STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

**DOCKET NO. DE 19-057**

IN THE MATTER OF: **PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE D/B/A EVERSOURCE ENERGY**

**Notice of Intent to File Rate Schedules**

# UPDATED TESTIMONY

OF

**Dr. J. Randall Woolridge**

July 16, 2020

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## List of Attachments

# I. INTRODUCTION

**Q. Please state your full name.**

A. My name is J. Randall Woolridge.

**Q. By whom are you employed and what is your business address?**

A. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of Pennsylvania State University. I am also the Director of the Smeal College Trading Room and President of the Nittany Lion Fund, LLC. A summary of my educational background, research, and related business experience was included with my initial testimony as Attachment JRW-1.

**Q. What is the purpose of your testimony in this proceeding?**

A. I have been asked by the Staff of the New Hampshire Public Utilities Commission to provide an update to my overall fair rate of return or cost of capital for the regulated electric distribution service of the Public Service Company of New Hampshire Corp. d/b/a Eversource Energy ("Eversource" or the "Company").

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

A. First, I will review my updated cost of capital recommendation for Eversource Energy. Second, I provide a brief update on capital costs in today's capital markets. Third, I provide updated financial information on my proxy group of electric utility companies for estimating the cost of capital for Eversource. Fourth, I provide the results of my updated cost of equity capital studies for Eversource.

## A. Overview

**Q. Please review the company's proposed rate of return.**

A. The Company has proposed a capital structure of 3.17% short-term debt, 41.98% long-term debt and 54.85% common equity. The Company has recommended short-term and long-term debt cost rates of 2.45% and 4.37%. Eversource witness Ms. Anne Bulkley has recommended a common equity cost rate of 10.40% for the New Hampshire electric distribution operations of Eversource. The Company's overall proposed rate of return is 7.62%.

**Q. What are your updated recommendations regarding the appropriate rate of return for Eversource?**

A. I have used a capital structure that is more reflective of the capital structures of electric utility companies. I am using a capital structure consisting of 50.0% debt and 50.00% common equity. To estimate an equity cost rate for the Company, I have applied the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM") to my proxy group of electric utility companies ("Electric Proxy Group"). I have also used Ms. Bulkley's Proxy Group. My updated recommendation is that the appropriate ROE for the Company is 8.70%. This figure is at the upper end of my equity cost rate range of 7.6% to 8.70%. Combined with my recommended capitalization ratios and senior capital cost rate, my overall rate of return or cost of capital for the Company is 6.47% as summarized in Updated Attachment JRW-3.

**Table 1**
**Updated Recommended Cost of Capital**

| Capital Source | Capitalization Ratios | Cost Rate | Weighted Cost Rate |
|---|---|---|---|
| **Short-Term Debt** | **3.51%** | **2.45%** | **0.09%** |
| **Long-Term Debt** | **46.49%** | **4.37%** | **2.03%** |
| **Common Equity** | **50.00%** | **8.70%** | **4.35%** |
| **Total Capitalization** | **100.00%** | | **6.47%** |

## II. Capital Market Conditions

**Q. Please provide a summary of the capital market indicators in Updated Attachment JRW-7.**

A. Page 1 of Updated Attachment JRW-7 shows the yields on A rated public utility bonds. These yields declined with interest rates in general in the year 2019, falling from 4.25% to 3.25%. They bounced around during the months of March and April, and are currently at 2.90%.

Page 2 of Updated Attachment JRW-7 shows that the average dividend yield for publicly-held electric utilities is just above 3.0% as of year-end 2019. The average earned ROE and market-to-book ratio for publicly-held electric utilities as of year-end 2019, as shown on page 3 of Updated Attachment JRW-7, were 10.2% and 2.02%.

Page 4 of Updated Attachment JRW-7 is an updated study of industry betas. I update this study each year, and in my January 2020 update, the average electric, gas and water utility betas were 0.58, 0.67, and 0.70, respectively. However, as discussed above, utility stocks were more volatile than the overall market during March and April when the financial markets were especially volatile. *Value Line*

updates betas for companies on a quarterly basis. After their most recent update following the market volatility, I updated my industry beta study and now the average electric, gas and water utility betas were 0.86, 0.85, and 0.78, respectively. As such, this short period when utility stocks were more volatile that the market resulted in a significant increase in utility betas as published by *Value Line*. This issue is discussed later in this update testimony, as there are some measurement problems with *Value Line* betas.

**Q. Please review the financial markets in 2020.**

A. The financial markets began the year in good form – stock prices rose about five percent in the first six weeks of the year and interest rates declined. Then came weeks of chaos. In the middle of February, the spread of the coronavirus went global and the virus became a major risk factor for the world's population and global economy. The coronavirus disease 2019 (COVID-19), has spread to over 180 countries around the world and was officially identified by the World Health Organization as a global pandemic in mid-March.

Investors around the world began to focus on the potential economic consequences of the coronavirus in the middle of January.[1] However, the markets largely ignored the impact of the virus until the third week of February. In the following month, the S&P 500 market declined thirty-five percent and investors fled to low risk financial assets, most notably long-term Treasury bonds. The yield on the benchmark 30-year Treasury bond declined from 2.0% to 1.3%, but even

[1] Akane Otane, "Coronavirus Tests Market's Faith in Global Economy" *Wall Street Journal*, January 28, 2019.

traded as low as 0.9%, an all-time low. Furthermore, the day-to-day volatility of prices in financial markets has been at extremes. The VIX, which is the CBOE volatility index and is known as Wall Street's Fear Index, increased from 15 and traded over 50, a level which has not been seen since the financial crisis in 2008. The stock market began its recovery in the third week of March. Despite the ongoing spread of COVID-19 and an economic crisis created by the virus that includes record unemployment, the S&P 500 has come back strong and is within 5% of its previous all-time high in February. The 30-year Treasury yield, which was about 2.0% in mid-February, dropped to record low levels below 1.0% and now has come back to about 1.3%. The VIX, which topped out over 50, is now in the 25-30 range. And utility stocks, which declined with the market by about 35% from Mid-February to mid-March, has come back, but less so than the overall market.

**Figure 1**
**S&P 500, 30-Year Treasury Yields,**
**The VIX, and Dow Jones Utilities (DJU)**
**YTD-2020**

**Q. How have utility stocks fared in this market?**

A. Given their regulated nature, utility stocks have traditionally been very low risk. However, these stocks lost that identity in March and April of this year due to the economic crisis brought on by the novel coronavirus. This was recently highlighted in the *Wall Street Journal*.[2] The article noted that utility stocks became more volatile than the overall market in March and April, a rare occurrence. The only other time this has happened in the past two years is during a bout of market volatility in February 2018. Investor's concerns appear to be related to several factors: (1) potential falling power demand; (2) with the loss of jobs, the ability for customers to pay their bills; (3) commercial and industrial customers will most certainly reduce their power demand due to the slower economy; and (4) reflecting the lower demand, wholesale power prices fell 20% in March.

The bottom line is that utility investors are not used to the uncertainty associated with the coronavirus. The article also noted that, despite these issues, nearly all major U.S. utilities have reaffirmed their full-year guidance, only CenterPoint has reduced its dividend, and to date, there have not been any credit downgrades from S&P or Moody's. Along these lines, the article also noted that the stability of the earnings is not really an issue with utilities, but that may be hurting utilities as investors, in the market

[2] Anna Hirtenstein – "Safe Utilities Have Been More Volatile Than Broader Stock Market," *Wall Street Journal, June* 14, 2020.

bounce back, are looking for companies and industries that will recover when the economy rebounds.

**Q. How have these market developments impacted estimating the cost of equity capital for a public utility?**

A. Traditionally, there are three models used to estimate an equity cost rate for a public utility – the DCF, CAPM, and risk premium models. The issues with using these models in the markets today are summarized below:

1. DCF Model – The ROE from the DCF model is the sum of the dividend yield and expected long-term growth rate. The dividend yield is observable, and dividend yields have increased due to the decline in utility stock prices. However, day-to-day stock prices are volatile, and dividend levels may change. But the big factor is the long-term growth rate. The long-term growth rate is usually based, in part, on analysts' three-to-five-year EPS growth rate estimates. And it is likely that these growth rates will be lowered due to the significant slowdown in economic growth associated with the coronavirus.

2. CAPM Approach – The CAPM has three components – the risk-free interest rate, beta, and the market risk premium ("MRP"). The impact of the decrease in the risk-free interest rate yield is directly observable, but is volatile on a day-to-day basis. Betas are measured using historical returns and, with the inclusion of the recent volatility in utility stocks, utility betas have increased. But the impact of the current environment on the market risk premium is uncertain. The market risk premium is measured as the E(RM) – RF. The market risk premium increases by the lower level of the risk-free interest rate. However, the impact of the current

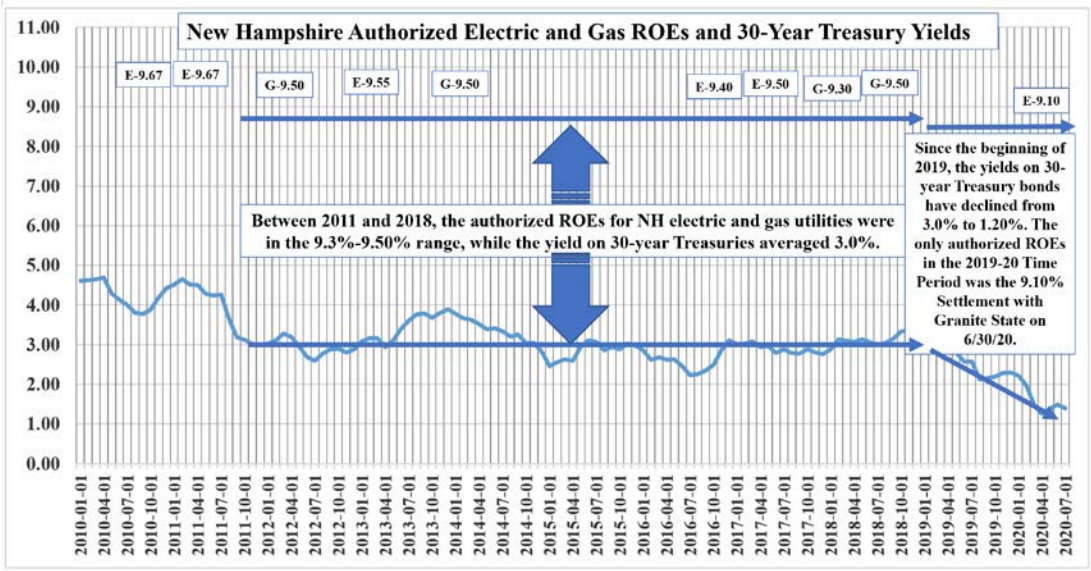
environment on the expected stock market return (E(RM)) is uncertain. Historical return and survey approaches to estimating the MRP would not capture the changes over the past three months. And the expected return models would suffer from the same issue as the DCF model. Namely, estimates of the E(R) are very indeterminate, since these models normally rely, in large part, on analysts' forecasts of three-to-five-year EPS growth rates and, as discussed above, these forecasts would appear to be very difficult to make given the highly uncertain economic environment. I believe that this is even more true for the S&P 500 as opposed to regulated utilities given the huge impact of the virus on such industries as travel, restaurants, hotels, aviation, autos, and other sectors tied to retail spending.

3. Risk Premium Approach – The ROE from a risk premium approach is the sum of the risk-free interest rate and a risk premium. As noted, the risk-free rate component is directly observable, and is lower in the current environment. The risk premium component of the model is usually computed using historical utility stock and bond returns or historical authorized utility ROEs minus the risk-free interest rate. Since both the stock and bond returns and the authorized ROEs approaches to estimating the risk premium component use historical data and hence do not change with the current environment, the risk premium is not impacted by the current environment.

**Q. On a related issue, how have the declines in interest rates been reflected in authorized ROEs for electric utilities.**

A. It is my opinion that regulators usually lower authorized ROEs for utilities with a lag to an increase or decrease in interest rates. Figure 2 shows authorized ROEs in New Hampshire for electric utilities and gas distribution companies over the 2010-2020 time period. It shows that from 2011-2018, the 30-year-Treasury yields are in the 3.0% range and the authorized ROEs in New Hampshire for electric utilities and gas distribution companies were in the 9.30%-9.50% range. But, interest rates have declined significantly in 2019-20. The 30-year-Treasury yield declined from 3.0% to 2.0% in 2019, and declined further in 2020 due to the coronavirus. This yield hit an all-time low of 0.90% in March, and has settled in the 1.3% range over the past month or so. Perhaps reflecting this decline in interest rates, the recent settlement in the Liberty Utilities rate case resulted in a 9.10% ROE.

**Figure 2**
**New Hampshire Authorized ROEs and 30-Year Treasury Yields, 2010-2020**



## III. Proxy Group Statistics

**Q. Please describe your approach to developing a fair rate of return recommendation for Eversource.**

A. To develop a fair rate of return recommendation for the Company, I have evaluated the return requirements of investors on the common stock of a proxy group of publicly-held electric distribution companies ("Electric Proxy Group"). I have also used the group developed by Ms. Bulkley ("Bulkley Proxy Group").

**Q. Please describe the updated Electric Proxy Group.**

A. The selection criteria for the Electric Proxy Group include the following:

(1) At least 50% of revenues from regulated electric operations as reported in SEC Form 10-K Report;

(2) Listed as a U.S.-based Electric Utility by *Value Line Investment Survey*;

(3) An investment-grade corporate credit and bond rating;

(4) Has paid a cash dividend for the past six months, with no cuts or omissions;

(5) Not involved in an acquisition of another utility, and not the target of an acquisition; and

(6) Analysts' long-term EPS growth rate forecasts available from Yahoo and/or Zack's.

The Electric Proxy Group includes thirty-one companies. Summary financial statistics for the proxy group are listed in Updated Attachment JRW-4. The median operating revenues and net plant among members of the Electric Proxy

Group are $6,845.0 million and $24,412.0 million, respectively. The group on average receives 80% of its revenues from regulated electric operations, has a BBB+ bond rating from Standard & Poor's and a Baa1 rating from Moody's, a current average common equity ratio of 43.9%, and an earned return on common equity of 10.4%.

**Q. Please discuss the Bulkley Proxy Group.**

A. Ms. Bulkley's group is much smaller (only eight companies) because she places restrictions on the percentages of regulated electric generation and regulated electric operating income. Summary financial statistics for Ms. Bulkley's proxy group are provided in Panel B of page 1 of Updated Attachment JRW-4. The median operating revenues and net plant for the Bulkley Proxy Group are $3,261.2 million and $10,173.6 million, respectively. The group on average receives 85% of its revenues from regulated electric operations, has a BBB+ bond rating from Standard & Poor's ("S&P's") and a Baa1 rating from Moody's, a common equity ratio of 47.6%, and a current earned return on common equity of 10.0%.

**Q. Which proxy group do you believe provides more reliable results?**

A. Due to the small size of the Bulkley Proxy Group, I believe the Electric Proxy Group provides more reliable results. But I am also using the Bulkley Proxy Group.

**Q. How does the investment risk of the Company compare to the two proxy groups?**

A. I believe that bond ratings provide a good assessment of the investment risk of a company. The S&P and Moody's issuer credit ratings for Eversource are A1 and

Baa1, respectively. However, it should be noted that Eversource's S&P rating was A+ before it was downgraded by two notches on July 25, 2019 as a result of its decision to pursue growth through riskier offshore wind investments.[3] This downgrade had nothing to do with the risk of Eversource New Hampshire.

The average S&P and Moody's ratings for the Electric and Bulkley Proxy Groups are BBB+ and Baa1. Hence, even before the downgrade, Eversource's S&P rating is one notch above the average of the two groups (BBB+ vs. BBB+) while the Company's Moody's rating is equal to the average of the two proxy groups. Overall, I believe that, based on the credit ratings, even with the S&P two-notch downgrade, the Company is slightly less risky than the proxy groups.

On page 2 of Updated Attachment JRW-4, I have assessed the riskiness of the two proxy groups using five different risk measures. These measures include Beta, Financial Strength, Safety, Earnings Predictability, and Stock Price Stability. These risk measures indicate that the two proxy groups are similar in risk. The comparisons of the risk measures include Beta (0.86 vs. 0.86), Financial Strength (A vs. A) Safety (1.8 vs. 2.0), Earnings Predictability (76 vs. 71), and Stock Price Stability (91 vs. 94). On balance, these measures suggest that the two proxy groups are similar in risk.

**Q. What do you conclude from your risk analysis?**

A. First, based on the credit ratings from S&P and Moody's, I conclude that the Company is a little less risky than the average of the two proxy groups. Second,

[3] See Attachment JRW-2 of my initial testimony in this proceeding - S&P downgrades Eversource's ratings by 2 notches – 7-26-19.

the S&P and Moody's credit ratings and the five *Value Line* risk ratings are very similar for the two groups, and therefore I conclude that the two groups are similar in risk. And third, the biggest change that has occurred in the relative risk study are the betas of the two groups. This issue is discussed below.

## IV. The Cost of Common Equity Capital

**Q. How did you estimate the cost of equity capital for the Company?**

A. Primarily, I rely on the DCF model to estimate the cost of equity capital. Given the investment valuation process and the relative stability of the utility business, the DCF model provides the best measure of equity cost rates for public utilities. I have also performed a capital asset pricing model ("CAPM") study; however, I give these results less weight because I believe that risk premium studies, of which the CAPM is one form, provide a less reliable indication of equity cost rates for public utilities.

**Q. Please explain why you believe that the CAPM provides a less reliable indicator of equity cost rates?**

A. I believe that the CAPM provides a less reliable measure of a utility's equity cost rate because it requires an estimate of the market risk premium. As discussed below, there is a wide variation in estimates of the market risk premium found in studies by academics and investment firms as well as in surveys of market professionals.

## A. DCF Approach

**Q. Please review your updated dividend yields.**

A. I have calculated the dividend yields for the companies in the proxy group using the current annual dividend and the 30-day, 90-day, and 180-day average stock prices. These dividend yields are provided on page 2 of Updated Attachment JRW-9. Given recent developments, I am using the updated dividend yields using 30-day and 90-day average stock prices. Using both the means and medians, the dividend yields range from 3.5% to 3.7% for the Electric Proxy Group and 3.7% to 4.0% for the Bulkley Proxy Group. Therefore, I will use dividend yields of 3.60% and 3.80% for my Electric Proxy Group and the Bulkley Proxy Group, respectively.

**Q. What adjustment factor do you use for your dividend yield?**

A. I adjust the dividend yield by one-half (1/2) of the expected growth so as to reflect growth over the coming year. The DCF equity cost rate ("K") is computed as:

$$K = [ (D/P) * (1 + 0.5g) ] + g$$

**Q. Please discuss the updated historical growth of the companies in the proxy group, as provided by V*alue Line.***

A. Page 3 of Updated Attachment JRW-9 provides the 5- and 10- year historical growth rates for EPS, DPS, and BVPS for the companies in the two proxy groups, as published in the *Value Line Investment Survey.* The median historical growth measures for EPS, DPS, and BVPS for the Electric Proxy Group, as provided in Panel A, range from 4.0% to 5.5%, with an average of the medians of 4.5%. For

the Bulkley Proxy Group, as shown in Panel B of page 3 of Attachment JRW-9, the historical growth measures in EPS, DPS, and BVPS, as measured by the medians, range from 2.8% to 5.0%, with an average of the medians of 3.9%.

**Q. Please summarize V*alue Line's* updated projected growth rates for the companies in the proxy group.**

A. *Value Line's* updated projections of EPS, DPS, and BVPS growth for the companies in the proxy groups are shown on page 4 of Updated Attachment JRW-9. As stated above, due to the presence of outliers, the medians are used in the analysis. For the Electric Proxy Group, as shown in Panel A of page 4 of Updated Attachment JRW-9, the medians range from 4.0% to 5.5%, with an average of the medians of 4.8%. The range of the medians for the Bulkley Proxy Group, shown in Panel B of page 4 of Updated Attachment JRW-9, is from 3.8% to 4.8%, with an average of the medians of 4.2%.[4]

Also provided on page 4 of Updated Attachment JRW-9 are the prospective sustainable growth rates for the companies in the two proxy groups as measured by *Value Line*'s average projected retention rate and return on shareholders' equity. As noted above, sustainable growth is a significant and a primary driver of long-run earnings growth. For the Electric and Bulkley Proxy Groups, the median prospective sustainable growth rates are 3.5% and 2.8%, respectively.

[4] It should be noted that *Value Line* uses a different approach in estimating projected growth. *Value Line* does not project growth from today, but *Value Line* projects growth from a three-year base period – 2016-2018 – to a projected three-year period for the period 2022-2024. Using this approach, the three-year based period can have a significant impact on the *Value L*ine growth rate if this base period includes years with abnormally high or low earnings. Therefore, I evaluate these growth rates separately from analysts EPS growth rates.

**Q. Please review the updated analysts' forecasts of expected 5-year eps growth.**

A. Yahoo and Zacks collect, summarize, and publish Wall Street analysts' long-term EPS growth rate forecasts for the companies in the proxy group. These forecasts are provided for the companies in the proxy groups on page 5 of Updated Attachment JRW-9. I have reported both the mean and median growth rates for the groups. The mean/median of analysts' projected EPS growth rates for the Electric and Bulkley Proxy Groups are 5.1%/5.4% and 4.5%/4.7%, respectively.[5]

**Q. Please summarize your updated analysis of the historical and prospective growth of the proxy group.**

A. Page 6 of Attachment JRW-9 shows the summary DCF growth rate indicators for the proxy group. The historical growth rate indicators for my Electric Proxy Group imply a baseline growth rate of 4.5%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 4.8%, and *Value Line*'s projected sustainable growth rate is 3.5%. The projected EPS growth rates of Wall Street analysts for the Electric Proxy Group are 5.1% and 5.4% as measured by the mean and median growth rates. The overall range for the projected growth-rate indicators (ignoring historical growth) is 3.5% to 5.4%. Giving primary weight to the projected EPS growth rate of Wall Street analysts and *Value Line*, I believe that the appropriate projected growth rate is 5.0%. This growth rate figure is in the upper end of the range of projected growth rates for the Electric Proxy Group.

[5] Given variation in the measures of central tendency of analysts' projected EPS growth rates proxy groups, I have considered both the means and medians figures in the growth rate analysis.

For the Bulkley Proxy Group, the historical growth rate indicators suggest a growth rate of 3.9%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 4.2%, and *Value Line*'s projected sustainable growth rate is 2.8%. The projected EPS growth rates of Wall Street analysts are 4.5% and 4.7% as measured by the mean and median growth rates. The overall range for the projected growth rate indicators is 2.8% to 4.7%. Giving primary weight to the projected EPS growth rate of Wall Street analysts and *Value Line*, I believe that the appropriate projected growth rate is in the 4.50% range. This growth rate figure is in the upper end of the range of historic and projected growth rates for the Bulkley Proxy Group.

**Q. What are the results from your updated application of the DCF model?**

A. My DCF-derived equity cost rate for the group are summarized on page 1 of Updated Attachment JRW-9 and in Table 2 below.

**Table 2**
**DCF-derived Equity Cost Rate/ROE**

| | Dividend Yield | 1 + ½ Growth Adjustment | DCF Growth Rate | Equity Cost Rate |
|---|---|---|---|---|
| **Electric Proxy Group** | **3.60%** | **1.0250** | **5.00%** | **8.70%** |
| **Bulkley Proxy Group** | **3.80%** | **1.0225** | **4.50%** | **8.40%** |

The overall DCF results for the Electric and Bulkley Proxy Groups are 8.70% and 8.40%, respectively.

## B. Capital Asset Pricing Model

**Q. Please discuss the risk-free interest rate.**

A. The yield on long-term U.S. Treasury bonds has usually been viewed as the risk-free rate of interest in the CAPM. The yield on long-term U.S. Treasury bonds, in turn, has been considered to be the yield on U.S. Treasury bonds with 30-year maturities.

**Q. What risk-free interest rate are you using in your CAPM?**

A. As shown on page 2 of Updated Attachment JRW-10, the yield on 30-year U.S. Treasury bonds has been in the 1.3% to 4.0% range over the 2013–2020 time period. The current 30-year Treasury yield is near the bottom of this range. Given the recent range of yields, I have chosen to use a yield toward the high end of the range as my risk-free interest rate. Therefore, I am using 2.50% as the risk-free rate, or $R_f$, in my CAPM. This rate is consistent with Duff & Phelps, who are also using 2.50% (see page 7 of Updated Attachment JRW-10.)[6].

**Q. Does your 2.50% risk-free interest rates take into consideration forecasts of higher interest rates?**

A. No; it does not. As I stated before, forecasts of higher interest rates have been notoriously wrong for a decade. My 2.50% risk-free interest rate takes into account the range of interest rates in the past and effectively synchronizes the risk-free rate with the market risk premium. The risk-free rate and the market risk premium are interrelated in that the market risk premium is developed in relation to the risk-free rate. As discussed below, my market risk premium is based on the

[6] https://www.duffandphelps.com/insights/publications/cost-of-capital.

results of many studies and surveys that have been published over time. Therefore, my risk-free interest rate of 3.50% is effectively a normalized risk-free rate of interest.

**Q. Please discuss your updated betas.**

A. I have traditionally used the betas for the companies as provided in the *Value Line Investment Survey*. As discussed above, the betas for utilities recently increased significantly as a result of the volatility of utility stocks during the stock market meltdown associated with the novel coronavirus in March. Utility betas as measured by *Value Line* have been in the 0.55 to 0.70 range for the past ten years. But utility stocks were much more volatile relative to the market in March and April, and this resulted in an increase of above 0.30 to the average utility beta.

*Value Line* defines their computation of beta as:[7]

> Beta - A relative measure of the historical sensitivity of a stock's price to overall fluctuations in the New York Stock Exchange Composite Index. A Beta of 1.50 indicates a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Index. The ''Beta coefficient'' is derived from a regression analysis of the relationship between weekly percent-age changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. The Betas are adjusted for their long-term tendency to converge toward 1.00. Value Line then adjusts these Betas to account for their long-term tendency to converge toward 1.00.

However, there are several issues with *Value Line* betas:

1. *Value Line* betas are computed using weekly returns, and the volatility of utility stocks during March was impacted by using weekly and not monthly returns.

[7] www.valueline.com

Yahoo Finance uses five years of monthly returns to compute betas, and Yahoo Finance's betas for utilities are lower than *Value Lin*e's'

2. *Value Line* betas are computed using the New York Stock Exchange Index as the market. While about 3,000 stocks trade on the NYSE, most technology stocks are traded on the NASDAQ or over-the-counter market and not the NYSE. Technology stocks, which make up about 25% of the S&P 500, tend to be more volatile. If they were traded on the NYSE, they would increase the volatility of the measure of the market and thereby lower utility betas.

3. Major vendors of CAPM betas such as Merrill Lynch, *Value Line*, and Bloomberg publish adjusted betas. The so-called Blume adjustment cited by *Value Line* adjusts betas calculated using historical returns data to reflect the tendency of stock betas to regress toward 1.0 over time, which means that the Betas of typical low beta stocks tend to increase toward 1.0, and the betas of typical high beta stocks tend to decrease toward 1.0.[8] The Blume adjustment procedure is:

Regressed Beta = .67 * (Observed Beta) + 0.33

For example, suppose a company has an observed past beta of 0.50. The regressed (Blume-adjusted) beta would be:

Regressed Beta = .67 * (0.50) + 0.33 = 0.67

Blume offered two reasons for betas to regress toward 1.0. First, he suggested it may be by-product of management's efforts to keep the level of firm's systematic risk close to that of the market. He also speculated that it results from the

[8] M. Blume, "On the Assessment of Risk," *Journal of Finance*, March 1971.

management's efforts to diversify through investment projects.

However, there is an issue with using regressed betas for utilities. Specifically, a study by Michelfelder and Theodossiou investigated whether regressed Betas are appropriate for utilities.[9] Conceptually, Michelfelder and Theodossiou suggested that utilities are different from unregulated companies in several areas which may result in betas not regressing toward 1.0:[10]

> Being natural monopolies in their own geographic areas, public utilities have more influence on the prices of their product (gas and electricity) than other firms. The rate setting process provides public utilities with the opportunity to adjust prices of gas and electricity to recover the rising costs of fuel and other materials used in the transmission and distribution of electricity and gas.

To test for a regression toward 1.0, the authors used monthly holding period total returns for 57 publicly traded U.S. public utilities for the period from January 1962 to December 2007 using 60, 84, 96, and 108 monthly returns over five different non-lapping periods. They also used alternative time periods and got similar results. The authors came to the following conclusion from their analysis of the data:[11]

> Major vendors of CAPM Betas such as Merrill Lynch, Value Line, and Bloomberg distribute Blume adjusted betas to investors. We have shown empirically that public utility betas do not have a tendency to converge to 1. Short-term Betas of public utilities follow a cyclical pattern with recent downward trends, then upward structural breaks with long-term betas following a downward trend.

The authors concluded that utility betas converge to 0.59 as opposed to 1.0. The implication is that using regressed betas such as those from *Value Line* will

[9] Richard A. Michelfelder and Panayiotis Theodossiou, "Public Utility Beta Adjustment and Biased Costs of Capital in Public Utility Rate Proceedings," *The Electricity Journal*, November, 2013.

[10] *Id*, p. 61.

[11] *Id*, p. 67.

result in an inflated expected return using the CAPM for electric utilities.

**Q. Given this discussion, what betas are you using in your CAPM?**

**A.** As shown on page 3 of Updated Attachment JRW-10, the median *Value Line* beta for both the Electric and Bulkley Proxy Groups is 0.85. At this point, until I have studied utility betas in more depth, I will continue to use *Value Line* betas in my CAPM.

**Q. Please review updates to your risk premium studies.**

A. I have updated pages 5 and 6 of Attachment JRW-10 with updated and new market risk premium studies published since I filed my initial testimony. The median of the market risk premium studies on pages 5 and 6 of Updated Attachment JRW-10 are 4.83% and 5.13%.

**Q. Please highlight some of the updated risk premium studies.**

A. I will highlight several studies/surveys.

Pablo Fernandez conducts annual surveys of financial analysts and companies regarding the equity risk premiums used in their investment and financial decision-making.[12] His survey results are included on pages 5 and 6 of Updated Attachment JRW-10. The results of his 2020 survey of academics, financial analysts, and companies, which included 4,000 responses, indicated a mean market risk premium employed by U.S. analysts and companies of 5.6%.[13] His estimated

[12] Pablo Fernandez, Vitaly Pershin, and Isabel Fernandez Acín, "Market Risk Premium and Risk-Free Rate used for 81 countries in 2020: a survey," *IESE Business School*, (Apr. 2019), available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3358901.

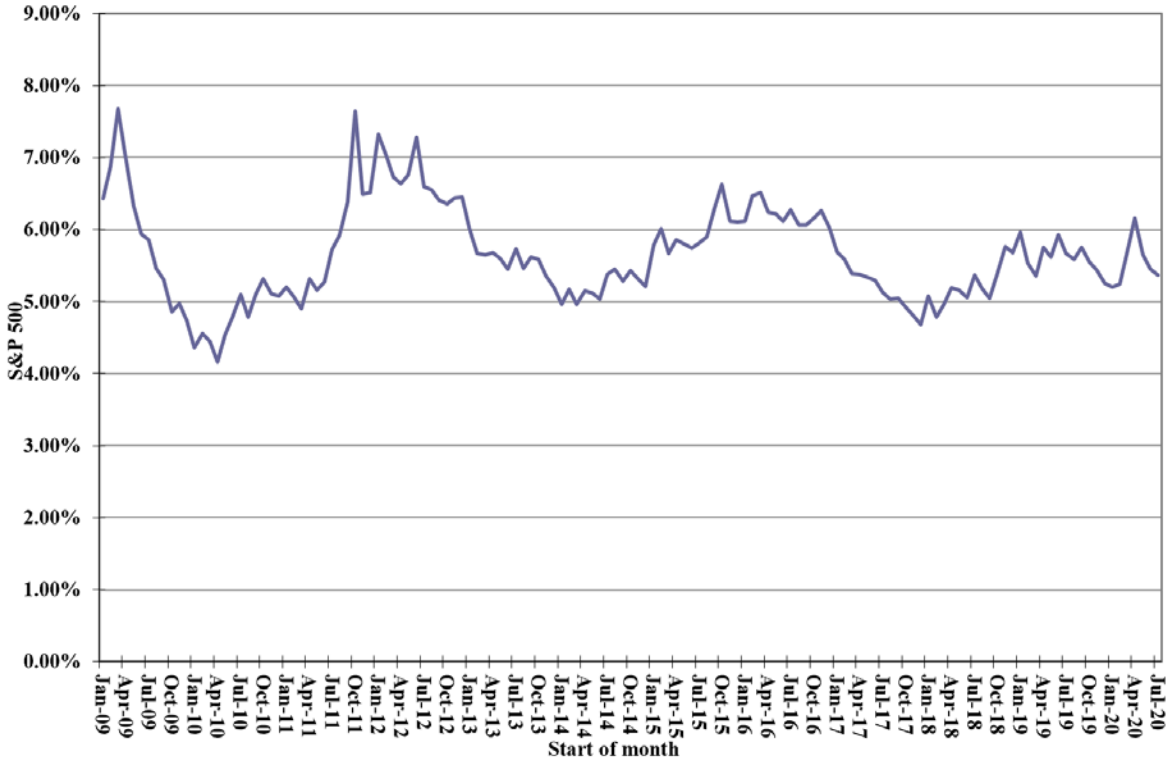
[13] *Id.* p. 3.

market risk premium for the U.S. has been in the 5.00%-5.60% range in recent years.

Professor Aswath Damodaran of New York University, a leading expert on valuation and the market risk premium, provides a monthly updated market risk premium based on projected S&P 500 EPS and stock price level and long-term interest rates. His estimated market risk premium, shown graphically in Figure 3, below, for the past 20 years, has primarily been in the range of 5.0% to 6.0% since 2010. As of July 2020, his estimate of the implied market risk premium was 5.65%.[14]

[14] http://pages.stern.nyu.edu/~adamodar/.

**Figure 3**
**Damodaran Market Risk Premium**




Source: http://pages.stern.nyu.edu/~adamodar/

Duff & Phelps, an investment advisory firm, provides recommendations for the normalized risk-free interest rate and market risk premiums to be used in calculating the cost of capital data. Its recommendations over the 2008-2020 time periods are shown on page 7 of Updated Attachment JRW-10 and are shown graphically in Figure 4. Over the past decade, Duff & Phelps' recommended normalized risk-free interest rates have been in the 2.50% to 4.00% range and market risk premiums has been in the 5.0% to 6.0% range. Most recently, in the wake of the novel coronavirus in 2020, Duff & Phelps decreased its recommended

normalized risk-free interest rate from 3.0% to 2.50% and increased its market risk premium from 5.00% to 6.00%.[15]

**Figure 4**
**Duff & Phelps**
**Normalized Risk-Free Rate and Market Risk Premium Recommendations**
**2007-2020**


Source: https://www.duffandphelps.com/insights/publications/cost-of-capital

KPMG is one of the largest public accounting firms in the world. Its recommended market risk premium over the 2013-2020 time period is shown in Panel A of page 8 of Updated Attachment JRW-10. KPMG's recommended market risk premium has been in the 5.50% to 6.75% range over this time period.

[15] Duff & Phelps, "U.S. Equity Risk Premium Recommendation," (June 30, 2020, https://www.duffandphelps.com/insights/publications/cost-of-capital.

In the first quarter of 2020, KPMG increased its estimated market risk premium from 5.75% to 6.75%.[16]

Finally, the website *market-risk-premia.com* provides risk-free interest rates, implied market risk premiums, and overall cost of capital for 36 countries around the world. These parameters for the U.S. over the 2002-2020 time period are shown in Panel B of page 8 of Updated Attachment JRW-10. As of May 31, 2020, *market-risk-premia.com* estimated an implied cost of capital for the U.S. of 5.89% consisting of a risk-free rate of 0.65% and an implied market risk premium of 5.24%.[17]

**Q. Given these results, what market risk premium are you using in your CAPM?**

A. The studies on page 6 of Attachment JRW-10, and more importantly the more timely and relevant studies just cited, suggest that the appropriate market risk premium in the U.S. is in the 4.0% to 6.0% range. I will use an expected market risk premium of 6.00%, which is in the upper end of the range, as the market risk premium. I gave most weight to the market risk premium estimates of Duff & Phelps, KPMG, the Fernandez survey, and Damodaran. This is a conservatively high estimate of the market risk premium considering the many studies and surveys of the market risk premium.

**Q. What equity cost rate is indicated by your CAPM analysis?**

[16] KPMG, "Equity Market Risk Premium Research Summary," (March 31, 2020), https://assets.kpmg/content/dam/kpmg/nl/pdf/2020/services/equitiy-market-risk-premium-research-summary-march-2020.pdf.

[17] Market-Risk-Premia.com, "Implied Market-risk-premia: USA," http://www.market-risk-premia.com/us.html.

A. The results of my CAPM study for the proxy groups are summarized on page 1 of Attachment JRW-10 and in Table 3 below.

**Table 3**
**CAPM-Derived Equity Cost Rate/ROE**
$K = (R_f) + ß * [E(R_m) - (R_f)]$

| | Risk-Free Rate | Beta | Equity Risk Premium | Equity Cost Rate |
|---|---|---|---|---|
| **Electric Proxy Group** | **2.50%** | **0.85** | **6.0%** | **7.6%** |
| **Bulkley Proxy Group** | **2.50%** | **0.85** | **6.0%** | **7.6%** |

For the Electric Proxy Group, the risk-free rate of 2.50% plus the product of the beta of 0.85 times the equity risk premium of 6.0% results in a 7.6% equity cost rate. For the Bulkley Proxy Group, the risk-free rate of 2.50% plus the product of the beta of 0.85 times the equity risk premium of 6.0% results in a 7.6% equity cost rate.

## C. Equity Cost Rate Summary

**Q. Please summarize the results of your equity cost rate studies.**

A. My DCF and CAPM analyses for the Electric and Bulkley Proxy Groups indicate equity cost rates of 8.70%/7.60% and 8.40%/7.60%, respectively.

**Table 4**
**ROEs Derived from DCF and CAPM Models**

| | DCF | CAPM |
|---|---|---|
| **Electric Proxy Group** | **8.70%** | **8.40%** |
| **Bulkley Proxy Group** | **7.60%** | **7.60%** |

**Q. Given these results, what is your estimated equity cost rate for the group?**

A. Given these results, I conclude that the appropriate equity cost rate for companies in the Electric and Bulkley Proxy Groups is in the 7.60% to 8.70% range. However, since I rely primarily on the DCF model as well as the results for the Electric Proxy Group, I am using the upper end of the range as the equity cost rate. Therefore, I conclude that the appropriate equity cost rate for the Company is 8.70%.

**Q. Please indicate why an equity cost rate of 8.70% is appropriate for the electric operations of Eversource.**

A. There are a number of reasons why an equity cost rate of 8.70% is appropriate and fair for the Company in this case:

1. As shown in Updated Attachment JRW-7, page 1, capital costs for utilities, as indicated by long-term bond yields, are still at historically low levels. In addition, given low inflationary expectations and slow global economic growth, interest rates are likely to remain at low levels for some time.

2. As shown in Attachment Updated JRW-7, page 4, the electric utility industry is still among the lowest risk industries in the U.S. as measured by beta. As such, the cost of equity capital for this industry is amongst the lowest in the U.S., according to the CAPM.

3. Based on Eversource's S&P and Moody's issuer credit ratings of A- and Baa1, I conclude that Eversource is a little less risky than the two proxy groups;

4. The authorized ROEs for electric utility companies have declined from 10.01% in 2012, 9.8% in 2013, 9.76% in 2014, 9.58% in 2015, 9.60% in 2016,

9.68% in 2017, 9.56% in 2018, and 9.64% in 2019, and 9.45% in the first quarter of 2020.[18] In addition, the authorized ROEs for electric distribution companies have been 30-40 basis points below those for integrated electric utilities. In my opinion, authorized ROEs have lagged behind capital market cost rates, or in other words, authorized ROEs have been slow to reflect low capital market cost rates. However, the trend has been towards lower ROEs and the norm now is below 10%. Hence, I believe that my recommended ROE reflects our present historically low capital cost rates, and these low capital cost rates are finally being recognized as the norm by state utility regulatory commissions.

**Q. Please discuss your recommendation in light of a Moody's publication on the subject of utility company ROEs and credit quality.**

A. Moody's recently published an article on utility ROEs and credit quality. In the article, Moody's recognizes that authorized ROEs for electric and gas companies are declining due to lower interest rates. [19]

> The credit profiles of US regulated utilities will remain intact over the next few years despite our expectation that regulators will continue to trim the sector's profitability by lowering its authorized returns on equity (ROE). Persistently low interest rates and a comprehensive suite of cost recovery mechanisms ensure a low business risk profile for utilities, prompting regulators to scrutinize their profitability, which is defined as the ratio of net income to book equity. We view cash flow measures as a more important rating driver than authorized ROEs, and we note that regulators can lower authorized ROEs without hurting cash flow, for instance by targeting depreciation, or through special rate structures.

[18] S&P Global Market Intelligence, RRA *Regulatory Focus*, 2019.

[19] Moody's Investors Service, "Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles," March 10, 2015.

Moody's indicates that with the lower authorized ROEs, electric and gas companies are earning ROEs of 9.0% to 10.0%, but this is not impairing their credit profiles and is not deterring them from raising record amounts of capital. With respect to authorized ROEs, Moody's recognizes that utilities and regulatory commissions are having trouble justifying higher ROEs in the face of lower interest rates and cost recovery mechanisms.[20]

> Robust cost recovery mechanisms will help ensure that US regulated utilities' credit quality remains intact over the next few years. As a result, falling authorized ROEs are not a material credit driver at this time, but rather reflect regulators' struggle to justify the cost of capital gap between the industry's authorized ROEs and persistently low interest rates. We also see utilities struggling to defend this gap, while at the same time recovering the vast majority of their costs and investments through a variety of rate mechanisms.

Overall, this article further supports the belief that lower authorized ROEs are unlikely to hurt the financial integrity of utilities or their ability to attract capital.

**Q. Do you believe that your 8.70% ROE recommendation meets *Hope* and *Bluefield* standards?**

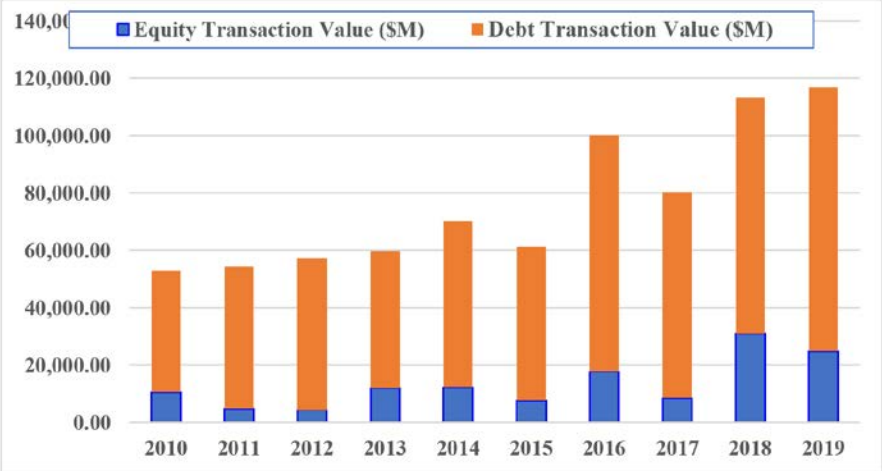
A. Yes. As previously noted, according to the *Hope* and *Bluefield* decisions, returns on capital should be: (1) comparable to returns investors expect to earn on other investments of similar risk; (2) sufficient to assure confidence in the company's financial integrity; and (3) adequate to maintain and support the company's credit and to attract capital.

[20] Moody's Investors Service, "Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles," March 10, 2015.

**Q. Are utilities able to attract capital with the lower ROEs?**

A. Yes. As shown on page 3 of Updated Attachment JRW-7, utilities have been earning ROEs of about 9.0% (on average) in recent years. Figure 5 shows the annual amounts of debt and equity capital raised by public utility companies over the past decade. Electric utility and gas distribution companies have taken advantage of the low interest rate and capital cost environment of recent years and raised records amount of capital in the markets. In fact, in each of 2018 and 2019, public utilities have raised a total of over $100 billion in debt and equity. Clearly, even with lower ROEs, utilities are able to attract record amounts of capital.

**Figure 5**
**Debt and Equity Capital Raised by Public Utilities**
**2010-2019**




Source: S&P Global Market Intelligence, S&P Cap IQ, 2020.

**Q. Has Eversource raised capital recently?**

A. Eversource has earned a ROE of about 9.0% in recent years, and has recently raised both debt and equity capital. On January 7, 2020, Eversource issued $350 million of unsecured, 30-year bonds at a yield of 3.46%. In addition, on February 19, 2020 Eversource sold $700 million in common stock, and on June 11, 2020, Eversource sold another $518 million in common stock.

**Q. Does this conclude your update testimony?**

A. Yes.

# Attachment JRW-3

## Public Service of New Hampshire d/b/a Eversource Energy
## Recommended Cost of Capital

| Capital Source | Capitalization Ratios | Cost Rate | Weighted Cost Rate |
|---|---|---|---|
| **Short-Term Debt** | **3.51%** | **2.45%** | **0.09%** |
| **Long-Term Debt** | **46.49%** | **4.37%** | **2.03%** |
| **Common Equity** | **50.00%** | **8.70%** | **4.35%** |
| **Total Capitalization** | **100.00%** | | **6.47%** |

* Capital Structure Ratios are developed in Attachment JRW-5.

**Attachment JRW-4**
**Public Service of New Hampshire d/b/a Eversource Energy**
**Summary Financial Statistics for Proxy Group**

**Panel A**
**Electric Proxy Group**

| Company | Operating Revenue ($mil) | Percent Reg Elec Revenue | Percent Reg Gas Revenue | Net Plant ($mil) | Market Cap ($mil) | S&P Issuer Credit Rating | Moody's Long Term Rating | Pre-Tax Interest Coverage | Primary Service Area | Common Equity Ratio | Return on Equity | Market to Book Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | $1,240.5 | 84% | 0% | $4,405.6 | $3,983.2 | BBB+ | Baa1 | 2.89x | MN, WI | 56.1% | 8.5% | 1.78 |
| Alliant Energy Corporation (NYSE-LNT) | $3,647.7 | 84% | 12% | $13,527.1 | $14,177.5 | A- | Baa1 | 2.63x | WI,IA,IL,MN | 43.6% | 11.4% | 2.72 |
| Ameren Corporation (NYSE-AEE) | $5,646.0 | 80% | 13% | $24,412.0 | $21,439.4 | BBB+ | Baa1 | 3.56x | IL,MO | 44.7% | 10.6% | 2.66 |
| American Electric Power Co. (NYSE-AEP) | $15,561.4 | 96% | 0% | $61,095.5 | $49,306.3 | A- | Baa1 | 2.67x | 10 States | 38.6% | 9.9% | 2.51 |
| Avangrid (NYSE-AGR) | $6,338.0 | 56% | 23% | $25,421.0 | $16,661.6 | BBB+ | Baa1 | 3.14x | NY,CT,ME | 64.2% | 4.6% | 1.09 |
| Avista Corporation (NYSE-AVA) | $1,345.6 | 64% | 22% | $4,944.9 | $3,488.8 | BBB | Baa2 | 2.21x | WA,OR,AK,ID | 45.7% | 10.6% | 1.80 |
| CMS Energy Corporation (NYSE-CMS) | $6,845.0 | 65% | 28% | $18,973.0 | $19,402.5 | BBB+ | Baa1 | 2.54x | MI | 27.3% | 13.9% | 3.87 |
| Consolidated Edison, Inc. (NYSE-ED) | $12,574.0 | 64% | 17% | $44,747.0 | $29,375.6 | BBB+ | A3 | 2.58x | NY,PA | 44.2% | 7.7% | 1.62 |
| Dominion Energy Inc. (NYSE-D) | $16,572.0 | 67% | 34% | $69,581.0 | $74,607.2 | BBB+ | NA | 2.49x | VA,NC,SC,OH,WV,UT | 40.5% | 5.4% | 2.52 |
| Duke Energy Corporation (NYSE-DUK) | $24,658.0 | 91% | 7% | $102,339.0 | $74,542.2 | A- | Baa1 | 2.59x | NC,OH,FL,SC,KY | 40.5% | 8.3% | 1.66 |
| Edison International (NYSE-EIX) | $12,347.0 | 100% | 0% | $44,849.0 | $25,437.9 | BBB | Baa3 | 2.54x | CA | 37.9% | 10.8% | 1.91 |
| Entergy Corporation (NYSE-ETR) | $10,878.7 | 88% | 0% | $35,515.6 | $25,636.9 | BBB+ | Baa2 | 2.15x | LA,AR,MS,TX | 33.4% | 13.0% | 2.50 |
| Evergy, Inc. (NYSE-EVRG) | $5,147.8 | 100% | 0% | $19,216.9 | $16,564.2 | A- | Baa1 | 3.07x | KS,MO | 46.0% | 7.2% | 1.93 |
| Eversource Energy (NYSE-ES) | $8,526.5 | 82% | 12% | $27,635.4 | $32,513.5 | A- | Baa1 | 3.49x | CT,NH,MA | 44.4% | 7.5% | 2.57 |
| Exelon Corporation (NYSE-EXC) | $34,438.0 | 59% | 4% | $78,749.0 | $45,617.6 | BBB+ | Baa2 | 2.80x | PA,NJ,IL,MD,DCDE | 43.6% | 9.3% | 1.41 |
| FirstEnergy Corporation (NYSE-FE) | $10,844.0 | 100% | 0% | $31,881.0 | $26,224.6 | BBB | Baa3 | 1.82x | OH,PA,NY,NJ,WV,MD | 24.7% | 13.1% | 3.76 |
| Hawaiian Electric Industries (NYSE-HE) | $2,874.6 | 89% | 0% | $5,308.8 | $5,109.8 | BBB- | NA | 3.73x | HI | 47.7% | 9.8% | 2.24 |
| IDACORP, Inc. (NYSE-IDA) | $1,346.4 | 100% | 0% | $4,531.5 | $5,372.7 | BBB | Baa1 | 2.96x | ID | 57.2% | 9.6% | 2.18 |
| MGE Energy, Inc. (NYSE-MGEE) | $555.0 | 70% | 30% | $1,643.4 | $2,631.0 | AA- | Aa2 | 4.95x | WI | 60.3% | 10.4% | 3.07 |
| NextEra Energy, Inc. (NYSE-NEE) | $19,204.0 | 71% | 0% | $82,010.0 | $137,996.0 | A- | Baa1 | 2.43x | FL | 43.8% | 10.6% | 3.73 |
| NorthWestern Corporation (NYSE-NWE) | $1,257.9 | 78% | 22% | $4,704.6 | $3,932.3 | BBB | NA | 2.83x | MT,SD,NE | 47.5% | 10.2% | 1.93 |
| OGE Energy Corp. (NYSE-OGE) | $2,231.6 | 100% | 100% | $8,964.8 | $8,015.1 | BBB+ | Baa1 | 3.36x | OK,AR | 55.2% | 10.6% | 1.94 |
| Otter Tail Corporation (NDQ-OTTR) | $919.5 | 50% | 0% | $1,775.7 | $2,065.4 | BBB | Baa2 | 4.16 | MN,ND,SD | 52.1% | 11.5% | 2.64 |
| Pinnacle West Capital Corp. (NYSE-PNW) | $3,471.2 | 95% | 0% | $14,254.3 | $11,273.2 | A- | A3 | 2.95x | AZ | 47.8% | 10.1% | 2.08 |
| PNM Resources, Inc. (NYSE-PNM) | $1,457.6 | 100% | 0% | $5,509.9 | $4,149.2 | BBB+ | Baa3 | 1.14x | NM,TX | 33.0% | 4.6% | 2.47 |
| Portland General Electric Company (NYSE-POR) | $2,123.0 | 100% | 0% | $6,820.0 | $5,325.9 | BBB+ | A3 | 2.62x | OR | 48.1% | 8.4% | 2.06 |
| PPL Corporation (NYSE-PPL) | $7,769.0 | 91% | 8% | $36,578.0 | $24,708.2 | A- | Baa2 | 3.18x | PA,KY | 35.9% | 14.2% | 1.90 |
| Sempra Energy (NYSE-SRE) | $10,829.0 | 56% | 44% | $37,043.0 | $43,210.1 | BBB+ | Baa1 | 2.31x | CA,TX | 36.5% | 10.4% | 2.44 |
| Southern Company (NYSE-SO) | $21,419.0 | 73% | 14% | $84,420.0 | $71,408.9 | A- | Baa2 | 3.20x | GA,FL,NJ,IL,VA,TN,MS | 34.1% | 18.1% | 2.60 |
| WEC Energy Group (NYSE-WEC) | $7,523.1 | 58% | 42% | $23,661.5 | $32,871.4 | A- | Baa1 | 3.12x | WI,IL,MN,MI | 43.9% | 11.4% | 3.25 |
| Xcel Energy Inc. (NYSE-XEL) | $11,529.0 | 83% | 16% | $40,781.0 | $36,307.1 | A- | Baa1 | 2.69x | MN,WI,ND,SD,MI | 39.2% | 10.8% | 2.74 |
| Mean | $8,745.8 | 80% | 14% | $31,138.7 | $28,172.8 | BBB+ | Baa1 | 2.86 | | 43.8% | 10.1% | 2.37 |
| Median | $6,845.0 | 83% | 8% | $24,412.0 | $21,439.4 | BBB+ | Baa1 | 2.80 | | 43.9% | 10.4% | 2.44 |

Data Source: Company 2019 SEC 10-K filings, S&P Capital IQ; *Value Line Investment Survey* , 2020.

**Panel B**
**Bulkley Proxy Group**

| Company | Operating Revenue ($mil) | Percent Reg Elec Revenue | Percent Reg Gas Revenue | Net Plant ($mil) | Market Cap ($mil) | S&P Issuer Credit Rating | Moody's Long Term Rating | Pre-Tax Interest Coverage | Primary Service Area | Common Equity Ratio | Return on Equity | Market to Book Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | $1,240.5 | 84% | 0% | $4,405.6 | $3,983.2 | BBB+ | Baa1 | 2.89x | MN, WI | 56.1% | 8.5% | 1.78 |
| Alliant Energy Corporation (NYSE-LNT) | $3,647.7 | 84% | 12% | $13,527.1 | $14,177.5 | A- | Baa1 | 2.63x | WI,IA,IL,MN | 43.6% | 11.4% | 2.72 |
| Avangrid (NYSE-AGR) | $6,338.0 | 56% | 23% | $25,421.0 | $16,661.6 | BBB+ | Baa1 | 3.14x | NY,CT,ME | 64.2% | 4.6% | 1.09 |

**Attachment JRW-4**
**Public Service of New Hampshire d/b/a Eversource Energy**
***Value Line* Risk Metrics**

**Panel A**
**Electric Proxy Group**

| Company | Beta | Financial Strength | Safety | Earnings Predictability | Stock Price Stability |
|---|---|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | 0.85 | A | 2 | 80 | 95 |
| Alliant Energy Corporation (NYSE-LNT) | 0.80 | A | 2 | 90 | 95 |
| Ameren Corporation (NYSE-AEE) | 0.80 | A | 2 | 85 | 95 |
| American Electric Power Co. (NYSE-AEP) | 0.75 | A+ | 1 | 85 | 100 |
| Avangrid (NYSE-AGR) | 0.80 | B++ | 2 | 55 | 95 |
| Avista Corporation (NYSE-AVA) | 0.90 | A | 2 | 65 | 95 |
| CMS Energy Corporation (NYSE-CMS) | 0.80 | B++ | 2 | 85 | 90 |
| Consolidated Edison, Inc. (NYSE-ED) | 0.75 | A+ | 1 | 95 | 85 |
| Dominion Energy Inc. (NYSE-D) | 0.80 | B++ | 2 | 50 | 90 |
| Duke Energy Corporation (NYSE-DUK) | 0.85 | A | 2 | 90 | 90 |
| Edison International (NYSE-EIX) | 0.90 | B+ | 3 | 10 | 80 |
| Entergy Corporation (NYSE-ETR) | 0.95 | B++ | 2 | 60 | 90 |
| Evergy, Inc. (NYSE-EVRG) | 1.05 | B++ | 2 | NMF | 60 |
| Eversource Energy (NYSE-ES) | 0.90 | A | 1 | 95 | 85 |
| Exelon Corporation (NYSE-EXC) | 0.90 | B++ | 2 | 55 | 95 |
| FirstEnergy Corporation (NYSE-FE) | 0.85 | B++ | 2 | 40 | 95 |
| Hawaiian Electric Industries (NYSE-HE) | 0.80 | A | 2 | 60 | 100 |
| IDACORP, Inc. (NYSE-IDA) | 0.80 | A | 2 | 95 | 100 |
| MGE Energy, Inc. (NYSE-MGEE) | 0.70 | A | 1 | 95 | 95 |
| NextEra Energy, Inc. (NYSE-NEE) | 0.85 | A+ | 1 | 70 | 95 |
| NorthWestern Corporation (NYSE-NWE) | 0.90 | B++ | 2 | 85 | 100 |
| OGE Energy Corp. (NYSE-OGE) | 1.05 | A | 2 | 80 | 80 |
| Otter Tail Corporation (NDQ-OTTR) | 0.85 | A | 2 | 85 | 95 |
| Pinnacle West Capital Corp. (NYSE-PNW) | 0.85 | A+ | 1 | 95 | 100 |
| PNM Resources, Inc. (NYSE-PNM) | 0.90 | B+ | 3 | 75 | 90 |
| Portland General Electric Company (NYSE-POR) | 0.85 | B++ | 2 | 85 | 95 |
| PPL Corporation (NYSE-PPL) | 1.05 | B++ | 2 | 70 | 75 |
| Sempra Energy (NYSE-SRE) | 0.95 | A | 2 | 70 | 95 |
| Southern Company (NYSE-SO) | 0.90 | A | 2 | 85 | 90 |
| WEC Energy Group (NYSE-WEC) | 0.80 | A+ | 1 | 90 | 85 |
| Xcel Energy Inc. (NYSE-XEL) | 0.75 | A+ | 1 | 100 | 100 |
| Mean | 0.86 | A | 1.8 | 76 | 91 |

Data Source: *Value Line Investment Survey* , 2020.

**Panel B**
**Bulkley Proxy Group**

| Company | Beta | Financial Strength | Safety | Earnings Predictability | Stock Price Stability |
|---|---|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | 0.85 | A | 2 | 80 | 95 |
| Alliant Energy Corporation (NYSE-LNT) | 0.80 | A | 2 | 90 | 95 |
| Avangrid (NYSE-AGR) | 0.80 | B++ | 2 | 55 | 95 |
| FirstEnergy Corporation (NYSE-FE) | 0.85 | B++ | 2 | 40 | 95 |
| Hawaiian Electric Industries (NYSE-HE) | 0.80 | A | 2 | 60 | 100 |
| NorthWestern Corporation (NYSE-NWE) | 0.90 | B++ | 2 | 85 | 100 |
| Portland General Electric Company (NYSE-POR) | 0.85 | B++ | 2 | 85 | 95 |
| PPL Corporation (NYSE-PPL) | 1.05 | B++ | 2 | 70 | 75 |
| Mean | 0.86 | A | 2.0 | 71 | 94 |

Data Source: *Value Line Investment Survey* , 2019.

# *Value Line* Risk Metrics

**Beta**

A relative measure of the historical sensitivity of a stock's price to overall fluctuations in the New York Stock Exchange Composite Index. A beta of 1.50 indicates a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Index. The ''coefficient'' is derived from a regression analysis of the relationship between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. Betas are adjusted for their long-term tendency to converge toward 1.00.

**Financial Strength**

A relative measure of the companies reviewed by *Value Line* . The relative ratings range from A++ (strongest) down to C (weakest).

**Safety Rank**

A measurement of potential risk associated with individual common stocks. The Safety Rank is computed by averaging two other *Value Line* indexes the Price Stability Index and the Financial strength Rating. Safety Ranks range from 1 (Highest) to 5 (Lowest). Conservative investors should try to limit their purchases to equities ranked 1 (Highest) and 2 (Above Average) for Safety. .

**Earnings Predictability**

A measure of the reliability of an earnings forecast. Earnings Predictability is based upon the stability of year-to-year comparisons, with recent years being weighted more heavily than earlier ones. The most reliable forecasts tend to be those with the highest rating (100); the least reliable, the lowest (5). The earnings stability is derived from the standard deviation of percentage changes in quarterly earnings over an eight-year period. Special adjustments are made for comparisons around zero and from plus to minus.

**Stock Price Stability**

A measure of the stability of a stock's price. It includes sensitivity to the market (see Beta as well as the stock's inherent volatility. *Value Line's* Stability ratings range from 1 (highest) to 5 (lowest).

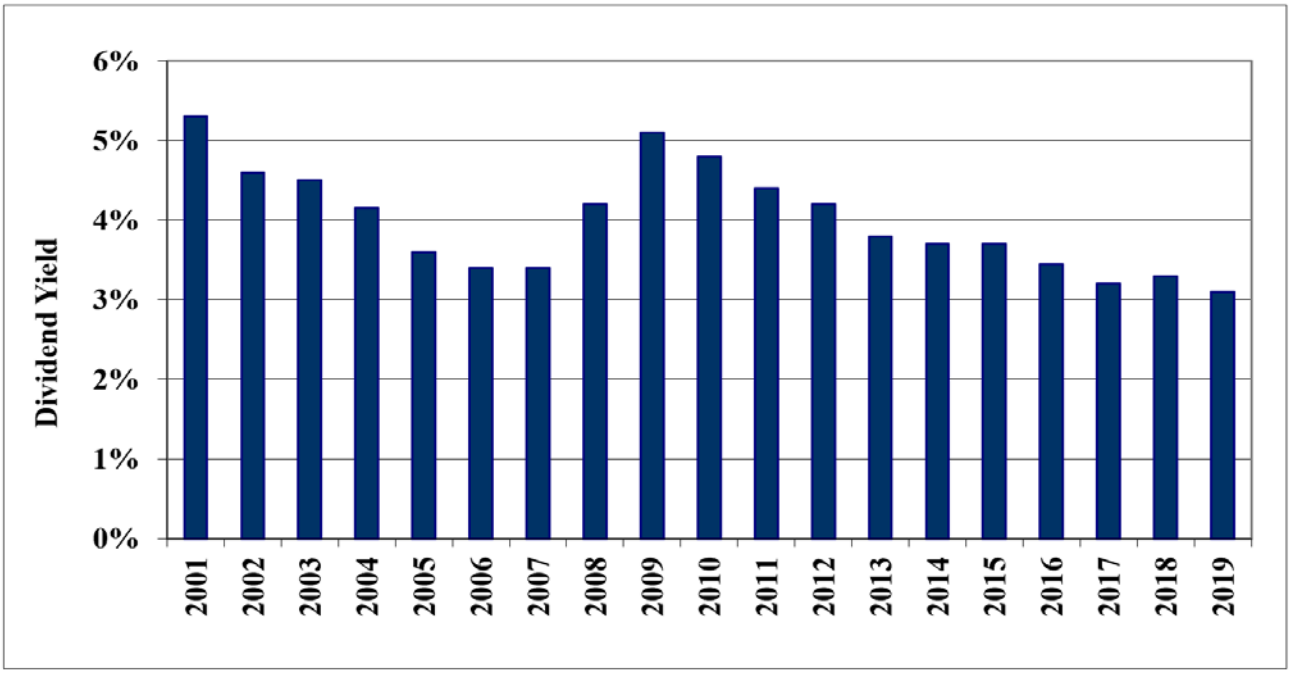
Source: *Value Line Investment Analyzer* .

**Attachment JRW-7**
**Long-Term 'A' Rated Public Utility Bonds**


**Data Source: Mergent Bond Record**

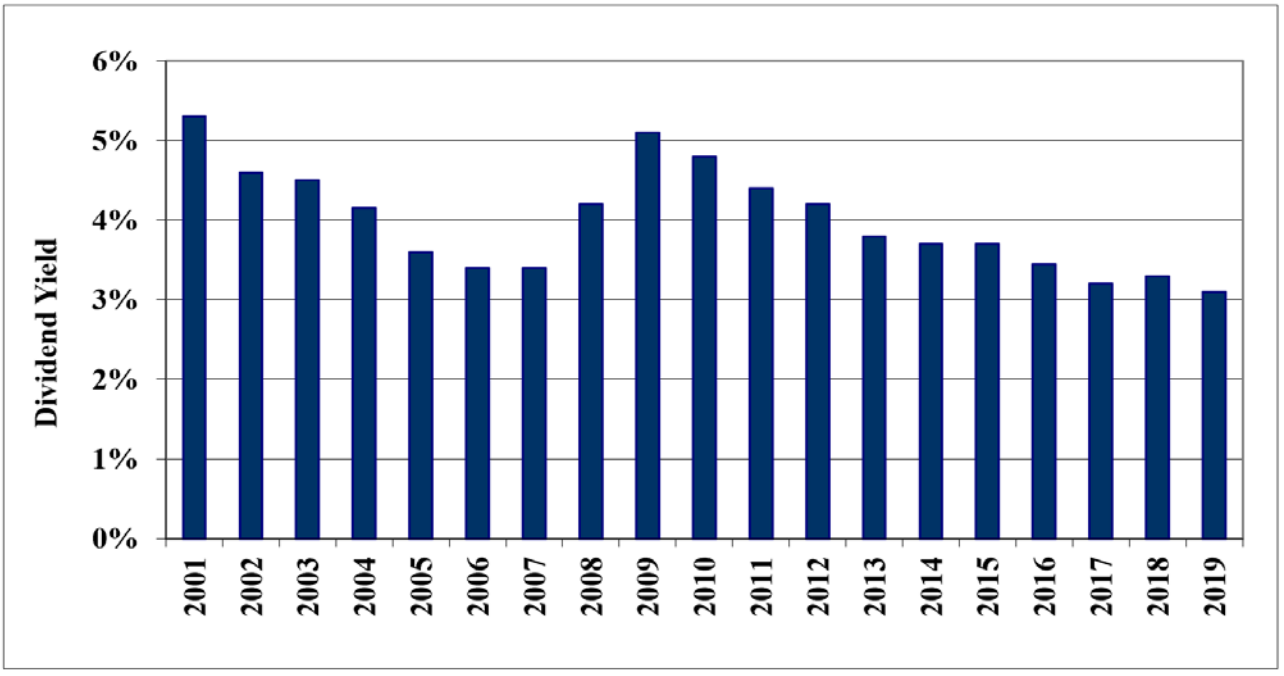
**Attachment JRW-7**

**Electric Utility Average Dividend Yield**




**Data Source:** ***Value Line Investment Survey.***

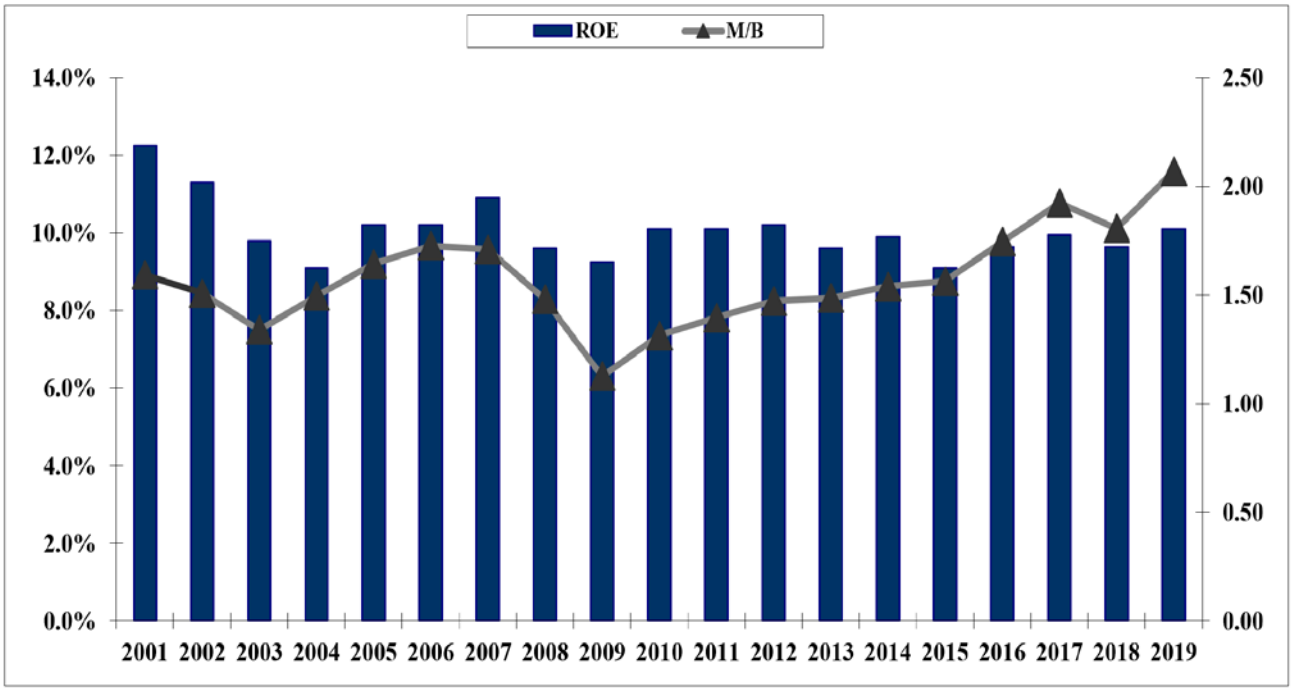
**Panel B**
**Gas Distribution Company Average Dividend Yield**




**Data Source:** ***Value Line Investment Survey.***

# Attachment JRW-7

## Electric Utility Average Return on Equity and Market-to-Book Ratios




**Data Source:** ***Value Line Investment Survey.***

**Attachment JRW-7**
**Industry Average Betas***
***Value Line Investment Survey* Betas****
**6-Jul-20**

| Rank | Industry | Beta | Rank | Industry | Beta | Rank | Industry | Beta |
|---|---|---|---|---|---|---|---|---|
| 1 | Homebuilding | 1.49 | 34 | Recreation | 1.17 | 67 | Publishing | 1.03 |
| 2 | Oilfield Svcs/Equip. | 1.43 | 35 | Diversified Co. | 1.16 | 68 | Insurance (Prop/Cas.) | 1.02 |
| 3 | Insurance (Life) | 1.43 | 36 | Electrical Equipment | 1.15 | 69 | Med Supp Non-Invasive | 1.01 |
| 4 | Hotel/Gaming | 1.38 | 37 | Electronics | 1.14 | 70 | Human Resources | 1.01 |
| 5 | Petroleum (Integrated) | 1.38 | 38 | Restaurant | 1.14 | 71 | Telecom. Equipment | 1.01 |
| 6 | Petroleum (Producing) | 1.37 | 39 | Computers/Peripherals | 1.14 | 72 | Investment Co.(Foreign) | 1.00 |
| 7 | Metal Fabricating | 1.33 | 40 | Bank (Midwest) | 1.14 | 73 | Investment Co. | 1.00 |
| 8 | Metals & Mining (Div.) | 1.32 | 41 | Bank | 1.13 | 74 | Computer Software | 1.00 |
| 9 | Natural Gas (Div.) | 1.32 | 42 | Automotive | 1.13 | 75 | Biotechnology | 0.99 |
| 10 | Building Materials | 1.31 | 43 | Retail (Softlines) | 1.12 | 76 | E-Commerce | 0.99 |
| 11 | Advertising | 1.31 | 44 | Reinsurance | 1.11 | 77 | Cable TV | 0.96 |
| 12 | Shoe | 1.31 | 45 | Railroad | 1.11 | 78 | Trucking | 0.95 |
| 13 | Maritime | 1.28 | 46 | Heavy Truck & Equip | 1.11 | 79 | Thrift | 0.95 |
| 14 | Steel | 1.28 | 47 | Semiconductor Equip | 1.10 | 80 | Tobacco | 0.94 |
| 15 | Apparel | 1.28 | 48 | R.E.I.T. | 1.10 | 81 | Foreign Electronics | 0.94 |
| 16 | Oil/Gas Distribution | 1.28 | 49 | Industrial Services | 1.10 | 82 | Telecom. Utility | 0.93 |
| 17 | Air Transport | 1.27 | 50 | Power | 1.10 | 83 | Environmental | 0.93 |
| 18 | Pipeline MLPs | 1.27 | 51 | Precision Instrument | 1.09 | 84 | Healthcare Information | 0.92 |
| 19 | Public/Private Equity | 1.26 | 52 | Wireless Networking | 1.09 | 85 | Beverage | 0.89 |
| 20 | Aerospace/Defense | 1.26 | 53 | Toiletries/Cosmetics | 1.09 | 86 | Telecom. Services | 0.88 |
| 21 | Retail Automotive | 1.26 | 54 | Internet | 1.08 | 87 | Electric Util. (Central) | 0.88 |
| 22 | Office Equip/Supplies | 1.24 | 55 | Semiconductor | 1.07 | 88 | Electric Utility (East) | 0.87 |
| 23 | Retail (Hardlines) | 1.23 | 56 | Retail Building Supply | 1.07 | 89 | Natural Gas Utility | 0.85 |
| 24 | Financial Svcs. (Div.) | 1.22 | 57 | Newspaper | 1.07 | 90 | Electric Utility (West) | 0.85 |
| 25 | Auto Parts | 1.22 | 58 | Packaging & Container | 1.06 | 91 | Entertainment Tech | 0.84 |
| 26 | Paper/Forest Products | 1.22 | 59 | Retail Store | 1.05 | 92 | Household Products | 0.82 |
| 27 | Chemical (Diversified) | 1.21 | 60 | Med Supp Invasive | 1.05 | 93 | Retail/Wholesale Food | 0.79 |
| 28 | Furn/Home Furnishings | 1.21 | 61 | Educational Services | 1.05 | 94 | Water Utility | 0.78 |
| 29 | Chemical (Specialty) | 1.20 | 62 | Information Services | 1.04 | 95 | Food Processing | 0.77 |
| 30 | Medical Services | 1.20 | 63 | Entertainment | 1.04 | 96 | Pharmacy Services | 0.73 |
| 31 | Chemical (Basic) | 1.18 | 64 | Funeral Services | 1.04 | 97 | Precious Metals | 0.70 |
| 32 | Engineering & Const | 1.18 | 65 | IT Services | 1.03 | | | |
| 33 | Machinery | 1.17 | 66 | Drug | 1.03 | | Mean | 1.10 |

*** Industry averages for 97 industries using *Value Line*'s database of 1,704 companies - Updated 7-6-20.**

**** *Value Line* computes betas using monthly returns regressed against the New York Stock Exchange Index for five years. These betas are then adjusted as follows: *VL* Beta = [{(2/3) * Regressed Beta} + {(1/3) * (1.0)}] to account to tendency for Betas to regress toward average of 1.0. See M. Blume, "On the Assessment of Risk," *Journal of Finance*, March 1971.**

# Attachment JRW-9

## Public Service of New Hampshire d/b/a Eversource Energy
## Discounted Cash Flow Analysis

### Panel A
### Electric Proxy Group

| | |
|---|---|
| **Dividend Yield*** | **3.60%** |
| **Adjustment Factor** | **1.025** |
| **Adjusted Dividend Yield** | **3.69%** |
| **Growth Rate**** | **5.00%** |
| **Equity Cost Rate** | **8.70%** |

*** Page 2 of Attachment JRW-9**
**** Based on data provided on pages 3, 4, 5, and 6 of Attachment JRW-9**

### Panel B
### Bulkley Proxy Group

| | |
|---|---|
| **Dividend Yield*** | **3.80%** |
| **Adjustment Factor** | **1.0225** |
| **Adjusted Dividend Yield** | **3.89%** |
| **Growth Rate**** | **4.50%** |
| **Equity Cost Rate** | **8.40%** |

*** Page 2 of Attachment JRW-9**
**** Based on data provided on pages 3, 4, 5, and 6 of Attachment JRW-9**

**Attachment JRW-9**

**Public Service of New Hampshire d/b/a Eversource Energy**
**Monthly Dividend Yields**

**Panel A**
**Electric Proxy Group***

| Company | Annual Dividend | Dividend Yield 30 Day | Dividend Yield 90 Day | Dividend Yield 180 Day |
|---|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | $2.47 | 4.3% | 4.2% | 3.5% |
| Alliant Energy Corporation (NYSE-LNT) | $1.42 | 2.9% | 2.9% | 2.8% |
| Ameren Corporation (NYSE-AEE) | $1.98 | 2.7% | 2.7% | 2.6% |
| American Electric Power Co. (NYSE-AEP) | $2.80 | 3.4% | 3.4% | 3.2% |
| Avangrid (NYSE-AVG) | $1.76 | 4.1% | 4.0% | 3.8% |
| Avista Corporation (NYSE-AVA) | $1.62 | 4.3% | 4.0% | 3.7% |
| CMS Energy Corporation (NYSE-CMS) | $1.63 | 2.8% | 2.8% | 2.7% |
| Consolidated Edison, Inc. (NYSE-ED) | $3.06 | 4.2% | 3.9% | 3.7% |
| Dominion Energy Inc. (NYSE-D) | $3.67 | 4.4% | 4.7% | 4.6% |
| Duke Energy Corporation (NYSE-DUK) | $3.78 | 4.5% | 4.5% | 4.3% |
| Edison International (NYSE-EIX) | $2.55 | 4.5% | 4.5% | 4.0% |
| Entergy Corporation (NYSE-ETR) | $3.72 | 3.8% | 3.8% | 3.4% |
| Evergy, Inc. (NYSE-EVRG) | $2.02 | 3.3% | 3.4% | 3.3% |
| Eversource Energy (NYSE-ES) | $2.27 | 2.7% | 2.7% | 2.7% |
| Exelon Corporation (NYSE-EXC) | $1.53 | 4.0% | 4.1% | 3.7% |
| FirstEnergy Corporation (NYSE-FE) | $1.56 | 3.8% | 3.8% | 3.5% |
| Hawaiian Electric Industries (NYSE-HE) | $1.32 | 3.5% | 3.3% | 3.1% |
| IDACORP, Inc. (NYSE-IDA) | $2.68 | 3.0% | 3.0% | 2.7% |
| MGE Energy, Inc. (NYSE-MGEE) | $1.41 | 2.2% | 2.2% | 2.0% |
| NextEra Energy, Inc. (NYSE-NEE) | $5.60 | 2.3% | 2.4% | 2.3% |
| NorthWestern Corporation (NYSE-NWE) | $2.40 | 4.2% | 4.1% | 3.7% |
| OGE Energy Corp. (NYSE-OGE) | $1.55 | 4.9% | 4.9% | 4.2% |
| Otter Tail Corporation (NDQ-OTTR) | $1.48 | 3.6% | 3.5% | 3.2% |
| Pinnacle West Capital Corp. (NYSE-PNW) | $3.13 | 4.1% | 4.1% | 3.7% |
| PNM Resources, Inc. (NYSE-PNM) | $1.23 | 3.1% | 3.1% | 2.7% |
| Portland General Electric Company (NYSE-POR) | $1.54 | 3.5% | 3.3% | 3.0% |
| PPL Corporation (NYSE-PPL) | $1.66 | 6.2% | 6.4% | 5.6% |
| SEMPRA Energy (NYSE-SRE) | $4.18 | 3.4% | 3.5% | 3.1% |
| Southern Company (NYSE-SO) | $2.56 | 4.6% | 4.6% | 4.3% |
| WEC Energy Group (NYSE-WEC) | $2.53 | 2.8% | 2.8% | 2.8% |
| Xcel Energy Inc. (NYSE-XEL) | $1.72 | 2.7% | 2.8% | 2.7% |
| Mean | | 3.7% | 3.6% | 3.4% |
| Median | | 3.6% | 3.5% | 3.3% |

Data Sources: http://quote.yahoo.com, July, 2020.

**Panel B**
**Bulkley Proxy Group**

| Company | Annual Dividend | Dividend Yield 30 Day | Dividend Yield 90 Day | Dividend Yield 180 Day |
|---|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | $2.47 | 4.3% | 4.2% | 3.5% |
| Alliant Energy Corporation (NYSE-LNT) | $1.42 | 2.9% | 2.9% | 2.8% |
| Avangrid (NYSE-AVG) | $1.76 | 3.6% | 3.5% | 3.5% |
| FirstEnergy Corporation (NYSE-FE) | $1.56 | 3.8% | 3.8% | 3.5% |
| Hawaiian Electric Industries (NYSE-HE) | $1.32 | 3.5% | 3.3% | 3.1% |
| NorthWestern Corporation (NYSE-NWE) | $2.40 | 4.2% | 4.1% | 3.7% |
| Portland General Electric Company (NYSE-POR) | $1.54 | 3.5% | 3.3% | 3.0% |
| PPL Corporation (NYSE-PPL) | $1.66 | 6.2% | 6.4% | 5.6% |
| Mean | | 4.0% | 3.9% | 3.6% |
| Median | | 3.7% | 3.7% | 3.5% |

Data Source: http://quote.yahoo.com, December, 2019.

**Attachment JRW-9**

**Public Service of New Hampshire d/b/a Eversource Energy**
**DCF Equity Cost Growth Rate Measures**
***Value Line* Historic Growth Rates**

**Panel A**
**Electric Proxy Group**

| Company | *Value Line* Historic Growth | | | | | |
|---|---|---|---|---|---|---|
| | Past 10 Years | | | Past 5 Years | | |
| | Earnings | Dividends | Book Value | Earnings | Dividends | Book Value |
| ALLETE, Inc. (NYSE-ALE) | 2.5 | 3.0 | 5.0 | 4.0 | 3.5 | 5.0 |
| Alliant Energy Corporation (NYSE-LNT) | 5.0 | 7.0 | 4.0 | 5.0 | 7.0 | 5.0 |
| Ameren Corporation (NYSE-AEE) | 1.0 | -2.0 | -0.5 | 6.5 | 3.0 | 2.5 |
| American Electric Power Co. (NYSE-AEP) | 3.0 | 4.5 | 4.0 | 4.0 | 5.5 | 3.0 |
| Avangrid (NYSE-AGR) | | | | | | |
| Avista Corporation (NYSE-AVA) | 6.5 | 8.0 | 4.0 | 7.0 | 4.0 | 4.5 |
| CMS Energy Corporation (NYSE-CMS) | 9.5 | 15.0 | 4.5 | 7.0 | 7.0 | 5.5 |
| Consolidated Edison, Inc. (NYSE-ED) | 2.5 | 2.0 | 4.0 | 2.0 | 3.0 | 4.5 |
| Dominion Energy Inc. (NYSE-D) | 1.5 | 7.5 | 6.0 | | 8.0 | 9.5 |
| Duke Energy Corporation (NYSE-DUK) | 3.0 | 3.0 | 2.0 | 2.5 | 3.0 | 1.0 |
| Edison International (NYSE-EIX) | -3.5 | 7.0 | 2.0 | -10.5 | 11.5 | 2.5 |
| Entergy Corporation (NYSE-ETR) | -0.5 | 2.5 | 1.0 | 0.5 | 1.5 | -2.5 |
| Evergy, Inc. (NYSE-EVRG) | | | | | | |
| Eversource Energy (NYSE-ES) | 6.0 | 9.0 | 6.5 | 7.0 | 7.0 | 3.5 |
| Exelon Corporation (NYSE-EXC) | -4.5 | -3.5 | 6.5 | 4.5 | -3.0 | 4.0 |
| FirstEnergy Corporation (NYSE-FE) | -7.0 | -3.0 | -8.5 | | -2.0 | -17.5 |
| Hawaiian Electric Industries (NYSE-HE) | 6.0 | | 2.5 | 2.0 | | 3.5 |
| IDACORP, Inc. (NYSE-IDA) | 7.0 | 7.0 | 5.5 | 4.0 | 9.0 | 5.0 |
| MGE Energy, Inc. (NYSE-MGEE) | 4.5 | 3.5 | 5.5 | 2.5 | 4.0 | 5.5 |
| Nextera Energy, Inc. (NYSE-NEE) | 6.5 | 9.5 | 9.0 | 7.0 | 11.0 | 10.5 |
| NorthWestern Corporation (NYSE-NWE) | 7.0 | 5.5 | 6.0 | 6.0 | 7.5 | 7.0 |
| OGE Energy Corp. (NYSE-OGE) | 5.0 | 7.0 | 7.0 | 2.0 | 10.0 | 5.5 |
| Otter Tail Corporation (NDQ-OTTR) | 5.5 | 1.5 | | 9.0 | 2.5 | 4.5 |
| Pinnacle West Capital Corp. (NYSE-PNW) | 6.5 | 3.0 | 3.0 | 5.0 | 3.5 | 4.0 |
| PNM Resources, Inc. (NYSE-PNM) | 15.0 | 5.0 | 0.5 | 7.0 | 10.0 | |
| Portland General Electric Company (NYSE-POR) | 3.5 | 4.0 | 3.0 | 4.0 | 5.5 | 3.5 |
| PPL Corporation (NYSE-PPL) | 1.0 | 2.0 | 1.0 | -1.0 | 2.0 | -3.5 |
| Sempra Energy (NYSE-SRE) | 2.0 | 10.0 | 5.0 | 4.0 | 7.5 | 4.5 |
| Southern Company (NYSE-SO) | 3.0 | 3.5 | 3.5 | 3.0 | 3.5 | 3.0 |
| WEC Energy Group (NYSE-WEC) | 8.5 | 14.5 | 8.0 | 6.0 | 9.5 | 10.5 |
| Xcel Energy Inc. (NYSE-XEL) | 5.5 | 5.0 | 4.5 | 5.0 | 6.5 | 4.5 |
| Mean | 3.8 | 5.0 | 3.7 | 3.9 | 5.4 | 3.5 |
| Median | 4.5 | 4.8 | 4.0 | 4.0 | 5.5 | 4.5 |

Data Source: *Value Line Investment Survey.*

| Average of Median Figures = | 4.5 |
|---|---|

**Panel B**
**Bulkley Proxy Group**

| Company | *Value Line* Historic Growth | | | | | |
|---|---|---|---|---|---|---|
| | Past 10 Years | | | Past 5 Years | | |
| | Earnings | Dividends | Book Value | Earnings | Dividends | Book Value |
| ALLETE, Inc. (NYSE-ALE) | 1.0 | 3.0 | 5.5 | 4.0 | 3.0 | 5.5 |
| Alliant Energy Corporation (NYSE-LNT) | 4.5 | 7.5 | 4.0 | 4.5 | 7.0 | 4.5 |
| Avangrid (NYSE-AVG) | | | | | | |
| FirstEnergy Corporation (NYSE-FE) | -7.0 | -2.5 | -8.0 | -2.5 | -5.0 | -17.5 |
| Hawaiian Electric Industries (NYSE-HE) | 5.0 | | 3.0 | 4.0 | | 3.5 |
| NorthWestern Corporation (NYSE-NWE) | 8.5 | 5.0 | 5.5 | 7.0 | 7.0 | 8.0 |
| PNM Resources, Inc. (NYSE-PNM) | 7.0 | 2.5 | | 6.0 | 11.0 | 1.0 |
| PPL Corporation (NYSE-PPL) | | 2.5 | 1.0 | -0.5 | 2.0 | -4.0 |
| Mean | 3.2 | 3.0 | 1.8 | 3.2 | 4.2 | 0.1 |
| Median | 4.8 | 2.8 | 3.5 | 4.0 | 5.0 | 3.5 |

Data Source: *Value Line Investment Survey.*

| Average of Median Figures = | 3.9 |
|---|---|

**Attachment JRW-9**

**Public Service of New Hampshire d/b/a Eversource Energy**
**DCF Equity Cost Growth Rate Measures**
***Value Line* Projected Growth Rates**

**Panel A**
**Electric Proxy Group**

| Company | *Value Line* Projected Growth Est'd. '17-'19 to '23-'25 | | | *Value Line* Sustainable Growth | | |
|---|---|---|---|---|---|---|
| | Earnings | Dividends | Book Value | Return on Equity | Retention Rate | Internal Growth |
| ALLETE, Inc. (NYSE-ALE) | 5.5 | 4.5 | 3.5 | 8.0% | 31.0% | 2.5% |
| Alliant Energy Corporation (NYSE-LNT) | 6.5 | 5.5 | 7.5 | 10.5% | 33.0% | 3.5% |
| Ameren Corporation (NYSE-AEE) | 6.0 | 5.0 | 5.5 | 10.0% | 45.0% | 4.5% |
| American Electric Power Co. (NYSE-AEP) | 5.0 | 5.5 | 4.5 | 10.5% | 31.0% | 3.3% |
| Avangrid (NYSE-AGR) | 6.0 | 2.5 | 1.0 | 5.5% | 28.0% | 1.5% |
| Avista Corporation (NYSE-AVA) | 1.0 | 4.0 | 3.0 | 8.0% | 36.0% | 2.9% |
| CMS Energy Corporation (NYSE-CMS) | 7.5 | 7.0 | 7.5 | 13.5% | 38.0% | 5.1% |
| Consolidated Edison, Inc. (NYSE-ED) | 3.0 | 3.5 | 3.0 | 8.0% | 34.0% | 2.7% |
| Dominion Energy Inc. (NYSE-D) | 7.0 | 4.5 | 6.0 | 14.0% | 24.0% | 3.4% |
| Duke Energy Corporation (NYSE-DUK) | 5.0 | 2.0 | 2.5 | 8.5% | 30.0% | 2.6% |
| Edison International (NYSE-EIX) | NMF | 4.0 | 5.5 | 10.0% | 36.0% | 3.6% |
| Entergy Corporation (NYSE-ETR) | 3.0 | 4.0 | 5.0 | 11.0% | 34.0% | 3.7% |
| Evergy, Inc. (NYSE-EVRG) | 3.0 | 5.5 | 2.0 | 8.0% | 25.0% | 2.0% |
| Eversource Energy (NYSE-ES) | 6.5 | 6.0 | 5.0 | 9.5% | 40.0% | 3.8% |
| Exelon Corporation (NYSE-EXC) | 5.0 | 5.5 | 4.0 | 9.0% | 48.0% | 4.3% |
| FirstEnergy Corporation (NYSE-FE) | 8.5 | 3.0 | 9.5 | 15.5% | 40.0% | 6.2% |
| Hawaiian Electric Industries (NYSE-HE) | 3.5 | 4.0 | 4.0 | 9.0% | 29.0% | 2.6% |
| IDACORP, Inc. (NYSE-IDA) | 3.0 | 6.5 | 3.5 | 9.0% | 33.0% | 3.0% |
| MGE Energy, Inc. (NYSE-MGEE) | 4.0 | 5.5 | 5.0 | 9.5% | 41.0% | 3.9% |
| Nextera Energy, Inc. (NYSE-NEE) | 10.0 | 10.5 | 6.0 | 12.5% | 36.0% | 4.5% |
| NorthWestern Corporation (NYSE-NWE) | 2.5 | 4.0 | 3.0 | 8.5% | 30.0% | 2.6% |
| OGE Energy Corp. (NYSE-OGE) | 3.0 | 6.0 | 1.0 | 12.5% | 26.0% | 3.3% |
| Otter Tail Corporation (NDQ-OTTR) | 3.5 | 5.0 | 4.0 | 11.0% | 31.0% | 3.4% |
| Pinnacle West Capital Corp. (NYSE-PNW) | 4.5 | 5.5 | 3.5 | 10.5% | 33.0% | 3.5% |
| PNM Resources, Inc. (NYSE-PNM) | 6.0 | 5.5 | 5.5 | 9.5% | 46.0% | 4.4% |
| Portland General Electric Company (NYSE-POR) | 4.0 | 6.0 | 3.0 | 9.0% | 33.0% | 3.0% |
| PPL Corporation (NYSE-PPL) | 2.5 | 2.0 | 4.5 | 12.5% | 33.0% | 4.1% |
| Sempra Energy (NYSE-SRE) | 10.0 | 7.5 | 4.5 | 11.0% | 41.0% | 4.5% |
| Southern Company (NYSE-SO) | 3.0 | 3.0 | 3.5 | 12.5% | 25.0% | 3.1% |
| WEC Energy Group (NYSE-WEC) | 6.0 | 6.5 | 3.5 | 12.5% | 32.0% | 4.0% |
| Xcel Energy Inc. (NYSE-XEL) | 6.0 | 6.0 | 5.5 | 11.0% | 40.0% | 4.4% |
| Mean | 5.0 | 5.0 | 4.4 | 10.3% | 34.3% | 3.5% |
| Median | 5.0 | 5.5 | 4.0 | 10.0% | 33.0% | 3.5% |
| Average of Median Figures = | | 4.8 | | | Median = | 3.5% |

*** 'Est'd. '17-'19 to '23-'25' is the estimated growth rate from the base period 2017 to 2019 until the future period 2023 to 2025.**
Data Source: *Value Line Investment Survey.*

**Panel B**
**Bulkley Proxy Group**

| Company | *Value Line* Projected Growth Est'd. '17-'19 to '23-'25 | | | *Value Line* Sustainable Growth | | |
|---|---|---|---|---|---|---|
| | Earnings | Dividends | Book Value | Return on Equity | Retention Rate | Internal Growth |
| ALLETE, Inc. (NYSE-ALE) | 5.5 | 4.5 | 3.5 | 8.0% | 31.0% | 2.5% |
| Alliant Energy Corporation (NYSE-LNT) | 6.5 | 5.5 | 7.5 | 10.5% | 33.0% | 3.5% |
| Avangrid (NYSE-AGR) | 6.0 | 2.5 | 1.0 | 5.5% | 28.0% | 1.5% |
| FirstEnergy Corporation (NYSE-FE) | 8.5 | 3.0 | 9.5 | 15.5% | 40.0% | 6.2% |
| Hawaiian Electric Industries (NYSE-HE) | 3.5 | 4.0 | 4.0 | 9.0% | 29.0% | 2.6% |
| NorthWestern Corporation (NYSE-NWE) | 2.5 | 4.0 | 3.0 | 8.5% | 30.0% | 2.6% |
| Portland General Electric Company (NYSE-POR) | 4.0 | 6.0 | 3.0 | 9.0% | 33.0% | 3.0% |
| PPL Corporation (NYSE-PPL) | 2.5 | 2.0 | 4.5 | 12.5% | 33.0% | 4.1% |
| Mean | 4.9 | 3.9 | 4.5 | 9.8% | 32.1% | 3.2% |
| Median | 4.8 | 4.0 | 3.8 | 9.0% | 32.0% | 2.8% |
| Average of Median Figures = | | 4.2 | | | Median = | 2.8% |

*** 'Est'd. '17-'19 to '23-'25' is the estimated growth rate from the base period 2017 to 2019 until the future period 2023 to 2025.**
Data Source: *Value Line Investment Survey.*

**Attachment JRW-9**

**Public Service of New Hampshire d/b/a Eversource Energy**
**DCF Equity Cost Growth Rate Measures**
**Analysts Projected EPS Growth Rate Estimates**

**Panel A**
**Electric Proxy Group**

| Company | Yahoo | Zacks | Mean |
|---|---|---|---|
| Company | Yahoo | Zacks | Mean |
| ALLETE, Inc. (NYSE-ALE) | 7.0% | N/A | 7.0% |
| Alliant Energy Corporation (NYSE-LNT) | 5.3% | 5.5% | 5.4% |
| Ameren Corporation (NYSE-AEE) | 5.9% | 6.8% | 6.4% |
| American Electric Power Co. (NYSE-AEP) | 5.9% | 5.8% | 5.8% |
| Avangrid (NYSE-AGR) | 5.2% | 5.8% | 5.5% |
| Avista Corp (NYSE-AVA) | 6.0% | 5.2% | 5.6% |
| CMS Energy Corporation (NYSE-CMS) | 7.2% | 6.9% | 7.0% |
| Consolidated Edison, Inc. (NYSE-ED) | 2.7% | 2.0% | 2.3% |
| Dominion Energy Inc. (NYSE-D) | 4.7% | 4.7% | 4.7% |
| Duke Energy Corporation (NYSE-DUK) | 4.7% | 4.6% | 4.6% |
| Edison International (NYSE-EIX) | 1.3% | 3.3% | 2.3% |
| Entergy Corporation (NYSE-ETR) | 6.2% | 5.7% | 6.0% |
| Evergy (NYSE-EVRG) | 3.9% | 5.0% | 4.4% |
| Eversource Energy (NYSE-ES) | 5.9% | 6.1% | 6.0% |
| Exelon Corporation (NYSE-EXC) | -3.6% | 2.7% | |
| FirstEnergy Corporation (NYSE-FE) | -2.4% | NA | |
| Hawaiian Electric Industries (NYSE-HE) | 3.3% | 1.7% | 2.5% |
| IDACORP, Inc. (NYSE-IDA) | 2.6% | 2.6% | 2.6% |
| MGE Energy, Inc. (NYSE-MGEE) | 4.0% | 4.2% | 4.1% |
| Nextera Energy, Inc. (NYSE-NEE) | 8.1% | 7.9% | 8.0% |
| NorthWestern Corporation (NYSE-NWE) | 3.7% | 3.4% | 3.5% |
| OGE Energy Corp. (NYSE-OGE) | 2.4% | 3.7% | 3.0% |
| Otter Tail Corporation (NDQ-OTTR) | 9.0% | N/A | 9.0% |
| Pinnacle West Capital Corp. (NYSE-PNW) | 4.5% | 5.2% | 4.8% |
| PNM Resources, Inc. (NYSE-PNM) | 5.7% | 6.2% | 5.9% |
| Portland General Electric Company (NYSE-POR) | 4.2% | 5.3% | 4.7% |
| PPL Corporation (NYSE-PPL) | 2.9% | N/A | 2.9% |
| Sempra Energy (NYSE-SRE) | 5.4% | 7.2% | 6.3% |
| Southern Company (NYSE-SO) | 4.5% | 4.0% | 4.3% |
| WEC Energy Group (NYSE-WEC) | 5.9% | 5.9% | 5.9% |
| Xcel Energy Inc. (NYSE-XEL) | 6.0% | 5.9% | 6.0% |
| | 4.4% | 4.9% | 5.1% |
| Median | 4.7% | 5.2% | 5.4% |

Data Sources: www.zacks.com, http://quote.yahoo.com, July, 2020.
* Exelon and FirstEnergy were excluded from the DCF analysis due to negative projected EPS growth rates.

**Panel B**
**Bulkley Proxy Group**

| Company | Yahoo | Zacks | Mean |
|---|---|---|---|
| ALLETE, Inc. (NYSE-ALE) | 7.0% | N/A | 7.0% |
| Alliant Energy Corporation (NYSE-LNT) | 5.3% | 5.5% | 5.4% |
| Avangrid (NYSE-AGR) | 5.2% | 5.8% | 5.5% |
| FirstEnergy Corporation (NYSE-FE) | -2.4% | NA | |
| Hawaiian Electric Industries (NYSE-HE) | 3.3% | 1.7% | 2.5% |
| NorthWestern Corporation (NYSE-NWE) | 3.7% | 3.4% | 3.5% |
| Portland General Electric Company (NYSE-POR) | 4.2% | 5.3% | 4.7% |
| PPL Corporation (NYSE-PPL) | 2.9% | N/A | 2.9% |
| Mean | 3.6% | 4.3% | 4.5% |
| Median | 3.9% | 5.3% | 4.7% |

Data Sources: www.zacks.com, http://quote.yahoo.com, November 6, 2019.
FirstEnergy is excluded due to negative projected EPS growth rate.

**Attachment JRW-9**

**Public Service of New Hampshire d/b/a Eversource Energy**
**DCF Growth Rate Indicators**

| Growth Rate Indicator | Electric Proxy Group | Bulkley Proxy Group |
|---|---|---|
| Historic *Value Line* Growth in EPS, DPS, and BVPS | 4.5% | 3.9% |
| Projected *Value Line* Growth in EPS, DPS, and BVPS | 4.8% | 4.2% |
| Sustainable Growth ROE * Retention Rate | 3.5% | 2.8% |
| Projected EPS Growth from Yahoo and Zack - Mean/Median | 5.1%/5.4% | 4.5%/4.7% |

# Attachment JRW-10

## Public Service of New Hampshire d/b/a Eversource Energy
## Capital Asset Pricing Model

### Panel A
### Electric Proxy Group

| | |
|---|---|
| **Risk-Free Interest Rate** | **2.50%** |
| **Beta*** | **0.85** |
| **Ex Ante Equity Risk Premium**** | **6.00%** |
| **CAPM Cost of Equity** | **7.6%** |

* See page 3 of Attachment JRW-10

** See pages 5 and 6 of Attachment JRW-10

### Panel B
### Bulkley Proxy Group

| | |
|---|---|
| **Risk-Free Interest Rate** | **2.50%** |
| **Beta*** | **0.60** |
| **Ex Ante Equity Risk Premium**** | **6.00%** |
| **CAPM Cost of Equity** | **6.1%** |

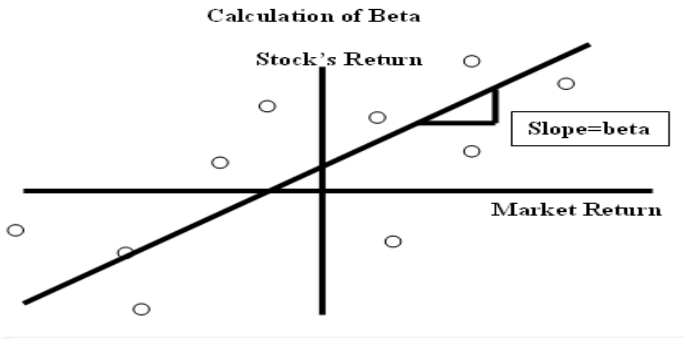
* See page 3 of Attachment JRW-10

** See pages 5 and 6 of Attachment JRW-10

**Attachment JRW-10**

**Thirty-Year U.S. Treasury Yields**
**2013-2020**


Source: Federal Reserve Bank of St. Louis, FRED Database.




**Panel A**
**Electric Proxy Group**

| Company | Beta |
|---|---|
| ALLETE, Inc. (NYSE-ALE) | 0.85 |
| Alliant Energy Corporation (NYSE-LNT) | 0.80 |
| Ameren Corporation (NYSE-AEE) | 0.80 |
| American Electric Power Co. (NYSE-AEP) | 0.75 |
| Avangrid (NYSE-AGR) | 0.80 |
| Avista Corporation (NYSE-AVA) | 0.90 |
| CMS Energy Corporation (NYSE-CMS) | 0.80 |
| Consolidated Edison, Inc. (NYSE-ED) | 0.75 |
| Dominion Energy Inc. (NYSE-D) | 0.80 |
| Duke Energy Corporation (NYSE-DUK) | 0.85 |
| Edison International (NYSE-EIX) | 0.90 |
| Entergy Corporation (NYSE-ETR) | 0.95 |
| Evergy, Inc. (NYSE-EVRG) | 1.05 |
| Eversource Energy (NYSE-ES) | 0.90 |
| Exelon Corporation (NYSE-EXC) | 0.90 |
| FirstEnergy Corporation (NYSE-FE) | 0.85 |
| Hawaiian Electric Industries (NYSE-HE) | 0.80 |
| IDACORP, Inc. (NYSE-IDA) | 0.80 |
| MGE Energy, Inc. (NYSE-MGEE) | 0.70 |
| NextEra Energy, Inc. (NYSE-NEE) | 0.85 |
| NorthWestern Corporation (NYSE-NWE) | 0.90 |
| OGE Energy Corp. (NYSE-OGE) | 1.05 |
| Otter Tail Corporation (NDQ-OTTR) | 0.85 |
| Pinnacle West Capital Corp. (NYSE-PNW) | 0.85 |
| PNM Resources, Inc. (NYSE-PNM) | 0.90 |
| Portland General Electric Company (NYSE-POR) | 0.85 |
| PPL Corporation (NYSE-PPL) | 1.05 |
| Sempra Energy (NYSE-SRE) | 0.95 |
| Southern Company (NYSE-SO) | 0.90 |
| WEC Energy Group (NYSE-WEC) | 0.80 |
| Xcel Energy Inc. (NYSE-XEL) | 0.75 |
| Mean | 0.86 |
| Median | 0.85 |

Data Source: *Value Line Investment Survey* , 2020.

**Panel B**
**Bulkley Proxy Group**

| Company | Beta |
|---|---|
| ALLETE, Inc. (NYSE-ALE) | 0.85 |
| Alliant Energy Corporation (NYSE-LNT) | 0.80 |
| Avangrid (NYSE-AGR) | 0.80 |
| FirstEnergy Corporation (NYSE-FE) | 0.85 |
| Hawaiian Electric Industries (NYSE-HE) | 0.80 |
| NorthWestern Corporation (NYSE-NWE) | 0.90 |
| Portland General Electric Company (NYSE-POR) | 0.85 |
| PPL Corporation (NYSE-PPL) | 1.05 |
| Mean | 0.86 |
| Median | 0.85 |

Data Source: *Value Line Investment Survey* , 2020.

**Attachment JRW-10**
**Risk Premium Approaches**

| | Historical Ex Post Returns | Surveys | Expected Return Models and Market Data |
|---|---|---|---|
| **Means of Assessing The Market Risk Premium** | Historical Average Stock Minus Bond Returns | Surveys of CFOs, Financial Forecasters, Companies, Analysts on Expected Returns and Market Risk Premiums | Use Market Prices and Market Fundamentals (such as Growth Rates) to Compute Expected Returns and Market Risk Premiums |
| **Problems/Debated Issues** | Time Variation in Required Returns, Measurement and Time Period Issues, and Biases such as Market and Company Survivorship Bias | Questions Regarding Survey Histories, Responses, and Representativeness<br><br>Surveys may be Subject to Biases, such as Extrapolation | Assumptions Regarding Expectations, Especially Growth |

Source: Adapted from Antti Ilmanen, Expected Returns on Stocks and Bonds," *Journal of Portfolio Management*, (Winter 2003).

**Attachment JRW-10**

**Capital Asset Pricing Model**
**Market Risk Premium**

| Category | Study Authors | Publication Date | Time Period Of Study | Methodology | Return Measure | Range Low | Range High | Midpoint of Range | Mean | Median |
|---|---|---|---|---|---|---|---|---|---|---|
| **Historical Risk Premium** | | | | | | | | | | |
| | Ibbotson | 2016 | 1928-2015 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.00% | |
| | | | | | Geometric | | | | 4.40% | |
| | Damodaran | 2020 | 1928-2019 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.43% | |
| | | | | | Geometric | | | | 4.83% | |
| | Dimson, Marsh, Staunton Credit Suisse Repo | 2019 | 1900-2018 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 5.50% | |
| | | | | | Geometric | | | | | |
| | Bate | 2008 | 1900-2007 | Historical Stock Returns - Bond Returns | Geometric | | | | 4.50% | |
| | Shiller | 2006 | 1926-2005 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 7.00% | |
| | | | | | Geometric | | | | 5.50% | |
| | Siegel | 2005 | 1926-2005 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.10% | |
| | | | | | Geometric | | | | 4.60% | |
| | Dimson, Marsh, and Staunton | 2006 | 1900-2005 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 5.50% | |
| | Goyal & Welch | 2006 | 1872-2004 | Historical Stock Returns - Bond Returns | | | | | 4.77% | |
| | Median | | | | | | | | | 5.50% |
| **Ex Ante Models (Puzzle Research)** | | | | | | | | | | |
| | Claus Thomas | 2001 | 1985-1998 | Abnormal Earnings Model | | | | | 3.00% | |
| | Arnott and Bernstein | 2002 | 1810-2001 | Fundamentals - Div Yld + Growth | | | | | 2.40% | |
| | Constantinides | 2002 | 1872-2000 | Historical Returns & Fundamentals - P/D & P/E | | | | | 6.90% | |
| | Cornell | 1999 | 1926-1997 | Historical Returns & Fundamental GDP/Earnings | | 3.50% | 5.50% | 4.50% | 4.50% | |
| | Easton, Taylor, et al | 2002 | 1981-1998 | Residual Income Model | | | | | 5.30% | |
| | Fama French | 2002 | 1951-2000 | Fundamental DCF with EPS and DPS Growth | | 2.55% | 4.32% | | 3.44% | |
| | Harris & Marston | 2001 | 1982-1998 | Fundamental DCF with Analysts' EPS Growth | | | | | 7.14% | |
| | McKinsey | 2002 | 1962-2002 | Fundamental (P/E, D/P, & Earnings Growth) | | 3.50% | 4.00% | | 3.75% | |
| | Siegel | 2005 | 1802-2001 | Historical Earnings Yield | | | | | 2.50% | |
| | Grabowski | 2006 | 1926-2005 | Historical and Projected | | 3.50% | 6.00% | 4.75% | 4.75% | |
| | Maheu & McCurdy | 2006 | 1885-2003 | Historical Excess Returns, Structural Breaks, | | 4.02% | 5.10% | 4.56% | 4.56% | |
| | Bostock | 2004 | 1960-2002 | Bond Yields, Credit Risk, and Income Volatility | | 3.90% | 1.30% | 2.60% | 2.60% | |
| | Bakshi & Chen | 2005 | 1982-1998 | Fundamentals - Interest Rates | | | | | 7.31% | |
| | Donaldson, Kamstra, & Kramer | 2006 | 1952-2004 | Fundamental, Dividend yld., Returns,, & Volatility | | 3.00% | 4.00% | 3.50% | 3.50% | |
| | Campbell | 2008 | 1982-2007 | Historical & Projections (D/P & Earnings Growth) | | 4.10% | 5.40% | | 4.75% | |
| | Best & Byrne | 2001 | Projection | Fundamentals - Div Yld + Growth | | | | | 2.00% | |
| | Fernandez | 2007 | Projection | Required Equity Risk Premium | | | | | 4.00% | |
| | DeLong & Magin | 2008 | Projection | Earnings Yield - TIPS | | | | | 3.22% | |
| | Siegel - Rethink ERP | 2011 | Projection | Real Stock Returns and Components | | | | | 5.50% | |
| | Duff & Phelps | 2020 | Projection | Normalized with 3.5% Long-Term Treasury Yield | | | | | 6.00% | |
| | Mschchowski - VL - 2014 | 2014 | Projection | Fundamentals - Expected Return Minus 10-Year Treasury Rate | | | | | 5.50% | |
| | American Appraisal Quarterly ERP | 2015 | Projection | Fundamental Economic and Market Factors | | | | | 6.00% | |
| | Market Risk Premia | 2020 | Projection | Fundamental Economic and Market Factors | | | | | 5.24% | |
| | KPMG | 2020 | Projection | Fundamental Economic and Market Factors | | | | | 6.75% | |
| | Damodaran -7-20 | 2020 | Projection | Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout) | | | | | 5.65% | |
| | **Social Security** | | | | | | | | | |
| | Office of Chief Actuary | | 1900-1995 | | | | | | | |
| | John Campbell | 2001 | 1860-2000 | Historical & Projections (D/P & Earnings Growth) | Arithmetic | 3.00% | 4.00% | 3.50% | 3.50% | |
| | | | Projected for 75 Years | | Geometric | 1.50% | 2.50% | 2.00% | 2.00% | |
| | Peter Diamond | 2001 | Projected for 75 Years | Fundamentals (D/P, GDP Growth) | | 3.00% | 4.80% | 3.90% | 3.90% | |
| | John Shoven | 2001 | Projected for 75 Years | Fundamentals (D/P, P/E, GDP Growth) | | 3.00% | 3.50% | 3.25% | 3.25% | |
| | Median | | | | | | | | | 4.50% |
| **Surveys** | | | | | | | | | | |
| | New York Fed | 2015 | Five-Year | Survey of Wall Street Firms | | | | | 5.70% | |
| | Survey of Financial Forecasters | 2020 | 10-Year Projection | About 20 Financial Forecastsers | | | | | 3.36% | |
| | Duke - CFO Magazine Survey | 2020 | 10-Year Projection | Approximately 200 CFOs | | | | | 4.05% | |
| | Welch - Academics | 2008 | 30-Year Projection | Random Academics | | 5.00% | 5.74% | 5.37% | 5.37% | |
| | Fernandez - Academics, Analysts, and Compan | 2020 | Long-Term | Survey of Academics, Analysts, and Companies | | | | | 5.60% | |
| | Median | | | | | | | | | 5.37% |
| **Building Block** | | | | | | | | | | |
| | Ibbotson and Chen | 2015 | Projection | Historical Supply Model (D/P & Earnings Growth) | Arithmetic | | | 6.22% | 5.21% | |
| | | | | | Geometric | | | 4.20% | | |
| | Chen - Rethink ERP | 2010 | 20-Year Projection | Combination Supply Model (Historic and Projection) | Geometric | | | | 4.00% | |
| | Ilmanen - Rethink ERP | 2010 | Projection | Current Supply Model (D/P & Earnings Growth) | Geometric | | | | 3.00% | |
| | Grinold, Kroner, Siegel - Rethink ERP | 2011 | Projection | Current Supply Model (D/P & Earnings Growth) | Arithmetic | | | 4.63% | 4.12% | |
| | | | | | Geometric | | | 3.60% | | |
| | Median | | | | | | | | | 4.06% |
| **Mean** | | | | | | | | | | **4.86%** |
| **Median** | | | | | | | | | | **4.83%** |

**Attachment JRW-10**

**Capital Asset Pricing Model**
**Market Risk Premium**

**Summary of 2010-20 Equity Risk Premium Studies**

| Category | Study Authors | Publication Date | Time Period Of Study | Methodology | Return Measure | Range Low | Range High | Midpoint of Range | Mean | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| **Historical Risk Premium** | | | | | | | | | | |
| | Ibbotson | 2016 | 1928-2015 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.00% | |
| | | | | | Geometric | | | | 4.40% | |
| | Damodaran | 2020 | 1928-2019 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.43% | |
| | | | | | Geometric | | | | 4.83% | |
| | Dimson, Marsh, Staunton _Credit Suisse Report | 2019 | 1900-2018 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 5.50% | |
| | | | | | Geometric | | | | | |
| | Median | | | | | | | | | 5.43% |
| **Ex Ante Models (Puzzle Research)** | | | | | | | | | | |
| | Siegel - Rethink ERP | 2011 | Projection | Real Stock Returns and Components | | | | | 5.50% | |
| | Duff & Phelps | 2020 | Projection | Normalized with 3.5% Long-Term Treasury Yield | | | | | 6.00% | |
| | Mschchowski - VL - 2014 | 2014 | Projection | Fundamentals - Expected Return Minus 10-Year Treasury Rate | | | | | 5.50% | |
| | American Appraisal Quarterly ERP | 2015 | Projection | Fundamental Economic and Market Factors | | | | | 6.00% | |
| | Market Risk Premia | 2020 | Projection | Fundamental Economic and Market Factors | | | | | 5.24% | |
| | KPMG | 2020 | Projection | Fundamental Economic and Market Factors | | | | | 6.75% | |
| | Damodaran -7-20 | 2020 | Projection | Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout) | | | | | 5.65% | |
| | Median | | | | | | | | | 5.65% |
| **Surveys** | | | | | | | | | | |
| | New York Fed | 2015 | Five-Year | Survey of Wall Street Firms | | | | | 5.70% | |
| | Survey of Financial Forecasters | 2020 | 10-Year Projection | About 20 Financial Forecastsers | | | | | 3.36% | |
| | Duke - CFO Magazine Survey | 2020 | 10-Year Projection | Approximately 200 CFOs | | | | | 4.05% | |
| | Fernandez - Academics, Analysts, and Companies | 2020 | Long-Term | Survey of Academics, Analysts, and Companies | | | | | 5.60% | |
| | Median | | | | | | | | | 4.83% |
| **Building Block** | | | | | | | | | | |
| | Ibbotson and Chen | 2015 | Projection | Historical Supply Model (D/P & Earnings Growth) | Arithmetic | | | 6.22% | 5.21% | |
| | | | | | Geometric | | | 4.20% | | |
| | Chen - Rethink ERP | 2010 | 20-Year Projection | Combination Supply Model (Historic and Projection) | Geometric | | | | 4.00% | |
| | Ilmanen - Rethink ERP | 2010 | Projection | Current Supply Model (D/P & Earnings Growth) | Geometric | | | | 3.00% | |
| | Grinold, Kroner, Siegel - Rethink ERP | 2011 | Projection | Current Supply Model (D/P & Earnings Growth) | Arithmetic | | | 4.63% | 4.12% | |
| | | | | | Geometric | | | 3.60% | | |
| | Median | | | | | | | | | 4.06% |
| **Mean** | | | | | | | | | | **4.99%** |
| **Median** | | | | | | | | | | **5.13%** |

# Duff & Phelps Risk-Free Interest Rates and Equity Risk Premium Estimates

DUFF & PHELPS

June 30, 2020

For additional information, please visit https://www.duffandphelps.com/insights/publications/cost-of-capital

## Table: Equity Risk Premium & Risk-free Rates

**Duff & Phelps Recommended U.S. Equity Risk Premium (ERP) and Corresponding Risk-free Rates ($R_f$); January 2008–Present**

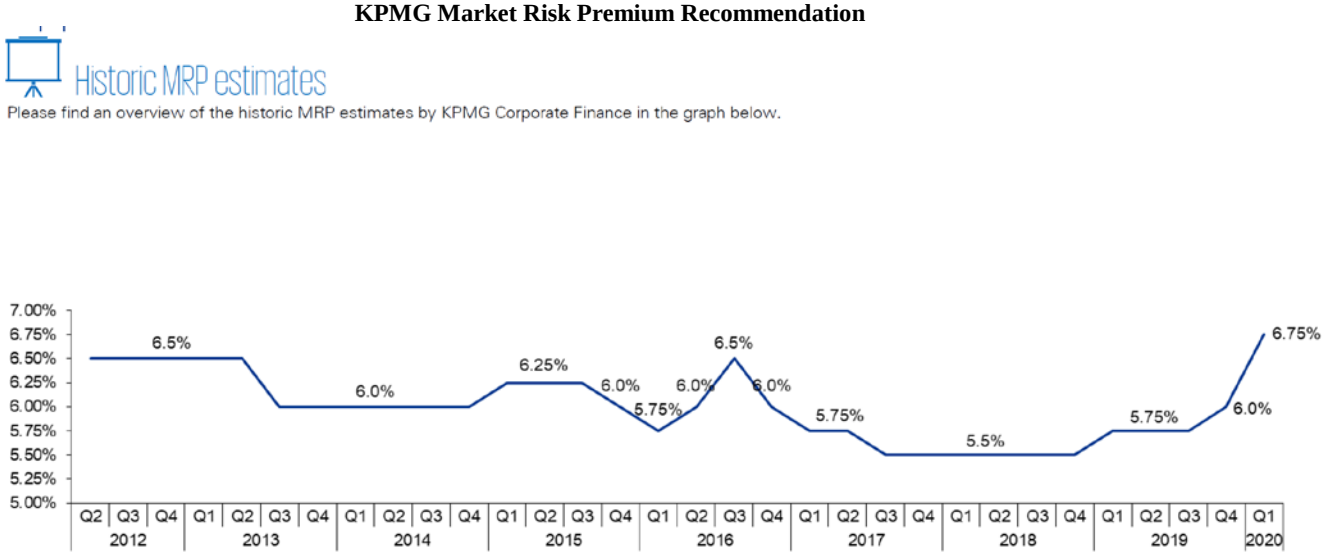
| Date | Risk-free Rate ($R_f$) | $R_f$ (%) | Duff & Phelps Recommended ERP (%) | What Changed |
|---|---|---|---|---|
| **Current Guidance:** | | | | |
| June 30, 2020 – UNTIL FURTHER NOTICE | Normalized 20-year U.S. Treasury yield | 2.50 | 6.00 | Rf |
| March 25, 2020 – June 29, 2020 | Normalized 20-year U.S. Treasury yield | 3.00 | 6.00 | ERP |
| December 19, 2019 – March 24, 2020 | Normalized 20-year U.S. Treasury yield | 3.00 | 5.00 | ERP |
| September 30, 2019 – December 18, 2019 | Normalized 20-year U.S. Treasury yield | 3.00 | 5.50 | $R_f$ |
| December 31, 2018 – September 29, 2019 | Normalized 20-year U.S. Treasury yield | 3.50 | 5.50 | ERP |
| September 5, 2017 – December 30, 2018 | Normalized 20-year U.S. Treasury yield | 3.50 | 5.00 | ERP |
| November 15, 2016 – September 4, 2017 | Normalized 20-year U.S. Treasury yield | 3.50 | 5.50 | $R_f$ |
| January 31, 2016 – November 14, 2016 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.50 | ERP |
| December 31, 2015 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.00 | |
| December 31, 2014 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.00 | |
| December 31, 2013 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.00 | |
| February 28, 2013 – January 30, 2016 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.00 | ERP |
| December 31, 2012 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.50 | |
| January 15, 2012 – February 27, 2013 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.50 | ERP |
| December 31, 2011 | Normalized 20-year U.S. Treasury yield | 4.00 | 6.00 | |
| September 30, 2011 – January 14, 2012 | Normalized 20-year U.S. Treasury yield | 4.00 | 6.00 | ERP |
| July 1 2011 – September 29, 2011 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.50 | $R_f$ |
| June 1, 2011 – June 30, 2011 | Spot 20-year U.S. Treasury yield | Spot | 5.50 | $R_f$ |
| May 1, 2011 – May 31, 2011 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.50 | $R_f$ |
| December 31, 2010 | Spot 20-year U.S. Treasury yield | Spot | 5.50 | |
| December 1, 2010 – April 30, 2011 | Spot 20-year U.S. Treasury yield | Spot | 5.50 | $R_f$ |
| June 1, 2010 – November 30, 2010 | Normalized 20-year U.S. Treasury yield | 4.00 | 5.50 | $R_f$ |
| December 31, 2009 | Spot 20-year U.S. Treasury yield | Spot | 5.50 | |
| December 1, 2009 – May 31, 2010 | Spot 20-year U.S. Treasury yield | Spot | 5.50 | ERP |
| June 1, 2009 – November 30, 2009 | Spot 20-year U.S. Treasury yield | Spot | 6.00 | $R_f$ |
| December 31, 2008 | Normalized 20-year U.S. Treasury yield | 4.50 | 6.00 | |
| November 1, 2008 – May 31, 2009 | Normalized 20-year U.S. Treasury yield | 4.50 | 6.00 | $R_f$ |
| October 27, 2008 – October 31, 2008 | Spot 20-year U.S. Treasury yield | Spot | 6.00 | ERP |
| January 1, 2008 – October 26, 2008 | Spot 20-year U.S. Treasury yield | Spot | 5.00 | Initialized |

"Normalized" in this context means that in months where the risk-free rate is deemed to be abnormally low, a proxy for a longer-term sustainable risk-free rate is used.

To learn more about cost of capital issues, and to ensure that you are using the most recent Duff & Phelps Recommended ERP, visit www.duffandphelps.com/insights/publications/cost-of-capital.
This and other related resources can also be found in the online Cost of Capital Navigator platform. To learn more about the Cost of Capital Navigator and other Duff & Phelps valuation and industry data products, visit www.DPCostofCapital.com.

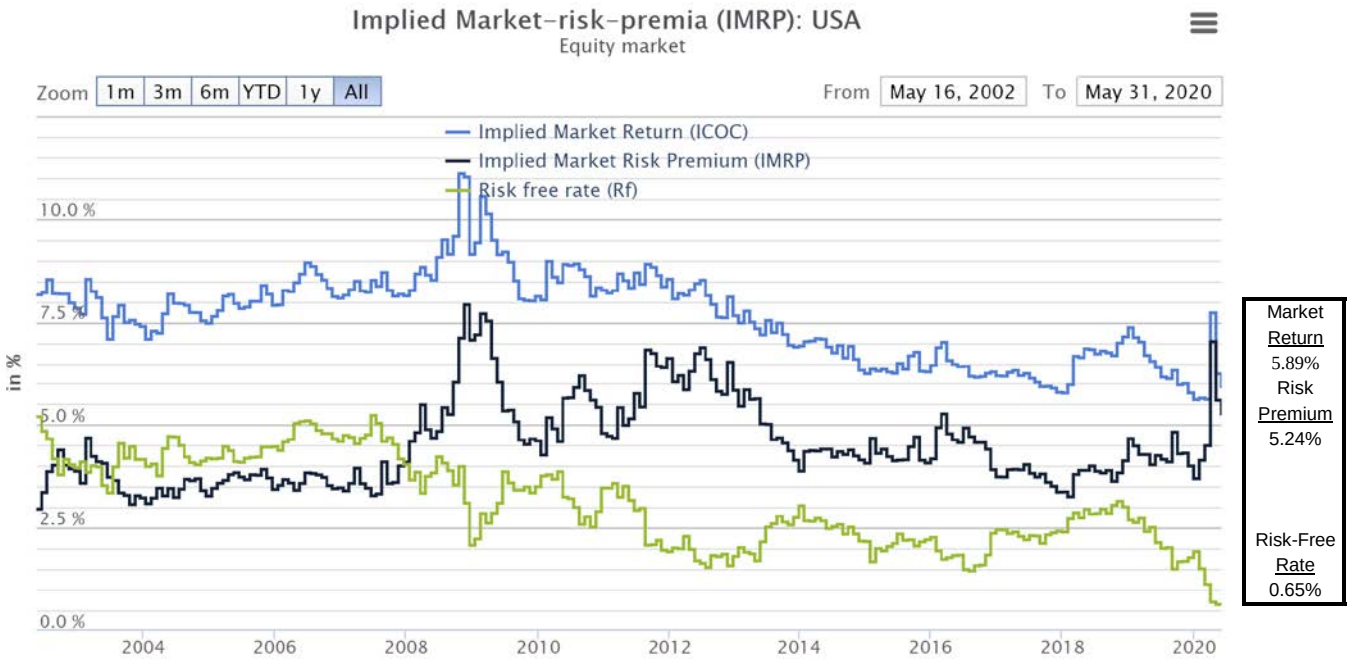
Source: https://www.duffandphelps.com/-/media/assets/pdfs/publications/valuation/coc/erp-risk-free-rates-jan-2008-present.ashx?la=en

**Panel A**
**KPMG Market Risk Premium Recommendation**




Source: https://assets.kpmg/content/dam/kpmg/nl/pdf/2020/services/equitiy-market-risk-premium-research-summary-march-2020.pdf

**Panel B**
**Market-Risk-Premia.com Implied Market Risk Premium**
**31-May-20**




Source: http://www.market-risk-premia.com/us.html