

STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION

In the matter of

Public Service of New Hampshire (Eversource Energy)

Docket No. DE 19-057

Petition for Permanent Rate Increase

DIRECT TESTIMONY

OF

Dr. Pradip K. Chattopadhyay
Assistant Consumer Advocate

December 20, 2019

TABLE OF CONTENTS

I. INTRODUCTION3

II. MARKET-TO-BOOK RATIO, EXPECTED RETURN ON EQUITY AND
REQUIRED RETURN ON EQUITY..... 8

III. ESTIMATING COST OF EQUITY USING SEVERAL APPROACHES18

 A. Discounted Cash Flow (DCF) Approach.....20

 B. Capital Asset Pricing Model (CAPM).....33

 C. Conclusion39

IV. SCHEDULES:

Schedule PKC-1	Stock Ratings
Schedule PKC-2	Common Equity Ratios
Schedule PKC-3	Stock Prices
Schedule PKC-4	Dividend Yield Estimate for the Next Period
Schedule PKC-5	Growth Components
Schedule PKC-6	“External Component” of COE
Schedule PKC-7	Expected Return on Equity and Retention Ratio
Schedule PKC-8	DCF ROE Estimates and Market-to-Book Ratio ROE Estimates
Schedule PKC-9	Proxy Beta
Schedule PKC-10	CAPM Calculations
Schedule PKC-11a & PKC 11b	Value Line Market Returns

1 **I. INTRODUCTION**

2 **Q. Please state your name, business address and occupation.**

3 A. My name is Pradip K. Chattopadhyay. My business address is 21 South Fruit Street,
4 Suite 18, Concord, New Hampshire. I am employed as the Assistant Consumer Advocate/Rate
5 and Market Policy Director with the New Hampshire Office of Consumer Advocate (OCA).

6 **Q. Please describe your formal education and professional experience.**

7 A. I have a Ph.D. in Economics from the University of Washington, Seattle, which I earned
8 in 1997. I have also taken courses in City and Regional Planning with applications to Energy
9 Planning from Ohio State University, Columbus OH, in 2001-02. I have taught several courses
10 in economics at the University of Washington as an instructor and adjunct faculty at its Business
11 School. I am also associated with the Southern New Hampshire University (SNHU) as an
12 adjunct faculty, where I teach several courses in economics.

13 From March 1998 to October 1999, I was a consultant with the National Council of
14 Applied Economic Research, New Delhi, India. From November 1999 to August 2001, I was
15 the Economist at the Uttar Pradesh Electricity Regulatory Commission (UPERC) in India, and
16 advised UPERC on tariff issues. From September 2001 to June 2002, I worked at the National
17 Regulatory Research Institute, Columbus, Ohio, as a graduate research associate while pursuing
18 advanced courses in Energy Planning in the City and Regional Planning Program at Ohio State
19 University. From June 2002 to July 2002, I worked at the World Bank, Washington D.C. as a
20 short-term consultant/intern with its Energy and Water Division.

1 I worked at the New Hampshire Public Utilities Commission (Commission) from August
2 2002 to January 2007 in the capacity of a Utility Analyst. My responsibilities at the Commission
3 as an analyst were in electric utility issues including analyzing and advising the Commission on
4 rate design, cost of capital issues, wholesale market issues, and other regional matters. I briefly
5 worked at the Massachusetts Department of Telecommunications and Energy (later reorganized
6 into Department of Public Utilities (MA-DPU)) starting in January 2007 as an Economist. At
7 MA-DPU, I represented the staff and examined gas demand estimation and forecasting,
8 decoupling issues, and environmental remediation matters.

9 I returned to the Commission in June 2007 to join its Telecom Division as its Assistant
10 Director, and continued in that position until December 2010. I was also helping other divisions
11 as an expert witness in economics-related issues as well as advising the Commission on regional
12 electric matters including FERC jurisdictional issues. I joined the Commission's Regional
13 Energy Division in January 2010 as the Regional Energy Analyst, and was advising the
14 Commission in that capacity until I joined the Antitrust and Utilities Division, Office of the
15 Minnesota Attorney General, in August 2013.

16 I came back to New Hampshire in March 2014 and worked as an independent consultant
17 until the end of August, 2014, representing the Minnesota Attorney General. I joined Liberty
18 Utilities at the end of August, 2014 as a Forecasting Analyst for its Energy Procurement
19 Department. I worked with Liberty Utilities for about three months, before starting my own
20 consultancy firm. In December 2014, I joined the OCA as its Rate and Market Policy Director.
21 I was later appointed the Assistant Consumer Advocate at the OCA.

22 **Q. Have you previously provided testimony before this Commission?**

1 A. Yes.

2 **Q. In which dockets did you testify?**

3 A. I provided testimony before the Commission in the following dockets:

- 4 • DE 03-200 – Rate Design Testimony which was about delivery rates for retail
5 ratepayers of Public Service of New Hampshire (PSNH);
- 6 • DE 06-028 – Cost of Capital Testimony which was also about PSNH’s delivery rates;
- 7 • DT 07-027 – Status of competition in retail telephony under TDS;
- 8 • DG 08-009 – Cost of Equity Testimony related to gas delivery rates of National Grid
9 NH;
- 10 • DE 09-035 – Cost of Equity Testimony in the matter of electric distribution rates
11 (PSNH);
- 12 • DG 14-380 – Testimony in Petition of Liberty Utilities (EnergyNorth Natural Gas)
13 requesting approval of firm transportation contract (North East Direct (NED));
- 14 • DG 15-155 – Testimony in Petition of Valley Green, LLC requesting franchise in
15 City of Lebanon and Town of Hanover, New Hampshire;
- 16 • DG 15-289 – Testimony in Petition of Liberty Utilities (EnergyNorth Natural Gas)
17 requesting franchise in City of Lebanon and Town of Hanover, New Hampshire;
- 18 • DG 15-494 – Testimony in Petition of Liberty Utilities (EnergyNorth Natural Gas)
19 requesting approval of firm transportation contract (NED);
- 20 • DE 16-383 – Testimony in Petition of Liberty Utilities (Granite State Electric) for
21 Permanent Rate Increase;
- 22 • DE 16-384 – Testimony in Petition of Unitil for Permanent Rate Increase;

- 1 • DG 16-852 – Testimony in EnergyNorth’s Petition for Lebanon-Hanover Franchise
- 2 Approval;
- 3 • DG 17-048 – Testimony in EnergyNorth’s Gas Distribution Service Rate Case;
- 4 • DG 17-070 – Testimony in Northern Utilities’ Gas Distribution Service Rate Case;
- 5 • DW 18-165 – Abenaki-Rosebrook Rate Case; Oral Testimony on Return on Equity
- 6 • DW 18 –118 – HAWC Rate Case; Oral Testimony on Return on Equity
- 7 • DG 18-140 – Testimony in Liberty Utilities’ Petition for Approval of RNG Supply
- 8 and Transportation Contract.
- 9 • DG 17-198 – Testimony in Liberty Utilities’ Petition for Approval of Natural Gas
- 10 Supply Strategy
- 11 • DG 19-064 – Testimony in Granite State Electric Distribution Rate Case

12 **Q. Have you ever provided testimony and affidavits before other Commissions?**

13 A. Yes. I have testified on cost of capital before the Minnesota Public Utilities Commission
14 in dockets G008/GR-13-316 and GR 13-617. I have also provided an affidavit before the
15 Federal Energy Regulatory Commission in a FERC Docket ER 09-14-000 on NSTAR’s petition
16 for ROE incentive adders on behalf of the New England Conference of Public Utilities
17 Commissioners (NECPUC).

18 **Q. What is the purpose of your testimony?**

19 A. The purpose of my testimony is to recommend, for Public Service of New Hampshire
20 (PSNH), doing business as Eversource Energy, the rate of return on equity in accordance with
21 standards set forth in *Bluefield Water Works v. Public Service Comm’n*, 262 U.S. 679, 692-93
22 (1923) (*Bluefield*), and *Federal Power Comm’n v. Hope Natural Gas Co.*, 320 U.S. 591, 605

1 (1944) (*Hope*). On advice of counsel, I understand that the standard set forth by the U.S.
2 Supreme Court is that a public utility may be allowed to earn a return comparable to a return on
3 investments in other enterprises having similar risks in order to allow the utility the opportunity
4 to attract capital and to maintain its credit. “The return should be reasonably sufficient to assure
5 confidence in the financial soundness of the utility and should be adequate, under efficient and
6 economical management, to maintain and support its credit and enable it to raise the money
7 necessary for the proper discharge of its public duties.” *Bluefield*, 262 U.S. at 693. I also state
8 my views on PSNH’s recommendations on cost of equity, and articulate reasons why I agree or
9 disagree with those recommendations.

10 **Q. What Rate of Return on Equity (ROE) and Rate of Return on Capital are the**
11 **Company requesting in this case?**

12 A. The Company is requesting a return on common equity of 10.40 percent. Based on the
13 actual net cost of debt, and the requested capital structure, the Company is seeking approval of
14 7.62 percent return on capital.

15 **Q. What do you recommend as the allowed ROE for the company?**

16 A. I am recommending a return of 8.27 percent as a point estimate. Based on my analysis, I
17 am also recommending a range of returns on equity that I consider reasonable for the company,
18 i.e., 8.15 percent to 8.35 percent.

19 **Q. Please discuss how your testimony is organized.**

20 A. As for what follows, Section II briefly reports my analysis of implications of observed
21 market-to-book ratios in the electric utility industry. In Section III, which has three subsections,
22 I use several approaches to derive estimates of the cost of equity and I conclude by stating my

1 recommendation on the cost of equity. Finally, Section IV includes the schedules that inform the
2 OCA's analysis.

3

4 **II. MARKET-TO-BOOK RATIO, EXPECTED RETURN ON EQUITY AND**
5 **REQUIRED RETURN ON EQUITY**

6 **Q. Why is it important to analyze observed market-to-book ratios of the electric utility**
7 **industry and PSNH's proxy group?**

8 A. It is important to investigate market-to-book ratios essentially for three reasons. First, the
9 current level of market-to-book ratio for a regulated company (which, of course, compares the
10 market value of its common stock to the value of its assets as reflected on the company's books)
11 is very telling with respect to the divergence between the expected return on equity and the
12 opportunity cost of equity with respect to the regulated company's common stock. (I explain
13 why this divergence is an important factor in the discussion that immediately follows.) Second,
14 whether or not the market-to-book ratio is significantly higher than one has implications for the
15 application of the Discounted Cash Flow (DCF) approach to estimating the opportunity cost of
16 equity. Finally, one of the DCF approaches that I have relied on uses market-to-book ratios as an
17 input. What follows in this section is predominantly the discussion of the first two reasons
18 mentioned. The need for tracking the market-to-book ratios of the constituent companies in the
19 proxy group is primarily taken up in detail in Section IIIA.

20 **Q. What is the relevance of the market-to-book ratio in the determination of the cost of**
21 **equity?**

1 A. When the market-to-book ratio of a utility is significantly higher than one, it indicates
2 that the return on equity that is *expected* by investors, which is greatly influenced by the allowed
3 rate of return for a regulated entity, exceeds the true opportunity cost of equity. In other words,
4 in the prevailing economic environment, the return that investors *expect* to receive is greater than
5 the return they would *require* in order to invest in the stock.

6 This has another important implication. While the DCF construct is predicated on using
7 long-term expectations, in practice, the DCF method relies on investors' expectations over the
8 medium term. Analysts' projections about investors' sentiments on relevant variables are not
9 available beyond three to five years into the future. The DCF method in practice therefore
10 captures investors' medium-term expectations that the market-to-book ratio would continue to
11 remain substantially higher than one, assuming the ratio is already at that level. I delve into this
12 issue in greater detail (pages 16-18 of my testimony) in my discussion of the characteristics of
13 the DCF approach, especially as it is practically implemented. The methods in the current
14 environment, therefore, will tend to produce estimates for ROE that reasonably exceed the "true"
15 cost of equity.¹

16 **Q. Please explain why the expected return on equity exceeds the cost of equity when the**
17 **market-to-book ratio is significantly greater than one.**

18 A. This fundamental result stems from the seminal Discounted Cash Flow (DCF) analysis,
19 which succinctly translates into the equation

¹ I use the phrase "true cost of equity" interchangeably with "cost of equity." I use both to refer to the opportunity cost associated with purchasing equity, i.e., the minimum return necessary to attract sufficient capital.

1
$$\frac{P}{B} = \frac{r_e - b_e r_e}{K - b_e r_e} \dots\dots\dots \text{Equation (1)}$$

2 where r_e is the expected return on equity, B is the book value of stock, b_e is the expected
3 retention ratio,² P is the market stock price, and K is the cost of equity, i.e., the required return
4 on equity.³

5 The DCF approach is based on the premise that the market price of a particular stock
6 equilibrates to the sum of the stream of returns expected in the future from the stock by investors,
7 discounted by the market cost of equity. This is an explicit way of modeling investor behavior,
8 and is a well-accepted way of explaining observed investor behavior. Heuristically speaking, if
9 the stock price is lower than the market-equilibrium price, the demand for the stock would be
10 greater than the supply, and stock sellers would raise their price to take advantage of the
11 situation. Likewise, if the price of the stock was higher than the market-equilibrium price, the
12 demand would be less than the supply of stocks, putting pressure on the sellers to lower their
13 price to reduce excess supply. It follows that when the expected return on equity is greater
14 (smaller) than the cost of equity, the market-to-book ratio would be greater (smaller) than one.

15 **Q. Can you explain Equation (1) in greater detail?**

16 A. Yes. If the expected return on equity exceeds the market cost of equity, the price of the
17 stock would have to be higher relative to the book value to ensure that the expected dividend, i.e.

² Retention ratio is the percentage of earnings that is retained to grow a business.
³ See Roger Morin’s *Regulatory Finance*, Utilities’ Cost of Capital, Public Utilities Report, Inc. (1994), page 248. The result holds even if we model new equity financing, as long as the growth in the number of outstanding stocks is reasonably low *ceteris paribus*, which in practice is generally true. Retention ratio is the proportion of earnings that is kept back as retained earnings; i.e., (net income less dividends)/net income.

1 $B(r_e - b_e r_e)$, on the stock equals the minimum required dividend, i.e. $P(K - b_e r_e)$. A look at
2 comparative statics is helpful.⁴ Everything else being equal, if the expected return on equity
3 increases (decreases), the expected dividend would momentarily be higher (lower) than
4 $P(K - b_e r_e)$. *Ceteris paribus*, this would trigger a greater (lower) demand for the stock than the
5 supply, which would consequently lead to a higher (lower) market price for the stock. The
6 adjustments would continue until Equation (1) holds, i.e. until there is equilibrium.

7 A simple numerical example would be helpful. Suppose the expected return on equity, r_e ,
8 is 10 percent, and the expected retention ratio, b_e , is 30 percent. Based on these numbers,
9 $r_e - b_e r_e$ is 7 percent.⁵ However, if the cost of equity for the same stock, K , is 8 percent, then
10 $(K - b_e r_e)$ must be 5 percent.⁶ To ensure that 7 percent of the book value, i.e., the expected
11 dividend, is exactly equal to 5 percent of the stock price, i.e. the minimum required dividend, the
12 only way that equation (1) can hold is through an adjustment to the price of the stock until it is
13 40 percent higher than the book value of the stock, i.e. the market-to-book ratio is exactly equal
14 to 1.4.

15 **Q. Please explain the difference between the cost of equity and the expected return on**
16 **equity in greater detail.**

17 A. While the expected rate of return on equity for a regulated utility is an accounting return,
18 i.e., it depends on the return allowed by the regulator as well as how the utility performs

⁴ Comparative statics is a comparison of two economic outcomes when a pertinent variable is changed from one level to another.

⁵ $(r_e - b_e r_e) = 10 - 0.30 * 10 = 10 - 3 = 7$.

⁶ $(K - b_e r_e) = 8 - 0.30 * 10 = 8 - 3 = 5$.

1 operationally, the cost of equity is the opportunity cost of equity, which is the minimum return
2 required to attract investment by investors.⁷

3 Ideally, a fair and reasonable return on equity for a regulated utility would equal the
4 opportunity cost of equity. A look at a group of regulated utilities of comparable risk is
5 instructive in estimating the opportunity cost of equity. Intrinsic to the determination of the
6 allowed return at any point in time is the need to avoid unnecessary wealth transfer from
7 ratepayers to shareholders, given the prevailing economic environment. To balance the interests
8 of ratepayers and the financial viability of the utility properly, any approach to determine the cost
9 of equity must reasonably target the need to encourage investment in the utility's equity at the
10 least cost to its ratepayers.

11 The expected return on equity for investment in a regulated utility at any point in time is
12 influenced by the return currently allowed on such investment, as authorized by the regulator in
13 the previous determination of such return. It is also influenced by investors' expectations about
14 possible changes in the future, especially with respect to operating efficiency and income
15 opportunities. The expected return on equity for a regulated utility can be greater, lesser or the
16 same as the cost of equity at any point in time.

17 **Q. Have you analyzed the electric utility industry's market-to-book ratios?**

18 A. Yes, I have. In order to recommend the rate of return on PSNH's equity, I have analyzed
19 the market-to-book for the electric utility industry, PSNH's witness Ms. Bulkley's recommended
20 proxy group, and OCA's recommended proxy group. These are depicted in Figure 1 below. As

⁷ "A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions in general." *Bluefield*, 262 U.S. at 693.

1 for the electric industry's situation, I have used SNL's Index, SNL Electric Company, which
2 includes all publicly traded (NYSE, NYSE MKT, NASDAQ, OTC) Electric Utilities and
3 Transmission companies in SNL's coverage universe.

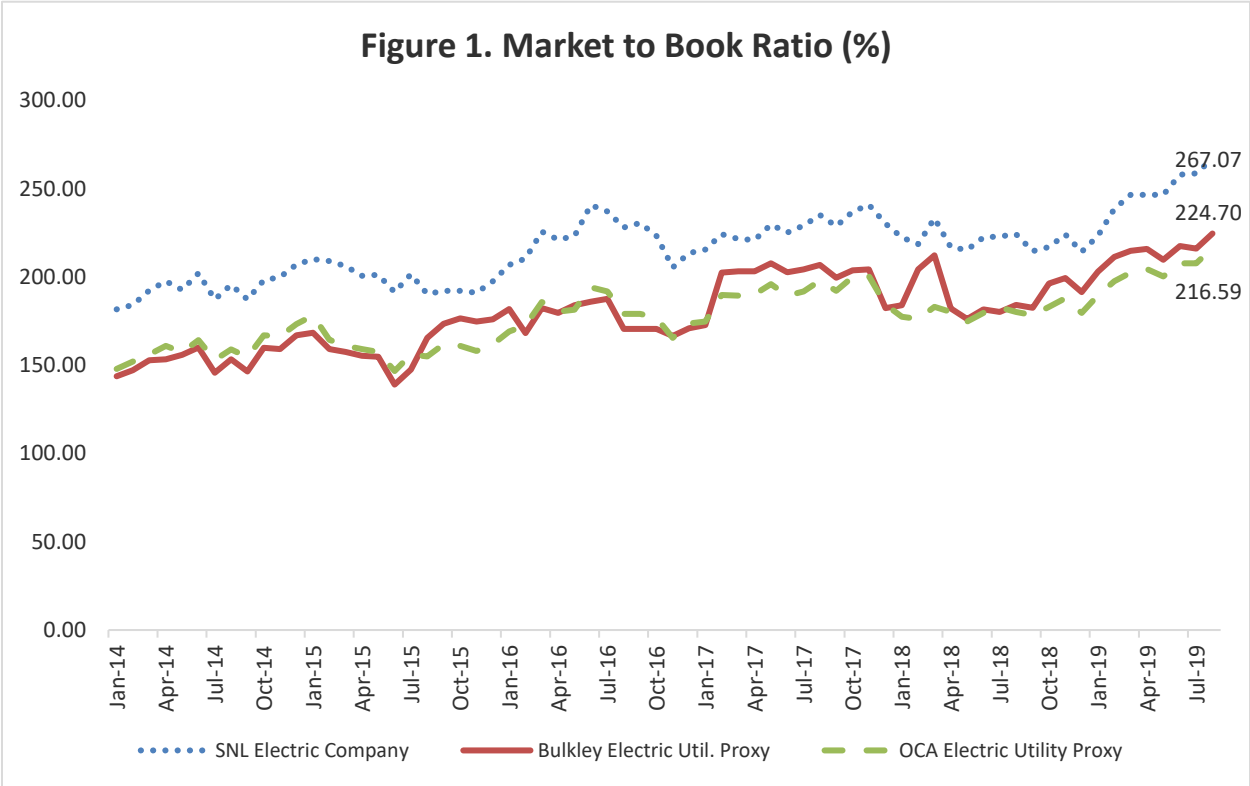
4 **Q. What do the electric utilities' market-to-book ratios indicate about the relationship**
5 **between the investors' expected return on equity and the cost of equity in the current**
6 **environment?**

7 A. Figure 1 shows that the average market-to-book-ratio of SNL electric companies as well
8 Ms. Bulkley's proxy have remained persistently well above one over the past six years; the
9 average market-to-book ratios for SNL electric utilities and Ms. Bulkley's proxy over the last six
10 years have been 2.17 and 1.81, respectively.⁸ As for the OCA's proxy, the average market-to-
11 book ratio for the corresponding period has been 1.78.

12 More importantly, as for the more current market-to-book ratios (August, 2019), they are
13 2.67, 2.25 and 2.17 for SNL electric companies, Ms. Bulkley's proxy and the OCA's proxy,
14 respectively. This indicates that the true cost of equity currently is comfortably less than the
15 return on equity expected by investors in electric utilities. In view of that, it is plain that if the
16 cost of equity is estimated based on existing expected return on common equity, the resulting

⁸ Data downloaded from SNL on October 28th, 2019.

1 return would unreasonably benefit shareholders at the expense of ratepayers.



2

3 **Q. In view of the observed market-to-book ratio being considerably higher than one, do**
4 **you have any recommendation on your preferred approach on estimating the cost of**
5 **equity?**

6 A. Yes, I do. I recommend relying predominantly on the DCF approach in determining the
7 allowed return on equity for PSNH.

8 One of the methods that Ms. Bulkley used to estimate her recommended cost of equity,
9 the Capital Asset Pricing Model (CAPM), predominantly uses historical stock-price appreciation
10 as the basis for measuring the expected return on common equity. Even when attempting to look
11 at forward-looking estimates, the method relies considerably on the historical trends in stock

1 prices. Not trivially, the betas,⁹ under the CAPM approach, are generally based on historical
2 stock prices. In a climate of market-to-book ratios being significantly greater than one, if
3 historically prices have tended to appreciate significantly because allowed returns (that are to
4 begin with higher than the true cost of equity) have moved further away from the true cost of
5 equity, the method will tend to produce estimates that will be further away from the true cost of
6 equity.

7 As for the Risk Premium Method (RPM), Ms. Bulkley uses historically allowed returns
8 on equity to calculate the risk premiums. Using historical data on allowed returns and Treasury
9 yields to inform cost of equity (which is inherently a forward-looking concept) is inappropriate.
10 Even setting that issue aside, to the extent allowed returns have captured the impact of price
11 appreciation resulting from greater divergence between allowed returns and the true cost of
12 equity, the method is susceptible to producing estimates that will have the same problem that the
13 CAPM approach has.

14 In contrast, the forward-looking DCF approach tends to correct somewhat for the
15 deviation between stock prices and book values. While the growth component is influenced
16 positively by price appreciation, the dividend yield component is negatively influenced by price
17 appreciation, thus producing a cost of equity estimate that relative to the other methods is more
18 in line with the true market cost of equity. It is true that investors' medium-term expectation
19 about ongoing sales in shares and the persistence in a greater-than-one market-to-book ratio, and
20 our reliance in practice on expectations of growth over the medium-term, tend to produce a
21 higher DCF estimate of cost of equity than the true cost of equity. However, investors

⁹ Beta is a measure of a stock's volatility relative to the market volatility.

1 understand that a continuing divergence in the stock price and the book value is unsustainable in
2 the long-run. That understanding gets somewhat reflected in the forward-looking DCF method,
3 even as it is usually implemented. In view of that, I recommend reliance on methods that are
4 based on the DCF approach.

5 **Q. Do you have any additional observations on the application of DCF in estimating the**
6 **cost of equity?**

7 A. Yes. Myron J. Gordon, who popularized the use of the DCF method for estimating ROE,
8 states that “the perfect capital markets cost of capital can be measured without bias only in the
9 special and uninteresting case where the allowed rate of return already is equal to the cost of
10 capital. When the allowed rate of return is above (below) the “true” cost of capital, the measured
11 cost of capital is biased up (down).”¹⁰ In the traditional model (wherein debt is valued at embedded
12 cost, not at the market cost of debt), the conclusion that the allowed rate of return is above (below)
13 the cost of capital when the market-to-book value ratio is above (below) one remains true.¹¹ The
14 traditional estimate of the cost of capital is however not too problematic as long as the inputs to
15 that estimation are reflected reasonably accurately. There are compelling reasons to conclude,
16 however, that the company’s implementation of the DCF approach leads to an upward-biased
17 estimate of the cost of equity, precisely due to the reliance on inaccurate inputs.

18 First, the standard DCF model is based on the premise that all key variables like the stock
19 price, book value, earnings, and dividends grow at the same rate in the long-run, and in the absence
20 of external financing, market price converges to the book value. Theoretically, a market-to-book
21 ratio that is significantly greater than one at any point in time implies that investors in general

¹⁰ See “The Cost of Capital to a Public Utility”, Myron J. Gordon, 1974, pages 9-10.

¹¹ *Id.* at 8.

1 expect the price over earnings ratio to decrease in the long-run. This translates into a growth
2 projection for stock price that lags the growth projection for earnings growth. Under the standard
3 DCF construct, since in the long-run both the stock price and earnings are premised to grow at the
4 same rate, the long-term equilibrium growth lies somewhere between the expected earnings growth
5 and the expected growth in price. In the current environment, the exclusive use of earnings growth
6 projections, theoretically, leads to an upward-biased estimate of the DCF growth component, and
7 consequently produces an upward-biased estimate of the opportunity cost of equity.¹²

8 Second, very importantly, analysts' growth estimates have been shown to be overly
9 optimistic and overstate the actual reported earnings. It is instructive to look at "The Cost of Capital
10 - A Practitioner's Guide," by David C. Parcell, prepared for the Society of Utility and Regulatory
11 Financial Analysts (2010 edition), pages 142-43, specifically for the insight that follows:

12 A study by Dreman and Berry concluded that consensus estimates of EPS
13 differ significantly from actual reported earnings. They also concluded that
14 the average error appears to be increasing over time and that analysts are
15 optimistic on average. They conclude "These findings question the use of
16 finely calibrated earnings forecasts that are integral to the most common
17 valuation/models and indirectly question the valuation methods
18 themselves" (Dreman and Berry, 1995, 30). A similar study by Clayman
19 and Schwartz compared Zacks Investment Research EPS projections with

¹² It is instructive to see Roger Morin's *Regulatory Finance, Utilities' Cost of Capital*, Public Utilities Report, Inc. (1994), page 123. Dr. Morin states that the "[a]pplication of the standard DCF model would result in a downward-biased estimate of the cost of equity to a public utility whose current market-to-book ratio is less than 1 and that is expected to converge toward 1 by investors." This is because investors recognize that a continuous divergence away from a market-to-book ratio equal to one is unsustainable. Investors' expectation about increase or decrease in the market-to-book ratio affects the growth component of the DCF model, biasing its result positively or negatively. When the market-to-book ratio is less than one, it is reasonable to assume that the investors expect the ratio to increase. The expected growth increase in market-to-book ratio results in price appreciation that exceeds the growth in earnings and application of the standard DCF approach will lead to a downward-biased estimate of the cost of equity. In contrast, when the market-to-book ratio is significantly greater than one, it is reasonable to assume that the investors expect the ratio to decrease. In that case, the expected decrease in the market-to-book ratio results in price appreciation that lags the growth in earnings and the application of the standard DCF approach will produce an upward-biased estimate of the cost of equity (k).

1 actual EPS for 399 companies for the period 1982-1992. They concluded
2 that analysts' forecasts of EPS overstated actual EPS by as much as fifty
3 percent. They conclude "...market participants should take analysts' innate
4 overestimation biases into account when making stock valuation
5 judgments" (Clayman and Schwartz, 1994, 68). Still another study by
6 Chopra (1998) concluded 'Analysts' forecasts of EPS and growth in EPS
7 tend to be overly optimistic. He concluded that analysts' forecasts of EPS
8 over the past 13 years have been more than twice actual growth rate.¹³
9

10 To prevent reliance on overly optimistic and overstated growth earnings, it is important
11 that at the minimum the DCF growth variable input should not be solely based on earnings
12 growth projections or any other solitary variable's growth projections; I discuss this issue in
13 greater detail in Section IIIA to further support this conclusion.
14

15 **III. ESTIMATING COST OF EQUITY USING SEVERAL APPROACHES**

16 **Q. Which approaches have you used to estimate the cost of equity?**

17 A. While I have relied primarily on the DCF construct to estimate the cost of equity for the
18 utility, I have also estimated the cost of equity using the CAPM construct. As for the DCF
19 construct, I have used the standard DCF approach (Subsection III.A), where the cost of equity is
20 estimated as the sum of the dividend yield and a measure of the growth component. As for the
21 CAPM approach (Subsection III.B), while I have derived an estimate of the cost of equity, for
22 reasons I discuss later, I do not base my point-estimate recommendation much on that method.
23 The CAPM estimation is somewhat useful however as a check on the reasonableness of the DCF
24 estimates. In each of these subsections I comment on Ms. Bulkley's analysis to the extent it is

¹³ Not surprisingly, one research thread on investors' projection of earnings growth has been to explain the "optimistic bias in earnings forecasts by security analysts". The explanations include strategic reporting bias, selection bias, cognitive bias, and bias due to skewed distribution of earnings and analysts' efforts to produce more accurate forecast. See "Earnings skewness and analyst forecast bias", Zhaoyang Gu & Joanna Shuang Wu, Journal of Accounting & Economics 35(2003) 5-29, Page 6.

1 relevant to my recommendation. I should also add that unlike Ms. Bulkley, I did not use the RPM
2 to derive an estimate of the cost of equity. While I have discussed briefly why previously, I
3 discuss the reasons a little bit more in what follows. Finally, I conclude this section with my
4 recommendation on the cost of equity for PSNH.

5 **Q. Apart from your preference for the DCF approach due to market-to-book ratio**
6 **consideration, are there other reasons why you rely primarily on the DCF construct to**
7 **estimate the cost of equity?**

8 A. Of the methods that Ms. Bulkley used to estimate her recommended cost of equity, CAPM
9 and RPM largely use historical data as the basis for measuring the expected return on common
10 equity. Even with attempts at forward-looking estimations, CAPM relies to a great extent on the
11 historical trends in stock prices, for example, to measure the betas required for the CAPM analysis.
12 This may provide insight into what returns investors expect based on past experience, but it has
13 limited value in assessing what returns are necessary to attract needed capital going forward.
14 While the CAPM model relies on betas that are based on historical stock prices, Ms. Bulkley's
15 RPM approach relies on regressing risk premiums on 30-year Treasury yields using historic data
16 for the period 1992 to February, 2019. Of course, Ms. Bulkley also relies on historically allowed
17 returns on equity to calculate historical risk premiums. By contrast, the DCF approach is
18 fundamentally forward looking. Also, the underlying construct behind the DCF analysis, i.e. the
19 current value of a common stock equates to the sum of the discounted stream of future income
20 from that stock, is widely accepted. Further, regarding the techniques that are used to estimate the
21 cost of equity for regulated utilities, the DCF model is the most commonly used model for

1 estimating the cost of common equity for public utilities.¹⁴ In fact, the Commission in New
2 Hampshire has predominantly relied on the DCF construct previously.

3

4 **III.A Discounted Cash Flow Approach**

5 **Q. Which DCF model do you use to estimate the cost of equity?**

6 A. I use a single-stage DCF model to derive estimates for the cost of equity for a group of
7 companies that forms a reasonable proxy for PSNH. The two essential elements of this method
8 are the dividend yield and the growth component. While I discuss the estimation of both elements
9 later in detail, it is important to point out that the growth component of the DCF equation tends to
10 be the most critical element in the use of the DCF methodology. A couple of things render the
11 estimation of the growth component somewhat challenging. First, while the growth component of
12 the single-stage DCF model is in principle meant to be based on long-term projections, in practice,
13 it is based at most on three-to-five-years' projections, since long-term projections are seldom
14 available. Second, "it is reasonable to believe that investors, as a group, do not utilize a single
15 growth estimate when they price a utility's stock."¹⁵ While growth projections by equity analysts
16 are available on variables like earnings, dividends, book value per share, among other things, what
17 weight one should give to different projections is often a matter of contention. Unlike Ms.
18 Bulkley's approach, which relies only on earnings growth to estimate the growth component, I
19 have relied on three estimates for the growth component: (1) the average of the growth rates in

¹⁴ See "*The Cost of Capital - A Practitioner's Guide*," by David C. Parcell, prepared for the Society of Utility and Regulatory Financial Analysts (2010 edition), Page 124.

¹⁵ *The Cost of Capital - A Practitioner's Guide*, by David C. Parcell, prepared for the Society of Utility and Regulatory Financial Analysts (2010 edition), Page 146.

1 earnings per share (EPS), book value per share (BVPS), and dividends per share (DPS); (2)
2 earnings growth only; and (3) sum of internal growth rate, br , and the external growth component,
3 sv .¹⁶ Of course, I strongly disagree with Ms. Bulkley's sole reliance on earnings growth
4 projections for reasons discussed previously, but also I do not believe that investors rely only on
5 earnings growth rates when they price a utility's stock. I discuss this in greater detail later.

6 **Q. Briefly describe the Single-Stage DCF Method.**

7 A. The single-stage DCF model is typically represented by the equation, $K = \frac{D_1}{P} + g$ where
8 K is the estimate of the cost of equity, $\frac{D_1}{P}$ is the next period's dividend yield, i.e., the next period's
9 dividend divided by the stock price, and g is the expected (constant) growth rate in dividends. The
10 model is based on the premise that since cash dividends are the only income from a share of stock
11 held in perpetuity, the value of that stock is the present value of its stream of cash dividends, where
12 the discount rate is the market's required return, K . Expected future dividends are represented by
13 applying a constant growth rate to the current observable dividend, to obtain the functionally
14 elegant expression for K .

15 **Q. What criteria did you use to select the DCF proxy group?**

16 A. When choosing my recommended sample, I effectively began with Value Line's universe
17 of electric companies (Value Line Electric Universe) that Ms. Bulkley subjected to her proxy
18 screening analysis. I do not find that the fourth, fifth, and the sixth criteria used by Ms. Bulkley
19 are reasonable.¹⁷ Also, for the seventh criterion, while I do not have an issue with screening out

¹⁶ The alternative is based on the formula, $br + sv$, where b is the retention ratio, r is the expected return on equity, s is the expected funds raised from the sale of stock as a fraction of existing equity, and v is $(1-(B/P))$, where B is the book value of the share and P is the price of the share.

¹⁷ See Ms. Bulkley's Testimony, Bates page 0623, lines 12 through 17.

1 companies that are parties to a merger or a transformative transaction, I believe only developments
2 over the last year or so should dictate the screening. To ensure that the companies selected for
3 PSNH's proxy are predominantly regulated electric utilities, I only included them in the proxy if
4 at least 70 percent of the revenues over 2015 are attributable to regulated electric business and at
5 least 80 percent of the assets are attributable to regulated business over 2016-2018.

6 **Q. Why do your criteria differ from that of Ms. Bulkley's criteria?**

7 A. In creating a reasonably "pure play" proxy that is comparable to PSNH it is important that
8 these companies exhibit a fairly high percentage of regulated assets in total assets and have the
9 majority of their revenue coming from electric regulated operations. A sufficiently high cut-off
10 for share of regulated operating income as a percentage of total net operating income may seem
11 like an appropriate screen at first glance, but such a metric is prone to exaggerate the role of
12 regulated operations when the non-regulated segment of a company is reporting significant losses
13 on operating income. For such a company, measuring the regulated share in total operating income
14 would tend to overstate its importance and may incorrectly allow the company's inclusion in the
15 proxy, even as that company may be fundamentally different from a regulated company since it is
16 exposed to significant market risks given a substantial presence in the non-regulated arena or a
17 non-gas activity. In contrast, if the non-regulated segment of the company is reporting significant
18 income, such an analysis may eliminate the company from the proxy, even though that company
19 may otherwise consist predominantly of its regulated business. Such a company's foray into a
20 non-regulated arena may be so insignificant that the company's risk profile actually matches that
21 of a regulated company better than the one included erroneously by relying on an income variable
22 like operating income.

1 As for Ms. Bulkley’s criterion to exclude companies that have more than 60 percent of an
2 utility’s MWh sales coming from owned generation, the Company has not demonstrated why a
3 regulated utility faces significantly different risk whether it procures its electric sales from own
4 generation or procures electricity from other generating companies. The criterion unnecessarily
5 restricts the size of the proxy group. If Ms. Bulkley had not applied the “own generation”
6 screening, her proxy group would have included eighteen companies as opposed to only eight per
7 her approach. Also, given how she relied on a band that is between the mean ROE and high ROE
8 to inform her recommended ROE for PSNH, I am very concerned that this screening leads to a
9 proxy that is unrepresentative of PSNH’s business. To better assess whether a company should be
10 included in a proxy for PSNH, I believe we should strive to have it sufficiently reflective of a “pure
11 play” regulated electric utility. I find that cut-offs of at least 80 percent for regulated assets and at
12 least 70 percent for regulated electric revenues are reasonable, given the dearth of standalone
13 companies that are publicly traded and consist solely of regulated electric business. Also, I have
14 only relied on mergers or transformative transactional developments over the last year in applying
15 Ms. Bulkley’s seventh criterion; *see* Ms. Bulkley’s Testimony, Bates page 000623, lines 2-17.

16 **Q. What is your recommended DCF proxy?**

17 A. Using information provided by the Company in response to data requests about Value Line
18 electric companies and additional research of 10-K forms and SNL data, and applying the
19 mentioned cut-offs of 70 percent for electric revenue in total revenue and 80 percent for regulated
20 assets in total assets, I preliminarily determined the list of companies that exceed those cutoffs. I
21 then, based on the latest information, applied Ms. Bulkey’s other screening criteria to determine
22 that the appropriate proxy group consists of Alliant Energy Corporation (LNT), Ameren
23 Corporation (AEE), American Electric Power Inc. (AEP), Avista Corporation (AVA),

1 Consolidated Edison (ED), Duke Energy Corporation (DUK), Edison International (EIX), Evergy
2 Inc. (EVRG), Entergy Corporation (ETR), IDACORP, Inc. (IDA), NorthWestern Corporation
3 (NWE), OGE Energy Corporation (OGE), Pinnacle West Capital Corporation (PNW), PNM
4 Resources Inc. (PNM), Portland General Electric Company (POR), PPL Corporation (PPL),
5 Southern Company (SO), and XCEL Energy Inc. (XEL).¹⁸ I have eliminated El Paso Electric
6 Company from the proxy group as it is in the process of being acquired by Infrastructure Investments
7 Fund (IIF). The transaction will require approvals from Public Utilities of Texas, New Mexico
8 Public Regulation Commission and Federal Energy Regulatory Commission. That creates some
9 uncertainty as to whether the transaction will materialize. I would also consider such a transaction
10 transformative enough that it is reasonable to exclude the Company from the proxy group. I have
11 also, in agreement with Ms. Bulkley, eliminated PSNH's parent Eversource from the proxy group
12 to avoid circular logic.

13 **Q. Do you believe that the proxy group listed is a reasonable proxy for PSNH?**

14 A. Yes, I do. The screening criteria go a long way in ensuring that my proxy group
15 reasonably reflects the risk profile of PSNH's electric utility business. For example, the proxy
16 group's average percentage of assets subject to electric utility regulation is 94.9 percent and the
17 average percentage of revenue subject to regulated electric business is 91.1 percent in 2015,
18 which are reasonably close to complete regulation as is the case for the distribution business of
19 PSNH in New Hampshire. Also, a check (see Schedule PKC-1) reveals that the S&P credit-
20 ratings for the group range between BBB to A-. The rating associated with Eversource is A-. As
21 for the capital structure, the company has proposed a common equity ratio of 54.85 percent. A
22 look at the proxy group indicates that over 2016 to 2018 the average equity ratio has been 46.7

¹⁸ The abbreviations represent the ticker symbols.

1 percent. (Schedule PKC-2 for Value Line data). PSNH's parent has a rating that is higher than
2 the average credit rating of the proxy group. Also, the company's proposed capital structure is
3 less leveraged than that of the proxy group's capital structure. It is reasonable to conclude that
4 the proxy group's cost of equity estimate would reasonably inform what the allowed returns on
5 equity and capital should be for the company.

6 **Q. Did you consider any additional check on the reasonableness of your DCF proxy?**

7 A. Yes. As a rough check to examine the reasonableness of the OCA proxy group, I also
8 briefly looked at the economic conditions characterizing New Hampshire (NH) relative to the
9 nation based on state coincident index data provided by the Federal Reserve Bank of Philadelphia
10 . As for August 2019 year-to-year growth in the index, while New Hampshire grew by 3.5 percent,
11 the U.S. economy grew by only 2.85 percent. Also, as for the states served by the companies
12 included in the proxy, the corresponding growth rates varied between -0.3 percent and 4.35
13 percent. Only 5 of the relevant 39 states registered higher growth compared to New Hampshire.¹⁹

14 **Q. What bearing do the economic conditions have on the reasonableness of the DCF**
15 **proxy group?**

16 A. Investors are assumed to be aware of current regional and national economic conditions.
17 Investors in PSNH's distribution business are expected to know that the local economy has been
18 outperforming the national economy as well as states in which the proxy group's businesses
19 operate. An investor's opportunity cost of equity, i.e., investor's required return, is expected to be

¹⁹ "The coincident indexes combine four state-level indicators to summarize current economic conditions in a single statistic. The four state-level variables in each coincident index are nonfarm payroll employment, average hours worked in manufacturing by production workers, the unemployment rate, and wage and salary disbursements deflated by the consumer price index (U.S. city average). The trend for each state's index is set to the trend of its gross domestic product (GDP), so long-term growth in the state's index matches long-term growth in its GDP." See <https://www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident>.

1 lower for investing in an economic activity in New Hampshire when compared to investing in a
2 comparable activity operating in an environment that is relatively less robust, all else equal. In
3 view of all of these considerations, it is my conclusion that the proxy group as chosen is rather
4 conservative and reasonable.

5 **Q. Please explain why you used pricing data from November 7, 2019 to December 6, 2019**
6 **to measure the dividend yields for the proxy's constituent companies.**

7 A. Investors' expectations about how companies will fare in the future are captured in the
8 most recently observed market price and dividend data. Data from fairly long historical periods
9 are unlikely to reflect investors' current expectations. That said, it is also true that some smoothing
10 of the price trend is useful as it filters possible transitory and temporary changes that characterize
11 daily movements in prices. I have, therefore, as of preparing this testimony, used daily pricing
12 data from the most recent month to calculate the average price (Schedule PKC-3), which in
13 conjunction with the annualized dividend helps measure the dividend yield (Schedule PKC-4)
14 component of the DCF based cost of equity.

15 **Q. Ms. Bulkley exclusively uses expected earnings growth rates for the growth**
16 **component in her single-stage DCF analysis. Do you agree with her approach?**

17 A. No. It is unreasonable to assume that investors use a single growth estimate when pricing
18 a utility's stock. Ms. Bulkley asserts in her testimony that "the use of dividend and book value
19 growth rates ignores the academic research demonstrating that earnings growth rates are most
20 relevant in stock price valuation." In support of this assertion she provides several academic
21 references. It is helpful to go over those references in greater detail.

22 Starting with the article by Carleton and Vander Weide, the fact is that the paper only looks
23 at historical growth rate in dividends (*see* page 79). As for analysts' growth forecasts, earnings

1 growth is the only variable that the article investigates. The paper does provide evidence that it is
2 better to use growth expectations rather than historical data to measure the growth component. It
3 does not, however, at all investigate whether analysts' earnings growth forecasts are better than
4 their dividends growth forecasts in capturing investors' expectations. It also does not, more
5 importantly, even remotely demonstrate that investors use only earnings and not dividends in
6 forming their investment decisions. The articles by the Advanced Research Center is essentially
7 based on the same approach as that adopted by Carleton and Vander Weide, and exhibits the same
8 deficiencies associated with the article by Carleton and Vander Weide. The articles by Harris and
9 Marston did not even investigate how dividends growth expectations perform. For example, the
10 article by Harris relies solely on EPS growth expectations to measure the growth component of
11 DCF (Page 65) by noting in footnote 6 that "[while] the model calls for expected growth in
12 dividends, no source of data on such projections is readily available." Most importantly again, the
13 articles have nothing to offer on whether investors form their investment decisions based *only* on
14 earnings and *not* dividends. The other citation, an article by Brigham, Shome, and Vinson, also
15 does not delve into the issue of whether investors form their investment decisions based *only* on
16 earnings. All it does is that it provides evidence that *ex ante* growth expectations are superior to
17 *ex post* growth estimates when estimating return on equity for utilities.

18 As for the reference to Dr. Morin's book, it opines that "[s]urveys of analytical techniques
19 actually used by analysts reveal the dominance of earnings and conclude that earnings are
20 considered far more important than dividends," and that "Value Line's principal investment rating
21 assigned to individual stocks, Timelines Rank, is based primarily on earnings, accounting for 65%
22 of the ranking." That assertion, if anything, indicates that investors do not rely *solely* on earnings
23 to reflect future long-term growth. Also, with respect to utilities, Value Line stresses quite often

1 that the investors are attracted towards utility stocks as they are high dividend paying stocks. I
2 discuss below more specifically why dividends matter to investors. I conclude the references in
3 Ms. Bulkley's testimony are not useful if they are meant to show that investors demonstrably form
4 their investment decisions based solely on expectations of growth in earnings, not dividends.

5 **Q. Please discuss the evidence from research and market realities?**

6 A. Both market realities and research indicate that not all investors are alike and they do not
7 only care about earnings growth. While providing a review of dividend policy theories and
8 evidence, Malkawi, Rafferty and Pillai (2010) survey academic research that argues why dividends
9 matter to investors.²⁰ Different researchers have provided empirical support for different theories.
10 To note just a couple of them, some have argued that dividends are sought as investors prefer "bird
11 in the hand" dividends rather than "two in the bush" future capital gains. Others have argued that
12 investors care about after-tax return and the differential tax treatment of capital gains and dividends
13 influences their demand for shares. In informing why dividends matter, some of the theories and
14 empirical analysis directly stress how different investors may view dividends differently. For
15 example, investors whose dividends are taxed higher than their capital gains may prefer earnings
16 driven stocks rather than dividends paying stocks, or how institutional investors as opposed to
17 individual investors are more attracted towards dividend-paying stocks, etc. It also remains true
18 that companies pay out dividends in billions of dollars in the marketplace suggesting that

²⁰ See "Dividend Policy: A Review of Theories and Empirical Evidence", Malkawi, Rafferty, and Pillai, International Bulletin of Business Administration, ISSN: 1451-243X Issue 9 (2010). Even managers need to carefully consider dividends policy because investors not only view dividends as being a return to shareholders but also watch movements in dividends to infer about the health of the firm. See "Topics in Finance Part VII – Dividend Policy" Judy Laux, American Journal of Business Education – November 2011, Volume 4, Number 11.

1 companies recognize that investors value them. I believe it is inappropriate to assume that only
2 earnings growth expectations matter to investors.²¹

3 **Q. What measures of the growth component do you consider?**

4 A. Since the DCF estimate is derived from the concept that cash dividends are the only income
5 from a share of stock held to infinity, in principle, it is the growth in dividends that should be used
6 for the growth component. Investors, however, have different expectations about growth and no
7 single indicator captures the expectations of all investors. Also, whether growth in dividends per
8 share (DPS) is sustainable or not is pertinent and its sustainability is affected by how both earnings
9 per share (EPS) and book value per share (BVPS) perform in the future. Sustainability of growth
10 in dividends under the DCF construct assumes that EPS, DPS and BVPS are all expected to grow
11 at the same rate in the future. Value Line five-year projections for the growth rates in earnings,
12 dividends and book value, however, reveal that these financial variables are expected to grow at
13 significantly different rates over the next three to five years.

14 In view of that, sole reliance on either dividends growth rate, book value growth rate or
15 earnings growth rate is unlikely to produce a reliable measure of the DCF growth component. I
16 instead use the average of the three expected growth rates as one of the measures for the growth
17 component to represent the growth component in the DCF analysis. One may reasonably assume
18 that the sustainable long-run growth rate to which earnings, dividends and book value growth rates
19 may converge in the future is represented by their average, rather than just one of those variables.
20 I have used the average of the Value Line five-year projections for growth in DPS and BVPS *and*
21 the average of the Value Line, Zacks and SNL median long-term projections for EPS growth rates

²¹ See also *The Cost of Capital - A Practitioner's Guide*, by David C. Parcell, prepared for the Society of Utility and Regulatory Financial Analysts (2010 edition), Page 146

1 to calculate the growth component. While in principle the single-stage DCF model is meant to be
2 based on long-term projections, its application however is based on at most five-year projections,
3 as truly long-term projections are seldom available.

4 I have also considered a second measure of the growth component, which is based on
5 estimates for the internal and external components for growth, retention ratio, expected return on
6 common equity, market-to-book ratio, and growth in the number of outstanding shares (called
7 retention growth). Finally, even though I have reservations about Ms. Bulkley's sole reliance on
8 earnings growth as a measure of the growth component, I considered and applied that approach to
9 my proxy to derive another DCF estimate for the cost of equity (*see* Schedule PKC-5 for the
10 calculation of the growth components; *see also* Schedules PKC-6 and PKC-7 for the inputs for
11 external and internal growth components).

12 **Q. Please explain how you estimate the growth component based on the retention ratio,**
13 **expected return on common equity, market-to-book ratio, and growth in the number of**
14 **outstanding stocks.**

15 A. I have used Value Line's expectation regarding retention ratios and returns on equity for
16 five years into the future to derive estimates for b and r and have used them to calculate the
17 expected internal growth component, br . To account for growth expectations from external
18 financing and derive estimates of the external growth component, I have also used the latest
19 market-to-book ratios from Yahoo Finance and the average of Value Line's five-year projections
20 for the number of outstanding shares. That is helpful in calculating the external growth component,
21 $s_e v$, where s_e = expected funds raised from sale of stock as a fraction of existing equity, and

1 $v = \left(1 - \frac{B}{P}\right)$.²² The revised formulation for the growth component can be alternatively expressed
2 as $b_e r_e + g_e \left(\frac{P}{B} - 1\right)$, where g_e is the expected growth rate in the number of outstanding shares. In
3 short, the growth component can be viewed as the sum of the “internal” growth rate, i.e. $b_e r_e$, and
4 the “external” growth rate, i.e. $g_e \left(\frac{P}{B} - 1\right)$.

5 **Q. Do you employ any outlier-determination approach?**

6 A. Yes.

7 **Q. Please describe your outlier-determination approach.**

8 A. I have employed the statistical outlier-determination approach that cost of equity estimates
9 lying outside the bandwidth of the mean plus or minus two times the variance are not statistically
10 representative of the proxy. In terms of probabilistic distribution terminology, this selection
11 criterion effectively mimics the widely-used statistical confidence interval of 95 percent. I have
12 also eliminated ROE estimates that are less than or equal to the recent yield on Utility A preferred
13 stocks, i.e. 5.99 percent *plus* 50 basis points (*see* Value Line’s Selection & Opinion, November
14 29, 2019).

15 **Q. Ms. Bulkley uses a screening that eliminates any ROE estimate that is below 7**
16 **percent. Why did you not apply a similar screening?**

17 A. First, I do not believe it is appropriate to solely use a lower-end ad hoc cut-off, as a proper
18 statistical outlier determination would recognize outliers not only at the lower-end, but also at the
19 higher-end. The OCA’s statistical selection-criterion, as mentioned previously, appropriately
20 applies a screening that eliminates outliers at both ends. Second, the OCA has applied an

²² See “*The Cost of Capital to a Public Utility*,” Myron Gordon, MSU Public Utilities Studies (1974), Page 30.

1 additional lower-end cut-off that conservatively recognizes that ROEs on common stocks are
2 expected to sufficiently exceed the yields on preferred stocks. The use of the recent yield on
3 Utility A preferred stocks *plus* 50 basis points as a lower-end feasible estimate on ROE is to capture
4 that spirit. The OCA does not agree that it is appropriate to rely on an ad hoc lower-end cut-off
5 that is not informed by market fundamentals. The OCA's approach, unlike the one used by Ms.
6 Bulkley, is better informed by current market realities.

7 **Q. What are the DCF estimates for your proxy?**

8 A. The single-stage DCF estimate, based on the average expected growth rates in earnings,
9 dividends and book value, is 8.09 percent. Schedule PKC-8 provides the calculations. When only
10 the EPS growth rate is used for the growth component, the single-stage DCF method produces an
11 estimate of 8.48 percent. When the "internal-plus-external" growth approach is used, the DCF
12 method produces an estimate of 8.24 percent. I have applied my recommended outlier-
13 determination criteria in deriving these estimates.

14 **Q. While Ms. Bulkley provides DCF estimates using the projected DCF approach, you
15 have not done so. Why?**

16 A. The DCF approach informing the ROE is based on the premise that a currently observed
17 market-determined stock price equates the sum of the discounted stream of future income from
18 that stock. Also, as for the dividend yield, the DCF approach relies on the projected dividend yield
19 emanating strictly from just the next year. To rely on pricing projections as to what some
20 investment analyst expects them to be in the future and applying a dividend yield projected well
21 beyond a year is inconsistent with the essence of DCF theory that builds upon the notion of
22 observed market-equilibrium price. Needless to say, I have not employed this approach, and would
23 strongly recommend that the Commission reject such an application.

1 **Q. Ms. Bulkley recommends an implicit adjustment for flotation costs in her estimates**
2 **of the cost of equity. Do you agree with that adjustment?**

3 A. No. As I have noted already, the DCF approach, informed by equity analysts' projections,
4 in practice relies on investors' expectations about earnings and dividends and other relevant
5 variables over three to five years. Even with reasonable treatment of the DCF growth component,
6 the approach tends to internalize the medium term expectation that the market-to-book ratio will
7 persist at levels relatively close to what is currently being observed. Given the reliance at best on
8 medium term expectations, we tend to derive estimates of the ROE that are sufficiently above the
9 true cost of equity in a setting where the stock prices are significantly above the book value.
10 Flotation cost is effectively small enough that my recommended return on equity, that relies on
11 investors' expectations of persistence in the market-to-book ratio being significantly greater than
12 one, already accounts for such costs adequately. Any further adjustment would simply
13 unnecessarily transfer wealth from ratepayers to shareholders.

14

15 **III.B Capital Asset Pricing Model (CAPM)**

16 **Q. Briefly describe the CAPM method.**

17 A. The CAPM method recognizes that common equity capital is more risky than debt from an
18 investor's standpoint, and that investors require higher returns on stocks than on bonds to be
19 compensated for the additional risk. The cost of common equity under CAPM is represented by
20 the following equation: $K = R_f + \beta_s * (R_M - R_f)$ where K is the cost of equity, R_f is the yield on
21 risk free securities, R_M is the expected return on the overall market and $(R_M - R_f)$ is the equity risk
22 premium demanded by shareholders to accept equity relative to debt. β_s is the average beta of a

1 group of comparable-risk companies that is used to adjust the risk premium to measure risks
2 specific to the regulated utility in question.

3 **Q. What is Ms. Bulkley's estimate of the cost of equity based on the CAPM method?**

4 A. Essentially, Ms. Bulkley derives two CAPM estimates of ROE using information from SP
5 500 stocks by applying the DCF construct to those to estimate the expected return on equity and
6 the yield on 30-year Treasury Bond. Her CAPM-based ROE estimate is 10.31 percent when she
7 uses Bloomberg beta. When she uses Value Line beta, her estimate is 9.56 percent.

8 **Q. Do you agree with Ms. Bulkley's CAPM approach? Please explain.**

9 A. No. I do not agree with her approach to measure market risk premium. The disagreement
10 is both with respect to how she measures risk-free return and how she calculates market returns. I
11 discuss these considerations below.

12 **Q. Why do you disagree with Ms. Bulkley's specification of the risk-free rate?**

13 A. I do not agree that the yield on 30-year Treasury bond is a reasonable proxy for the risk-free
14 rate. Strictly speaking, the risk-free return is best captured by short-term Treasury bills, but in
15 recognition that utility rates are usually set for longer periods and interested investors typically
16 have relative long investment time horizons, longer-term bonds are used to capture the risk-free
17 rate when applying CAPM to estimate the cost of equity.

18 It should be understood that long-term bonds are not risk-free for two main reasons: default
19 (credit) risk and interest rate risk. As for the interest rate risk, the longer termed a default-free
20 bond is, the greater is its interest rate risk. The 10-year Treasury long-term bond is my preferred
21 metric for the risk-free rate when conducting CAPM analysis for regulated companies. It strikes a
22 reasonable balance between choosing a truly interest rate risk-free instrument (like the shortest of

1 short term Treasury bills) and a consideration that investors have relatively long investment
2 horizons and that regulated utility rates are usually set for longer terms than just a few months.²³

3 Also, as for relying on projected Treasury bond yields to measure the risk-free rate, since
4 the observed market-based yield at any point in time is inherently based on future expectations of
5 market participants about the economy, I do not find it appropriate to use any information about
6 what analysts think the yields are going to be in the future either near-term or long-term. Yields
7 observable at any point in time in the market place is akin to price being observable in a
8 competitive market at any point in time. In a competitive environment, the observed market-
9 equilibrium bond yield, which represents the interplay of demand and supply realities, contains all
10 the information about what economic agents expect will happen in the future. Such a yield
11 therefore is the best indicator for a forward looking measure like the “risk-free” return.

12 **Q. You stated that you do not agree with Ms. Bulkley’s approach to calculate market**
13 **returns. Please explain why.**

14 A. My reservation about Ms. Bulkley’s approach stems from three reasons that are related to
15 how he employs the DCF approach in estimating the market returns.

16 First, I disagree with the sole reliance on earnings growth projections to estimate the DCF
17 growth components, as was discussed before in the section on DCF estimation of the proxy’s cost
18 of equity.

19 Second, I do not agree that information from stocks that have zero dividend yields should
20 be relied upon significantly to estimate the DCF based market returns. The DCF construct is
21 intrinsically based on modeling net present value of dividend yields that investors receive. Such
22 a construct ideally should not be applied on stocks that do not provide any dividends.

²³ For a good discussion on the determination of risk-free rate, see “*What is the Risk Free Rate? A Search for the Basic Building Block*,” Aswath Damodaran, Stern School of Business, New York University, December 2008.

1 Third, it should be recognized that the market portfolio as used by Bloomberg and Value
2 Line are very different and the betas associated with one source should not be used to derive CAPM
3 cost of equity estimates that relies on market data from the other. While Value Line betas are
4 based on a market return assumed to be that of the NYSE Composite Index, the Bloomberg betas
5 are based on the S&P 500 Index. The OCA has therefore only estimated market returns that relies
6 entirely only on Value Line data and uses only Value Line betas to derive cost of equity estimates.
7 We do recognize that such an exercise would also be appropriate if we relied entirely only on
8 Bloomberg data for both market returns and betas. The OCA however does not have access to
9 Bloomberg and did not get necessary data from the data requests propounded on the Company, to
10 fully conduct its own analysis. I have therefore relied only on Value Line data to estimate market
11 returns.²⁴

12 All of the noted considerations inform the OCA's CAPM estimation as discussed below. I
13 go through the CAPM inputs one-by-one.

14 **Q. What beta measures do you use for your sample?**

15 A. I use Value Line beta estimates for the companies in my DCF proxy group (*see* Schedule
16 PKC-9) to derive the average beta for those companies. The proxy beta is 0.58.

17 **Q. How do you calculate the equity risk premium?**

18 A. Two key elements in the determination of the equity risk premium are the risk-free rate and
19 the expected return on the market portfolio. As a proxy for the risk-free rate, as already discussed
20 earlier, the OCA relies on the average of the current yields on the 10-Year Treasury bond observed

²⁴ I did however calculate, based on the Company's response to data request OCA TS2-003, an estimate for return on equity using data *solely* on dividend-paying stocks per the Company's approach. That ROE estimate is 8.20 percent.

1 over the last month. The average yield over November 7, 2019 to December 6, 2019 has been 1.82
2 percent.

3 As for the expected market returns, I applied the DCF construct to the S&P 500 companies
4 essentially using the same approach that Ms. Bulkley followed, but for the DCF growth
5 components, I use not only earnings growth projections, but also latest Value Line dividends and
6 book value growth projections to derive three capitalization-weighted estimates of the expected
7 market return.

8 **Q. How did you derive the three market return estimates?**

9 A. First, using data for only dividend paying stocks from the S&P 500 universe, I derive an
10 estimate of market return that relies on only earnings growth projections. Again using data from
11 only dividend paying stocks, I derive the second estimate of market return relying on the average
12 of the earnings, dividends, and book value growth projections. Finally, using data for all stocks in
13 the S&P 500 universe, I derive the third market return estimate relying on only earnings growth
14 projections (Schedule PKC-10). The calculations are reported in Table 1 below.

Table 1: CAPM Cost-of-Equity Estimates			
	CAPM1	CAPM2	CAPM3
	Dividend Paying S&P 500		All S&P 500
	<i>EPS growth projection</i>	<i>Average EPS, DPS & BVPS growth projections</i>	<i>EPS growth projection</i>
DCF Market Return (a)	12.85	12.01	14.39
Risk Free Return (b)	1.82	1.82	1.82
Market Beta (c)	1.001	1.004	1.020
Risk Premium (a)-(b)	11.03	10.19	12.57
Beta adjusted RP (d) = ((a)-(b))/(c)	11.02	10.15	12.32
Proxy group beta (e)	0.58	0.58	0.58
CAPM ROE estimate (b)+(e)* (d)	8.25	7.74	9.00

15

1 As for the sample of companies, while the starting group of companies is same as the S&P
2 500 companies analyzed by Ms. Bulkley, to ensure that we are consistently looking at the same
3 companies as a group in deriving the market returns for each of the samples informing the three
4 estimates, I have only considered companies for which information is available for all of the input
5 variables.

6 For the first estimate that relies on information from only dividend-paying stocks, a
7 company is dropped if Value Line does not have data on earnings growth projections, market
8 capitalization or betas. For the second estimate, a company is dropped if Value Line does not have
9 its data for any one of the growth projections (earnings per share, dividends per share or book
10 value per share), market capitalization or betas. For the third estimate, that uses information from
11 all stocks (irrespective of whether those stocks pay dividends) I ignore the companies for which I
12 did not have data for market capitalization, earnings growth projections, or betas (as downloaded
13 from Value Line).

14 **Q. Please summarize the market return estimates.**

15 A. Schedule PKC-11a and PKC-11b report the OCA analyses that rely on Value Line data
16 latest as of November 21, 2019. The resulting expected market returns for the apposite Value
17 Line samples are 12.85 percent, 12.01 percent and 14.39 percent; see Table 1. For these estimates,
18 I appropriately adjusted the market capitalization weights to ensure that the weights added up to
19 one for the different samples associated with the estimations. Also, in deriving the projected
20 dividend yields, I applied the same approach that Ms. Bulkley used in her testimony.

21 **Q. Please describe how you estimate the market risk premiums.**

22 A. To derive the market risk premium, the difference between the relevant market return and
23 the bond yield is *divided* by the market-capitalization weighted mean of Value Line betas of the

1 constituent stocks. Doing so is appropriate, as the market proxy in the derivation of the Value
2 Line betas (that would be associated with a beta of one) is expected to be different from that
3 associated with the S&P 500 universe. The betas associated with the proxy groups associated with
4 estimates CAPM1, CAPM2, and CAPM3 are 1.001, 1.004 and 1.02, respectively.

5 **Q. What are your estimates for market-risk premium?**

6 A. When only the dividend-paying subset of stocks in the S&P 500 index is considered, and
7 only EPS growth projections are relied upon to measure the market returns, the estimate of equity
8 risk premium is (12.85 percent *less* 1.82 percent) divided by 1.001, which is the market-
9 capitalization weighted mean Value Line beta for the dividend-paying subset of the sample. The
10 estimate is 11.02 percent.

11 The same approach was employed to derive the second estimate of the market risk premium
12 relying on the average of EPS, DPS, and BVPS growth projections and information from only
13 dividend-paying S&P 500 stocks. The estimate is 10.15 percent.

14 Finally, using all stocks in the S&P 500 index, when only EPS growth projections are relied upon
15 to measure the DCF based market returns, the estimate for equity risk premium, is 12.32 percent.²⁵

16 **Q. What are the estimates of the cost of equity for the PSNH proxy group based on the three**
17 **estimated market risk premiums?**

18 A. The last row of Table 1 reports the three estimates. CAPM1, CAPM2 and CAPM3 ROE
19 estimates are 8.25 percent, 7.74 percent and 9.00 percent, respectively.

20

21 **III.C Conclusion**

22 **Q. Please summarize your cost of equity estimates.**

²⁵ All numbers reported here are rounded.

1 A. The table below reports the cost of equity estimates based on the different methodologies
2 that the OCA relied on.

Table 2: Summary of Cost of Equity Estimates	
DCF (traditional: EPS, BVPS & DPS average)	8.09
DCF (traditional: EPS)	8.48
DCF ($g=br+sv$ Method)	8.24
CAPM1	8.25
CAPM2	7.74
CAPM3	9.00

3
4 **Q. What is your recommendation on the allowed rate of return on equity?**

5 A. Table 2 summarizes estimates of cost of equity that the OCA's analysis produced. The
6 estimates range from 7.74 percent to 9.00 percent. The OCA recommends using solely the DCF
7 approach in estimating the cost of equity, for reasons that were discussed in Sections II and IIIA.
8 As stated earlier, the CAPM based cost of equity was estimated mainly as a check. The average
9 of all of the DCF estimates is 8.27 percent. As for a specific point estimate, the OCA therefore
10 recommends an allowed return of 8.27 percent. With respect to what constitutes a reasonable
11 range of allowed return on equity, the OCA recommends 8.15 to 8.35 percent.

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

13 A. Yes, it does.