NSTAR Electric Company
Western Massachusetts Electric Company
each d/b/a Eversource Energy
D.P.U. 17-05
Exhibit ES-RBH-1
January 17, 2017
H.O._____

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC UTILITIES

Petition of NSTAR Electric Company and Western Massachusetts Electric Company each d/b/a Eversource Energy for Approval of an Increase in Base Distribution Rates for Electric Service Pursuant to G.L. c. 164, § 94 and 220 C.M.R. § 5.00	D.P.U. 17-05

DIRECT TESTIMONY OF

Robert B. Hevert

Cost of Capital

On behalf of

NSTAR Electric Company

Western Massachusetts Electric Company

each d/b/a Eversource Energy

January 17, 2017

DIRECT TESTIMONY OF

ROBERT B. HEVERT

TABLE OF CONTENTS

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC UTILITIES

DIRECT TESTIMONY OF

Robert B. Hevert

I. INTRODUCTION

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

A. My name is Robert B. Hevert. I am a Partner at ScottMadden, Inc. ("ScottMadden"). My business address is 1900 West Park Drive, Suite 250, Westborough, Massachusetts, 01581.

Q. On whose behalf are you submitting this testimony?

A. I am submitting this direct testimony ("Direct Testimony") before the Massachusetts Department of Public Utilities (the "Department") on behalf of NSTAR Electric Company and Western Massachusetts Electric Company each d/b/a Eversource Energy, ("Eversource" or the "Company").

Q. Please describe your educational background.

A. I hold a Bachelor's degree in Business and Economics from the University of Delaware, and a Masters of Business Administration with a concentration in Finance from the University of Massachusetts. I also hold the Chartered Financial Analyst designation.

Q. Please describe your experience in the energy and utility industries.

A. I have worked in regulated industries for over 25 years, having served as an executive and manager with consulting firms, a financial officer of a publicly traded natural gas

utility (at the time, Bay State Gas Company), and an analyst at a telecommunications utility. In my role as a consultant, I have advised numerous energy and utility clients on a wide range of financial and economic issues including corporate and asset-based transactions, asset and enterprise valuation, transaction due diligence, and strategic matters. As an expert witness, I have provided testimony in more than 150 proceedings regarding various financial and regulatory matters before numerous state utility regulatory agencies, including the Department, the Federal Energy Regulatory Commission, and the Province of Alberta, Canada. A summary of my professional and educational background, including a list of my testimony in prior proceedings, is included in Exhibit ES-RBH-2.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. The purpose of my Direct Testimony is to present evidence and provide the Department with a recommendation regarding the Company's Return on Equity ("ROE"),[1] and to provide an assessment of the capital structure to be used for ratemaking purposes. My analyses and conclusions are supported by the data presented in Exhibits ES-RBH-3 through ES-RBH-11, which were prepared by me or under my direction.

[1] Throughout my testimony, I interchangeably use the terms "ROE" and "Cost of Equity."

Q. What are your conclusions regarding the appropriate Cost of Equity and capital structure for the Company?

A. My analyses indicate that the Company's Cost of Equity currently is in the range of 10.00 percent to 10.75 percent. Based on the quantitative and qualitative analyses discussed throughout my Direct Testimony and the Company's risk profile, I conclude that an ROE of 10.50 percent is reasonable and appropriate. I also conclude that the Company's proposed capital structure of 53.37 percent common equity, 0.94 percent preferred stock, and 45.69 percent long-term debt for NSTAR Electric, and 53.34 percent common equity and 46.66 percent long-term debt for WMECO, is appropriate.

Because all financial models are subject to various assumptions and constraints, equity analysts and investors tend to use multiple methods to develop their return requirements. I therefore relied on three widely accepted approaches to develop my ROE recommendation: (1) the Discounted Cash Flow ("DCF") model, including the Constant Growth, and Multi-Stage forms; (2) the Capital Asset Pricing Model ("CAPM"); and (3) the Bond Yield Plus Risk Premium approach.

In addition to the methods noted above, my recommendation takes into consideration the Company's rate mechanisms relative to its peers, flotation costs, and the increasing prevalence of distributed generation ("DG") and long-term contracts on the Company's risk profile. Although I did not make any explicit adjustments to my ROE estimates for those factors, I did consider those factors when determining where the Company's Cost of Equity should be established within the range of results.

Q. How is the remainder of your Direct Testimony organized?

A. The remainder of my Direct Testimony is organized as follows:

- Section III – Provides a summary of my conclusions and recommendations as they relate to the Cost of Equity;
- Section IV – Discusses the regulatory guidelines and financial considerations pertinent to the development of the cost of capital;
- Section V – Explains my selection of the proxy group of electric utilities used to develop my analytical results;
- Section VI – Explains my analyses and the analytical bases for my ROE recommendation;
- Section VII – Provides a discussion of specific business risks that have a direct bearing on the Company's Cost of Equity;
- Section VIII – Discusses the current capital market conditions and the effect of those conditions on the Company's Cost of Equity;
- Section IX – Addresses the reasonableness of the Company's capital structure; and
- Section X – Summarizes my conclusions and recommendations.

III. SUMMARY OF CONCLUSIONS

Q. What are the key factors considered in your analyses and upon which you base your recommended ROE?

A. My analyses and recommendations considered the following:

- The *Hope* and *Bluefield* decisions[2] that established the standards for determining a fair and reasonable allowed Return on Equity, including: consistency of the allowed return with other businesses having similar risk; adequacy of the return to provide access to capital and support credit quality; and that the end result must lead to just and reasonable rates.
- The effect of the current capital market conditions on investors' return requirements, including the Company's need to access capital as needed and at reasonable cost rates.
- The Company's business risks relative to the proxy group of comparable companies, and the implications of those risks in arriving at the appropriate ROE.

Q. What are the results of your analyses?

A. The results of my analyses are summarized in Table 1 (below).

[2] *Bluefield Waterworks & Improvement Co., v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923); *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944).

Table 1: Summary of Analytical Results

Discounted Cash Flow	***Mean Low***	***Mean***	***Mean High***
30-Day Constant Growth DCF	8.18%	8.94%	9.69%
90-Day Constant Growth DCF	8.13%	8.89%	9.65%
180-Day Constant Growth DCF	8.15%	8.91%	9.66%
Multi-Stage (Gordon Method)			
30-Day Multi-Stage DCF	8.96%	9.14%	9.34%
90-Day Multi-Stage DCF	8.92%	9.09%	9.28%
180-Day Multi-Stage DCF	8.93%	9.11%	9.30%
Multi-Stage (Terminal P/E Method)			
30-Day Multi-Stage DCF	9.77%	10.24%	10.70%
90-Day Multi-Stage DCF	9.65%	10.11%	10.57%
180-Day Multi-Stage DCF	9.69%	10.15%	10.61%
Supporting Methodologies			
CAPM Results		***Bloomberg Derived Market Risk Premium***	***Value Line Derived Market Risk Premium***
Average Bloomberg Beta Coefficient			
Current 30-Year Treasury (2.75%)		8.90%	9.51%
Near-Term Projected 30-Year Treasury (3.13%)		9.28%	9.89%
Average Value Line Beta Coefficient			
Current 30-Year Treasury (2.75%)		10.19%	10.94%
Near-Term Projected 30-Year Treasury (3.13%)		10.57%	11.32%
Bond Yield Risk Premium			
	Low	***Mid***	***High***
Bond Yield Risk Premium	10.01%	10.03%	10.34%

Based on the analytical results presented in Table 1, and in light of the considerations regarding the current capital market environment and the Company's relative business risks discussed throughout the balance of my Direct Testimony, it is my view that a reasonable range of estimates is from 10.00 percent to 10.75 percent, and that an ROE of

10.50 percent, is reasonable and appropriate.

IV. REGULATORY GUIDELINES AND FINANCIAL CONSIDERATIONS

Q. Please provide a brief summary of the guidelines established by the United States Supreme Court (the "Court") for the purpose of determining the Return on Equity.

A. The Court established the guiding principles for establishing a fair return for capital in two cases: (1) *Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* ("*Bluefield*");[3] and (2) *Federal Power Comm'n v. Hope Natural Gas Co.* ("*Hope*").[4] In *Bluefield*, the Court stated:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding, risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[5]

The Court therefore recognized that: (1) a regulated company cannot remain financially sound unless the return it is allowed to earn on its invested capital is at least equal to the cost of capital (the principle relating to the demand for capital); and (2) a regulated company will not be able to attract capital if it does not offer investors an opportunity to

---

[3] *Bluefield Waterworks & Improvement Co., v. Public Service Commission of West Virginia*, 262 U.S. 679, 692-93 (1923).

[4] *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944).

[5] *Bluefield*, 262 U.S. at 692-93 (1923).

earn a return on their investment equal to the return they expect to earn on other investments of the same risk (the principle relating to the supply of capital).

In *Hope*, the Court reiterated the financial integrity and capital attraction principles of the *Bluefield* case:

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock... By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.[6]

In summary, the Court clearly has recognized that the fair Return on Equity should be: (1) comparable to returns investors expect to earn on other investments of similar risk; (2) sufficient to assure confidence in the company's financial integrity; and (3) adequate to maintain and support the company's credit and to attract capital.

Q. Does Massachusetts precedent provide similar guidance?

A. Yes. The Department has consistently stated:

> The standard for determining the allowed ROE is set forth in Bluefield at 692-693 and Hope at 603. Specifically, the allowed ROE should preserve a company's financial integrity, allow a company to attract capital on reasonable terms, and be comparable to returns on investments of similar

[6] *Hope*, 320 U.S. at 603 (1944).

risk. See Bluefield at 692-693; Hope at 603, 605. It should be determined "having regard to all relevant facts." Bluefield at 692.[7]

Q. Aside from the standards established by the Courts, is it important for a utility to be allowed the opportunity to earn a return that is adequate to attract equity capital at reasonable terms?

A. Yes, it is. A return that is adequate to attract capital at reasonable terms, under varying market conditions, will enable the subject utility to provide safe, reliable electric distribution service while maintaining its financial integrity. Although the "capital attraction" and "financial integrity" standards are important principles in normal economic conditions, the practical implications of those standards are even more pronounced as increasing equity market volatility has intensified the importance of maintaining a strong financial profile.

Q. Are you aware of the Attorney General's recent request to the Department regarding authorized ROEs in Massachusetts?

A. Yes, I am aware that the Attorney General ("AG") recently requested that the Department open an investigation into "ways to increase transparency, efficiency, and public awareness and confidence regarding the profits that electric and gas companies are allowed to earn in Massachusetts."[8] In her request, the AG listed five reasons why she

---

[7] D.P.U. 13-90, *Petition of Fitchburg Gas and Electric Light Company (Electric Division) d/b/a Unitil*, Order, May 30, 2014, at 231. *See also*, D.P.U. 13-75, *Petition of Bay State Gas Company d/b/a Columbia Gas of Massachusetts*, February 28, 2014, at 327; D.P.U. 11-01, *Petition of Fitchburg Gas and Electric Light Company, d/b/a Unitil*, August 1, 2011, at 420; D.P.U. 09-39, *Petition of Massachusetts Electric Company and Nantucket Electric Company*, November 30, 2009, at 396.

[8] Letter from Massachusetts Attorney General Maura Healey, *RE: Request of the Office of Attorney General, Office of Ratepayer Advocacy for Investigation into Ways to Increase Transparency, Efficiency and Customer Awareness Regarding the Level of Profits Earned by Massachusetts Electric and Gas Distribution Companies*, December 19, 2016.

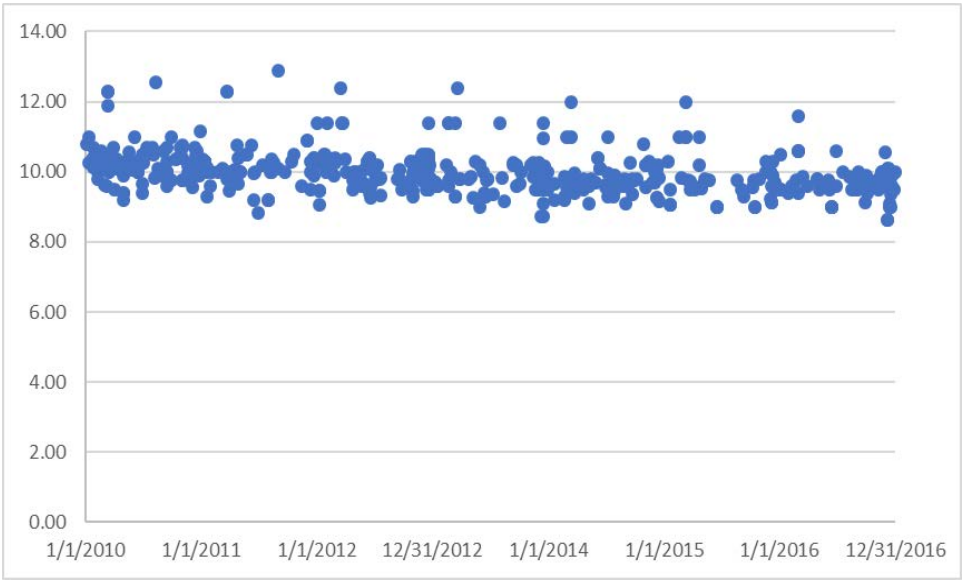
believes authorized ROEs have declined:

1. The utility industry has been and remains at the lowest level of risk for equity investment;
2. Capital costs for utilities, as indicated by long-term bond yields and interest rates have been and remain at historically low levels;
3. Although economic conditions have recovered significantly over the past five years from the Great Recession, the annual growth of the United States economy remains tepid at 2.00 to 2.50 percent;
4. The forecast for growth in the United States and World economies is expected to remain low compared to historical averages; and
5. Revenue decoupling and cost reconciling rate adjustment mechanisms have greatly reduced investment risk in utilities.

As shown in Chart 1 below, from 2010 to 2016 [9] there has been no discernible trend in authorized ROEs for electric and gas utilities. Rather, as evident in Chart 1, the central tendency (that is, both the mean and the median) for authorized ROEs during that period is about 10.00 percent.

[9] The years cited in the AG's request.

Chart 1: Authorized Electric and Gas ROEs 2010-2016[10]



Q. What is your response to the AG's assertion that the utility industry has been and remains at the lowest level of risk for equity investment?

A. I agree that relative to non-regulated industries, the utility industry is less risky. That fact is captured in the Beta coefficient component of the Capital Asset Pricing Model (described in Section VI below). As noted in Section VI, utility Beta coefficients are generally less than one, signifying they are less risky than the market. Companies in competitive, or non-regulated, industries have the ability to earn returns on common equity much higher than utilities, whose returns are regulated. Regardless, as the Supreme Court stated in *Hope*, the authorized ROE should be "commensurate with returns on investments in other enterprises having corresponding risks" (emphasis

[10] Source: SNL Financial.

added). That is, the appropriate comparison is to other companies that face similar risks as utilities. Although investors may require higher returns for non-regulated companies than they do for utilities, the fact that utilities are less risky than non-regulated companies has no bearing on the relative risk and required return of a subject utility compared to other companies of similar risk.

Further, that utilities may be less risky than non-regulated companies does not mean that they are without risk. For example, the utility industry is extremely capital intensive, requiring significant amounts of external capital to fund large, long-lived projects with long construction times. Utilities disclose many other risk factors in annual SEC Form 10-Ks including, but not limited to: regulatory risks, geographic and weather risks, financial risks, operational risks, risks associated with the generation portfolio, and environmental risks.

Q. Do you believe that the ROEs authorized in Massachusetts are out of step with ROEs authorized elsewhere in the United States?

A. No, I do not. In her request, the AG stated that authorized ROEs across the country have declined, while in Massachusetts they have increased, implying that returns authorized by the Department are out of step with the rest of the country. The AG's conclusion, however, is based on a small sample of data points. First, the AG bases her argument that returns authorized by the Department have increased since 2011 by comparing authorized returns to the Department's 9.20 percent ROE authorized for Fitchburg Gas and Electric ("Fitchburg") in D.P.U. 11-01/11-02. It is important to note, however, that the

Department authorized Fitchburg's ROE at the lower end of the reasonable range "to account for Fitchburg's subpar management performance and customer service." Because the 9.20 percent ROE awarded to Fitchburg reflected the Department's determination of Fitchburg's poor management performance, it is not an appropriate data point upon which to base her comparison. In fact, the 9.20 percent ROE authorized for Fitchburg is the lowest ROE ever authorized by the Department.

Moreover, the AG's comparison of ROEs authorized in Massachusetts to those authorized in Connecticut is inappropriate, as Connecticut is ranked as one of the least constructive regulatory jurisdictions, and routinely authorizes ROEs well below those authorized elsewhere in the country.[11] As shown in Table 2 below, ROEs authorized in Connecticut have been well below those authorized in the other New England states, as well as the rest of the country. ROEs authorized by the Department, on the other hand, have been comparable to the other New England states, although somewhat below the rest of the country.

Table 2: Authorized Utility ROEs 2008-2016[12]

	Connecticut	Maine	New Hampshire	Rhode Island	Massachusetts	Vermont	Rest of U.S.
Maximum	9.40	9.55	9.67	10.50	10.35	10.71	12.88
Minimum	8.75	9.00	9.50	9.50	9.20	9.60	8.64[13]
Median	9.18	9.50	9.55	9.65	9.75	10.16	10.05

[11] Regulatory Research Associates.
[12] Source: SNL Financial.
[13] Represents Illinois formula rate plans.

Q. Do credit rating agencies consider the regulatory environment in which a utility operates when determining a utility's credit rating?

A. Yes, they do. Standard and Poor's ("S&P"), for example, states that "[o]ne significant aspect of regulatory risk that influences credit quality is the regulatory environment in the jurisdictions where a utility operates."[14] S&P explains that "[w]hen we evaluate U.S utility regulatory environments, we consider financial stability to be of substantial importance. Cash takes precedence in credit analysis. A regulatory jurisdiction that recognizes the significance of cash flow in its decision-making is one that will appeal to creditors."[15]

Similarly, Moody's notes that regulators' "actions have a significant impact on the environment in which a utility operates."[16] Moody's considers the regulatory structure to be so important that 50.00 percent of the factors that weigh in a ratings determination are related to the nature of regulation.[17] As noted above, among the factors considered by Moody's in assessing the regulatory framework are the predictability and consistency of regulatory actions:

> As the revenues set by the regulator are a primary component of a utility's cash flow, the utility's ability to obtain predictable and supportive treatment within its regulatory framework is one of the most significant factors in assessing a utility's credit quality. The regulatory framework

[14] S&P Global Ratings, RatingsDirect, "Assessing U.S. Investor-Owned Utility Regulatory Environments," August 10, 2016, at 2.
[15] *Ibid*., at 6.
[16] Moody's Investor Service, *Consistency and Predictability of Regulatory Decisions Drive Differences in US Utility Credit Profiles*, July 21, 2014, at 2.
[17] Moody's Investors Service, Rating Methodology; Regulated Gas and Electric Utilities at 6 (Dec. 23, 2013).

> generally provides more certainty around a utility's cash flow and typically allows the company to operate with significantly less cushion in its cash flow metrics than comparably rated companies in other industrial sectors.
>
> ***
>
> In situations where the regulatory framework is less supportive, or is more contentious, a utility's credit quality can deteriorate rapidly.[18]

In my view, a change in Massachusetts' regulatory environment to an environment similar to Connecticut could negatively affect Massachusetts utilities' credit ratings, and therefore, raise investors' required Return on Equity.

Q. What is your response to the AG's remaining points regarding the purported downward trend in ROEs?

A. My response to numbers two through five of the AG's points (noted earlier) are addressed in more detail in the following sections of my Direct Testimony. As discussed in Section VIII, the recent, and continued low interest rate environment is a direct result of Federal monetary policy specifically intended to lower interest rates in response to the financial crisis that began in 2008. As the Federal Reserve has begun its move toward policy normalization, including the two increases to the Federal Funds rate, interest rates are expected to increase. To that point, investors currently see only about a 3.50 percent probability that the Federal Funds rate will **not** be increased over the coming year.[19]

As to the effect of rate mechanisms, I discuss in Section VII that estimating the Cost of

[18] Moody's Investors Service, Regulatory Frameworks – Ratings and Credit Quality for Investor-Owned Utilities at 2 (June 18, 2010).

[19] http://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html

Equity is a comparative assessment. As such, even if it were the case that revenue stabilization mechanisms mitigate "risk," they only would affect the Cost of Equity if: (1) the effect of the mechanism was to reduce risk below the levels faced by the subject company's peers in the proxy group; and (2) investors knowingly reduced their return requirements for the Company as a direct consequence of the mechanisms. Because the proxy companies all have a revenue stabilization mechanism in some form, in my view, the Company's proposed decoupling mechanism would not reduce its Cost of Equity.

V. PROXY GROUP SELECTION

Q. As a preliminary matter, why is it necessary to select a group of proxy companies to determine the Company's Cost of Equity?

A. The Cost of Equity for a given enterprise depends on the risks attendant to the business in which the subject company is engaged. According to financial theory, the value of a given company is equal to the aggregate market value of its constituent business units. The value of the individual business units reflects the risks and opportunities inherent in the business sectors in which those units operate. Because the ROE is a market-based concept, and in light of the fact that the Company is not a publicly traded entity, it is necessary to establish a group of companies that are both publicly traded and comparable to the Company in certain fundamental respects to serve as its "proxy" in the ROE estimation process.

Even if the Company were a publicly traded entity, it is possible that short-term events could bias its market value in one way or another during a given period. A significant

benefit of using a proxy group, therefore, is that it serves to moderate the effects of anomalous, temporary events that may be associated with any one company.

Q. Does the selection of a proxy group suggest that analytical results will be tightly clustered around average (*i.e.*, mean) results?

A. Not necessarily. The DCF approach is based on the theory that a stock's current price represents the present value of its future expected cash flows. The DCF model is defined as the sum of the expected dividend yield and projected long-term growth. Notwithstanding the care taken to ensure risk comparability, market expectations with respect to future risks and growth opportunities will vary from company to company. Therefore, even within a group of similarly situated companies, it is common for analytical results to reflect a seemingly wide range. At issue, then, is how to select an ROE estimate from within that range. That determination necessarily must be based on the informed judgment and experience of the analyst.

Q. Please provide a summary profile of the Company.

A. The Company provides electric distribution service to approximately 1.4 million residential, commercial, and industrial customers in Massachusetts,[20] and has long-term

[20] NSTAR Electric Company, FERC Form 1 Annual Report, December 31, 2015, at 304; Western Massachusetts Electric Company, FERC Form 1 Annual Report, December 31, 2015, at 304.

issuer ratings of A (Outlook: Positive), and A2 (Outlook: Stable) from S&P and Moody's, respectively.[21]

Q. How did you select the companies included in your proxy group?

A. To reflect the Company's electric operations and to obtain more stable analytical results, I began with the universe of companies that Value Line classifies as Electric Utilities, which includes 41 domestic U.S. utilities. I then applied the following screening criteria:

- Because certain of the models used in my analyses assume that earnings and dividends grow over time, I excluded companies that do not consistently pay quarterly cash dividends;
- All of the companies in my proxy group have been covered by at least two utility industry equity analysts;
- All of the companies in my proxy group have investment grade senior unsecured bond and/or corporate credit ratings from S&P;
- I excluded any company whose regulated operating income over the three most recently reported fiscal years comprised less than 60.00 percent of the respective totals for that company;

[21] Source: SNL Financial. NSTAR Electric and Western Massachusetts Electric have the same credit ratings from both S&P and Moody's.

- I excluded any company whose regulated electric operating income over the three most recently reported fiscal years represented less than 60.00 percent[22] of total regulated operating income; and
- I eliminated companies that are currently known to be party to a merger, or other significant transaction that may affect the stock price and growth rate.

Those screening criteria produced the following group of 20 proxy companies:

[22] In prior cases before the Department, I excluded companies whose regulated electric operating income over the three most recently reported fiscal years represented less than 90.00 percent of total regulated operating income. Due to recent consolidation in the industry, that threshold would produce a relative small group of proxy companies. As such, in this proceeding I have lowered the threshold to 60.00 percent.

Table 3: Proxy Group

Company	Ticker
ALLETE, Inc.	ALE
Alliant Energy Corp.	LNT
Ameren Corp.	AEE
American Electric Power	AEP
Avista Corp.	AVA
Black Hills Corporation	BKH
CenterPoint Energy, Inc.	CNP
CMS Energy Corp.	CMS
DTE Energy Co.	DTE
El Paso Electric	EE
IDACORP, Inc.	IDA
NorthWestern Corporation	NWE
OGE Energy Corp.	OGE
Otter Tail Corporation	OTTR
Pinnacle West Capital	PNW
PNM Resources, Inc.	PNM
Portland General Electric Co.	POR
SCANA Corp.	SCG
WEC Energy Group, Inc.	WEC
Xcel Energy, Inc.	XEL

Q. Is the approach described above consistent with prior Orders by the Department?

A. Yes, it is. In D.P.U. 10-70, the Department accepted the use of 23 electric companies as proxies for Western Massachusetts Electric Company.[23] The criteria discussed above are generally consistent with those used to select the proxy group in that proceeding, although Western Massachusetts Electric Company included a threshold of 50.00 percent

[23] D.P.U. 10-70, *Petition of Western Massachusetts Electric Company*, January 31, 2011, at 249.

of revenues from electric operations as a selection criterion, whereas my criterion requires 60.00 percent of regulated operating income from electric operations.

VI. COST OF EQUITY ESTIMATION

Q. Please briefly discuss the ROE in the context of the regulated rate of return.

A. Regulated utilities primarily use common stock and long-term debt to finance their permanent property, plant, and equipment. The overall Rate of Return for a regulated utility is based on its weighted average cost of capital, in which the cost rates of the individual sources of capital are weighted by their respective book values. Although the costs of debt and preferred stock can be directly observed, the Cost of Equity is market-based and, therefore, must be estimated based on observable market information.

Q. How is the required ROE determined?

A. The required ROE is estimated by using one or more analytical techniques that rely on market-based data to quantify investor expectations regarding required equity returns, adjusted for certain incremental costs and risks. By their very nature, quantitative models produce a range of results from which the market required ROE must be selected. As discussed throughout my Direct Testimony, that selection must be based on a comprehensive review of relevant data and information, and does not necessarily lend itself to a strict mathematical solution or formulaic approach. Consequently, the key consideration in determining the Cost of Equity is to ensure that the methodologies employed reasonably reflect investors' view of the financial markets in general, and the subject company (in the context of the proxy group) in particular.

Although we cannot directly observe the Cost of Equity, we can observe the methods frequently used by analysts and investors to arrive at their return requirements and expectations. While investors and analysts tend to use multiple approaches in developing their estimate of return requirements, each methodology requires certain judgment with respect to the reasonableness of assumptions and the validity of proxies in its application. In essence, analysts and academics understand that ROE models are tools to be used in the ROE estimation process and that strict adherence to any single approach, or the specific results of any single approach, can lead to flawed and unreliable conclusions. That position is consistent with the *Hope* and *Bluefield* finding that it is the analytical result, as opposed to the methodology, that is controlling in arriving at ROE determinations. A reasonable ROE estimate therefore considers alternative methodologies, observable market data, and the reasonableness of empirical results.

In my view, it is both prudent and appropriate to use multiple methodologies to mitigate the risk that the inputs required for a given approach may be less reliable, or that the underlying assumptions for a given approach may be less applicable, due to changing or anomalous market conditions. Such use, however, must be tempered with due caution as to the results generated by each individual approach. As such, I have considered the results of the Constant Growth and Multi-Stage forms of the DCF model, the Capital Asset Pricing Model, and the Bond Yield Plus Risk Premium approach.

A. Constant Growth Discounted Cash Flow Model

Q. Are DCF models widely used in regulatory proceedings?

A. Yes, in my experience the DCF model is widely recognized in regulatory proceedings. Nonetheless, neither the DCF nor any other model should be applied without considerable judgment in the selection of data and the interpretation of results.

Q. Please describe the DCF approach.

A. The DCF approach is based on the theory that a stock's current price represents the present value of all expected future cash flows. In its simplest form, the DCF model expresses the Cost of Equity as the sum of the expected dividend yield and long-term growth rate, and is expressed as follows:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_\infty}{(1+k)^\infty} \quad [1]$$

where P represents the current stock price, $D_1 \ldots D_\infty$ represent expected future dividends, and k is the discount rate, or required ROE. Equation [1] is a standard present value calculation that can be simplified and rearranged into the familiar form:

$$k = \frac{D_0\,(1+g)}{P} + g \quad [2]$$

Equation [2] often is referred to as the "Constant Growth DCF" model, in which the first term is the expected dividend yield and the second term is the expected long-term growth rate.

Q. What assumptions are required for the Constant Growth DCF model?

A. The Constant Growth DCF model requires the following assumptions: (1) a constant average growth rate for earnings and dividends; (2) a stable dividend payout ratio; (3) a constant price-to-earnings ("P/E") multiple; and (4) a discount rate greater than the expected growth rate. The model further assumes that the calculated Cost of Equity applies every year, without change, in perpetuity. The Department has recognized the limiting nature of those assumptions, pointing out that "[t]his model has a number of very strict assumptions…" and that those assumptions "…affect the estimates of cost of equity."[24] In that regard, the Department's observations are consistent with the position noted earlier: considerable judgment should be applied in developing the Constant Growth DCF analysis, and in interpreting the model's results.

Q. What market data did you use to calculate the dividend yield component of your DCF model?

A. The dividend yield is based on the current annualized dividend of the proxy companies, and average closing stock prices over the 30-, 90-, and 180-trading days as of November 30, 2016.

Q. Why did you use three averaging periods to calculate the average stock price?

A. I did so to ensure that the model's results are not skewed by anomalous events that may affect stock prices on any given trading day. At the same time, the averaging period

[24] D.P.U. 13-90, *Petition of Fitchburg Gas and Electric Light Company (Electric Division) d/b/a Unitil*, May 30, 2014, at 217.

should be reasonably representative of expected capital market conditions over the long term. In prior proceedings, I have used 30-, 90- and 180-day averaging periods. I have done so in this proceeding, as well. As discussed later in my Direct Testimony, however, to the extent that the longer averaging conventions reach back to periods during which utility stocks were valued at unusually high levels, Discounted Cash Flow-based methods may provide unreasonably low results.

Q. Did you make any adjustments to the dividend yield to account for periodic growth in dividends?

A. Yes, I did. Because utility companies tend to increase their quarterly dividends at different times throughout the year, it is reasonable to assume that dividend increases will be evenly distributed over calendar quarters. Given that assumption, it is appropriate to calculate the expected dividend yield by applying one-half of the long-term growth rate to the current dividend yield.[25] That adjustment ensures that the expected dividend yield is, on average, representative of the coming twelve-month period, and does not overstate the dividends to be paid during that time.

Q. Is it important to select appropriate measures of long-term growth in applying the DCF model?

A. Yes. In its Constant Growth form, the DCF model (*i.e.*, as presented in Equation [2] above) assumes a single growth estimate in perpetuity. In order to reduce the long-term growth rate to a single measure, one must assume a constant payout ratio, and that

[25] *See*, Exhibit ES-RBH-3.

earnings per share, dividends per share, and book value per share all grow at the same constant rate. Over the long term, however, dividend growth can only be sustained by earnings growth. Consequently, it is important to incorporate a variety of measures of long-term earnings growth into the Constant Growth DCF model.

Q. Please summarize the findings of academic research on the appropriate measure for estimating equity returns using the DCF model.

A. The relationship between various growth rates and stock valuation metrics has been the subject of much academic research.[26] As noted over 40 years ago by Charles Phillips in The Economics of Regulation:

> For many years, it was thought that investors bought utility stocks largely on the basis of dividends. More recently, however, studies indicate that the market is valuing utility stocks with reference to total per share earnings, so that the earnings-price ratio has assumed increased emphasis in rate cases.[27]

Philips' conclusion continues to hold true. Subsequent academic research has clearly and consistently indicated that measures of earnings and cash flow are strongly related to returns, and that analysts' forecasts of growth are superior to other measures of growth in

[26] *See*, *e.g.*, Harris, Robert, *Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return*, Financial Management, Spring 1986.

[27] Charles F. Phillips, Jr., The Economics of Regulation, Revised Edition, 1969, Richard D. Irwin, Inc., at 285.

predicting stock prices.[28] For example, Vander Weide and Carleton state that, "[our] results…are consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy-and-sell decisions."[29] Other research specifically notes the importance of analysts' growth estimates in determining the Cost of Equity, and in the valuation of equity securities. Dr. Robert Harris noted that "a growing body of knowledge shows that analysts' earnings forecast are indeed reflected in stock prices." Citing Cragg and Malkiel, Dr. Harris notes that those authors "found that the evaluations of companies that analysts make are the sorts of ones on which market valuation is based."[30] Similarly, Brigham, Shome and Vinson noted that "evidence in the current literature indicates that (i) analysts' forecasts are superior to forecasts based solely on time series data; and (ii) investors do rely on analysts' forecasts."[31]

To that point, the research of Carleton and Vander Weide demonstrates that earnings growth projections have a statistically significant relationship to stock valuation levels,

---

[28] *See*, *e.g*., Christofi, Christofi, Lori and Moliver, *Evaluating Common Stocks Using Value Line's Projected Cash Flows and Implied Growth Rate*, Journal of Investing (Spring 1999); Harris and Marston, *Estimating Shareholder Risk Premia Using Analysts Growth Forecasts*, Financial Management, 21 (Summer 1992); and Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management, Spring 1988.

[29] Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management, Spring 1988.

[30] Robert S. Harris, *Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return*, Financial Management, Spring 1986.

[31] Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, Financial Management, Spring 1985.

whereas dividend growth projections do not. Those findings suggest that investors form their investment decisions based on expectations of growth in earnings, not dividends. Consequently, earnings growth not dividend growth is the appropriate estimate for the purpose of the Constant Growth DCF model.

Q. Please summarize your inputs to the Constant Growth DCF model.

A. I applied the DCF model to the proxy group of electric utility companies using the following inputs for the price and dividend terms:

- The average daily closing prices for the 30-trading days, 90-trading days, and 180-trading days ended November 30, 2016 for the term P_0; and
- The annualized dividend per share as of November 30, 2016 for the term D_0.

I then calculated the DCF results using each of the following growth terms:

- The Zacks consensus long-term earnings growth estimates;
- The First Call consensus long-term earnings growth estimates; and
- The Value Line long-term earnings growth estimates.

Q. How did you calculate the high and low DCF results?

A. I calculated the proxy group mean high DCF result using the maximum Earnings Per Share ("EPS") growth rate as reported by Value Line, Zacks, and Yahoo! First Call for each proxy company in combination with the dividend yield for each of the proxy group companies. The average mean high result then reflects the average maximum DCF result for the proxy group as a whole. I used a similar approach to calculate the proxy group

mean low results, using instead the minimum growth rate as reported by Value Line, Zacks, and Yahoo! First Call for each proxy company.

Q. What are the results of your DCF analysis?

A. My Constant Growth DCF results are summarized in Table 4 (*see also*, Exhibit ES-RBH-3).

Table 4: Constant Growth DCF Results

	Mean Low	***Mean***	***Mean High***
30-Day Average	8.18%	8.94%	9.69%
90-Day Average	8.13%	8.89%	9.65%
180-Day Average	8.15%	8.91%	9.66%

Q. How did you reflect the Constant Growth DCF results in your ROE range and recommendation?

A. I recognize that in D.P.U. 13-90 the Department noted that the assumptions in the Constant Growth DCF model are "responsible for DCF cost of equity anomalies" and that because of those limitations "it is appropriate to consider all of the DCF estimates when evaluating the [c]ompany's ROE."[32] I agree with the Department that the assumptions underlying the Constant Growth DCF model may produce anomalous results; those results should be viewed with caution, particularly in light of the present capital market conditions that I discuss below. My recommendation therefore considers

[32] D.P.U. 13-90, *Petition of Fitchburg Gas and Electric Light Company (Electric Division) d/b/a Unitil*, May 30, 2014, at 219. [clarification added]

the full range of DCF results, along with the range of results from the methods discussed in the following sections of my Direct Testimony.

B. Multi-Stage Discounted Cash Flow Model

Q. What other forms of the DCF model have you used?

A. To address certain limiting assumptions underlying the Constant Growth form of the DCF model (such as those noted by the Department), I also applied the Multi-Stage (three-stage) Discounted Cash Flow Model. The Multi-Stage model, which is an extension of the Constant Growth form and has been applied in regulatory proceedings, enables the analyst to specify growth rates over three distinct stages. As with the Constant Growth form of the DCF model, the Multi-Stage form defines the Cost of Equity as the discount rate that sets the current price equal to the discounted value of future cash flows. Unlike the Constant Growth form, however, the Multi-Stage model must be solved in an iterative fashion.

Q. Is the Multi-Stage form of the DCF method commonly considered in regulatory proceedings?

A. Yes, it is. In my experience, forms of the Multi-Stage DCF approach have been presented and accepted in regulatory proceedings. For example, the Colorado Public Utilities Commission has found that the Multi-Stage DCF approach is "a rational, model-based approach supported by the evidence."[33] In previous rate cases before the

[33] Colorado Public Utilities Commission, Proceeding No. 12-AL-1268G, Decision No. R13-1307, at para. 318 and 321.

Department, the Multi-Stage DCF method has been presented, and the Department has noted the appropriateness of considering all of the DCF estimates when evaluating the Return on Equity.[34]

Q. Please summarize why you have included the Multi-Stage DCF model among those used to estimate the Cost of Equity.

A. First, as noted earlier it is both prudent and appropriate to use multiple methodologies to mitigate the effects of assumptions and inputs associated with any single approach. Second, the Constant Growth DCF model assumes that earnings, dividends, and book value will grow at the same, constant rate in perpetuity; that the payout ratio will remain constant in perpetuity; and that the Price/Earnings ratio will remain constant in perpetuity. The model further assumes that the return required today will be the same return required every year in the future. Those assumptions, however, are not likely to hold. In particular, it is likely that over time, payout ratios will increase from their current levels and, to the extent that long-term interest rates increase over the next few years, it is likely that the Cost of Equity also will increase. In my view, the Multi-Stage DCF model enables analysts to consider those issues, and to address the limiting and likely unrealistic assumptions underlying the Constant Growth form of the model.

[34] *See, e.g.*, *Petition of Fitchburg Gas and Electric Light Company (Electric Division) d/b/a Unitil,* D.P.U. 13-90, Order, May 30, 2014, at 219.

Q. Please generally describe the structure of your Multi-Stage DCF model.

A. As noted above, the model sets the subject company's stock price equal to the present value of future cash flows received over three "stages." In the first two stages, "cash flows" are defined as projected dividends. In the third stage, "cash flows" equal both dividends and the expected price at which the stock will be sold at the end of the period (*i.e.*, the "terminal price"). I calculated the terminal price based on the Gordon model, which defines the price as the expected dividend divided by the difference between the Cost of Equity (*i.e.*, the discount rate) and the long-term expected growth rate. In essence, the terminal price is defined by the present value of the remaining "cash flows" in perpetuity. In each of the three stages, the dividend is the product of the projected EPS and the expected dividend payout ratio. A summary description of the model is provided in Table 5 (below).

Table 5: Multi-Stage DCF Structure

Stage	**0**	**1**	**2**	**3**
Cash Flow Component	Initial Stock Price	Expected Dividend	Expected Dividend	Expected Dividend + Terminal Value
Inputs	Stock Price; EPS; Dividends Per Share ("DPS")	Expected EPS; Expected DPS	Expected EPS; Expected DPS	Expected EPS; Expected DPS; Terminal Value
Assumptions	30-, 90-, and 180-day average stock price	EPS Growth Rate; Payout Ratio	Growth Rate Change; Payout Ratio Change	Long-term Growth Rate; Long-term Payout Ratio

Q. What are the analytical benefits of your three-stage model?

A. The principal benefits relate to the flexibility provided by the model's formulation. Because the model provides the ability to specify near-term, intermediate, and long-term growth rates, it avoids the sometimes-limiting assumption that the subject company will grow at the same, constant rate in perpetuity. In addition, by calculating the dividend as the product of earnings and the payout ratio, the model enables analysts to reflect assumptions regarding the timing and extent of changes in the payout ratio to reflect, for example, increases or decreases in expected capital spending, or transition from current payout levels to long-term expected levels. In that regard, because the model is not

limited to a single provider, such as Value Line, for all inputs, it mitigates the potential bias associated with relying on a single source of growth rate projections.[35]

The Multi-Stage model also enables the analyst to assess the reasonableness of the inputs and results by reference to certain market-based metrics. For example, the terminal stock price can be divided by the expected earnings per share in the terminal year to calculate the expected P/E ratio. Similarly, the terminal P/E ratio can be divided by the terminal growth rate to develop a Price to Earnings Growth ("PEG") ratio. To the extent that the projected P/E or PEG ratios are inconsistent with historical experience, it may indicate incorrect or inconsistent assumptions within the balance of the model.

Q. Please summarize your inputs to the Multi-Stage DCF model.

A. I applied the Multi-Stage model to the proxy group described earlier in my Direct Testimony. My assumptions with respect to the various model inputs are described in Table 6 (below).

[35] *See, e.g.*, Harris and Marston, *Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts*, Financial Management, 21 (Summer 1992).

Table 6: Multi-Stage DCF Model Assumptions

Stage	Initial	First	Transition	Terminal
Stock Price	30-, 90-, and 180-day average stock price as of November 30, 2016			
Earnings Growth	2015 actual EPS escalated by Period 1 growth rate	EPS growth as average of: (1) Value Line; (2) Zacks; (3) First Call	Transition to Long-term GDP growth	Long-term GDP growth
Payout Ratio		Value Line company-specific	Transition to long-term industry payout ratio	Long-term expected payout ratio
Terminal Value				Expected dividend in final year divided by solved Cost of Equity less long-term growth rate

Q. How did you calculate the long-term GDP growth rate?

A. The long-term growth rate of 5.36 percent is based on the real Gross Domestic Product ("GDP") growth rate of 3.24 percent, and an inflation rate of 2.05 percent. The real GDP growth equals the compound annual rate of growth in the chain-weighted real GDP from

1929 through 2015.[36] The rate of inflation of 2.05 percent is an average of two components: the compound annual forward rate starting in ten years (i.e., 2026, which is the beginning of the terminal period) based on the 180-day average spread between yields on long-term nominal Treasury Securities and long-term Treasury Inflation Protected Securities, known as the "TIPS spread" of 1.80 percent; and the projected Blue Chip Financial Forecast of CPI for 2023 – 2027 of 2.30 percent. I averaged these two measures of inflation because nominal Treasury yields are related to inflation, and given the effect of commodities (such as oil) on inflation, the current TIPS spread may somewhat understate long-term expected inflation.

Q. What were your specific assumptions with respect to the payout ratio?

A. As noted in Table 6, for the first two periods I relied on the first year and long-term projected payout ratios reported by Value Line[37] for each of the proxy group companies. I then assumed that by the end of the second period (*i.e.*, the end of year 10), the payout ratio will converge to the long-term industry average of 66.88 percent.[38]

Q. What was your principal assumption regarding the terminal value?

A. Although I performed a series of analyses in which the terminal value is calculated based

---

[36] Bureau of Economic Analysis, November 29, 2016 update.

[37] As reported in the Value Line Investment Survey as "All Div'ds to Net Prof."

[38] Source: Bloomberg Professional. The assumption of mean reversion in payout ratios is consistent with published texts. As noted by Morin, "Most firms, including utilities, tend to maintain a fixed payout ratio when it is averaged over several years." *See* Roger A. Morin, PhD, New Regulatory Finance, Public Utilities Reports, June 2006, at 258.

on the terminal growth rate described above,[39] I also performed a series of analyses in which the terminal value is based on the current P/E ratio.[40] The results of those analyses are shown in Table 7 below (*see also*, Exhibit ES-RBH-4, pages 11-19).

Table 7: Multi-Stage DCF Results

	Low	***Mean***	***High***
30-Day Average	9.77%	10.24%	10.70%
90-Day Average	9.65%	10.11%	10.57%
180-Day Average	9.69%	10.15%	10.61%

Q. Did you undertake any additional analyses to support your DCF model results?

A. Yes. While the Department accepts the DCF models in its analysis, it may also rely on other approaches to determine the appropriate rate of return. As such, I also applied the Capital Asset Pricing Model, and the Bond Yield Plus Risk Premium method.

C. Capital Asset Pricing Model Analysis

Q. Please briefly describe the general form of the CAPM analysis.

A. The CAPM analysis is a risk premium approach that estimates the Cost of Equity for a given security as a function of a risk-free return plus a risk premium (to compensate investors for the non-diversifiable or "systematic" risk of that security). As shown in

[39] *See*, Exhibit ES-RBH-4, pages 1-9.

[40] Defined as the 30-day average of the proxy group P/E ratio, calculated as an Index. In D.P.U. 15-155, the Attorney General argued that utilities' relatively high P/E ratios are "justified." *See*, Testimony and Exhibits of J. Randall Woolridge, Ph.D., D.P.U. 15-155, at 70.

Equation [3], the CAPM is defined by four components, each of which theoretically must be a forward-looking estimate:

$$k = r_f + \beta(r_m - r_f) \quad [3]$$

where:

k = the required market ROE;

β = Beta coefficient of an individual security;

r_f = the risk-free rate of return; and

r_m = the required return on the market as a whole.

In Equation [3], the term ($r_m - r_f$) represents the Market Risk Premium. According to the theory underlying the CAPM, since unsystematic risk can be diversified away by adding securities to their investment portfolios, investors should be concerned only with systematic or non-diversifiable risk. Non-diversifiable risk is measured by the Beta coefficient, which is defined as:

$$\beta_j = \frac{\sigma_j}{\sigma_m} x \, \rho_{j,m} \quad [4]$$

where σ_j is the standard deviation of returns for company "j"; σ_m is the standard deviation of returns for the broad market (as measured, for example, by the S&P 500 Index); and $\rho_{j,m}$ is the correlation of returns between company j and the broad market. Thus, the Beta coefficient represents both the relative volatility (*i.e.*, the standard deviation) of returns, and the correlation in returns between the subject company and the overall market.

Q. What assumptions regarding the risk-free rate did you include in your CAPM analysis?

A. Because utility assets represent long-term investments, I used two different estimates of the risk-free rate: (1) the current 30-day average yield on 30-year Treasury bonds (*i.e.*, 2.75 percent); and (2) the near-term (that is, through the first calendar quarter of 2018) projected 30-year Treasury yield (*i.e.*, 3.13 percent).[41]

Q. Please describe your *ex-ante* approach to estimating the Market Risk Premium.

A. The approach is based on the market-required return, less the current 30-year Treasury bond yield. To do so, I relied on data from two sources: (1) Bloomberg; and (2) Value Line. For both Bloomberg and Value Line, I calculated the market capitalization weighted expected dividend yield (using the same one-half growth rate assumption described earlier), and combined that amount with the market capitalization weighted projected earnings growth rate to arrive at the market capitalization weighted average DCF result. I then subtracted the current 30-year Treasury yield from that amount to arrive at the market DCF-derived *ex-ante* Market Risk Premium estimate. The results of those calculations are provided in Exhibit ES-RBH-5.

Q. How did you apply your expected Market Risk Premium and risk-free rate estimates?

A. I relied on each of the *ex-ante* Market Risk Premia discussed above, together with the current and projected 30-year Treasury bond yields as inputs to my CAPM analyses.

---

[41] *See*, Blue Chip Financial Forecasts, Vol. 35, No. 12, December 1, 2016, at 2.

Q. What Beta coefficients did you use in your CAPM analysis?

A. As shown in Exhibit ES-RBH-6, I considered the Beta coefficients reported by two sources: Bloomberg and Value Line. For each source, I employed the average of the reported Beta coefficient for each proxy company. While both of those services adjust their calculated (or "raw") Beta coefficients to reflect the tendency of the Beta coefficient to regress to the market mean of 1.00, Value Line calculates the Beta coefficient over a five-year period, while Bloomberg's calculation is based on two years of data.

Q. What are the results of your CAPM analyses?

A. The results are summarized in Table 8 (*see also*, Exhibit ES-RBH-7).

Table 8: Summary of CAPM Results

	Bloomberg Derived Market Risk Premium	***Value Line Derived Market Risk Premium***
Average Bloomberg Beta Coefficient		
Current 30-Year Treasury (2.75%)	8.90%	9.51%
Near-Term Projected 30-Year Treasury (3.13%)	9.28%	9.89%
Average Value Line Beta Coefficient		
Current 30-Year Treasury (2.75%)	10.19%	10.94%
Near-Term Projected 30-Year Treasury (3.13%)	10.57%	11.32%

D. Bond Yield Plus Risk Premium Approach

Q. Please generally describe the Bond Yield Plus Risk Premium approach.

A. This approach is based on the basic financial tenet that equity investors bear the residual

risk associated with ownership and therefore require a premium over the return they would have earned as a bondholder. That is, since returns to equity holders are more risky than returns to bondholders, equity investors must be compensated for bearing that additional risk. Risk premium approaches, therefore, estimate the Cost of Equity as the sum of the equity risk premium, and the yield on a particular class of bonds. Because the Equity Risk Premium is not directly observable, it must be estimated using one of several approaches, some of which incorporate *ex-ante*, or forward-looking estimates of the Cost of Equity, and others that consider historical, or *ex-post*, estimates. An alternative approach is to use actual authorized returns for electric utilities to estimate the Equity Risk Premium.

Q. Please explain how you performed your Bond Yield Plus Risk Premium analysis.

A. As discussed above, I first defined the Risk Premium as the difference between authorized ROEs and the then-prevailing level of long-term (*i.e.*, 30-year) Treasury yield. I then gathered data from 1,488 electric utility proceedings between January 1, 1980 and November 30, 2016.[42] I also calculated the average period between the filing of the case and the date of the final order (that is, the lag period). To reflect the prevailing level of interest rates during the pendency of each proceeding, I calculated the average 30-year Treasury yield over the applicable average lag period (approximately 201 days).

[42] Source: Regulatory Research Associates.

Because the data covers a number of economic cycles,[43] the analysis also may be used to assess the stability of the Equity Risk Premium. As noted above, the Equity Risk Premium is not constant over time; prior research has shown that it is directly related to expected market volatility, and inversely related to the level of interest rates.[44] That finding is particularly relevant given the historically low level of current Treasury yields.

Q. How did you model the relationship between interest rates and the Equity Risk Premium?

A. I modeled the relationship using regression analysis, in which the observed Equity Risk Premium was the dependent variable, and the average 30-year Treasury yield was the independent variable. Relative to the long-term historical average, the analytical period includes interest rates and authorized ROEs that are quite high during one period (*i.e.*, the 1980s) and that are quite low during another (*i.e.*, the post-Lehman bankruptcy period). To account for that variability, I used the semi-log regression equation, in which the Equity Risk Premium is expressed as a function of the natural log of the 30-year Treasury yield:

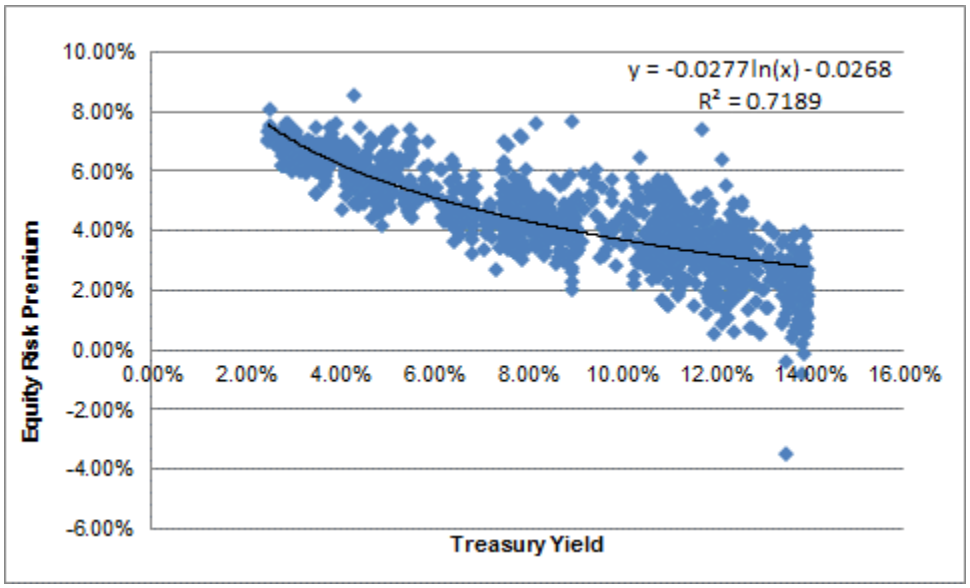
$$RP = \alpha + \beta(LN(T_{30})) \quad [5]$$

[43] *See*, National Bureau of Economic Research, U.S. Business Cycle Expansion and Contractions.

[44] *See*, *e.g.*, Robert S. Harris and Felicia C. Marston, *The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts*, Journal of Applied Finance, Vol. 11, No. 1, 2001, at 11-12; Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, Financial Management, Spring 1985, at 33-45; and Farris M. Maddox, Donna T. Pippert, and Rodney N. Sullivan, *An Empirical Study of Ex Ante Risk Premiums for the Electric Utility Industry*, Financial Management, Autumn 1995, at 89-95.

As shown on Chart 2 (below), semi-log regressions are useful when measuring an absolute change in the dependent variable (in this case, the Risk Premium) relative to a proportional change in the independent variable (the 30-year Treasury yield).

Chart 2: Equity Risk Premium[45]



As Chart 2 demonstrates, over time there has been a statistically significant, negative relationship between the 30-year Treasury yield and the Equity Risk Premium. An important consequence of that relationship is that simply applying the long-term average Equity Risk Premium of 4.53 percent (*see* Exhibit ES-RBH-8) to current Treasury yields would significantly understate the Cost of Equity. Based on the regression coefficients in Chart 2, however, the implied ROE is between 10.01 percent and 10.34 percent (*see* Exhibit ES-RBH-8).

[45] *See also*, Exhibit ES-RBH-8.

VII. BUSINESS RISKS AND OTHER CONSIDERATIONS

Q. What additional information did you consider in assessing the analytical results discussed above?

A. Because the analytical methods discussed above produce a range of estimates, there are several additional factors that should be taken into consideration when establishing a reasonable range for the Company's Cost of Equity. Those factors include (1) the Company's rate mechanisms relative to its peers, (2) flotation costs, and (3) the increasing prevalence of DG and long-term contracts.

A. Rate Mechanisms

Q. Please provide an overview of the Department's prior directive regarding rate case proceedings and evidence of the relationship between cost recovery mechanisms and the Cost of Equity.

A. In the Department's Order in D.P.U. 07-50A, *Investigation by the Department of Public Utilities on its own Motion into Rate Structures that will Promote Efficient Deployment of Demand Resources* (the "Decoupling Order"), the Department stated that it "will consider the impact of a decoupling mechanism for a distribution company along with all other factors affecting that company's required ROE in the context of a rate proceeding, where the evidence and arguments may be fully tested."[46] In rate case orders issued since the Decoupling Order, the Department consistently has stated that it considers each

[46] D.P.U. 07-50A, *Investigation by the Department of Public Utilities on its own Motion into Rate Structures that will Promote Efficient Deployment of Demand Resources*, Order, July 16, 2008, at 74.

company's reconciling mechanisms when determining the allowed ROE.[47] Consistent with the Department's directive in the Decoupling Order, in this section I present evidence regarding the effect of the Company's proposed revenue decoupling mechanisms on its relative risk (and, therefore, on its Cost of Equity). As discussed below, my assessment focuses on the prevalence of revenue stabilization mechanisms among the proxy companies.

Q. Please briefly describe the Company's proposed Revenue Decoupling and Performance Based Rate mechanisms.

A. In this proceeding, the Company is proposing a full revenue decoupling mechanism ("RDM") for NSTAR Electric that is substantially similar to the mechanism approved by the Department for WMECO in D.P.U. 10-70, in that actual billed revenue would be reconciled annually with target revenue set by the Department. The proposed RDM tariff applies to both WMECO (replacing the current WMECO RDM) and NSTAR Electric. To recover the distribution revenue target through the RDM, actual revenue is compared to the distribution target revenue at the end of the year, and the difference is allocated to each rate class and divided by forecast sales to produce a cent per kWh revenue decoupling adjustment factor ("RDAF") for each class. The RDAF is applied to customer's billed kWh during the subsequent year, and can be either a credit or debit,

[47] *See e.g.*, D.P.U. 09-39, *Petition of Massachusetts Electric Company and Nantucket Electric Company*, Order, November 30, 2009, at 392; D.P.U. 12-25, *Petition of Bay State Gas Company, d/b/a Columbia Gas of Massachusetts*, Order, November 1, 2012, at 438-439; D.P.U. 13-90, Petition *of Fitchburg Gas and Electric Light Company (Electric Division) d/b/a Unitil*, Order, May 30, 2014, at 234.

depending on whether actual revenue is greater than or less than the distribution revenue target in the prior year.[48]

In addition, as described by Witnesses Edward A. Davis and Richard D. Chin, the Company's annual distribution revenue target would be determined by its proposed performance-based ratemaking mechanism ("PBRM") for both NSTAR Electric and WMECO. The PBRM would annually adjust the distribution revenue target approved by the Department for inflation and other factors. This adjustment would be allocated to each rate class within NSTAR Electric and WMECO, and the non-customer components of base rates in each class would be adjusted accordingly. Once base distribution rates are adjusted through the PBRM, the new revenue target for each entity is reconciled through the RDM as described above.

Q. How common are revenue stabilization and cost recovery mechanisms within the industry in general?

A. There is little question that revenue stabilization and cost recovery structures have become increasingly common. The increased interest in such mechanisms has generally resulted from the growing cost of maintaining system reliability, coupled with flat or declining sales volume brought on by energy efficiency. Adjustment mechanisms to recover fuel costs, purchased power expenses, energy efficiency and demand-side program costs, new plant investment, and other expenses are common.[49] In addition,

[48] The Company is proposing to calculate separate RDAFs for NSTAR Electric and WMECO.
[49] *See*, Exhibit ES-RBH-10.

decoupling mechanisms have been implemented by electric utilities in 25 states.[50] Although the specific form of the Company's proposed mechanisms may be unique, the adoption and implementation of alternative regulation mechanisms in general is quite common and has become an increasingly visible issue to investors.

Q. Are cost recovery and revenue stabilization mechanisms common among the proxy companies?

A. Yes, they are. Exhibit ES-RBH-10 provides a summary of revenue stabilization mechanisms and cost trackers currently in effect at each electric utility subsidiary of the proxy companies. As Exhibit ES-RBH-10 demonstrates, all of the proxy companies employ cost recovery mechanisms similar to those in place at the Company. Nearly all of the proxy companies' operating subsidiaries recover fuel, as well as energy efficiency costs through a cost recovery mechanism; and 14 of the 20 proxy companies have mechanisms in place to recover costs of renewable energy projects, such as the Commonwealth's Renewable Portfolio Standard ("RPS").[51] As to decoupling mechanisms, ten of the 20 proxy companies have either full or partial decoupling mechanisms in place in at least one operating subsidiary. Exhibit ES-RBH-10 also includes a summary of the alternative regulation and incentive plans currently in effect at the proxy companies, including formula-based rate plans, which provide comprehensive

[50] *See, e.g., Adjustment Clauses: A State-by-State Overview*, Regulatory Research Associates Regulatory Focus, August 22, 2016.

[51] As mandated by the Green Communities Act, Acts of 2008, Chapter 169, Section 83 and 83A, as amended by Acts of 2012, Chapter 209.

adjustment mechanisms that automatically adjust rates in the event that earned return is above or below an authorized range.

Q. How have you reflected that information in your assessment of the Company's Cost of Equity?

A. First, my analyses and conclusions recognize that developing the Cost of Equity necessarily is a comparative assessment. As such, even if it were the case that revenue stabilization mechanisms mitigate "risk," they only would affect the Cost of Equity if: (1) the effect of the mechanism was to reduce risk below the levels faced by the subject company's peers in the proxy group; and (2) investors knowingly reduced their return requirements for the Company as a direct consequence of the mechanisms. The first analytical step, therefore, is to understand whether revenue stabilization mechanisms are in place at the proxy companies.

I have addressed the question of the extent to which revenue stabilization mechanisms are in place at comparable companies in Exhibit ES-RBH-10. There, I note that all of the 20 proxy companies have such mechanisms in place in at least one jurisdiction. Because revenue stabilization mechanisms are so common among electric distribution utilities, there is no reason to believe that the Company is less risky than its peers. I therefore do not believe it would be appropriate to reduce the Company's ROE in connection with its rate mechanisms, including its proposed decoupling mechanism.

B. Flotation Costs

Q. What are flotation costs?

A. Flotation costs are the costs associated with the sale of new issues of common stock. These costs include out-of-pocket expenditures for preparation, filing, underwriting and other issuance costs of common stock.

Q. Why is it important to recognize flotation costs in the allowed ROE?

A. In order to attract and retain new investors, a regulated utility must have the opportunity to earn a return that is both competitive and compensatory. To the extent that a company is denied the opportunity to recover prudently incurred flotation costs, actual returns will fall short of expected (or required) returns, thereby diminishing its ability to attract adequate capital on reasonable terms.

Q. Are flotation costs part of the utility's invested costs or part of the utility's expenses?

A. Flotation costs are part of the invested costs of the utility, which are properly reflected on the balance sheet under "paid in capital." They are not current expenses, and therefore are not reflected on the income statement. Rather, like investments in rate base or the issuance costs of long-term debt, flotation costs are incurred over time. As a result, the great majority of a utility's flotation cost is incurred prior to the test year, but remains part of the cost structure that exists during the test year and beyond, and as such, should be recognized for ratemaking purposes. Therefore, recovery of flotation costs is appropriate even if no new issuances are planned in the near future because failure to

allow such cost recovery may deny the Company the opportunity to earn its required rate of return in the future.

Q. Is the need to consider flotation costs eliminated because the Company is a wholly-owned subsidiary of Eversource Energy?

A. No. Although the Company is a wholly owned subsidiary of Eversource Energy, it is appropriate to consider flotation costs because wholly owned subsidiaries receive equity capital from their parents and provide returns on the capital that roll up to the parent, which is designated to attract and raise capital based on the returns of those subsidiaries. To deny recovery of issuance costs associated with the capital that is invested in the subsidiaries ultimately would penalize the investors that fund the utility operations, and would inhibit the utility's ability to obtain new equity capital at a reasonable cost.

Q. Do the DCF and CAPM models already incorporate investor expectations of a return in order to compensate for flotation costs?

A. No. The models used to estimate the appropriate ROE assume no "friction" or transaction costs, as these costs are not reflected in the market price (in the case of the DCF model) or risk premium (in the case of the CAPM and the Bond Yield Plus Risk Premium model). Therefore, it is appropriate to consider flotation costs when determining where within the range of reasonable results the Company's return should fall.

Q. Is the need to consider flotation costs recognized by the academic and financial communities?

A. Yes. The need to reimburse investors for equity issuance costs is recognized by the

academic and financial communities in the same spirit that investors are reimbursed for the costs of issuing debt. This treatment is consistent with the philosophy of a fair rate of return. As explained by Dr. Shannon Pratt:

> Flotation costs occur when a company issues new stock. The business usually incurs several kinds of flotation or transaction costs, which reduce the actual proceeds received by the business. Some of these are direct out-of-pocket outlays, such as fees paid to underwriters, legal expenses, and prospectus preparation costs. Because of this reduction in proceeds, the business's required returns must be greater to compensate for the additional costs. Flotation costs can be accounted for either by amortizing the cost, thus reducing the net cash flow to discount, or by incorporating the cost into the cost of equity capital. Since flotation costs typically are not applied to operating cash flow, they must be incorporated into the cost of equity capital.[52]

Q. Have you calculated the effect of flotation costs on the return on equity?

A. Yes, I have. I modified the DCF calculation to derive the dividend yield that would reimburse investors for direct issuance costs. Based on the weighted average issuance costs shown in Exhibit ES-RBH-11, a reasonable estimate of flotation costs is approximately 0.12 percent (12 basis points).

C. Other Considerations

Q. Are there other business risks that you have considered in developing your ROE recommendation?

A. Yes, there are. First, one objective of the 2012 *Act relative to competitively priced*

[52] Shannon P. Pratt, Roger J. Grabowski, Cost of Capital: Applications and Examples, 4th ed. (John Wiley & Sons, Inc., 2010), page 586.

electricity in the Commonwealth[53] is to expand distributed generation and net metering opportunities, and to double the amount of power supply that electric distribution companies must purchase from renewable generators under long term contracts. That policy objective was reinforced in the Department's Order in the Electric Grid Modernization proceeding (D.P.U. 12-76-B). In its Order, the Department discussed distributed generation as one of the main objectives of the proceeding:

> Integrating distributed resources, such as renewables, EVs, microgrids, and storage, is key to achieving the Commonwealth's climate and resiliency goals and statutory requirements…Grid modernization will enable the safe interconnection and full integration of greater quantities of intermittent distributed resources.[54]

From the perspective of equity investors, distributed generation resources may lead to disruptions in the traditional cost recovery model for electric utilities and electricity markets and, therefore, introduce an incremental element of uncertainty and risk. Although it is difficult to quantify the effect, the additional risk associated with distributed generation within the Commonwealth of Massachusetts provides additional support for my ROE range and recommendation.

In addition, pursuant to the Green Communities Act, the Company has entered into a

---

53 Chapter 209, Acts of 2012

54 D.P.U. 12-76-B, *Investigation by the Department of Public Utilities on its own Motion into Modernization of the Electric Grid,* Order, June 12, 2014, at 12-13.

series of Commonwealth-mandated contracts relating to energy procurement.[55] Those contracts, which include commitments for wind and solar power, represent long-term financial obligations. Putting aside the question of the extent to which rating agencies will, or may, impute additional debt on the Company's balance sheet in connection with those agreements, the commitments are long-term fixed obligations that the Company is contractually bound to pay. As with other long-term contractual obligations, equity investors bear the residual risk if the Company is not able to recover its costs relating to those agreements; the additional financial leverage associated with the fixed obligations concentrates the residual equity risk. Consequently, potential changes in market conditions (that affect the market value of the contracts themselves) or the regulatory environment (enabling the Company to recover its costs) may represent an additional element of equity risk.

Q. Do credit rating agencies recognize risks associated with an increase in distributed generation resources for a particular company?

A. Yes, they do. Although S&P has noted that the competitive threat from rooftop solar panels has not been significant enough to have an effect on credit quality to date, it has outlined the potential risks to the electric utility sector:

> …should solar rooftop use suddenly increase, a utility would be forced to recover its excess electric capacity costs from its remaining customers.

[55] *See e.g., Petition of NSTAR Electric Company for approval by the Department of Public Utilities of:(1) a long-term contract to purchase wind power and renewable energy certificates, pursuant to St. 2008, c. 169, § 83, and 220 C.M.R. § 17.00 et seq.; and (2) a long-term renewable energy contract adjustment mechanism tariff, M.D.P.U. No. 164,* D.P.U. 11-05/11-06/11-07, August 19, 2011.

> The resulting higher bills to the remaining utility customers would only further drive those customers to install solar panels. This could, again, prevent the utility from fully recovering its costs and investments in a timely manner, potentially harming its credit quality.[56]

Moody's has noted that under certain conditions, there could be "large negative consequences" for utilities as a result of the widespread deployment of distributed generation resources. Under those conditions, when the regulatory structure does not address the effect of distributed generation, Moody's suggests that "the likelihood of negative credit events would rise due to the technological disruption." [57]

Similarly, a July 2014 article quoted Bernstein Research analysts regarding the risk of distributed generation from a utility's perspective, stating that "[f]or the foreseeable future, distributed solar will exist in a parasitic relationship to the grid, absorbing its revenues while continuing to rely upon it for economic viability,' the analysts said, noting two specific challenges distributed solar creates for utilities: lost sales volume and a 'foregone' need for new capacity."[58]

---

[56] Standard and Poor's Research, "Why U.S. Electric Utilities' Credit Quality Can Withstand the Rise of Rooftop Solar," November 15, 2013, at 6.

[57] Moody's also refers to distributed generation as a "form of technology event risk, where event risk is low or remote, but with high severity implications should the event actually materialize." *See* Moody's Investors Service, *Regulatory framework holds keys to risk and rewards associated with distributed generation*, April 23, 2014, at 2.

[58] Copley, Michael, "Despite distributed generation's buzz, grid power 'here to stay,' Bernstein says," SNL Financial, July 21, 2014.

As to Massachusetts utilities in particular, a recent report identified the Commonwealth as among the first states in which electric industry disruption resulting from distributed generation is most likely to occur.[59]

VIII. CAPITAL MARKET ENVIRONMENT

Q. Do economic conditions influence the required cost of capital and required return on common equity?

A. Yes. As discussed in Section VI, the models used to estimate the Cost of Equity are meant to reflect, and therefore are influenced by, current and expected capital market conditions. Therefore, it is important to assess the reasonableness of any financial model's results in the context of observable market data. To the extent certain ROE estimates are incompatible with such data or inconsistent with basic financial principles, it is appropriate to consider whether alternative estimation techniques are likely to provide more meaningful and reliable results.

Q. Do you have any general observations regarding the relationship between current capital market conditions and the Company's Cost of Equity?

A. Yes, I do. Much has been reported about the Federal Reserve's market intervention since 2007, and its effect on interest rates. Although the Federal Reserve completed its Quantitative Easing initiative in October 2014, it was not until December 2015 that it

[59] Deloitte Center for Energy Solutions, *The New Math: Solving the equation for disruption to the U.S. electric power industry*, 2014, at 4. See also Barclays Credit Research, *The Solar Vortex: Credit Implications of Electric Grid Defection*, May 20, 2014, at 4.

raised the Federal Funds rate, and began the process of rate normalization.[60] A significant issue, then, is how investors will react as that process continues, and eventually is completed. A viable outcome is that investors will perceive greater chances for economic growth, which will increase the growth rates included in the Constant Growth DCF model. At the same time, higher growth and the absence of Federal market intervention could provide the opportunity for interest rates to increase, thereby increasing the dividend yield portion of the DCF model. In that case, both terms of the Constant Growth DCF model would increase, producing increased ROE estimates.

More recently, interest rates have risen and credit spreads have become increasingly volatile. In the equity markets, sectors that historically have included dividend-paying companies have lost value, as increasing interest rates have provided investors with other sources of current yields. Because those dynamics affect different models in different ways, it would be inappropriate to rely on a single method to estimate the Companies' Cost of Equity. A more reasoned approach is to understand the relationships among Federal Reserve policies, interest rates, and measures of market risk, and to assess how those factors may affect different models and their results. As discussed throughout my Direct Testimony, the current market is one in which it is very important to consider a broad range of data and models when determining the Cost of Equity.

[60] Federal Reserve Press Release dated December 16, 2015.

Q. Please summarize the effect of recent Federal Reserve policies on interest rates and the Cost of Capital.

A. Beginning in 2008, the Federal Reserve proceeded on a steady path of initiatives intended to lower long-term Treasury yields.[61] The Federal Reserve policy actions "were designed to put downward pressure on longer-term interest rates by having the Federal Reserve take onto its balance sheet some of the duration and prepayment risks that would otherwise have been borne by private investors."[62] Under that policy, "Securities Held Outright" on the Federal Reserve's balance sheet increased from approximately $489 billion at the beginning of October 2008 to approximately $4.23 trillion by the end of November 2016.[63] To put that increase in context, the securities held by the Federal Reserve represented approximately 3.29 percent of GDP at the end of September 2008, and had risen to approximately 22.65 percent of GDP in November 2016.[64] As such, the Federal Reserve policy actions have represented a significant source of liquidity, and have had a substantial effect on capital markets.

Just as market intervention by the Federal Reserve has reduced interest rates, it also had the effect of reducing market volatility. As shown in Chart 3 (below), each time the Federal Reserve began to purchase bonds (as evidenced by the increase in "Securities Held Outright" on its balance sheet), volatility subsequently declined. In fact, in

---

61 *See* Federal Reserve Press Release (June 19, 2013).

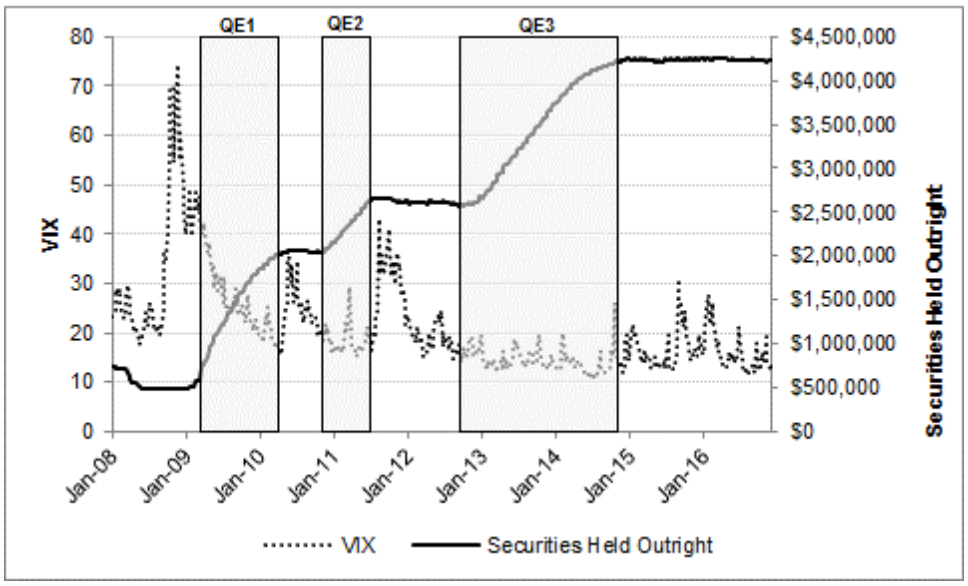
62 Federal Reserve Bank of New York, Domestic Open Market Operations During 2012, p. 29 (Apr. 2013).

63 Source: Federal Reserve Board Schedule H.4.1. "Securities held outright" include U.S. Treasury securities, Federal agency debt securities, and mortgage-backed securities.

64 Source: Federal Reserve Board Schedule H.4.1; Bureau of Economic Analysis.

September 2012, when the Federal Reserve began to purchase long-term securities at a pace of $85 billion per month, volatility (as measured by the CBOE Volatility Index, known as the "VIX") fell, and through October 2014 remained in a relatively narrow range. The reason is quite straight-forward: Investors became confident that the Federal Reserve would intervene if markets were to become unstable.

Chart 3: VIX and Federal Reserve Asset Purchases[65]



The important analytical issue is whether we can infer that risk aversion among investors is at a historically low level, implying a Cost of Equity that is well below recently authorized returns. Given the negative correlation between the expansion of the Federal Reserve's balance sheet and the VIX, it is difficult to conclude that fundamental risk aversion and investor return requirements have fallen. If it were the case that investors

[15] Source: Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis; Federal Reserve Statistical Release H.4.1, Factors Affecting Reserve Balances.

believe that volatility will remain at low levels (that is, that market risk and uncertainty will remain low), it is not clear why they would decrease their return requirements for defensive sectors such as utilities. In that respect, it appears that the Constant Growth DCF results are at odds with market conditions.

Q. Does your recommendation also consider the interest rate environment?

A. Yes, it does. From an analytical perspective, it is important that the inputs and assumptions used to arrive at an ROE recommendation, including assessments of capital market conditions, are consistent with the recommendation itself. Although I appreciate that all analyses require an element of judgment, the application of that judgment must be made in the context of the quantitative and qualitative information available to the analyst and the capital market environment in which the analyses were undertaken.

The low interest rate environment associated with central bank intervention may lead some analysts to conclude that current capital costs, including the Cost of Equity, are low and will remain as such. Putting aside the increases in volatility discussed above, that conclusion only holds true under the hypothesis of Perfectly Competitive Capital Markets ("PCCM") and the classical valuation framework which, under normal economic and capital market conditions, underpin the traditional Cost of Equity models. PCCMs are those in which no single trader, or "market-mover", would have the power to change the

prices of goods or services, including bond and common stock securities.[66] In other words, under the PCCM hypothesis, no single trader would have a significant effect on market prices.

Classic valuation theory assumes that investors trade securities rationally, with prices reflecting their perceptions of value.[67] Although central banks have the ability to set benchmark interest rates, they have been maintaining below normal rates to stimulate continued economic and capital market recovery. It therefore is reasonable to conclude that the Federal Reserve and other central banks have been acting as market-movers, thereby having a significant effect on the market prices of both bonds and stocks. The presence of market-movers, such as the Federal Reserve, runs counter to the PCCM hypothesis, which underlies traditional Cost of Equity models. Consequently, the results of those models should be considered in the context of both quantitative and qualitative information.

Although the Federal Reserve's market intervention policies have kept interest rates historically low, since July 8, 2016 (when the 30-year Treasury yield hit an all-time low of 2.11 percent), the 30-year Treasury yield has risen approximately 100 basis points.

Q. Have credit spreads changed recently?

A. Yes, they have. Because credit spreads, which represent the difference between the

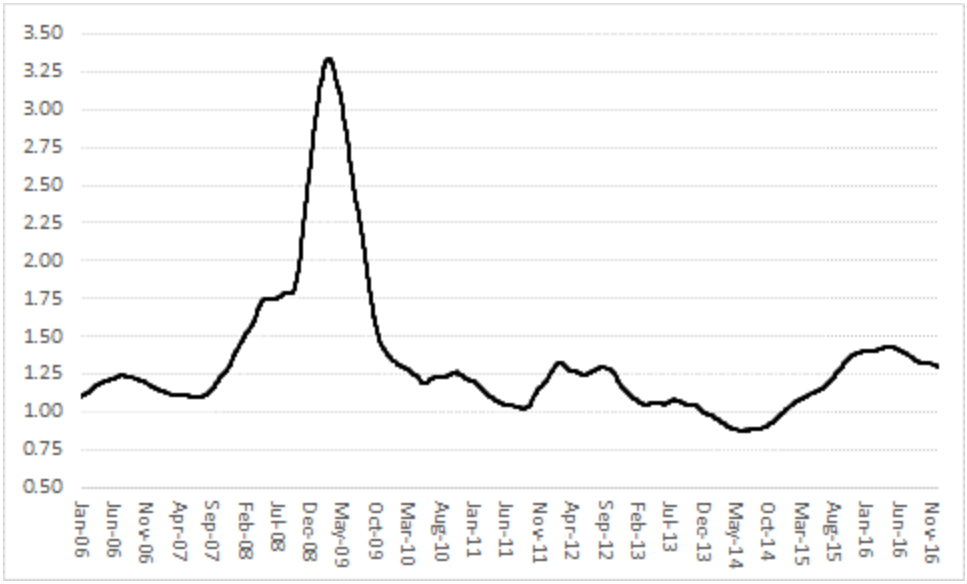
---

[66] *See* Myron J. Gordon, The Cost of Capital to a Public Utility, 1974, at 15. *See also* http://www.nasdaq.com/investing/glossary/p/perfectly-competitive-finanacial-markets.

[67] *I.e.*, the traditional efficient markets formulation. *See* Stowe et al., Equity Asset Valuation, 2007, at 18.

yields on debt and Treasury yields, can be directly observed, we can review the change in spreads over time and relative to other market sectors. Although credit spreads are not a full measure of equity risk, they reasonably can be seen to reflect, to some extent, investors' assessment of risk at a given point in time. As Chart 4 below indicates, current credit spreads (for A-rated utilities) are near their highest level since the year 2006, but for the financial crisis during 2008 and 2009.

Chart 4: A-Rated Utility Credit Spreads[68]



Looking to the period subsequent to the financial crisis, the 100-day average credit spread is in the top 79th percentile. Taken from that perspective, it is apparent that investors currently see the utility sector as relatively risky, and require higher returns as compensation for that risk.

[68] Source: Bloomberg Professional. 100-day moving average.

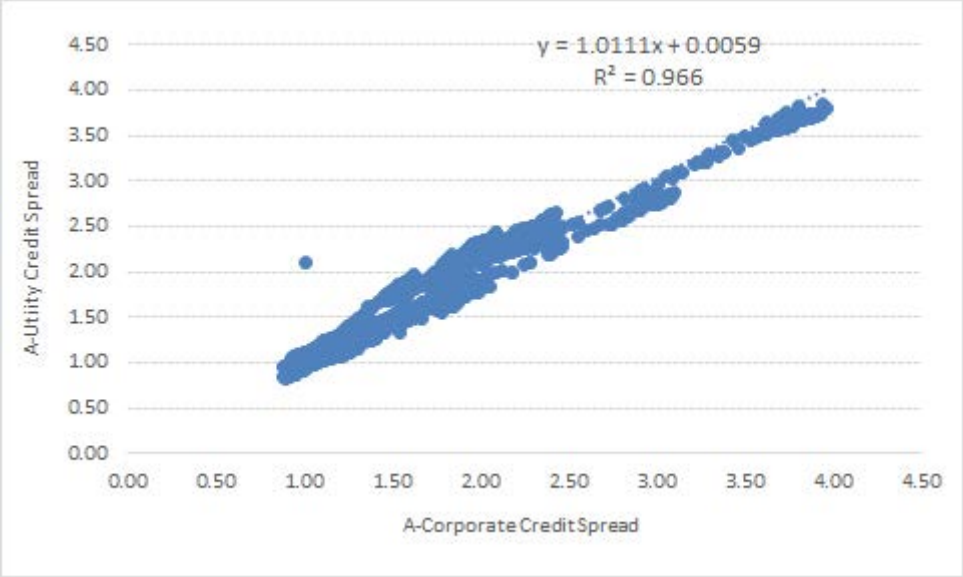
As to the relationship between the level of Treasury yields and credit spreads, the level of explanatory value is essentially zero; Treasury yields explain virtually none of the change in credit spreads. Equity market volatility (as measured by the VIX), on the other hand, explains about 68.00 percent of the change in credit spreads. That is, investors are concerned with market uncertainty, and require higher returns as uncertainty increases. Based on data from the Chicago Board Options Exchange, broad market volatility is expected to increase by over 75.00 percent over the coming two years.[69]

Q. Have you also reviewed the relationship between credit spreads for A-rated utility debt relative to A-rated corporate debt?

A. Yes, I have. Given the historical volatility in the spread between corporate and utility A-rated debt, there is no reason to conclude that utility yields are different than those of their corporate counterparts. That conclusion is consistent with the finding that over time, there has been a nearly one-to-one relationship between credit spreads on A-rated corporate and utility bonds. In fact, a regression analysis in which corporate credit spreads are the explanatory variable and utility credit spreads are the dependent variable shows that slope is approximately 1.00 and highly significant (see Chart 5, below). Because the intercept term is statistically insignificant, we can conclude that there has been no material difference between the two, and there certainly is no meaningful difference in the current market.

[69] Source: CBOE.com, accessed December 9, 2016.

Chart 5: Corporate and Utility Credit Spreads (A-Rated)[70]



Q. Are interest rates expected to increase going forward?

A. Yes, they are. At its December meeting, the Federal Reserve's Federal Open Market Committee raised the target federal funds rate for the second time since ending its Quantitative Easing program in 2014 to 0.50 percent – 0.75 percent.[71] In its post-meeting press release, Federal Reserve Chair Janet Yellen stated that the median projection for the federal funds rate rises from the current 0.75 percent to 1.40 percent at the end of 2017, 2.10 percent at the end of 2018, and 2.90 percent by the end of 2019.[72]

---

70 Source: Bloomberg Professional. Please note that for a univariate regression, the correlation coefficient equals the square root of the R-square. In this case, the square root of 0.966 is approximately 0.983 (98.30 percent).

71 FOMC Press Conference, December 14, 2016, at 1. https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20161214.pdf

72 *Ibid*., at 3.

Q. Does market-based data indicate that investors see a probability of increasing interest rates?

A. Yes. There is observable market data indicating investors expect interest rates to increase in the near future. Regarding future Federal Funds rate increases, data compiled by CME Groups indicates that investors see a 97.00 percent likelihood of further Federal Funds rate increases, even after the December 14, 2016 increase. As shown in Table 9, (below) the market is now anticipating at least one additional rate hike (74.30 percent probability) and possibly two or three (33.60 percent and 8.80 percent probability, respectively) by December 2017.

Table 9: Probability of Federal Funds Rate Increases[73]

Target Rate (bps)	Federal Reserve Meeting Date							
	2/1/17	3/15/17	5/3/17	6/14/17	7/26/17	9/20/17	11/1/17	12/13/17
50-75	96.0%	79.0%	63.8%	25.5%	19.8%	10.1%	8.5%	3.5%
75-100	4.0%	20.3%	31.6%	50.9%	45.2%	32.8%	29.1%	17.5%
100-125		0.7%	4.5%	20.7%	27.5%	36.2%	35.7%	32.7%
125-150			0.1%	2.7%	6.8%	16.9%	20.0%	28.8%
150-175				0.1%	0.7%	3.7%	5.8%	13.4%
175-200						0.3%	0.9%	3.5%
200-225							0.1%	0.5%

In fact, the probability of no increase in the coming year is only 3.50 percent.

Looking to long-term interest rates, consensus projections gathered by Blue Chip Financial Forecasts suggest a 30-year Treasury yield of 3.40 percent by the first quarter

[73] Source: http://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html, accessed 12/15/2016.

of 2018 (an approximately 38 basis point increase over the 3.02 percent yield as of end of November, and 25 basis points above the December 15 spot yield).[74] The Social Security Administration ("SSA") projects that long-term Treasury yields will rise from 2.40 percent in 2016 to 4.80 percent by 2021. Similarly, market expectations for increased long-term Treasury yields are apparent in the market prices to buy or sell at-the-money options in long-term Government bond funds. That is, the value of the option to sell the TLT (an exchange-traded fund of long-term Government bonds) in January 2019 at today's price is approximately one and a half times more than the value of the option to buy that fund.[75] Since bond prices fall as interest rates increase, investors see a greater likelihood of increases in long-term interest rates than decreases.

Lastly, we can view the market's expectations of future interest rates based on the current yield curve. Those expected rates, often referred to as "forward yields" are derived from the "Expectations" theory, which states that (for example) the current 30-year Treasury yield equals the combination of the current three-year Treasury yield, and the 29-year Treasury yield expected in one year. That is, an investor would be indifferent to (1) holding a 30-year Treasury to maturity, or (2) holding a one-year Treasury to maturity,

[74] Blue Chip Financial Forecasts, Vol. 35, No. 12, December 1, 2016, at 2.
[75] http://www.nasdaq.com/symbol/tlt/option-chain?dateindex=8

then a 29-year Treasury bond, also to maturity.[76] As Chart 6 (below) indicates, since 2006 the implied forward 29- and 28- year yields (one and two years hence, respectively) consistently exceeded the (interpolated) spot yields. That is, just as economists' projections implied increased interest rates, so did observable Treasury yields.

Chart 6: Forward vs. Interpolated Treasury Yields[77]

Q. Have you considered other data points in your assessment of general economic conditions?

A. Yes. Although a single observation, I note that the Bureau of Economic Analysis

[76] In addition to the Expectations theory, there are other theories regarding the term structure of interest rates including: the Liquidity Premium Theory, which asserts that investors require a premium for holding long term bonds; the Market Segmentation Theory, which states that securities of different terms are not substitutable and, as such, the supply of and demand for short-term and long-term instruments is developed independently; and the Preferred Habitat Theory, which states that in addition to interest rate expectations, certain investors have distinct investment horizons and will require a return premium for bonds with maturities outside of that preference.

[77] Source: Federal Reserve Schedule H.15. Spot yields are interpolated.

recently announced that third quarter Gross Domestic Product rose by 3.50 percent.[78] At the same time, expected inflation (as measured by the 30-year TIPS spread) was in the range of 2.05 percent to 2.10 percent,[79] suggesting nominal GDP growth in the range of 5.60 percent to 5.65 percent, which is above, yet comparable to the 5.36 percent long-term growth rate I use in my Multi-Stage DCF analysis.

Q: What do you conclude from those analyses?

A: First, it is clear that interest rates have increased from the low levels experienced in early 2016. It also is clear that investor expectations, as measured by forward Treasury yields and the implied probability of Federal Funds rate increases, suggest rising capital costs in the near term. Those higher Treasury yields, combined with elevated credit spreads again indicate expectations for increased capital costs. The observation that interest rates and GDP growth have increased indicate that the financial community sees the strong prospect of increased growth throughout the economy. As that occurs, and as interest rates continue to rise, it would be reasonable to expect higher dividend yields and higher growth rates. In the context of the Discounted Cash Flow model, those variables would combine to indicate increases in the Cost of Equity.

Although the market data discussed above indicate increasing costs of capital, it is important to keep in mind that estimating the Cost of Equity is an empirical, but not an entirely mathematical exercise; that the methods used, or the weight given to any one

[78] Bureau of Economic Analysis, News Release dated December 22, 2016.
[79] Federal Reserve Schedule H.15, dated December 27, 2016.

method, may change from case to case; and that the returns authorized in other jurisdictions provide a relevant, observable, and verifiable benchmark for assessing the reasonableness of analytical assumptions, results, and conclusions.

Q. Have there been other recent periods when utility valuation levels were high relative to both their long-term average and the market?

A. Yes. In early 2015, the utility sector (as measured by the S&P Electric Utility Index) traded at a Price/Earnings ratio of approximately 18.00. During the same period, the overall market (as measured by the S&P 500) traded at a P/E of approximately 18.00. In late January 2015, the utility sector began to lose value, and by June 2015 it had lost approximately 15.50 percent of its value. Similarly, the P/E ratio of the S&P Electric Utility Index was only slightly below that of the S&P 500 in early July 2016. Since then, the S&P Electric Utility Index lost approximately 13.00 percent of its value, while the S&P 500 increased approximately 3.64 percent. Also during that time, the 30-year Treasury yield increased by almost 90 basis points (an increase of over 40.00 percent). The point simply is that as investors see an increasing likelihood of higher interest rates, they will move out of sectors that provided higher yields relative to the overall market. As they do, valuations and P/E ratios fall.

Q. What conclusions do you draw from your analyses of the current capital market environment, and how do those conclusions affect your ROE recommendation?

A. In my view, we cannot conclude that the recent levels of utility valuations are due to a fundamental change in the risk perceptions of utility investors. Utility credit spreads are at historically elevated levels, and there is no measurable difference between credit

spreads of A-rated utility debt, and A-rated corporate debt. That is, based on analyses of credit spreads, there is no reason to conclude that investors see utilities as less risky relative to either historical levels or to their corporate counterparts.

From an analytical perspective, it is important that the inputs and assumptions used to arrive at an ROE determination, including assessments of capital market conditions, are consistent with the conclusion itself. Although I appreciate that all analyses require an element of judgment, the application of that judgment must be made in the context of the quantitative and qualitative information available to the analyst and the capital market environment in which the analyses were undertaken. Because the application of financial models and interpretation of their results often is the subject of differences among analysts in regulatory proceedings, I believe that it is important to review and consider a variety of data points; doing so enables us to put in context both quantitative analyses and the associated recommendations.

Because not all models used to estimate the Cost of Equity adequately reflect those changing market dynamics, it is important to give appropriate weight to the methods and to their results. Moreover, because those models produce a range of results, it is important to consider the type of data discussed above in determining where the Companies' ROE falls within that range. On balance, I believe that Constant Growth DCF-based results should be viewed very carefully, and that somewhat more weight should be afforded the Risk Premium-based methods. I believe that doing so supports my recommended range of 10.00 percent to 10.75 percent, and my ROE recommendation

of 10.50 percent.

IX. CAPITAL STRUCTURE

Q. What is the Company's proposed capital structure for NSTAR Electric and WMECO?

A. The Company has proposed a capital structure composed of 53.37 percent common equity, 0.94 percent preferred stock, and 45.69 percent long-term debt for NSTAR Electric; and a capital structure composed of 53.34 percent common equity and 46.66 percent long-term debt for WMECO.

Q. How does the capital structure affect the Cost of Equity?

A. The capital structure relates to a company's financial risk, which represents the risk that a company may not have adequate cash flows to meet its financial obligations, and is a function of the percentage of debt (or financial leverage) in its capital structure. In that regard, as the percentage of debt in the capital structure increases, so do the fixed obligations for the repayment of that debt. Consequently, as the degree of financial leverage increases, the risk of financial distress (*i.e.*, financial risk) also increases. Because the capital structure can affect the subject company's overall level of risk, it is an important consideration in establishing a just and reasonable rate of return.

Q. Please discuss your analysis of the capital structures of the proxy group companies.

A. The proxy group has been selected to reflect comparable companies in terms of financial, business, and regulatory risks. Therefore, it is appropriate to compare the capital structures of the utility operating companies held by the proxy group companies to that of

the subject company in order to assess whether the proposed capital structure is consistent with industry standards for companies with commensurate risk profiles. As a measure of industry practice, I calculated the average capital structure for each of the utility operating companies held by the proxy companies over the last eight fiscal quarters. As shown in Exhibit ES-RBH-9, the Company's proposed equity ratios of 53.37 percent for NSTAR Electric and 53.34 percent for WMECO are within the range of equity ratios for that group, and are comparable to the median equity ratio of approximately 52.11 percent. The average common equity ratios (on a company-specific basis) range from 33.69 percent to 58.48 percent. Similarly, although some of the proxy companies employ slightly lower amounts of preferred equity and slightly more long-term debt than the Company proposes, the proposed long-term debt ratio of 45.69 percent for NSTAR Electric and 46.66 percent for WMECO are well within the range of ratios for the proxy group. Finally, the proposed preferred equity ratio of 0.94 percent for NSTAR Electric is also within the range of preferred equity ratios for the proxy group. It is my view, therefore, that the Company's proposed capital structures are consistent with its peers and are reasonable for the purpose of determining its overall rate of return.

Q. Is the Company's proposed equity ratios consistent with "sound utility practice"?

A. Yes, they are. First, as discussed above, the Company's proposed common equity ratios are within the range of the capital structures in place at the proxy group companies used to estimate its cost of equity. Moreover, the proposed capital structures will be in line with the U.S. utility industry generally, and with other regulated utilities in Massachusetts. A

November 2016 report by Regulatory Research Associates ("RRA") reported that the average common equity ratio (excluding short-term debt) for the 81 major utility subsidiaries of the RRA Index companies as of September 30, 2016, was 52.40 percent. SNL Energy reports that this average equity ratio has been quite stable, with the average year-end equity ratio (excluding short-term debt) ranging from 51.31 percent to 52.49 percent for 2012 through 2015.[80] Among Massachusetts electric and natural gas distribution utilities, currently authorized equity ratios range from approximately 50.00 percent to 53.54 percent. Consequently, I believe the Company's proposed capital structure of 53.37 percent common equity, 0.94 percent preferred stock, and 45.69 percent long-term debt for NSTAR Electric, and 53.34 percent common equity and 46.66 percent long-term debt for WMECO, is appropriate.

Q. What is your conclusion regarding an appropriate capital structure for the NSTAR Electric and WMECO?

A. Considering the median actual equity ratio of 52.11 percent for the proxy group companies, I believe that the Company's proposed common equity ratios of 53.37 percent for NSTAR Electric and 53.34 percent for WMECO is appropriate as it is consistent with the proxy group companies.

[80] SNL Energy Financial Focus, "Quality Measures: Utility Subsidiaries, Calendar Years 2012-2015, and 12 Months Ended September 30, 2016," November 29, 2016, at 6.

X. SUMMARY AND CONCLUSIONS

Q. What is your conclusion regarding the Company's Cost of Equity?

A. I believe that a return on common equity in the range of 10.00 percent to 10.75 percent represents the range of equity investors' required return for investment in electric utilities similar to the Company in today's capital markets. Within that range, I believe that 10.50 percent is reasonable and appropriate.

My recommendation considers the Company's risk profile relative to the proxy group, including the Company's rate mechanisms relative to its peers, flotation costs, the effect of the proposed ROE on the Company's financial integrity, and the increasing presence of DG and long-term contracts. As discussed throughout my Direct Testimony, an ROE of 10.50 percent reasonably represents the return required to invest in a company with a risk profile comparable to the Company, assuming the Company has a reasonable opportunity to earn that return. Table 11 summarizes my analytical results.

Table 11: Summary of Analytical Results

Discounted Cash Flow	Mean Low	Mean	Mean High
30-Day Constant Growth DCF	8.18%	8.94%	9.69%
90-Day Constant Growth DCF	8.13%	8.89%	9.65%
180-Day Constant Growth DCF	8.15%	8.91%	9.66%
Multi-Stage (Gordon Method)			
30-Day Multi-Stage DCF	8.96%	9.14%	9.34%
90-Day Multi-Stage DCF	8.92%	9.09%	9.28%
180-Day Multi-Stage DCF	8.93%	9.11%	9.30%
Multi-Stage (Terminal P/E Method)			
30-Day Multi-Stage DCF	9.77%	10.24%	10.70%
90-Day Multi-Stage DCF	9.65%	10.11%	10.57%
180-Day Multi-Stage DCF	9.69%	10.15%	10.61%
Supporting Methodologies			
CAPM Results		***Bloomberg Derived Market Risk Premium***	***Value Line Derived Market Risk Premium***
Average Bloomberg Beta Coefficient			
Current 30-Year Treasury (2.75%)		8.90%	9.51%
Near-Term Projected 30-Year Treasury (3.13%)		9.28%	9.89%
Average Value Line Beta Coefficient			
Current 30-Year Treasury (2.75%)		10.19%	10.94%
Near-Term Projected 30-Year Treasury (3.13%)		10.57%	11.32%
Bond Yield Risk Premium			
	Low	***Mid***	***High***
Bond Yield Risk Premium	10.01%	10.03%	10.34%

Q. Does this conclude your Direct Testimony?

A. Yes, it does.