

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION

Complainant,

v.

NORTHWEST NATURAL GAS
COMPANY,

Respondent.

DOCKET UG- _____

NORTHWEST NATURAL GAS COMPANY

Direct Testimony of Dr. Bente Villadsen

RATE OF RETURN ON EQUITY

Exh. BV-1CT

REDACTED VERSION

December 18, 2020

DIRECT TESTIMONY OF DR. BENTE VILLADSEN**Table of Contents**

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1 I. INTRODUCTION

2 **Q1: Please state your name, occupation, and business address for the record.**

3 A1: My name is Bente Villadsen and I am a Principal of The Brattle Group, whose business
4 address is One Beacon Street, Suite 2600, Boston, Massachusetts, 02108.

5 **Q2: Briefly describe your education and professional qualifications.**

6 A2: I have more than 20 years of experience working with regulated utilities on cost of
7 capital and related matters. My practice focuses on cost of capital, regulatory finance,
8 and accounting issues. I am the co-author of the text, “Risk and Return for Regulated
9 Industries” and a frequent speaker on regulated finance at conferences and webinars. I
10 have testified or filed expert reports on cost of capital in Alaska, Arizona, California,
11 Illinois, Michigan, New Mexico, New York, Oregon, and Washington, as well as
12 before the Bonneville Power Administration, Federal Energy Regulatory Commission
13 (“FERC”), the Surface Transportation Board, the Alberta Utilities Commission, the
14 Ontario Energy Board, and Mexico’s Comisión Reguladora de Energía. I have
15 provided white papers on cost of capital to the regulators in Australia, Canada, and
16 Europe. I have testified or filed testimony on regulatory accounting issues before
17 FERC, the Regulatory Commission of Alaska, the Michigan Public Service
18 Commission, the Texas Public Utility Commission as well as in international and U.S.
19 arbitrations and regularly provide advice to utilities on regulatory matters as well as
20 risk management.

21 I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus,
22 Denmark. Exhibit BV-2 (Exh. BV-2) contains more information on my professional
23 qualifications as well as a list of my prior testimonies and publications.

1 **Q3: What is the purpose of your testimony in this proceeding?**

2 A3: Northwest Natural Gas Company d/b/a/ NW Natural (“NW Natural” or the
3 “Company”) has asked me to estimate the cost of equity that the Washington Utilities
4 and Transportation Commission (the “Commission”) should allow NW Natural an
5 opportunity to earn on the equity financed portion of its regulated gas utility rate base
6 in Washington for the period beginning November 1, 2021 to coincide with the
7 effective date of the annual Purchased Gas Adjustment (“PGA”) rate change. I also
8 consider the relative risk of the Company and its proposed regulatory capital structure
9 ratio to arrive at my recommendation for the allowed Return on Equity (“ROE”).

10 **II. SUMMARY OF CONCLUSIONS**

11 **Q4: Do you have any preliminary comments regarding the appropriate ROE?**

12 A4: The current determination of NW Natural’s allowed ROE takes place during uncertain
13 economic and financial conditions due to the ongoing impacts of the COVID-19
14 pandemic, which has led to unprecedented low U.S. Treasury bond yields, substantial
15 stock and commodity price declines, while at the same time measures of volatility
16 spiked to all-time highs and remain elevated compared to long-term averages.
17 Measures of the premium that investors require over and above the risk-free rate to
18 invest in equities and bonds have increased as well. Going forward, the length and
19 extent of the impacts of the pandemic are not known and will depend on how measures
20 impacting commerce stay in place and when a vaccine becomes widely available.¹ In
21 light of this uncertainty, it is important to assure investors that the allowed ROE and

¹ I acknowledge that all of society has been impacted to a degree not seen in decades, but I focus my discussion on the financial and economic impacts in this report.

1 capital structure is such that NW Natural can continue to raise the needed capital to
2 continue to provide safe, adequate and reliable service to its customers, while also
3 providing a return that is comparable to those that investors expect.

4 NW Natural's allowed ROE in its most recent approved Washington rate case
5 dated October 21, 2019² was determined in an all-party settlement at 9.4 percent
6 approved by the Commission. At that time, the Chicago Board of Options Exchange's
7 CBOE Volatility Index ("VIX") was 14.0 whereas just a few months later on March
8 16, 2020, the VIX reached an all-time high of 82.69 and has remained at an elevated
9 level since then. The VIX is currently at 23.84 and has averaged approximately 30.15
10 in 2020 (to November 18).³ Similarly, Bloomberg's estimation of the market risk
11 premium ("MRP") was at 7.0 percent in October 2019 and reached a high of 9.8 percent
12 in March 2020 and is currently at 7.69 percent.⁴ Simply put, the financial markets are
13 in extreme turmoil, which has had negative impacts on investors, not just in terms of
14 returns but also with regard to volatility and risk. However, it is important to look to
15 stability in investors' allowed returns and recognize that the currently low Treasury
16 yields are not reflective of a low cost of equity. Specifically, the data points to a higher
17 return on equity today than at the time of the implementation of NW Natural's prior
18 Commission-approved rate case settlement in October 2019. That is, if we assume that
19 9.4 percent was appropriate in October 2019, then the ROE estimated today must be

² Washington Utilities and Transportation Commission v. Northwest Natural Gas d/b/a NW Natural, Docket UG-181053, Order 06 (Oct. 21, 2019).

³ Bloomberg, as of November 18, 2020.

⁴ *Id.*, measured over a 10-year bond.

1 higher. I provide more discussion of the current capital market conditions and their
2 impact on the ROE for NW Natural in Washington in Section IV.

3 When evaluating the cost of equity, it is also important to consider business
4 risks as long-term development for natural gas distribution utilities, such as NW
5 Natural. These long-term business risks have become more uncertain. While cities
6 within NW Natural's Washington service territory have not imposed bans on gas hook-
7 ups, cities such as Berkeley, California, have imposed bans on natural gas hook-ups in
8 new buildings. At the same time, the construction of natural gas infrastructure has
9 become increasingly challenging, which makes the natural gas utility industry face
10 higher risks. I further discuss how these and other business risk factors affect the cost
11 of equity in Section VI.

12 **Q5: Please summarize your recommendations for NW Natural's ROE.**

13 A5: I find a lower bound for NW Natural's cost of equity is the ROE granted most recently,
14 9.4 percent, and an upper bound of is 10.25 percent on 49 percent equity and
15 recommend conservatively that NW Natural's cost of equity is 9.9 percent at the
16 requested 49 percent equity capital structure.⁵ The recommendation is based on my
17 finding that a reasonable range for gas local distribution companies ("LDCs") cost of
18 equity is in the range of slightly below 9½ to 10¼ percent and reflects NW Natural's
19 business risk. This recommendation is based on my implementation of standard cost
20 of capital estimation models including two versions each of the Discounted Cash Flow
21 ("DCF") model and the Capital Asset Pricing Model ("CAPM"), as well as an Implied

⁵ I note that in the Direct Testimony of Zachary Kravitz (Exh. ZDK-1T), NW Natural is requesting a ROE of 9.4 percent.

1 Risk Premium analysis and an analysis of NW Natural’s business risk. Figure 1 below
2 summarizes the model results using the requested 49 percent equity capital structure.
3 The table also presents the corresponding reasonable ranges, which I discuss further in
4 Section V below. Based on my consideration of the results from the various cost of
5 capital estimation models as well as the context of Washington and NW Natural’s
6 specific risk, I believe it is appropriate to place NW Natural’s allowed return in the
7 upper half of the reasonable ranges.

8 **Figure 1: Summary of Reasonable Ranges of Estimates at 49% Equity**

	Gas Sample	Full Sample
CAPM/ ECAPM	9.5% - 10.25%	9.5% - 10.0%
DCF	9.9% (9.5% – 10.25%)	8.7% - 9.9%
Risk Premium	9.3% - 9.5%	N/A

Note: Full sample considers both natural gas and water proxy companies

9 Using NW Natural’s requested 49 percent equity capital structure, I find a range
10 of about 9.4 percent to 10.25 percent rate of return on equity to be within a reasonable
11 range using a sample of regulated natural gas distribution utilities. Consequently, a
12 lower bound on NW Natural’s cost of equity is that currently allowed. I further support
13 that range by using a sample of highly regulated water utilities, which confirm the
14 reasonable range of estimates. In the current environment, where there has been
15 considerable consolidation of the natural gas industry and regulatory initiatives to
16 switch from natural gas to alternative sources of energy, I find it beneficial to confirm
17 the estimates by additional companies using a sample of highly regulated water utilities

1 that are in my opinion the closest to a gas LDC sample. I provide a further explanation
2 in Section V below.

3 **Q6: Given your recommendation to set the Company's ROE at 9.9 percent, how do**
4 **you view the Company's proposal to maintain its current Commission approved**
5 **ROE of 9.4 percent?**

6 A6: Based on my understanding of NW Natural's proposal, the Company is taking the
7 unusual step of seeking to establish the Company's ROE at the lowest point on my
8 recommended range of ROE at 9.4 percent to maintain its most recently approved ROE.
9 While this is unusual for a utility to divert from my recommended ROE – in this case
10 9.9 percent – these are unusual times, and I understand the broader context of NW
11 Natural's decision. The COVID-19 pandemic is an extraordinary event that has
12 reshaped most of our lives, and many have faced health and financial hardships that
13 could never be anticipated just one year ago. The Company's requested ROE of 9.4
14 percent seeks to limit the rate impact of this rate case on its customers by proposing the
15 lowest ROE on my recommended range, which would maintain its current ROE
16 through the Company's rate plan and until its next rate case. While in my expert
17 witness capacity, I would not recommend utilizing the lowest point of my range, I
18 recognize the Company's proposal is based on factors outside of my analysis. Finally,
19 the Company's proposal is still within my recommended range, and thus supported by
20 my testimony.

21 **Q7: How is the remainder of your testimony organized?**

22 A7: Section III formally defines the cost of capital and explains the techniques for
23 estimating it in the context of utility rate regulation. Section IV discusses conditions

1 and trends in capital markets and their impacts on the cost of capital. Section V
2 explains my analyses and presents the results. Section VI discusses NW Natural's
3 business risk characteristics, unique risks facing Washington-based natural gas utilities
4 and other business risks specific to NW Natural that are relevant to my recommended
5 allowed ROE. Finally, Section VII concludes with a summary of my
6 recommendations.

7 **III. COST OF CAPITAL PRINCIPLES AND APPROACH**

8 **A. Risk and the Cost of Capital**

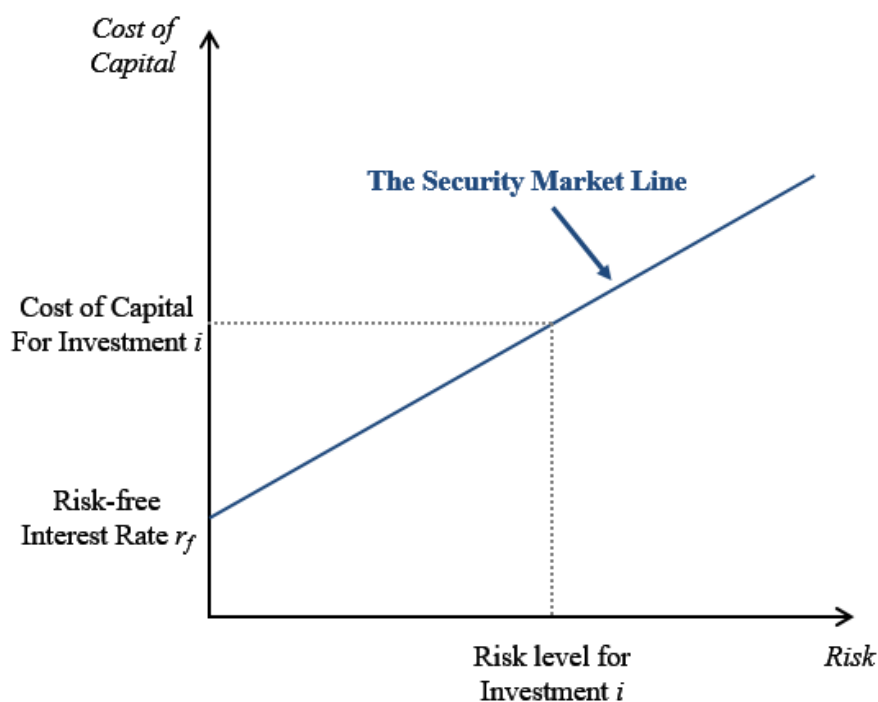
9 **Q8: How is the "Cost of Capital" defined?**

10 A8: The cost of capital is defined as the expected rate of return in capital markets on
11 alternative investments of equivalent risk. Put differently, it is the rate of return
12 investors require based on the risk-return alternatives available in competitive capital
13 markets. The cost of capital is a type of opportunity cost: it represents the rate of return
14 that investors could expect to earn elsewhere without bearing more risk. "Expected" is
15 used in the statistical sense: the mean of the distribution of possible outcomes. The
16 terms "expect" and "expected," as in the definition of the cost of capital itself, refer to
17 the probability-weighted average over all possible outcomes.

18 The definition of the cost of capital recognizes a tradeoff between risk and
19 return that can be represented by the "security market risk-return line" or "Security
20 Market Line" for short. This line is depicted in Figure 2 below. The higher the risk,
21 the higher the cost of capital required.

1

Figure 2: The Security Market Line



2 **Q9: What factors contribute to systematic risk for an equity investment?**

3 A9: When estimating the cost of equity for a given asset or business venture, two categories
4 of risk are important. The first is business risk, which is the degree to which the cash
5 flows generated by the business (and its assets) vary in response to moves in the broader
6 market. In context of the CAPM, business risk can be quantified in terms of an “assets
7 beta” or “unlevered beta.” For a company with an assets beta of 1, the value of its
8 enterprise will increase (decrease) by 1 percent for a 1 percent increase (decline) in the
9 market index.

10 The second category of risk relevant for an equity investment depends on how
11 the business enterprise is financed and is called financial risk. Section B below explains
12 how financial risk affects the systematic risk of equity.

1 **Q10: What are the guiding standards that define a just and reasonable allowed rate of**
2 **return on rate-regulated utility investments?**

3 A10: The seminal guidance on this topic was provided by the U.S. Supreme Court in the
4 *Hope* and *Bluefield* cases,⁶ which found that:

- 5 • The return to the equity owner should be commensurate with returns on investments
6 in other enterprises having corresponding risks;⁷
- 7 • The return should be reasonably sufficient to assure confidence in the financial
8 soundness of the utility; and
- 9 • The return should be adequate, under efficient and economical management for the
10 utility to maintain and support its credit and enable it to raise the money necessary
11 for the proper discharge of its public duties.⁸

12 **Q11: How does the standard for a just and reasonable allowed rate of return relate to**
13 **the cost of capital?**

14 A11: The first component of the *Hope* and *Bluefield* standard, as articulated above, is directly
15 aligned with the financial concept of the opportunity cost of capital.⁹ The cost of capital

⁶ *Bluefield Water Works & Improvement Co. v. Public Service Com'n of West Virginia*, 262 U.S. 679 (1923) (“*Bluefield*”), and *Federal Power Com'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944) (“*Hope*”).

⁷ *Hope*, 320 U.S. at 603.

⁸ *Bluefield*, 262 U.S. at 680.

⁹ A formal link between the opportunity cost of capital as defined by financial economics and the proper expected rate of return for utilities was developed by Stewart C. Myers, “Application of Finance Theory to Public Utility Rate Cases,” *Bell Journal of Economics & Management Science* 3:58-97 (1972).

1 is the rate of return investors can expect to earn in capital markets on alternative
2 investments of equivalent risk.¹⁰

3 By investing in a regulated utility asset, investors are tying up some capital in
4 that investment, thereby foregoing alternative investment opportunities. Hence, the
5 investors are incurring an “opportunity cost” equal to the returns available on those
6 alternative investments. The allowed return on equity needs to be at least as high as
7 the expected return offered by alternative investments of equivalent risk or investors
8 will choose these alternatives instead. If it is not, the utility’s ability to raise capital
9 and fund its operations will be negatively impacted. This is a fundamental concept in
10 cost of capital proceedings for regulated utilities such as NW Natural.

11 **Q12: Please summarize how you considered risk when estimating the cost of capital.**

12 A12: To evaluate comparable business risk, I looked to a proxy group of regulated natural
13 gas and water utilities. The natural gas and water utilities I consider have a high
14 proportion of regulated assets and revenue with the majority having more than 80
15 percent of assets subject to regulation. Additionally, they all have a network of assets
16 that are used to serve end-use customers and they are capital intensive (meaning that
17 each dollar in revenue requires substantial investment in fixed assets). Further (as
18 explained in Section B below), I analyzed and adjusted for differences in financial risk
19 due to different levels of financial leverage among the proxy companies and between
20 the capital structures of the proxy companies and the regulatory capital structure that

¹⁰ The opportunity cost of capital is also referred to as simply the “cost of capital,” and can be equivalently described in terms of the “required return” needed to attract investment in a particular security or other asset (i.e., the level of expected return at which investors will find that asset at least as attractive as an alternative investment).

1 will be applied to NW Natural for ratemaking purposes. To determine where in the
2 estimated range of NW Natural's ROE reasonably falls, I compared the business risk
3 of NW Natural to that of the proxy group companies.

4 **B. Financial Risk and the Cost of Equity**

5 **Q13: How does capital structure affect the cost of equity?**

6 A13: Debt holders in a company have a fixed claim on the assets of the company and are
7 paid prior to the company's owners (equity holders) who hold the inherently variable
8 residual claim on the company's operating cash flows. Because equity holders only
9 receive the profit that is left over after the fixed debt payments are made, higher degrees
10 of debt in the capital structure amplify the variability in the expected rate of return
11 earned by equity-holders. This phenomenon of debt resulting in financial leverage for
12 equity holders means that, all else equal, a greater proportion of debt in the capital
13 structure increases risk for equity holders, causing them to require a higher rate of
14 return on their equity investment, even for an equivalent level of underlying business
15 risk.

16 **Q14: How do differences in financial leverage affect the estimation of the cost of**
17 **equity?**

18 A14: The DCF models and the CAPM rely on market data to estimate the cost of equity for
19 the proxy companies, so the results reflect the value of the capital that investors hold
20 during the estimation period (market values).

21 The authorized ROE is applied to the regulatory equity portion of NW Natural's
22 rate base. Because the cost of equity is measured using a group of proxy companies, it
23 may well be the case that these companies finance their operations with a different debt

1 and equity proportion than the proportion the Commission allows in NW Natural's rate
2 base. Specifically, the DCF models (and the CAPM) measure the cost of equity using
3 market data and consequently are measures of the cost of equity using the proportion
4 of debt and equity that is inherent in that data. Therefore, I consider the impact of any
5 difference between the financial risk inherent in those cost of equity estimates and the
6 capital structure used to determine NW Natural's required return on equity.

7 Differences in financial risk due to the different degree of financial leverage in
8 NW Natural's regulatory capital structure compared to the capital structures of the
9 proxy companies mean that the equity betas measured for the proxy companies must
10 be adjusted before they can be applied in determining NW Natural's return on equity.
11 Similarly, the cost of equity measured by applying the DCF models to the proxy
12 companies' market data requires adjustment if it is to serve as an estimate of the
13 appropriate allowed ROE for NW Natural at the regulatory capital structure the
14 Commission grants.

15 Importantly, taking differences in financial leverage into account does not
16 change the value of the rate base. Rather, it acknowledges the fact that a higher degree
17 of financial leverage in the regulatory capital structure imposes a higher degree of
18 financial risk for an equity investment in NW Natural's rate base than is experienced
19 by equity investors in the market-traded stock of the less leveraged proxy companies.

1 **Q15: How specifically do you consider financial risk in your analysis using market**
2 **data for the proxy group companies?**

3 A15: The impact of financial risk is taken into account in an analysis of cost of equity using
4 market-based models such as the DCF and CAPM in several manners.¹¹ One way is to
5 determine the after-tax weighted-average cost of capital for the proxy group using the
6 equity and debt percentages as the weight assigned to the cost of equity and debt.
7 Financial theory holds that for a given level of business risk, the weighted average cost
8 of capital is constant over a broad set of capital structures, i.e., the weighted average
9 cost of capital is the same at, for example, 55 and 45 percent equity, as the cost of
10 equity increases as the percentage of equity decreases. I estimate the weighted cost of
11 capital for each utility in the proxy group based on that utility's capital structure. I then
12 evaluate the average weighted cost of capital across the proxy group. Once the
13 weighted cost of capital is determined for the proxy group, I can then determine the
14 cost of equity that is required at NW Natural's capital structure. This approach assumes
15 that the after-tax weighted average cost of capital is constant for a range that spans the
16 capital structures used to estimate the cost of equity and the regulatory capital structure.

17 A second approach was developed by Professor Hamada, who estimated the
18 cost of equity using the CAPM and made comparisons between companies with
19 different capital structures using beta. Specifically, in the Hamada approach, I use the
20 estimated beta to calculate what beta would be associated with a 100 percent equity

¹¹ The impact of financial leverage on the risk premium model needs to be considered separately as it uses regulatory data rather than market data, meaning that differences in regulatory capital structures are relevant for this model.

1 financed firm to obtain a so-called all-equity or assets beta and then re-lever the beta to
2 determine the beta associated with the regulatory capital structure. This requires an
3 estimate of the systematic risk associated with debt (i.e., the debt beta), which is usually
4 quite small. In Exhibit BV-3 (Exh. BV-3), I set forth additional technical details
5 regarding the methods that can be used to account for financial risk when estimating
6 the cost of capital.

7 **Q16: Can you provide a numerical illustration of how the cost of equity changes, all**
8 **else being equal, when the degree of leverage changes?**

9 A16: Yes. I constructed a simple example below, where only the leverage of a company
10 varies. I assumed the return on equity is 11.00 percent at a 50 percent equity capital
11 structure and determine the return on equity that would result in the same overall return
12 if the percentage of equity in the capital structure were reduced to 45 percent.

13 **Figure 3: Illustration of the Impact of Financial Risk on ROE**

		Company A (50% Equity)	Company B (45% Equity)
Rate Base	[a]	\$1,000	\$1,000
Equity	[b]	\$500	\$450
Debt	[c]	\$500	\$550
Total Cost of Capital (8%)	[d] = [a] × 8%	\$80.0	\$80.0
Cost of Debt (5%)	[e] = [c] × 5%	\$25.0	\$27.5
Equity Return	[f] = [d] - [e]	\$55.0	\$52.5
Rate of Return on Equity (ROE)	[g] = [f] / [b]	11.00%	11.67%

14 Figure 3, above, illustrates how financial risk¹² affects returns and the ROE. The
15 overall return remains the same for Company A and B at \$80. But Company B with

¹² Financial risk is risk that a company has due to its capital structure; specifically, the higher a company's debt, the larger the financial risk.

1 the lower equity share and higher financial leverage must earn a higher percentage ROE
2 in order to maintain the same overall return. This higher percentage allowed ROE
3 represents the increased risk to equity investors caused by the higher degree of
4 leverage. Importantly, regardless of the equity percentage, customers will pay \$80 in
5 capital costs – the only difference between the two companies is how that \$80 is
6 sourced between equity and debt holders.

7 The principle illustrated in Figure 3 is an example of the first adjustment I
8 performed to account for differences in financial risk when conducting estimates of the
9 cost of equity applicable to NW Natural.

10 **Q17: Does this approach apply to the risk premium analysis?**

11 A17: Yes, to the extent that there are differences between the capital structures of the
12 companies used to determine the benchmark ROE and NW Natural, I need to consider
13 whether I am comparing apples to apples. However, because the allowed ROE usually
14 applied to book value capital structures, it is the book value capital structure that is
15 relevant for the risk premium method. Further, the average book value capital structure
16 for natural gas utilities for which I have allowed ROE data for, the past has been close
17 to that of NW Natural, I do not need to make any adjustments to the estimated ROE. I
18 note, however that for 2020, the average and median allowed equity percentage was
19 52.2 percent and 52.9 percent, respectively.¹³ Given NW Natural's lower than average
20 or median equity percentage, the Company's ROE ought to exceed that of the average
21 and median, all else equal.

¹³ S&P Global Market Intelligence, "Rate Case History" Online version as of October 1, 2020.

1 **C. Approach to Estimating the Cost of Equity**

2 **Q18: Please describe your approach for determining the cost of equity for NW**

3 **Natural.**

4 A18: As stated above, the standard for establishing a fair rate of return on equity requires
5 that a regulated utility be allowed to earn a return equivalent to what an investor could
6 expect to earn on an alternative investment of equivalent risk. Therefore, my approach
7 to estimating the cost of equity for NW Natural focuses on measuring the expected
8 returns required by investors to invest in companies that face business and financial
9 risks comparable to those faced by NW Natural. Because certain models require
10 market data, my consideration of comparable companies is restricted to those that have
11 publicly traded stock. To this end, I have selected two proxy groups consisting of
12 publicly traded companies. The first proxy group consists of companies providing
13 primarily regulated natural gas distribution services and the second proxy group
14 consists of highly regulated companies in the water utility industry.¹⁴ I consider both
15 the natural gas distribution sample and the full sample when deriving estimates of the
16 representative cost of equity according to standard financial models, including two
17 versions of the DCF.

¹⁴ I consider both a natural gas distribution utility sample (because NW Natural is a natural gas distribution utility) and a sample including water utilities. The latter sample has the advantage of being highly regulated and, like gas distribution utilities, being engaged in distributing a commodity through an extensive network of pipes. Additionally, there is no substitute for water, while there are initiatives to substitute gas for renewable sources. As a result, the estimates from water companies are less influenced by individual state policies or changing federal policies than those of the natural gas companies – i.e., they reflect to a larger degree the fundamental risks of regulated utilities. Lastly, the number of companies in the natural gas distribution industry has been reduced due to mergers and acquisitions, so the water utility industry serves to increase the number of available, fully regulated utilities that serve customers through a network of pipes.

1 I also perform an analysis of historical allowed ROEs for gas LDCs in relation
2 to prevailing risk-free interest rates at the time the ROE was authorized, and use the
3 implied allowed risk-premium relationship to estimate a utility cost of equity consistent
4 with current economic conditions. The results of this implied risk premium analysis
5 (sometimes referred to herein as the “Risk Premium” model) are an additional
6 consideration that supports my recommendation and serves as a check on the
7 reasonableness of my market-based results.

8 **IV. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL**

9 **Q19: What do you cover in this section?**

10 A19: In this section, I address recent changes in capital market conditions, the increased
11 volatility in equity and debt markets, how these factors affect the cost of equity and its
12 estimation. Specifically, I address (i) interest rate developments; (ii) recent changes in
13 utility credit spreads; and (iii) investors perception of the market risk premium.

14 **Q20: Why do you discuss capital market conditions in a testimony aimed at**
15 **determining NW Natural’s ROE?**

16 A20: Capital market conditions are important to cost of equity estimation methodologies and
17 can affect the inputs to the cost of equity models. Inputs to the DCF models are affected
18 by the economy in general as economic growth will affect growth rates and utility stock
19 prices. Consequently, the capital market developments affect the growth rates,
20 dividend yield, and the assessment of estimates’ reasonableness.

21 Furthermore, the risk-free rate is an input to the risk premium model and
22 CAPM, so that recent and expected developments in government bond yields are
23 important to assess the validity of any measure of the risk-free rate. Similarly, the MRP

1 is an input to the CAPM, so factors that affect the MRP (e.g. volatility and changes in
2 investors' risk perceptions) are vital for accurate determination of the ROE.

3 **Q21: Can you provide a summary of recent events, which have impacted capital**
4 **market conditions?**

5 A21: Capital markets have seen historic changes since NW Natural's last rate case in
6 Washington was effective in November 2019. Starting in January 2020, long-standing
7 trade tensions that were weighing on the economy began to ease. The U.S. signed
8 Phase 1 of the U.S.-China Trade Agreement and also the United States-Mexico-Canada
9 Agreement ("USMCA"). However, around the same time, a novel virus was beginning
10 to spread in China and Europe. By March 2020, the World Health Organization
11 declared that the COVID-19 outbreak was a pandemic. Many governments around the
12 world, including in the U.S., sought measures to limit the health and economic impacts
13 from the pandemic. By mid-March, local and state governments began issuing stay-at-
14 home orders and major portions of the U.S. economy were shut down. As a result, over
15 65 million people in the U.S. have filed initial unemployment claims since March 21.¹⁵
16 To help mitigate the economic impacts, the U.S. Federal Government passed the \$2.1
17 trillion CARES Act on March 27, 2020.¹⁶ The U.S. Federal Reserve also cut its policy
18 rate to 0 to 0.25 percent and announced "unlimited" quantitative easing and emergency

¹⁵ U.S. Department of Labor, "Unemployment Insurance Weekly Claims," New Release, November 12, 2020.

¹⁶ The White House, "Statement by the President," March 27, 2020, accessed October 2, 2020,
<https://www.whitehouse.gov/briefings-statements/statement-by-the-president-38/>.

1 liquidity programs to support financial markets.¹⁷ Despite this, the U.S. economy
2 contracted substantially in the first half of 2020. According to the Bureau of Economic
3 Analysis (“BEA”) first and second quarter 2020 GDP decreased by annualized rate of
4 5.0 percent and 31.4 percent, respectively.¹⁸ By June 2020, the National Bureau of
5 Economic Research declared the U.S. was in a recession. As of September 2020, the
6 U.S. unemployment rate stands at 7.9 percent with permanent job losses at 3.8 million,
7 up 2.5 million since February.¹⁹

8 **Q22: What are the expectations going forward?**

9 A22: The extent and length of the economic and financial impacts from COVID-19 are still
10 unknown. The impacts on the economy and unemployment will depend on how long
11 social-distancing measures are required and how long it takes to develop and distribute
12 a vaccine. Recent surveys by economists, such as in the *Blue Chip Economic*
13 *Indicators* survey, indicate that the nominal U.S. GDP will decline by 3.0 percent in
14 2020 before recovery by 5.5 percent in 2021.²⁰ The Congressional Budget Office
15 expects nominal GDP will contract by 5.7 percent in 2020 before recovery by 6.2

¹⁷ U.S. Federal Reserve, “Federal Reserve Announces Extensive New Measures to Support the Economy,”
Press Release, March 23, 2020,
<https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm>.

¹⁸ Bureau of Economic Analysis, “Gross Domestic Product, 2nd Quarter 2020 (Third Estimate); Corporate
Profits, (Revised), U.S. Department of Commerce, September 30, 2020. Accessed October 2, 2020,
<https://www.bea.gov/news/2020/gross-domestic-product-third-estimate-corporate-profits-revised-and-gdp-industry-annual>.

¹⁹ U.S. Department of Labor, “The Employment Situation – September 2020,” News Release, October 2, 2020,
https://www.dol.gov/newsroom/economicdata/empsit_10022020.pdf.

²⁰ Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020, pp. 2-3.

1 percent in 2021.²¹ Longer term, the forecasted nominal GDP growth remains at a bit
2 over 4 percent,²² and that is the figure that impacts the cost of equity estimate in the
3 DCF model. In August, the U.S. Federal Reserve announced a policy change whereby
4 they would target inflation at 2 percent *on average* indicating the Federal Reserve may
5 hold interest rates for longer.²³ After their September 2020 meeting, the Federal
6 Reserve released economic projections indicating that policy rates would remain at
7 current levels through 2023.²⁴ This will likely continue to exert downward pressure on
8 interest rates over the near to medium term. While the length and extent of the
9 economic impacts from COVID-19 are currently unknown, the impacts are expected
10 to persist for some time until a vaccine or some other effective treatment is developed.²⁵

11 **Q23: How does this impact the cost of equity estimation for NW Natural?**

12 A23: It is important to remember that the cost of equity and capital structure established for
13 NW Natural in this proceeding is expected to be in effect beyond the current
14 extraordinary impacts of the COVID-19 pandemic. The analysis and recommendations

²¹ Congressional Budget Office, “An Update to the Economic Outlook: 2020 to 2030,” U.S. Department of Commerce, July 2020. Accessed September 1, 2020, <https://www.cbo.gov/publication/56465>.

²² Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020, p. 14 shows a long-term nominal GDP growth of 4.1 percent. The most recent Congressional Budget Office outlook shows a long-term real growth of 2.2 percent and an inflation rate of 2.0 percent for a nominal growth over 4 percent.

²³ U.S. Federal Reserve, “Federal Open Market Committee announces approval of updates to its Statement on Longer-Run Goals and Monetary Policy Strategy,” August 27, 2020, accessed October 2, 2020, <https://www.federalreserve.gov/newsevents/pressreleases/monetary20200827a.htm>.

²⁴ U.S. Federal Reserve, “Table 1. Economic Projections of Federal Reserve Board members and Federal Reserve Bank presidents under their individual assumptions of projected appropriate monetary policy, September 2020,” September 15, 2020, accessed October 2, 2020, <https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20200916.pdf>.

²⁵ The Federal Reserve in their September 16, 2020 FOMC statement said, “The ongoing public health crisis will continue to weigh on economic activity, employment, and inflation in the near term, and poses considerable risks to the economic outlook over the medium term.” <https://www.federalreserve.gov/newsevents/pressreleases/monetary20200916a.htm>.

1 should reflect expected market conditions that will prevail over the relevant rate period
2 and not exclusively current market conditions. As discussed further below, many of
3 the inputs to the cost of equity estimation methodologies are currently at unprecedented
4 levels. Sole reliance on current economic and financial conditions to estimate NW
5 Natural's cost of equity would unfairly lock NW Natural and their customers into the
6 current economic and financial environment. Doing so would also not provide a fair
7 return, especially when compared to other utilities that did not undergo a cost of capital
8 proceeding during this period. However, the current conditions create an exorbitant
9 amount of uncertainty about the future and, if the financial crisis can be used as a guide,
10 investors' heightened perception of risk are likely to linger.

11 **A. Interest Rates**

12 **Q24: How do interest rates affect the cost of equity?**

13 A24: The current interest rate environment affects the cost of equity estimation in several
14 ways. Most directly, the CAPM takes as one of its inputs a measure of the risk-free
15 rate (see Figure 2). The estimated cost of equity using the CAPM decreases (increases)
16 by one percentage point when the risk free rate decreases (increases) by one percentage
17 point. Therefore, to the extent that prevailing government yields are depressed due to
18 economic uncertainties related to COVID-19 or the monetary policy responses, using
19 current yields as the risk-free rate will depress the CAPM estimate below what is
20 representative of the forward-looking cost of equity, which will be in effect during the
21 relevant regulatory period. Put another way, with current government bond yields
22 downwardly biased due to flight-to-quality behavior by investors and "unlimited"
23 quantitative easing programs by the U.S. Federal Reserve, using current yields in the

1 CAPM will also downward bias the cost of equity estimate. At the same time, a low
2 interest rate is associated with a high market risk premium, so that these two measures
3 offset one another to a degree. To avoid any bias in the cost of equity estimate, it is
4 important to use a forecasted risk-free rate and consider whether the rate needs to be
5 normalized (or the risk premium investors require needs to be adjusted) to ensure the
6 resulting CAPM estimate reflects a non-biased estimate of NW Natural's cost of equity
7 over the relevant regulatory period. As the economy begins to recover, as forecasted,
8 in 2021 interest rates are expected to increase from current lows. Therefore, the
9 allowed fair return on equity for utilities should reflect the future interest rate
10 environment.

11 **Q25: What are the relevant developments regarding interest rates?**

12 A25: Interest rates are currently near historic lows due to flight-to-quality behaviors by
13 investors as well as the Federal Reserve's expansion of its quantitative easing
14 programs. Interest rates on 10-year U.S. Government bonds were at 1.86 percent at the
15 end of 2019.²⁶ As large parts of the economy began to shut down in response to the
16 pandemic, investors fled riskier assets for safer assets. This demand for U.S.
17 government bonds caused bond yields to decrease rapidly. On March 9, 2020, the
18 entire U.S. yield curve fell below 100 bps for the first time in history and the 10-year
19 U.S. government bond yield hit a record low of 0.339 percent.²⁷ Since then, long-term

²⁶ Bloomberg accessed September 1, 2020.

²⁷ Sunny Oh, "Treasury yield curve sinks below 1% after oil and coronavirus worries rout stocks," *Market Watch*, March 9, 2020, accessed March 31, 2020, <https://www.marketwatch.com/story/30-year-treasury-yield-tumbles-below-1-after-oil-and-coronavirus-worries-rout-stocks-2020-03-09>

1 government bond yields have increased somewhat—10 year U.S. Government bond
2 yields are currently at 0.85 percent.²⁸

3 Most economists expect the economy to begin to recover in 2021.²⁹ This is
4 expected to cause interest rates to rise from near-historic lows. Blue Chip Economic
5 Indicators’ (“BCEI”) October 2020 edition forecasts that the yield on 10-year treasury
6 bonds will increase to 0.9 by 2021.³⁰ That is, the consensus forecast is that the yield
7 on long-term treasury bonds will increase from current levels of 0.85 percent.³¹ BCEI
8 projects the 10-year government bond yield will be 1.4 and 1.7 in 2022 and 2023,
9 respectively (Figure 4).³² The expectations for 2021 and onward is what is relevant for
10 this proceeding as rates are expected to be in effect starting in November 2021.
11 Because the risk-free rates are an input to several cost of equity estimation models, the
12 relationship between current and forecasted risk-free rates is an important
13 consideration.

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²⁸ Bloomberg as of November 18, 2020.

²⁹ For example, Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020 collects GDP growth data from 40 financial institutions, academic institutions and other entities – all of whom predict a positive growth for 2021 with an average of 5.5 percent.

³⁰ Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020, p. 3. The historical maturity premium for a 20-year treasury bond over a 10-year treasury bond is approximately 50 basis points.

³¹ Bloomberg, as of November 18, 2020.

³² Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020, p. 14.

1 **Figure 4: Historical and Projected Ten-Year Treasury Bond Yields³³**



2 **B. Yield Spreads**

3 **Q26: Why are bond yield spreads relevant to your cost of equity analysis?**

4 A26: Bond yield spreads (also called credit spreads) reflect the premium that investors
5 demand to hold debt securities (specifically corporate or utility bonds) that are not risk
6 free. Analogously, the Market Risk Premium (MRP)—which is a key input to the
7 CAPM cost of equity estimation—represents the risk premium that investors require to
8 hold equities rather than risk-free government bonds.

9 If bond yields are influenced to some extent by the same underlying market
10 factors that drive the systematic risk premium for equities, shifts in directly observable
11 credit spreads can assist with inference about changes in the MRP, which itself must
12 be estimated.³⁴ More specifically, if both credit spreads and equity premiums are
13 determined in part by the general premium required by investors for bearing systematic

³³ Id.

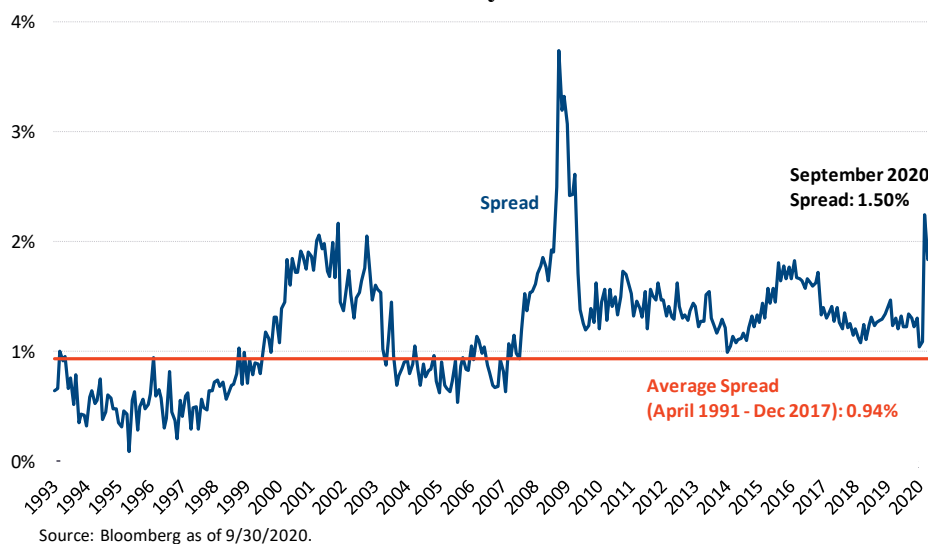
³⁴ This is the same issue as in cost of capital estimation more generally: the cost of debt can often be directly observed in the form of market bond yields, whereas the cost of equity must be estimated based on financial models.

1 risk, then an increase in credit spreads may indicate an increase in the forward-looking
2 MRP.

3 **Q27: How does the current spread between utility and U.S. government bond yields**
4 **compare to historical spreads?**

5 A27: Utility bond yield spreads have increased substantially recently as investors require
6 additional compensation to hold non-government debt due to the increased business
7 risks and economic uncertainties. As shown in Figure 5 below, the spread between 20-
8 year A-rated utility bond yields and 20-year U.S. government bond yields are currently
9 at 1.50 percent, approximately 56 basis points above the pre-financial crisis average of
10 0.94 percent. I note that the spread increased dramatically in early 2020, but has since
11 declined some.

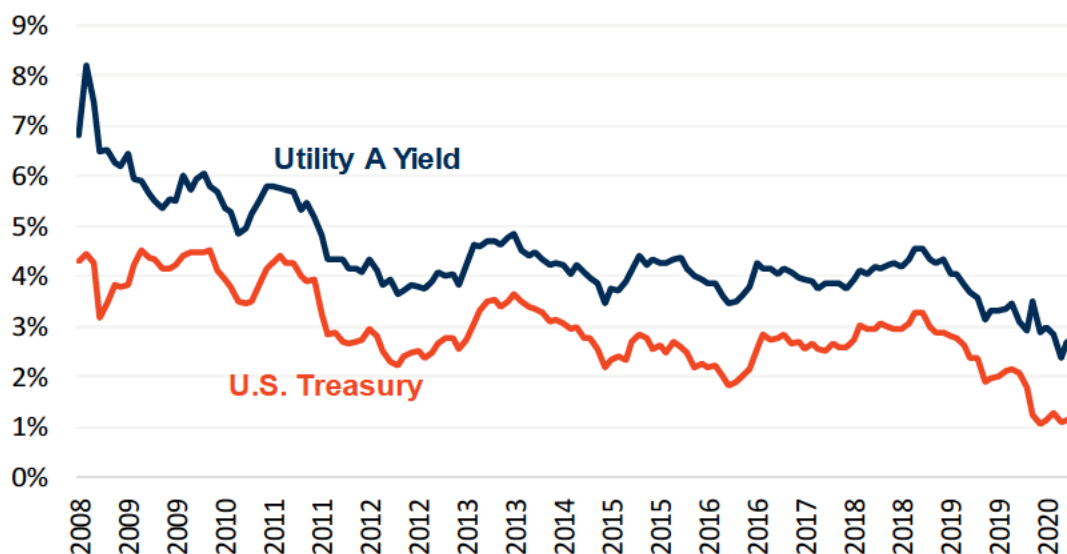
12 **Figure 5: Yield Spread Between Utility A-rated Bond Yields and 20 Year U.S.**
13 **Treasury Bonds**



14 The yield spread is commonly thought to be explained by default risk, taxes,
15 downward pressure on government bond yields due to monetary policy, or the equity
16 risk premium. Hence, an increase in the spread could be caused by any or all of these

1 components. As the default risk has not changed materially for highly rated utility
 2 bonds³⁵ and taxes are a very small portion of the spread, the remaining components:
 3 downward pressure and the equity risk premium must explain the majority of the spread
 4 increase. Figure 6 below illustrates that the increased spread is attributable both to
 5 lower yields on government bonds and also an increased premium required by investors
 6 to hold riskier assets.

7 **Figure 6: Utility A-rated Bond Yields and 20 Year U.S. Treasury Yields**



Source: Bloomberg, data as of September 30, 2020.

8 While spreads have narrowed since the height of the COVID-19 pandemic in
 9 March and April, they remain elevated compared to the pre-COVID-19 period
 10 indicating lingering uncertainty and elevated risk. On April 2, 2020, S&P Global
 11 Ratings downgraded the outlook for North American utilities from “stable” to

³⁵ S&P Ratings reports Utility defaults are down slightly in 2020 versus 2019 year to date. S&P Global Ratings, “Corporate Defaults Slow In The Third Quarter While The Oil and Gas Total Remains High,” October 2, 2020.

1 “negative” due to COVID-19 risks, citing concerns about the adequacy of utilities’
2 financial cushions to weather the financial downturn.³⁶ With heightened concern about
3 utility credit, spreads and risk premiums are likely to remain elevated.

4 **C. Risk Premiums**

5 **Q28: What is the current evidence regarding market volatility?**

6 A28: Recently, financial markets have become extremely volatile as shown in near-term
7 common volatility measures, such as the VIX (Figure 7 below), which is frequently
8 referred to as the market’s fear index. The VIX reached an all-time high of 82.69 on
9 March 16, 2020, which was higher than the peak of 80.86 during the Financial Crisis.
10 Although the VIX has slowly retreated from recent highs to 23.84 currently, it remains
11 elevated relative to the long run average of 19.4.³⁷ Comparably, at the time of NW
12 Natural’s last rate case in Washington (all-party settlement filed October 2019), the
13 VIX stood at approximately 14.0. Clearly, investors are faced with substantially higher
14 volatility today than during NW Natural’s most recent rate case and higher volatility
15 implies a higher risk premium.

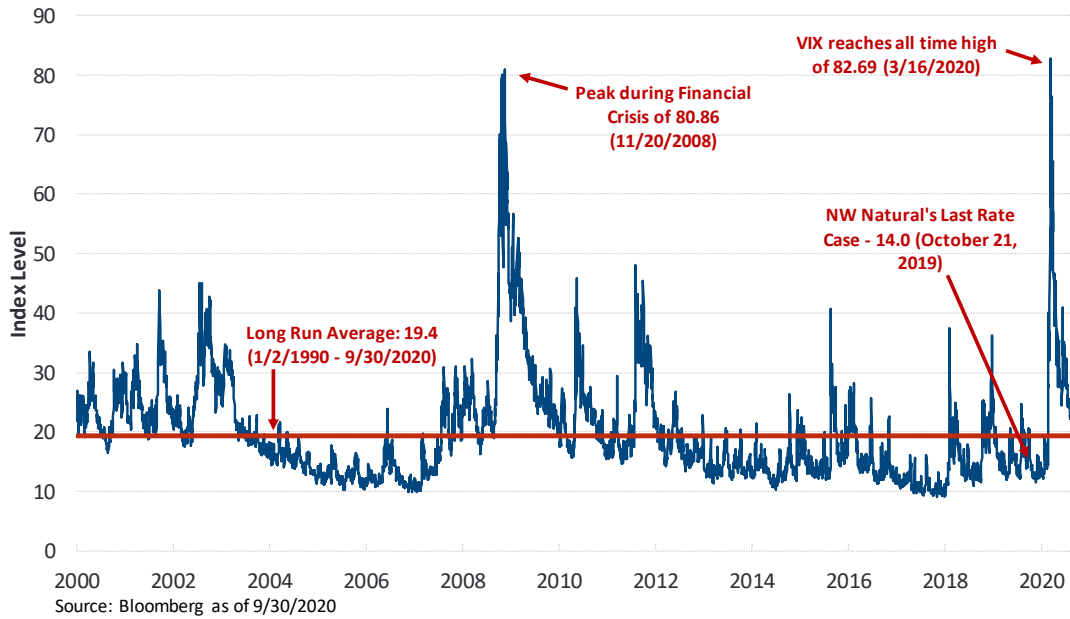
³⁶ For clarity, S&P Global Ratings did not change the outlook for specific utilities, instead the April 2020 outlook revision was for the North American utility industry.

S&P Global Market Intelligence, “S&P lowers North American utilities outlook to negative on coronavirus risk,” April 2, 2020, Accessed April 3, 2020, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/s-p-lowers-north-american-utilities-outlook-to-negative-on-coronavirus-risk-57886477>.

³⁷ Bloomberg, as of November 18, 2020.

1

Figure 7: VIX

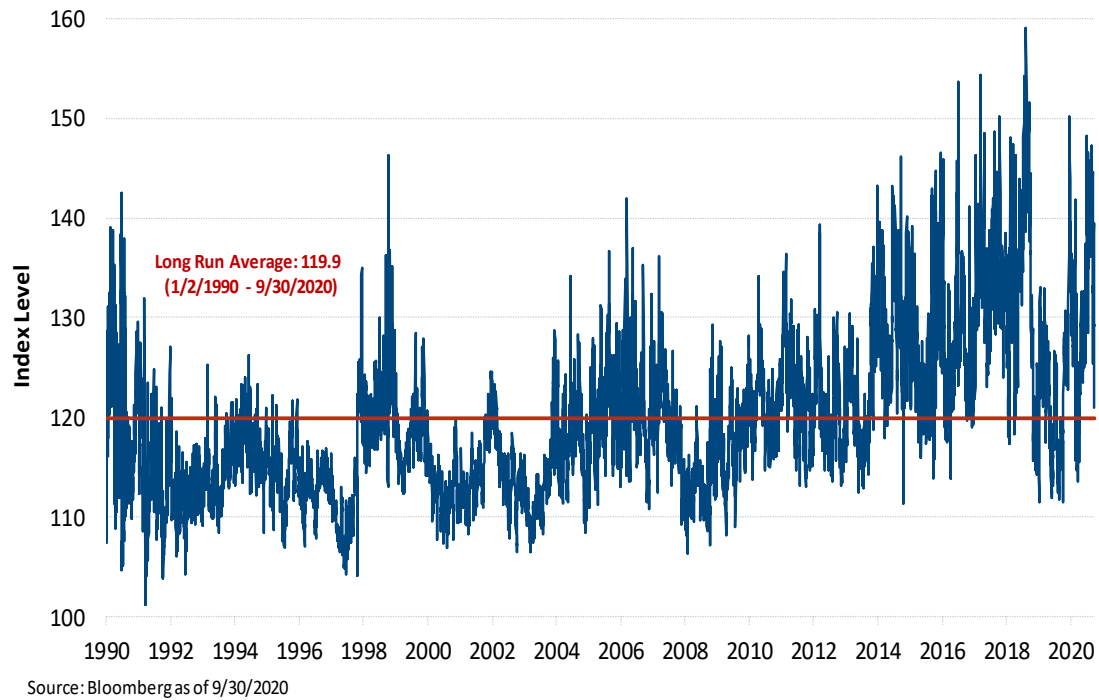


2 Similarly, the SKEW index, which measures the market’s willingness to pay
3 for protection against negative “black swan” stock market events (i.e., sudden
4 substantial downturns),³⁸ shows that investors are cautious. A SKEW value of 100
5 indicates outlier returns are unlikely, but as the SKEW increases, the probability of
6 outlier returns becomes more significant. Figure 8 below shows the development in
7 the SKEW since 2005 and that the index has recently increased following a period of
8 declining SKEW. The index spiked over 148.3 on June 30, 2020, which is 28 points
9 above its long run average of 119.9. The recent spike in the SKEW shows that investors
10 are willing to pay for protection against downside risks.

³⁸ For example, <http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew>.

1

Figure 8: SKEW



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Q29: What is the Market Risk Premium?

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A29: In general, a risk premium is the amount of “excess” return—above the risk-free rate of return—that investors require to compensate them for taking on risk. As illustrated in Figure 2, the riskier the investment, the larger the risk premium investors will require.

11

12

The MRP is the risk premium associated with investing in the market as a whole. Since the so-called “market portfolio” embodies the maximum possible degree

1 of diversification for investors,³⁹ the MRP is a highly relevant benchmark indicating
2 the level of risk compensation demanded by capital market participants. It is also a
3 direct input necessary to estimating the cost of equity using the CAPM and other risk-
4 positioning models.

5 **Q30: Please explain the current evidence related to the Market Risk Premium.**

6 A30: The heightened volatility has increased the premium that investors require to hold risky
7 assets, especially when measured utilizing forward-looking methodologies that
8 estimate expected market returns with reference to current dividend yields. This year,
9 Bloomberg’s forward-looking estimate of the MRP for the U.S. (Figure 9 below)
10 increased to as high as 9.84 percent in March 2020 and is currently at 7.69 percent.⁴⁰
11 At the same time, the MRP measured using FERC’s methodology consistent with
12 FERC Order 569-A increased to 9.00 percent as of September 30, 2020.⁴¹ This is
13 consistent with an increase in the MRP of over 185 basis points relative to the historic
14 average.⁴²

15 ///

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³⁹ In finance theory, the “market portfolio” describes a value-weighted combination of all risky investment assets (e.g., stocks, bonds, real estate) that can be purchased in markets. In practice, academics and financial analysts nearly always use a broad-based stock market index, such as the S&P 500, to represent the overall market.

⁴⁰ Bloomberg, as of November 18, 2020. Measured over a 10-year U.S. Treasury bond.

⁴¹ FERC Opinion No. 569-A, Docket No. EL14-12-004, EL15-45-013, May 21, 2021, FERC Order on Rehearing, see also BV-4, Scheduled BV-18.

⁴² The long-term historical average arithmetic MRP as calculated by Duff & Phelps using the Ibbotson method is 7.15 percent. Source: Duff & Phelps 2019.

1
2

Figure 9: Bloomberg's Daily Market Risk Premium and Risk Free Rate (Nov. 2019 to Sep. 2020)



3 **Q31: Are higher risk premiums relevant given that treasuries are near historic lows?**

4 A31: Yes—this is highly relevant for cost of equity estimation as current risk-free rates are
 5 extremely low. On March 9, 2020, the entire U.S. yield curve settled below 1.00
 6 percent for the first time in history.⁴³ Since then, U.S. Government bond yields have
 7 increased somewhat with the 20-year and 30-year bond yields at or slightly above 1.00
 8 percent. This decrease in bond yields has occurred as investors fled to safer assets due
 9 to the heightened market uncertainty. As shown above in Figure 9, the MRP has also
 10 increased as risk-free rates decreased.

⁴³ According to the Federal Reserve, the yield on the 10-year, 20-year, and 30-year Treasury bonds on March 9, 2020 was 0.54 percent, 0.87 percent, and 0.99 percent respectively. These yields have since increased slightly. Source: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>

1 Further, as shown in both academic and industry analysis, the allowed risk
2 premium over the risk-free rate is inversely related to the risk-free rate. For example,
3 Villadsen et al. (2017) found that the allowed risk premium increases by approximately
4 0.44 percent for each 1 percent decline in the risk-free rate.⁴⁴ Morin finds that the risk
5 premium increases by 0.52 percent for each 1 percent decline in the risk-free rate.⁴⁵
6 Thus, the risk premium is likely to increase as the risk-free rate declines. As shown in
7 Figure 9 above, this phenomenon is also documented in the forward-looking market
8 risk premium calculated by Bloomberg. According to Bloomberg, the current market
9 risk premium is 7.69 percent,⁴⁶ which is substantially higher than the historical average
10 MRP of about 7.15 percent. It is also an increase over the forward-looking MRPs at
11 the end of 2019 of 6.48 percent, which were much more in line with the historical
12 average MRP.⁴⁷

13 **Q32: Is there evidence that the MRP will remain elevated going forward?**

14 A32: Yes. In 2015, Duarte and Rosa of the Federal Reserve of New York performed a study
15 that aggregated the results of many models of the required MRP in the United States
16 and tracked them over time.⁴⁸ This analysis found a very high MRP after the financial
17 crisis, relative to time periods prior the crisis.

⁴⁴ Bente Villadsen, Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe, “*Risk and Return for Regulated Industries*,” Academic Press, 2017, pp. 118-119.

⁴⁵ Roger A. Morin, “*New Regulatory Finance*,” Public Utilities Reports, Inc., 2006, pp. 123-125.

⁴⁶ Bloomberg, as of November 18, 2020.

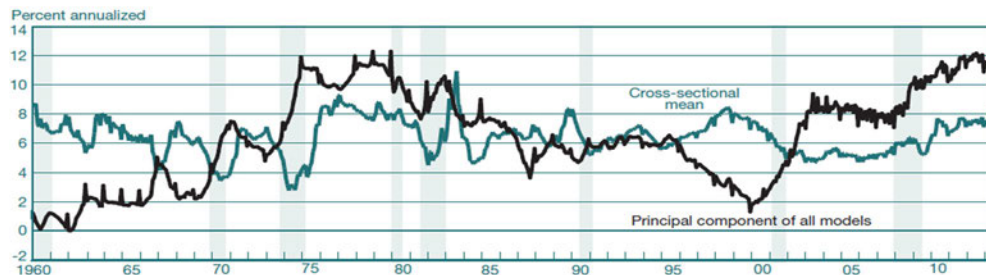
⁴⁷ *Ibid.*, accessed November 18, 2020.

⁴⁸ Fernando Durate and Carlo Rosa, “The Equity Risk Premium: A Review of Models,” *Federal Reserve Bank of New York*, December 2015 (“Duarte and Rosa, 2015”) https://www.newyorkfed.org/research/staff_reports/sr714.html.

1 The authors estimated the MRP that resulted from a range of models each year
2 from 1960 through the time of their study. The authors then reported the average as
3 well as the first principal component of the results.⁴⁹ The authors found that the models
4 used to determine the risk premium were converging to provide comparable estimates
5 and that the average annual estimate of the MRP had reached an all-time high in 2012-
6 2013 (Figure 10 below is a copy of the summary chart from Duarte and Rosa’s 2015
7 paper). These directional trends identified by Duarte and Rosa are reasonably
8 consistent with those observed from Bloomberg and they further support the
9 proposition that the elevation of the MRP over its historical pre-crisis levels was a
10 persistent feature of capital markets in the time following the financial crisis.
11 Specifically, the financial crisis saw high volatility and a flight to quality – similar to
12 conditions seen in 2020 in response to the COVID-19 pandemic. Therefore, it is
13 reasonable to expect that the current MRP will remain elevated compared to historical
14 levels, especially given the uncertainty related to the extent of economic and financial
15 impacts from COVID-19 and the historically low interest rates.

16
17

**Figure 10: Duarte and Rosa’s Chart 3
One-Year Ahead MRP and Cross-Sectional Mean of Models**



⁴⁹ Duarte and Rosa emphasize the “first principal component” of the 20 models. This means that the authors used statistics to compute the weighted average combination of the models that captures the variability among the 20 models over time.

1 **Q33: Please summarize how the economic developments discussed above have affected**
2 **the return on equity and debt that investors require.**

3 A33: Utilities rely on investors in capital markets to provide funding to support their capital
4 expenditure programs and efficient business operations. Investors consider the risk-
5 return tradeoff in choosing how to allocate their capital among different investment
6 opportunities. It is therefore important to consider how investors view the current
7 economic conditions, including the plausible developments in the risk-free rate and the
8 growth in the U.S. GDP.

9 These investors have been dramatically affected by the ongoing market
10 uncertainty, so there are reasons to believe that their risk aversion remains elevated
11 relative to pre-COVID-19 levels. As NW Natural is expected to be compensated as a
12 utility on the equity component of its rate base, the same factors would affect NW
13 Natural's equity.

14 **V. ESTIMATING THE COST OF EQUITY**

15 **A. Proxy Group Selection**

16 **Q34: How do you identify proxy companies of comparable business risk to NW**
17 **Natural?**

18 A34: NW Natural is primarily engaged in the regulated natural gas distribution business.
19 The business risk associated with these endeavors depends on many factors, including
20 the specific characteristics of the service territory and regulatory environment in which
21 the provider of these services operates. Consequently, it is not possible to identify
22 publicly traded proxy companies that replicate every aspect of NW Natural's risk

1 profile. However, selecting companies with business operations concentrated in
2 regulated industries or having similar lines of business and/or business environments
3 is an appropriate starting point for selecting one or more proxy groups of comparable
4 risk to NW Natural. As a second step, I must evaluate NW Natural or Washington-
5 specific risks to ensure that the Company's ROE is placed appropriately relative to the
6 sample companies.

7 To this end, I have selected a sample of natural gas distribution utilities and
8 water utilities. Jointly these companies comprise the "Full Sample." I also report
9 results for the gas distribution utilities that are included in the Full Sample and refer to
10 that sample as the "Gas Sample." The proxy companies are similar to NW Natural in
11 that they are rate regulated by state utility commissions, provide customers a product
12 through a network of pipeline assets, and rely on substantial capital to provide service;
13 i.e., they are capital intensive as is NW Natural.

14 It is important that a proxy group used to assess the cost of equity for NW
15 Natural (absent of any unique Washington or Company characteristics) is regulated,
16 because regulation tends to place substantial requirements and also protections on the
17 companies. I also believe the physical characteristics of the industry – e.g., network,
18 capital intensive, serving different customer groups (residential, commercial,
19 industrial) – is a characteristic of NW Natural and of the selected natural gas
20 distribution and water utilities. The network characteristic implies that assets cannot
21 readily be employed in a different capacity, capital intensity affects the operating risks
22 through the split between fixed and variable costs, and the customer composition
23 affects the demand risk. For example, many natural gas and water utilities face

1 declining per-customer demand due to conservation, and regulation (legislation or
2 voluntary commitments) has in many jurisdictions, including Washington, resulted in
3 the moratoriums on service disconnections due to non-payment during the declared
4 COVID-19 public-health emergency or for a specified period of time. Consequently,
5 the amount of uncollected revenue has increased.

6 **Q35: Why are you including water utilities when evaluating the cost of capital for a**
7 **natural gas utility?**

8 A35: For several reasons. First, the natural gas distribution industry and the water utility
9 industry share many characteristics such as the fact that both are highly regulated and
10 commonly by the same regulatory entity, based on a network of pipes and mains,
11 capital intensive, and serving residential, commercial and industrial customers.
12 Second, investors make comparisons across regulated companies, so it becomes
13 important to consider whether the returns awarded NW Natural are comparable not
14 only to other natural gas utilities but also to other similar risk benchmarks – I consider
15 a broader sample of natural gas and water utilities a reasonable such benchmark. Third,
16 the natural gas distribution industry is expected to undergo substantial changes as
17 customers, regulators and the legislature focus on carbon reductions. This means that
18 initiatives in a specific state influence stock prices and analysts' evaluations along with
19 more fundamental operating and market conditions. I therefore select a group of water
20 utilities, where there are no carbon considerations, to assess whether the estimates from
21 the gas LDCs are reasonable. While the call for reductions in natural gas use in home
22 heating etc. has yet to receive substantial attention in NW Natural's service territory in
23 Washington, the focus on climate policy initiatives to reduce greenhouse gas (GHG)

1 emissions and limit the development of natural gas infrastructure in many jurisdictions
2 does impact all natural gas utilities. In addition, NW Natural is smaller in size as
3 measured by revenue or equity than the comparable companies. I therefore believe
4 these companies provide a useful benchmark when evaluating the cost of equity for
5 NW Natural.

6 Water utilities are better proxies for natural gas utilities than, for example,
7 electric utilities for several reasons: (i) water utilities serve customers through a
8 network of pipes similar to gas utilities, (ii) water utilities are highly regulated while
9 some electric utilities own unregulated generation, (iii) water utilities and gas utilities
10 are currently undertaking substantial investment in pipe replacement, and (iv) water
11 utilities have generally had stable credit ratings similar to those of gas utilities.

12 I note that my recommended ROE for NW Natural is fully supported by the gas
13 utility sample but I find the water sample provides additional confirmation on the
14 numbers.

15 **Q36: Please summarize how you selected the members of the Full Sample and the Gas**
16 **Sample.**

17 A36: To identify companies suitable for inclusion in the Full Sample, I started with the
18 universe of publicly traded companies in the natural gas and water utility industry as
19 identified by Value Line Investment Analyzer (“Value Line”). I started with Value
20 Line’s list of publicly traded companies classified as gas LDCs or water utilities. Next,
21 I reviewed business descriptions and financial reports of these companies and
22 eliminated companies that had less than 50 percent of their assets dedicated to regulated
23 utility activities in their industry; e.g., natural gas or water utility services.

1 Within this group of companies, I applied further screening criteria to eliminate
2 companies that have had recent significant events that could affect the market data
3 necessary to perform cost of capital estimation. Specifically, I identified companies
4 that have cut their dividends or engaged in substantial merger and acquisition (“M&A”)
5 activities over the relevant estimation window.⁵⁰ I eliminated companies with such
6 dividend cuts because the announcement of a cut may produce disturbances in the stock
7 prices and growth rate expectations in addition to potentially being a signal of financial
8 distress. I eliminated companies with significant M&A activities because such events
9 typically affect a company’s stock price in ways that are not representative of how
10 investors perceive its business and financial risk characteristics. For example, a
11 utility’s stock price will commonly jump upon the announcement of an acquisition to
12 match the acquirer’s bid.

13 Further, I require companies have an investment grade credit rating⁵¹ and more
14 than \$300 million in annual revenues for liquidity purposes.⁵² A final, and
15 fundamental, requirement is that the proxy companies have the necessary data available
16 for estimation.

⁵⁰ As described in Sections V.B and V.C, the CAPM requires five years of historical data, while the DCF relies on current market data.

⁵¹ In some cases, a proxy company does not have a credit rating from any of the major rating agencies. However, if they were to be rated, they would receive an investment grade rating. In these instances, I assign the company the average credit rating of the rest of the proxy group.

⁵² I relax my \$300 million annual revenue screening criteria to include two more companies—Middlesex Water and York Water Company—in recognition that these companies have very stable finances despite relatively low revenue.

1 **Q37: What are the characteristics of the Gas and Water Utility Proxy Group?**

2 A37: I calculate my results for both the gas proxy group and for the combined Gas and Water
3 Utility Proxy Group. The proxy group(s) are comprised of gas and water utilities whose
4 primary source of revenues and majority of assets are subject to regulation. The final
5 proxy group consists of the nine gas and six water utilities listed in Figure 11 below.

6 All companies are engaged in the distribution of a commodity to end customers
7 through a network of pipes and mains. While the product differs across gas and water
8 utilities, they are all focused on distribution, have a mix of residential, commercial and
9 industrial customers and all are regulated. Further, the proxy group companies have an
10 average credit rating of approximately A, which is slightly above NW Natural's credit
11 rating of Baa1 from Moody's (broadly equivalent to BBB+).

12 Figure 11 reports the proxy companies' annual revenues for the most recent
13 four quarters as of 2Q 2020 and also reports the market capitalization, credit rating,
14 beta and growth rate. The annual revenue as well as the market cap was obtained from
15 Bloomberg. The credit rating is reported by Bloomberg.⁵³ The growth rate estimate is
16 a weighted average between estimates from Thomson Reuters and *Value Line*. Betas
17 were obtained from *Value Line*.

18 ///

19 ///

20 ///

21 ///

⁵³ In cases where a company does not have a S&P rating from Bloomberg, Moody's rating was obtained from Moody's, annual reports, or Bloomberg.

1

Figure 11: Gas and Water Utility Proxy Group

Company	Annual Revenue (Q2 2020) (\$MM)	Regulated Assets	Market Cap. (Q2 2020) (\$MM)	Value Line Beta	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]	[6]
Atmos Energy	\$2,790	MR	\$12,331	0.80	A	6.9%
Chesapeake Utilities	\$474	R	\$1,396	0.75	A	9.0%
New Jersey Resources	\$2,033	R	\$3,056	0.90	AA-	6.0%
NiSource Inc	\$4,897	R	\$8,852	0.85	BBB+	6.9%
Northwest Natural	\$758	MR	\$1,724	0.80	BBB+	6.0%
ONE Gas Inc	\$1,503	R	\$4,039	0.80	A	6.5%
South Jersey Inds	\$1,518	R	\$2,510	1.00	BBB	12.2%
Southwest Gas	\$3,167	MR	\$3,767	0.90	BBB+	7.6%
Spire Inc	\$1,829	R	\$3,426	0.80	A-	15.1%
Amer States Water	\$478	R	\$2,849	0.65	A+	5.6%
Amer Water Works	\$3,690	R	\$23,036	0.85	A	7.3%
California Water	\$710	R	\$2,287	0.65	A+	17.7%
Middlesex Water	\$138	R	\$1,170	0.70	A	3.8%
SJW Group	\$503	R	\$1,758	0.80	A-	14.8%
York Water Co (The)	\$53	R	\$600	0.80	A-	5.3%
Average	\$1,636		\$4,853	0.80	A-	8.7%

Sources and Notes:

[1]: Latest Bloomberg data available as of September 30, 2020

[2]: Key R - Regulated (80% or more of assets regulated)

MR - Mostly Regulated (less than 80% of assets regulated)

[3]: See Schedule No BV-3 Panels A through I

[4]: See Schedule No BV-10

[5]: Latest Bloomberg data available as of September 30, 2020

[6]: See Schedule No BV-5

2 I note that I included NW Natural in the proxy group for comparability, but I ensure
3 the Company does not unduly influence the estimated cost of equity.

4 **Q38: How do the proxy companies compare to NW Natural in terms of financial**
5 **metrics?**

6 A38: NW Natural's regulated gas operations are expected to generate revenue of [REDACTED]
7 [REDACTED] in 2020,⁵⁴ while NW Natural Holdings had revenue of \$746 million in 2019.⁵⁵
8 Of the [REDACTED] in projected operating revenue, approximately [REDACTED]
9 [REDACTED] is earned from NW Natural's Washington operations. Compared to the annual

⁵⁴ As provided by NW Natural

⁵⁵ NW Natural 2019 10-K, p. 32.

1 revenues of the proxy companies, NW Natural is smaller. NW Natural's secured credit
2 rating is AA- and A2 from S&P and Moody's, respectively, while NW Natural does
3 not have an unsecured credit rating from S&P, Moody's unsecured credit rating is
4 Baa1,⁵⁶ which is towards the lower end of the comparable companies. Lastly, as noted
5 above, NW Natural is a regulated distribution company as are the other proxy
6 companies.

7 **Q39: What regulatory capital structure did you use for NW Natural?**

8 A39: As recommended by NW Natural Company witness Mr. Brody Wilson (Exh. BJW-
9 1T), I use a capital structure including 49 percent equity in my recommendation.⁵⁷

10 **B. The CAPM Based Cost of Equity Estimates**

11 **Q40: Please briefly explain the CAPM.**

12 A40: CAPM assumes the collective investment decisions of investors in capital markets will
13 result in equilibrium prices for all risky assets such that the returns investors expect to
14 receive on their investments are commensurate with the risk of those assets relative to
15 the market as a whole. The CAPM posits a risk-return relationship known as the
16 Security Market Line (see Figure 2 in Section III), in which the required expected return
17 on an asset (above the risk-free return) is proportional to that asset's relative risk as
18 measured by that asset's beta.

19 More precisely, the CAPM states that the cost of capital for an investment, S
20 (e.g., a particular common stock), is determined by the risk-free rate plus the stock's

⁵⁶ NW Natural, Investor Presentation, September 2020, p. 37 and NW Natural 2019 10-K, p. 58.

⁵⁷ See Direct Testimony of Brody J. Wilson (Exh. BJW-1T).

1 systematic risk (as measured by beta) multiplied by the market risk premium.
2 Mathematically, the relationship is given by the following equation:

3
$$r_s = r_f + \beta_s \times MRP \quad (1)$$

- 4 • r_s is the cost of capital for investment S;
5 • r_f is the risk-free interest rate;
6 • β_s is the beta risk measure for the investment S; and
7 • MRP is the market equity risk premium.

8 The CAPM is a “risk-positioning model,” which operates on the principle
9 (corroborated by empirical data) that investors price risky securities to offer a higher
10 expected rate of return than safe securities. It says that an investment, whose returns
11 do not vary relative to market returns, should receive the risk-free interest rate (that is
12 the return on a zero-risk security, the y-axis intercept in Figure 2), whereas investments
13 of the same risk as the overall market (*i.e.*, those that by definition have average
14 systematic market risk) are priced so as to expect to return the risk-free rate plus the
15 MRP. Further, it says that the risk premium of a security over the risk-free rate equals
16 the product of the beta of that security and the MRP.

17 **1. Inputs to the CAPM**

18 **Q41: What inputs does your implementation of the CAPM require?**

19 A41: As demonstrated by equation (1), estimating the cost of equity for a given company
20 requires a measure of the risk-free rate of interest and the MRP, as well as a measure
21 of the stock’s beta. There are several choices and sources of data that inform the
22 selection of these inputs. I discuss these issues below. (Additional technical detail,

1 along with a discussion of the finance theory underlying the CAPM is provided in Exh.
2 BV-3.)

3 **Q42: What value did you use for the risk-free rate of interest?**

4 A42: I use the yield on a 20-year U.S. Treasury bond as the risk-free rate for purposes of my
5 analysis. Recognizing the fact that the cost of capital set in this proceeding will be in
6 effect starting November 1, 2021, I rely on a forecast of what Government bond yields
7 will be one year out. In October 2020, the *Blue Chip Economic Indicators* (“BCEI”)
8 survey estimated the 10-year U.S. Treasury bond yields will be 1.4 percent in 2022 –
9 two months into the new rates.⁵⁸ The forecasted risk-free rate for 2023 and 2024 is
10 higher at 1.7 and 2.0 percent, respectively. I then adjust this value upwards by 50 basis
11 points to reflect the historical maturity premium for the 20-year U.S. Treasury bond
12 yield over the 10 U.S. Treasury bond yield.⁵⁹ This gives me a risk-free rate of 1.9
13 percent for 2022.

14 Additionally, it is important to recognize the implication of higher spreads
15 between utility bond yields and U.S. Government bond yields. As of the end of
16 September, this spread is approximately 50 basis points higher than it was prior to the
17 2008 financial crisis. One explanation of this is that prevailing government bond yields
18 are depressed relative to longer-term market expectations due to monetary policy and
19 flight-to-quality behaviors by investors. Therefore, I also consider a scenario in which
20 the appropriate risk-free rate is conservatively 0.25 percent higher at 2.15 percent.

⁵⁸ Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, October 2020, p. 3.

⁵⁹ This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Government Bonds over the period 1990-2020, using data from Bloomberg.

1 **Q43: What value did you use for the MRP?**

2 A43: Like the cost of capital itself, the MRP is a forward-looking concept. It is by definition
3 the premium above the risk-free interest rate that investors can expect to earn by
4 investing in a value-weighted portfolio of all risky investments in the market. The
5 premium is not directly observable. Rather, it must be inferred or forecasted based on
6 known market information. One commonly used method for estimating the MRP is to
7 measure the historical average premium of market returns over the income returns on
8 government bonds over a long historical period.⁶⁰ The average market risk premium
9 from 1926 to the present (2019) is 7.15 percent.⁶¹ I use this value of the MRP along
10 with a risk-free rate of 2.15 percent in one of my CAPM scenarios.

11 However, investors may require a higher or lower risk premium, reflecting the
12 investment alternatives and aggregate level of risk aversion at any given time. As
13 explained in Section IV, there is evidence that investors' level of risk aversion is
14 elevated relative to the time before the COVID-19 pandemic and may remain elevated
15 for some time, even after the pandemic. In recognition of the evidence that forward-
16 looking measures of expected market equity risk premium are higher than the long-
17 term historical average, I also perform a CAPM calculation using Bloomberg's
18 forecasted MRP of 7.47 percent.⁶²

⁶⁰ The longest period for which Duff & Phelps reports data is 1926 to current. Based on financial textbooks such as Ross, Westerfield and Jaffe, *Corporate Finance*, 10th Edition, 2013, pp. 324-327, I use the longest period for which reliable estimates are available – in this case 1926 to 2019.

⁶¹ Duff & Phelps, *Ibbotson SBBI 2019 Valuation Yearbook* 10-21.

⁶² Bloomberg as of September 30, 2020.

1 **Q44: Please summarize the parameters of the scenarios and variations you considered**
2 **in your CAPM and ECAPM analyses.**

3 A44: The parameters are displayed in Figure 12 below. In my CAPM and ECAPM analyses,
4 I consider two sets of scenarios based on the empirical observation that the yield spread
5 is higher than normal as is the forecast MRP, as discussed above in Section IV. The
6 increase yield spreads could reflect the increase in MRP or downward pressure on the
7 yield of government bonds due to monetary policy and flight-to-quality behaviors.
8 Therefore, I use an unadjusted historic average MRP with the increased estimate of the
9 risk-free rate in one scenario; whereas, in the second scenario I use an unadjusted
10 forecasted risk-free rate with a higher estimate of the MRP. To be conservative, I do
11 not simultaneously normalize the risk-free rate and elevate the MRP.

12 Scenario 1 uses the forecasted 20 year U.S. Treasury rate for 2022 and then
13 adjusted this to include half of the current spread between utility and Government bond
14 yields. This results in a Scenario 1 risk-free rate of 2.15 percent. I pair this with the
15 long-term average historic MRP of 7.15 percent as estimated by Duff & Phelps.

16 In my second scenario, I use an unadjusted risk-free rate based on the forecasted
17 20 year U.S. Treasury rate for 2022 of 1.90 percent. I then use Bloomberg's forecasted
18 MRP of 7.47 percent.

19 **Figure 12: CAPM and ECAPM Scenarios**

	Scenario 1	Scenario 2
Risk-Free Interest Rate	2.15%	1.90%
Market Risk Premium	7.15%	7.47%

1 **Q45: What betas did you use for the companies in your proxy groups?**

2 A45: I used *Value Line* betas, which are estimated using the most recent five years of weekly
3 historical returns data.⁶³ The *Value Line* levered equity betas are reported in Figure 11
4 above. Importantly, these betas—which are measured (by *Value Line*) using the market
5 stock return data of the proxy companies—reflect the level of financial risk inherent in
6 the proxy companies' market value leverage ratios over the estimation period. Because
7 NW Natural's regulatory capital structure includes a substantially higher proportion of
8 debt financing than does the market data on the proxy companies used to estimate the
9 ROE, the financial risk associated with an equity investment in NW Natural's rate base
10 is correspondingly greater than the financial risk borne by investors in the proxy
11 companies' publicly traded stock. Importantly, the DCF model and the CAPM-based
12 models use market data to estimate the ROE, so that it is the market value capital
13 structure that is the relevant comparison across companies. As the risk premium
14 model's ROE estimates are based on book value capital structures, the relevant
15 comparison is across book value capital structures for that model.

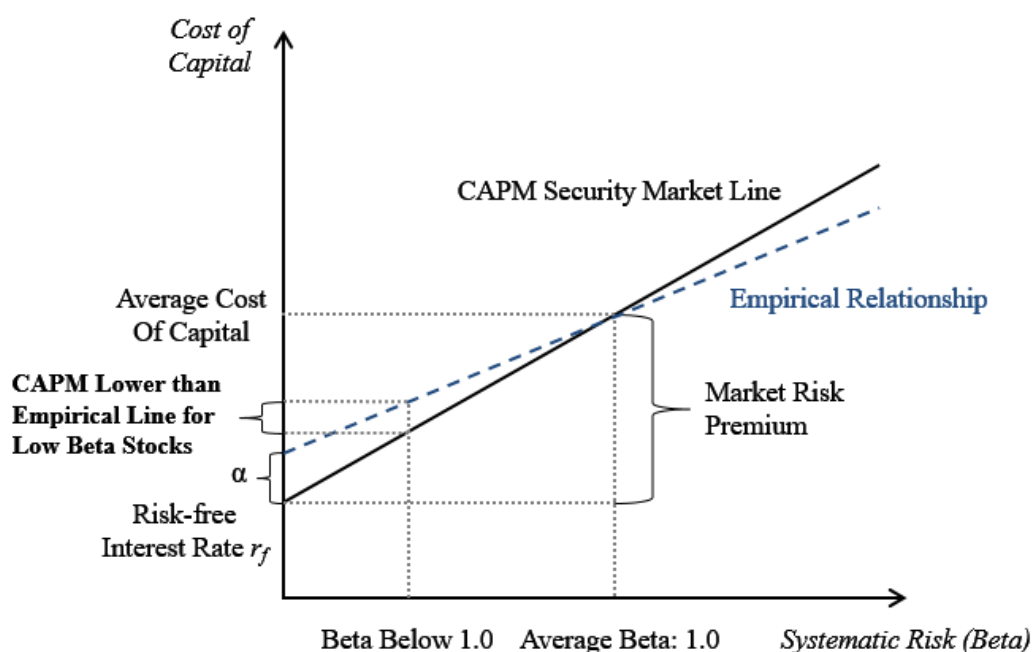
16 Consequently, standard textbook techniques are applied to unlever the *Value*
17 *Line* betas reported in Figure 11 above and relever the resulting asset betas at NW
18 Natural's regulatory capital structure.⁶⁴

⁶³ See Value Line Glossary, accessible at <http://www.valueline.com/Glossary/Glossary.aspx>

⁶⁴ The Technical Appendix (Exh. BV-3) to this testimony provides a detailed description of the standard textbook formulas used to implement the "Hamada" technique for unlevering measured equity betas based on the proxy companies' capital structures to calculate "asset betas" that measure the proxy companies' business risk independent of the financial risk impact of differing capital structures. The proxy group average asset betas are then relevered at the target capital structure (i.e., NW Natural's regulatory capital structure), with the precise relevered beta depending on the specific version of the unlevering/relevering formula employed.

1

Figure 13: The Empirical Security Market Line



2 **Q47: Why do you use the ECAPM?**

3 A47: Academic research finds that the CAPM has not generally performed well as an
 4 empirical model. One of its short-comings is directly addressed by the ECAPM, which
 5 recognizes the consistent empirical observation that the CAPM underestimates the cost
 6 of capital for low beta stocks. In other words, the ECAPM is based on recognizing that
 7 the actual observed risk-return line is flatter and has a higher intercept than that
 8 predicted by the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact,
 9 which has been established by repeated empirical tests of the CAPM. In summary,
 10 these studies estimate alpha parameters that range between 1 percent⁶⁶ and 7.32

⁶⁶ Black, Fischer. Beta and Return. *The Journal of Portfolio Management* 20 (Fall): 8-18.

1 percent.⁶⁷ I apply an alpha parameter of 1.5 percent in my application of the ECAPM.
2 Exh. BV-3 provides further discussion of the empirical findings that have tested the
3 CAPM and also provides documentation for the magnitude of the adjustment, α .

4 **3. Results from the CAPM Based Models**

5 **Q48: Please summarize the results of the CAPM-based models.**

6 A48: The results of CAPM and ECAPM estimation for the two proxy groups are presented
7 in Figure 14 below. The ranges of results for each model (CAPM and ECAPM) reflect
8 the application of different specific versions of the textbook formulas used to account
9 for the impact of different financial leverage on financial risk.

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⁶⁷ Fama, Eugene F. and Kenneth R. French. 1992. The Cross-Section of Expected Stock Returns. *Journal of Finance* 47 (June): 427-465.

1 **Figure 14: CAPM and ECAPM Summary at 49% Equity Capital Structure**

Return on Equity Summary and Sensitivity Analysis Full Sample		
Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Full Sample		
<i>Financial Risk Adjusted Method</i>		
CAPM	9.9%	9.9%
ECAPM ($\alpha = 1.5\%$)	10.3%	10.4%
<i>Hamada Adjustment Without Taxes</i>		
CAPM	9.6%	9.7%
ECAPM ($\alpha = 1.5\%$)	9.6%	9.7%
<i>Hamada Adjustment With Taxes</i>		
CAPM	9.3%	9.4%
ECAPM ($\alpha = 1.5\%$)	9.3%	9.4%
Gas Sample		
<i>Financial Risk Adjusted Method</i>		
CAPM	10.0%	10.0%
ECAPM ($\alpha = 1.5\%$)	10.3%	10.3%
<i>Hamada Adjustment Without Taxes</i>		
CAPM	9.7%	9.8%
ECAPM ($\alpha = 1.5\%$)	9.7%	9.7%
<i>Hamada Adjustment With Taxes</i>		
CAPM	9.4%	9.5%
ECAPM ($\alpha = 1.5\%$)	9.4%	9.5%
Water Sample		
<i>Financial Risk Adjusted Method</i>		
CAPM	9.8%	9.8%
ECAPM ($\alpha = 1.5\%$)	10.4%	10.4%
<i>Hamada Adjustment Without Taxes</i>		
CAPM	9.5%	9.6%
ECAPM ($\alpha = 1.5\%$)	9.4%	9.5%
<i>Hamada Adjustment With Taxes</i>		
CAPM	9.1%	9.1%
ECAPM ($\alpha = 1.5\%$)	9.1%	9.2%

Sources and Notes:

[1]: Long-Term Risk Free Rate of 2.15%, Long-Term Market Risk Premium of 7.15%.

[2]: Long-Term Risk Free Rate of 1.90%, Long-Term Market Risk Premium of 7.47%.

1 **Q49: How do you interpret the results of your CAPM and ECAPM Analyses?**

2 A49: The results in Figure 14 above range from 9.0 to 10.25 percent with the majority of the
3 results in the range of 9.5 to 10.0 percent.⁶⁸ As I discussed above, the established
4 academic evidence indicates that the traditional CAPM tends to underestimate the cost
5 of equity for lower-than-average risk companies, such as the natural gas and water
6 utilities in Figure 11, so the ECAPM results are more reliable. As a result, I consider
7 a reasonable range of 9.4 (the currently allowed ROE) to 10.25 percent for the Gas
8 Sample, which is supported by a reasonable range of 9.25 to 10.5 percent for the Water
9 Sample (rounding to the nearest ¼ percent and ignoring the highest and lowest results).
10 I also note that the CAPM may underestimate the cost of equity for smaller companies
11 such as NW Natural.⁶⁹

12 **C. DCF Based Estimates**

13 **Q50: Please describe the DCF model's approach to estimating the cost of equity.**

14 A50: The DCF model attempts to estimate the cost of capital for a given company directly,
15 rather than based on its risk relative to the market as the CAPM does. The DCF method
16 assumes that the market price of a stock is equal to the present value of the dividends
17 that its owners expect to receive. The method also assumes that this present value can
18 be calculated by the standard formula for the present value of a cash flow—literally a

⁶⁸ I round to the nearest 0.25 percent when determining ranges of reasonable results. Clearly, there are numbers outside the range of 9.0 to 10.25 percent in Figure 14 but if rounding to the nearest 0.25 percent, I have a small number of observations outside the range. I round to the nearest 0.25 percent because the cost of capital cannot, in my opinion, be determined with greater precision.

⁶⁹ I also note that relying on the FERC methodology for the MRP would result in an increase to the CAPM / ECAPM results of 148 to 170 basis points.

1 stream of expected “cash flows” discounted at a risk-appropriate discount rate. When
2 the cash flows are dividends, that discount rate is the cost of equity capital:

3
$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \dots + \frac{D_T}{(1+r)^T} \quad (3)$$

4 Where,

5 P_0 is the current market price of the stock;

6 D_t is the dividend cash flow expected at the end of period t ;

7 T is the last period in which a dividend cash flow is to be received; and

8 r is the cost of equity capital.

9 Importantly, this formula implies that if the current market price and the pattern
10 of expected dividends are known, it is possible to “solve for” the discount rate r that
11 makes the equation true. In this sense, a DCF analysis can be used to estimate the cost
12 of equity capital implied by the market price of a stock and market expectations for its
13 future dividends.

14 Many DCF applications assume that the growth rate lasts into perpetuity, so the
15 formula can be rearranged algebraically to directly estimate the cost of capital.
16 Specifically, the implied DCF cost of equity can then be calculated using the well-
17 known “DCF formula” for the cost of capital:

18
$$r = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1 + g) + g \quad (4)$$

19 where D_0 is the current dividend, which investors expect to increase at rate g by the
20 end of the next period, and over all subsequent periods into perpetuity.

21 Equation (4) says that if equation (3) holds, the cost of capital equals the
22 expected dividend yield plus the (perpetual) expected future growth rate of dividends.

1 I refer to this as the single-stage DCF model; it is also known as the Gordon Growth
2 model, in honor of its originator, Professor Myron J Gordon.

3 **Q51: Are there other versions of the DCF model?**

4 A51: Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models
5 that use cash flow rather than dividends, or versions that combine aspects of (i) and
6 (ii).⁷⁰ One such alternative expands the Gordon Growth model to three stages. In the
7 multistage model, earnings and dividends can grow at different rates, but must grow at
8 the same rate in the final, constant growth rate period.⁷¹

9 In my implementation of the multi-stage DCF, I assume that companies grow
10 their dividend for five years at the forecasted company-specific rate of earnings growth,
11 with that growth then tapering over the next five years toward the growth rate of the
12 overall economy (i.e., the long-term gross domestic product (GDP) growth rate
13 forecasted to be in effect ten years or more into the future).

14 **1. DCF Inputs and Results**

15 **Q52: What growth rate information do you use?**

16 A52: The first step in my DCF analysis (either constant growth or multi-stage formulations)
17 is to examine a sample of investment analysts' forecasted earnings growth rates for
18 companies in my proxy group. For the single-stage DCF and for the first stage of the
19 multi-stage DCF, I use investment analyst forecasts of company-specific growth rates
20 sourced from *Value Line* and Thomson Reuters *IBES*.

⁷⁰ The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009.

⁷¹ See Exh. BV-3 for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

1 For the long-term growth rate for the final, constant-growth stage of the
2 multistage DCF estimates, I use the long-term U.S. GDP growth forecast of 4.1 from
3 Blue Chip Economic Indicators.⁷² Thus, the long-run (or terminal) growth rate in the
4 multi-stage model is nominal GDP growth.

5 Additionally, I relied on the dividend yield of the companies, which I estimate
6 using the most recently available dividend information (currently) and the average of
7 the last 15 days of stock prices ending September 30, 2020. As the single largest
8 advantage of the DCF model is that it uses current market information, I find it is
9 important to use a relatively short time period to determine the dividend yield – yet to
10 avoid the bias caused by any one day. I believe a 15-day average accomplishes that
11 goal. Because the stock price of utilities currently is higher than they historically have
12 been and because some companies engage in share buybacks, the dividend yield
13 underestimates the yield on cash distributions to investors.

14 **Q53: Please explain how input data can affect the DCF models.**

15 A53: The Gordon Growth/single-stage DCF models require forecast growth rates that reflect
16 investor expectations about the pattern of dividend growth for the companies over a
17 sufficiently long horizon, but estimates are typically only available for 3-5 years.

18 One issue with the data is that it includes solely dividend payments as cash
19 distributions to shareholders, while some companies also use share repurchases to
20 distribute cash to shareholders. To the extent that companies in my samples use share
21 repurchases, the DCF model using dividend yields will underestimate the cost of equity

⁷² See Blue Chip Economic Indicators, October 2020, p. 15.

1 for these companies. While there are companies in my sample that have engaged in
2 share buybacks in the past, the magnitude is currently not large.

3 A second issue is that the flight to quality has resulted in higher than usual stock
4 prices for natural gas and water utilities and hence lower than usual dividend yields.
5 As a result, the dividend yield may be downward biased. The multi-stage DCF model
6 additionally requires a measure of the long-term GDP growth.

7 **Q54: Please summarize the DCF-based cost of equity estimates for the proxy groups.**

8 A54: The results of the DCF based estimation for the proxy groups are displayed below in
9 Figure 15.

10 **Figure 15: DCF Model Results at 49% Equity Capital Structure**

	Simple	Multi-stage
Gas Sample	13.2%	9.9%
Water Sample	14.0%	8.7%

11 **Q55: How do you interpret the results of your DCF Analyses?**

12 A55: The DCF model estimates presented in Figure 15 range from 8.7 percent to 14.0
13 percent. As discussed above, there is unprecedented levels of volatility currently in the
14 market. When market prices fall, dividend yields increase and reflect the increased
15 cost of equity. However, the DCF model requires forecasted growth rates that are based
16 on stable economic conditions to satisfy the constant dividend growth assumption.
17 Growth rates may also be slower than dividend yields to reflect market uncertainty.
18 Consequently, I give more weight to the results from the Multi-Stage DCF
19 implementation. For the Gas Sample, the result is 9.9 percent, which is consistent with

1 the range of the CAPM and ECAPM estimates. The result for the Water Sample is 8.7
2 percent, which is slightly below but consistent with the range of the CAPM and
3 ECAPM estimates. Given the much higher estimates for the single-stage DCF, I
4 believe the multi-stage DCF results may underestimate the cost of equity at this time,
5 but acknowledge that the cost of equity is below the results obtained from the single-
6 stage model. For example, the averages of the simple and multi-stage results are 11.5
7 and 11.4 percent, respectively. Consequently, I find that the Gas Sample results are
8 reasonably consistent with a range of about 9.5 to a bit above 10 percent; e.g., 10.25
9 percent.

10 **D. Risk Premium Model Estimates**

11 **Q56: Did you estimate the cost of equity that results from analysis of risk premiums**
12 **implied by allowed ROEs in past utility rate cases?**

13 A56: Yes. In this type of analysis, sometimes called the “risk premium model,” the cost of
14 equity capital for utilities is estimated based on the historical relationship between
15 allowed ROEs in utility rate cases and the risk-free rate of interest at the time the ROEs
16 were granted. These estimates add a “risk premium” implied by this relationship to the
17 relevant (prevailing or forecast) risk-free interest rate:

18
$$\text{Cost of Equity} = r_f + \text{Risk Premium} \quad (5)$$

19 **Q57: What are the merits of this approach?**

20 A57: First, it estimates the cost of equity from regulated entities as opposed to holding
21 companies, so that the relied-upon figure is directly applicable to a rate base. Second,
22 the allowed returns are readily observable to market participants, who will use this one
23 data input in making investment decisions, so that the information is at the very least a

1 good check on whether the return is comparable to that of other investments. Third, I
2 analyze the spread between the allowed ROE at a given time and the then-prevailing
3 interest rate to ensure that I properly consider the interest rate regime at the time the
4 ROE was awarded. This implementation ensures that I can compare allowed ROE
5 granted at different times and under different interest rate regimes.

6 **Q58: How did you use rate case data to estimate the risk premiums for your analysis?**

7 A58: The rate case data from Q1 1990 through Q3 2020 is derived from Regulatory Research
8 Associates.⁷³ Using this data I compared (statistically) the average allowed rate of
9 return on equity granted by U.S. state regulatory agencies in gas distribution rate cases
10 to the average 20-year Treasury bond yield that prevailed in each quarter.⁷⁴ I calculated
11 the allowed utility “risk premium” in each quarter as the difference between allowed
12 returns and the Treasury bond yield, since this represents the compensation for risk
13 allowed by regulators. Then I used the statistical technique of ordinary least squares
14 (“OLS”) regression to estimate the parameters of the linear equation:

$$15 \quad \text{Risk Premium} = A_0 + A_1 \times (\text{Treasury Bond Yield}) \quad (6)$$

16 I derived my estimates of A_0 and A_1 using standard statistical methods (OLS
17 regression) and found that the regression has a high degree of explanatory power in a
18 statistical sense. I report my results for the respective classifications of rate cases below
19 in Figure 16.⁷⁵ I note that the results displayed in Figure 16 below show that the risk

⁷³ S&P Market Intelligence, as of September 2020.

⁷⁴ I rely on the 20-year government bond to be consistent with the analysis using the CAPM to avoid confusion about the risk-free rate. While it is important to use a long-term risk-free rate to match the long-lived nature of the assets, the exact maturity is a matter of choice.

⁷⁵ Exh. BV-4, Schedule BV-16 contains my risk premium analysis.

1 premium model fits the data well as the R-squared is above 0.87 and R-squared is a
2 measure of how well the data fits the model. An R-squared above 0.8 indicates a solid
3 result.

4 **Figure 16: Implied Risk Premium Model Estimates⁷⁶**

	R Squared	Estimate of Intercept (A0)	Estimate of Slope (A1)	Implied Cost of Equity Range	
	[1]	[2]	[3]	[4]	[5]
Natural Gas Utility	0.874	8.52%	-0.565	9.3%	9.5%

Sources and Notes:

[1]-[3]: Estimated Using S&P Market Intelligence, as of September 2020

[4]: Risk-free rate of 1.9%

[5]: Risk-free rate of 2.15% (includes utility yield spread adjustment of 0.25%)

5 **Q59: What conclusions did you draw from your risk premium analysis?**

6 A59: The results in Figure 16 indicate a ROE of 9.3 to 9.5 percent for an average gas
7 distribution utility based on the risk premium model, which is consistent with the
8 reasonable range of CAPM and DCF estimates. While the risk premium model is based
9 on historical allowed returns and not underpinned by fundamental financial principles
10 in the manner of the CAPM and DCF models, I believe that this analysis, when properly
11 designed, executed, and placed in the proper context, is a valid and useful approach to
12 estimating utility ROEs. Because the risk premium analysis as implemented takes into
13 account the interest rate prevailing during the quarter the decision that granted an ROE
14 used in the analysis was issued, it provides a useful benchmark for the cost of equity in

⁷⁶ Note: Negative estimate of slope indicates that as the risk-free rate increases (decrease) the estimated risk premium decreases (increase). As discussed in Section IV.C. (Q31:) This inverse relationship between the risk free rate and risk premiums is supported by academic and industry analysis, including Villadsen et. al (2017)(Footnote 445) which found that for each 1 percent decline in the risk free rate the estimated risk premium increased by approximately 0.44 percent, in line with the results shown in Figure 16.

1 any interest environment. Because it relies on the returns for regulated utilities, I
2 believe this method provides a good way to directly assess whether the ROE is
3 commensurate with that available to alternative regulated investments of similar risk.

4 **E. Summary of Results**

5 **Q60: Please summarize your results before considering where to place NW Natural.**

6 A60: Assuming a 49 percent equity capital structure for NW Natural, I find the reasonable
7 range of ROE results displayed in Figure 17. Next, I consider NW Natural and
8 Washington specific risks to inform my recommendation of a reasonable ROE for NW
9 Natural.

10 **Figure 17: Summary of Reasonable Ranges**

	Gas Sample	Full Sample
CAPM/ ECAPM	9.5% - 10.25%	9.5% - 10.0%
DCF	9.9% (9.5% – 10.25%)	8.7% - 9.9%
Risk Premium	9.3% - 9.5%	N/A

Note: Full sample considers both natural gas and water proxy companies

11 **VI. NW NATURAL SPECIFIC CIRCUMSTANCES**

12 **A. Business Risk Characteristics**

13 **Q61: How does the business risk of NW Natural compare to that of the sample?**

14 A61: Like the sample companies, NW Natural's business is concentrated in regulated gas
15 distribution industry. It also has a credit rating that is comparable to that of the sample
16 but is one of the few utilities that have been downgraded over the past couple of years.
17 Regulatory policy plays a role in the business risk of the Company.

1 To that end, I note that NW Natural does not currently have a decoupling
2 mechanism in Washington State – decoupling mechanisms are common among gas
3 LDCs.⁷⁷ Additionally, in the current environment of declining energy demand and an
4 emphasis on decreasing carbon emissions, there is some uncertainty about NW
5 Natural’s future demand. Washington has several initiatives to reduce CO2 emissions
6 significantly. Because burning natural gas releases CO2 into the atmosphere, these
7 initiatives create stranded cost risks for NW Natural. Washington is a founding
8 member of the Pacific Coast Collaborative, which calls for reducing emission levels to
9 two tons per capita by 2050. To this end, Washington has committed to reducing the
10 State’s greenhouse gas emissions to 45 percent below 1990 levels by 2030, 70 percent
11 by 2040, and net zero or 95 percent below 1990 levels by 2050.⁷⁸ Washington also
12 passed Senate Bill 5116, which commits the state to a carbon-natural electricity supply
13 by 2030 with the goal of eliminating fossil generation by 2045.⁷⁹

14 State level actions have focused on reducing carbon emissions or increasing
15 generation from renewable resources. At a more local level, some cities have shifted
16 their policy focus to reducing reliance on natural gas. For example, Washington cities

⁷⁷ See, for example, RRA Regulatory Focus, “Adjustment Clauses: A State-by-State Overview,” November 12, 2019.

⁷⁸ Washington State Legislature, HB2311-2019-20, <https://app.leg.wa.gov/billsummary?BillNumber=2311&Year=2019&Initiative=false>.

⁷⁹ Washington Governor Jay Inslee, “Policy Brief – Washington Enacts Strongest Clean Electricity Standard in the Nation,” May 2019, <https://www.governor.wa.gov/sites/default/files/documents/clean-electricity-policy-brief-bill-signing.pdf>.

1 such as Bellingham, Seattle, and Vancouver have contemplated or enacted
2 moratoriums on natural gas infrastructure.⁸⁰

3 Outside Washington, the City of Berkeley’s ban on natural gas hook-ups in new
4 buildings⁸¹ and regulations pertaining to new housing’s ability to use renewable
5 resources are being introduced. For example, California has a requirement that all new
6 homes have solar panels by 2020, while other states are considering similar
7 regulations.⁸² At the same time, there are substantial efforts to increase non-carbon
8 heating through, for example, incentives for heat pump installation, which will reduce
9 the amount of gas (and/or oil) used for heating.⁸³ If any of the risks discussed above
10 were to materialize or be at high risk of materializing, the business risk of the gas LDC
11 industry would increase substantially. This risk is not included in my current
12 recommendation.

13 **Q62: What is NW Natural’s size relative to the sample companies?**

14 A62: The majority of the publicly traded gas LDCs in the U.S., as well as the companies I
15 select for my full sample, are larger than NW Natural. For example, the average market
16 capitalization of the Gas Sample (including NW Natural) is \$4.6 billion. That is nearly

⁸⁰ Bellingham and Seattle are not within NW Natural’s service territory, but the cities’ moratoriums may indicate a movement in that direction more broadly.

⁸¹ Ravani, Sarah, “Berkeley becomes first U.S. city to ban natural gas in new homes,” *San Francisco Chronicle*, July 2019. For clarity, my recommended ROE of 10 percent in this proceeding **does not** incorporate the risks of such bans but merely points to potential future risks to the industry.

⁸² Los Angeles Times, “Starting in 2020, all new homes in California must come with solar panels” by Jack Flemming, Dec, 14, 2018.

⁸³ For example, EfficiencyMaine (<https://www.efficiencymaine.com/at-home/ductless-heat-pumps/>) offers residential customers rebates for installing heat pumps.

1 three times NW Natural's market capitalization of \$1.7 billion.⁸⁴ If I were to consider
2 only NW Natural's Washington-regulated portion the difference would be even larger.

3 **Q63: Why does the size of NW Natural matter?**

4 A63: Empirically, investors have required a higher premium to invest in smaller companies
5 than in larger ones. For example, Duff & Phelps data indicate that NW Natural's
6 market capitalization puts it in the 6th size decile, while the average natural gas
7 company in the sample falls in the 4th size decile.⁸⁵ Companies in the 6th size decile on
8 average have a return on equity evidence suggests that investors in smaller companies
9 require a higher return than do investors in larger companies. The majority of the
10 sample companies are materially larger than NW Natural. Empirical evidence suggests
11 that investors in NW Natural may require a premium over and above that required for
12 larger companies. Consequently, NW Natural requires a cost of equity higher than the
13 average of that for the sample companies all else equal.

14 **Q64: How have the current market uncertainties impacted NW Natural?**

15 A64: Similar to many other states, Washington began issuing stay-at-home orders and
16 restricting gatherings in early March to mitigate the impacts of COVID-19. As a result,
17 many business activities across the State were restricted. Consumer spending declined
18 by up to 35 percent and over 1.7 million people have filed initial unemployment claims
19 since mid-March.⁸⁶ As of the end of September, Washington's unemployment rate

⁸⁴ As of the end of Q2 2020. See Figure 11 in Section V for details.

⁸⁵ Duff & Phelps, "CRSP Decile Size Study," 2020.

⁸⁶ Washington State Department of Commerce, "Economic Recovery Dashboard", accessed November 17, 2020, <https://www.commerce.wa.gov/datadashboard/>.

1 stood at 7.4 percent compared to 4.4 percent in January 2020.⁸⁷ To protect consumers
2 as unemployment and economic hardships increased, many States implemented
3 moratoriums on utility disconnects due to non-payment. In Washington, Governor
4 Inslee enacted a moratorium on utility disconnections for residential customers due to
5 non-payment, charging late fees, or refusing to reconnect customers. At the end of
6 October, these protections were extended through April 2021.⁸⁸

7 The risk that utilities face is that they will not be fully compensated for customer
8 non-payments resulting from rising unemployment or business shutdowns. As a result,
9 utilities continue to serve all their customers, even if they are not collecting revenues
10 from all their customers. These impacts will be felt most strongly for utilities with
11 large commercial and industrial customer bases or utilities that serve areas hit hardest
12 by layoffs. NW Natural's sales volumes are comprised approximately 40 percent
13 industrial, 22 percent commercial, and 38 percent residential.⁸⁹ In Washington, NW
14 Natural does not have a decoupling mechanism as it does in its Oregon service territory.
15 As a result, NW Natural's Washington operations rely on per-Dth charges to recover
16 fixed costs that are at higher risk of under-recovery due to demand reductions. While
17 decoupling mechanisms may mitigate the impacts, utilities are still at heightened
18 business risk given the broad economic impacts across all customer classes and

⁸⁷ Ibid.

⁸⁸ Washington Utilities and Transportation Commission, "Order 01 Extending Suspension of Disconnection of Energy Services for Nonpayment and Adopted Related Requirements," October 20, 2020, Docket U-200281.

⁸⁹ NW Natural, 2019 10-K, p. 10, <https://s23.q4cdn.com/611156738/files/annual/716f1951-3453-912b-2656-5c75ca7f5fa0.PDF>.

1 structural limitations regarding decoupling mechanism (e.g. caps of cost recovery,
2 limitations on sharing across customer classes, or the rate of amortizing balances).

3 Rating agencies have also noted the increased risk for utilities. On April 2, S&P
4 Global Ratings lowered its outlook for the North American utility industry from
5 “stable” to “negative” citing concerns about the financial cushions of utilities.⁹⁰ S&P
6 also said they expect that a prolonged recession may cause utilities to reduce capital
7 spending and potentially cut dividends. This could affect utilities’ ability to attract
8 capital and would undoubtedly increase their business risk.

9 **Q65: Can you please summarize your assessment of NW Natural’s business risk**
10 **relative to the sample?**

11 A65: Relative to the gas sample, NW Natural is smaller, has no decoupling mechanism and
12 may, given its location on the US west coast face greater legislative initiatives to reduce
13 carbon and natural gas infrastructure. While the impact of carbon reduction on NW
14 Natural’s risk profile could be substantial, I have not taken these aspects into account
15 in my ROE recommendation. I simply note that these are factors that need to be
16 monitored closely as the impact could be substantial in future years. My
17 recommendation does not account for such risks. Consequently, from a business risk
18 perspective, NW Natural is slightly more risky than the sample.

⁹⁰ For clarity, S&P Global Ratings did not change the outlook for specific utilities, instead the April 2020 outlook revision was for the North American utility industry.

S&P Global Market Intelligence, “S&P lowers North American utilities outlook to negative on coronavirus risk,” April 2, 2020, Accessed April 3, 2020, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/s-p-lowers-north-american-utilities-outlook-to-negative-on-coronavirus-risk-57886477>.

1 **VII. COST OF CAPITAL RECOMMENDATION**

2 **Q66: Please summarize your conclusion regarding NW Natural's risk and the**
3 **necessary return.**

4 A66: I find that NW Natural has slightly above average risk compared to the average sample
5 company given its smaller size, lack of decoupling mechanism, and Washington
6 specific risks. I therefore recommend that NW Natural be granted an ROE of at least
7 9.4 percent as in its most recent rate case and find a range 9.5 – 10.25 percent is the
8 most representative of the sample companies. I note that indications are that the ROE
9 today is higher than at the time of NW Natural's last Washington State rate case, which
10 was settled at 9.4 percent. Thus, the 9.4 percent ROE is at the very bottom of the
11 reasonable range.

12 **Q67: What do you recommend for NW Natural's cost of equity in this proceeding?**

13 A67: The CAPM/ ECAPM and the DCF for the gas sample show a reasonable range of about
14 9.4 (current ROE) percent to 10.25 percent rounding to the nearest ¼ percent. The Risk
15 Premium model's results are slightly below the range at 9.3 percent to 9.5 percent. As
16 NW Natural is smaller than the average gas sample company and the risk premium
17 results pertain, on average, to a higher equity percentage, I find that a range of 9.4 –
18 10.25 percent would be within reason for NW Natural and note that the range is
19 supported by the results for the water sample. As a result, my recommendation would
20 be to place NW Natural within that range and recommend conservatively 9.9 percent
21 as the rate of return on the equity portion of its regulated rate base at the requested 49
22 percent equity capital structure. As explained above, NW Natural has decided to divert
23 from my recommendation of 9.9 percent ROE, and instead, it has proposed to set its

1 ROE at the lowest end of my recommended range of 9.4 percent. While the Company's
2 proposal is lower than I would recommend, it is still within my recommended range
3 and supported by my analysis.

4 **Q68: Does this conclude your Direct Testimony?**

5 A68: Yes, it does.

1

VIII. LIST OF EXHIBITS

2

3 Exh. BV-2.....Resume

4 Exh. BV-3.....Technical Appendix

5 Exh. BV-4.....Cost of Equity Model