

STATE OF NEW HAMPSHIRE  
BEFORE THE  
PUBLIC UTILITIES COMMISSION

In the matter of

Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities

Docket No. DG 20-105

Petition for Permanent Rate Increase

DIRECT TESTIMONY

OF

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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 the 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 currently 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 – Petition of Liberty Utilities (EnergyNorth Natural Gas) requesting  
13 approval of firm transportation contract (North East Direct (NED));
- 14 • DG 15-155 – Petition of Valley Green, LLC requesting franchise in City of Lebanon  
15 and Town of Hanover, New Hampshire;
- 16 • DG 15-289 – Petition of Liberty Utilities (EnergyNorth Natural Gas) requesting  
17 franchise in City of Lebanon and Town of Hanover, New Hampshire;
- 18 • DG 15-494 – Petition of Liberty Utilities (EnergyNorth Natural Gas) requesting  
19 approval of firm transportation contract (NED);
- 20 • DE 16-383 – Petition of Liberty Utilities (Granite State Electric) for Permanent Rate  
21 Increase;
- 22 • DE 16-384 – Petition of Unitil for Permanent Rate Increase;

- DG 16-852 – EnergyNorth’s Petition for Lebanon-Hanover Franchise Approval;
- DG 17-048 – EnergyNorth’s Gas Distribution Service Rate Case;
- DG 17-070 – Northern Utilities’ Gas Distribution Service Rate Case;
- DW 18-165 – Abenaki-Rosebrook Rate Case; Oral Testimony on Return on Equity;
- DW 18 –118 – HAWC Rate Case; Oral Testimony on Return on Equity;
- DG 18-140 – Liberty Utilities’ Petition for Approval of RNG Supply and Transportation Contract;
- DG 17-198 – Liberty Utilities’ Petition for Approval of Natural Gas Supply Strategy;
- DG 19-064 – Testimony in Granite State Electric Distribution Rate Case
- DG 19-057 – Direct and Supplemental Testimony in Eversource Electric Distribution Rate Case
- DE 19-142 – Oral Testimony on Eversource/Burgess Power Contract and Cost Recovery
- DG 19-126 – Testimony on Northern Utilities’ 2019 Integrated Resource Plan

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

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

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

1 A. The purpose of my testimony is to recommend, for EnergyNorth, the rate of return on  
2 equity in accordance with standards set forth in *Bluefield Water Works v. Public Service*  
3 *Comm'n*, 262 U.S. 679, 692-93 (1923) (*Bluefield*), and *Federal Power Comm'n v. Hope Natural*  
4 *Gas Co.*, 320 U.S. 591, 605 (1944) (*Hope*). On advice of counsel, I understand that the standard  
5 set forth by the U.S. Supreme Court is that a public utility should be allowed to earn a return  
6 comparable to a return on investment in other enterprises having similar risks in order to allow  
7 the utility the opportunity to attract capital and to maintain its credit. "The return should be  
8 reasonably sufficient to assure confidence in the financial soundness of the utility and should be  
9 adequate, under efficient and economical management, to maintain and support its credit and  
10 enable it to raise the money necessary for the proper discharge of its public duties." *Bluefield*,  
11 262 U.S. at 693. I also state my views on EnergyNorth's recommendations on cost of equity,  
12 and articulate reasons why I agree or disagree with those recommendations.

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

15 A. The Company is requesting a return on common equity of 10.51 percent. Based on the  
16 actual net cost of debt, and the requested capital structure, the Company is seeking approval of  
17 7.47 percent return on capital.

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

19 A. I am recommending a return of 8.90 percent as a specific point estimate. Based on my  
20 analysis, I am also recommending a range of returns on equity that I consider reasonable for the  
21 company, i.e., 8.80 percent to 9.00 percent.

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

1 A. In Section II, as the economy is reeling under an unprecedented once-in-a-century global  
2 pandemic, I briefly focus on what that implies for a reasonable application of the different  
3 methods in determining the recommended ROE, and whether it is appropriate to somewhat  
4 adjust the Discounted Cash Flow (DCF) and the Capital Asset Pricing Model (CAPM) analytics  
5 in this docket. In Section III, I briefly discuss the implications of observed market-to-book  
6 ratios<sup>1</sup> in the gas utility industry and EnergyNorth's proxy groups for the methods employed in  
7 determining the recommended ROE. In Section IV, I use several approaches to derive estimates  
8 of the cost of equity and I conclude by stating my recommendation on the cost of equity. Section  
9 IV is divided into Subsections A, B and C, covering the DCF analytics, the CAPM analytics, and  
10 Conclusion, respectively. Section V includes an attachment and the schedules that inform the  
11 OCA's analysis.

## 12 13 **II. IMPACT OF COVID-19 ON THE ECONOMY AND GAS UTILITIES**

14 **Q. Please summarize the state of the U.S. economy in the midst of the COVID-19**  
15 **pandemic.**

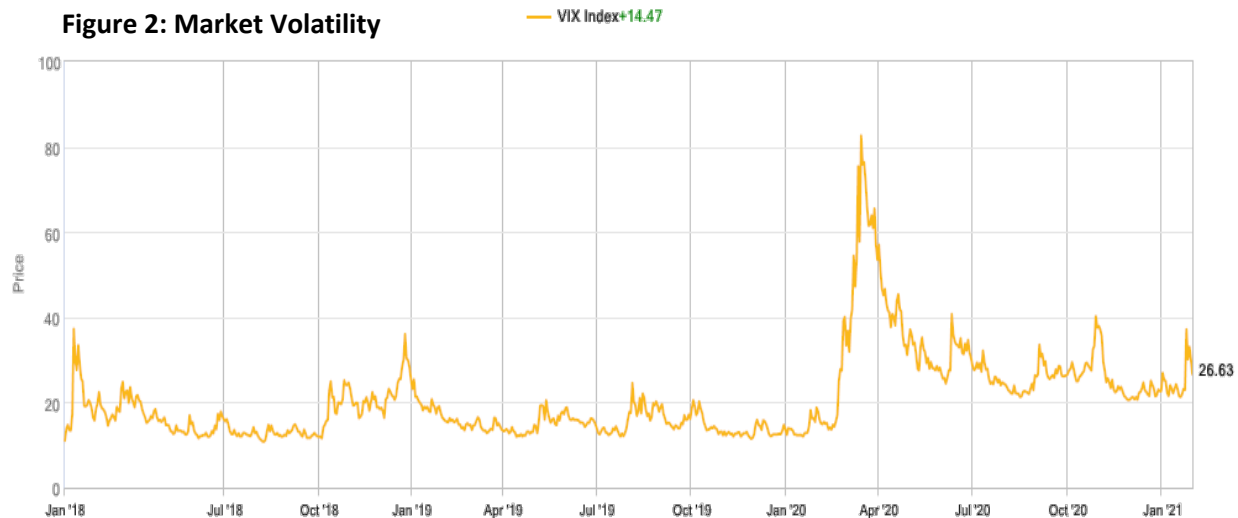
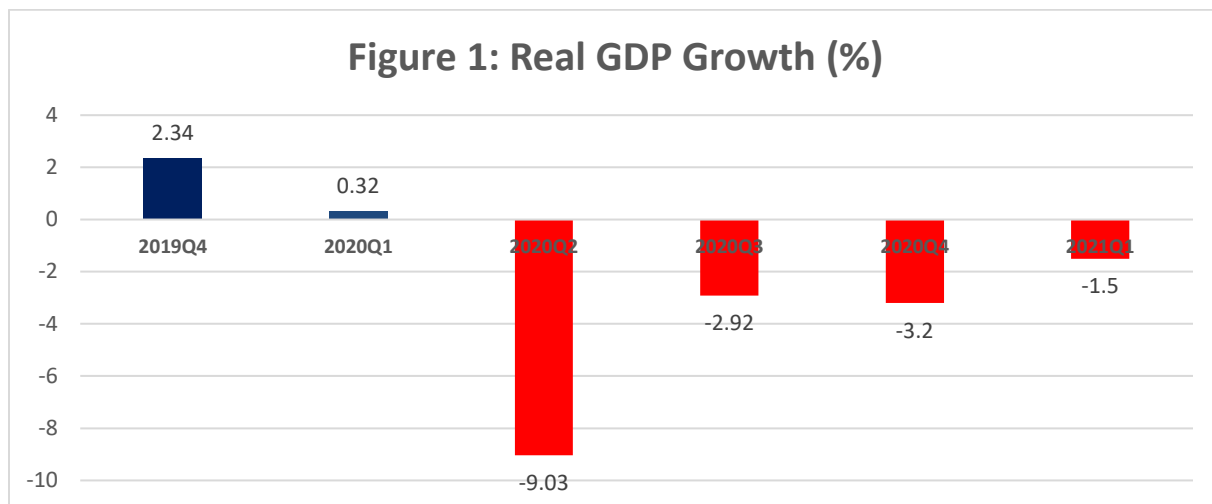
16 A. Amidst the devastating pandemic in 2020, the U.S. economy has contracted perceptibly.  
17 The real GDP fell 3.7 percent in 2020. The economy is expected to be on a recovery path by the  
18 end of 2021, but even in the current quarter (2021Q1), the real GDP has actually contracted 1.5  
19 percent, year-to-year. Figure 1 shows the quarterly real GDP growth rates beginning 2020. It is  
20 evident that the economy got a severe jolt in 2020:Q2, but year-to-year the real GDP growth  
21 rates remained negative for the subsequent quarters as well during 2020. Figure 2 depicts the

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<sup>1</sup> This ratio relates the market price of stock to its book value.

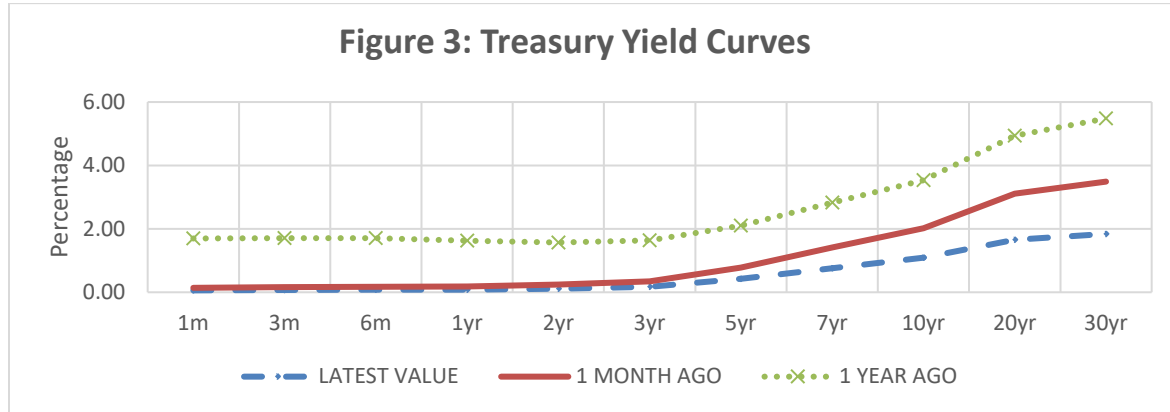


1 VIX index to show how uncertainty reigned at the beginning of the pandemic.<sup>2</sup> While the  
2 volatility index has decreased significantly by now, it is still higher than where it was in 2020  
3 before February 14<sup>th</sup>. The grim economic reality is also captured in Figure 3, which depicts the  
4 latest Treasury bond yield curve, showing that the yields have come down significantly  
5 regardless of the bond-terms relative to where things stood a year ago around January.<sup>3</sup>



<sup>2</sup> VIX is the ticker symbol and the popular name for the Chicago Board Options Exchange's CBOE Volatility Index, a popular measure of the stock market's expectation of volatility based on S&P 500 index options.

<sup>3</sup> The data analytics behind the graphs were obtained from SNL on February 2<sup>nd</sup>, 2021.



**Q. Can you also briefly discuss how the gas utility industry has performed during the pandemic?**

**A.** Yes. First, it would be helpful to look at how investors have viewed the gas utility industry relative to a broader index like S&P 500 over the pandemic (including currently). I have provided the trends for All Value Line Gas Utilities, the OCA’s proxy group<sup>4</sup> and S&P 500 starting 2019 in Figure 4.<sup>5</sup>

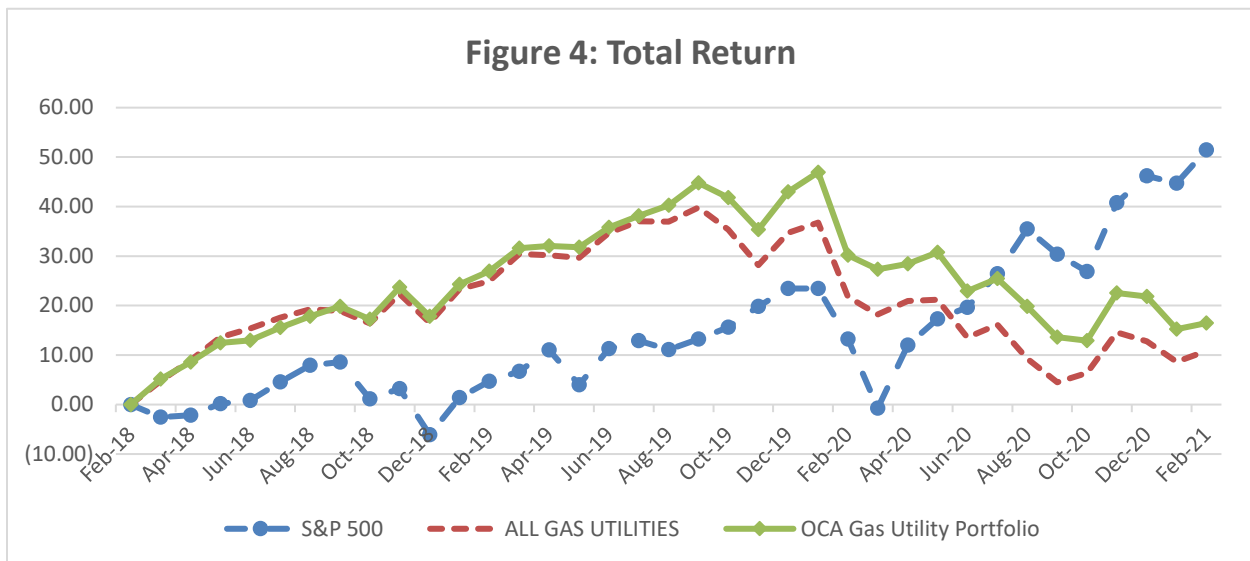
Comparing the OCA’s proxy group with S&P 500 shows that while the total returns (relative to beginning of 2018) for the two were essentially moving in the same direction before January 2020, the S&P 500’s total return has continued to increase after a short downward blip,

<sup>4</sup> The OCA’s proxy group comprises of Atmos Energy Corporation, Chesapeake Utilities Corporation, Northwest Natural Gas Company, One Gas Inc., and Spire Inc. The selection of the proxy group is discussed in detail in Section IV.A.1 later.

<sup>5</sup> In the schedules in this testimony, I have included the analytics for all Value Line gas utilities for which earnings growth projections are available from Value Line to produce ROEs for those utilities. When viewing this set of utilities with earnings growth projections from Value Line, I will refer to them as “All Gas Utilities” here onward. I will be providing some comments on how the OCA’s proxy compares with All Gas Utilities later, so it is also important to note that this alternative proxy group mimics Mr. Cochrane’s proxy entirely, except Mr. Cochrane had dropped NWN from this set, as he deemed NWN to be an outlier based on Value Line’s growth projection of 26.5 percent. In response to data request OCA 3.1a, he states “Northwest Natural was excluded from the proxy group, even though it “strictly” met the screening criteria, due to its Value Line EPS growth rate being 26.5%, making it an outlier.” As will be evident from my testimony later, I employ the “mean *plus/minus* 2\*standard deviation” statistical outlier determination approach to the ROEs. That approach lets the statistics associated with the proxy groups determine which ROE estimates are included in the determination of recommended ROE for EnergyNorth and which are not.

but the OCA's proxy's total return has been falling, thereafter. The trend traversed by the OCA proxy is very similar to the one traversed by the Value Line Gas Utilities. The trends in the two composites, i.e. OCA Gas proxy and S&P 500, have essentially diverged lately.

Second, as depicted in Attachment 1, in comparing the trends in stock prices for the constituents of the OCA' proxy group over the last few years with analysts' target stock prices, we find that there has been greater divergence between the two prices (actual versus target) after January 2020. The actual stock prices are generally struggling to keep up with the target prices.<sup>6</sup> Third, the average Value Line beta for the OCA's proxy group has increased from February 2020 to February 2021 by 0.26 (from 0.55 to 0.81), but the S&P 500's Value Line beta still hovers around 1.<sup>7</sup>



<sup>6</sup> Price target is an analyst's expectation of the stock price that is deemed to be fairly valued relative to its projected and historical earnings. When the price target for a stock is higher than the actual stock price, it reflects the analyst's expectation that the stock price is going to increase in the future. Attachment 1 provides the comparison between the actual stock price and the target price (SNL Analyst coverage) for the five companies included in the OCA proxy.

<sup>7</sup> Beta is a measure of the systematic risk of a portfolio relative to the market as a whole. The Value Line betas are calculated using information on roughly 1700 stocks that Value Line covers in its analyses. In DG 19-064, which

1 **Q. You previously mentioned that the unprecedented economic reality amidst the**  
2 **COVID-19 pandemic could have implications for reasonable adjustments to the methods**  
3 **you employ in determining the recommended ROE. Please elaborate.**

4 A. From the look at the US economy and the state of the natural gas utility industry (at least  
5 as reflected in the OCA's proxy group), it is evident that gas utilities are not in a stable  
6 environment lately. Therefore, while a sole reliance on a Single-Stage DCF approach may have  
7 been reasonable before the pandemic, it is useful to also employ the Three-Stage DCF approach  
8 to estimate additional ROE estimates in the current environment.<sup>8</sup> I have therefore in principle  
9 accepted the Three-Stage DCF approach deployed by EnergyNorth ROE witness John. Cochrane  
10 (Bates page II-304, Line 5 to Bates page II-308, Line 16). I disagree with some of the key inputs  
11 that Mr. Cochrane relied on in estimating the Three-Stage DCF-based ROEs. Therefore, in my  
12 calculations I have adjusted some of those inputs, as is discussed later in my testimony.

13 **III. MARKET-TO-BOOK RATIO, EXPECTED RETURN ON EQUITY AND**  
14 **REQUIRED RETURN ON EQUITY**

15 **Q. You also mentioned that it is important to analyze observed market-to-book ratios**  
16 **of the gas utility industry and EnergyNorth's proxy groups. Please explain why?**

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was Granite State Electric's rate case, the representative S&P 500 beta was around 1.00, while in this rate case, as discussed later in Section IV.B, it is around 0.99 approximately.

<sup>8</sup> I disagree with Mr. Cochrane's characterization that the reliance on the Three-Stage DCF approach is necessarily standard in New Hampshire, but such a use is certainly reasonable in the current environment. The Three-Stage DCF (Mr. Cochrane uses the term Multi-Stage DCF instead) approach assumes that the growth component associated with the DCF formula converges to the expected long-run GDP growth rate at the third-stage. The thinking is that no company can continually grow forever in a way that its growth rates diverges too much from the long-run growth rate associated with the economy at-large. As the same approach was relied upon by Mr. Cochrane, please see Direct Testimony of John Cochrane, Bates page II-304, Line 6 to Bates page II-307, Line 16, for a description of the methodology.

1 A. It is important to investigate market-to-book ratios essentially for three reasons. First, the  
2 current level of market-to-book ratio for a regulated company (which, of course, compares the  
3 market value of its common stock to the value of its assets as reflected on the company's books)  
4 is very telling with respect to the divergence between the expected return on equity and the  
5 opportunity cost of equity with respect to the regulated company's common stock. I explain why  
6 this divergence is an important factor in the discussion that immediately follows.

7 Second, whether the market-to-book ratio is significantly higher than one has  
8 implications for the application of the Discounted Cash Flow (DCF) approach to estimating the  
9 opportunity cost of equity (including whether one should accommodate an adjustment for  
10 flotation cost).

11 Finally, one of the DCF approaches that I have relied on uses market-to-book ratios as an  
12 input. What follows in this section is predominantly the discussion of the first two reasons  
13 mentioned above. The need for tracking the market-to-book ratios of the constituent companies  
14 in the alternative proxy group my testimony adopts (which I refer to as the OCA proxy group) is  
15 primarily taken up in detail in Subsection IV.A.

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

18 A. When the market-to-book ratio of a utility is significantly higher than one, it indicates  
19 that the return on equity that is *expected* by investors, which is greatly influenced by the allowed  
20 rate of return for a regulated entity, exceeds the true opportunity cost of equity. In other words,  
21 if the market-to-book ratios of the proxy group's companies are observed to be significantly

1 greater than one,<sup>9</sup> the return that investors *expect* to receive is greater than the return they would  
2 *require* in order to invest in those stocks.

3 This has another important implication. While the DCF construct is predicated on using  
4 long-term expectations, in practice the DCF method relies on investors' expectations over the  
5 medium term. Analysts' projections about investors' sentiments on relevant variables are not  
6 available beyond three to five years into the future. The DCF method therefore tends to capture  
7 investors' medium-term expectations that the market-to-book ratio will continue to remain  
8 substantially higher than one, assuming the ratio is already at that level. I delve into this issue in  
9 greater detail (Pages 19-23 of my testimony) in my discussion of the characteristics of the DCF  
10 method, especially as it is implemented in practical terms. The DCF method in the current  
11 environment, therefore, tends to produce estimates for ROE that reasonably exceed the "true"  
12 cost of equity.<sup>10</sup>

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

15 A. The DCF approach is based on the premise that the market price of a particular stock  
16 equilibrates to the sum of the stream of returns expected in the future from the stock by investors,  
17 discounted by the market cost of equity. This is an explicit way of modeling investor behavior,  
18 and is a well-accepted way of explaining observed investor behavior. Heuristically speaking, if  
19 the stock price is lower than the market-equilibrium price, the demand for the stock would be

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<sup>9</sup> As Figure 5 later shows the average market-to-book ratio of the OCA proxy group even with the downward slide in stock prices due to the pandemic, is currently around 1.70.

<sup>10</sup> 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.

greater than the supply, and stock sellers would raise their price to take advantage of the situation. Likewise, if the price of the stock was higher than the market-equilibrium price, the demand would be less than the supply of stocks, putting pressure on the sellers to lower their price to reduce excess supply. It follows that when the expected return on equity is greater (smaller) than the cost of equity, the market-to-book ratio would be greater (smaller) than one. This fundamental result stemming from the seminal DCF analysis, can be succinctly expressed in an equation

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

where  $r_e$  is the expected return on equity,  $B$  is the book value of stock,  $b_e$  is the expected retention ratio,<sup>11</sup>  $P$  is the market stock price, and  $K$  is the cost of equity, i.e., the required return on equity.<sup>12</sup>

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

A. Yes. If the expected return on equity exceeds the market cost of equity, the price of the stock would have to be higher relative to the book value to ensure that the expected dividend on the stock, i.e.,  $B(r_e - b_e r_e)$ , equals the minimum required dividend, i.e.  $P(K - b_e r_e)$ . A look at comparative statics is helpful.<sup>13</sup> Everything else being equal, if the expected return on equity

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<sup>11</sup> Retention ratio is the percentage of earnings that is retained to grow a business.

<sup>12</sup> See Roger Morin, *Regulatory Finance: Utilities' Cost of Capital*, Public Utilities Reports, Inc. (1994), at 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.

<sup>13</sup> Comparative statics is a comparison of two economic outcomes when a pertinent variable is changed from one level to another, ceteris paribus.

1 increases (decreases), the expected dividend would momentarily be higher (lower) than  
2  $P(K - b_e r_e)$ . Ceteris paribus, this would trigger a greater (lower) demand for the stock than the  
3 supply, which would consequently lead to a higher (lower) market price for the stock. The  
4 adjustments would continue until Equation (1) holds, i.e., until there is equilibrium.

5 A simple numerical example would be helpful. Suppose the expected return on equity,  $r$ ,  
6 is 10 percent, and the expected retention ratio,  $b$ , is 30 percent. Based on these numbers,  
7  $r_e - b_e r_e$  is 7 percent.<sup>14</sup> However, if the cost of equity for the same stock,  $K$ , is 8 percent, then  
8  $(K - b_e r_e)$  must be 5 percent.<sup>15</sup> To ensure that 7 percent of the book value, i.e. the expected  
9 dividend, is exactly equal to 5 percent of the stock price, i.e. the minimum required dividend, the  
10 only way that equation (1) can hold is through an adjustment to the price of the stock until it is  
11 40 percent higher than the book value of the stock, i.e., the market-to-book ratio is exactly equal  
12 to 1.4.<sup>16</sup>

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

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

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<sup>14</sup>  $(r_e - b_e r_e) = 10 - 0.30 \cdot 10 = 10 - 3 = 7$ .

<sup>15</sup>  $(K - b_e r_e) = 8 - 0.30 \cdot 10 = 8 - 3 = 5$ .

<sup>16</sup>  $\frac{P}{B} = \frac{(r_e - b_e r_e)}{(K - b_e r_e)} = \frac{7}{5} = 1.4$ .



1 operationally, the cost of equity is the opportunity cost of equity, which is the minimum return  
2 required to attract investment by investors.<sup>17</sup>

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.

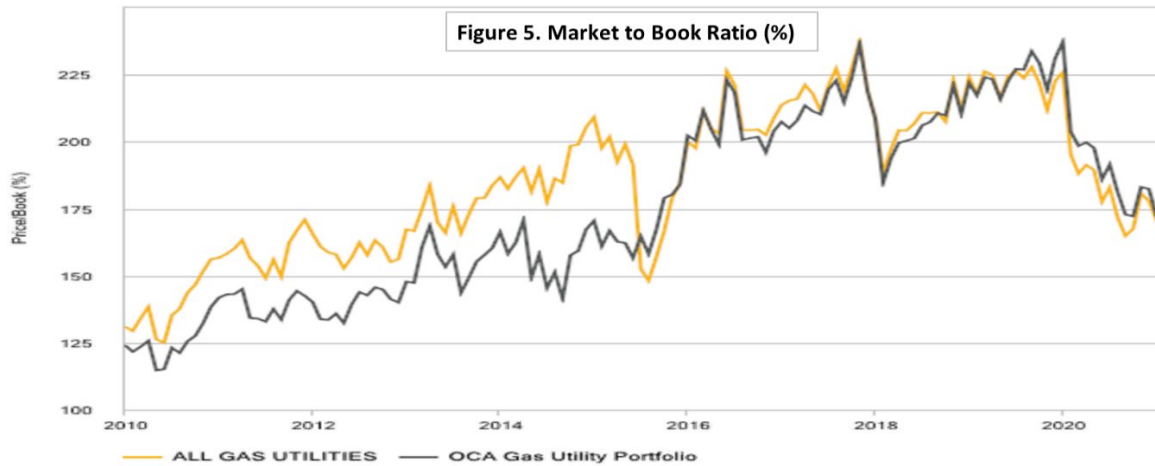
17 **Q. Have you analyzed the natural gas utility industry's market-to-book ratios?**

18 A. Yes, I have. In order to recommend the rate of return on EnergyNorth's equity, I have  
19 analyzed the market-to-book ratios for All Gas Utilities (which essentially mimics  
20 EnergyNorth's witness Mr. Cochrane's recommended proxy group) and the OCA's

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<sup>17</sup> "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 recommended proxy group. These are depicted in Figure 5 below.



2

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

6 A. Figure 5 shows that the average market-to-book-ratios of the OCA's proxy group as well  
7 as All Gas Utilities have persistently remained well above one over the past ten years or so; the  
8 average market-to-book ratios for the OCA's proxy group and All Gas Utilities over the last ten  
9 years have been 1.75 and 1.85, respectively.<sup>18</sup>

10 As for the more current market-to-book ratios (January, 2021), they are 1.73 for All Gas  
11 Utilities, and 1.70 for the OCA's proxy group. Figure 5 shows that the market-to-book ratios  
12 have come down from above 2.0 to around 1.7 during the pandemic. The pandemic seems to  
13 have impacted the market-to-book ratios adversely, but the ratios are still comfortably above 1.  
14 This indicates that the true cost of equity currently remains tangibly less than the return on equity  
15 expected by investors in gas utilities. In view of that, we can infer that if the cost of equity is

<sup>18</sup> Data downloaded from SNL on February 8, 2021.

1 estimated based solely on existing expected return on equity, the resulting return would  
2 unreasonably benefit shareholders at the expense of ratepayers.

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 EnergyNorth. As noted previously, I will be relying on both the  
8 Single-Stage and the Three-Stage DCF methods.

9 One of the methods that Mr. Cochrane used to estimate his recommended cost of equity,  
10 the Capital Asset Pricing Model (CAPM), predominantly uses historical stock-price appreciation  
11 as the basis for measuring the expected return on common equity. Even when attempting to look  
12 at forward-looking estimates, the method relies considerably on the historical trends in stock  
13 prices. Not trivially, the betas under the CAPM approach are generally based on historical  
14 prices. In a climate of market-to-book ratios being significantly greater than one, if historically  
15 prices have tended to appreciate significantly because allowed returns (that are to begin with  
16 higher than the true cost of equity) have moved further away from the true cost of equity, the  
17 method will tend to produce estimates that will also be further away from the true cost of  
18 equity.<sup>19</sup>

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<sup>19</sup> As is evident from the movement in the market-to-book ratios for the proxy groups over the pandemic, the CAPM estimates in the current environment are less prone to being upwardly biased, but with the reliance on betas that are estimated based on previous years, the OCA believes it is still appropriate to place, at best, little weight on the CAPM estimates.

1 In contrast, the forward-looking DCF approach tends to correct somewhat for the  
2 deviation between stock prices and book values. While the growth component is influenced  
3 positively by price appreciation, the dividend yield component is negatively influenced by price  
4 appreciation, thus producing a cost of equity estimate that relative to the other methods is more  
5 in line with the true market cost of equity. It is true that investors' medium-term expectation  
6 about ongoing sales in shares and the persistence of a greater-than-one market-to-book ratio, and  
7 our reliance in practice on expectations of growth over the medium-term, tend to produce a  
8 higher DCF estimate of cost of equity than the true cost of equity. However, investors  
9 understand that a continuing divergence between the stock price and the book value is  
10 unsustainable in the long-run. That understanding gets somewhat reflected in the forward-  
11 looking DCF method, even as it is usually implemented. In view of that, I recommend reliance  
12 on methods that are based on the DCF approach.<sup>20</sup>

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

15 A. Yes. In the application of DCF it is important to ensure that the inputs are estimated  
16 reasonably accurately. Myron J. Gordon, the economist who popularized the use of the DCF  
17 method for estimating ROE, states that "the perfect capital markets cost of capital can be  
18 measured without bias only in the special and uninteresting case where the allowed rate of return  
19 already is equal to the cost of capital. When the allowed rate of return is above (below) the 'true'  
20 cost of capital, the measured cost of capital is biased up (down)."<sup>21</sup> In the traditional model

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<sup>20</sup> As was discussed previously, in the current environment, with the COVID-19 pandemic still raging, the gas utility industry is in a somewhat unstable environment. We have therefore also relied on the Three-Stage DCF approach to inform our DCF-based ROE recommendation in the next section.

<sup>21</sup> See Myron J. Gordon, "The Cost of Capital to a Public Utility" (1974) (Gordon) at 9-10.

(wherein debt is valued at embedded cost, not at the market cost of debt), the conclusion that the allowed rate of return is above the cost of capital when the market-to-book value ratio is above one remains true.<sup>22</sup> The traditional estimate of the cost of capital is however not too problematic as long as the inputs to the return on equity estimation are reflected reasonably accurately.

**Q. Do you believe that the Company's approach uses inputs to the ROE estimations that are reasonably accurate?**

A. No. There are compelling reasons to conclude however that the company's implementation of the DCF approach leads to an upward-biased estimate of the cost of equity, precisely due to the reliance on inaccurate inputs.

First, the standard DCF model is based on the premise that all key variables like the stock price, book value, earnings, and dividends grow at the same rate in the long-run, and in the absence of external financing, market price converges to the book value. Theoretically, a market-to-book ratio that is significantly greater than one at any point in time implies that investors in general expect the price over earnings ratio to decrease in the long-run.<sup>23</sup> This translates into a growth projection for stock price that lags the growth projection for earnings growth. Under the standard DCF construct, since in the long-run both the stock price and earnings are premised to grow at the same rate, the long-term equilibrium growth lies somewhere between the expected earnings growth and the expected growth in price. In the current environment, the exclusive use of earnings growth projections theoretically leads to an upward-

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<sup>22</sup> *Id.* at 8. The inverse is also true, i.e., that the allowed rate of return is below the cost of capital when the market-to-book value ratio is below one.

<sup>23</sup> The average P/E LTM (Last Twelve Months) over the last year has been 23.4 (based on monthly data latest as of January 12, 2021). The average over the last twenty years has been 17.8. While the difference between the pre-pandemic P/E LTM and the average over twenty years was greater, even with the effect of the pandemic, one can conclude that over the long-run the P/E LTM would be expected to fall.

1   biased estimate of the DCF growth component, and consequently produces an upward-biased  
2   estimate of the opportunity cost of equity.<sup>24</sup>

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

8           A study by Dreman and Berry concluded that consensus estimates of EPS  
9   differ significantly from actual reported earnings. They also concluded  
10   that the average error appears to be increasing over time and that analysts  
11   are optimistic on average. They conclude "These findings question the  
12   use of finely calibrated earnings forecasts that are integral to the most  
13   common valuation/models and indirectly question the valuation methods  
14   themselves" (Dreman and Berry, 1995, 30). A similar study by Clayman  
15   and Schwartz compared Zacks Investment Research EPS projections with  
16   actual EPS for 399 companies for the period 1982-1992. They concluded  
17   that analysts' forecasts of EPS overstated actual EPS by as much as fifty  
18   percent. They conclude "...market participants should take analysts'  
19   innate overestimation biases into account when making stock valuation  
20   judgments" (Clayman and Schwartz, 1994, 68). Still another study by  
21   Chopra (1998) concluded 'Analysts' forecasts of EPS and growth in EPS  
22   tend to be overly optimistic. He concluded that analysts' forecasts of EPS  
23   over the past 13 years have been more than twice actual growth rate.<sup>25</sup>

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<sup>24</sup> It is instructive to see Morin's *Regulatory Finance*, *supra* n. 12, at 123. 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.

<sup>25</sup> Not surprisingly, one research thread on investors' projection of earnings per share (EPS) 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.

Also, a paper by Lacina, Liu, and Xu (2011) demonstrates that even a simple random-walk time series modeling of future earnings expectations does better than analysts' projections:

We evaluate the performance of financial analysts versus naïve models in making long-term earnings forecasts. Long-term earnings forecasts are generally defined as third-, fourth-, and fifth-year earnings forecasts. We find that for the fourth and fifth years, analysts' forecasts are no more accurate than naïve random walk (RW) forecasts or naïve RW with economic growth forecasts. Furthermore, naïve model forecasts contain a large amount of incremental information over analysts' long-term forecasts in explaining future actual earnings. Tests based on subsamples show that the performance of analysts' long-term forecasts declines relative to naïve model forecasts for firms with high past earnings growth and low analyst coverage. Furthermore, a model that combines a naïve benchmark (last year's earnings) with the analyst long-term earnings growth forecast does not perform better than analysts' forecasts or naïve model forecasts. Our findings suggest that analysts' long-term earnings forecasts should be used with caution by researchers and practitioners. Also, when analysts' earnings forecasts are unavailable, naïve model earnings forecasts may be sufficient for measuring long-term earnings expectations.<sup>26</sup>

To prevent reliance on overly optimistic and overstated growth earnings, it is important that at the minimum the DCF growth variable input should not be solely based on earnings growth projections or any other solitary variable's growth projections. I discuss this issue in greater detail in Subsection IV.A.1 to further support this conclusion.

#### IV. ESTIMATING COST OF EQUITY USING SEVERAL APPROACHES

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

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<sup>26</sup> "An evaluation of financial analysts and naïve methods in forecasting long-term earnings," Michael Lacina, B. Brian Lee and Randall Zhaohui Xu, *Advances in Business and Management Forecasting*, Volume 8, at 77–101.

1 A. While I have relied primarily on the DCF construct to estimate the cost of equity for the  
2 utility, I have also estimated the cost of equity using the CAPM construct. As for the DCF  
3 construct, I have used the standard DCF approach (for both the Single-Stage and the Three-Stage  
4 renderings), where the cost of equity is estimated as the sum of the dividend yield and a measure  
5 or measures of the growth components (Subsection IV.A).

6 I have derived estimates of the cost of equity using the CAPM approach (Subsection  
7 IV.B). For reasons I discuss later, I do not base my point-estimate recommendation on that  
8 method. The CAPM estimation is nevertheless useful as it provides a check on the  
9 reasonableness of the DCF estimates. In each of these Subsections I comment on Mr.  
10 Cochrane's analysis to the extent it is relevant to my recommendation. Finally, I conclude this  
11 section with my recommendation on the cost of equity for EnergyNorth (Subsection IV.C).

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

15 A. Yes. Of the methods that Mr. Cochrane used to estimate his recommended cost of equity,  
16 CAPM substantively uses historical data as the basis for measuring the expected return on  
17 common equity. Compared to attempts at forward-looking estimations, CAPM relies to a great  
18 extent on the historical trends in stock prices, for example, to measure the betas required for the  
19 CAPM analysis. This may provide insight into what returns investors expect based on past  
20 experience, but it has somewhat limited value in assessing what returns are necessary to attract  
21 needed capital going forward. By contrast, the DCF approach is essentially forward looking.  
22 Also, the fundamental underlying construct behind the DCF analysis, i.e., the value of a common  
23 stock equating to the sum of the discounted stream of future income from that stock, is widely



accepted. Further, regarding the techniques that are used to estimate the cost of equity for regulated utilities, the DCF model is the most commonly used model for estimating the cost of common equity for public utilities.<sup>27</sup> In fact, the Commission in New Hampshire has predominantly relied on the DCF construct previously.

#### **IV.A Discounted Cash Flow Approach**

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

A. As noted previously, given the current reality of the pandemic and the observed unstable current state of the gas utility industry, I have used both the Single-Stage and the Three-Stage DCF models to derive several estimates of the cost of equity for a group of companies that forms a reasonable proxy for EnergyNorth. For ease of presentation, I have discussed the Single-Stage DCF estimation and the Three-Stage DCF estimation in separate subsections. It will be evident, in my testimony that both approaches have similar inputs, i.e. dividend yields and growth components. The growth components, however, differ in what expectations are modeled and in the methodologies employed. We therefore analyze the Single-Stage DCF method in Subsection IV.A.1 and the Three-Stage DCF approach in Subsection IV.A.2. Those analyses follow next.

##### **IV.A.1: Single-Stage DCF Approach**

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

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<sup>27</sup> See Parcell at 124.

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

9 **Q. Do you have any observations on the practical applicability of the Single-Stage DCF**  
10 **Method?**

11 A. Yes, I do. As the modeling above indicates, the two essential elements of this method are  
12 the dividend yield and the growth component. While I discuss the estimation of both elements  
13 later in detail, it is important to point out that the growth component of the DCF equation tends  
14 to be the most critical element in the use of the DCF methodology. A couple of things render the  
15 estimation of the growth component somewhat challenging. First, while the growth component  
16 of the Single-Stage DCF model is in principle meant to be based on long-term projections, in  
17 practice, it is based at most on three-to-five-years' projections, since long-term projections are  
18 seldom available. Second, "it is reasonable to believe that investors, as a group, do not utilize a  
19 single growth estimate when they price a utility's stock."<sup>28</sup> While growth projections by equity  
20 analysts are available on variables like earnings, dividends, book value per share, among other

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<sup>28</sup> Parcell at 146.

1 things, what weight one should give to different projections is often a matter of contention.

2 Unlike Mr. Cochrane's approach, which relies only on earnings growth to estimate the growth

3 component, I have relied on three estimates for the growth component: (1) the average of the

4 growth rates in earnings per share (EPS), book value per share (BVPS), and dividends per share

5 (DPS); (2) earnings growth only; and (3) sum of internal growth rate, i.e.,  $br$ , and the external

6 growth component, i.e.,  $sv$ .<sup>29</sup> Of course, I strongly disagree with Mr. Cochrane's sole reliance on

7 earnings growth projections for reasons already discussed, but also I do not believe that investors

8 rely only on earnings growth rates when they price a utility's stock. I discuss this in greater

9 detail later, but first I discuss the selection of the OCA's proxy group. The same selection is also

10 applied to the Three-Stage DCF estimation that follows in the next Subsection.

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

12 A. When choosing my recommended sample, I effectively began with Value Line's universe

13 of gas utilities (Value Line Natural Gas Universe) that Mr. Cochrane subjected to his proxy

14 screening analysis. I find that all but the first criteria that were used by him are reasonable; *see*

15 Mr. Cochrane's Testimony at Bates II-295, line 17 to Bates II-296, line 8. In place of Mr.

16 Cochrane's first criterion, I have used cut-offs based on the shares of regulated revenue in total

17 revenue and regulated assets in total assets. At the outset it needs to be recognized that the

18 universe of natural gas utilities is small enough that the cut-offs relied upon for regulated

19 revenue and assets are less stringent than what I typically use when determining the proxy group

20 for an electric utility. To ensure that the companies selected for EnergyNorth's proxy group are

21 predominantly regulated natural gas utilities, I included them in the proxy group if at least 50

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<sup>29</sup> 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 percent of the revenues over 2017-19 are attributable to regulated natural gas business and at  
2 least 75 percent of the assets are attributable to regulated natural gas business over 2017-2019.

3 **Q. Why do your criteria differ from that of Mr. Cochrane's criteria?**

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

21 To better assess whether a company should be included in a proxy for EnergyNorth, I  
22 believe we should strive to have it sufficiently reflective of a "pure play" regulated gas utility. I  
23 find that cut-offs of at least 75 percent for regulated assets and at least 50 percent for regulated

1 gas revenues are reasonable, given the dearth of standalone companies that are publicly traded  
2 and consist solely of regulated gas business.

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

4 A. Using information provided by the Company in response to data requests about Value  
5 Line gas utilities and additional research of 10-K forms and SNL data, and applying the cut-offs  
6 of 50 percent for natural gas revenue in total revenue and 75 percent for regulated assets in total  
7 assets, I preliminarily determined the list of companies that exceed those cutoffs. I then, based  
8 on the latest information, applied the other screening criteria (the same as those used by Mr.  
9 Cochrane) to determine that the appropriate proxy group consists of (1) Atmos Energy  
10 Corporation (ATO), (2) Chesapeake Utilities Corporation (CPK), (3) Northwest Natural Gas  
11 Company (NWN), (4) One Gas, Inc. (OGS), and (5) Spire, Inc. (SR).

12 **Q. Do you believe that the group listed above is a reasonable proxy for EnergyNorth?**

13 A. Yes, I do. The screening criteria go a long way in ensuring that my proxy group  
14 reasonably reflects the risk profile of EnergyNorth's utility business. For example, the proxy  
15 group's average percentage of assets as well as revenue subject to gas utility regulation are both  
16 92 percent. That is reasonably close to complete regulation as is the case for the distribution  
17 business of EnergyNorth in New Hampshire. Also, Schedule PKC-1 shows that the Value Line's  
18 financial strength's ratings for the group ranges between BBB+ to A+. The S&P and Moody's  
19 ratings, which are available for only three of the five OCA's proxy group's companies, ranges A-  
20 to A. As for all Value Line Gas Utilities, only five of the nine utilities have ratings available  
21 from S&P, and four of the nine9 utilities have ratings available from Moody's. The S&P rating  
22 associated with Algonquin Power & Utilities Corporation (AQN, EnergyNorth's parent, which is  
23 not a predominantly gas utility) is BBB (Ratings are not available from either Moody's or Value

Line). As for the capital structure, the company has proposed a common equity ratio of 50.15 percent. The proxy group's average equity ratio over 2017 to 2019 was 58.27 percent. (See Schedule PKC-2 for Value Line data). EnergyNorth's parent has a rating that is lower than the average credit rating of the proxy group. Algonquin Power & Utilities Corporation's average equity ratio over 2017-2019 was 53.67. During 2020Q3 YTD, it was 57.5. The lower credit rating of AQN compared to the OCA's proxy group is consistent with the capital structure of Algonquin being slightly more leveraged than that associated with the proxy group. It is reasonable to conclude that the proxy group's cost of equity estimate, reasonably adjusted, would inform what the allowed returns on equity should be for the company.

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

A. Yes. Though, the uncertainty associated with the current pandemic renders the examination of economic realities, somewhat less useful, I briefly examined the economic conditions characterizing New Hampshire relative to the nation based on state coincident index data provided by the Federal Reserve Bank of Philadelphia. As for December 2020 year-to-year growth in the index, while New Hampshire contracted by 2.35 percent year-to-year, the US economy contracted by 4.38 percent. Also, as for the states served by the companies included in the proxy, the corresponding growth rates varied between -8.19 percent and +0.67 percent. Seven out of the relevant 14 states registered greater contraction than New Hampshire.<sup>30</sup> This suggests that it is reasonable to assume that an investor's opportunity cost of equity, i.e.,

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<sup>30</sup> "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>.

investor's required return, in New Hampshire's economic environment is roughly comparable to an investor's opportunity cost of equity in the OCA's proxy group's economic environment.

**Q. Do you believe, with only five utilities in your proxy group, the DCF estimations can reasonably derive representative ROEs for EnergyNorth?**

A. While the small size of the proxy group does pose some issues, in the application of the statistical screening for outliers, if all of the estimates from the three variants of the Single-Stage DCF estimation and the three variants of the Three-Stage DCF estimation are subjected to the solitary statistical screening for outliers, I believe with 30 estimates, the resulting average ROE would be robust enough and reasonable to inform the recommended ROE for EnergyNorth.

**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. I have also eliminated ROE estimates that are less than the recent yield on Utility A preferred stocks, i.e. 6.41 percent, *plus* 50 basis points. (See Value Line's Selection & Opinion, March 5, 2021). The Utility A preferred stocks based cut-off is therefore 6.91 percent.

**Q. Please explain why you used pricing data from February 1, 2021 to March 1, 2021 to measure the dividend yields for the proxy's constituent companies.**

A. Investors' expectations about how companies will fare in the future are captured in the most recently observed market price and dividend data. Data from fairly long historical periods are unlikely to reflect investors' current expectations. That said, it is also true that some

1 smoothing of the price trend is useful as it filters possible transitory and temporary changes that  
2 characterize daily movements in prices. I have therefore used daily pricing data from the most  
3 recent month (Schedule PKC-3) to calculate the average price, which in conjunction with the  
4 annualized dividend helps measure the dividend yield (Schedule PKC-4) component of the DCF-  
5 based cost of equity.

6 **Q. Mr. Cochrane exclusively uses expected earnings growth rates for the growth**  
7 **component in his Single-Stage DCF analysis. Do you agree with his approach?**

8 A. No. It is unreasonable to assume that investors use a single growth estimate when pricing  
9 a utility's stock.

10 While I have already provided some thoughts on this issue (*see* page 21, line 5 to page  
11 23, line 21), it is helpful to note that both market realities and research indicate that not all  
12 investors are alike and they do not only care about earnings growth. While providing a review of  
13 dividend policy theories and evidence, Malkawi, Rafferty and Pillai (2010) survey academic  
14 research that explores why dividends matter to investors.<sup>31</sup> Different researchers have provided  
15 empirical support for different theories. To just note a couple of them, some have argued that  
16 dividends are sought as investors prefer “bird in the hand” dividends rather than “two in the  
17 bush” future capital gains. Others have argued that investors care about after-tax return and the  
18 differential tax treatment of capital gains and dividends influences their demand for shares. In  
19 discussing why dividends matter, some of the theories and empirical analysis directly stress how  
20 different investors may view dividends differently. For example, investors whose dividends are

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<sup>31</sup> See Malkawi, Rafferty, and Pillai “*Dividend Policy: A Review of Theories and Empirical Evidence*,” International Bulletin of Business Administration, ISSN: 1451-243X Issue 9 (2010). Even managers need to consider dividends policy carefully 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 taxed higher than their capital gains may prefer earnings-driven stocks rather than dividends  
2 paying stocks, or how institutional investors as opposed to individual investors are more attracted  
3 towards dividend-paying stocks, etc. It also remains true that companies pay out dividends in  
4 billions of dollars in the marketplace suggesting that companies recognize that investors value  
5 them. I believe it is inappropriate to assume that only earnings growth expectations matter to  
6 investors.<sup>32</sup>

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

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

18 In view of that, sole reliance on either dividends growth rate, book value growth rate, or  
19 earnings growth rate is unlikely to produce a reliable measure of the DCF growth component. I  
20 instead use the average of the three expected growth rates as one of the measures for the growth  
21 component to represent the growth component in the DCF analysis. One may reasonably assume  
22 that the sustainable long-run growth rate to which earnings, dividends and book value growth

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<sup>32</sup> See also Parcell at 146.

1 rates may converge in the future is represented by their average, rather than just one of those  
2 variables. I have used the average of the Value Line five-year projections for growth in DPS and  
3 BVPS *and* the average of the Value Line, Zacks, Yahoo Finance and SNL long-term projections  
4 for EPS growth rates to calculate the growth component. While in principle the Single-Stage  
5 DCF model is meant to be based on long-term projections, its application however is based on at  
6 most five-year projections, as truly long-term projections are seldom available.

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

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

18 A. I have used Value Line's expectation regarding retention ratios and returns on equity for  
19 five years into the future to derive estimates for  $b$  and  $r$  and have used them to calculate the  
20 expected internal growth component, i.e.  $br$ . To account for growth expectations from external  
21 financing and derive estimates of the external growth component, I have also used the latest  
22 market-to-book ratios from Yahoo Finance and the average of Value Line's five-year projections  
23 for the number of outstanding shares. That is helpful in calculating the external growth

1 component, i.e.  $s_e v$ , where  $s_e$  = expected funds raised from sale of stock as a fraction of existing  
2 equity, and  $v = \left(1 - \frac{B}{P}\right)$ .<sup>33</sup> The revised formulation for the growth component can be  
3 alternatively expressed as  $b_e r_e + g_e \left(\frac{P}{B} - 1\right)$ , where  $g_e$  is the expected growth rate in the number  
4 of outstanding shares. In short, the growth component can be viewed as the sum of the  
5 “internal” growth rate, i.e.  $b_e r_e$ , and the “external” growth rate, i.e.  $g_e \left(\frac{P}{B} - 1\right)$ .

6

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

8 A. Without the application of the outlier screening determination on the proxy group’s  
9 constituent companies, the Single-Stage DCF estimates, based on the average expected growth  
10 rates in earnings, dividends and book value, vary between 8.15 percent and 11.12 percent.  
11 Schedule PKC-8 provides the calculations. When only the EPS growth rate is used for the  
12 growth component, the Single-Stage DCF method produce estimates that vary between 7.77  
13 percent and 12.04 percent. When the “internal-plus-external” growth approach is used, the  
14 Single-Stage DCF method produce estimates that vary between 7.06 percent and 19.28 percent.  
15 These estimates are later subjected to the outlier determination screening when the sample is  
16 expanded to include the estimates from the Three-Stage DCF approach.

17

18 **IV.A.2: Three-Stage DCF Approach**

19 **Q. Please describe the Three-Stage DCF approach.**

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<sup>33</sup> See Gordon at 30.

1 A. While the notion that the current price of a stock equals the present value of cash flows  
2 into the future still holds, the Three-Stage DCF assumes that the growth rates in the cash flows  
3 (dividends) are initially the same as the growth rate assumed in the Single-Stage DCF for several  
4 years (below, I have modeled five years akin to the approach followed by Mr. Cochrane), but by  
5 the tenth year, the growth rate changes to another level. It is typical to use the projected long-  
6 term growth rate in GDP as the DCF growth component starting the tenth year. I used that  
7 growth rate, in the same vein as that of Mr. Cochrane. For the years during the transition, many  
8 assume that the growth rate changes gradually to attain the assumed growth rate associated with  
9 the tenth year. I have followed the same approach that Mr. Cochrane has used, i.e. the growth  
10 changes every year starting the sixth year uniformly to attain the growth rate assumed for the  
11 tenth year.

12 **Q. How is your approach different from that employed by Mr. Cochrane?**

13 A. My approach is different in several ways. Though mechanically I have used the same  
14 approach as that of Mr. Cochrane in estimating my Three-Stage DCF estimates, for the first stage  
15 of growth I have relied on three measures of growth components as used in the Single-Stage  
16 DCF estimations (*see* page 34, line 2 to line 14) as opposed to relying only on the earnings  
17 growth projections per Mr. Cochrane's approach. So for each company in the OCA proxy group  
18 I have calculated three Three-Stage DCF-based ROE estimates. In those calculations, I have also  
19 used the projected 2021 dividend yields per the Value Line one-pagers (in the same vein as my  
20 Single-Stage DCF application).

21 Also, I find the projection of the nominal GDP growth rate used by Mr. Cochrane for the  
22 terminal growth component to be significantly inflated. Specifically, I find Mr. Cochrane's input  
23 on the projected real GDP growth is significantly overstated and therefore unreasonable. As

1 evident from Figure 6 below, the average real GDP growth rates over the last twenty and ten  
2 years have been 1.71 percent and 1.68 percent, respectively. The average growth rate over the  
3 past thirty years has been 2.29 percent. With the long-term expectation on inflation rate around 2  
4 percent (I find Mr. Cochrane's estimate on inflation rate reasonable), I find it reasonable to  
5 assume at most 4.17 percent for the projected long-term nominal growth rate. I therefore use 4.17  
6 percent as the terminal growth rate in the Three-Stage DCF estimations. Noteworthy, my  
7 terminal growth assumption conforms well with the long-term GDP growth projections by U.S.  
8 Energy Information Agency (Annual Energy Outlook 2021, Table A20),<sup>34</sup> and the  
9 Congressional Budget Office's GDP growth projections in its economic outlook for 2020-  
10 2031("An Overview of the Economic Outlook: 2021-2031," February 2021).<sup>35</sup>

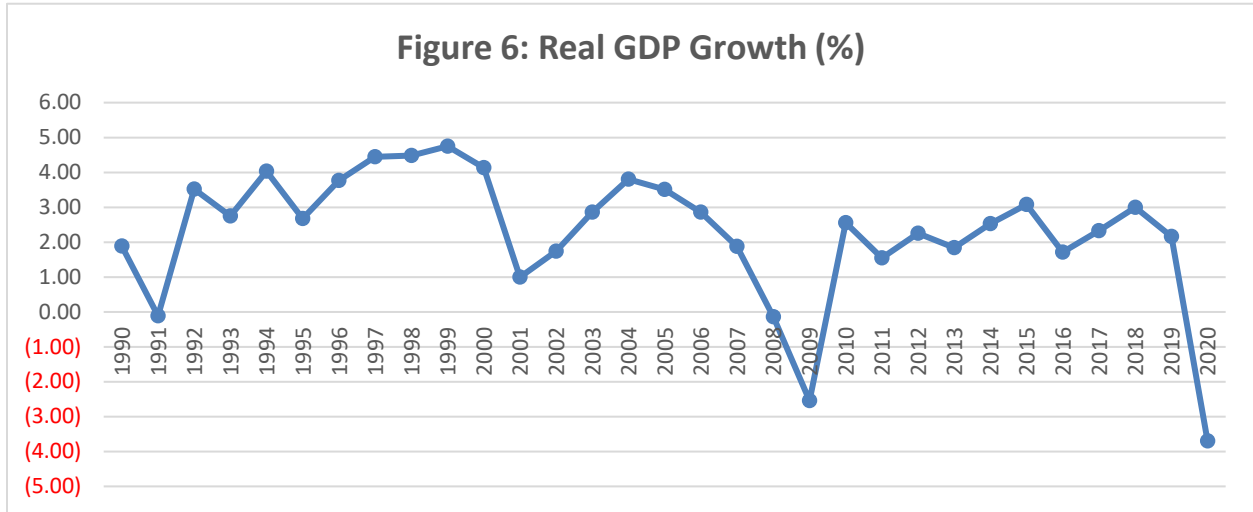
11 I should add that the terminal growth component assumed in the OCA analysis is not  
12 intended to be exactly mimicking any particular GDP growth projection. A set of companies  
13 may very well in the long-run grow at a rate that is not exactly same as the long-term GDP  
14 growth long term GDP growth projection, given the idiosyncrasies associated with that set of  
15 companies. To provide context, looking at the previous roughly thirty years of data (1990 to  
16 2020), the average EPS growth rate of All Gas Utilities, ignoring NI (it has a negative EPS  
17 growth rate) and OGS (data available for the last nine years only), is 4.74 percent, and the  
18 corresponding average DPS growth rate of All Gas Utilities is 3.21 percent. Alternatively,  
19 looking at the OCA proxy group (without OGS), the average EPS and the DPS growth rates are

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<sup>34</sup> Annual Energy Outlook 2021, Table 20. See [https://www.eia.gov/outlooks/aeo/section\\_appendices.php](https://www.eia.gov/outlooks/aeo/section_appendices.php)

<sup>35</sup> See Table 2.1 of the publication. <https://www.cbo.gov/publication/56991>

1 4.92 percent and 2.95 percent, respectively.



2  
3 I think it is very reasonable to use 4.17 percent as the terminal growth rate for the Three-  
4 Stage DCF analyses conducted in this testimony; in essence the OCA input for the terminal growth  
5 is 100 basis points less than what Mr. Cochrane had assumed for his analysis.

6 **Q. Do you have any additional observations on your application of the Three-Stage DCF**  
7 **approach?**

8 A. Yes. For the convenience of anyone considering my testimony, I want to comment on  
9 the modeling a bit. In terms of the application, I have relied on the same Three-Stage DCF  
10 EXCEL macro that Mr. Cochrane used to conduct his analyses. I have simply adjusted the row  
11 number and the column alphabets in the EXCEL macro(s) as appropriate to facilitate the  
12 “Goalseek” function in EXCEL. As my approach mechanically mimics that of Mr. Cochrane’s  
13 approach, how the transition between the first stage of growth and the terminal growth is  
14 practically implemented can be gleaned from the example provided by Mr. Cochrane at Table 8  
15 of his testimony (Direct Testimony of Mr. Cochrane, Bates page II-307, Lines 3-8).

16 **Q. What are the Three-Stage DCF estimates for your proxy?**

1 A. When the growth component is assumed to be the average of the 3-5 years' projections  
2 on EPS, DPS, and BVPS growth rates, the Three-Stage DCF ROE estimates vary between 6.46  
3 percent and 9.40 percent. When the growth component is assumed to be the projected EPS  
4 growth rate, the ROE estimates vary between 6.45 percent and 9.52 percent, and when the  
5 retention growth approach is used, the ROE estimates vary between 7.10 percent and 9.06  
6 percent.

7 **Q. Please provide the results of your analysis when you apply the previously mentioned**  
8 **outlier determination screening on all of the Single-Stage and Three-Stage DCF estimates**  
9 **as one sample.**

10 A. The statistical outlier-determination screening, of mean *plus/minus* 2 times the standard  
11 deviation, eliminates 1 out of the thirty estimates that our analysis had produced. I have also  
12 eliminated 2 ROE estimates that are less than the recent yield on Utility A preferred stocks *plus*  
13 50 basis points. That screening produces an overall average ROE of 8.71 percent.<sup>36</sup> When the  
14 EPS growth projections based estimates are ignored, the average ROE is 8.53 percent.

15 **Q. Mr. Cochrane recommends adjustment for flotation costs in his estimates of the cost**  
16 **of equity. Do you agree with that adjustment?**

17 A. No. As I have noted already, the DCF approach, informed by equity analysts'  
18 projections, in practice relies on investors' expectations about earnings and dividends and other  
19 relevant variables over three to five years. Even with reasonable treatment of the DCF growth  
20 component, the approach tends to internalize the medium term expectation that the market-to-  
21 book ratio will persist at levels relatively close to what is currently being observed. Given the  
22 reliance at best on medium term expectations, we tend to derive estimates of the ROE that are

---

<sup>36</sup> If the OCA approach is applied on Mr. Cochrane's proxy group, the screening produces an overall average of 9.10 percent.

sufficiently above the true cost of equity in a setting where the stock prices are significantly above the book value. Flotation cost is effectively small enough that my recommended return on equity, which relies on investors' expectations of persistence in the market-to-book ratio being significantly greater than one, already accounts for such costs adequately. Any further adjustment would simply unnecessarily transfer wealth from ratepayers to shareholders.

**Q. Do you agree with Mr. Cochrane that there is a need to adjust the return on equity upward due to the consideration of small-size premium?**

A. No. Even though he does not recommend an explicit adjustment for small-firm effect, Mr. Cochrane devotes part of his testimony to why he thinks the allowed return on equity should build in some slack for such an adjustment. The Commission should not allow any accommodation of the small size premium. First, there is counter-evidence indicating that the small-firm effect is too dependent on the time-period chosen for analysis, and is dependent on the month of January for high stock price returns. Second, there is also counter-evidence that the size effect may not apply to regulated utility operations.<sup>37</sup>

#### **IV.B Capital Asset Pricing Model (CAPM)**

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

A. The CAPM method recognizes that common equity capital is more risky than debt from an investor's standpoint, and that investors require higher returns on stocks than on bonds to be compensated for the additional risk. The cost of common equity under CAPM is represented by 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

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<sup>37</sup> See "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 risk free securities,  $R_M$  is the expected return on the overall market and  $(R_M - R_f)$  is the equity risk  
2 premium demanded by shareholders to accept equity relative to debt.  $\beta_s$  is the average beta of a  
3 group of comparable-risk companies that is used to adjust the risk premium to measure risks  
4 specific to the regulated utility in question.

5 **Q. What is Mr. Cochrane's estimate of the cost of equity based on the CAPM method?**

6 A. Mr. Cochrane derives a CAPM estimate of ROE using information from SP 500 stocks  
7 by applying the DCF construct to those stocks to estimate the expected return on equity and the  
8 yield on 30-year Treasury bond. His CAPM-based ROE estimate is 11.76 percent.

9 **Q. Do you agree with Mr. Cochrane's CAPM approach? Please explain.**

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

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

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

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

1 instrument (like the shortest of short term Treasury bills) and a consideration that investors have  
2 relatively long investment horizons and that regulated utility rates are usually set for longer terms  
3 than just a few months.<sup>38</sup>

4 **Q. You stated that you do not agree with Mr. Cochrane's approach to calculate market**  
5 **returns. Please explain why.**

6 A. My reservations about Mr. Cochrane's approach stem from two reasons that are related to  
7 how he employs the DCF approach in estimating the market returns.

8 First, I disagree with the sole reliance on earnings growth projections to estimate the DCF  
9 growth components, as was discussed before in the section on DCF estimation of the proxy  
10 group's cost of equity.

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

15 **Q. Do you have any additional observations on the application of the CAPM approach**  
16 **given the current reality of the US economy reeling under the ongoing COVID-19**  
17 **pandemic?**

18 A. In the same vein as the approach relied upon in the proxy group's DCF analyses above,  
19 for the DCF Market Return based CAPM modeling, I have applied both the Single-Stage DCF  
20 approach and the Three-Stage DCF approach. For the Single-Stage DCF estimations of Market  
21 Returns, I have used the average of EPS, DPS, and BVPS growth projections on only dividend  
22 paying stocks to derive one estimate. I have also used only the EPS growth projections to derive

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<sup>38</sup> For a good discussion on the determination of risk-free rate, see Aswath Damodaran, "What is the Risk Free Rate? A Search for the Basic Building Block," Stern School of Business, New York University, (2008).

1 estimates for both the set of *only* dividend-paying stocks and that of *all* stocks. Thus, we derive  
2 three estimates of Market Returns using the Single-Stage DCF approach. For the Three-Stage  
3 DCF approach, I have only modeled stocks that do pay dividends; consequently there are only  
4 two Three-Stage DCF estimates for the Market Returns; one with a first stage growth component  
5 of EPS growth projection, and the other with the average of EPS, DPS, and BVPS growth  
6 projections. Therefore, what follows, I have obtained five CAPM estimates of ROE in total. For  
7 convenience, I have again analyzed the CAPM analysis based on the Single-Stage DCF-based  
8 Market Return estimation and the Three-Stage DCF-based Market Return estimation in separate  
9 Subsections, i.e. IV.B.1 and IV.B.2. As the key inputs, other than how the growth components  
10 are modeled under the two DCF approaches do not differ, Subsection IV.B.1 is more detailed (as  
11 it explains all the inputs), but Subsection IV.B.2 only briefly discusses how the growth  
12 components were modeled differently in deriving the Three-Stage DCF-based Market Returns.  
13 The OCA's Single-Stage DCF-based CAPM estimation is discussed first.

14 **Q. Do you have any additional reason why you rely on the Three-Stage DCF-based**  
15 **Markets Returns to derive a couple of additional CAPM estimates?**

16 A. Yes. The Single-Stage DCF approach that Mr. Cochrane relied upon (and to which I  
17 have resorted to in principle later in my testimony) uses projections for the growth components  
18 that do not jibe at all with the historical realities on EPS and DPS growth rates. As Randall  
19 Woolridge, representing the PUC staff, pointed out in his testimony previously in DE 19-064  
20 (Bates page 73, lines 1-5, Granite State Electric's rate case), an average market return on S&P  
21 500 based on just three to five years' growth projections on EPS (this is also true for DPS and  
22 BVPS) is grossly inconsistent with the historically observed significantly lower average growth  
23 rate in S&P 500 EPS and S&P 500 DPS (*See* Woolridge Testimony, DE 19-064, Bates page 75,

Lines 1-7). While I have relied on the Single-Stage DCF-based Market Returns to derive CAPM estimates in the same vein as Mr. Cochrane's approach, I have also employed the Three-Stage DCF-based estimations to accommodate a third-stage growth component that is more in line with the historically observed average EPS growth rate. These additional estimates, are not only useful because we are analyzing investors' behavior over a once-in-a-hundred-years' pandemic, but also because they provide more realistic estimates of ROE than what we obtain using Mr. Cochrane's approach that solely relies on three to five years' EPS growth projections by analysts. These additional estimates bring some sanity to the application of the CAPM approach as well.

**IV.B.1: CAPM Estimation Using Single-Stage DCF-based Market Returns**

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

A. I use Value Line beta estimates for the companies that are in the OCA's proxy group (*see* Schedule PKC-9) to derive the average beta for those companies. The proxy beta is 0.81.

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

A. Two key elements in the determination of the equity risk premium are the risk-free rate and the expected return on the market portfolio. As a proxy for the risk-free rate, as already discussed earlier, the OCA relies on the average of the current yields on the 10-Year Treasury bond observed over the last month. The average yield over February 2, 2021 to March 1, 2021 has been 1.27 percent.

In calculating the expected market returns, I applied the DCF construct to the S&P 500 companies essentially using the same approach that Mr. Cochrane followed, but for the DCF growth components, I use not only earnings growth projections, but also the latest Value Line

dividends and book value growth projections to derive three capitalization-weighted estimates of the expected market return.

**Q. How did you derive the Single-Stage DCF-based market return estimates?**

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

| <b>Table 1: Single-Stage DCF Market&gt;Returns-Based CAPM ROE Estimates</b> |                                    |                                                       |                              |
|-----------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------|------------------------------|
|                                                                             | <b>CAPM1</b>                       | <b>CAPM2</b>                                          | <b>CAPM3</b>                 |
|                                                                             | <b>Dividend-Paying S&amp;P 500</b> |                                                       | <b>All S&amp;P 500</b>       |
|                                                                             | <i>EPS growth projection</i>       | <i>Average EPS, DPS &amp; BVPS growth projections</i> | <i>EPS growth projection</i> |
| DCF Market Return (a)                                                       | 12.22                              | 11.68                                                 | 14.13                        |
| Risk Free Return (b)                                                        | 1.27                               | 1.27                                                  | 1.27                         |
| Market Beta (c)                                                             | 0.99                               | 0.99                                                  | 0.98                         |
| Risk Premium (a)-(b)                                                        | 10.95                              | 10.41                                                 | 12.85                        |
| Beta adjusted RP (d) = ((a)-(b))/(c)                                        | 11.08                              | 10.54                                                 | 13.17                        |
| Proxy group beta (e)                                                        | 0.81                               | 0.81                                                  | 0.81                         |
| CAPM ROE estimate (b)+(e)* (d)                                              | 10.25                              | 9.81                                                  | 11.94                        |

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

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

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

10 A. Schedule PKC-11 reports the OCA analyses that rely on Value Line data latest as of  
11 February 17, 2021. The resulting expected market returns for the apposite Value Line samples  
12 are 12.22 percent, 11.68 percent and 14.13 percent; *see* Table 1. For these estimates, I  
13 appropriately adjusted the market capitalization weights to ensure that the weights added up to  
14 one for the different samples associated with the estimations. Also, in deriving the projected  
15 dividend yields, I applied the same approach that Mr. Cochrane used in his testimony.

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

17 A. To derive the market risk premium, the difference between the relevant market return and  
18 the bond yield is *divided* by the market-capitalization weighted mean of Value Line betas of the  
19 constituent stocks. Doing so is appropriate, as the market proxy in the derivation of the Value  
20 Line betas (that would be associated with a beta of one) is expected to be different from that  
21 associated with the S&P 500 universe. The betas associated with the proxy groups associated  
22 with estimates CAPM1, CAPM2, and CAPM3 are 0.988, 0.988 and 0.976, respectively.

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

A. When only the dividend-paying subset of stocks in the S&P 500 index is considered, and only EPS growth projections are relied upon to measure the market returns, the estimate of equity risk premium is (12.22 percent *less* 1.27 percent) divided by 0.988, which is the market-capitalization weighted mean Value Line beta for the dividend-paying subset of the sample. The estimate is 11.08 percent.

The same approach was employed to derive the second estimate of the market risk premium relying on the average of EPS, DPS, and BVPS growth projections and information from only dividend-paying S&P 500 stocks. The estimate is 10.54 percent.<sup>39</sup>

Finally, using all stocks in the S&P 500 index, when only EPS growth projections are relied upon to measure the DCF-based market returns, the estimate for equity risk premium, is 13.17 percent.

**Q. What are the estimates of the cost of equity for the EnergyNorth proxy group based on Single-Stage DCF Market Returns?**

A. The last row of Table 1 reports the three estimates. CAPM1, CAPM2 and CAPM3 ROE estimates are 10.25 percent, 9.81 percent and 11.94 percent, respectively.

#### **IV.B.2 CAPM Estimation Using Three-Stage DCF-based Market Returns**

**Q. Describe how the derivation of Three-Stage DCF-based Market Returns differs from the approach used in the derivation of the Single-Stage DCF-based Market Returns.**

A. The two approaches differ only with respect to how the growth component is handled. In the Three-Stage DCF approach, for the first five years into the future, the growth components are assumed to be the same as the one used in the Single-Stage DCF methods. For the sixth year to

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<sup>39</sup> All numbers reported here are rounded.

1 the tenth year, we assume the “Single-Stage” growth components transitions linearly to the  
2 terminal growth rate for each company included in the S&P 500 portfolio. The approach used is  
3 essentially the same as the one that was used in Subsection IV.A.2, but recognizing that S&P 500  
4 companies tend to be, relatively speaking, high growth companies initially and that many are in  
5 the early stages of their existence, I have used 7.50 percent as the terminal growth rate. As was  
6 noted previously, in running the model, I have used the same Excel Macro that Mr. Cochrane  
7 had used for his Multi-Stage DCF analysis. I simply made relevant changes to the row numbers  
8 and the column alphabets in the coding to obtain the Three-Stage ROE estimates as reported in  
9 Schedules PKC-12 and PKC-13. The results are summarized in Table 2.

10 **Q. Can you provide additional justification for your choice of the terminal growth**  
11 **rate?**

12 A. Yes. The mix of S&P 500 constituents, as is well understood, can change overtime. In  
13 fact, as an example, TESLA got added to the mix very recently (after the Company filed its  
14 testimony); companies can also drop out. Newly added companies to the S&P 500 index are  
15 often path-breaking and exhibit very high growth rates in their early stages of existence. That  
16 tends to skew the growth upwards. I find that the historical average of around 7 percent for S&P  
17 500 EPS growth rate (1960-2018, See Woolridge Testimony, DE 19-064, Bates page 75, lines 1-  
18 7), and an average of 7.6 percent over 2002 to 2020,<sup>40</sup> suggests that the chosen terminal growth  
19 rate is reasonable.

20 **Q. What are the estimates of the cost of equity for the EnergyNorth proxy group based**  
21 **on Three-Stage DCF Market Returns?**

---

<sup>40</sup> See <https://einvestingforbeginners.com/historical-eps-data-for-the-sp-500-20-years-of-average-yoy-growth/>



- 1 A. The last row of Table 2 reports the two estimates. CAPM4 and CAPM5 ROE estimates  
2 are 8.13 percent and 8.06 percent, respectively.

| <b>Table 2: Three-Stage DCF Market&gt;Returns-Based CAPM ROE Estimates</b> |                              |                                                       |
|----------------------------------------------------------------------------|------------------------------|-------------------------------------------------------|
|                                                                            | <i>EPS growth projection</i> | <i>Average EPS, DPS &amp; BVPS growth projections</i> |
|                                                                            | CAPM4                        | CAPM5                                                 |
| DCF Market Return (a)                                                      | 9.73%                        | 9.61%                                                 |
| Risk Free Return (b)                                                       | 1.27%                        | 1.27%                                                 |
| Market Beta (c)                                                            | 0.999                        | 0.996                                                 |
| Risk Premium (a)-(b)                                                       | 8.46%                        | 8.34%                                                 |
| Beta adjusted RP (d) = ((a)-(b))/(c)                                       | 8.47%                        | 8.38%                                                 |
| Proxy group beta (e)                                                       | 0.81                         | 0.81                                                  |
| CAPM ROE estimate (b)+(e)* (d)                                             | 8.13%                        | 8.06%                                                 |

- 3  
4 **Q. Please summarize the findings from the CAPM analyses.**

- 5 A. The average of the all of the CAPM estimates is 9.64 percent. But, when the growth  
6 estimates are based on EPS, DPS, and BVPS growth projections (CAPM1, CAPM2 and  
7 CAPM5), the average is 9.37 percent. As noted previously, we do not recommend relying on the  
8 CAPM approach in setting the allowed return on equity, but the analyses are still useful as  
9 checks.

10  
11 **IV.C Conclusion**

- 12 **Q. What is your recommendation on the allowed rate of return on equity?**

- 13 A. When we consider all methods (DCF and CAPM equally weighted), inclusive of  
14 estimations using EPS growth projections, the average ROE estimate is 9.18 percent.<sup>41</sup>

<sup>41</sup> For all of the DCF estimations here we have applied the outlier determination screening previously discussed.

1 Considering all methods (DCF and CAPM weighted equally), but excluding the estimations  
2 using EPS growth projections, the average ROE is 8.95 percent.

3 When we rely only on the DCF estimations, inclusive of estimates based solely on EPS  
4 growth projections, the average ROE estimate is 8.71 percent. When we exclude the estimates  
5 based solely on EPS growth projection, the average ROE estimate is 8.53 percent.

6 In view of our preferred reliance on the DCF approach, and considering how  
7 EnergyNorth/Algonquin (AQN) compares with the OCA proxy, the OCA recommends an  
8 allowed ROE of 8.90 percent. As for a reasonable range for the allowed ROE, the OCA  
9 recommends 8.80 percent to 9.00 percent.

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

11 **A.** Yes, it does.