STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION

In the matter of

Unitil Energy Systems, Inc. (Unitil Energy)

Docket No. DE 16-384

Petition for Permanent Rate Increase

DIRECT TESTIMONY

OF

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November 16, 2016

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I. INTRODUCTION

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

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

Q.   Please describe your formal education and professional experience.

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

From March 1998 to October 1999, I was a consultant with the National Council of Applied Economic Research, New Delhi, India. From November 1999 to August 2001, I was the Economist at the Uttar Pradesh Electricity Regulatory Commission (UPERC) in India, and advised UPERC on tariff issues. From September 2001 to June 2002, I worked at the National Regulatory Research Institute, Columbus, Ohio, as a

1   graduate research associate while pursuing advanced courses in Energy Planning in the

2   City and Regional Planning Program at Ohio State University. From June 2002 to July

3   2002, I worked at the World Bank, Washington D.C. as a short-term consultant/intern

4   with its Energy and Water Division.

5   I worked at the New Hampshire Public Utilities Commission (Commission) from

6   August 2002 to January 2007 in the capacity of a Utility Analyst. My responsibilities at

7   the Commission as an analyst were in electric utility issues including analyzing and

8   advising the Commission on rate design, cost of capital issues, wholesale market issues,

9   and other regional matters. I briefly worked at the Massachusetts Department of

10   Telecommunications and Energy (later reorganized into Department of Public Utilities

11   (MA-DPU)) starting in January 2007 as an Economist. At MA-DPU, I represented the

12   staff and examined gas demand estimation and forecasting, decoupling issues, and

13   environmental remediation matters.

14   I returned to the Commission in June 2007 to join its Telecom Division as its

15   Assistant Director, and continued in that position until December 2010. I was also

16   helping other divisions as an expert witness in economics-related issues as well as

17   advising the Commission on regional electric matters including FERC jurisdictional

18   issues. I joined the Commission's Regional Energy Division in January 2010 as the

19   Regional Energy Analyst, and was advising the Commission in that capacity until I

20   joined the Antitrust and Utilities Division, Office of the Minnesota Attorney General, in

21   August 2013.

1   I came back to New Hampshire in March 2014 and worked as an independent

2   consultant until the end of August, 2014, representing the Minnesota Attorney General.

3   I joined Liberty Utilities at the end of August, 2014 as a Forecasting Analyst for its

4   Energy Procurement Department. I worked with Liberty Utilities for about three

5   months, before starting my own consultancy firm.   In December 2014, I joined the OCA

6   as its Rate and Market Policy Director. I was later appointed the Assistant Consumer

7   Advocate at the OCA.

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

9   A.   Yes.

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

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

12   • DE 03-200 – Rate design testimony which was about delivery rates for retail

13   ratepayers of Public Service of New Hampshire (PSNH);

14   • DE 06-028 – Cost of capital testimony which was also about PSNH's delivery

15   rates;

16   • DT 07-027 – Status of competition in retail telephony under TDS;

17   • DG 08-009 – Cost of equity testimony related to gas delivery rates of National

18   Grid NH;

19   • DE 09-035 – Cost of equity testimony in the matter of electric distribution

20   rates (PSNH);

1   • DG 14-380 – Petition of Liberty Utilities (EnergyNorth Natural Gas)

2   requesting approval of firm transportation contract (North East Direct

3   (NED));

4   • DG 15-155 – Petition of Valley Green, LLC requesting franchise in City of

5   Lebanon and Town of Hanover, New Hampshire;

6   • DG 15-289 – Petition of Liberty Utilities (EnergyNorth Natural Gas)

7   requesting franchise in City of Lebanon and Town of Hanover, New

8   Hampshire;

9   • DG 15-494 – Petition of Liberty Utilities (EnergyNorth Natural Gas)

10   requesting approval of firm transportation contract (NED).

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

12 A.   Yes. I have testified on cost of capital before the Minnesota Public Utilities

13 Commission in dockets G008/GR-13-316 and GR 13-617. I have also provided an

14 affidavit before the Federal Energy Regulatory Commission in a FERC Docket ER 09-14-

15 000 on NSTAR's petition for ROE incentive adders on behalf of the New England

16 Conference of Public Utilities Commissioners (NECPUC).

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

18 A.   The purpose of my testimony is to recommend, for Unitil Energy, the rate of

19 return on equity in accordance with standards set forth in *Bluefield Water Works v. Public*

20 *Service Comm'n*, 262 U.S. 679, 692-93 (1923) (*Bluefield*) and *Federal Power Comm'n v. Hope*

1   *Natural Gas Co.*, 320 U.S. 591, 605 (1944) (*Hope*). On advice of counsel, I understand that

2   the standard set forth by the U.S. Supreme Court is that a public utility may be allowed

3   to earn a return comparable to a return on investments in other enterprises having

4   similar risks in order to allow the utility the opportunity to attract capital and to

5   maintain its credit. "The return should be reasonably sufficient to assure confidence in

6   the financial soundness of the utility and should be adequate, under efficient and

7   economical management, to maintain and support its credit and enable it to raise the

8   money necessary for the proper discharge of its public duties." *Bluefield*, 262 U.S. at 693.

9   I also state my views on Unitil's recommendations on cost of equity, and articulate

10   reasons why I agree or disagree with those recommendations.

11   **Q.**   **What Rate of Return on Equity (ROE) and Rate of Return on Capital are the**

12   **Company requesting in this case?**

13   A.   The Company is requesting a return on common equity of 10.30 percent. Based

14   on the embedded cost of debt, and the requested capital structure, the Company is

15   seeking approval of 8.75 percent return on capital.

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

17   A.   I am recommending a return of 8.50 percent as a point estimate. Based on my

18   analysis, I am also recommending a range of returns on equity that I consider

19   reasonable for the company, i.e. 8.20 percent to 8.60 percent.

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

1   A.   As for what follows, section II briefly reports my analysis of implications of

2   observed market-to-book ratios[1] in the electric utility industry. In section III, which has

3   three subsections, I use several approaches to derive estimates of the cost of equity and I

4   conclude by stating my recommendation on the cost of equity. Finally, Section IV

5   includes the schedules that inform the OCA's analysis.

6

7   **II.   MARKET-TO-BOOK RATIO, EXPECTED RETURN ON EQUITY AND**

8   **REQUIRED RETURN ON EQUITY**

9   **Q.   Why is it important to analyze observed market-to-book ratios of the electric**

10   **utility industry and Unitil's proxy group?**

11   A.   It is important to investigate market-to-book ratios essentially for three reasons.

12   First, the current level of market-to-book ratio for a regulated company is very telling

13   with respect to the divergence between the expected return on equity and the

14   opportunity cost of equity with respect to the regulated company's common stock.

15   Second, whether or not the market-to-book ratio is significantly higher than one has

16   implications for the application of the Discounted Cash Flow (DCF) approach to

17   estimating the opportunity cost of equity. Finally, one of the DCF approaches that I

18   have relied on uses market-to-book ratios as an input. What follows in this section is

19   predominantly the discussion of the first two reasons mentioned above. The need for

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[1] This ratio relates the market price of stock to its book value.

1   tracking the market-to-book ratios of the constituent companies in the proxy group is

2   primarily taken up in detail in section IIIA.

3   **Q.   What is the relevance of the market-to-book ratio in the determination of the**

4   **cost of equity?**

5   A.   When the market-to-book ratio of a utility is significantly higher than one, it

6   indicates that the return on equity that is *expected* by investors, which is greatly

7   influenced by the allowed rate of return for a regulated entity, exceeds the true

8   opportunity cost of equity. In other words, the return that investors *expect* to receive is

9   greater than the return they would *require* in order to invest in the stock.

10   This has another important implication. While the DCF construct is predicated

11   on using long-term expectations, in practice, the DCF method relies on investors'

12   expectations over the medium term. Analysts' projections about investors' sentiments

13   on relevant variables are not available beyond three to five years into the future. The

14   DCF method in practice therefore captures investors' medium-term expectations that

15   the market-to-book ratio would continue to remain substantially higher than one, if to

16   begin with the market-to-book ratio is significantly greater than one. I delve into this

17   issue in greater detail (Pages 14-19 of my testimony) where I discuss the characteristics

18   of the DCF approach, especially as it is practically implemented. The methods in the

1   current environment, therefore, will tend to produce estimates for ROE that reasonably

2   exceed the "true" cost of equity.[2]

3   **Q.   Please explain why the expected return on equity exceeds the cost of equity**

4   **when the market-to-book ratio is significantly greater than one.**

5   A.   This fundamental result stems from the seminal Discounted Cash Flow (DCF)

6   analysis, which succinctly translates into the equation

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

8   where r_e is the expected return on equity, B is the book value of stock, b_e is the

9   expected retention ratio, P is the market stock price, and K is the cost of equity, i.e. the

10   required return on equity. [3]

11   The DCF approach is based on the premise that the market price of a particular

12   stock equilibrates to the sum of the stream of returns expected in the future from the

13   stock by investors, discounted by the market cost of equity. This is an explicit way of

14   modeling investor behavior, and is a well-accepted way of explaining observed investor

15   behavior. Heuristically speaking, if the stock price is lower than the market-equilibrium

16   price, the demand for the stock would be greater than the supply, and stock sellers

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[2] 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.
[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   would raise their price to take advantage of the situation. Likewise, if the price of the

2   stock was higher than the market-equilibrium price, the demand would be less than the

3   supply of stocks, putting pressure on the sellers to lower their price to reduce excess

4   supply. It follows that when the expected return on equity is greater (smaller) than the

5   cost of equity, the market-to-book ratio would be greater (smaller) than one.

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

7   A.   Yes. If the expected return on equity exceeds the market cost of equity, the price

8   of the stock would have to be higher relative to the book value to ensure that the

9   expected dividend, i.e. $B(r_e - b_e r_e)$, on the stock equals the minimum required dividend,

10   i.e. $P(K - b_e r_e)$. A look at comparative statics is helpful. Everything else being equal, if

11   the expected return on equity increases (decreases), the expected dividend would

12   momentarily be higher (lower) than $P(K - b_e r_e)$. Ceteris paribus, this would trigger a

13   greater (lower) demand for the stock than the supply, which would consequently lead

14   to a higher (lower) market price for the stock. The adjustments would continue until

15   Equation (1) holds, i.e. until there is equilibrium.

16   A simple numerical example would be helpful. Suppose the expected return on

17   equity, r, is 10 percent, and the expected retention ratio, b, is 30 percent. Based on these

18   numbers, $r_e - b_e r_e$ is 7 percent.[4] However, if the cost of equity for the same stock, K, is 8

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[4] $(r_e - b_e r_e)$ =10 - 0.30*10= 10-3 = 7.

1   percent, then $(K - b_e r_e)$ must be 5 percent.[5] To ensure that 7 percent of the book value,

2   i.e. the expected dividend, is exactly equal to 5 percent of the stock price, i.e. the

3   minimum required dividend, the only way that equation (1) can hold is through an

4   adjustment to the price of the stock until it is 40 percent higher than the book value of

5   the stock, i.e. the market-to-book ratio is exactly equal to 1.4.

6   **Q.   Please explain the difference between the cost of equity and the expected**

7   **return on equity in greater detail.**

8   A.   While the expected rate of return on equity for a regulated utility is an

9   accounting return, i.e. it depends on the return allowed by the regulator as well as how

10   the utility performs operationally, the cost of equity is the opportunity cost of equity,

11   which is the minimum return required to attract investment by investors.[6]

12   Ideally, a fair and reasonable return on equity for a regulated utility would equal

13   the opportunity cost of equity. A look at a group of regulated utilities of comparable

14   risk is instructive in estimating the opportunity cost of equity. Intrinsic to the

15   determination of the allowed return is the need to avoid unnecessary wealth transfer

16   from ratepayers to shareholders. To properly balance the interests of ratepayers and the

17   financial viability of the utility, any approach to determine the cost of equity must

18   reasonably target the need to encourage investment in the utility's equity at the least

19   cost to its ratepayers.

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

[6] "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   The expected return on equity for investment in a regulated utility at any point

2 in time is influenced by the return currently allowed on such investment, as authorized

3 by the regulator in the previous determination of such return. It is also influenced by

4 investors' expectations about possible changes in the future, especially with respect to

5 operating efficiency and income opportunities. The expected return on equity for a

6 regulated utility can be greater, lesser or the same as the cost of equity at any point in

7 time.

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

9 A.   Yes, I have. But as the objective of my analysis is to recommend the rate of

10 return on Unitil's equity, I have also analyzed the market-to-book for Mr. Hevert's

11 recommended proxy group and OCA's recommended proxy group. These are depicted

12 in Figure 1 below. As for the electric industry's situation, I have used SNL's Index, SNL

13 Electric Company, which represents electric distribution and transmission companies.

14 **Q.**   **What do the electric utilities' market-to-book ratios indicate about the**

15 **relationship between the investors' expected return on equity and the cost of equity**

16 **in the current milieu?**

17 A.   Figure 1 shows that the average market-to-book-ratio of electric utilities as well

18 Mr. Hevert's proxy have remained persistently well above one over the past six years;

19 the average market-to-book ratios for SNL electric utilities and Mr. Hevert's proxy over

1   the last six years have been 1.84 and 1.57, respectively.[7] As for the OCA's proxy, the

2   average market-to-book ratio for the corresponding period has been 1.53.

3   More importantly, as for the current market-to-book ratios, they are 2.20, 1.82 and 1.74

4   for SNL electric, Hevert's proxy and the OCA's proxy, respectively. This indicates that

5   the true cost of equity currently is comfortably less than the return on equity expected

6   by investors in electric utilities. In view of that, if the cost of equity is plainly estimated

7   based on existing expected return on common equity, the resulting return would

8   unreasonably benefit shareholders at the expense of ratepayers.

9   **Q.**   **In view of the observed market-to-book ratio being considerably higher than**

10   **one, do you have any recommendation on your preferred approach on estimating the**

11   **cost of equity?**

[7] Data downloaded from SNL on October 20th, 2016.

1   A.   Yes, I do. Out of the three primary methods that Mr. Hevert used to estimate his

2   recommended cost of equity, the Capital Asset Pricing Model (CAPM) predominantly

3   uses historical stock-price appreciation as the basis for measuring the expected return

4   on common equity. Even when attempting to look at forward-looking estimates, the

5   method relies considerably on the historical trends in stock prices. Not trivially, the

6   betas, under the CAPM approach are generally based on historical prices. In a climate

7   of market-to-book ratios being significantly greater than one, if historically prices have

8   tended to appreciate significantly because allowed returns (that are to begin with higher

9   than the true cost of equity) have moved further away from the true cost of equity, the

10   method will tend to produce estimates that will be further away from the true cost of

11   equity.

12   As for the Risk Premium Method (RPM), Mr. Hevert uses historically allowed

13   returns on equity to calculate the risk premiums. Using historical data on allowed

14   returns and treasury yields to inform cost of equity (which is inherently a forward-

15   looking concept) is inappropriate. Even setting that issue aside, to the extent allowed

16   returns have captured the impact of price appreciation resulting from greater

17   divergence between allowed returns and the true cost of equity, the method is

18   susceptible to producing estimates that will have the same problem that the CAPM

19   approach has.

20   In contrast, the forward looking DCF approach tends to correct somewhat for the

21   deviation between stock prices and book values. While the growth component is

1   influenced positively by price appreciation, the dividend yield component is negatively

2   influenced by price appreciation, thus producing a cost of equity estimate that relative

3   to the other methods is more in line with the true market cost of equity. It is true that

4   investors' medium-term expectation about ongoing sales in shares and the persistence

5   in a greater-than-one market-to-book ratio, and our reliance in practice on expectations

6   of growth over the medium-term, tend to produce a higher DCF estimate of cost of

7   equity than the true cost of equity. However, investors understand that a continuing

8   divergence in the stock price and the book value is unsustainable in the long-run. That

9   understanding gets somewhat reflected in the forward-looking DCF method, even as it

10   is usually implemented. In view of that, I recommend reliance on methods that are

11   based on the DCF approach.

12   **Q.   Do you have any additional observations on the application of DCF in**

13   **estimating the cost of equity?**

14   A.   Yes.   Myron J. Gordon, who popularized the use of the DCF method for

15   estimating ROE, states that "the perfect capital markets cost of capital can be measured

16   without bias only in the special and uninteresting case where the allowed rate of return

17   already is equal to the cost of capital. When the allowed rate of return is above (below)

18   the "true" cost of capital, the measured cost of capital is biased up (down)."[8] In the

19   traditional model (wherein debt is valued at embedded cost), while the conclusion that

20   the allowed rate of return is above (below) the cost of capital when the market-to-book

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[8] See "The Cost of Capital to a Public Utility", Myron J. Gordon, 1974, Pages 9-10.

1   value ratio is above (below) one remains true,[9] the estimate of the cost of capital is not

2   problematic as long as the inputs to that estimation are reflected reasonably accurately.

3   With respect to the practical implementation of DCF approach to the estimation of cost

4   of equity though, there are compelling reasons to conclude that the approach as

5   proposed by the company leads to an upward-biased estimate of the cost of equity,

6   precisely due to the reliance on inaccurate inputs.

7   First, the standard DCF model is based on the premise that all key variables like

8   the stock price, book value, earnings, and dividends grow at the same rate in the long-

9   run, and in the absence of external financing, market price converges to the book value.

10   Theoretically, a market-to-book ratio that is significantly greater than one at any point

11   in time implies that investors in general expect the price over earnings ratio to decrease

12   in the long-run. This translates into a growth projection for stock price that lags the

13   growth projection for earnings growth. Under the standard DCF construct, since in the

14   long-run, both the stock price and earnings are premised to grow at the same rate, the

15   long-term equilibrium growth lies somewhere between the expected earnings growth

16   and the expected growth in price. In the current environment, the exclusive use of

17   earnings growth projections, theoretically, leads to an upward-biased estimate of the

18   DCF growth component, and consequently produces an upward-biased estimate of the

19   opportunity cost of equity.[10]

[9] *Id.* at 8.
[10] 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

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

6	A study by Dreman and Berry concluded that consensus estimates
7	of EPS differ significantly from actual reported earnings. They also
8	concluded that the average error appears to be increasing over time
9	and that analysts are optimistic on average. They conclude "These
10	findings question the use of finely calibrated earnings forecasts that
11	are integral to the most common valuation/models and indirectly
12	question the valuation methods themselves" (Dreman and Berry,
13	1995, 30). A similar study by Clayman and Schwartz compared
14	Zacks Investment Research EPS projections with actual EPS for 399
15	companies for the period 1982-1992. They concluded that analysts'
16	forecasts of EPS overstated actual EPS by as much as fifty percent.
17	They conclude "…market participants should take analysts' innate
18	overestimation biases into account when making stock valuation
19	judgments" (Clayman and Schwartz, 1994, 68). Still another study
20	by Chopra (1998) concluded 'Analysts' forecasts of EPS and growth
21	in EPS tend to be overly optimistic. He concluded that analysts'

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).

A look at the P/E ratio for OCA's proxy is helpful. Lately, the P/E ratio of the OCA proxy has been around 22, while over the last ten years or so the average has been 18. As for a broader market index, the average of the S&P 500 P/E ratios has been approximately 16 in the last hundred years, while it is currently estimated to be approximately 24 (data from October 14, 2016). It is reasonable to assume that investors would expect the P/E ratio to decline over the long run compared to where it is today.

1   forecasts of EPS over the past 13 years have been more than twice

2   actual growth rate.[11]

3

4   It is important that at the least the DCF growth variable input should not be

5 solely based on earnings growth projections or any other solitary variable's growth

6 projections; I discuss this issue in greater detail in section IIIA to further support this

7 conclusion.

8

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

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

11 A.   While I have relied primarily on the DCF construct to estimate the cost of equity

12 for the utility, I have also estimated the cost of equity using the CAPM construct. As for

13 the DCF construct, I have used the standard DCF approach (Section III.A), where the

14 cost of equity is estimated as the sum of the dividend yield and a measure of the growth

15 component. As for the CAPM approach (subsection III.B), while I have derived an

16 estimate of the cost of equity, for reasons I discuss later, I do not base my point-estimate

17 recommendation on that method. The CAPM estimation is nevertheless useful as it

18 provides a check on the reasonableness of the DCF estimates.[12] In each of these

19 subsections I comment on Mr. Hevert's analysis to the extent it is relevant to my

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[11] 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.

[12] When the market-to-book ratio remains consistently significantly higher than 1, the CAPM estimate tends to be upward biased and provides some direction towards what would be a reasonable allowed return on equity, even when one bases that allowed return on the DCF construct.

1   recommendation. I should also add that unlike Mr. Hevert, I did not use the RPM to

2   derive an estimate of the cost of equity. While I have discussed briefly why previously,

3   I discuss the reasons a little bit more in what follows. Finally, I conclude this section

4   with my recommendation on the cost of equity for Unitil Energy.

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 Mr. Hevert used to estimate his recommended cost of

9   equity, CAPM and RPM predominantly use historical data as the basis for measuring

10   the expected return on common equity. Compared to attempts at forward-looking

11   estimations, these methods rely to a great extent on the historical trends in stock prices

12   or other relevant variables. This may provide insight into what returns investors expect

13   based on past experience, but it has limited value in assessing what returns are

14   necessary to attract needed capital going forward. While the CAPM model relies on

15   betas that are based on historical stock prices, Mr. Hevert's RPM approach relies on

16   regressing risk premiums on 30-year Treasury yields using historic data for the period

17   January, 1980 to February, 2016. Of course, Mr. Hevert also relies on historically

18   allowed returns on equity to calculate historical risk premiums.[13] By contrast, the DCF

19   approach is essentially forward looking. Also, the fundamental underlying construct

20   behind the DCF analysis, i.e. the value of a common stock equates to the sum of the

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[13] While the reliance on historical data is problematic, as was discussed before, allowed return on equity in itself is not necessarily a good measure of the true cost of equity at any point in time.

1 discounted stream of future income from that stock, is widely accepted. Further,

2 regarding the techniques that are used to estimate the cost of equity for regulated

3 utilities, the DCF model is the most commonly used model for estimating the cost of

4 common equity for public utilities.[14] Of course, as Mr. Hevert has acknowledged in his

5 testimony, the Commission in New Hampshire has exclusively relied on the DCF

6 construct previously.

7

III.A Discounted Cash Flow Approach

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

10 A.   I use a single-stage DCF model to derive estimates for the cost of equity for a

11 group of companies that forms a reasonable proxy for Unitil Energy. The two essential

12 elements of this method are the dividend yield and the growth component. While I

13 discuss the estimation of both elements later in detail, it is important to point out that

14 the growth component of the DCF equation tends to be the most critical element in the

15 use of the DCF methodology. A couple of things render the estimation of the growth

16 component somewhat challenging. First, while the growth component of the single-

17 stage DCF model is in principle meant to be based on long-term projections, in practice,

18 it is based at most on three-to-five-years' projections, since long-term projections are

19 seldom available. Second, "it is reasonable to believe that investors, as a group, do not

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

1   utilize a single growth estimate when they price a utility's stock."[15]   While growth

2   projections by equity analysts are available on variables like earnings, dividends, book

3   value per share, among other things, what weight one should give to different

4   projections is often a matter of contention. Unlike Mr. Hevert's approach, which relies

5   only on earnings growth to estimate the growth component, I have relied on three

6   estimates for the growth component: (1) the average of the growth rates in earnings per

7   share (EPS), book value per share (BVPS), and dividends per share (DPS); (2) earnings

8   growth only; and (3) sum of internal growth rate, i.e. *br*, and the external growth

9   component, i.e. *sv*.[16] Of course, I strongly disagree with Mr. Hevert's sole reliance on

10   earnings growth projections for reasons already discussed above, but also I do not

11   believe that investors rely only on earnings growth rates when they price a utility's

12   stock. I discuss this in greater detail later.

13   **Q.   Briefly Describe The Single-Stage DCF Method.**

14   A.   The single-stage DCF model is typically represented by the equation, $K = \dfrac{D_1}{P} + g$

15   where *K* is the estimate of the cost of equity, $\dfrac{D_1}{P}$ is next period's dividend yield, i.e. next

16   period's dividend divided by the stock price, and *g* is the expected (constant) growth

17   rate in dividends. The model is based on the premise that since cash dividends are the

18   only income from a share of stock held in perpetuity, the value of that stock is the

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[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.

[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.

1   present value of its stream of cash dividends, where the discount rate is the market's

2   required return, i.e., *K*. Expected future dividends are represented by applying a

3   constant growth rate to the current observable dividend, to obtain the functionally

4   elegant expression for *K* as shown above.

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

6   A.   When choosing my recommended sample, I effectively began with Mr. Hevert's

7   universe of electric companies (Value Line Electric Universe) that he subjected to his

8   proxy screening analysis. I find that all but the fourth and the fifth criteria that were

9   used by him are reasonable.[17] To ensure that the companies selected for Unitil's proxy

10   are predominantly regulated electric utilities, I only included them in the proxy if at

11   least 70 percent of the revenues over 2015 are attributable to regulated electric business

12   and at least 80 percent of the assets are attributable to regulated business over 2015.

13   **Q.   Why do your criteria differ from that of Mr. Hevert's criteria?**

14   A.   In creating a reasonably "pure play" proxy that is comparable to Unitil Energy it

15   is important that these companies exhibit a fairly high percentage of *regulated assets* and

16   have the majority of their revenue coming from electric regulated operations.   A

17   sufficiently high cut-off for share of regulated net operating income as a percentage of

18   total net operating income may seem like an appropriate screen at first glance, but such

19   a metric is prone to exaggerate the role of regulated operations when the non-regulated

20   segment of a company is reporting significant losses on net operating income. For such

21   a company, measuring the regulated share in total net operating income would tend to

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[17] See Mr. Hevert's Testimony, Bates Page 000319, lines 14 through 19.

1   overstate its importance and may incorrectly allow the company's inclusion in the

2   proxy, even as that company may be fundamentally different from a regulated

3   company since it is exposed to significant market risks given a substantial presence in

4   the non-regulated arena or a non-gas activity. In contrast, if the non-regulated segment

5   of the company is reporting significant income, such an analysis may eliminate the

6   company from the proxy, even though that company may otherwise consist

7   predominantly of its regulated business. Such a company's foray into a non-regulated

8   arena may be so insignificant that the company's risk profile actually matches that of a

9   regulated company better than the one included erroneously by relying on net-income

10   variable like net operating income. Accordingly, to better assess whether a company

11   should be included in a proxy for Unitil Energy, I believe we should strive to have it

12   sufficiently reflective of a "pure play" regulated electric utility. I find that cut-offs of at

13   least 80 percent for regulated assets and at least 70 percent for regulated electric

14   revenues are reasonable, given the dearth of standalone companies that are publicly

15   traded and consist solely of regulated electric business. Also, as I rely not only on

16   earnings projections but also on dividends and book value projections in my DCF

17   analysis, since to the best of my knowledge dividends and book value projections are

18   covered only by Value Line Survey, I only consider companies that are covered by

19   Value Line Survey.

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

21   A.   Using information provided by the Company in response to data requests about

22   the percentages discussed above, and applying the mentioned cut-offs, I determined

1   that the appropriate proxy group consists of Alliant Energy Corporation (LNT),

2   Ameren Corporation (AEE), American Electric Power Inc. (AEP), Avista Corporation

3   (AVA), Consolidated Edison (ED), Eversource Energy (ES), IDACORP, Inc. (IDA),

4   NorthWestern Corporation (NWE), OGE Energy Corporation (OGE), Pinnacle West

5   Capital Corporation (PNW), PNM Resources Inc. (PNM), Portland General Electric

6   Company (POR) and XCEL Energy Inc. (XEL). It should be pointed out that OCA's

7   proxy group, unlike that of Mr. Hevert, does not include Great Plains Energy Inc. (GXP)

8   and Westar Energy, Inc. (WR) as Great Plains Energy Inc. is in the process of acquiring

9   Westar.[18]

10 **Q.   Do you believe that the group listed above is a reasonable proxy for Unitil**

11 **Energy?**

12 A.   Yes, I do. The screening criteria go a long way in ensuring that my proxy group

13 reasonably reflects the risk profile of Unitil's electric utility business. For example, the

14 proxy group's average percentage of assets subject to electric utility regulation is 95

15 percent and the average percentage of revenue subject to regulated electric business is

16 88 percent in 2015, which are reasonably close to complete regulation as is the case for

17 the distribution business of Unitil Energy in New Hampshire. Also, a check (see

18 Schedule PKC-1) reveals that the S&P credit ratings for the group ranges between BBB

19 to A-, which on average is commensurate with the rating associated with Unitil

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[18] The Company's response to DR OCA 4-4 does not provide data on Allete's share of electric regulated revenue in total revenue. Allete, Inc. 2015 Form 10-K at Page 8 however reports that the regulated revenue as a percentage of consolidated operating revenue is 67 percent. Part of this revenue also includes revenue from gas and water utility service. As for 2015, it is evident that the share of regulated electric revenue is less than 70 percent of Allete's consolidated revenue. Also, in 2015, the company's share of regulated assets in total assets is less than 80 percent. OCA's proxy therefore does not include Allete Inc.

1 Corporation, i.e. BBB+. Also, while the company has proposed a common equity ratio

2 of 50.97 percent (Mr. Hevert's Testimony, Bates Page 000367, line 1), a look at the proxy

3 group indicates that while over 2011 to 2015 the average equity ratio has been 51.02

4 percent, over the next five years or so the expected equity ratio is 50.75 percent (see

5 Schedule PKC-2). It is reasonable to conclude that the proxy group's capital structure is

6 commensurate with that of the company's requested capital structure, and would

7 appropriately inform what the allowed returns on equity and capital should be for the

8 company.

9 **Q.**   **Did you consider any additional check on the reasonableness of your DCF**

10 **proxy?**

11 A.   Yes. As a rough check to examine the reasonableness of the OCA proxy group, I

12 also briefly looked at the economic conditions characterizing New Hampshire (NH)

13 relative to the nation as well as states collectively served by the proxy group. As for

14 quarter-to-quarter growth (annualized) in Real GDP between 4th quarter of 2015 and 1st

15 quarter of 2016, while NH grew by 2.9 percent, the US economy grew by only 0.8

16 percent. Also, as for the states served by the companies included in the proxy, the

17 corresponding growth rates varied between -11.4 percent and 3.9 percent. Only 3 of the

18 relevant 32 states registered higher growth compared to NH.[19]

19 **Q.**   **What bearing do the economic conditions, as described above, have on the**

20 **reasonableness of the DCF proxy group?**

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[19] See http://www.bea.gov/newsreleases/regional/gdp_state/qgsp_newsrelease.htm

1 A.   Investors are assumed to be aware of current regional and national economic

2 conditions. Investors in Unitil's distribution business in NH are expected to know that

3 the local economy has been outperforming the national economy as well as states

4 wherein the proxy group's businesses operate. An investor's opportunity cost of equity,

5 i.e. investor's required return, is expected to be lower for investing in an economic

6 activity in New Hampshire when compared to investing in a comparable activity

7 operating in an environment that is relatively less robust, all else equal. In view of the

8 above, it is my conclusion that the proxy group produces an estimate for the cost of

9 equity that reflects a somewhat higher risk than that is perceived from investing in

10 Unitil. In short, the DCF proxy group as chosen is rather conservative and reasonable.

11 **Q.   Please explain why you used data from October 2016 to measure the dividend**

12 **yields for the proxy's constituent companies.**

13 A.   Investors' expectations about how companies will fare in the future are captured

14 in the most recently observed market price and dividend data. Data from fairly long

15 historical periods are unlikely to reflect investors' current expectations. That said, it is

16 also true that some smoothing of the price trend is useful as it filters possible transitory

17 and temporary changes that characterize daily movements in prices. I have, therefore,

18 as of preparing this testimony, used daily pricing data from the most recent month to

19 calculate the average price, which in conjunction with the annualized dividend helps

20 measure the dividend yield (Schedule PKC-4) component of the DCF based cost of

21 equity.

Q. **Mr. Hevert exclusively uses expected earnings growth rates for the growth component in his DCF analysis. Do you agree with his approach?**

A.   No. It is unreasonable to assume that investors use a single growth estimate when pricing a utility's stock. Mr. Hevert states in his testimony that "investors form their investment decisions based on expectations of growth in earnings, not dividends." When the OCA asked Mr. Hevert to provide specific support for this assertion, he provided references to several articles that do not even remotely provide such support. As for the overt reference in the testimony to the article by Carleton and Vander Weide, the fact is that the paper only looks at historical growth rate in dividends (See Page 79). As for analysts' growth forecasts, earnings growth is the only variable that the article investigates. The paper does provide evidence that it is better to use growth expectations rather than historical data to measure the growth component. It does not, however, at all investigate whether analysts' earnings growth forecasts are better than their dividends growth forecasts in capturing investors' expectations. It also does not, more importantly, even remotely, demonstrate that investors use only earnings and not dividends in forming their investment decisions.

As for other references, the article by Christofi, Lori and Moliver (1999), the word "dividend" appears few times in that article, but none of those references are about expectations of growth in dividends. Again, more importantly, the paper has nothing to say about whether investors form their investment decisions only based on earnings and not dividends. The article by Harris and did not even investigate how dividends growth expectations perform. The article relies solely on EPS growth expectations to

measure the growth component of DCF (Page 65) by noting in footnote 6 that "[while] the model calls for expected growth in dividends, no source of data on such projections is readily available." Most importantly again, this article has nothing to offer on whether investors form their investment decisions based *only* on earnings and *not* dividends. As for Charles Phillips, *The Economics of Regulation*, 1969, Chapter 9, while it points out how the market is also valuing utilities based on earnings per share, it nowhere discredits the importance of dividends and more importantly has nothing to offer on whether *only* earnings growth forecasts should be used to estimate the DCF growth component. The reference is clearly not useful if it is meant to show that investors demonstrably form their investment decisions based solely on expectations of growth in earnings, not dividends. In conclusion, Mr. Hevert has not provided any persuasive evidence backing his assertion.

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

A.	Both market realities and research indicate that not all investors are alike and they do not only care about earnings growth. While providing a review of dividend policy theories and evidence, Malkawi, Rafferty and Pillai (2010) survey academic research that argues why dividends matter to investors.[20] Different researchers have provided empirical support for different theories. To just note a couple of them, some have argued that dividends are sought as investors prefer "bird in the hand" dividends

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[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   rather than "two in the bush" future capital gains. Others have argued that investors

2   care about after-tax return and the differential tax treatment of capital gains and

3   dividends influences their demand for shares. In informing why dividends matter,

4   some of the theories and empirical analysis directly stress how different investors may

5   view dividends differently. For example, investors whose dividends are taxed higher

6   than their capital gains may prefer earnings driven stocks rather than dividends paying

7   stocks, or how institutional investors as opposed to individual investors are more

8   attracted towards dividend-paying stocks, etc. It also remains true that companies pay

9   out dividends in billions of dollars in the marketplace suggesting that companies

10   recognize that investors value them. I believe it is inappropriate to assume that only

11   earnings growth expectations matter to investors.[21]

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

13   A.   Since the DCF estimate is derived from the concept that cash dividends are the

14   only income from a share of stock held to infinity, in principle, it is the growth in

15   dividends that should be used for the growth component. Investors, however, have

16   different expectations about growth and no single indicator captures the expectations of

17   all investors. Also, whether growth in dividends per share (DPS) is sustainable or not is

18   pertinent and its sustainability is affected by how both earnings per share (EPS) and

19   book value per share (BVPS) perform in the future. Sustainability of growth in

20   dividends under the DCF construct assumes that EPS, DPS and BVPS are all expected to

[21] Also 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 146

1   grow at the same rate in the future. Value Line five-year projections for the growth rates

2   in earnings, dividends and book value, however, reveal that these financial variables

3   are expected to grow at significantly different rates over the next three to five years.

4   In view of that, sole reliance on either dividends growth rate, book value growth

5   rate or earnings growth rate is unlikely to produce a reliable measure of the DCF

6   growth component. I instead use the average of the three expected growth rates as one

7   of the measures for the growth component to represent the growth component in the

8   DCF analysis. One may reasonably assume that the sustainable long-run growth rate to

9   which earnings, dividends and book value growth rates may converge in the future is

10   represented by their average, rather than just one of those variables, as Mr. Hevert's

11   analysis suggests. I have used the average of the Value Line five-year projections for

12   growth in DPS and BVPS *and* the average of the Value Line, Yahoo Finance, Zacks and

13   SNL median long-term projections for EPS growth rates to calculate the growth

14   component. While in principle the single-stage DCF model is meant to be based on

15   long-term projections, its application however is based on at most five-year projections,

16   as truly long-term projections are seldom available.

17   I have also considered a second measure of the growth component, which is

18   based on estimates for the internal and external components for growth, retention ratio,

19   expected return on common equity, market-to-book ratio, and growth in the number of

20   outstanding shares (called retention growth). Finally, even though I have reservations

21   about Mr. Hevert's sole reliance on earnings growth as a measure of the growth

22   component, I considered and applied that approach to my proxy to derive another DCF

1   estimate for the cost of equity (see Schedule PKC-5 for the calculation of the growth

2   components; also see Schedules PKC-6 and PKC-7 for the inputs for external and

3   internal growth components).

4   **Q.**   **Please explain how you estimate the growth component based on the retention**

5   **ratio, expected return on common equity, market-to-book ratio, and growth in the**

6   **number of outstanding stocks.**

7   A.   I have used Value Line's expectation regarding retention ratios and returns on

8   equity for five years into the future to derive estimates for b and r and have used them

9   to calculate the expected internal growth component, i.e. br. To account for growth

10   expectations from external financing and derive estimates of the external growth

11   component, I have also used the latest market-to-book ratios from Yahoo Finance and

12   the average of Value Line's five-year projections for the number of outstanding shares.

13   That is helpful in calculating the external growth component, i.e. $s_e v$, where s_e =

14   expected funds raised from sale of stock as a fraction of existing equity, and $v = \left(1 - \dfrac{B}{P}\right)$

15   .[22] The revised formulation for the growth component can be alternatively expressed as

16     $b_e r_e + g_e \left(\dfrac{P}{B} - 1\right)$, where g_e is the expected growth rate in the number of outstanding

17   shares. In short, the growth component can be viewed as the sum of the "internal"

18   growth rate, i.e. $b_e r_e$, and the "external" growth rate, i.e. $g_e \left(\dfrac{P}{B} - 1\right)$.

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

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

A.   Yes.

Q.   Please describe your outlier-determination approach.

A.   I have employed the statistical outlier-determination approach that cost of equity estimates lying outside the bandwidth of the mean plus or minus two times the variance are not statistically representative of the proxy. In terms of probabilistic distribution terminology, this selection criterion effectively mimics the widely-used statistical confidence interval of 95 percent.

Q.   What are the DCF estimates for your proxy?

A.   The single-stage DCF estimate, based on the average expected growth rates in earnings, dividends and book value, is 8.46 percent. Schedule PKC-8 provides the calculations. When only the EPS growth rate is used for the growth component, the single-stage DCF method produces an estimate of 8.68 percent. When the "internal-plus-external" growth approach is used, the DCF method produces an estimate of 7.40 percent. I have applied my recommended outlier-determination criteria in deriving these estimates. As it turns out, the outlier boundaries do not require eliminating any of the sample observations for any of the estimations.

Q.   While Mr. Hevert provides DCF estimates using the multi-stage DCF approach, you have not done so. Why?

A.   The Multi-Stage approach relies on one's judgment over how growth rates will pan out in the future. It is no different from the kind of judgment I have applied with respect to weighting different growth estimates even though they are all derived from applying the single-stage DCF approach. Also, one of the primary uses of the Multi-

1   Stage DCF approach is for a company that is not in a sufficiently stable environment.

2   Certainly, with respect to Unitil Energy System, there is no reason to believe that is the

3   case. I, therefore, do not conduct a Multi-Stage DCF estimation for the return on equity.

4   **Q.   Mr. Hevert recommends adjustment for flotation costs in his estimates of the**

5   **cost of equity. Do you agree with those adjustments?**

6   A.   No. As I have noted already, the DCF approach, informed by equity analysts'

7   projections, in practice relies on investors' expectations about earnings and dividends

8   and other relevant variables over three to five years. Even with reasonable treatment of

9   the DCF growth component, the approach tends to internalize the medium term

10   expectation that the market-to-book ratio will persist at levels relatively close to what is

11   currently being observed. Given the reliance at best on medium term expectations, we

12   tend to derive estimates of the ROE that are sufficiently above the true cost of equity in

13   a setting where the stock prices are significantly above the book value.[23] Flotation cost

14   is effectively small enough that my recommended return on equity, that relies on

15   investors' expectations of persistence in the market-to-book ratio being significantly

16   greater than one, already accounts for such costs adequately. Any further adjustment

17   would simply unnecessarily transfer wealth from ratepayers to shareholders.

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[23] Despite several rates cases and Commissions setting new ROEs since 2010, we have not witnessed a consistently significant movement towards a market-to-book ratio being one; while the SNL Electric M/B ratio has increased from 1.57 to 2.19, Mr. Hevert's proxy's M/B ratio has increased from 1.26 to 1.83 over 2010 to 2016. Interestingly, there have been 302 electric rate-case decisions on ROEs since year 2010 in the US, and the median allowed-return on equity has fallen from 10.50 percent to 9.65 percent between 2009 and 2015 (source: RRA Rate-Case Statistics, data downloaded on Nov. 2, 2016). As I have explained before, even as Commissions try to set the allowed return to be close to the true cost of equity, the application of different methodologies including the DCF approach, given current realities, tend to capture the persistence in the market-to-book ratio being greater than one enough that they produce estimates of cost of equity that comfortably exceed the true cost of equity.

Q. Are you suggesting that flotation cost adder should be allowed only if the market-to-book ratio was close to one?

A. Let's assume that the market-to-book ratio is actually close to one. If a new issuance is in the horizon out of necessity and there is a real risk of dilution hinting that the allowed return on equity in place at that time is not fair and trails the opportunity cost of equity, it may become necessary that a flotation cost recovery mechanism be allowed. Actually, anything that will help to instill investors' confidence in the utility would be worthwhile during such times. It may well be the case though, that something more fundamental than mere allowance of flotation cost would be needed. It would be in the interest of both the investors and the ratepayers to allow an upward adjustment to the allowed return on equity more generally for such a utility, if it is evident that the company is otherwise prudent in its operations.

Q. Since flotation costs are real regardless of whether the market-to-book ratio is greater than one or not, are you ignoring those costs in recommending disallowing flotation cost adder when market-to-book ratio is significantly higher than one?

A. Not at all. If a utility issues stocks and successfully sells them to raise the book value it needs, it must be true that investors expect a return on investment that is at least the cost of equity otherwise they would not have purchased the stock. Since an investor is completely aware that the utility's receipt per new share is definitely lower than the price paid for that stock (due to issuance cost), by buying the stock he or she reveals that the return on the book value is at least equal to the required return on the price of the stock. The mere fact that the stocks were bought by investors reveals that

1   the allowed return on the book value adequately compensates for issuance costs. In an

2   environment of market-to-book ratios being significantly greater than one, given the

3   size of flotation costs relative to the market-to-book leverage, even with a reasonable

4   application of the DCF approach to determine the cost of equity, the market-to-book

5   ratio continues to remain sufficiently higher than one. Even without a flotation cost

6   adder, one can conclude that going forward the utility will have little issue with

7   attracting equity when it needs additional funds to ensure reliable service for the rate

8   payers without compromising its financial viability.

9   **Q.**   **Do you agree with Mr. Hevert that there is a need to adjust the return on**

10   **equity upward due to the consideration of small-size premium?**

11   A.   No. Even though he does not recommend an explicit adjustment for small-firm

12   effect, Mr. Hevert devotes part of his testimony on why he thinks the allowed return on

13   equity should build in some slack for such an adjustment, and he considers "the effect

14   of small size in determining where the Company's ROE falls within the range of

15   results". It is the OCA's position that the Commission should not allow any

16   accommodation of the small size premium. First, there is counter-evidence indicating

17   that the small-firm effect is too dependent on the time-period chosen for analysis, and is

18   dependent on the month of January for high stock price returns. Second, there is also

19   counter-evidence that the size effect may not apply to regulated utility operations.[24]

[24] See for example, Block, S.B., "*A Study of Financial Analysts: Practice and Theory*," Association for Investment Management Research (July/August 1999); and Wong, A., "*Utility Stocks and the Size Effect: An Empirical Analysis*," Journal of the Midwest Finance Association (1993).

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

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

3   A.   The CAPM method recognizes that common equity capital is more risky than

4   debt from an investor's standpoint, and that investors require higher returns on stocks

5   than on bonds to be compensated for the additional risk. The cost of common equity

6   under CAPM is represented by the following equation: $K = R_f + \beta_s * (R_M - R_f)$ where K

7   is the cost of equity, R_f is the yield on risk free securities, R_M is the expected return on

8   the overall market and $(R_M - R_f)$ is the equity risk premium demanded by shareholders

9   to accept equity relative to debt. β_s is the average beta of a group of comparable-risk

10   companies that is used to adjust the risk premium to measure risks specific to the

11   regulated utility in question.

12   **Q.   What is Mr. Hevert's estimate of the cost of equity based on the CAPM**

13   **method?**

14   A.   Mr. Hevert derives two sets of CAPM estimates of the cost of equity (See Mr.

15   Hevert's Testimony, Bates Page 000346, Table 8). The pure "Bloomberg" estimates are

16   9.02 percent and 9.69 percent, and the pure "Value Line estimates are 10.22 percent and

17   10.89 percent.   He also estimates two other sets of CAPM estimates that mix Bloomberg

18   data with Value Line betas and Value Line data with Bloomberg betas. While the

19   Bloomberg data/ Value Line betas based estimates are 10.95 percent and 11.62 percent,

20   the Value Line data/ Bloomberg betas based estimates are 8.46 percent and 9.13

21   percent.

1   **Q.   Do you agree with Mr. Hevert's CAPM approach? Please explain.**

2   A.   No. First, as I have already noted, Mr. Hevert's estimates are actually not ex-

3   ante. The betas are estimated using historical stock prices. Since the CAPM approach

4   relies on betas that are based on historical data, it cannot provide a truly forward-

5   looking estimate of the cost of equity. Second, I do not agree even with his approach to

6   measure ex-ante risk premiums. The disagreement is both with respect to how he

7   measures risk-free return and how he calculates market returns. I discuss these

8   considerations below, but as an initial observation, I disagree with his mixing market

9   return estimates from one source with betas from the other. While Value Line betas are

10   based on a market return assumed to be that of the NYSE Composite Index, the

11   Bloomberg betas are based on the S&P 500 Index. Only the pure estimates are the ones

12   that are relevant; i.e. coupling Value Line betas with Value Line estimates of market

13   return, and Bloomberg betas with Bloomberg estimates of market return.

14   **Q.   Why do you disagree with Mr. Hevert's specification of the risk-free rate?**

15   A.   I do not agree that the yield on 30-year Treasury bond is a reasonable proxy for

16   the risk-free rate. Strictly speaking, the risk-free return is best captured by short-term

17   Treasury bills, but in recognition that utility rates are usually set for longer periods and

18   interested investors typically have relative long investment time horizons, longer-term

19   bonds are used to capture the risk-free rate when applying CAPM to estimate the cost

20   of equity.

21   It should be understood that long-term bonds are not risk-free for two main reasons:

22   default (credit) risk and interest rate risk. As for the interest rate risk, the longer termed

1 a default-free bond is, the greater is its interest rate risk. The 10-year Treasury long-term

2 bond is my preferred metric for the risk-free rate when conducting CAPM analysis for

3 regulated companies. It strikes a reasonable balance between choosing a truly interest

4 rate risk-free instrument (like the shortest of short term Treasury bills) and a

5 consideration that investors have relative long investment horizons and that regulated

6 utility rates are usually set for longer terms than just a few months. [25]

7   As for relying on the 10-year Treasury bond yield to measure the risk-free rate,

8 since the observed market based yield at any point in time is inherently based on future

9 expectations of market participants about the economy, I do not find it appropriate to

10 use any information about what analysts think the yields are going to be in the future

11 either near-term or long-term.[26]   Also, it is appropriate to rely on the most recently-

12 observed yields. I discuss my approach in detail later.

13 **Q.   You stated that you do not agree with Mr. Hevert's approach to calculate**

14 **market returns. Please explain why.**

15 A.   My reservation about Mr. Hevert's approach again stems from the overreliance

16 on earnings growth projections that tend to be upward biased as discussed before in the

17 section on DCF estimation of the proxy's cost of equity. As already noted, I also do not

18 agree that the market-return estimates associated with the projected-yield are

19 warranted (See Table 8 of Mr. Hevert's testimony). Additionally, even if those were

[25] 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.

[26] Yields observable at any point in time in the market place is akin to price being observable in the market place at any point in time. In a competitive environment, they contain all the information about what economic agents expect will happen in the future, and are the best indicators to use when one is trying to estimate forward looking measures like the "risk-free" return or the cost of equity.

1   warranted, I disagree with Mr. Hevert that the market premiums associated with the

2   *projected-yield* based cost of equity estimations should be the difference between the

3   DCF estimate of market return and the *observed yield* on bond. In estimating the

4   *projected-yield* based cost of equity for the proxy, the market premium for the proxy

5   should more appropriately be the proxy's beta times the difference between DCF

6   estimate of market return and the *projected-yield*. Even if one were to agree with Mr.

7   Hevert's approach to rely on the projected bond yield, his approach results in an

8   overstated cost of equity, given the mechanics he employs.[27]

9   **Q.   What do you consider to be a reasonable approach to estimating the market**

10 **returns?**

11 A.   First, as already noted, it is not appropriate to use projections on bond-yields to

12 measure the "risk-free return" component of the CAPM approach. The OCA as

13 mentioned before finds it reasonable to use the currently observed yields on the 10-year

14 Treasury bond. Second, as for Bloomberg market return estimates, it is important that

15 *only* market return information from Bloomberg is relied upon. Likewise, *only* market

16 return information from Value Line should be used to derive the Value Line estimates.

17 It should be recognized that the market portfolio as used by Bloomberg and Value Line

18 are very different and the betas associated with one source should not be used to derive

[27] Limiting the analysis to only the "pure" Bloomberg and Value Line estimations as reported in Table 8 of Mr. Hevert's testimony, given that the Bloomberg and Value Line betas for the proxy are 0.585 and 0.764, the projected bond yield is 3.35%, and the DCF ex-ante market risk premiums for Bloomberg and Value Line are respectively (13.51-3.35) and (12.55-3.35), i.e. 10.16% and 9.20%, the CAPM projected-yield based cost of equity estimates are 3.35 *plus* 0.585*10.16 and 3.35 *plus* 0.764*9.20, respectively. Therefore, the projected yield based pure Bloomberg CAPM estimate of ROE is 9.30%, and the pure Value Line estimate of ROE is 10.38%. Mr. Hevert's corresponding estimates, i.e. 9.69% and 10.89% (See Table 8, Mr. Hevert's Testimony) are overstated by 0.39% and 0.51% respectively.

1   CAPM cost of equity estimates that relies on market data from the other. Therefore, the

2   OCA has only estimated two CAPM based cost-of -equity estimates; one that relies

3   entirely only on Bloomberg data and another that relies entirely only on Value Line

4   data.

5   As for the need to correct for the sole reliance on earnings growth estimates, the

6   OCA finds it reasonable to use Mr. Hevert's *Bloomberg* estimate (that relies solely on

7   earnings growth projections), but for the Value Line estimate it uses information on

8   earnings growth, dividends growth as well as book value growth projections. The OCA

9   ultimately relies on the average of its Bloomberg and Value Line estimates to obtain its

10 CAPM estimate of the proxy's cost of equity (see Schedule PKC-10).   Doing so is

11 reasonable, as that ensures that the OCA estimate is not entirely predicated on earnings

12 growth projections. Finally, I reject the small size premium adjustment (explicitly or

13 otherwise) for reasons discussed in section III.A. The OCA's CAPM estimation is

14 discussed below in detail by going through the inputs one-by-one.

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

16 A.   I use Value Line and Bloomberg beta estimates for the companies in my DCF

17 sample (see Schedule PKC-9). The proxy beta for the Bloomberg application is 0.62,

18 while that for the Value Line estimation, it is 0.72.

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

20 A.   Two key elements in the determination of the equity risk premium are the risk-

21 free rate and the expected return on the market portfolio. As a proxy for the risk-free

22 rate, as already discussed earlier, the OCA relies on the average of the current yields on

1   the 10-Year Treasury bond observed over the last month. The average yield over

2   October 17, 2016 to November 14, 2016 was 1.87 percent.

3   As for the expected market returns, it is helpful to discuss the Bloomberg

4   approach and the Value Line approach separately. As for Bloomberg, I completely rely

5   on the long-term growth expectations furnished by Mr. Hevert and his application of

6   the DCF approach, which produces an estimate of the expected market return of 13.02

7   percent (Company's response to OCA 6-3, Attachment-1).

8   In the case of Value Line, I use not only earnings growth projections, but also

9   latest Value Line dividends and book value growth projections to derive three capital-

10   weighted estimates of the expected market return. While the starting group of

11   companies is same as the S&P 500 companies analyzed by Mr. Hevert (Company

12   response to OCA 3-6, Attachment 1), to ensure that we are consistently looking at the

13   same companies as a group in deriving the EPS, DPS, and BVPS projections, I only use

14   companies for which the data is fully available for not only the aforementioned

15   projections, but also for market capitalization, betas, and dividend yields. Schedule

16   PKC-11 reports the OCA analysis. The number of companies that are subjected to that

17   analysis is 408. The resulting expected market returns for this Value Line sample are

18   12.84 percent, 10.95 percent and 9.65 percent respectively for EPS and DPS and BVPS 3-

19   5 years' growth projections. The average of these returns represents the estimate of the

20   expected market return for the Value Line sample, i.e. 11.15 percent.

21   As for the Bloomberg and Value Line market risk premiums, their derivations

22   differ in a crucial way. To derive the Bloomberg market risk premium, the average

1   bond yield is simply subtracted from the Bloomberg estimate of market return. To

2   derive the Value Line market risk premium, however, the difference between Value

3   Line market return and the bond yield is *divided* by the market-capitalization weighted

4   mean of Value Line betas of the 408 companies that constitute the OCA's Value Line

5   sample. Doing so is appropriate, as the market proxy in the derivation of the Value

6   Line betas (that would be associated with a beta of one) is different from that is

7   associated with the group of companies that is used to estimate the Value Line market

8   return.

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

10   A.   As explained above, the Bloomberg estimate of the equity risk premium is 13.02

11   percent *less* 1.87 percent, i.e. 11.15 percent. The Value Line estimate of equity risk

12   premium, however, is (11.15 percent *less* 1.87 percent) divided by 0.98, which is the

13   market-capitalization weighted mean beta of the Value Line sample.[28] The Value Line

14   estimate of equity risk premium is therefore 9.28 percent divided by 0.98, i.e. 9.45

15   percent.[29]

16   **Q.   What are the Bloomberg and Value Line estimates of the cost of equity for the**

17   **Unitil proxy?**

18   A.   As for Bloomberg, using the recent average yield on 10-year Treasury bond, and

19   the Bloomberg beta of 0.62, the proxy's cost of equity is estimated to be 1.87 *plus*

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[28] As it turns out, the OCA's Value Line sample has a beta that indicates that the portfolio is less volatile than the underlying market portfolio that the Value Line relied on in its estimation of betas for different companies/stocks. The analysis is based on data obtained from Value Line on November 1, 2016.
[29] All numbers reported here are rounded.

1   0.62×11.15 percent, i.e. 8.75 percent. The corresponding Value Line calculation yields

2   1.87 *plus* 0.72×9.45 percent, i.e. 8.66 percent.

3   **Q.   What is your CAPM cost of equity estimate for Unitil Energy Systems?**

4   A.   The OCA finds it reasonable to use the average of the two estimates noted above

5   to derive its CAPM estimate of Unitil's cost of equity, i.e. 8.71 percent. While the OCA's

6   recommended point-estimate is strictly based on DCF approaches, the CAPM estimate

7   provides a useful check as to the reasonability of the DCF based estimate, and

8   ultimately the OCA's recommended allowed return on equity.

9

10   **III.C   Conclusion**

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

12   A.   The table below reports the cost of equity estimates based on the different

13   methodologies that the OCA relied on.

Summary of Cost of Equity Estimates	
DCF (traditional: EPS, BVPS & DPS average)	8.46
DCF (traditional: EPS)	8.68
DCF ($g=br+sv$ Method)	7.40
CAPM	8.71

14
15   **Q.   What is your recommendation on the allowed rate of return on equity?**

16   A.   The table above summarizes estimates of cost of equity that the OCA's analysis

17   produced. The average of those estimates is 8.31 percent. The range of estimates is 7.40

18   percent to 8.71 percent.   The OCA recommends using solely the DCF approach in

19   estimating the cost of equity, for reasons that were discussed in sections II and IIIA. As

1   stated earlier, the CAPM based cost of equity was estimated mainly as a check. The

2   average of all of the DCF estimates is 8.18 percent. In considering the DCF estimates, as

3   the *br+sv* method yields a considerably lower estimate compared to the rest of the DCF

4   estimates, the OCA bases its recommended allowed return on equity predominantly on

5   the other two DCF estimates. The OCA recommends an allowed return of 8.50 percent.

6   As was discussed in this testimony before, it is important that the allowed return be set

7   fairly conservatively to account for changing market conditions (more specifically,

8   economic downturns). In setting the recommended return on equity, it is therefore

9   reasonable to opt for an estimate that is at the higher end of the range of the OCA's

10   estimates. With respect to what constitutes a reasonable range of allowed return on

11   equity, the OCA recommends 8.20 to 8.60 percent.

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

13   A.   Yes, it does.