, as shown in Figure 11 below, the option-implied beta is very sensitive to the expiration date of the contract.

Figure 11: Option-Implied Beta as of August 23, 2024[96]

Options Contract Expiration	Beta		
	CWT	MSEX	SJW
0.90 Months	0.6915	2.2509	-0.5039
1.82 Months	-0.4166	1.1444	2.4308
3.89 Months	0.9413	0.4532	0.9045
6.88 Months	-0.5991	-0.4037	0.4496

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE OPTION CONTRACT DATA RELIED UPON BY MR. ROTHSCHILD.

[95] *Id.*

[96] 2024.08 - RFC Water Proxy Group OptIVA Results.xlsx

A. As discussed previously, there is limited options contract data available for utilities. Further, Mr. Rothschild has made several simplifying assumptions (essentially creating data) to fill in large gaps in the data set. Therefore, the analysis he performs is not market-based and cannot be used to estimate the cost of equity for the proxy group companies.

Q. HAVE MR. ROTHSCHILD'S OPTION-IMPLIED AND HISTORICAL BETAS PRODUCED GENERALLY CONSISTENT RESULTS?

A. No. As shown in Rebuttal Exhibit AEB-8, Mr. Rothschild relied on option-implied and hybrid beta estimates between mid-2020 and the end of 2022, yet the resulting betas have varied widely over time from 0.38 to 0.82. A proxy group beta of 0.38 will produce a substantially different CAPM result than a proxy group beta of 0.82. Similarly, as I will discuss in more detail below, Mr. Rothchild recently adjusted his approach in 2023 to rely on option-implied and historical blended betas as opposed to option-implied and hybrid betas; however, Mr. Rothschild's betas have still varied significantly from 0.81 to 0.95.

Q. HAS MR. ROTHSCHILD DEVELOPED A CONSISTENT METHODOLOGY FOR CALCULATING BETAS?

A. No. As noted above, I have reviewed Mr. Rothschild's testimony in many rate proceedings over the past several years, and over that time period, this concept has been continually evolving. As shown in Rebuttal Exhibit AEB-8, Mr. Rothschild's use of option-implied and historical blended betas is a new approach that Mr. Rothschild appears to have started relying on in 2023 in Docket No. 23-08-32 for Connecticut Water. Additionally, in the current proceeding and in Docket No. 23-11-02 for Connecticut Natural Gas Corporation[97],

[97] Source: 2023.04.04-12.26 - RFC Gas Proxy Group OptIVA Results – D.xlsx.

Mr. Rothschild is calculating his weekly forward option-implied beta based on an average of the daily forward option-implied beta coefficients in a week; however, this is also a new approach, as in prior proceedings Mr. Rothschild has estimated his forward option-implied betas using options data for a single trading day. Therefore, Mr. Rothschild's approach to calculating beta varies significantly from case to case as do the resulting estimates of beta, which has a significant effect on the results produced by his CAPM analyses. Given that Mr. Rothschild's methodologies and beta coefficients have varied significantly over the last three and half years, it is not reasonable to conclude that these beta coefficients will result in cost of equity estimates from the CAPM that reasonably reflect the cost of equity during the period in which the rates in this proceeding will be in effect.

3. Market Risk Premium

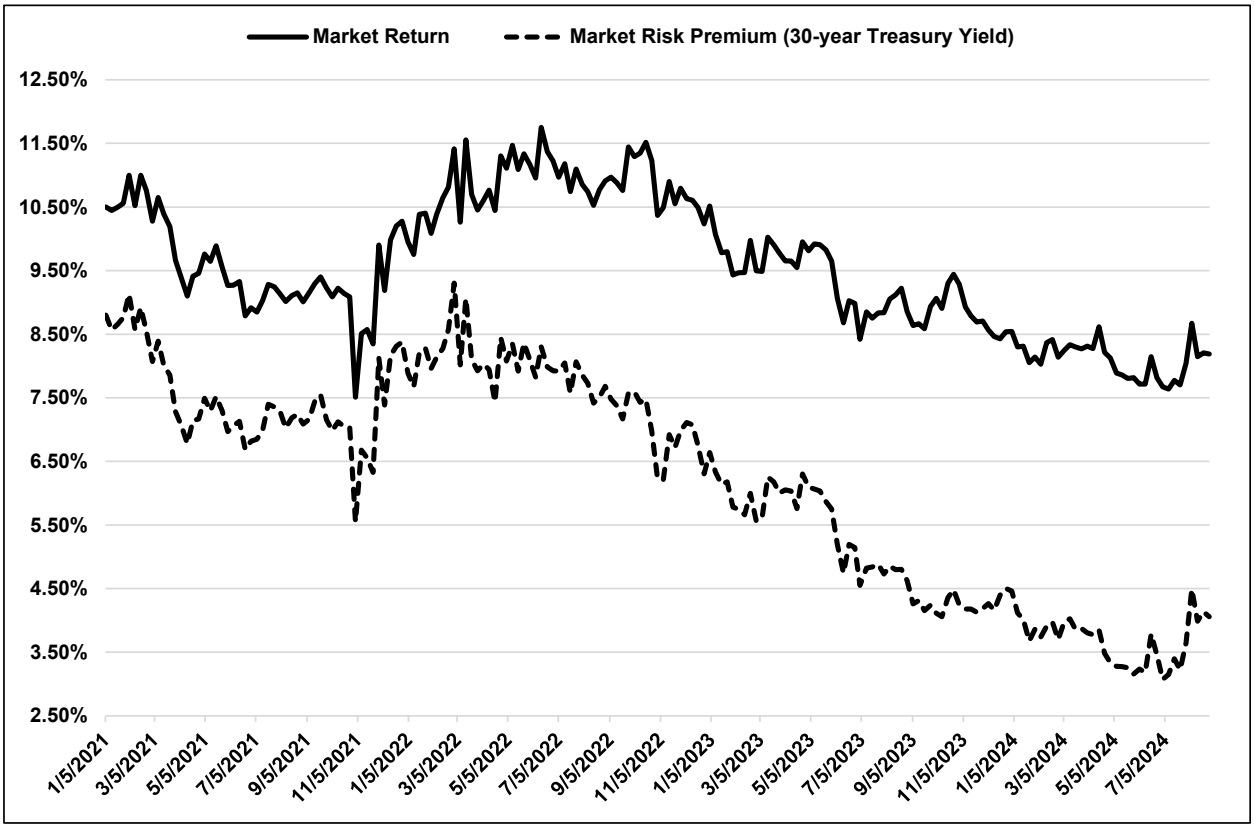
Q. DO MR. ROTHSCHILD'S MARKET RISK PREMIUM ESTIMATES SUFFER SIMILAR FLAWS TO THOSE IDENTIFIED IN HIS BETA ESTIMATES?

A. Yes. While Mr. Rothschild includes options contracts that expire up to 61 months in the future for his market risk premium calculation, he still relies on options contracts for a single trading day, which, as discussed, are sensitive to trading day volatility and do not produce consistent results. Depending on the day chosen, this type of volatility will result in significant changes in the market return using Mr. Rothschild's estimation process. Accordingly, it is not appropriate to estimate the cost of equity for Tennessee-American using a calculation that can vary greatly from day–to–day.

In addition, as shown in Figure 12, Mr. Rothschild's market return calculation has varied significantly since January 2021 from a low of 7.51 percent to a high of 11.75 percent. Further, as shown in Figure 12, Mr. Rothschild's estimate of the forward looking

market return has decreased by approximately 22 percent since January 2023. This demonstrates that it is not appropriate to estimate the cost of equity for Tennessee-American using an approach that can vary so greatly in such a short period of time.

Figure 12: Variability in Mr. Rothschild's Market Return and Market Risk Premium – January 2021 – August 2024[98]



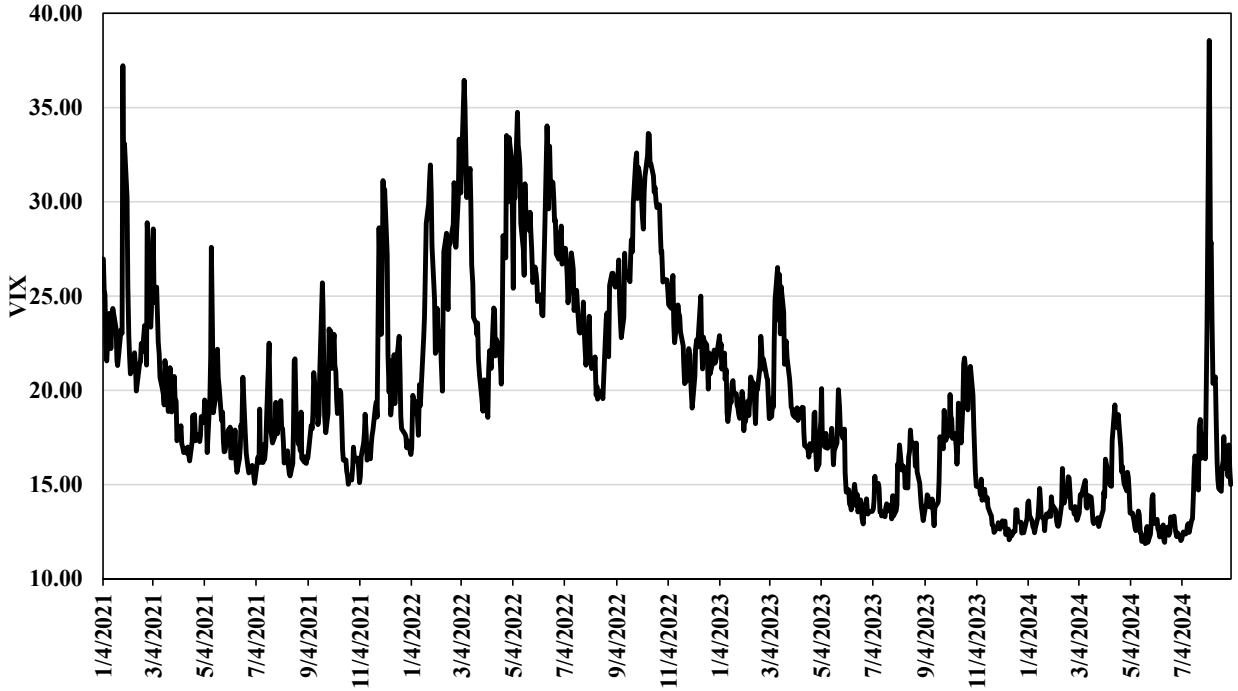
Q. DOES MR. ROTHSCHILD'S ESTIMATE OF THE MARKET RISK PREMIUM USING A THREE-MONTH AVERAGE ADDRESS THE DEFICIENCY OF USING SPOT MARKET DATA?

A. No. While Mr. Rothschild indicates he uses a three-month average, it is my understanding based on a review of the workpapers provided by Mr. Rothschild that the calculation represents the average of options contract data for a single day for each week in each of

[98] 2024.08.31 - TAWC Cost of Capital (RFC Water PG).xlsx.

the three months.[99] Therefore, again, this average will be highly dependent on the days selected especially given that options data are highly correlated with the VIX, which, as shown in Figure 13, has been quite volatile.

Figure 13: VIX Index – January 1, 2021 to August 30, 2024[100]



Q. IN ADDITION TO THE ISSUES YOU HAVE ALREADY IDENTIFIED WITH MR. ROTHSCHILD'S ESTIMATE OF THE MARKET RISK PREMIUM, ARE THERE FUNDAMENTAL CONCERNS WITH MR. ROTHSCHILD'S RELIANCE ON OPTIONS DATA TO ESTIMATE THE MARKET RETURN?

A. Yes. While Mr. Rothschild is relying on investors who trade options contracts, the data represents options investors' predictions as to the direction of the market over the near-term which could be incorrect. In fact, a recent *Forbes* article casts doubt on the accuracy

[99] 2024.08 - SPX MRP and TS.xlsm

[100] Chicago Board Options Exchange, CBOE Volatility Index: VIX [VIXCLS], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/VIXCLS, September 30, 2024.

of options investors' expectations, suggesting that options buyers lose 90 percent of the time, which suggests that the options market has worse odds than a casino:

> Mood is one thing – it may well be dark – but the significance of it is altogether different. The PCR [Put/Call ratio] signal is a huge Green Light for investors.
>
> This is because, like almost all measures of broad investor sentiment, the Put/Call Ratio is contrarian. It has to be interpreted as the opposite of what it seems to say. If negative sentiment predominates – with so many more Puts than Calls – it is historically a reliable signal of an upturn in the market in the not-too-distant future.
>
> How can this be so? Thousands or tens of thousands of options buyers are convinced that their bets on a continued decline will pay off. Aren't we urged to respect the "wisdom of crowds"?
>
> Yet this crowd is not just wrong. It is precisely, spectacularly and persistently wrong.
>
> "It is widely known that options traders, especially option buyers, are not the most successful traders. Option buyers lose about 90% of the time."
>
> This is an overlooked truism in finance. "The options market has even worse odds than a casino. Practically every option buyer loses money."[101]

If options traders' views regarding the direction of the market over the near-term are considered incorrect, it is likely that the market return calculated using options data will not be reflective of the return requirements of all investors. For example, if options investors are purchasing significantly more puts (*i.e.*, options that grant investors the right to sell an equity at a specified price in the future) than calls (*i.e.*, options that grant investors the right to buy an equity at a specified price in the future), options investors are bearish on the market and expect it to decline. This would indicate increased risk in the market and thus an increase in investors' required return and the market risk premia. However, as noted by the *Forbes* article, this is likely an indicator for non-options investors to instead buy equities as the market has likely bottomed and will increase over the near-term.

[101] George Calhoun, "The Put/Call Ratio Says 'Get In The Market Now!," *Forbes*, September 22, 2022,.

Likewise, the converse is true if options investors are buying significantly more calls than puts, expecting the market to increase. Therefore, if non-options investors are taking a "contrarian" approach to the trends in options, a market return based on options data will not accurately reflect the broader expectations of all investors over the near-term.

Q. HAVE YOU REVIEWED ACADEMIC RESEARCH THAT SUPPORTS YOUR CONCLUSION?

A. Yes. De Silva, So, and Smith (2023) note an increase in the proportion of retail investors trading options since the COVID-19 pandemic; however, these retail investors have lost money trading options:

> This combination of behaviors translates to retail losses of 5-to-9% around earnings announcements on average, and 10-to-14% for high expected volatility announcements. This has led to significant capital transfers from retail investors to market makers, especially during the COVID pandemic. Our results complement the findings in Poteshman and Serbin (2003) that unsophisticated investors exercise options early by showing that not only do these investors misunderstand the mechanics of options, but also they trade these options at times when and in stocks where they have exceptionally high prices.[102]

This shows that retail traders in options markets have been consistently incorrect regarding near-term expectations.

Additionally, Cao, Li, Zhan and Zhou (2023) examined how equity options trading affects the market risk premium. Cao, Li, Zhan and Zhou found that higher (lower) levels of call option volume would lead to lower (higher) stock market returns in the next days, weeks and months:

> We find ACIB [aggregate equity call option order imbalance] strongly and negatively predict future stock market returns from days to months. Higher

[102] De Silva, Tim and Smith, Kevin and So, Eric C., Losing is Optional: Retail Option Trading and Expected Announcement Volatility (June 8, 2023). Available at SSRN: https://ssrn.com/abstract=4050165 or http://dx.doi.org/10.2139/ssrn.4050165.

> (lower) ACIB leads to lower (higher) stock market returns in next couple of days, weeks, and months respectively. Interestingly, we do not find such predictive power from using a similar aggregate equity put option order imbalance (APIB). Moreover, we conduct robustness checks by decomposing equity option trading into different groups based on trading size, option moneyness, option time to maturity, option traders, alternative aggregation method, and alternative data resources. We find the predictive power of ACIB remains strong and robust in most cases, and is more prominent among options driven by retail investors.
>
> ***
>
> Overall, we argue that the predictive power of ACIB forecasting market risk premium comes from general sentiment trading behaviour among equity option traders, especially the retail investors who are overly optimistic or pessimistic. Our evidence is consistent with the view that retail investors are sensitive to the underlying stocks' current performance, thus leading to overbought (too bullish) or oversold (too bearish) reactions of option trading.[103]

Both studies provide support for a "contrarian" approach where if the Put/Call ratio is significantly greater (less) than 1, the market is likely to increase (decrease). Thus, the studies provide evidence that Mr. Rothschild's market return based on options data is likely not aligned with investors' near-term expectations regarding the market return.

Q. IS MR. ROTHSCHILD'S METHODOLOGY FOR ESTIMATING THE MARKET RETURN IN THIS PROCEEDING CONSISTENT WITH THE APPROACH HE HAS APPLIED IN PRIOR PROCEEDINGS?

A. No. While Mr. Rothschild admits that he made a change in his methodology for estimating the option-implied market return in late 2020 to rely on a log-normal function and a cumulative probability of 50 percent, he states that he has relied on this updated methodology since 2021.[104] However, while it may be true that each of his testimonies

[103] Jie Cao, Gang Li, Xintong Zhan, and Guofu Zhou, "Betting Against the Crowd: Option Trading and Market Risk Premium," *SSRN*, September 1, 2022.

[104] Rothschild Testimony, at 126:15-23.

since 2021 have relied on a log-normal function to estimate the option-implied market return, Mr. Rothschild is still making changes to his calculation of the option-implied market return. For example, as shown in Figure 14, Mr. Rothschild calculated different option-implied market returns as of December 28, 2021, in three separate rate cases in 2022 ranging from 9.98 percent to 10.41 percent, a difference of 43 basis points. Similarly, in Connecticut Docket No 22-08-08 for United Illuminating, Mr. Rothschild estimated a spot option-implied market return of 11.45 percent as of September 27, 2022, whereas in Connecticut Docket No. 22-07-01 for Aquarion Water, Mr. Rothschild calculated a spot option implied market return for this exact same date of 10.98 percent, a difference of 47 basis points. Finally, in Docket No 23-11-02 for Connecticut Natural Gas Corporation, Mr. Rothschild estimated a spot option-implied market return of 8.57 percent as of December 26, 2023; however, in the current proceeding, Mr. Rothchild calculated a spot option implied market return for December 26, 2023, of 8.54 percent. Therefore, despite Mr. Rothschild's contention that he has used the same methodology for a few years, his calculations of the option-implied market return are not consistent from case to case. This demonstrates that it is not appropriate to subject the cost of equity for Tennessee-American to an experimental estimate of the market return that is highly variable and constantly evolving.

Figure 14: Summary of Mr. Rothschild's Market Return

Company	Docket No.	Date of Testimony	12/28/2021	6/28/2022	9/27/2022	12/26/2023
San Jose Water Company[105]	A.21.05.001 *et. al.*	1/31/22	10.41%	N/A	N/A	N/A
Pennsylvania American Water[106]	R-2022-3031672 (Water) R-2022-3031673 (Wastewater)	7/29/22	10.28%	11.22%	N/A	N/A
Aquarion Water[107]	22-07-01	10/26/22	9.98%	10.96%	10.98%	N/A
United Illuminating[108]	22-08-08	12/13/22	10.28%	11.22%	11.45%	N/A
Connecticut Natural Gas Corporation[109]	23-11-02	2/8/24	10.28%	11.22%	11.45%	8.57%
Tennessee-American[110]	24-00032	9/17/24	10.28%	11.22%	11.44%	8.54%

Q. HAS MR. ROTHSCHILD PROVIDED ANY SUPPORT THAT HIS APPROACH OF ESTIMATING THE MARKET RISK PREMIUM IS RELIED UPON BY INVESTORS OR EQUITY ANALYSTS?

A. No. Mr. Rothschild has provided no support to show that his methodology has been used by either investors or equity analysts. Since the purpose is to estimate the cost of equity consistent with investors' expectations, it is important that the methodologies used reflect the methodologies that investors would actually rely on to develop their return requirements. Therefore, it would be reasonable and appropriate to disregard Mr.

[105] California Public Utilities Commission, Docket A.21.05.001 *et. al.,* January 31, 2022, at 87. Workpaper titled "2021.12.31 – CA4 Cost of Capital (RFC Water PG)".
[106] Pennsylvania Public Utilities Commission, Docket No. R-2022-3031672, Rothschild Testimony, July 29, 2022, at 94. Workpaper titled "2022.06.30 - PAWC Cost of Capital (RFC Water PG)".
[107] Workpaper titled: 2022.09.30 - Aquarion Cost of Capital (RFC Water PG).
[108] Workpaper titled: 2022.10.31 - UI Cost of Capital (Bulkley Electric PG).
[109] Workpaper titled: 2023.12.31 - CNG Cost of Capital (RFC Gas PG).
[110] Workpaper titled: 2024.08.31 - TAWC Cost of Capital (RFC Water PG).

Rothschild's market return calculation in favor of a more defensible and traditional methodology.

Q. WHAT IS MR. ROTHSCHILD'S CONCERN WITH THE MARKET RISK PREMIUM YOU HAVE USED IN YOUR CAPM ANALYSIS?

A. Mr. Rothschild's primary criticism of my market risk premium is that it relies on an estimate of the market return calculated using analysts' forecasts of earnings growth rates, and Mr. Rothschild contends that these estimates are not market data. Further, he suggests that my estimate of the return on the overall market, used to estimate the market risk premium, is incorrect because it produces a result that is higher than the result from his option-implied analysis.[111]

Q. WHAT IS YOUR RESPONSE TO MR. ROTHSCHILD'S CONCERNS ABOUT YOUR FORWARD-LOOKING MARKET RETURN?

A. This is just another example of where Mr. Rothschild's criticisms of my analyses are internally inconsistent and in direct conflict with his own analyses. While Mr. Rothschild suggests that my reliance on analysts' forecasted growth rates to estimate the market return are not market data, he relies on the same analysts' projections to calculate his sustainable growth rate in his constant growth DCF and his non-constant growth rate DCF. In other words, the forward-looking market return that is calculated in my CAPM analysis is developed using a DCF methodology and is very similar to the constant growth DCF model that Mr. Rothschild relies on to develop his recommended ROE for Tennessee-American. Specifically, while Mr. Rothschild and I disagree on the estimate of growth for the constant

[111] Rothschild Testimony, at 93:3-9.

growth DCF (I rely on projected EPS growth rates developed by the equity analysts, while Mr. Rothschild uses projected ROEs from *Value Line* and *Zacks*), nonetheless, we both rely on projected market data. Thus, there is no basis to Mr. Rothschild's contention that my calculation of the market return is not market-based.

Q. IS THERE ANY BASIS TO MR. ROTHSCHILD'S CONTENTION THAT THE MARKET RETURN USED IN YOUR CAPM ANALYSES IS TOO HIGH?

A. No. The market return shown in my analyses is within the range established by historical market return data and has been relied upon in other regulatory jurisdictions.

- The expected market return estimated in my analysis is reasonable and consistent with the range of annual equity returns that have been observed over the past century, whereby the realized equity return over this period was at least as high as my market return or greater.[112] The market return in my updated CAPM analysis is 12.07 percent, or below the 12.70 percent market return that I relied on in my direct testimony, and thus continues to be consistent with the frequency of historical market returns at or above my estimate, which demonstrates it is a reasonable expectation for the market.
- In a recent cost of capital proceeding for the electric utilities, the CPUC noted that all parties recognized that historical market returns and economically logical projections fall within the range of 12 percent.[113] This recognition is consistent with the market return utilized in my initial CAPM analysis in my direct testimony and in my updated CAPM analysis in this rebuttal testimony.
- The FERC has supported the use of a constant growth DCF model to estimate the market return in the CAPM such as I have done. For example, in Opinion No. 569-A, the FERC continued to support the use of the constant growth DCF model to calculate the market return for the CAPM noting:

> We also continue to find that the CAPM should use a one-step DCF for its risk premium. This is because the rationale for using a two-step DCF methodology for a specific group of utilities does not apply when conducting a DCF study of the dividend-paying companies in the S&P 500, as the Commission found in Opinion Nos. 531-B and 569.172 A long-term component is unnecessary because of the regular updates to the S&P 500, which allows it to continue to grow at a short-term growth rate and because S&P 500

[112] Bulkley Direct Testimony, at 46:3-11.

[113] California Public Utilities Commission, Application 22-04-008, *et al*., Decision 22-12-031, December 15, 2022, at 23.

companies include stocks that are both new and mature, the latter of which have a moderating effect on the short-term growth rates.[114]

- Various state utility regulatory commissions have also supported the use of a constant growth DCF model to estimate the market return in the CAPM. As shown in Figure 15, the Staff of the Illinois Commerce Commission ("ICC"), the Bureau of Investigation and Enforcement ("I&E") of the Pennsylvania Public Utility Commission ("Pennsylvania PUC"), and the Staff of the Maine Public Utilities Commission ("Maine PUC") have each supported the forward-looking market risk premium, and the market return estimates using the constant growth DCF model. In each of these cases, the respective regulatory commission relied on the estimated CAPM results by these parties to determine the authorized ROE and did not dispute the use of the constant growth DCF model to calculate the market return.

Figure 15: Examples of Jurisdictions Where Market Return Estimated Using the Constant Growth DCF Model

Intervening Party	Applicant	Docket No.	Approach of Intervening Party to Calculating the Market Return	Date of Order	Did the Commission Rely on the Intervening Party's CAPM?
Staff of the ICC	North Shore Gas Company	20-0810	CGDCF of the dividend-paying companies in the S&P 500 (11.95%)[115]	9/8/21	Yes[116]
I&E	Aqua Pennsylvania, Inc.	R-2021-3027385	CGDCF of the Value Line Universe and S&P 500 (12.14%)[117]	5/12/22	Yes, the regulator placed primary weight on I&E's CAPM[118]
Staff of the Maine PUC	Northern Utilities, Inc.	2019-00092	CGDCF of the dividend-paying companies in the S&P 500 (11.33%-13.49%)[119]	4/1/20	Yes[120]

- The U.S. Circuit Court of Appeals for the District of Columbia has addressed the concern regarding the use of projected EPS growth rates in a constant growth DCF model to estimate the market return in its review of FERC Opinion No. 569-B. In the Court's decision, it acknowledged that the FERC has relied on the use of EPS growth rates in the calculation of the forward-looking market return on the S&P 500 because

[114] Ass'n. of Businesses Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc., 171 FERC ¶ 61,154, ¶ 85 (2020).
[115] Illinois Commerce Commission, Docket No. 20-0810, Order at 71 (Sept. 8, 2021).
[116] *Id*. at 86-87.
[117] Pennsylvania Public Utility Commission, Docket No. R-2021-3027385, Opinion and Order at 147, (May 16, 2022).
[118] *Id*. at 178.
[119] Maine Public Utilities Commission, Docket No. 2019-00092, Bench Analysis at 21 (Oct. 29, 2019).
[120] *Id*., Order Part II at 58 (April 1, 2020).

the S&P 500 is regularly updated to include companies with high market capitalization and it includes companies at all stages of growth, including lower and higher growth potential. The Court determined that FERC's rationale for using projected EPS growth rates was sufficient and did not accept the challenge to this assumption.[121]

For all of these reasons, there is no basis to Mr. Rothschild's contention that the market return or market risk premia in my cost of equity analyses is too high.

Q. HAVE YOU REVIEWED ANY STUDIES THAT HAVE EVALUATED THE REASONABLENESS OF MARKET RISK PREMIUM ESTIMATES?

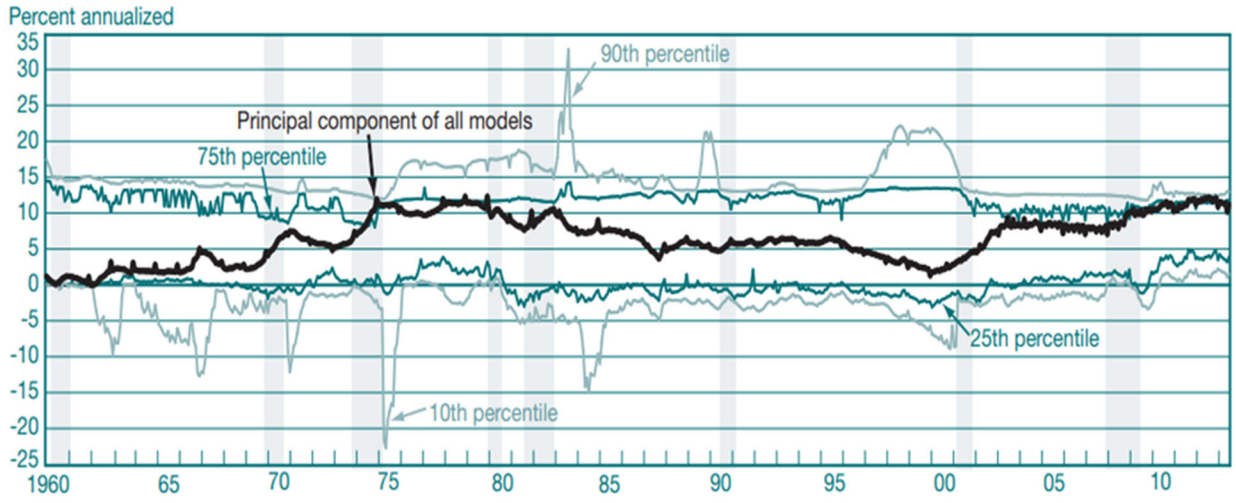
A. Yes. The Federal Reserve Bank of New York published an analysis in 2015 that reviewed 20 methodologies (including the methodology relied on by Dr. Damodaran, as well as survey results similar to those reported at the Equity Risk Premium Forum, each of which were referenced by Mr. Rothschild as support for his conclusion that my estimates of the market risk premium are "excessive") over the period 1960 through 2013 for estimating the market risk premium.[122] The results of this study demonstrate that the market risk premium estimates that I relied on in my direct testimony, which are in the range of 8.32 percent to 8.60 percent, are reasonable. Specifically, the key conclusions from this study are:

- The 20 methodologies reviewed reflected a range for the market risk premium of between -1.0 percent to 14.5 percent.
- As shown in Figure 16, the principal component analysis of the 20 models (the bold black line) produced a range for the market risk premium of approximately 0 percent to over 10 percent from 1960 through 2013.
- The one-year-ahead market risk premium was consistently greater than 10 percent following the financial crisis of 2008/09.

[121] MISO Transmission Owners, et al. v. FERC, 45 F.4th 248 (D.C. Cir. 2022).

[122] Fernando Duarte and Carla Rosa, "The Equity Risk Premium: A Review of Models," Federal Reserve Bank of New York (2015) *available at* https://www.newyorkfed.org/medialibrary/media/research/epr/2015/2015_EPR_equity-risk-premium.pdf?sc_lang=en&hash=C889266A02FA8CB4CA370BB787FD6892.

Figure 16: The Federal Reserve Bank of New York, One-Year-Ahead Market Risk Premium[123]



Q. HAVE YOU ADJUSTED MR. ROTHSCHILD'S CAPM ANALYSES TO ADDRESS SOME OF THE PROBLEMS YOU HAVE IDENTIFIED?

A. Yes. Specifically, I adjusted Mr. Rothschild's CAPM analysis to: (1) only rely on the 30-year Treasury bond yield as the estimate of the risk-free rate; and (2) rely on my updated forward-looking market return of 12.07 percent estimated using the constant growth DCF model as shown in Rebuttal Exhibit AEB-5.[124] As shown in Rebuttal Exhibit AEB-9, by making reasonable modifications to Mr. Rothschild's CAPM analysis, the cost of equity results range from 9.86 percent to 11.66 percent, which is significantly higher than the 7.07 percent to 7.91 percent range developed by Mr. Rothschild's CAPM Analysis.[125] I

[123] *Id.* at 50.

[124] While I also disagree with Mr. Rothschild's use of the 3-month historical average Treasury Bond yield and the spot 30-year Treasury Bond yield as the risk-free rate as well as his reliance on option-implied and historical blended betas, the selection of the market return represents the most significant methodological difference in our CAPM analyses. Therefore, I have not calculated a revised version of Mr. Rothschild's CAPM analysis using either projected Treasury Bond yields or two-year and five-year historical beta coefficients.

[125] Rothschild Testimony, at 13:7-8 (Table 2).

recommend that the Commission place greater weight on this revised CAPM analysis, as it is internally consistent and more appropriately reflects investor-expected return requirements than the CAPM estimates developed by Mr. Rothschild.

E. Adjustments to Mr. Rothschild's Cost of Equity Analyses

Q. PLEASE SUMMARIZE THE RESULTS OF MR. ROTHSCHILD'S COST OF EQUITY ESTIMATION MODELS BASED ON YOUR SUGGESTED ADJUSTMENTS TO HIS MODELS.

A. As summarized in Figure 17, the details of which are reflected in Rebuttal Exhibit AEB-7 and Rebuttal Exhibit AEB-9, reasonable adjustments to Mr. Rothschild's cost of equity estimation models produce a result ranging from 9.34 percent to 11.62 percent, which is much higher than the range of results reported by Mr. Rothschild of 7.09 percent to 8.28 percent for Tennessee-American. Furthermore, my recommended ROE of 10.75 percent falls well within the range of adjusted results, while Mr. Rothschild recommended ROE of 8.28 percent is significantly below the adjusted range of results.

Figure 17: Adjusted Results of Mr. Rothschild's Cost of Equity Estimation Models

	Low	High
Constant Growth DCF	9.33%	9.46%
CAPM		
Spot	9.86%	10.95%
3-Mo. Weighted Average	10.17%	11.66%
Outer Quartile Range	9.34%	11.62%
Proxy Group Cost of Equity	10.48%	

F. Business Risks

Q. WHAT DOES MR. ROTHSCHILD STATE REGARDING THE RISKS TO WHICH THE COMPANY IS SUBJECT IN ESTABLISHING THE ROE IN THIS PROCEEDING?

A. Mr. Rothschild claims that the regulatory and business risk factors that I reviewed in my direct testimony including flotation costs, small size and regulatory risk do not have a significant effect on the cost of equity for Tennessee-American and therefore, should not be considered when determining the Company's authorized ROE.[126]

Q. WHAT IS YOUR RESPONSE?

A. Mr. Rothschild's opposition to my consideration of the business risk factors faced by the Company is inconsistent with his own ROE recommendation. Specifically, Mr. Rothchild recommends an ROE of 8.28 percent for Tennessee-American which is at the high end of his recommended range of 7.09 percent to 8.28 percent.[127] Therefore, while he might disagree with the specific business risk factors that I evaluated for the Company relative to my proxy group, because he placed his recommended ROE at the high end of his recommended range, as opposed to the midpoint, it is clear that Mr. Rothschild also believes that the Company has greater business risk relative to the companies included in his water proxy group.

[126] Rothschild Testimony, at 96:13-97:4.
[127] *Id.,* at 12:3-9.

VI. RESPONSE TO MR. ROTHSCHILD'S AND MR. GARRETT'S CAPITAL STRUCTURE RECOMMENDATIONS

Q. WHAT HAVE MR. ROTHSCHILD AND MR. GARRETT RECOMMENDED REGARDING THE CAPITAL STRUCTURE FOR THE COMPANY?

A. Mr. Rothschild contends that Tennessee-American's proposed capital structure is not reasonable because the proposed common equity ratio of 54.52 percent is significantly above the proxy group average equity ratio that he calculates for his proxy group.[128] Instead, Mr. Rothschild recommends a capital structure of 50.90 percent common equity, 47.11 percent long-term debt and 1.99 percent short-term debt.[129] In addition, Mr. Rothschild states that if Tennessee-American's proposed capital structure is approved, he proposes a downward adjustment of 15 basis points to his recommended ROE to account for what he claims is the decreased financial risk associated with the Company's proposed equity ratio.[130]

Mr. Garrett also opposes the Company's proposed equity ratio of 54.52 percent because he claims that the Company's proposed capital structure benefits from "double leverage." According to Mr. Garrett, Tennessee-American's parent company, AWK, has a more leveraged capital structure and therefore is using debt to finance equity in Tennessee-American.[131] To alleviate this concern, Mr. Garrett contends that Tennessee-American's capital structure should be set at a level similar to AWK's capital structure. As a result, he recommends an equity ratio of 44.57 percent which is the low end of the range of my

[128] *Id.,* at 78:9-11.
[129] *Id.,* at Exhibit ALR-1.
[130] *Id.,* at 11:15-18.
[131] Garrett Testimony, at 36:13-38:5.

analysis of the capital structures of the proxy group companies at the operating subsidiary level and is consistent with AWK's equity ratio of 44.19 percent. Mr. Garrett's proposed capital structure for Tennessee-American consists of 44.57 percent equity, 53.44 percent long-term debt and 1.99 percent short-term debt.[132]

Q. IS THE ANALYSIS THAT MR. ROTHSCHILD RELIES ON TO ESTABLISH THE CAPITAL STRUCTURES OF THE PROXY GROUP COMPANIES REASONABLE?

A. No. First, it is not appropriate to compare Tennessee-American's proposed equity ratio to the average equity ratio of the proxy group at the holding company level such as Mr. Rothschild has done. Specifically, as shown on pages 4 and 5 of Schedule ALR-5, Mr. Rothschild relies on the book value common equity ratios at the holding company level for the publicly-traded companies in his proxy group. As such, Mr. Rothschild is using book value debt for the holding companies in his proxy group, rather than considering the capital structures of the operating companies.

Second, while it is not appropriate, if the capital structures at the holding company level are considered, the market value of debt and equity must be used to estimate the percentage of debt and equity in the capital structure, not the book value of debt and equity as used by Mr. Rothschild.

Q. WHY IS IT INAPPROPRIATE TO RELY ON THE HOLDING COMPANY CAPITAL STRUCTURES TO SET THE CAPITAL STRUCTURE FOR THE OPERATING COMPANY?

[132] *Id.,* at 39:12-15.

A. The holding company data on which Mr. Rothschild relies includes corporate-level debt that is not part of the regulated or financial capital structure of the operating utilities. The relevant capital structure for comparison purposes to the Company is at the operating company level, not the holding company. The Commission should establish rates by evaluating Tennessee-American on a stand-alone basis from its parent. Therefore, it is reasonable and appropriate to rely on the operating subsidiary capital structures that have been used to fund utility operations for the comparison of the Company to other utilities. In contrast, relying on the proxy group capital structures, as Mr. Rothschild has done, will result in a ratemaking capital structure for the Company that reflects the capital structures, risks, and capital costs of unregulated affiliates, and the financial diversification of the proxy group holding companies, which is contrary to the stand-alone principal of ratemaking as further discussed by Company witness Furia.

Q. IS TENNESSEE-AMERICAN'S PROPOSED EQUITY RATIO CONSISTENT WITH THE EQUITY RATIOS OF THE OPERATING UTILITY SUBSIDIARIES OF THE PROXY GROUP?

A. Yes. As discussed in my direct testimony, I reviewed the Company's proposed capital structures and the capital structures of the utility operating subsidiaries of the proxy companies. As shown in Rebuttal Exhibit AEB-10, which updates the analysis provided in Exhibit AEB-11, the mean actual common equity ratio for the period of 2021-2023 for my proxy group at the operating subsidiary level was 54.06 percent, within a range from 46.25 percent to 60.03 percent. Therefore, Tennessee-American's proposed equity ratio of 54.52 percent is consistent with the average and well within the range of equity ratios for the utility operating subsidiaries of the proxy group companies and therefore is reasonable.

In contrast, Mr. Rothschild's proposed equity ratio of 50.90 percent is well below the average equity ratio of the operating companies owned by the proxy group companies while Mr. Garrett's proposed equity ratio of 44.57 is below the range of my updated analysis and thus unnecessarily imposes financial risk on the Company that is significantly greater than the proxy group.

Q. WHY IS IT INAPPROPRIATE TO RELY ON THE BOOK VALUE OF THE CAPITAL STRUCTURES OF THE PROXY GROUP COMPANIES AT THE HOLDING COMPANY LEVEL FOR THE BENCHMARKING ANALYSES PERFORMED BY MR. ROTHSCHILD?

A. The use of the book value of debt and equity for the proxy group companies at the holding company level creates a mismatch between the capital structure data that is being used to determine the reasonableness of the Company's equity ratio and the data that is being used in the models to determine the cost of equity for Tennessee-American. Mr. Rothschild considers the results of the DCF model to determine the cost of equity for the Company. In his DCF model, he estimates the dividend yield based on the expected dividends of the proxy group companies and their respective current stock prices (which is the current *market value* of their equity). Similarly, Mr. Rothschild also relies on the CAPM to estimate the cost of equity for the Company, and in doing so, relies on beta coefficients that reflect the returns of each of the proxy group companies based on their respective *market value*. In addition, Mr. Rothschild suggests that all of the data relied upon in his CAPM is market data, and that his option-implied betas are based on market value. The cost of equity developed by Mr. Rothschild represents the return required by investors on the *market* value of equity not the *book* value.

Q. WHAT IS THE EFFECT OF RELYING ON THE REQUIRED RETURN ON THE MARKET VALUE OF EQUITY FOR ASSESSING THE COST OF EQUITY, BUT THEN THE BOOK VALUE OF DEBT AND EQUITY FOR ASSESSING THE CAPITAL STRUCTURE?

A. If the market value of debt and equity are substantially different than the book value of debt and equity, then the resulting cost of equity estimate would not reflect the financial risk of the book value capital structure. This is illustrated in the following set of equations found readily in corporate finance textbooks including *Principles of Corporate Finance,*[133] which Mr. Rothschild has acknowledged is a "leading financial textbook used in business schools and investment banks around the world."[134] As shown in Equation [1], the value of a company (or asset) is determined as follows:

$$V = D + E \qquad [1]$$

Where:

V = Market value of a company/asset

D = Market value of debt

E = Market value of equity

For simplicity, if it is assumed that there are no taxes, based on Equation [1], the total return on V can be estimated as follows:

$$r_V = \frac{D}{D + E} \text{ x } r_D + \frac{E}{E + D} \text{ x } r_E \qquad [2]$$

Where:

r_V = expected return on assets / weighted-average cost of capital

r_D = expected return on debt

[133] Brealey, Myers, and Allen, *Principles of Corporate Finance,* 12th Ed., 2017, at 437-446.
[134] Rothschild Testimony, at 13:12-14:2.

r_E = expected return on equity

Then, Equation [2] can be rearranged into the following form to solve for the expected return on equity, r_E:

$$r_E = r_V + (r_V - r_D)\frac{D}{E} \qquad [3]$$

As shown in Equation [3], the expected return on the market value of equity is a function of the market debt-to-equity ratio. As the percentage of debt increases, the financial risk of the firm increases, and thus investors require a higher return to compensate for the additional financial risk. Therefore, if the book debt-to-equity ratio for the proxy group is substantially different than the market debt-to-equity ratio, the expected return on equity will also be substantially different.

Q. IS THE BOOK VALUE DEBT-TO-EQUITY RATIO DIFFERENT FROM THE MARKET VALUE DEBT-TO-EQUITY RATIO?

A. Yes. Rebuttal Exhibit AEB-11 presents the average market value common equity ratio for my and Mr. Rothschild's proxy groups as of December 31, 2023.[135] As shown therein, the average common equity ratios for my and Mr. Rothschild's proxy groups were 60.36 percent and 69.08 percent, respectively. Given that Mr. Rothschild estimates the cost of equity in the DCF and CAPM analyses based on the market value of the proxy group companies' equity, this means that the cost of equity he estimates reflects the financial risk of a market value common equity ratio of 69.08 percent. In other words, this means that the market value common equity ratio is significantly greater than the average book value

[135] Note, this represents the data most currently available at this time.

equity ratio that Mr. Rothschild relies on of 50.90 percent.[136] Given the greater financial risk associated with the increased leverage of the book value capital structures of the proxy group companies cited by Mr. Rothschild, investors would require a much higher cost of equity than estimated by his DCF and CAPM analyses. In this case, relying on a cost of equity estimate based on market values but a capital structure based on book values results in the incorrect conclusion that a return reflecting the financial risk of the market value equity ratio would be sufficient to compensate investors for a much more highly levered capital structure based on book value.

Q. HOW DOES THE COMPANY'S PROPOSED EQUITY RATIO COMPARE TO THE MARKET VALUE EQUITY RATIO OF THE PROXY GROUP?

A. As noted above, the average market value common equity ratio for my proxy group as of December 31, 2023, was 60.36 percent, or significantly higher than the Company's proposed capital structure, which consists of 54.52 percent common equity. Therefore, while evaluating the capital structures of the holding companies of the proxy group relative to the Company is not appropriate for the reasons discussed, when the comparison based on this approach as supported by Mr. Rothschild is done correctly, it demonstrates that the Company's proposed equity ratio is reasonable.

Q. DO YOU AGREE WITH MR. GARRETT THAT THE EQUITY RATIO SHOULD BE BASED ON THE PARENT COMPANY, AWK, AND NOT THE OPERATING SUBSIDIARY, TENNESSEE-AMERICAN?

[136] Exhibit ALR-5, page 5.

A. No. The basis for Mr. Garrett's recommendation that Tennessee-American's equity ratio should be consistent with the Company's parent company, AWK, is that AWK uses double leverage; however, this logic runs counter to financial theory.[137] While the capital structure and the cost of capital are intended to reflect the risks of the operations of the company, which in this case is Tennessee-American, the double leverage argument suggests that the required return should be based on the *source of funds*, not the *risk of the investment*. The double leverage argument, therefore, suggests that the value of the equity in a company would differ based on the investor's source of funds, which is illogical, as also discussed by Company witness Furia.

Q. CAN YOU PROVIDE AN EXAMPLE TO EXPLAIN WHY MR. GARRETT'S PROPOSAL IS FLAWED?

A. Yes. Consider the scenario where an investor borrows funds to invest in a stock, such as Apple Inc. ("AAPL"). The expected return to that investor on the AAPL stock is not the cost of the debt that the investor undertook to make the investment, but rather the return afforded all AAPL investors for that same period of investment.[138] In contrast, Mr. Garrett's position as applied to this example suggests that the required return to that investor would be a debt return because of the source of the funds, which is irrational, given that this investor would bear all the risk of repayment that is inherent in holding equity in AAPL. Consistent with financial theory, the proper return in this example is based on the risk associated with the use of funds, which is the equity return, not the source of the funds, which is the debt cost.

[137] *See, e.g.*, Dr. Roger A. Morin, *Modern Regulatory Finance*, Public Utilities Reports, Inc., 2021, Chapter 20.
[138] Assumes stock investments occurred at the same time period.

Q. ARE THERE ACADEMIC PUBLICATIONS THAT SUPPORT THE VIEW THAT THE COST OF CAPITAL SHOULD BE ESTABLISHED FOR EACH INVESTMENT ON A STAND-ALONE BASIS?

A. Yes. Several financial textbooks support this position. For example, in *Principles of Corporate Finance,* Brealey, Myers and Allen note:

> In principle, each project should be evaluated at its own opportunity cost of capital; the true cost of capital depends on the use to which the capital is put. If we wish to estimate the cost of capital for a particular project, it is project risk that counts.[139]

Similarly, Modern Corporate Finance indicates:

> Each project has its own required return, reflecting three basic elements: (1) the real or inflation-adjusted risk-free interest rate; (2) an inflation premium approximately equal to the amount of expected inflation; and (3) a premium for risk. The first two cost elements are shared by all projects and reflect the time value of money, whereas the third component varies according to the risks borne by investors in the different projects. For a project to be acceptable to the firm's shareholders, its return must be sufficient to compensate them for all three cost components. This minimum or required return is the project's cost of capital and is sometimes referred to as a hurdle rate. In discussing how to calculate the project's cost of capital, we begin by assuming the firm is all-equity financed and later relax that assumption.
>
> The preceding paragraph bears a crucial message: The cost of capital for a project depends on the riskiness of the assets being financed, not on the identity of the firm undertaking the project. … the risk-required return trade-off is set in the financial marketplace is based on the yields available to investors on other investments with similar risk characteristics. Consequently, the required return on a project (the project's cost of capital) is an opportunity cost, which depends on the alternative market investment that investors must forgo.[140]

[139] Richard A. Brealey, Stewart C. Myers, Franklin Allen, Principles of Corporate Finance, McGraw-Hill Irwin, 8th Ed., 2006, at 234.

[140] Alan C. Shapiro, Modern Corporate Finance, Wiley, 1st Ed., 1990, at 276.

Finally, the use of double leverage versus an independent capital structure was studied by Pettway and Jordan (1983)[141] and Lerner (1973).[142] Pettway and Jordan (1983) evaluated the use of these two capital structures in achieving three goals of rate of return regulation, which are that the allowed return must: (1) be sufficiently low as to eliminate monopoly rents or producer's surplus; (2) be sufficiently high to attract capital and guide the allocation of capital resources in a socially desired fashion; and (3) exactly compensate the investors of capital for the risk of their investment in the public utility. The conclusions reached by Pettway and Jordan (1983) were as follows:

> The "double leverage" approach to estimate the allowed rate of return would be incorrect and inappropriate when parents diversify into subsidiaries of unequal risk and/or use parent debt. The use of "double leverage" (1) does not eliminate "monopoly rents" or "producer's surplus" in the regulated operating company, (2) does not provide the proper rate of return to attract capital and to guide the allocation of capital resources in a socially desirable fashion, and (3) does not correctly compensate the investors of capital for the riskiness of their investments in the public utility. In the section, the two approaches are compared in a theoretical framework with tax effects specifically considered. The "independent company" approach is found to be universally correct, whereas the "double leverage" approach is only correct in specific areas. When a public utility holding company has a diversified group of subsidiaries of unequal risk and/or parent debt, a "double leverage" approach which uses the parent's WACC as an estimate of the cost of equity capital of the regulated subsidiary is incorrect and should not be employed. The results of this paper, using both a series of examples and a theoretical framework analysis, reaffirm the "independent company" approach as satisfying the three standards of rate of return regulation. The analysis finds no valid support for the "double leverage" approach; the "independent company" approach is shown to be universally correct.[143]

Lerner (1973) concluded that the double leverage adjustment should be rejected because it discriminates among classes of security holders, is contrary to the basic

[141] Richard H. Pettway and Bradford D. Jordan, "Diversification, Double Leverage, and the Cost of Capital," *The Journal of Financial Research*, Vol VI, No. 4 Winter 1983.
[142] Eugene M. Lerner, "What are the Real Double Leverage Problems," Public Utilities Reports, Inc., June 7, 1973.
[143] *Id.*

principles of financial theory and, if applied, would lead to consequences that are not in the public interest. The author, who was a finance professor at Northwestern University at the time the report was published, noted that it is well-established in financial theory that the cost of equity capital is the risk-adjusted opportunity cost to the investor and that the sources of shareholder funds do not enter into the cost of equity calculation. Further, Lerner (1973) recognized that it is:

> illogical to equate a corporation's cost of equity with its shareholders' sources or costs of funds. The relevant considerations are the alternatives available to the shareholders and the returns and risks associated with those alternatives. Where or how the shareholder obtained the funds used to purchase the shares, or the cost of those funds to the shareholder, are totally irrelevant to the calculation of the cost of equity to the corporation.
>
> This is also true whether the corporation has one or many shareholders and whether the shareholders are individuals or corporations. There is no basis in financial theory for estimating the cost of equity by one procedure for corporations whose shares are owned by individuals and by a different procedure - e.g., using the double leverage adjustment - for corporations whose shares are owned by a holding company. To do so is discriminatory. The mere transfer of ownership of an operating company from the public to a holding company or the reverse should not logically in and of itself result in a change in the operating company's allowable rate of return. Nor should the cost of capital of a parent holding company determine the cost of equity of the subsidiary.[144]

Q. DOES FINANCIAL THEORY REQUIRE ALIGNING THE COMPANY'S EQUITY RATIO TO THE PROXY GROUP EQUITY RATIO USED TO DETERMINE THE ROE?

A. Yes. Mr. Rothschild's proposed equity ratio of 50.90 percent and Mr. Garrett's proposed equity ratio of 44.57 percent, both of which consist of more debt than the Company's proposed capital structure, result in significantly greater leverage on average than the proxy

[144] Eugene M. Lerner, "What are the Real Double Leverage Problems," Public Utilities Reports, Inc., June 7, 1973, at 22.

group measured using data at both the holding company and operating subsidiary levels. Thus, the capital structure recommendations of Mr. Rothschild and Mr. Garrett would result in the Company's financial risk being substantially greater than that of the proxy group warranting a common equity cost rate well above the proxy group average. It is a fundamental tenet of finance that the greater the amount of financial risk borne by common shareholders, the greater the return required by shareholders in order to be compensated for the added financial risk imparted by the greater use of senior debt financing. In other words, the greater the debt ratio, the greater is the return required by equity investors. The cost of equity must be adjusted to reflect the additional risk associated with the more debt-heavy capital structure.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

SUMMARY OF COE ANALYSES RESULTS

	Minimum Growth Rate	Average Growth Rate	Maximum Growth Rate
Constant Growth DCF			
Mean Results:			
30-Day Average	8.99%	9.97%	10.86%
90-Day Average	9.18%	10.17%	11.05%
180-Day Average	9.29%	10.27%	11.16%
Average	9.15%	10.14%	11.02%
Median Results:			
30-Day Average	8.94%	9.77%	10.45%
90-Day Average	9.20%	10.03%	10.67%
180-Day Average	9.26%	10.05%	10.81%
Average	9.13%	9.95%	10.64%

	Current 30-day Average Treasury Bond Yield	Near-Term Blue Chip Forecast Yield	Long-Term Blue Chip Forecast Yield
CAPM:			
Current *Value Line* Beta	10.89%	10.88%	10.90%
Current Bloomberg Beta	10.13%	10.10%	10.14%
Long-term Avg. *Value Line* Beta	10.03%	10.00%	10.05%
ECAPM:			
Current *Value Line* Beta	11.19%	11.18%	11.20%
Current Bloomberg Beta	10.61%	10.59%	10.62%
Long-term Avg. *Value Line* Beta	10.54%	10.52%	10.55%

30-DAY CONSTANT GROWTH DCF

Company	Ticker	[1] Annualized Dividend	[2] Stock Price	[3] Dividend Yield	[4] Expected Dividend Yield	[5] Value Line Earnings Growth	[6] Yahoo! Finance Earnings Growth	[7] Zacks Earnings Growth	[8] Average Growth Rate	[9] Low ROE	[10] Mean ROE	[11] High ROE
Atmos Energy Corporation	ATO	$3.22	$127.58	2.52%	2.61%	7.00%	7.40%	7.00%	7.13%	9.61%	9.75%	10.02%
NiSource Inc.	NI	$1.06	$31.68	3.35%	3.47%	9.50%	7.50%	6.00%	7.67%	9.45%	11.14%	13.01%
Northwest Natural Gas Company	NWN	$1.95	$39.26	4.97%	5.08%	6.50%	2.80%	n/a	4.65%	7.84%	9.73%	11.63%
ONE Gas, Inc.	OGS	$2.64	$67.78	3.90%	3.98%	3.50%	5.00%	5.00%	4.50%	7.46%	8.48%	8.99%
Spire, Inc.	SR	$3.02	$65.37	4.62%	4.74%	4.50%	6.36%	5.00%	5.29%	9.22%	10.03%	11.13%
Eversource Energy	ES	$2.86	$65.41	4.37%	4.49%	6.00%	4.20%	5.70%	5.30%	8.66%	9.79%	10.50%
American States Water Company	AWR	$1.86	$81.37	2.29%	2.35%	6.50%	4.40%	6.30%	5.73%	6.74%	8.09%	8.86%
California Water Service Group	CWT	$1.12	$53.39	2.10%	2.21%	11.50%	10.80%	n/a	11.15%	13.01%	13.36%	13.72%
Middlesex Water Company	MSEX	$1.30	$62.51	2.08%	2.13%	6.50%	2.70%	n/a	4.60%	4.81%	6.73%	8.65%
SJW Group	SJW	$1.60	$59.07	2.71%	2.81%	6.50%	7.50%	7.50%	7.17%	9.30%	9.97%	10.31%
Essential Utilities, Inc.	WTRG	$1.30	$39.71	3.28%	3.38%	7.00%	5.20%	5.80%	6.00%	8.56%	9.38%	10.39%
All Companies												
Mean				3.29%	3.39%	6.82%	5.81%	6.04%	6.29%	8.61%	9.68%	10.66%
Median				3.28%	3.38%	6.50%	5.20%	5.90%	5.73%	8.66%	9.75%	10.39%
Excluding Middlesex Water Company												
Mean										8.99%	9.97%	10.86%
Median										8.94%	9.77%	10.45%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional, equals 30-day average as of August 31, 2024
[3] Equals [1] / [2]
[4] Equals [3] x (1 + 0.50 x [8])
[5] Source: Value Line
[6] Source: Yahoo! Finance
[7] Source: Zacks
[8] Equals Average ([5], [6], [7])
[9] Equals [3] x (1 + 0.50 x Minimum ([5], [6], [7]) + Minimum ([5], [6], [7])
[10] Equals [4] + [8]
[11] Equals [3] x (1 + 0.50 x Maximum ([5], [6], [7]) + Maximum ([5], [6], [7])

90-DAY CONSTANT GROWTH DCF

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]

Company	Ticker	Annualized Dividend	Stock Price	Dividend Yield	Expected Dividend Yield	Value Line Earnings Growth	Yahoo! Finance Earnings Growth	Zacks Earnings Growth	Average Growth Rate	Low ROE	Mean ROE	High ROE
Atmos Energy Corporation	ATO	$3.22	$120.01	2.68%	2.78%	7.00%	7.40%	7.00%	7.13%	9.78%	9.91%	10.18%
NiSource Inc.	NI	$1.06	$29.55	3.59%	3.72%	9.50%	7.50%	6.00%	7.67%	9.69%	11.39%	13.26%
Northwest Natural Gas Company	NWN	$1.95	$37.51	5.20%	5.32%	6.50%	2.80%	n/a	4.65%	8.07%	9.97%	11.87%
ONE Gas, Inc.	OGS	$2.64	$64.16	4.11%	4.21%	3.50%	5.00%	5.00%	4.50%	7.69%	8.71%	9.22%
Spire, Inc.	SR	$3.02	$62.14	4.86%	4.99%	4.50%	6.36%	5.00%	5.29%	9.47%	10.28%	11.37%
Eversource Energy	ES	$2.86	$61.18	4.67%	4.80%	6.00%	4.20%	5.70%	5.30%	8.97%	10.10%	10.81%
American States Water Company	AWR	$1.86	$75.98	2.45%	2.52%	6.50%	4.40%	6.30%	5.73%	6.90%	8.25%	9.03%
California Water Service Group	CWT	$1.12	$50.85	2.20%	2.33%	11.50%	10.80%	n/a	11.15%	13.12%	13.48%	13.83%
Middlesex Water Company	MSEX	$1.30	$56.69	2.29%	2.35%	6.50%	2.70%	n/a	4.60%	5.02%	6.95%	8.87%
SJW Group	SJW	$1.60	$56.30	2.84%	2.94%	6.50%	7.50%	7.50%	7.17%	9.43%	10.11%	10.45%
Essential Utilities, Inc.	WTRG	$1.30	$38.29	3.40%	3.50%	7.00%	5.20%	5.80%	6.00%	8.69%	9.50%	10.52%
All Companies												
Mean				3.48%	3.59%	6.82%	5.81%	6.04%	6.29%	8.80%	9.88%	10.86%
Median				3.40%	3.50%	6.50%	5.20%	5.90%	5.73%	8.97%	9.97%	10.52%
Excluding Middlesex Water Company												
Mean										9.18%	10.17%	11.05%
Median										9.20%	10.03%	10.67%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional, equals 90-day average as of August 31, 2024
[3] Equals [1] / [2]
[4] Equals [3] x (1 + 0.50 x [8])
[5] Source: Value Line
[6] Source: Yahoo! Finance
[7] Source: Zacks
[8] Equals Average ([5], [6], [7])
[9] Equals [3] x (1 + 0.50 x Minimum ([5], [6], [7]) + Minimum ([5], [6], [7])
[10] Equals [4] + [8]
[11] Equals [3] x (1 + 0.50 x Maximum ([5], [6], [7]) + Maximum ([5], [6], [7])

180-DAY CONSTANT GROWTH DCF

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Company	Ticker	Annualized Dividend	Stock Price	Dividend Yield	Expected Dividend Yield	Value Line Earnings Growth	Yahoo! Finance Earnings Growth	Zacks Earnings Growth	Average Growth Rate	Low ROE	Mean ROE	High ROE

Atmos Energy Corporation	ATO	$3.22	$116.52	2.76%	2.86%	7.00%	7.40%	7.00%	7.13%	9.86%	10.00%	10.27%
NiSource Inc.	NI	$1.06	$27.74	3.82%	3.97%	9.50%	7.50%	6.00%	7.67%	9.94%	11.63%	13.50%
Northwest Natural Gas Company	NWN	$1.95	$36.94	5.28%	5.40%	6.50%	2.80%	n/a	4.65%	8.15%	10.05%	11.95%
ONE Gas, Inc.	OGS	$2.64	$62.32	4.24%	4.33%	3.50%	5.00%	5.00%	4.50%	7.81%	8.83%	9.34%
Spire, Inc.	SR	$3.02	$60.58	4.99%	5.12%	4.50%	6.36%	5.00%	5.29%	9.60%	10.40%	11.50%
Eversource Energy	ES	$2.86	$59.21	4.83%	4.96%	6.00%	4.20%	5.70%	5.30%	9.13%	10.26%	10.98%
American States Water Company	AWR	$1.86	$74.73	2.49%	2.56%	6.50%	4.40%	6.30%	5.73%	6.95%	8.30%	9.07%
California Water Service Group	CWT	$1.12	$48.80	2.30%	2.42%	11.50%	10.80%	n/a	11.15%	13.22%	13.57%	13.93%
Middlesex Water Company	MSEX	$1.30	$55.84	2.33%	2.38%	6.50%	2.70%	n/a	4.60%	5.06%	6.98%	8.90%
SJW Group	SJW	$1.60	$57.34	2.79%	2.89%	6.50%	7.50%	7.50%	7.17%	9.38%	10.06%	10.40%
Essential Utilities, Inc.	WTRG	$1.30	$36.90	3.53%	3.63%	7.00%	5.20%	5.80%	6.00%	8.82%	9.63%	10.65%
All Companies												
Mean				3.58%	3.68%	6.82%	5.81%	6.04%	6.29%	8.90%	9.97%	10.95%
Median				3.53%	3.63%	6.50%	5.20%	5.90%	5.73%	9.13%	10.05%	10.65%
Excluding Middlesex Water Company												
Mean										9.29%	10.27%	11.16%
Median										9.26%	10.05%	10.81%

Notes:
[1] Source: Bloomberg Professional
[2] Source: Bloomberg Professional, equals 180-day average as of August 31, 2024
[3] Equals [1] / [2]
[4] Equals [3] x (1 + 0.50 x [8])
[5] Source: Value Line
[6] Source: Yahoo! Finance
[7] Source: Zacks
[8] Equals Average ([5], [6], [7])
[9] Equals [3] x (1 + 0.50 x Minimum ([5], [6], [7]) + Minimum ([5], [6], [7])
[10] Equals [4] + [8]
[11] Equals [3] x (1 + 0.50 x Maximum ([5], [6], [7]) + Maximum ([5], [6], [7])

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & VL BETA

$$K = Rf + \beta\,(Rm - Rf)$$
$$K = Rf + 0.25 \times (Rm - Rf) + 0.75 \times \beta \times (Rm - Rf)$$

Company	Ticker	[1] Current 30-day average of 30-year U.S. Treasury bond yield	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.23%	0.85	12.07%	7.84%	10.89%	11.19%
NiSource Inc.	NI	4.23%	0.95	12.07%	7.84%	11.68%	11.78%
Northwest Natural Gas Company	NWN	4.23%	0.85	12.07%	7.84%	10.89%	11.19%
ONE Gas, Inc.	OGS	4.23%	0.85	12.07%	7.84%	10.89%	11.19%
Spire, Inc.	SR	4.23%	0.85	12.07%	7.84%	10.89%	11.19%
Eversource Energy	ES	4.23%	0.95	12.07%	7.84%	11.68%	11.78%
American States Water Company	AWR	4.23%	0.70	12.07%	7.84%	9.72%	10.31%
California Water Service Group	CWT	4.23%	0.75	12.07%	7.84%	10.11%	10.60%
Middlesex Water Company	MSEX	4.23%	0.75	12.07%	7.84%	10.11%	10.60%
SJW Group	SJW	4.23%	0.85	12.07%	7.84%	10.89%	11.19%
Essential Utilities, Inc.	WTRG	4.23%	1.00	12.07%	7.84%	12.07%	12.07%
Mean			0.85			10.89%	11.19%

Notes:
[1] Source: Bloomberg Professional, 30-day average as of August 31, 2024
[2] Source: Value Line Reports, July 5, 2024, August 9, 2024, and August 23, 2024.
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- NEAR-TERM PROJECTED RISK-FREE RATE & VL BETA

$$K = Rf + \beta\,(Rm - Rf)$$
$$K = Rf + 0.25 \times (Rm - Rf) + 0.75 \times \beta \times (Rm - Rf)$$

Company	Ticker	[1] Near-term projected 30-year U.S. Treasury bond yield (Q4 2024 - Q4 2025)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.12%	0.85	12.07%	7.95%	10.88%	11.18%
NiSource Inc.	NI	4.12%	0.95	12.07%	7.95%	11.67%	11.77%
Northwest Natural Gas Company	NWN	4.12%	0.85	12.07%	7.95%	10.88%	11.18%
ONE Gas, Inc.	OGS	4.12%	0.85	12.07%	7.95%	10.88%	11.18%
Spire, Inc.	SR	4.12%	0.85	12.07%	7.95%	10.88%	11.18%
Eversource Energy	ES	4.12%	0.95	12.07%	7.95%	11.67%	11.77%
American States Water Company	AWR	4.12%	0.70	12.07%	7.95%	9.68%	10.28%
California Water Service Group	CWT	4.12%	0.75	12.07%	7.95%	10.08%	10.58%
Middlesex Water Company	MSEX	4.12%	0.75	12.07%	7.95%	10.08%	10.58%
SJW Group	SJW	4.12%	0.85	12.07%	7.95%	10.88%	11.18%
Essential Utilities, Inc.	WTRG	4.12%	1.00	12.07%	7.95%	12.07%	12.07%
Mean			0.85			10.88%	11.18%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 43, No. 9, August 30, 2024, at 2
[2] Source: Value Line Reports, July 5, 2024, August 9, 2024, and August 23, 2024.
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- LONG-TERM PROJECTED RISK-FREE RATE & VL BETA

$$K = Rf + \beta\,(Rm - Rf)$$
$$K = Rf + 0.25 \times (Rm - Rf) + 0.75 \times \beta \times (Rm - Rf)$$

Company	Ticker	[1] Projected 30-year U.S. Treasury bond yield (2026-2030)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.30%	0.85	12.07%	7.77%	10.90%	11.20%
NiSource Inc.	NI	4.30%	0.95	12.07%	7.77%	11.68%	11.78%
Northwest Natural Gas Company	NWN	4.30%	0.85	12.07%	7.77%	10.90%	11.20%
ONE Gas, Inc.	OGS	4.30%	0.85	12.07%	7.77%	10.90%	11.20%
Spire, Inc.	SR	4.30%	0.85	12.07%	7.77%	10.90%	11.20%
Eversource Energy	ES	4.30%	0.95	12.07%	7.77%	11.68%	11.78%
American States Water Company	AWR	4.30%	0.70	12.07%	7.77%	9.74%	10.32%
California Water Service Group	CWT	4.30%	0.75	12.07%	7.77%	10.13%	10.61%
Middlesex Water Company	MSEX	4.30%	0.75	12.07%	7.77%	10.13%	10.61%
SJW Group	SJW	4.30%	0.85	12.07%	7.77%	10.90%	11.20%
Essential Utilities, Inc.	WTRG	4.30%	1.00	12.07%	7.77%	12.07%	12.07%
Mean			0.85			10.90%	11.20%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 43, No. 6, May 31, 2024, at 14
[2] Source: Value Line Reports, July 5, 2024, August 9, 2024, and August 23, 2024.
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & BLOOMBERG BETA

$$K = Rf + \beta (Rm - Rf)$$
$$K = Rf + 0.25 \times (Rm - Rf) + 0.75 \times \beta \times (Rm - Rf)$$

Company	Ticker	[1] Current 30-day average of 30-year U.S. Treasury bond yield	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.23%	0.74	12.07%	7.84%	10.03%	10.54%
NiSource Inc.	NI	4.23%	0.79	12.07%	7.84%	10.46%	10.86%
Northwest Natural Gas Company	NWN	4.23%	0.69	12.07%	7.84%	9.64%	10.24%
ONE Gas, Inc.	OGS	4.23%	0.76	12.07%	7.84%	10.21%	10.68%
Spire, Inc.	SR	4.23%	0.76	12.07%	7.84%	10.18%	10.65%
Eversource Energy	ES	4.23%	0.79	12.07%	7.84%	10.44%	10.85%
American States Water Company	AWR	4.23%	0.64	12.07%	7.84%	9.26%	9.96%
California Water Service Group	CWT	4.23%	0.69	12.07%	7.84%	9.63%	10.24%
Middlesex Water Company	MSEX	4.23%	0.76	12.07%	7.84%	10.22%	10.68%
SJW Group	SJW	4.23%	0.80	12.07%	7.84%	10.47%	10.87%
Essential Utilities, Inc.	WTRG	4.23%	0.84	12.07%	7.84%	10.84%	11.15%
Mean			0.75			10.13%	10.61%

Notes:
[1] Source: Bloomberg Professional, 30-day average as of August 31, 2024
[2] Source: Bloomberg Professional, as of August 31, 2024
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- NEAR-TERM PROJECTED RISK-FREE RATE & BLOOMBERG BETA

$$K = Rf + \beta (Rm - Rf)$$
$$K = Rf + 0.25 \times (Rm - Rf) + 0.75 \times \beta \times (Rm - Rf)$$

Company	Ticker	[1] Near-term projected 30-year U.S. Treasury bond yield (Q4 2024 - Q4 2025)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.12%	0.74	12.07%	7.95%	10.00%	10.52%
NiSource Inc.	NI	4.12%	0.79	12.07%	7.95%	10.43%	10.84%
Northwest Natural Gas Company	NWN	4.12%	0.69	12.07%	7.95%	9.60%	10.22%
ONE Gas, Inc.	OGS	4.12%	0.76	12.07%	7.95%	10.18%	10.66%
Spire, Inc.	SR	4.12%	0.76	12.07%	7.95%	10.15%	10.63%
Eversource Energy	ES	4.12%	0.79	12.07%	7.95%	10.41%	10.83%
American States Water Company	AWR	4.12%	0.64	12.07%	7.95%	9.22%	9.93%
California Water Service Group	CWT	4.12%	0.69	12.07%	7.95%	9.60%	10.22%
Middlesex Water Company	MSEX	4.12%	0.76	12.07%	7.95%	10.20%	10.66%
SJW Group	SJW	4.12%	0.80	12.07%	7.95%	10.45%	10.86%
Essential Utilities, Inc.	WTRG	4.12%	0.84	12.07%	7.95%	10.83%	11.14%
Mean			0.75			10.10%	10.59%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 43, No. 9, August 30, 2024, at 2
[2] Source: Bloomberg Professional, as of August 31, 2024
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- LONG-TERM PROJECTED RISK-FREE RATE & BLOOMBERG BETA

$$K = Rf + \beta (Rm - Rf)$$
$$K = Rf + 0.25 \times (Rm - Rf) + 0.75 \times \beta \times (Rm - Rf)$$

Company	Ticker	[1] Projected 30-year U.S. Treasury bond yield (2026-2030)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.30%	0.74	12.07%	7.77%	10.05%	10.56%
NiSource Inc.	NI	4.30%	0.79	12.07%	7.77%	10.47%	10.87%
Northwest Natural Gas Company	NWN	4.30%	0.69	12.07%	7.77%	9.66%	10.26%
ONE Gas, Inc.	OGS	4.30%	0.76	12.07%	7.77%	10.23%	10.69%
Spire, Inc.	SR	4.30%	0.76	12.07%	7.77%	10.20%	10.67%
Eversource Energy	ES	4.30%	0.79	12.07%	7.77%	10.45%	10.86%
American States Water Company	AWR	4.30%	0.64	12.07%	7.77%	9.28%	9.98%
California Water Service Group	CWT	4.30%	0.69	12.07%	7.77%	9.65%	10.26%
Middlesex Water Company	MSEX	4.30%	0.76	12.07%	7.77%	10.24%	10.70%
SJW Group	SJW	4.30%	0.80	12.07%	7.77%	10.49%	10.88%
Essential Utilities, Inc.	WTRG	4.30%	0.84	12.07%	7.77%	10.85%	11.16%
Mean			0.75			10.14%	10.62%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 43, No. 6, May 31, 2024, at 14
[2] Source: Bloomberg Professional, as of August 31, 2024
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & VALUE LINE LT AVERAGE BETA

K = Rf + β (Rm − Rf)
K = Rf + 0.25 x (Rm - Rf) + 0.75 x β x (Rm − Rf)

Company	Ticker	[1] Current 30-day average of 30-year U.S. Treasury bond yield	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.23%	0.75	12.07%	7.84%	10.11%	10.60%
NiSource Inc.	NI	4.23%	0.76	12.07%	7.84%	10.15%	10.63%
Northwest Natural Gas Company	NWN	4.23%	0.71	12.07%	7.84%	9.79%	10.36%
ONE Gas, Inc.	OGS	4.23%	0.74	12.07%	7.84%	10.01%	10.53%
Spire, Inc.	SR	4.23%	0.74	12.07%	7.84%	10.04%	10.55%
Eversource Energy	ES	4.23%	0.76	12.07%	7.84%	10.20%	10.67%
American States Water Company	AWR	4.23%	0.69	12.07%	7.84%	9.65%	10.25%
California Water Service Group	CWT	4.23%	0.70	12.07%	7.84%	9.75%	10.33%
Middlesex Water Company	MSEX	4.23%	0.74	12.07%	7.84%	10.00%	10.52%
SJW Group	SJW	4.23%	0.76	12.07%	7.84%	10.22%	10.68%
Essential Utilities, Inc.	WTRG	4.23%	0.79	12.07%	7.84%	10.43%	10.84%
Mean			0.74			10.03%	10.54%

Notes:
[1] Source: Bloomberg Professional, 30-day average as of August 31, 2024
[2] Source: Rebuttal Exhibit AEB-4
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & VALUE LINE LT AVERAGE BETA

K = Rf + β (Rm − Rf)
K = Rf + 0.25 x (Rm - Rf) + 0.75 x β x (Rm − Rf)

Company	Ticker	[1] Near-term projected 30-year U.S. Treasury bond yield (Q4 2024 - Q4 2025)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.12%	0.75	12.07%	7.95%	10.08%	10.58%
NiSource Inc.	NI	4.12%	0.76	12.07%	7.95%	10.13%	10.61%
Northwest Natural Gas Company	NWN	4.12%	0.71	12.07%	7.95%	9.76%	10.34%
ONE Gas, Inc.	OGS	4.12%	0.74	12.07%	7.95%	9.98%	10.50%
Spire, Inc.	SR	4.12%	0.74	12.07%	7.95%	10.01%	10.53%
Eversource Energy	ES	4.12%	0.76	12.07%	7.95%	10.17%	10.65%
American States Water Company	AWR	4.12%	0.69	12.07%	7.95%	9.61%	10.23%
California Water Service Group	CWT	4.12%	0.70	12.07%	7.95%	9.72%	10.31%
Middlesex Water Company	MSEX	4.12%	0.74	12.07%	7.95%	9.97%	10.50%
SJW Group	SJW	4.12%	0.76	12.07%	7.95%	10.19%	10.66%
Essential Utilities, Inc.	WTRG	4.12%	0.79	12.07%	7.95%	10.41%	10.82%
Mean			0.74			10.00%	10.52%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 43, No. 9, August 30, 2024, at 2
[2] Source: Rebuttal Exhibit AEB-4
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

CAPITAL ASSET PRICING MODEL -- CURRENT RISK-FREE RATE & VALUE LINE LT AVERAGE BETA

K = Rf + β (Rm − Rf)
K = Rf + 0.25 x (Rm - Rf) + 0.75 x β x (Rm − Rf)

Company	Ticker	[1] Projected 30-year U.S. Treasury bond yield (2026-2030)	[2] Beta (β)	[3] Market Return (Rm)	[4] Market Risk Premium (Rm − Rf)	[5] ROE (K)	[6] ECAPM ROE
Atmos Energy Corporation	ATO	4.30%	0.75	12.07%	7.77%	10.13%	10.61%
NiSource Inc.	NI	4.30%	0.76	12.07%	7.77%	10.17%	10.65%
Northwest Natural Gas Company	NWN	4.30%	0.71	12.07%	7.77%	9.81%	10.37%
ONE Gas, Inc.	OGS	4.30%	0.74	12.07%	7.77%	10.03%	10.54%
Spire, Inc.	SR	4.30%	0.74	12.07%	7.77%	10.06%	10.56%
Eversource Energy	ES	4.30%	0.76	12.07%	7.77%	10.21%	10.68%
American States Water Company	AWR	4.30%	0.69	12.07%	7.77%	9.67%	10.27%
California Water Service Group	CWT	4.30%	0.70	12.07%	7.77%	9.77%	10.35%
Middlesex Water Company	MSEX	4.30%	0.74	12.07%	7.77%	10.02%	10.53%
SJW Group	SJW	4.30%	0.76	12.07%	7.77%	10.23%	10.69%
Essential Utilities, Inc.	WTRG	4.30%	0.79	12.07%	7.77%	10.45%	10.85%
Mean			0.74			10.05%	10.55%

Notes:
[1] Source: Blue Chip Financial Forecasts, Vol. 43, No. 6, May 31, 2024, at 14
[2] Source: Rebuttal Exhibit AEB-4
[3] Source: Rebuttal Exhibit AEB-5
[4] Equals [3] - [1]
[5] Equals [1] + [2] x [4]
[6] Equals [1] + 0.25 x ([4]) + 0.75 x ([2] x [4])

HISTORICAL BETA - 2013 - 2023

Company	Ticker	[1] 12/31/2013	[2] 12/31/2014	[3] 12/31/2015	[4] 12/31/2016	[5] 12/31/2017	[6] 12/31/2018	[7] 12/31/2019	[8] 12/31/2020	[9] 12/31/2021	[10] 12/31/2022	[11] 12/31/2023	[12] Average
Atmos Energy Corporation	ATO	0.80	0.80	0.80	0.70	0.70	0.60	0.60	0.80	0.80	0.80	0.85	0.75
NiSource Inc.	NI	0.85	0.85	NMF	NMF	0.60	0.50	0.55	0.85	0.85	0.85	0.90	0.76
Northwest Natural Gas Company	NWN	0.65	0.70	0.65	0.65	0.70	0.60	0.60	0.80	0.85	0.80	0.80	0.71
ONE Gas, Inc.	OGS				0.70	0.70	0.65	0.65	0.80	0.80	0.80	0.80	0.74
Spire, Inc.	SR	0.65	0.70	0.70	0.70	0.70	0.65	0.65	0.85	0.85	0.85	0.85	0.74
Eversource Energy	ES			0.75	0.70	0.65	0.60	0.55	0.90	0.90	0.90	0.90	0.76
American States Water Company	AWR	0.65	0.70	0.70	0.75	0.80	0.70	0.65	0.65	0.65	0.65	0.70	0.69
California Water Service Group	CWT	0.60	0.70	0.75	0.75	0.80	0.70	0.70	0.65	0.70	0.70	0.70	0.70
Middlesex Water Company	MSEX	0.75	0.70	0.70	0.75	0.80	0.75	0.75	0.75	0.70	0.70	0.75	0.74
SJW Group	SJW	0.85	0.85	0.75	0.75	0.70	0.60	0.60	0.85	0.80	0.80	0.85	0.76
Essential Utilities, Inc.	WTRG	0.60	0.70	0.75	0.70	0.75	0.70	0.65	0.95	0.95	0.95	1.00	0.79
Mean		0.71	0.74	0.73	0.72	0.72	0.64	0.63	0.80	0.80	0.80	0.83	0.74

Notes:
[1] Value Line, dated December 26, 2013.
[2] Value Line, dated December 31, 2014.
[3] Value Line, dated December 30, 2015.
[4] Value Line, dated December 29, 2016.
[5] Value Line, dated December 28, 2017.
[6] Value Line, dated December 27, 2018.
[7] Value Line, dated December 26, 2019.
[8] Value Line, dated December 30, 2020.
[9] Value Line, dated December 29, 2021.
[10] Value Line, dated December 30, 2022.
[11] Value Line, dated December 29, 2023.
[12] Average ([1] - [11])

MARKET RISK PREMIUM DERIVED FROM S&P 500 INDEX

[1] Estimated Weighted Average Dividend Yield	1.54%
[2] Estimated Weighted Average Long-Term Growth Rate	10.45%
[3] S&P 500 Estimated Required Market Return	12.07%

Name	Ticker	[4] Shares Outst'g	[5] Price	[6] Market Capitalization	[7] Weight in Index	[8] Estimated Dividend Yield	[9] Cap-Weighted Dividend Yield	[10] Bloomberg Long-Term Growth Est.	[11] Cap-Weighted Long-Term Growth Est.
LyondellBasell Industries NV	LYB	325.09	98.70	32,086		5.43%		-8.07%	
American Express Co	AXP	710.91	258.65	183,877	0.50%	1.08%	0.01%	15.74%	0.08%
Verizon Communications Inc	VZ	4,209.52	41.78	175,874	0.48%	6.37%	0.03%	0.86%	0.00%
Broadcom Inc	AVGO	4,654.88	162.82	757,908	2.08%	1.29%	0.03%	15.88%	0.33%
Boeing Co/The	BA	616.17	173.74	107,053				38.60%	
Solventum Corp	SOLV	172.71	64.11	11,073				-2.00%	
Caterpillar Inc	CAT	484.90	356.10	172,672	0.47%	1.58%	0.01%	8.38%	0.04%
JPMorgan Chase & Co	JPM	2,845.17	224.80	639,593	1.75%	2.05%	0.04%	4.05%	0.07%
Chevron Corp	CVX	1,828.92	147.95	270,588	0.74%	4.41%	0.03%	7.00%	0.05%
Coca-Cola Co/The	KO	4,309.87	72.47	312,336	0.86%	2.68%	0.02%	6.36%	0.05%
AbbVie Inc	ABBV	1,766.34	196.31	346,751	0.95%	3.16%	0.03%	8.80%	0.08%
Walt Disney Co/The	DIS	1,813.59	90.38	163,912	0.45%	1.00%	0.00%	18.89%	0.08%
Corpay Inc	CPAY	69.43	315.55	21,910	0.06%			14.87%	0.01%
Extra Space Storage Inc	EXR	211.93	177.00	37,511		3.66%		-0.20%	
Exxon Mobil Corp	XOM	4,442.83	117.94	523,987	1.44%	3.22%	0.05%	5.00%	0.07%
Phillips 66	PSX	418.57	140.31	58,729		3.28%		-9.00%	
General Electric Co	GE	1,084.31	174.62	189,342		0.64%		29.30%	
HP Inc	HPQ	963.72	36.18	34,867	0.10%	3.05%	0.00%	1.42%	0.00%
Home Depot Inc/The	HD	993.29	368.50	366,028	1.00%	2.44%	0.02%	3.87%	0.04%
Monolithic Power Systems Inc	MPWR	48.75	934.68	45,568		0.53%			
International Business Machines Corp	IBM	921.15	202.13	186,192	0.51%	3.30%	0.02%	3.90%	0.02%
Johnson & Johnson	JNJ	2,407.24	165.86	399,265	1.09%	2.99%	0.03%	3.73%	0.04%
Lululemon Athletica Inc	LULU	117.66	259.47	30,529	0.08%			7.00%	0.01%
McDonald's Corp	MCD	717.34	286.99	205,870	0.56%	2.33%	0.01%	5.15%	0.03%
Merck & Co Inc	MRK	2,534.81	118.45	300,248	0.82%	2.60%	0.02%	14.00%	0.12%
3M Co	MMM	549.35	134.69	73,992		2.08%		-5.37%	
American Water Works Co Inc	AWK	194.86	143.12	27,889	0.08%	2.14%	0.00%	8.00%	0.01%
Bank of America Corp	BAC	7,759.58	40.75	316,203		2.55%			
Pfizer Inc	PFE	5,666.70	29.01	164,391	0.45%	5.79%	0.03%	6.39%	0.03%
Procter & Gamble Co/The	PG	2,349.71	171.54	403,069	1.10%	2.35%	0.03%	7.37%	0.08%
AT&T Inc	T	7,170.24	19.90	142,688	0.39%	5.58%	0.02%	1.84%	0.01%
Travelers Cos Inc/The	TRV	227.93	228.07	51,984	0.14%	1.84%	0.00%	18.21%	0.03%
RTX Corp	RTX	1,330.24	123.34	164,072	0.45%	2.04%	0.01%	10.23%	0.05%
Analog Devices Inc	ADI	496.49	233.92	116,140		1.57%		-5.82%	
Walmart Inc	WMT	8,038.25	77.23	620,794	1.70%	1.07%	0.02%	9.24%	0.16%
Cisco Systems Inc	CSCO	4,028.82	50.54	203,616	0.56%	3.17%	0.02%	3.40%	0.02%
Intel Corp	INTC	4,276.00	22.04	94,243	0.26%			4.26%	0.01%
General Motors Co	GM	1,123.92	49.78	55,949	0.15%	0.96%	0.00%	11.02%	0.02%
Microsoft Corp	MSFT	7,433.04	417.14	3,100,617	8.50%	0.72%	0.06%	16.10%	1.37%
Dollar General Corp	DG	219.92	82.97	18,246		2.84%		-3.74%	
Cigna Group/The	CI	279.55	361.81	101,144	0.28%	1.55%	0.00%	11.65%	0.03%
Kinder Morgan Inc	KMI	2,219.46	21.57	47,874	0.13%	5.33%	0.01%	6.52%	0.01%
Citigroup Inc	C	1,907.80	62.64	119,504		3.58%		27.26%	
American International Group Inc	AIG	643.95	77.05	49,616	0.14%	2.08%	0.00%	12.42%	0.02%
Altria Group Inc	MO	1,706.22	53.77	91,744	0.25%	7.59%	0.02%	4.14%	0.01%
HCA Healthcare Inc	HCA	258.07	395.59	102,091	0.28%	0.67%	0.00%	10.81%	0.03%
International Paper Co	IP	347.37	48.42	16,820		3.82%		-2.00%	
Hewlett Packard Enterprise Co	HPE	1,299.67	19.37	25,175	0.07%	2.68%	0.00%	3.73%	0.00%
Abbott Laboratories	ABT	1,739.90	113.27	197,078	0.54%	1.94%	0.01%	8.12%	0.04%
Aflac Inc	AFL	560.03	110.36	61,804	0.17%	1.81%	0.00%	7.55%	0.01%
Air Products and Chemicals Inc	APD	222.32	278.85	61,993	0.17%	2.54%	0.00%	9.52%	0.02%
Super Micro Computer Inc	SMCI	58.56	437.70	25,630				69.00%	
Royal Caribbean Cruises Ltd	RCL	257.42	164.62	42,376		0.97%		30.00%	
Hess Corp	HES	308.12	138.06	42,538	0.12%	1.27%	0.00%	16.00%	0.02%
Archer-Daniels-Midland Co	ADM	478.14	60.99	29,162		3.28%		-3.62%	
Automatic Data Processing Inc	ADP	407.80	275.91	112,515		2.03%			
Verisk Analytics Inc	VRSK	142.42	272.82	38,856	0.11%	0.57%	0.00%	12.54%	0.01%
AutoZone Inc	AZO	17.08	3,181.48	54,349	0.15%			14.66%	0.02%
Linde PLC	LIN	477.50	478.25	228,366	0.63%	1.16%	0.01%	11.76%	0.07%
Avery Dennison Corp	AVY	80.52	221.85	17,863	0.05%	1.59%	0.00%	12.84%	0.01%
Enphase Energy Inc	ENPH	135.42	121.04	16,391	0.04%			7.45%	0.00%
MSCI Inc	MSCI	78.65	580.59	45,663	0.13%	1.10%	0.00%	11.93%	0.01%
Ball Corp	BALL	303.57	63.61	19,310	0.05%	1.26%	0.00%	13.35%	0.01%
Axon Enterprise Inc	AXON	75.57	364.97	27,582				20.81%	
Dayforce Inc	DAY	158.10	57.17	9,039					
Carrier Global Corp	CARR	902.75	72.78	65,702	0.18%	1.04%	0.00%	6.74%	0.01%
Bank of New York Mellon Corp/The	BK	737.96	68.22	50,343	0.14%	2.76%	0.00%	10.55%	0.01%
Otis Worldwide Corp	OTIS	400.56	94.69	37,929	0.10%	1.65%	0.00%	10.00%	0.01%
Baxter International Inc	BAX	510.18	37.94	19,356	0.05%	3.06%	0.00%	6.50%	0.00%
Becton Dickinson & Co	BDX	289.04	242.41	70,067	0.19%	1.57%	0.00%	8.34%	0.02%
Berkshire Hathaway Inc	BRK/B	1,325.19	475.92	630,686					
Best Buy Co Inc	BBY	215.71	100.40	21,658	0.06%	3.75%	0.00%	4.17%	0.00%
Boston Scientific Corp	BSX	1,472.63	81.79	120,446	0.33%			12.58%	0.04%
Bristol-Myers Squibb Co	BMY	2,027.40	49.95	101,268		4.80%		33.60%	
Brown-Forman Corp	BF/B	303.54	45.37	13,772		1.92%		-2.38%	
Coterra Energy Inc	CTRA	739.27	24.33	17,987	0.05%	3.45%	0.00%	10.06%	0.00%
Hilton Worldwide Holdings Inc	HLT	246.43	219.64	54,125	0.15%	0.27%	0.00%	14.97%	0.02%
Carnival Corp	CCL	1,122.46	16.50	18,521					
Qorvo Inc	QRVO	94.86	115.89	10,993	0.03%			17.09%	0.01%
Builders FirstSource Inc	BLDR	116.45	174.00	20,263	0.06%			1.45%	0.00%
UDR Inc	UDR	329.82	44.51	14,680	0.04%	3.82%	0.00%	1.85%	0.00%

		[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Name	Ticker	Shares Outst'g	Price	Market Capitalization	Weight in Index	Estimated Dividend Yield	Cap-Weighted Dividend Yield	Bloomberg Long-Term Growth Est.	Cap-Weighted Long-Term Growth Est.
Clorox Co/The	CLX	123.86	158.31	19,609	0.05%	3.08%	0.00%	8.65%	0.00%
Paycom Software Inc	PAYC	57.43	162.78	9,349	0.03%	0.92%	0.00%	9.41%	0.00%
CMS Energy Corp	CMS	298.64	67.86	20,265	0.06%	3.04%	0.00%	7.28%	0.00%
Colgate-Palmolive Co	CL	817.09	106.50	87,020	0.24%	1.88%	0.00%	8.73%	0.02%
EPAM Systems Inc	EPAM	56.94	200.76	11,430	0.03%			5.29%	0.00%
Conagra Brands Inc	CAG	479.05	31.20	14,946	0.04%	4.49%	0.00%	1.81%	0.00%
Airbnb Inc	ABNB	440.00	117.31	51,617	0.14%			19.84%	0.03%
Consolidated Edison Inc	ED	346.15	101.56	35,155	0.10%	3.27%	0.00%	5.58%	0.01%
Corning Inc	GLW	855.70	41.85	35,811	0.10%	2.68%	0.00%	13.41%	0.01%
GoDaddy Inc	GDDY	140.97	167.41	23,600					
Cummins Inc	CMI	137.05	312.85	42,875	0.12%	2.33%	0.00%	8.28%	0.01%
Caesars Entertainment Inc	CZR	216.34	37.64	8,143				-35.64%	
Danaher Corp	DHR	722.21	269.31	194,499	0.53%	0.40%	0.00%	1.89%	0.01%
Target Corp	TGT	460.68	153.62	70,769	0.19%	2.92%	0.01%	14.38%	0.03%
Deere & Co	DE	273.60	385.74	105,538		1.52%		-9.99%	
Dominion Energy Inc	D	838.94	55.90	46,897		4.78%		21.59%	
Dover Corp	DOV	137.46	186.03	25,571	0.07%	1.11%	0.00%	7.72%	0.01%
Alliant Energy Corp	LNT	256.50	58.27	14,946	0.04%	3.30%	0.00%	7.34%	0.00%
Steel Dynamics Inc	STLD	154.30	119.51	18,441		1.54%		-4.38%	
Duke Energy Corp	DUK	771.00	113.95	87,855	0.24%	3.67%	0.01%	6.61%	0.02%
Regency Centers Corp	REG	181.50	72.69	13,193	0.04%	3.69%	0.00%	3.79%	0.00%
Eaton Corp PLC	ETN	398.10	306.93	122,189	0.33%	1.23%	0.00%	14.60%	0.05%
Ecolab Inc	ECL	284.54	253.18	72,039	0.20%	0.90%	0.00%	15.76%	0.03%
Revvity Inc	RVTY	123.34	122.54	15,114	0.04%	0.23%	0.00%	9.44%	0.00%
Emerson Electric Co	EMR	572.70	105.39	60,357	0.17%	1.99%	0.00%	15.10%	0.02%
EOG Resources Inc	EOG	568.60	128.82	73,247	0.20%	2.83%	0.01%	3.28%	0.01%
Aon PLC	AON	217.24	343.72	74,670	0.20%	0.79%	0.00%	11.10%	0.02%
Entergy Corp	ETR	213.83	120.69	25,807	0.07%	3.75%	0.00%	7.17%	0.01%
Equifax Inc	EFX	123.74	306.74	37,955		0.51%		21.48%	
EQT Corp	EQT	594.02	33.51	19,906		1.88%			
IQVIA Holdings Inc	IQV	182.30	251.55	45,858	0.13%			10.83%	0.01%
Gartner Inc	IT	77.06	491.96	37,910	0.10%			7.67%	0.01%
FedEx Corp	FDX	244.96	298.77	73,188	0.20%	1.85%	0.00%	13.35%	0.03%
FMC Corp	FMC	124.82	64.58	8,061	0.02%	3.59%	0.00%	15.67%	0.00%
Brown & Brown Inc	BRO	285.26	105.13	29,989	0.08%	0.49%	0.00%	10.85%	0.01%
Ford Motor Co	F	3,904.40	11.19	43,690	0.12%	5.36%	0.01%	1.34%	0.00%
NextEra Energy Inc	NEE	2,055.00	80.51	165,448	0.45%	2.56%	0.01%	8.17%	0.04%
Franklin Resources Inc	BEN	523.00	20.24	10,585		6.13%			
Garmin Ltd	GRMN	192.21	183.29	35,231	0.10%	1.64%	0.00%	9.55%	0.01%
Freeport-McMoRan Inc	FCX	1,436.86	44.28	63,624	0.17%	1.36%	0.00%	17.59%	0.03%
Dexcom Inc	DXCM	400.73	69.34	27,786				21.07%	
General Dynamics Corp	GD	274.78	299.36	82,258	0.23%	1.90%	0.00%	15.55%	0.04%
General Mills Inc	GIS	556.62	72.29	40,238	0.11%	3.32%	0.00%	2.38%	0.00%
Genuine Parts Co	GPC	139.32	143.26	19,959		2.79%			
Atmos Energy Corp	ATO	155.23	130.74	20,295	0.06%	2.46%	0.00%	7.00%	0.00%
WW Grainger Inc	GWW	48.83	984.92	48,090		0.83%			
Halliburton Co	HAL	882.83	31.09	27,447	0.08%	2.19%	0.00%	8.17%	0.01%
L3Harris Technologies Inc	LHX	189.71	236.67	44,897	0.12%	1.96%	0.00%	8.77%	0.01%
Healthpeak Properties Inc	DOC	699.29	22.28	15,580	0.04%	5.39%	0.00%	5.33%	0.00%
Insulet Corp	PODD	70.12	202.77	14,217	0.04%			17.61%	0.01%
Catalent Inc	CTLT	180.98	60.96	11,033					
Fortive Corp	FTV	350.34	74.40	26,065	0.07%	0.43%	0.00%	10.49%	0.01%
Hershey Co/The	HSY	147.67	193.06	28,510	0.08%	2.84%	0.00%	2.21%	0.00%
Synchrony Financial	SYF	395.23	50.26	19,864		1.99%		64.00%	
Hormel Foods Corp	HRL	548.31	32.55	17,847	0.05%	3.47%	0.00%	6.59%	0.00%
Arthur J Gallagher & Co	AJG	219.10	292.57	64,102	0.18%	0.82%	0.00%	12.87%	0.02%
Mondelez International Inc	MDLZ	1,335.80	71.81	95,924	0.26%	2.62%	0.01%	6.93%	0.02%
CenterPoint Energy Inc	CNP	651.72	27.30	17,792	0.05%	2.93%	0.00%	8.00%	0.00%
Humana Inc	HUM	120.40	354.47	42,679		1.00%		-1.30%	
Willis Towers Watson PLC	WTW	101.56	292.11	29,666	0.08%	1.21%	0.00%	11.69%	0.01%
Illinois Tool Works Inc	ITW	296.90	253.18	75,169	0.21%	2.37%	0.00%	6.90%	0.01%
CDW Corp/DE	CDW	133.58	225.64	30,140	0.08%	1.10%	0.00%	7.02%	0.01%
Trane Technologies PLC	TT	225.67	361.66	81,616	0.22%	0.93%	0.00%	15.56%	0.03%
Interpublic Group of Cos Inc/The	IPG	375.59	32.28	12,124	0.03%	4.09%	0.00%	3.20%	0.00%
International Flavors & Fragrances Inc	IFF	255.66	103.99	26,586	0.07%	1.54%	0.00%	2.12%	0.00%
Generac Holdings Inc	GNRC	60.15	156.53	9,416	0.03%			7.00%	0.00%
NXP Semiconductors NV	NXPI	254.73	256.36	65,303	0.18%	1.58%	0.00%	5.89%	0.01%
Kellanova	K	343.95	80.04	27,530	0.08%	2.85%	0.00%	9.29%	0.01%
Broadridge Financial Solutions Inc	BR	116.71	212.86	24,843		1.65%			
Kimberly-Clark Corp	KMB	336.80	144.66	48,722	0.13%	3.37%	0.00%	8.36%	0.01%
Kimco Realty Corp	KIM	674.12	23.26	15,680	0.04%	4.13%	0.00%	3.63%	0.00%
Oracle Corp	ORCL	2,755.86	141.29	389,375	1.07%	1.13%	0.01%	15.06%	0.16%
Kroger Co/The	KR	721.79	53.21	38,406	0.11%	2.41%	0.00%	3.11%	0.00%
Lennar Corp	LEN	241.70	182.06	44,004	0.12%	1.10%	0.00%	4.30%	0.01%
Eli Lilly & Co	LLY	950.43	960.02	912,428		0.54%		33.00%	
Bath & Body Works Inc	BBWI	219.11	30.76	6,740	0.02%	2.60%	0.00%	14.74%	0.00%
Charter Communications Inc	CHTR	142.74	347.54	49,608	0.14%			7.10%	0.01%
Loews Corp	L	219.52	81.94	17,987		0.31%			
Lowe's Cos Inc	LOW	567.29	248.50	140,973		1.85%		-0.19%	
Hubbell Inc	HUBB	53.68	399.92	21,468		1.22%			
IDEX Corp	IEX	75.70	206.48	15,631		1.34%			
Marsh & McLennan Cos Inc	MMC	491.76	227.51	111,879	0.31%	1.43%	0.00%	9.10%	0.03%
Masco Corp	MAS	218.25	79.56	17,364	0.05%	1.46%	0.00%	7.76%	0.00%
S&P Global Inc	SPGI	320.20	513.24	164,339	0.45%	0.71%	0.00%	14.53%	0.07%
Medtronic PLC	MDT	1,282.49	88.58	113,603	0.31%	3.16%	0.01%	5.66%	0.02%
Viatris Inc	VTRS	1,193.52	12.08	14,418		3.97%		-3.41%	
CVS Health Corp	CVS	1,257.98	57.24	72,007	0.20%	4.65%	0.01%	1.82%	0.00%
DuPont de Nemours Inc	DD	417.50	84.25	35,174	0.10%	1.80%	0.00%	2.50%	0.00%
Micron Technology Inc	MU	1,108.84	96.24	106,715		0.48%		31.94%	
Motorola Solutions Inc	MSI	166.84	442.04	73,750	0.20%	0.89%	0.00%	9.36%	0.02%

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Name	Ticker	Shares Outst'g	Price	Market Capitalization	Weight in Index	Estimated Dividend Yield	Cap-Weighted Dividend Yield	Bloomberg Long-Term Growth Est.	Cap-Weighted Long-Term Growth Est.
Cboe Global Markets Inc	CBOE	104.63	205.40	21,492	0.06%	1.23%	0.00%	13.78%	0.01%
Newmont Corp	NEM	1,152.49	53.39	61,531		1.87%		48.45%	
NIKE Inc	NKE	1,201.46	82.95	99,661	0.27%	1.78%	0.00%	4.46%	0.01%
NiSource Inc	NI	448.51	33.06	14,828	0.04%	3.21%	0.00%	7.00%	0.00%
Norfolk Southern Corp	NSC	226.10	256.16	57,917	0.16%	2.11%	0.00%	9.68%	0.02%
Principal Financial Group Inc	PFG	231.58	81.42	18,856	0.05%	3.54%	0.00%	13.00%	0.01%
Eversource Energy	ES	357.39	67.53	24,134	0.07%	4.24%	0.00%	5.46%	0.00%
Northrop Grumman Corp	NOC	146.25	521.15	76,216	0.21%	1.58%	0.00%	8.68%	0.02%
Wells Fargo & Co	WFC	3,403.77	58.47	199,018	0.55%	2.74%	0.01%	7.95%	0.04%
Nucor Corp	NUE	237.34	151.91	36,054		1.42%		-1.48%	
Occidental Petroleum Corp	OXY	916.20	56.98	52,205		1.54%		24.00%	
Omnicom Group Inc	OMC	195.65	100.43	19,649	0.05%	2.79%	0.00%	5.36%	0.00%
ONEOK Inc	OKE	584.07	92.36	53,945		4.29%			
Raymond James Financial Inc	RJF	205.94	119.57	24,625	0.07%	1.51%	0.00%	15.40%	0.01%
PG&E Corp	PCG	2,137.46	19.70	42,108	0.12%	0.20%	0.00%	9.95%	0.01%
Parker-Hannifin Corp	PH	128.60	600.20	77,183	0.21%	1.09%	0.00%	13.44%	0.03%
Rollins Inc	ROL	484.31	50.18	24,303	0.07%	1.20%	0.00%	13.38%	0.01%
PPL Corp	PPL	737.77	31.91	23,542	0.06%	3.23%	0.00%	7.01%	0.00%
ConocoPhillips	COP	1,161.25	113.79	132,139	0.36%	2.74%	0.01%	13.00%	0.05%
PulteGroup Inc	PHM	207.52	131.65	27,321	0.07%	0.61%	0.00%	8.99%	0.01%
Pinnacle West Capital Corp	PNW	113.61	87.52	9,943	0.03%	4.02%	0.00%	8.22%	0.00%
PNC Financial Services Group Inc/The	PNC	397.50	185.09	73,573	0.20%	3.46%	0.01%	18.04%	0.04%
PPG Industries Inc	PPG	233.30	129.73	30,266	0.08%	2.10%	0.00%	8.33%	0.01%
Progressive Corp/The	PGR	585.67	252.20	147,705		0.16%		36.31%	
Veralto Corp	VLTO	247.11	112.43	27,782		0.32%			
Public Service Enterprise Group Inc	PEG	498.16	80.75	40,227	0.11%	2.97%	0.00%	7.47%	0.01%
Cooper Cos Inc/The	COO	199.16	105.73	21,057	0.06%			12.43%	0.01%
Edison International	EIX	383.93	87.03	33,413	0.09%	3.58%	0.00%	6.00%	0.01%
Schlumberger NV	SLB	1,419.84	43.99	62,459	0.17%	2.50%	0.00%	12.22%	0.02%
Charles Schwab Corp/The	SCHW	1,778.45	65.10	115,777	0.32%	1.54%	0.00%	12.07%	0.04%
Sherwin-Williams Co/The	SHW	252.26	369.37	93,177	0.26%	0.77%	0.00%	9.88%	0.03%
West Pharmaceutical Services Inc	WST	72.54	313.63	22,751	0.06%	0.26%	0.00%	2.89%	0.00%
J M Smucker Co/The	SJM	106.41	114.68	12,203	0.03%	3.77%	0.00%	6.07%	0.00%
Snap-on Inc	SNA	52.68	283.74	14,948	0.04%	2.62%	0.00%	3.83%	0.00%
AMETEK Inc	AME	231.54	171.05	39,604	0.11%	0.65%	0.00%	7.02%	0.01%
Uber Technologies Inc	UBER	2,100.94	73.13	153,642				60.59%	
Southern Co/The	SO	1,094.63	86.40	94,576	0.26%	3.33%	0.01%	7.23%	0.02%
Truist Financial Corp	TFC	1,339.14	44.46	59,538	0.16%	4.68%	0.01%	10.91%	0.02%
Southwest Airlines Co	LUV	599.16	28.92	17,328		2.49%			
W R Berkley Corp	WRB	380.55	59.70	22,719	0.06%	0.54%	0.00%	13.27%	0.01%
Stanley Black & Decker Inc	SWK	153.96	101.54	15,633		3.23%			
Public Storage	PSA	175.83	343.72	60,436	0.17%	3.49%	0.01%	1.23%	0.00%
Arista Networks Inc	ANET	314.15	353.38	111,015	0.30%			18.60%	0.06%
Sysco Corp	SYY	491.52	77.97	38,324	0.11%	2.62%	0.00%	7.00%	0.01%
Corteva Inc	CTVA	687.80	57.13	39,294	0.11%	1.19%	0.00%	9.85%	0.01%
Texas Instruments Inc	TXN	913.05	214.34	195,702		2.43%		-2.86%	
Textron Inc	TXT	187.36	91.20	17,088	0.05%	0.09%	0.00%	10.05%	0.00%
Thermo Fisher Scientific Inc	TMO	382.00	615.07	234,954	0.64%	0.25%	0.00%	8.70%	0.06%
TJX Cos Inc/The	TJX	1,127.87	117.27	132,266	0.36%	1.28%	0.00%	8.20%	0.03%
Globe Life Inc	GL	89.82	105.05	9,436	0.03%	0.91%	0.00%	6.00%	0.00%
Johnson Controls International plc	JCI	668.01	72.85	48,665	0.13%	2.03%	0.00%	8.72%	0.01%
Ulta Beauty Inc	ULTA	47.12	352.84	16,624	0.05%			1.64%	0.00%
Union Pacific Corp	UNP	609.20	256.09	156,010	0.43%	2.09%	0.01%	11.33%	0.05%
Keysight Technologies Inc	KEYS	173.54	154.12	26,746				-1.19%	
UnitedHealth Group Inc	UNH	923.42	590.20	545,001	1.49%	1.42%	0.02%	10.44%	0.16%
Blackstone Inc	BX	720.08	142.36	102,510		2.30%		24.48%	
Marathon Oil Corp	MRO	559.38	28.65	16,026		1.54%		-5.00%	
Bio-Rad Laboratories Inc	BIO	22.80	337.32	7,689	0.02%			12.00%	0.00%
Ventas Inc	VTR	413.15	62.11	25,661	0.07%	2.90%	0.00%	8.22%	0.01%
Labcorp Holdings Inc	LH	83.96	229.89	19,302	0.05%	1.25%	0.00%	8.45%	0.00%
Vulcan Materials Co	VMC	132.06	245.21	32,382		0.75%			
Weyerhaeuser Co	WY	727.32	30.49	22,176		2.62%		-13.66%	
Williams Cos Inc/The	WMB	1,218.93	45.77	55,790	0.15%	4.15%	0.01%	4.28%	0.01%
Constellation Energy Corp	CEG	315.12	196.70	61,984		0.72%		20.39%	
WEC Energy Group Inc	WEC	316.08	93.03	29,405	0.08%	3.59%	0.00%	7.82%	0.01%
Adobe Inc	ADBE	443.40	574.41	254,693	0.70%			16.27%	0.11%
Vistra Corp	VST	343.56	85.43	29,350		1.03%			
AES Corp/The	AES	710.92	17.13	12,178		4.03%			
Expeditors International of Washington Inc	EXPD	141.13	123.41	17,417	0.05%	1.18%	0.00%	4.39%	0.00%
Amgen Inc	AMGN	537.33	333.83	179,377	0.49%	2.70%	0.01%	3.52%	0.02%
Apple Inc	AAPL	15,204.14	229.00	3,481,747	9.54%	0.44%	0.04%	8.04%	0.77%
Autodesk Inc	ADSK	215.51	258.40	55,688	0.15%			10.23%	0.02%
Cintas Corp	CTAS	100.77	805.12	81,131	0.22%	0.78%	0.00%	10.59%	0.02%
Comcast Corp	CMCSA	3,863.06	39.57	152,861	0.42%	3.13%	0.01%	7.32%	0.03%
Molson Coors Beverage Co	TAP	192.59	53.97	10,394	0.03%	3.26%	0.00%	5.29%	0.00%
KLA Corp	KLAC	134.43	819.43	110,152	0.30%	0.71%	0.00%	10.00%	0.03%
Marriott International Inc/MD	MAR	281.52	234.69	66,071	0.18%	1.07%	0.00%	4.25%	0.01%
Fiserv Inc	FI	575.73	174.60	100,522	0.28%			11.52%	0.03%
McCormick & Co Inc/MD	MKC	252.02	80.03	20,169	0.06%	2.10%	0.00%	5.83%	0.00%
PACCAR Inc	PCAR	524.22	96.18	50,420	0.14%	1.25%	0.00%	0.48%	0.00%
Costco Wholesale Corp	COST	443.34	892.38	395,623	1.08%	0.52%	0.01%	10.36%	0.11%
Stryker Corp	SYK	381.08	360.42	137,347	0.38%	0.89%	0.00%	8.60%	0.03%
Tyson Foods Inc	TSN	285.82	64.31	18,381		3.05%			
Lamb Weston Holdings Inc	LW	143.67	61.92	8,896	0.02%	2.33%	0.00%	2.16%	0.00%
Applied Materials Inc	AMAT	824.40	197.26	162,622	0.45%	0.81%	0.00%	9.28%	0.04%
American Airlines Group Inc	AAL	653.54	10.62	6,941				-13.42%	
Cardinal Health Inc	CAH	243.85	112.72	27,486	0.08%	1.79%	0.00%	9.84%	0.01%
Cincinnati Financial Corp	CINF	156.24	137.03	21,410	0.06%	2.36%	0.00%	7.83%	0.00%
Paramount Global	PARA	626.01	10.47	6,554		1.91%		49.00%	
DR Horton Inc	DHI	326.04	188.76	61,543	0.17%	0.64%	0.00%	8.27%	0.01%

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Name	Ticker	Shares Outst'g	Price	Market Capitalization	Weight in Index	Estimated Dividend Yield	Cap-Weighted Dividend Yield	Bloomberg Long-Term Growth Est.	Cap-Weighted Long-Term Growth Est.
Electronic Arts Inc	EA	264.20	151.82	40,111	0.11%	0.50%	0.00%	12.85%	0.01%
Fair Isaac Corp	FICO	24.52	1,730.27	42,424				23.00%	
Fastenal Co	FAST	572.65	68.28	39,100		2.28%			
M&T Bank Corp	MTB	167.00	170.76	28,517	0.08%	3.16%	0.00%	3.87%	0.00%
Xcel Energy Inc	XEL	557.50	61.23	34,136	0.09%	3.58%	0.00%	7.10%	0.01%
Fifth Third Bancorp	FITB	676.80	42.69	28,892		3.28%		25.00%	
Gilead Sciences Inc	GILD	1,244.99	79.00	98,354	0.27%	3.90%	0.01%	15.38%	0.04%
Hasbro Inc	HAS	139.41	68.16	9,502		4.11%		33.11%	
Huntington Bancshares Inc/OH	HBAN	1,452.43	14.97	21,743	0.06%	4.14%	0.00%	3.32%	0.00%
Welltower Inc	WELL	609.15	120.68	73,512	0.20%	2.22%	0.00%	15.65%	0.03%
Biogen Inc	BIIB	145.66	204.76	29,826	0.08%			6.10%	0.00%
Northern Trust Corp	NTRS	201.64	91.21	18,391	0.05%	3.29%	0.00%	10.11%	0.01%
Packaging Corp of America	PKG	89.81	209.54	18,819	0.05%	2.39%	0.00%	5.83%	0.00%
Paychex Inc	PAYX	359.74	131.20	47,198	0.13%	2.99%	0.00%	7.54%	0.01%
QUALCOMM Inc	QCOM	1,114.00	175.30	195,284	0.54%	1.94%	0.01%	10.64%	0.06%
Ross Stores Inc	ROST	333.58	150.61	50,240	0.14%	0.98%	0.00%	8.85%	0.01%
IDEXX Laboratories Inc	IDXX	82.31	481.33	39,616	0.11%			11.25%	0.01%
Starbucks Corp	SBUX	1,133.20	94.57	107,167	0.29%	2.41%	0.01%	9.67%	0.03%
KeyCorp	KEY	928.12	17.06	15,834	0.04%	4.81%	0.00%	20.00%	0.01%
Fox Corp	FOXA	224.65	41.37	9,294	0.03%	1.31%	0.00%	5.35%	0.00%
Fox Corp	FOX	235.58	38.43	9,053	0.02%	1.41%	0.00%	5.35%	0.00%
State Street Corp	STT	298.62	87.10	26,010	0.07%	3.49%	0.00%	8.82%	0.01%
Norwegian Cruise Line Holdings Ltd	NCLH	439.69	17.89	7,866				50.58%	
US Bancorp	USB	1,560.51	47.23	73,703	0.20%	4.15%	0.01%	3.39%	0.01%
A O Smith Corp	AOS	119.96	83.72	10,043		1.53%			
Gen Digital Inc	GEN	615.53	26.46	16,287	0.04%	1.89%	0.00%	10.49%	0.00%
T Rowe Price Group Inc	TROW	222.60	106.04	23,604	0.06%	4.68%	0.00%	7.30%	0.00%
Waste Management Inc	WM	401.32	212.04	85,095	0.23%	1.41%	0.00%	13.29%	0.03%
Constellation Brands Inc	STZ	182.19	240.71	43,855	0.12%	1.68%	0.00%	11.37%	0.01%
Invesco Ltd	IVZ	450.03	17.09	7,691	0.02%	4.80%	0.00%	9.27%	0.00%
Intuit Inc	INTU	279.55	630.26	176,187	0.48%	0.66%	0.00%	18.79%	0.09%
Morgan Stanley	MS	1,620.89	103.61	167,940	0.46%	3.57%	0.02%	9.60%	0.04%
Microchip Technology Inc	MCHP	536.51	82.16	44,079		2.21%		-10.99%	
Crowdstrike Holdings Inc	CRWD	232.72	277.28	64,528				35.70%	
Chubb Ltd	CB	403.93	284.18	114,790	0.31%	1.28%	0.00%	2.20%	0.01%
Hologic Inc	HOLX	232.27	81.24	18,870	0.05%			8.86%	0.00%
Citizens Financial Group Inc	CFG	448.30	43.05	19,299		3.90%			
Jabil Inc	JBL	113.45	109.28	12,397	0.03%	0.29%	0.00%	7.13%	0.00%
O'Reilly Automotive Inc	ORLY	58.01	1,129.97	65,545	0.18%			10.21%	0.02%
Allstate Corp/The	ALL	264.04	188.94	49,888		1.95%		168.00%	
Equity Residential	EQR	379.14	74.88	28,390	0.08%	3.61%	0.00%	4.23%	0.00%
BorgWarner Inc	BWA	227.77	33.96	7,735	0.02%	1.30%	0.00%	4.40%	0.00%
Keurig Dr Pepper Inc	KDP	1,356.09	36.61	49,646	0.14%	2.35%	0.00%	6.90%	0.01%
Host Hotels & Resorts Inc	HST	702.44	17.70	12,433		4.52%			
Incyte Corp	INCY	192.60	65.66	12,646				33.16%	
Simon Property Group Inc	SPG	326.04	167.35	54,562	0.15%	4.90%	0.01%	1.42%	0.00%
Eastman Chemical Co	EMN	116.86	102.37	11,963	0.03%	3.16%	0.00%	6.10%	0.00%
AvalonBay Communities Inc	AVB	142.22	225.73	32,103	0.09%	3.01%	0.00%	4.93%	0.00%
Prudential Financial Inc	PRU	357.00	121.16	43,254	0.12%	4.29%	0.01%	9.72%	0.01%
United Parcel Service Inc	UPS	732.51	128.55	94,164	0.26%	5.07%	0.01%	0.60%	0.00%
Walgreens Boots Alliance Inc	WBA	863.28	9.25	7,985		10.81%		-14.70%	
STERIS PLC	STE	98.62	241.10	23,777		0.95%			
McKesson Corp	MCK	129.68	561.08	72,759	0.20%	0.51%	0.00%	11.18%	0.02%
Lockheed Martin Corp	LMT	238.36	564.95	134,660	0.37%	2.23%	0.01%	2.11%	0.01%
Cencora Inc	COR	196.01	239.57	46,958	0.13%	0.85%	0.00%	10.67%	0.01%
Campbell Soup Co	CPB	298.55	49.72	14,844	0.04%	2.98%	0.00%	8.36%	0.00%
Capital One Financial Corp	COF	381.86	146.93	56,106	0.15%	1.63%	0.00%	12.32%	0.02%
Waters Corp	WAT	59.36	346.35	20,560	0.06%			7.80%	0.00%
Nordson Corp	NDSN	57.18	256.56	14,671		1.22%			
Dollar Tree Inc	DLTR	214.94	84.49	18,161	0.05%			12.39%	0.01%
Darden Restaurants Inc	DRI	118.46	158.15	18,735	0.05%	3.54%	0.00%	10.59%	0.01%
Evergy Inc	EVRG	229.75	59.14	13,587	0.04%	4.35%	0.00%	4.00%	0.00%
Match Group Inc	MTCH	257.90	37.21	9,596				36.15%	
Domino's Pizza Inc	DPZ	34.97	414.21	14,486	0.04%	1.46%	0.00%	12.56%	0.00%
NVR Inc	NVR	3.08	9,172.46	28,233	0.08%			7.60%	0.01%
NetApp Inc	NTAP	204.78	120.72	24,721	0.07%	1.72%	0.00%	5.34%	0.00%
Old Dominion Freight Line Inc	ODFL	214.30	192.80	41,316	0.11%	0.54%	0.00%	3.02%	0.00%
DaVita Inc	DVA	83.90	150.92	12,662	0.03%			20.00%	0.01%
Hartford Financial Services Group Inc/The	HIG	293.01	115.63	33,881	0.09%	1.63%	0.00%	12.37%	0.01%
Iron Mountain Inc	IRM	293.34	113.26	33,223		2.53%			
Estee Lauder Cos Inc/The	EL	233.18	91.66	21,373	0.06%	2.88%	0.00%	14.58%	0.01%
Cadence Design Systems Inc	CDNS	273.82	268.93	73,638	0.20%			16.20%	0.03%
Tyler Technologies Inc	TYL	42.67	587.87	25,086					
Universal Health Services Inc	UHS	59.46	237.77	14,138	0.04%	0.34%	0.00%	15.50%	0.01%
Skyworks Solutions Inc	SWKS	159.72	109.59	17,503		2.55%		-2.57%	
Quest Diagnostics Inc	DGX	111.32	156.97	17,473	0.05%	1.91%	0.00%	6.05%	0.00%
Rockwell Automation Inc	ROK	113.47	272.03	30,866	0.08%	1.84%	0.00%	1.73%	0.00%
Kraft Heinz Co/The	KHC	1,209.08	35.43	42,838	0.12%	4.52%	0.01%	2.51%	0.00%
American Tower Corp	AMT	467.08	224.06	104,654	0.29%	2.89%	0.01%	12.31%	0.04%
Regeneron Pharmaceuticals Inc	REGN	108.42	1,184.69	128,441				52.50%	
Amazon.com Inc	AMZN	10,495.57	178.50	1,873,459				28.99%	
Jack Henry & Associates Inc	JKHY	72.91	173.03	12,615	0.03%	1.27%	0.00%	9.73%	0.00%
Ralph Lauren Corp	RL	40.06	171.26	6,860	0.02%	1.93%	0.00%	11.05%	0.00%
BXP Inc	BXP	157.93	75.22	11,880	0.03%	5.21%	0.00%	0.40%	0.00%
Amphenol Corp	APH	1,204.29	67.45	81,229	0.22%	0.98%	0.00%	16.86%	0.04%
Howmet Aerospace Inc	HWM	408.15	96.66	39,451		0.33%		22.11%	
Valero Energy Corp	VLO	320.38	146.73	47,009		2.92%		-24.00%	
Synopsys Inc	SNPS	153.61	519.58	79,815	0.22%			16.33%	0.04%
Etsy Inc	ETSY	114.75	55.09	6,322	0.02%			4.06%	0.00%
CH Robinson Worldwide Inc	CHRW	117.28	103.51	12,140	0.03%	2.40%	0.00%	17.48%	0.01%

		[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Name	Ticker	Shares Outst'g	Price	Market Capitalization	Weight in Index	Estimated Dividend Yield	Cap-Weighted Dividend Yield	Bloomberg Long-Term Growth Est.	Cap-Weighted Long-Term Growth Est.
Accenture PLC	ACN	626.38	341.95	214,192	0.59%	1.51%	0.01%	5.80%	0.03%
TransDigm Group Inc	TDG	56.11	1,373.21	77,052	0.21%			19.57%	0.04%
Yum! Brands Inc	YUM	281.17	134.92	37,935	0.10%	1.99%	0.00%	11.41%	0.01%
Prologis Inc	PLD	925.91	127.82	118,350	0.32%	3.00%	0.01%	5.36%	0.02%
FirstEnergy Corp	FE	575.92	43.92	25,294	0.07%	3.87%	0.00%	7.02%	0.00%
VeriSign Inc	VRSN	97.60	183.90	17,949					
Quanta Services Inc	PWR	147.33	275.13	40,535		0.13%			
Henry Schein Inc	HSIC	126.71	70.55	8,939	0.02%			9.01%	0.00%
Ameren Corp	AEE	266.51	82.51	21,990	0.06%	3.25%	0.00%	6.16%	0.00%
ANSYS Inc	ANSS	87.39	321.42	28,088					
FactSet Research Systems Inc	FDS	38.04	422.84	16,085	0.04%	0.98%	0.00%	9.67%	0.00%
NVIDIA Corp	NVDA	24,530.00	119.37	2,928,146		0.03%		44.35%	
Cognizant Technology Solutions Corp	CTSH	495.66	77.77	38,547	0.11%	1.54%	0.00%	6.20%	0.01%
Intuitive Surgical Inc	ISRG	355.35	492.63	175,058	0.48%			17.51%	0.08%
Take-Two Interactive Software Inc	TTWO	175.28	161.71	28,345				60.49%	
Republic Services Inc	RSG	314.07	208.21	65,392	0.18%	1.11%	0.00%	10.33%	0.02%
eBay Inc	EBAY	489.00	59.10	28,900	0.08%	1.83%	0.00%	10.12%	0.01%
Goldman Sachs Group Inc/The	GS	315.80	510.25	161,137	0.44%	2.35%	0.01%	14.20%	0.06%
SBA Communications Corp	SBAC	107.47	226.66	24,360	0.07%	1.73%	0.00%	15.96%	0.01%
Sempra	SRE	633.15	82.18	52,032	0.14%	3.02%	0.00%	5.27%	0.01%
Moody's Corp	MCO	182.10	487.74	88,817	0.24%	0.70%	0.00%	14.41%	0.04%
ON Semiconductor Corp	ON	428.36	77.87	33,356	0.09%			1.28%	0.00%
Booking Holdings Inc	BKNG	33.52	3,909.23	131,053	0.36%	0.90%	0.00%	14.59%	0.05%
F5 Inc	FFIV	58.28	203.15	11,840	0.03%			7.83%	0.00%
Akamai Technologies Inc	AKAM	151.53	101.84	15,431	0.04%			6.12%	0.00%
Charles River Laboratories International Inc	CRL	51.63	197.75	10,210	0.03%			5.20%	0.00%
MarketAxess Holdings Inc	MKTX	37.75	242.39	9,151	0.03%	1.22%	0.00%	4.02%	0.00%
Devon Energy Corp	DVN	626.20	44.78	28,041	0.08%	3.93%	0.00%	6.60%	0.01%
Bio-Techne Corp	TECH	158.60	73.99	11,735	0.03%	0.43%	0.00%	6.00%	0.00%
Alphabet Inc	GOOGL	5,859.00	163.38	957,243	2.62%	0.49%	0.01%	15.01%	0.39%
Teleflex Inc	TFX	47.12	245.17	11,552	0.03%	0.55%	0.00%	7.95%	0.00%
Allegion plc	ALLE	87.13	138.84	12,097	0.03%	1.38%	0.00%	7.73%	0.00%
Netflix Inc	NFLX	429.17	701.35	300,995				35.72%	
Warner Bros Discovery Inc	WBD	2,451.91	7.84	19,223				28.63%	
Agilent Technologies Inc	A	287.33	142.92	41,065	0.11%	0.66%	0.00%	5.74%	0.01%
Trimble Inc	TRMB	244.21	56.69	13,844					
Elevance Health Inc	ELV	231.89	556.89	129,135	0.35%	1.17%	0.00%	11.79%	0.04%
CME Group Inc	CME	360.09	215.74	77,687	0.21%	2.13%	0.00%	3.82%	0.01%
Juniper Networks Inc	JNPR	329.16	38.88	12,798	0.04%	2.26%	0.00%	6.00%	0.00%
BlackRock Inc	BLK	148.13	901.81	133,583	0.37%	2.26%	0.01%	9.76%	0.04%
DTE Energy Co	DTE	206.93	125.02	25,870	0.07%	3.26%	0.00%	10.27%	0.01%
Celanese Corp	CE	109.26	130.60	14,270	0.04%	2.14%	0.00%	0.56%	0.00%
Nasdaq Inc	NDAQ	575.94	72.08	41,514	0.11%	1.33%	0.00%	10.30%	0.01%
Philip Morris International Inc	PM	1,554.80	123.29	191,692	0.53%	4.22%	0.02%	9.36%	0.05%
Ingersoll Rand Inc	IR	403.48	91.45	36,899		0.09%			
Salesforce Inc	CRM	956.00	252.90	241,772	0.66%	0.63%	0.00%	17.52%	0.12%
Roper Technologies Inc	ROP	107.20	554.41	59,432		0.54%			
Huntington Ingalls Industries Inc	HII	39.22	282.77	11,089	0.03%	1.84%	0.00%	7.62%	0.00%
MetLife Inc	MET	700.33	77.48	54,261	0.15%	2.81%	0.00%	14.38%	0.02%
Tapestry Inc	TPR	230.22	40.97	9,432	0.03%	3.42%	0.00%	5.52%	0.00%
CSX Corp	CSX	1,938.74	34.27	66,441	0.18%	1.40%	0.00%	9.21%	0.02%
Edwards Lifesciences Corp	EW	602.40	69.96	42,144	0.12%			8.56%	0.01%
Ameriprise Financial Inc	AMP	98.19	449.44	44,130	0.12%	1.32%	0.00%	16.59%	0.02%
Zebra Technologies Corp	ZBRA	51.58	345.38	17,815					
Zimmer Biomet Holdings Inc	ZBH	203.65	115.46	23,514	0.06%	0.83%	0.00%	6.96%	0.00%
Camden Property Trust	CPT	106.64	125.20	13,351	0.04%	3.29%	0.00%	1.87%	0.00%
CBRE Group Inc	CBRE	306.43	115.14	35,282					
Mastercard Inc	MA	916.71	483.34	443,083	1.21%	0.55%	0.01%	15.18%	0.18%
CarMax Inc	KMX	156.08	84.55	13,196	0.04%			17.91%	0.01%
Intercontinental Exchange Inc	ICE	574.14	161.55	92,753	0.25%	1.11%	0.00%	9.95%	0.03%
Fidelity National Information Services Inc	FIS	545.57	82.45	44,982		1.75%		22.20%	
Smurfit WestRock PLC	SW	519.36	47.42	24,628	0.07%	2.55%	0.00%	1.00%	0.00%
Chipotle Mexican Grill Inc	CMG	1,369.48	56.08	76,800				22.64%	
Wynn Resorts Ltd	WYNN	110.99	76.88	8,533		1.30%			
Live Nation Entertainment Inc	LYV	232.11	97.67	22,671					
Assurant Inc	AIZ	51.79	195.63	10,132	0.03%	1.47%	0.00%	7.14%	0.00%
NRG Energy Inc	NRG	206.38	85.01	17,544	0.05%	1.92%	0.00%	4.00%	0.00%
Monster Beverage Corp	MNST	979.54	47.13	46,166	0.13%			10.18%	0.01%
Regions Financial Corp	RF	915.13	23.17	21,203	0.06%	4.32%	0.00%	4.68%	0.00%
Baker Hughes Co	BKR	993.42	35.17	34,939		2.39%		69.21%	
Mosaic Co/The	MOS	318.64	28.57	9,103		2.94%		-21.74%	
Expedia Group Inc	EXPE	124.66	139.09	17,338	0.05%			19.59%	0.01%
CF Industries Holdings Inc	CF	180.41	83.09	14,990		2.41%		-9.54%	
APA Corp	APA	369.91	28.49	10,539		3.51%		-5.79%	
Leidos Holdings Inc	LDOS	134.71	158.51	21,354	0.06%	0.96%	0.00%	11.76%	0.01%
Alphabet Inc	GOOG	5,585.00	165.11	922,139	2.53%	0.48%	0.01%	15.01%	0.38%
First Solar Inc	FSLR	107.05	227.37	24,339				41.25%	
TE Connectivity Ltd	TEL	303.92	153.60	46,682	0.13%	1.69%	0.00%	5.41%	0.01%
Discover Financial Services	DFS	251.07	138.71	34,826	0.10%	2.02%	0.00%	11.65%	0.01%
Visa Inc	V	1,670.45	276.37	461,661	1.27%	0.75%	0.01%	12.33%	0.16%
Mid-America Apartment Communities Inc	MAA	116.88	162.37	18,977	0.05%	3.62%	0.00%	0.65%	0.00%
Xylem Inc/NY	XYL	242.89	137.53	33,405		1.05%			
Marathon Petroleum Corp	MPC	334.68	177.12	59,279		1.86%		-13.00%	
Tractor Supply Co	TSCO	107.87	267.55	28,860	0.08%	1.64%	0.00%	5.68%	0.00%
Advanced Micro Devices Inc	AMD	1,618.48	148.56	240,442				25.66%	
ResMed Inc	RMD	146.93	245.02	36,001	0.10%	0.87%	0.00%	9.57%	0.01%
Mettler-Toledo International Inc	MTD	21.36	1,439.08	30,734	0.08%			9.15%	0.01%
VICI Properties Inc	VICI	1,043.14	33.48	34,924	0.10%	4.96%	0.00%	1.83%	0.00%
Copart Inc	CPRT	962.30	52.96	50,963					
Jacobs Solutions Inc	J	124.25	150.88	18,747	0.05%	0.77%	0.00%	10.87%	0.01%

		[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Name	Ticker	Shares Outst'g	Price	Market Capitalization	Weight in Index	Estimated Dividend Yield	Cap-Weighted Dividend Yield	Bloomberg Long-Term Growth Est.	Cap-Weighted Long-Term Growth Est.
Albemarle Corp	ALB	117.53	90.25	10,607		1.80%		35.42%	
Fortinet Inc	FTNT	764.91	76.71	58,676	0.16%			8.66%	0.01%
Moderna Inc	MRNA	384.40	77.40	29,752	0.08%			17.95%	0.01%
Essex Property Trust Inc	ESS	64.22	301.79	19,380	0.05%	3.25%	0.00%	4.50%	0.00%
CoStar Group Inc	CSGP	409.82	77.30	31,679	0.09%			13.84%	0.01%
Realty Income Corp	O	870.87	61.85	53,861	0.15%	5.10%	0.01%	3.85%	0.01%
Westinghouse Air Brake Technologies Corp	WAB	175.18	169.57	29,706	0.08%	0.47%	0.00%	16.12%	0.01%
Pool Corp	POOL	38.26	351.62	13,452		1.37%		-0.04%	
Western Digital Corp	WDC	343.45	65.59	22,527				-10.00%	
PepsiCo Inc	PEP	1,373.57	172.88	237,463	0.65%	3.14%	0.02%	7.40%	0.05%
Diamondback Energy Inc	FANG	178.39	195.11	34,806	0.10%	4.80%	0.00%	8.34%	0.01%
Palo Alto Networks Inc	PANW	323.80	362.72	117,449	0.32%			11.52%	0.04%
ServiceNow Inc	NOW	206.00	855.00	176,130					
Church & Dwight Co Inc	CHD	244.82	101.88	24,942	0.07%	1.11%	0.00%	7.35%	0.01%
Federal Realty Investment Trust	FRT	83.67	115.00	9,622	0.03%	3.83%	0.00%	4.97%	0.00%
MGM Resorts International	MGM	303.77	37.59	11,419				20.80%	
American Electric Power Co Inc	AEP	532.12	100.28	53,361	0.15%	3.51%	0.01%	6.25%	0.01%
Invitation Homes Inc	INVH	612.59	36.84	22,568	0.06%	3.04%	0.00%	5.19%	0.00%
PTC Inc	PTC	120.14	179.09	21,515	0.06%			14.76%	0.01%
JB Hunt Transport Services Inc	JBHT	101.99	173.20	17,664	0.05%	0.99%	0.00%	9.73%	0.00%
Lam Research Corp	LRCX	129.88	821.01	106,629	0.29%	1.12%	0.00%	16.29%	0.05%
Mohawk Industries Inc	MHK	63.12	155.14	9,792	0.03%			4.45%	0.00%
GE HealthCare Technologies Inc	GEHC	456.66	84.82	38,734	0.11%	0.14%	0.00%	10.92%	0.01%
Pentair PLC	PNR	165.50	88.69	14,678	0.04%	1.04%	0.00%	12.50%	0.01%
Vertex Pharmaceuticals Inc	VRTX	258.10	495.89	127,990	0.35%			11.00%	0.04%
Amcor PLC	AMCR	1,445.34	11.44	16,535	0.05%	4.37%	0.00%	3.71%	0.00%
Meta Platforms Inc	META	2,184.73	521.31	1,138,921	3.12%	0.38%	0.01%	19.80%	0.62%
T-Mobile US Inc	TMUS	1,166.78	198.72	231,863	0.64%	1.31%	0.01%	5.00%	0.03%
United Rentals Inc	URI	66.14	741.26	49,024	0.13%	0.88%	0.00%	7.45%	0.01%
Alexandria Real Estate Equities Inc	ARE	174.93	119.57	20,916	0.06%	4.35%	0.00%	3.03%	0.00%
Honeywell International Inc	HON	649.67	207.91	135,073	0.37%	2.08%	0.01%	8.65%	0.03%
Delta Air Lines Inc	DAL	645.42	42.49	27,424	0.08%	1.41%	0.00%	6.74%	0.01%
United Airlines Holdings Inc	UAL	328.80	44.04	14,480	0.04%			5.31%	0.00%
Seagate Technology Holdings PLC	STX	210.20	99.55	20,925		2.81%			
News Corp	NWS	190.68	29.43	5,612		0.68%			
Centene Corp	CNC	526.03	78.83	41,467	0.11%			4.40%	0.01%
Martin Marietta Materials Inc	MLM	61.12	533.37	32,598	0.09%	0.59%	0.00%	7.47%	0.01%
Teradyne Inc	TER	163.18	136.73	22,311	0.06%	0.35%	0.00%	16.14%	0.01%
PayPal Holdings Inc	PYPL	1,022.33	72.43	74,048	0.20%			12.03%	0.02%
Tesla Inc	TSLA	3,194.64	214.11	684,004				-11.00%	
KKR & Co Inc	KKR	887.44	123.77	109,838		0.57%			
Arch Capital Group Ltd	ACGL	376.06	113.09	42,528	0.12%			6.13%	0.01%
Dow Inc	DOW	703.27	53.58	37,681		5.23%		-1.67%	
Everest Group Ltd	EG	43.27	392.24	16,974	0.05%	2.04%	0.00%	2.48%	0.00%
Teledyne Technologies Inc	TDY	46.78	432.80	20,248					
GE Vernova Inc	GEV	274.80	201.00	55,235				70.40%	
News Corp	NWSA	378.33	28.33	10,718		0.71%			
Exelon Corp	EXC	999.74	38.09	38,080	0.10%	3.99%	0.00%	5.31%	0.01%
Global Payments Inc	GPN	254.44	111.01	28,245	0.08%	0.90%	0.00%	9.30%	0.01%
Crown Castle Inc	CCI	434.57	112.02	48,680	0.13%	5.59%	0.01%	1.13%	0.00%
Aptiv PLC	APTV	265.76	71.53	19,010	0.05%			16.91%	0.01%
Align Technology Inc	ALGN	74.70	237.22	17,720	0.05%			9.53%	0.00%
Kenvue Inc	KVUE	1,915.17	21.95	42,038	0.12%	3.74%	0.00%	13.58%	0.02%
Targa Resources Corp	TRGP	219.08	146.90	32,183	0.09%	2.04%	0.00%	16.74%	0.01%
Bunge Global SA	BG	141.65	101.38	14,361		2.68%		-8.59%	
LKQ Corp	LKQ	263.26	41.59	10,949		2.89%			
Deckers Outdoor Corp	DECK	25.41	959.29	24,377	0.07%			10.80%	0.01%
Zoetis Inc	ZTS	453.05	183.49	83,130	0.23%	0.94%	0.00%	10.36%	0.02%
Equinix Inc	EQIX	94.95	834.36	79,218	0.22%	2.04%	0.00%	14.03%	0.03%
Digital Realty Trust Inc	DLR	327.41	151.61	49,639	0.14%	3.22%	0.00%	3.21%	0.00%
Molina Healthcare Inc	MOH	58.60	349.79	20,498	0.06%			11.98%	0.01%
Las Vegas Sands Corp	LVS	736.43	38.99	28,713		2.05%			

Notes:
[1] Equals sum of Col. [9]
[2] Equals sum of Col. [11]
[3] Equals ([1] x (1 + (0.5 x [2]))) + [2]
[4] Source: Bloomberg Professional as of August 31, 2024
[5] Source: Bloomberg Professional as of August 31, 2024
[6] Equals [4] x [5]
[7] Equals weight in S&P 500 based on market capitalization [6] if Growth Rate >0% and ≤20%
[8] Source: Bloomberg Professional as of August 31, 2024
[9] Equals [7] x [8]
[10] Source: Bloomberg Professional as of August 31, 2024
[11] Equals [7] x [10]

MR. ROTHSCHILD'S OPTION-IMPLIED GROWTH RATES - MAY 28, 2024 - AUGUST 27, 2024

Company	Ticker	5/28/2024	6/4/2024	6/11/2024	6/18/2024	6/25/2024	7/2/2024	7/9/2024	7/16/2024	7/23/2024	7/30/2024	8/6/2024	8/13/2024	8/20/2024	8/27/2024
American States Water Company	AWR	N/A	N/A	N/A	N/A	N/A	4.74%	3.57%	N/A	N/A	N/A	4.54%	N/A	N/A	N/A
American Water Works Company, Inc.	AWK	4.05%	4.52%	4.00%	3.79%	2.87%	2.92%	3.04%	4.87%	4.09%	4.02%	4.91%	5.03%	5.06%	4.23%
Essential Utilities, Inc.	WTRG	N/A	N/A	N/A	N/A	6.68%	7.30%	6.57%	5.04%	3.09%	4.48%	6.76%	9.26%	N/A	9.07%
California Water Service Group	CWT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Middlesex Water Company	MSEX	5.32%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SJW Group	SJW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum		4.05%	4.52%	4.00%	3.79%	2.87%	2.92%	3.04%	4.87%	3.09%	4.02%	4.54%	5.03%	5.06%	4.23%
Maximum		5.32%	4.52%	4.00%	3.79%	6.68%	7.30%	6.57%	5.04%	4.09%	4.48%	6.76%	9.26%	5.06%	9.07%
Mean		4.68%	4.52%	4.00%	3.79%	4.78%	4.99%	4.39%	4.96%	3.59%	4.25%	5.41%	7.14%	5.06%	6.65%
# of Companies Incl. in Avg.		2	1	1	1	2	3	3	2	2	2	3	2	1	2

MR. ROTHSCHILD'S OPTION-IMPLIED BETA - MAY 28, 2024 - AUGUST 27, 2024

Company	Ticker	5/28/2024	6/4/2024	6/11/2024	6/18/2024	6/25/2024	7/2/2024	7/9/2024	7/16/2024	7/23/2024	7/30/2024	8/6/2024	8/13/2024	8/20/2024	8/27/2024
American States Water Company	AWR	N/A	N/A	N/A	N/A	N/A	0.85474	0.74402	N/A	N/A	N/A	0.60161	N/A	N/A	N/A
American Water Works Company, Inc.	AWK	0.83860	0.90795	0.84488	0.79983	0.67079	0.70208	0.72951	0.88471	0.77513	0.74031	0.69896	0.70190	0.79138	0.67648
Essential Utilities, Inc.	WTRG	N/A	N/A	N/A	N/A	1.08428	1.19517	1.14641	0.95625	0.73575	0.86820	0.95836	1.00232	N/A	1.29629
California Water Service Group	CWT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Middlesex Water Company	MSEX	1.27179	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SJW Group	SJW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum		0.8386	0.9080	0.8449	0.7998	0.6708	0.7021	0.7295	0.8847	0.7357	0.7403	0.6016	0.7019	0.7914	0.6765
Maximum		1.2718	0.9080	0.8449	0.7998	1.0843	1.1952	1.1464	0.9562	0.7751	0.8682	0.9584	1.0023	0.7914	1.2963
Mean		1.0552	0.9080	0.8449	0.7998	0.8775	0.9173	0.8733	0.9205	0.7554	0.8043	0.7530	0.8521	0.7914	0.9864
# of Companies Incl. in Avg.		2	1	1	1	2	3	3	2	2	2	3	2	1	2

MR. ROTHSCHILD'S ADJUSTED CONSTANT GROWTH DCF ANALYSIS

	Line No.	Formula/Note	Based on Average Market Price For Year Ending 8/31/2024	Based on Market Price As Of 8/31/2024
Dividend Yield	[1]	Exhibit ALR-3, page 1	2.49%	2.37%
Mean Earnings Growth Rate	[2]	Zacks, Yahoo! and Value Line	6.89%	6.89%
Increment to Dividend Yield for Growth to Next Year	[3]	Equals [1] x (0.5 x [2])	0.09%	0.08%
Required Return	[4]	Equals [1] + [2] + [3]	9.46%	9.33%

ZACKS, YAHOO! FINANCE AND VALUE LINE EARNINGS GROWTH RATES AS OF AUGUST 31, 2024

Company	Ticker	Value Line Earnings Growth	Yahoo! Finance Earnings Growth	Zacks Earnings Growth	Average Growth Rate
American Water Works Company Inc.	AWK	4.50%	7.50%	8.00%	6.67%
American States Water Company	AWR	6.50%	4.40%	6.30%	5.73%
California Water Service Group	CWT	11.50%	10.80%	n/a	11.15%
Middlesex Water Company	MSEX	6.50%	2.70%	n/a	4.60%
SJW Group	SJW	6.50%	7.50%	7.50%	7.17%
Essential Utilities, Inc.	WTRG	7.00%	5.20%	5.80%	6.00%
Mean					6.89%

Summary of Mr. Rothschild's Calculation of Beta

Applicant	Docket No.	Date	Beta Coefficients Source	Beta Coefficient	Notes
Pennsylvania American Water	Docket No. R-2020-3019369	7/31/2020	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.38 – 0.66	[1]
Dominion Energy South Carolina, Inc.	Docket No. 2020-125-E	9/30/2020	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.62 – 0.76	[2]
MDU- North Dakota	Case No. PU-20-379	12/31/2020	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.62 - 0.72	[3]
United Illuminating/Eversource	Docket No. 17-12-03RE11	3/31/2021	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.58 – 0.63	[4]
San Jose Water Company	Docket A.21.05.001 *et. al.*	1/31/2022	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.73 – 0.78	[5]
Piedmont Natural Gas Company, Inc.	Docket No. 2022-89-G	7/12/2022	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.51 – 0.64	[6]
Pennsylvania American Water	R-2022-3031672 (Water) R-2022-3031673 (Wastewater)	7/29/2022	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.67 – 0.71	[7]
Aquarion Water Company	Docket No. 22-07-01	10/26/2022	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.63 – 0.82	[8]
United Illuminating	Docket No. 22-08-08	12/13/2022	Forward beta (Option-implied beta) & Hybrid beta (Average of Option-implied beta and Historical betas).	0.63 – 0.79	[9]
Connecticut Water	Docket No. 23-08-32	12/14/2023	Forward beta (Option-implied beta) & Historical Blended beta (Weighted average of Historical betas over three time periods).	0.81 - 0.88	[10]
Connecticut Natural Gas Corporation & The Southern Connecticut Gas Company	Docket No. 23-11-02	2/8/2024	Forward beta (Option-implied beta) & Historical Blended beta (Weighted average of Historical betas over three time periods).	0.84 - 0.94	[11]
Tennessee-Amercian	Docket No. 24-00032	9/17/2024	Forward beta (Option-implied beta) & Historical Blended beta (Weighted average of Historical betas over three time periods).	0.72 - 0.95	[12]

Notes:

[1] Source: Pennsylvania Public Utilities Commission, Docket No. R-2020-3019369, Rothschild Direct Testimony, September 8, 2020, at 51.

[2] Source: Public Service Commission of South Carolina, Docket No. 2020-125-E, Direct Testimony of Aaron Rothschild, November 10, 2020, at 54.

[3] Source: North Dakota Public Service Commission, Case No. PU-20-379, Rothschild Direct Testimony, January 15, 2021, at 57.

[4] Source: Connecticut Public Utilities Regulatory Authority, Docket No. 17-12-03RE11, April 26, 2021, at 64-65.

[5] Source: California Public Utilities Commission, Docket A.21.05.001 et. al., January 31, 2022, at 87.

[6] Source: Public Service Commission of South Carolina, Docket No. 2022-89-G, July 12, 2022, at 97.

[7] Source: Pennsylvania Public Utilities Commission, Docket No. R-2022-3031672, Rothschild Direct Testimony, July 29, 2022, at 94.

[8] Source: Connecticut Public Utilities Regulatory Authority, Docket No. 22-07-01, October 26, 2022, at 95.

[9] Source: Connecticut Public Utilities Regulatory Authority, Docket No. 22-08-08, December 13, 2022, at 115.

[10] Source: Connecticut Public Utilities Regulatory Authority, Docket No. 23-08-32, December 14, 2023, Rothschild Direct Testimony, at 64.

[11] Source: Connecticut Public Utilities Regulatory Authority, Docket No. 23-11-02, February 8, 2024, Rothschild Direct Testimony Regarding CNG, at 64; and Connecticut Public Utilities Regulatory Authority, Docket No. 23-11-02, February 8, 2024, Rothschild Direct Testimony Regarding SCG, at 64.

[12] Rothschild Direct Testimony, at 67.

MR. ROTHSCHILD'S ADJUSTED CAPM ANALYSIS

	Line No.	Formula/Note	30-Year Treasury Bond - Weighted Avg.		30-Year Treasury Bond - Spot	
			Historical Blended Beta	Forward Beta	Historical Blended Beta	Forward Beta
Risk Free	[1]	Exhibit ALR-4, page 2	4.33%	4.33%	4.20%	4.20%
Beta	[2]	Exhibit ALR-4, page 3	0.75	0.95	0.72	0.86
Market Return	[3]	Rebuttal Exhibit AEB-5	12.07%	12.07%	12.07%	12.07%
Required Return for Tennessee-Amercian	[4]	Equals [1] + [2] x ([3] - [1])	10.17%	11.66%	9.86%	10.95%

CAPITAL STRUCTURE ANALYSIS

COMMON EQUITY RATIO [1]

Proxy Group Company	Ticker	2023	2022	2021	3-yr Avg.
American States Water Company	AWR		54.16%	56.91%	55.54%
Atmos Energy Corporation	ATO	60.20%	60.01%	59.88%	60.03%
California Water Service Group	CWT	57.04%	50.07%	48.82%	51.97%
Essential Utilities, Inc.	WTRG	55.59%	57.04%	53.58%	55.41%
Eversource Energy	ES	55.48%	55.31%	53.25%	54.68%
Middlesex Water Company	MSEX	56.62%	57.46%	57.39%	57.16%
NiSource Inc.	NI	55.44%	54.17%	54.85%	54.82%
Northwest Natural Gas Company	NWN	46.96%	47.72%	44.08%	46.25%
ONE Gas, Inc.	OGS	60.41%	58.24%	61.09%	59.92%
SJW Group	SJW	53.11%	50.45%	50.85%	51.47%
Spire, Inc.	SR	46.34%	47.22%	48.62%	47.39%
MEAN		54.72%	53.81%	53.57%	54.06%
LOW		46.34%	47.22%	44.08%	46.25%
HIGH		60.41%	60.01%	61.09%	60.03%

COMMON EQUITY RATIO - UTILITY OPERATING COMPANIES

Company Name	Ticker	2023	2022	2021	3-yr Avg.
Golden State Water / Bear Valley	AWR		54.16%	56.91%	55.54%
Atmos Energy Corporation	ATO	60.20%	60.01%	59.88%	60.03%
California Water Service	CWT		49.58%	48.07%	48.83%
New Mexico Water Service Water Division	CWT		67.34%	67.75%	67.55%
New Mexico Water Service Sewer Division	CWT		63.61%	61.90%	62.76%
Washington Water Service	CWT	56.97%	60.27%	65.96%	61.07%
Hawaii Water Service Kaanapali Division	CWT	49.38%	49.85%	51.93%	50.39%
Hawaii Water Service Pukalani Division	CWT	67.08%	65.87%	65.58%	66.18%
Aqua Pennsylvania Water	WTRG		55.77%	53.84%	54.81%
Aqua Pennsylvania Wastewater	WTRG		99.90%	98.06%	98.98%
Peoples Natural Gas Company	WTRG	55.92%	54.64%	53.44%	54.66%
Peoples Gas Company	WTRG		56.67%	54.83%	55.75%
Aqua Ohio Water	WTRG	53.47%	54.03%	52.11%	53.20%
Aqua Ohio Wastewater	WTRG	90.58%	74.40%	73.67%	79.55%
Aqua Illinois	WTRG	58.81%	56.55%	57.99%	57.78%
Aqua Texas	WTRG	52.80%	49.99%	49.81%	50.87%
Aqua New Jersey, Inc. Water	WTRG	49.09%	56.45%	53.19%	52.91%
Aqua New Jersey, Inc. Wastewater	WTRG	100.00%	100.00%	79.06%	93.02%
Aqua North Carolina	WTRG		50.21%	48.75%	49.48%
Aqua Virginia	WTRG	50.31%	47.83%	48.83%	48.99%
Delta Natural Gas Company	WTRG	58.03%	52.45%	49.69%	53.39%
Peoples Gas of WV	WTRG		31.35%	39.38%	35.36%
Connecticut Light and Power Company	ES	56.16%	57.03%	54.86%	56.02%
Yankee Gas Company	ES		58.44%	57.37%	57.90%
Aquarion Water Company CT	ES	54.48%	55.32%	56.14%	55.31%
NSTAR Electric Company	ES	55.48%	55.89%	54.13%	55.17%
NSTAR Gas Company	ES	56.89%	50.96%	48.03%	51.96%
Aquarion Water Company MA	ES	67.53%	67.75%	68.10%	67.80%
Eversource Gas of MA	ES	55.55%	49.62%	47.20%	50.79%
Public Service Company of NH	ES	53.20%	51.22%	47.48%	50.63%
Aquarion Water Company NH	ES		69.12%	52.71%	60.92%
Middlesex Water Company	MSEX	56.91%	57.50%	57.46%	57.29%
Pinelands Water	MSEX	36.86%	52.71%	51.34%	46.97%
Pinelands WW	MSEX	39.89%	55.29%	51.48%	48.89%
Northern Indiana Public Service Company LLC	NI	59.26%	56.92%	58.59%	58.26%
Columbia Gas of Kentucky, Inc.	NI	53.66%	54.91%	53.87%	54.15%
Columbia Gas of Maryland, Inc.	NI	52.00%	51.96%	55.26%	53.07%
Columbia Gas of Ohio, Inc.	NI	50.50%	50.67%	50.79%	50.65%
Columbia Gas of Pennsylvania, Inc.	NI	55.88%	56.64%	56.05%	56.19%
Columbia Gas of Virginia, Inc.	NI	45.25%	44.25%	44.52%	44.67%
Northwest Natural Gas Company	NWN	46.96%	47.72%	44.08%	46.25%
Kansas Gas Service Company, Inc.	OGS	60.44%	58.37%	61.37%	60.06%
Oklahoma Natural Gas Company	OGS	60.46%	58.26%	60.99%	59.90%
Texas Gas Service Company, Inc.	OGS	60.35%	58.13%	60.98%	59.82%
San Jose Water	SJW		48.74%	50.22%	49.48%
CT Water	SJW	53.99%	52.92%	50.95%	52.62%
Maine Water Co.	SJW	52.77%	48.91%	48.30%	49.99%
Canyon Lake Water Service Company	SJW	48.92%	53.74%	59.53%	54.06%
Spire Alabama Inc.	SR	51.50%	52.01%	54.91%	52.81%
Spire Gulf Inc.	SR		41.35%	41.14%	41.24%
Spire Mississippi Inc.	SR		38.02%	39.18%	38.60%
Spire Missouri Inc.	SR	44.11%	45.49%	46.20%	45.27%

Notes:

[1] Ratios are weighted by actual common capital, preferred equity, long-term debt and short-term debt of Operating Subsidiaries.

[2] Natural Gas, Electric and Water operating subsidiaries where data was unable to be obtained for 2023, 2022 and 2021 were removed from the analysis.

CAPITAL STRUCTURE ANALYSIS

LONG-TERM DEBT RATIO [1]

Proxy Group Company	Ticker	2023	2022	2021	3-yr Avg.
American States Water Company	AWR		34.94%	38.45%	36.69%
Atmos Energy Corporation	ATO	39.80%	39.99%	40.12%	39.97%
California Water Service Group	CWT	42.45%	48.22%	51.11%	47.26%
Essential Utilities, Inc.	WTRG	43.72%	39.44%	43.69%	42.28%
Eversource Energy	ES	41.30%	42.29%	43.44%	42.35%
Middlesex Water Company	MSEX	37.85%	35.79%	39.54%	37.73%
NiSource Inc.	NI	44.56%	45.83%	45.15%	45.18%
Northwest Natural Gas Company	NWN	52.40%	45.46%	44.85%	47.57%
ONE Gas, Inc.	OGS	25.06%	41.76%	38.91%	35.24%
SJW Group	SJW	39.62%	43.32%	46.96%	43.30%
Spire, Inc.	SR	42.56%	39.45%	40.00%	40.67%
Proxy Group					
MEAN		40.93%	41.50%	42.93%	41.66%
LOW		25.06%	34.94%	38.45%	35.24%
HIGH		52.40%	48.22%	51.11%	47.57%

LONG-TERM DEBT RATIO - UTILITY OPERATING COMPANIES

Company Name	Ticker	2023	2022	2021	3-yr Avg.
Golden State Water / Bear Valley	AWR		34.94%	38.45%	36.69%
Atmos Energy Corporation	ATO	39.80%	39.99%	40.12%	39.97%
California Water Service	CWT		48.78%	51.85%	50.32%
New Mexico Water Service Water Division	CWT		30.38%	30.18%	30.28%
New Mexico Water Service Sewer Division	CWT		34.70%	36.53%	35.61%
Washington Water Service	CWT	42.43%	35.60%	34.04%	37.36%
Hawaii Water Service Kaanapali Division	CWT	50.62%	50.15%	48.07%	49.61%
Hawaii Water Service Pukalani Division	CWT	32.92%	34.13%	34.42%	33.82%
Aqua Pennsylvania Water	WTRG		43.55%	45.28%	44.42%
Aqua Pennsylvania Wastewater	WTRG		0.10%	1.94%	1.02%
Peoples Natural Gas Company	WTRG	43.18%	36.93%	39.09%	39.73%
Peoples Gas Company	WTRG		27.32%	43.12%	35.22%
Aqua Ohio Water	WTRG	46.53%	45.97%	47.89%	46.80%
Aqua Ohio Wastewater	WTRG	9.42%	25.60%	26.33%	20.45%
Aqua Illinois	WTRG	41.19%	43.45%	42.01%	42.22%
Aqua Texas	WTRG	47.20%	50.01%	50.19%	49.13%
Aqua New Jersey, Inc. Water	WTRG	50.91%	43.55%	46.81%	47.09%
Aqua New Jersey, Inc. Wastewater	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua North Carolina	WTRG		49.79%	51.25%	50.52%
Aqua Virginia	WTRG	49.69%	52.17%	51.17%	51.01%
Delta Natural Gas Company	WTRG	36.96%	37.19%	41.51%	38.55%
Peoples Gas of WV	WTRG		21.98%	43.11%	32.55%
Connecticut Light and Power Company	ES	42.77%	41.82%	43.93%	42.84%
Yankee Gas Company	ES		36.40%	36.50%	36.45%
Aquarion Water Company CT	ES	43.17%	43.57%	41.40%	42.72%
NSTAR Electric Company	ES	40.83%	43.68%	43.63%	42.72%
NSTAR Gas Company	ES	34.64%	40.11%	38.45%	37.73%
Aquarion Water Company MA	ES	20.27%	10.19%	11.42%	13.96%
Eversource Gas of MA	ES	41.81%	43.66%	43.14%	42.87%
Public Service Company of NH	ES	41.53%	44.04%	49.23%	44.93%
Aquarion Water Company NH	ES		22.71%	35.52%	29.12%
Middlesex Water Company	MSEX	37.46%	36.24%	40.01%	37.90%
Pinelands Water	MSEX	63.14%	0.00%	0.00%	21.05%
Pinelands WW	MSEX	60.11%	0.00%	0.00%	20.04%
Northern Indiana Public Service Company LLC	NI	40.74%	43.08%	41.41%	41.74%
Columbia Gas of Kentucky, Inc.	NI	46.34%	45.09%	46.13%	45.85%
Columbia Gas of Maryland, Inc.	NI	48.00%	48.04%	44.74%	46.93%
Columbia Gas of Ohio, Inc.	NI	49.50%	49.33%	49.21%	49.35%
Columbia Gas of Pennsylvania, Inc.	NI	44.12%	43.36%	43.95%	43.81%
Columbia Gas of Virginia, Inc.	NI	54.75%	55.75%	55.48%	55.33%
Northwest Natural Gas Company	NWN	52.40%	45.46%	44.85%	47.57%
Kansas Gas Service Company, Inc.	OGS	39.56%	41.63%	38.63%	39.94%
Oklahoma Natural Gas Company	OGS	39.54%	41.74%	39.01%	40.10%
Texas Gas Service Company, Inc.	OGS	0.00%	41.87%	39.02%	26.96%
San Jose Water	SJW		42.87%	49.72%	46.30%
CT Water	SJW	40.35%	43.98%	45.81%	43.38%
Maine Water Co.	SJW	35.59%	41.40%	37.26%	38.08%
Canyon Lake Water Service Company	SJW	40.75%	46.10%	40.28%	42.38%
Spire Alabama Inc.	SR	41.62%	33.01%	42.04%	38.89%
Spire Gulf Inc.	SR		38.77%	42.00%	40.38%
Spire Mississippi Inc.	SR		0.00%	0.00%	0.00%
Spire Missouri Inc.	SR	42.96%	42.91%	39.42%	41.76%

Notes:

[1] Ratios are weighted by actual common capital, preferred equity, long-term debt and short-term debt of Operating Subsidiaries.

[2] Natural Gas, Electric and Water operating subsidiaries where data was unable to be obtained for 2023, 2022 and 2021 were removed from the analysis.

CAPITAL STRUCTURE ANALYSIS

PREFERRED EQUITY RATIO [1]

Proxy Group Company	Ticker	2023	2022	2021	3-yr Avg.
American States Water Company	AWR		0.00%	0.00%	0.00%
Atmos Energy Corporation	ATO	0.00%	0.00%	0.00%	0.00%
California Water Service Group	CWT	0.00%	0.00%	0.00%	0.00%
Essential Utilities, Inc.	WTRG	0.00%	0.00%	0.00%	0.00%
Eversource Energy	ES	0.51%	0.52%	0.56%	0.53%
Middlesex Water Company	MSEX	0.28%	0.30%	0.32%	0.30%
NiSource Inc.	NI	0.00%	0.00%	0.00%	0.00%
Northwest Natural Gas Company	NWN	0.00%	0.00%	0.00%	0.00%
ONE Gas, Inc.	OGS	0.00%	0.00%	0.00%	0.00%
SJW Group	SJW	0.00%	0.00%	0.00%	0.00%
Spire, Inc.	SR	0.00%	0.00%	0.00%	0.00%
Proxy Group					
MEAN		0.08%	0.07%	0.08%	0.08%
LOW		0.00%	0.00%	0.00%	0.00%
HIGH		0.51%	0.52%	0.56%	0.53%

PREFERRED EQUITY RATIO - UTILITY OPERATING COMPANIES

Company Name	Ticker	2023	2022	2021	3-yr Avg.
Golden State Water / Bear Valley	AWR		0.00%	0.00%	0.00%
Atmos Energy Corporation	ATO	0.00%	0.00%	0.00%	0.00%
California Water Service	CWT		0.00%	0.00%	0.00%
New Mexico Water Service Water Division	CWT		0.00%	0.00%	0.00%
New Mexico Water Service Sewer Division	CWT		0.00%	0.00%	0.00%
Washington Water Service	CWT	0.00%	0.00%	0.00%	0.00%
Hawaii Water Service Kaanapali Division	CWT	0.00%	0.00%	0.00%	0.00%
Hawaii Water Service Pukalani Division	CWT	0.00%	0.00%	0.00%	0.00%
Aqua Pennsylvania Water	WTRG		0.00%	0.00%	0.00%
Aqua Pennsylvania Wastewater	WTRG		0.00%	0.00%	0.00%
Peoples Natural Gas Company	WTRG	0.00%	0.00%	0.00%	0.00%
Peoples Gas Company	WTRG		0.00%	0.00%	0.00%
Aqua Ohio Water	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua Ohio Wastewater	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua Illinois	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua Texas	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua New Jersey, Inc. Water	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua New Jersey, Inc. Wastewater	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua North Carolina	WTRG		0.00%	0.00%	0.00%
Aqua Virginia	WTRG	0.00%	0.00%	0.00%	0.00%
Delta Natural Gas Company	WTRG	0.00%	0.00%	0.00%	0.00%
Peoples Gas of WV	WTRG		0.00%	0.00%	0.00%
Connecticut Light and Power Company	ES	1.07%	1.15%	1.20%	1.14%
Yankee Gas Company	ES		0.00%	0.00%	0.00%
Aquarion Water Company CT	ES	0.00%	0.00%	0.00%	0.00%
NSTAR Electric Company	ES	0.39%	0.42%	0.47%	0.43%
NSTAR Gas Company	ES	0.00%	0.00%	0.00%	0.00%
Aquarion Water Company MA	ES	0.00%	0.00%	0.00%	0.00%
Eversource Gas of MA	ES	0.00%	0.00%	0.00%	0.00%
Public Service Company of NH	ES	0.00%	0.00%	0.00%	0.00%
Aquarion Water Company NH	ES		0.01%	0.01%	0.01%
Middlesex Water Company	MSEX	0.28%	0.30%	0.33%	0.30%
Pinelands Water	MSEX	0.00%	0.00%	0.00%	0.00%
Pinelands WW	MSEX	0.00%	0.00%	0.00%	0.00%
Northern Indiana Public Service Company LLC	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Kentucky, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Maryland, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Ohio, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Pennsylvania, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Virginia, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Northwest Natural Gas Company	NWN	0.00%	0.00%	0.00%	0.00%
Kansas Gas Service Company, Inc.	OGS	0.00%	0.00%	0.00%	0.00%
Oklahoma Natural Gas Company	OGS	0.00%	0.00%	0.00%	0.00%
Texas Gas Service Company, Inc.	OGS	0.00%	0.00%	0.00%	0.00%
San Jose Water	SJW		0.00%	0.00%	0.00%
CT Water	SJW	0.00%	0.00%	0.00%	0.00%
Maine Water Co.	SJW	0.00%	0.00%	0.00%	0.00%
Canyon Lake Water Service Company	SJW	0.00%	0.00%	0.00%	0.00%
Spire Alabama Inc.	SR	0.00%	0.00%	0.00%	0.00%
Spire Gulf Inc.	SR		0.00%	0.00%	0.00%
Spire Mississippi Inc.	SR		0.00%	0.00%	0.00%
Spire Missouri Inc.	SR	0.00%	0.00%	0.00%	0.00%

Notes:

[1] Ratios are weighted by actual common capital, preferred equity, long-term debt and short-term debt of Operating Subsidiaries.

[2] Natural Gas, Electric and Water operating subsidiaries where data was unable to be obtained for 2023, 2022 and 2021 were removed from the analysis.

CAPITAL STRUCTURE ANALYSIS

SHORT-TERM DEBT RATIO [1]

Proxy Group Company	Ticker	2023	2022	2021	3-yr Avg.
American States Water Company	AWR		10.90%	4.64%	7.77%
Atmos Energy Corporation	ATO	0.00%	0.00%	0.00%	0.00%
California Water Service Group	CWT	0.51%	1.72%	0.08%	0.77%
Essential Utilities, Inc.	WTRG	0.69%	3.52%	2.73%	2.31%
Eversource Energy	ES	2.72%	1.89%	2.75%	2.45%
Middlesex Water Company	MSEX	5.26%	6.45%	2.75%	4.82%
NiSource Inc.	NI	0.00%	0.00%	0.00%	0.00%
Northwest Natural Gas Company	NWN	0.64%	6.82%	11.07%	6.18%
ONE Gas, Inc.	OGS	14.53%	0.00%	0.00%	4.84%
SJW Group	SJW	7.27%	6.22%	2.19%	5.23%
Spire, Inc.	SR	11.11%	13.32%	11.38%	11.94%
Proxy Group					
MEAN		4.27%	4.62%	3.42%	4.21%
LOW		0.00%	0.00%	0.00%	0.00%
HIGH		14.53%	13.32%	11.38%	11.94%

SHORT-TERM DEBT RATIO - UTILITY OPERATING COMPANIES

Company Name	Ticker	2023	2022	2021	3-yr Avg.
Golden State Water / Bear Valley	AWR		10.90%	4.64%	7.77%
Atmos Energy Corporation	ATO	0.00%	0.00%	0.00%	0.00%
California Water Service	CWT		1.64%	0.07%	0.86%
New Mexico Water Service Water Division	CWT		2.28%	2.07%	2.18%
New Mexico Water Service Sewer Division	CWT		1.69%	1.57%	1.63%
Washington Water Service	CWT	0.60%	4.13%	0.00%	1.58%
Hawaii Water Service Kaanapali Division	CWT	0.00%	0.00%	0.00%	0.00%
Hawaii Water Service Pukalani Division	CWT	0.00%	0.00%	0.00%	0.00%
Aqua Pennsylvania Water	WTRG		0.68%	0.87%	0.78%
Aqua Pennsylvania Wastewater	WTRG		0.00%	0.00%	0.00%
Peoples Natural Gas Company	WTRG	0.90%	8.43%	7.47%	5.60%
Peoples Gas Company	WTRG		16.01%	2.05%	9.03%
Aqua Ohio Water	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua Ohio Wastewater	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua Illinois	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua Texas	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua New Jersey, Inc. Water	WTRG	0.00%	0.00%	0.00%	0.00%
Aqua New Jersey, Inc. Wastewater	WTRG	0.00%	0.00%	20.94%	6.98%
Aqua North Carolina	WTRG		0.00%	0.00%	0.00%
Aqua Virginia	WTRG	0.00%	0.00%	0.00%	0.00%
Delta Natural Gas Company	WTRG	5.01%	10.36%	8.80%	8.06%
Peoples Gas of WV	WTRG		46.66%	17.51%	32.09%
Connecticut Light and Power Company	ES	0.00%	0.00%	0.00%	0.00%
Yankee Gas Company	ES		5.16%	6.12%	5.64%
Aquarion Water Company CT	ES	2.35%	1.11%	2.46%	1.97%
NSTAR Electric Company	ES	3.30%	0.00%	1.77%	1.69%
NSTAR Gas Company	ES	8.48%	8.93%	13.52%	10.31%
Aquarion Water Company MA	ES	12.20%	22.06%	20.47%	18.24%
Eversource Gas of MA	ES	2.64%	6.73%	9.66%	6.34%
Public Service Company of NH	ES	5.26%	4.74%	3.30%	4.43%
Aquarion Water Company NH	ES		8.17%	11.76%	9.96%
Middlesex Water Company	MSEX	5.35%	5.96%	2.20%	4.50%
Pinelands Water	MSEX	0.00%	47.29%	48.66%	31.98%
Pinelands WW	MSEX	0.00%	44.71%	48.52%	31.08%
Northern Indiana Public Service Company LLC	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Kentucky, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Maryland, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Ohio, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Pennsylvania, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Columbia Gas of Virginia, Inc.	NI	0.00%	0.00%	0.00%	0.00%
Northwest Natural Gas Company	NWN	0.64%	6.82%	11.07%	6.18%
Kansas Gas Service Company, Inc.	OGS	0.00%	0.00%	0.00%	0.00%
Oklahoma Natural Gas Company	OGS	0.00%	0.00%	0.00%	0.00%
Texas Gas Service Company, Inc.	OGS	39.65%	0.00%	0.00%	13.22%
San Jose Water	SJW		8.40%	0.05%	4.22%
CT Water	SJW	5.67%	3.10%	3.24%	4.00%
Maine Water Co.	SJW	11.64%	9.70%	14.44%	11.93%
Canyon Lake Water Service Company	SJW	10.34%	0.16%	0.19%	3.56%
Spire Alabama Inc.	SR	6.88%	14.98%	3.05%	8.30%
Spire Gulf Inc.	SR		19.88%	16.86%	18.37%
Spire Mississippi Inc.	SR		61.98%	60.82%	61.40%
Spire Missouri Inc.	SR	12.93%	11.60%	14.38%	12.97%

Notes:

[1] Ratios are weighted by actual common capital, preferred equity, long-term debt and short-term debt of Operating Subsidiaries.

[2] Natural Gas, Electric and Water operating subsidiaries where data was unable to be obtained for 2023, 2022 and 2021 were removed from the analysis.

Market Value of the Capital Structure of Company and CAD Proxy Groups

Expressed in ($000s)

				[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
				Debt												**Preferred Equity**		**Common Equity**		**Market Value**			
Company	Ticker	Company Proxy Group	CAD Proxy Group	Current Assets	Current Liabilities	Current Long-Term Debt and Leases	Net Working Capital	Short-Term Debt	Short-Term Debt Adj'd for Net Working Capital	Long-Term Debt	Book Value of Total Debt	Market Value of Long-Term Debt	Carrying Amount of Long-Term Debt	Adjustment to Book Value of Long-Term Debt	Market Value of Total Debt	Book Value of Preferred Equity	Market Value of Preferred Equity	Book Value of Common Equity	Market Value of Common Equity	Market Value Of the Firm	Debt Ratio	Preferred Equity Ratio	Common Equity Ratio
Atmos Energy Corporation	ATO	Yes		$1,679,717	$1,170,481	$11,483	$520,719	$0	$0	$7,529,273	$7,540,756	$7,856,154	$8,760,000	-$903,846	$6,636,910	$0	$0	$ 11,273,209	$ 17,481,607	$24,118,517	27.52%	0.00%	72.48%
NiSource Inc.	NI	Yes		$4,499,400	$5,265,100	$32,100	($733,600)	$3,048,600	$733,600	$11,081,300	$11,847,000	$8,479,400	$9,553,600	-$1,074,200	$10,772,800	$486,100	$486,100	$ 7,783,500	$ 10,976,180	$22,235,080	48.45%	2.19%	49.36%
Northwest Natural Gas Company	NWN	Yes		$601,440	$696,878	$153,198	$57,760	$89,780	$0	$ 1,502,602	$1,655,800	$1,148,395	$1,336,864	-$188,469	$1,467,331	$0	$0	$ 1,283,838	$ 1,432,146	$2,899,477	50.61%	0.00%	49.39%
ONE Gas, Inc.	OGS	Yes		$765,204	$1,477,221	$806,414	$94,397	$88,500	$0	$2,174,701	$2,981,115	$2,500,000	$2,700,000	-$200,000	$2,781,115	$0	$0	$ 2,765,877	$ 3,533,532	$6,314,647	44.04%	0.00%	55.96%
Spire, Inc.	SR	Yes		$1,219,900	$2,210,500	$457,000	($533,600)	$1,047,500	$533,600	$3,247,800	$4,238,400	$3,083,700	$3,412,900	-$329,200	$3,909,200	$242,000	$242,000	$ 2,808,800	$ 3,318,308	$7,469,508	52.34%	3.24%	44.42%
Eversource Energy	ES	Yes		$4,247,994	$6,341,397	$882,957	($1,210,446)	$1,930,422	$1,210,446	$24,067,198	$26,160,601	$22,855,200	$24,413,500	-$1,558,300	$24,602,301	$0	$0	$ 14,173,892	$ 21,560,414	$46,162,715	53.29%	0.00%	46.71%
American Water Works Company, Inc.	AWK		Yes	$1,389,000	$2,151,000	$485,000	($277,000)	$179,000	$179,000	$11,791,000	$12,455,000	$11,376,000	$12,190,000	-$814,000	$11,641,000	$0	$0	$ 9,797,000	$ 25,699,113	$37,340,113	31.18%	0.00%	68.82%
American States Water Company	AWR	Yes	Yes	$205,978	$166,623	$44,209	$83,564	$0	$0	$873,674	$917,883	$556,214	$579,047	-$22,833	$895,050	$0	$0	$ 776,109	$ 2,973,979	$3,869,029	23.13%	0.00%	76.87%
California Water Service Group	CWT	Yes	Yes	$296,285	$430,339	$1,634	($132,420)	$180,000	$132,420	$1,065,373	$1,199,427	$965,444	$1,053,440	-$87,996	$1,111,431	$0	$0	$ 1,426,733	$ 2,993,470	$4,104,901	27.08%	0.00%	72.92%
Middlesex Water Company	MSEX	Yes	Yes	$108,536	$103,829	$8,340	$13,047	$42,750	$0	$361,216	$369,556	$363,045	$364,674	-$1,629	$367,927	$2,084	$2,084	$ 422,991	$ 1,168,475	$1,538,486	23.91%	0.14%	75.95%
SJW Group	SJW	Yes	Yes	$198,389	$342,974	$48,975	($95,610)	$171,500	$95,610	$1,526,699	$1,671,284	$1,394,412	$1,526,699	-$132,287	$1,538,997	$0	$0	$ 1,233,397	$ 2,086,822	$3,625,819	42.45%	0.00%	57.55%
Essential Utilities, Inc.	WTRG	Yes	Yes	$491,979	$797,927	$74,775	($231,173)	$173,481	$173,481	$6,860,510	$7,108,766	$5,980,722	$6,938,008	-$957,286	$6,151,480	$0	$0	$ 5,896,183	$ 10,202,743	$16,354,223	37.61%	0.00%	62.39%
Company Proxy Group - Mean																					39.13%	0.51%	60.36%
CAD Proxy Group - Mean																					30.89%	0.02%	69.08%

Notes:

[1] S&P Capital IQ Pro.
[2] S&P Capital IQ Pro.
[3] S&P Capital IQ Pro.
[4] Equals [1] - ([2] -[3])
[5] S&P Capital IQ Pro.
[6] Equals:
  [A] 0 if [4] > 0
  [B] ABS of [4] if [4] < 0 and ABS of [4] < [5]
  [C] [5] if [4] < 0 and ABS of [4] > [5]
[7] S&P Capital IQ Pro.
[8] Equals [3] + [6] + [7]
[9] Company 10-Ks
[10] Company 10-Ks
[11] Equals [9] - [10]
[12] Equals [8] + [11]
[13] S&P Capital IQ Pro.
[14] Equals [13]
[15] S&P Capital IQ Pro.
[16] S&P Capital IQ Pro.
[17] Equals [12] + [14] + [16]
[18] Equals [12] / [17]
[19] Equals [14] / [17]
[20] Equals [16] / [17]

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served via U.S. Mail or electronic mail upon:

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This the 22nd day of October 2024.

Melvin J. Malone