PSC-5

BEFORE
THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

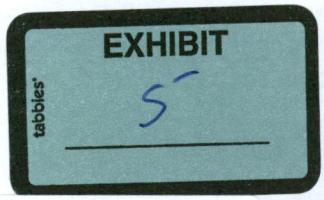
DIRECT TESTIMONY
OF
AARON L. ROTHSCHILD

COST OF CAPITAL

ON BEHALF OF
THE NORTH DAKOTA PUBLIC SERVICE COMMISSION ADVOCACY STAFF OFFICE

CASE NO. PU-20-379

January 15, 2021



Contents

I. STATEMENT OF QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Aaron L. Rothschild. My title is President, and my business address is 15 Lake Road, Ridgefield, CT.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am President of Rothschild Financial Consulting.

Q. PLEASE STATE YOUR EDUCATIONAL ACHIEVEMENTS AND PROFESSIONAL DESIGNATIONS.

A. I have a B.A. degree in mathematics from Clark University (1994) and an M.B.A. from Vanderbilt University (1996).

Q. PLEASE DESCRIBE YOUR BUSINESS EXPERIENCE.

A. I performed financial analysis in the telecom industry in the United States and Asia Pacific from 1996 to 2001, investment banking consulting in New York, complex systems science research regarding the power sector at an independent research institute, and I have prepared rate of return testimonies since 2002. My experience includes providing expert witness services to the California Public Advocates Office to evaluate the financial health, basic operation, wildfire cost recovery, and organizational culture/governance of gas and electric utilities,[1] as well as evaluating bankruptcy restructuring plans for Pacific Gas and Electric. On October 16, 2020, the California Public Utility Commission adopted my

[1] The California Public Utility Commission's PG&E Safety Culture Investigation 15-08-019.

recommendation for the creation of a financial team to ensure Southern California Edison's proposed issuance of securitized bonds reduce, to the maximum extent possible, the rates that consumers will pay on a present value basis compared to traditional utility financing mechanisms.[2] See Exhibit ALR-1 for my resume.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION, OR OTHER STATE COMMISSIONS? IF SO, WHICH COMMISSIONS?

A. Yes, I have testified before this Commission previously. My expert witness experience includes testifying in over 50 cost of capital proceedings before the following state commissions: California, Colorado, Connecticut, Delaware, Florida, New Jersey, Maryland, North Dakota, Pennsylvania, South Carolina, and Vermont. See Exhibit ALR-1 for the list of dockets for each of my testimonies.

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. The North Dakota Public Service Commission Advocacy Staff ("PSC Staff").

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide my recommendations to the North Dakota Public Service Commission ("NDPSC") regarding the appropriate cost of equity, capital structure, and overall cost of capital for Montana-Dakota Utilities Co. ("Montana-Dakota" or "Company").

[2] Application 20-07-008.

Q. HAVE YOU REVIEWED MONTANA-DAKOTA'S APPLICATION AND DIRECT TESTIMONY?

A. Yes.

II. INTRODUCTION AND SUMMARY OF CONCLUSIONS

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. First, I provide a summary of my recommendations, an overview of cost of equity concepts, how current capital markets relate to my cost of equity calculations, and a summary of why Montana-Dakota's rate of return calculations are unreasonable. Second, I provide my capital structure and cost of debt recommendations. Third, I provide an overview of current capital markets. Fourth, I provide a detailed explanation of how I calculate my cost of equity recommendation. Fifth, I critique the testimony of Montana-Dakota's rate of return witness.

Q. PLEASE PROVIDE A SUMMARY OF YOUR RECOMMENDATIONS.

A. I recommend the following cost of capital for Montana-Dakota's gas utility operations:

- An overall cost of capital/rate of return of 6.24% (6.16% - 6.32%)[3]
- A cost of equity of 8.09% (7.93% - 8.25%)
- A capital structure containing 50.31% common equity and 42.37% debt
- A debt cost rate of 4.72%

[3] Using Ms. Bulkley's capital structure of 50.306% common equity would result in a cost of capital of 5.99% to 6.15%.

A summary of my cost of capital recommendations for Montana-Dakota's gas utility operations is presented in Table 1 below.

TABLE 1: ALR RECOMMENDATION - MONTANA-DAKOTA UTILITIES CO.
Case No. PU-20-379

	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	42.37%	4.72%	2.00%
Short-Term Debt	7.32%	2.38%	0.17%
Common Equity	50.31%	8.09%	4.07%
Rate of Return			6.24%

Schedule ALR-1

Q. PLEASE COMPARE YOUR COST OF CAPITAL RECOMMENDATIONS TO MONTANA-DAKOTA'S REQUESTED COST OF CAPITAL.

A. As shown in Table 2 below, Ms. Bulkley and I recommend the same cost of debt (4.72%) and capital structure.[4] Our cost of equity recommendations are different, however. My 8.09% cost of equity recommendation results in a 6.24% overall rate of return. Ms. Bulkley's 10.200% cost of equity recommendation results in an overall rate of return of 7.304%.

TABLE 2: RECOMMENDATION COMPARISON - ROTHSCHILD AND BULKLEY

	Cost of Equity	Cost of Debt	Common Equity %	Long-Term Debt %	Rate of Return
Rothschild [1]	8.09%	4.72%	50.31%	42.37%	6.24%
Bulkley [2]	10.20%	4.72%	50.31%	42.37%	7.30%

[1] Schedule ALR-1
[2] Montana-Dakota Utilities Co. & Great Plains Natural Gas Co. Workpapers Index

[4] As explained later in my testimony, the capital structure requested by the Company has a common equity ratio that is higher than the average of my Gas Proxy Group, so I have made an adjustment to my recommended cost of equity to compensate for that fact.

Q. PLEASE PROVIDE A SUMMARY OF HOW MS. BULKLEY'S COST OF EQUITY RECOMMENDATION COMPARES TO YOUR RECOMMENDATION AND RETURN EXPECTATIONS OF MAJOR FINANCIAL INSTITUTIONS.

A. My direct testimony explains that Ms. Bulkley's 10.200% cost of equity recommendation is above (1) return expectations indicated by market data (e.g., stocks, bonds, options), and (2) return expectations published by major financial institutions.

As shown in Table 3 below, Ms. Bulkley's 10.200% cost of equity recommendation is considerably higher than return expectations published by major banks and brokerage houses 5.5 to 8.5%).

TABLE 3: COST OF EQUITY COMPARISON	Nominal
Ms. Bulkley' Recommendation for Montana-Dakota (August 2020) [1]	10.2%
Compared to Leading Financial Institutions/Publications - U.S. Large Cap Stocks	
Duff & Phelps (December 2020) [2]	8.0%
Horizon Actuarial Services, LLC Survey (July 2020) [3]	5.5 - 8.5%
50% Percentile: 7.2%	
J.P. Morgan Asset Management - Equity Long-Term Returns (March 2020) [4]	7.2%
Charles Schwab - Long-Term Market Returns (March 2020) [5]	7.1%

Dates above indicate latest market-data used in analysis.

Sources:

[1] Ms. Bulkley's Direct Testimony, page 7, line 11.

[2] Duff & Phelps Recommended U.S. Equity Risk Premium Decreased from 6.0% to 5.5%, Effective December 9, 2020

[3] Horizon Actuarial Services, LLC, Survey of Capital Market Assumptions Survey, July 2020. Participants Include: Bank of New York Mellon, BlackRock, Franklin Templeton, Goldman Sachs Asset Management J.P. Morgan Asset Management, Merrill Lynch Global Institutional Consulting, Morgan Stanley Wealth Management, Royal Bank of Canada, SunTrust, UBS, The Vanguard Group.

[4] J.P. Morgan Asset Management - LTCMA Market-to-Market: COVID-19 - New Cycle, New Starting Point, April 30, 2020.

[5] Charles Schwab - Why Market Returns May Be Lower and Global Diversification More Important in the Future, June 23, 2020.

I provide the data shown in Table 3 above to show that major financial institutions are telling their clients to expect lower returns on their investments than the cost of equity proposed by Ms. Bulkley. The return expectations published by all of these financial institutions are based on their own financial models and are for the overall stock market. Ms. Bulkley's cost of equity recommendation is for a regulated utility company. It is unlikely that investors would expect to earn a higher return on equity for a cost of service regulated utility company than for the overall stock market.

My 8.09% (7.93% - 8.25%) cost of equity for Montana-Dakota is also on the high end of the range of the published figures shown in Table 3 on page 5, which should give the Commission confidence that if my recommendation is used to set rates, it will still enable Montana-Dakota to raise the capital it requires. The cost of equity cannot be calculated as precisely as the weight or height of an object. Therefore, I recommend a cost of equity of between 7.93% and 8.25%, and the Commission can use the forecasts shown in Table 3 along with market data provided in this testimony to determine the cost of equity within that range which they consider appropriate for setting Montana-Dakota's rates.

Q. MS. BULKLEY CLAIMS THAT A 13.95% EXPECTED RETURN FOR THE OVERALL MARKET (S&P 500) IS NOT UNREASONABLE BASED ON FORECASTS FROM S&P GLOBAL. WHY DON'T YOU INCLUDE THIS 13.95% RETURN EXPECTATION IN YOUR COST OF EQUITY COMPARISON TABLE?

A. I was initially skeptical of Ms. Bulkley's forecasted market returns (13.95%) because it is off the charts high. Her 13.95% market return expectations are about twice the equity return expectations of pension funds, leading financial institutions, investment advisors, utility company witnesses in PG&E's ongoing application to issue securitized bonds, and current market data. However, I did not want to exclude Ms. Bulkely's 13.95% market return expectation just because it is off the charts. If Ms. Bulkley's 13.95% market return expectations are accurate, it would send shock waves through the pension fund industry. A 13.95% equity return expectation would allow pension funds to sharply reduce contributions because a higher return allows pensions to meet their obligations with less money.

Ms. Bulkley's 13.95% market return expectation is based on earnings per share forecasts provided by the S&P Global analyst Howard Silverblatt. I contacted Mr. Silverblatt directly and asked him if he recommends using his earnings growth rate projections in a DCF model to calculate S&P 500 return expectations. Mr. Silverblatt urged caution. In an email response to my inquiries, he told me "The majority of the estimates come from the buy-side, which does have a reputation for being overly optimistic." He also said, "due to the COVID impact, some growth rates may be the product of depressed earnings levels." Based on my discussion with the very S&P Global analyst behind the numbers, I cannot justify including Ms. Bulkley's 13.95% market return expectation in my cost of equity comparison.

Q. WHAT DO MARKET RETURN EXPECTATIONS OF LEADING FINANCIAL INSTITUTIONS INDICATE REGARDING THE REASONABLENESS OF MS. BULKLEY'S 10.200% COST OF EQUITY RECOMMENDATION?

A. The market return expectations of leading financial institutions indicate that Ms. Bulkley's 10.200% cost of equity recommendation is beyond unreasonable.

Q. WHY DON'T YOU INCLUDE AUTHORIZED GAS UTILITY ROES IN YOUR COST OF EQUITY COMPARISON TABLE?

A. As explained below, Montana-Dakota's authorized ROE should be market-based. In other words, it should be based on investors' return expectations as indicated by market data. Even if we assume that all historical authorized ROEs of gas utilities in other jurisdictions are based on accurate market-based cost of equity calculations, they are from the past. The cost of equity should be based on current expectations. Setting rates based on historical data is like driving a car by looking out the rear-view mirror. Calculating the cost of equity

while looking backward is particularly ineffective now because COVID-19 has caused capital markets to take a sharp turn. Unless authorized ROEs are set based investors' expectations as indicated by market data at the time of the proceeding, we risk setting rates that will not allow a utility to raise capital or overcharging consumers. It is understandable to review recent authorized ROEs, but I strongly encourage considering the return expectations of leading financial institutions and the results of my financial models presented below.

Q. YOU DETERMINED THAT MONTANA-DAKOTA SHOULD BE AUTHORIZED TO EARN A RETURN ON EQUITY (ROE) EQUAL TO ITS MARKET-BASED COST OF 8.09%. PLEASE DEFINE THE COST OF EQUITY.

A. The cost of equity is market-based. In other words, the cost of equity is the return investors expect to earn when they purchase the equity (or stock) of a company. This makes sense because investor-owned utility companies ("IOUs") raise money from investors. It is critical that the authorized rate of return ("ROE") be consistent with the market return expectations of investors. If the authorized ROE is below investors' market return expectations, Montana-Dakota will not be able to raise the capital required to provide safe and reliable service. On the other hand, if the allowed return is above investors' market return requirements, consumers will be paying more than is necessary for their service.

Q. IT MAKES SENSE THAT THE COST OF EQUITY SHOULD BE BASED ON THE RETURN EXPECTATIONS OF THOSE PROVIDING THE IOU WITH CAPITAL.

DO SOME RATE OF RETURN WITNESSES USE A DIFFERENT DEFINTIOIN FO THE COST OF EQUITY?

A. All rate of return witnesses that I am aware of define the cost of equity as market-based somewhere in their testimony. However, many witnesses implicitly define the cost of equity, at least in part, as a hybrid of accounting returns (return on book equity) and return expectations of so-called "expert forecasters" such as economists and equity analysts. Some even use their personal market speculations to calculate the cost of equity. This mischaracterization of the cost of equity is unfortunate because it makes it more challenging for a commission to make an informed decision.

Q. ISN'T YOUR COST OF EQUITY RECOMMENDATION BASED ON YOUR OPINION OR FORECASTS OF FUTURE STOCK PRICE RETURNS?

A. No. I do not pretend to have a capital market crystal ball. Capital markets are unpredictable and as explained above, it is investor expectations that matter above all else since they are the ones providing the capital. Therefore, I provide an expert evaluation of investors' return expectations as indicated by the market prices of stocks, bonds, and stock options. This is an important topic that I will revisit throughout my testimony.

I do use Value Line and Zacks forecasts to estimate the market-based cost of equity in my DCF analyses. However, I do not use them mechanically and go to great lengths to distill the sustainable growth component to ensure they are in line with investors' long-term expectations. My CAPM is based completely on investors' expectations as indicated by market prices.

Q. WHY DON'T YOU BASE YOUR COST OF EQUITY RECOMMENDATION ON YOUR PERSONAL STOCK MARKET FORECASTS?

A. I do not base my cost of equity recommendation for Montana-Dakota on my opinion of future stock prices for two reasons. First, I do not know what stock prices will be in the future. Capital markets are extremely difficult, if not impossible, to forecast because current stock and bond prices already reflect the forecasts of millions of investors who stand to make a lot of money if their forecasts are even slightly more accurate than the market consensus. Second, even if my capital market forecasts were more accurate than the market consensus as indicated by market prices, it would not impact Montana-Dakota's cost of equity because I could not provide them anywhere near the amount of capital required to provide safe and reliable service.

Q. PLEASE SUMMARIZE HOW YOU DETERMINED YOUR 8.09% COST OF EQUITY RECOMMENDATION FOR MONTANA-DAKOTA'S GAS UTILITY OPERATIONS.

A. To arrive at my recommendations, I applied the Discounted Cash Flow ("DCF") Model, including a Constant Growth and a Non-Constant Growth method, and a Capital Asset Pricing Model ("CAPM") to a proxy group of 10 publicly traded gas utility companies ("Gas Proxy Group") using data available through December 31, 2020. However, I do not accept the results of my cost of equity models blindly because capital markets are complicated and constantly changing. As discussed below, I review capital market data in general and the model results of leading financial institutions as a check on the reasonableness of my model results and the reasonableness of company witness Ms. Bulkley's cost of equity recommendation.

Q. ARE YOUR COST OF EQUITY MODELS BASED ON ESTABLISHED METHODOLOGIES?

A. The purpose of my testimony is to provide the Commission with an independent analysis. However, I do not reinvent the wheel. It is mostly a question of which established methodologies and theories to use. There are countless established methodologies and theories used by investors, scholars, and rate of return witnesses. And finance does not stand still. For example, Wall Street traders have been increasingly using machine learning to make investment decisions and the use of quantum computing is likely the next new tool.

The Constant Growth DCF model I chose to use is the same one chosen by major financial institutions. J.P. Morgan Chase uses the sustainable growth form of the DCF method, as I do, in its 2019 Long-Term Capital Market Assumptions publication.[5] *Principles of Corporate Finance*, a leading financial textbook used in business schools and investment banks around the world, recommends using the very same method I use to calculate the cost of equity for regulated energy utility companies.[6] As discussed in Section V. Capital Asset Pricing Model on page 46, my CAPM is based on methodologies used by Value Line, the Chicago Board of Options Exchange (CBOE), and published in peer-reviewed academic journals (e.g., The Review of Financial Studies). My CAPM method has also been recognized by other commissions. On April 9, 2020, the Public Service Commission of South Carolina stated the following:

> Amongst the three witnesses, Consumer Affairs Rothschild's approach was unique in that he included the use of both historical and

[5] 23rd Annual Edition, Long-Term Capital Market Assumptions - Time-tested projections to build stronger portfolios, pp. 62-63.
[6] Brealey, Myers, and Allen (2017), Principles of Corporate Finance, 12th Edition, McGraw-Hill Irwin, New York, page 86-87.

forward-looking, market-based data in his analysis. Based on the testimony and facts presented, the Commission therefore adopts the recommended ROE of 7.46% proposed by witness Rothschild.[7]

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR COST OF EQUITY MODELS.

A. I have determined the cost of equity for the average company in my Gas Proxy Group to be between 8.10% and 8.41%.[8] As shown in Table 4 below, the high-end results of my cost of equity models, including eight variations of the CAPM, range between 6.88% and 11.45%, averaging 8.41%. The low-end results of my cost of equity models range between 6.61% and 10.71%, averaging 8.10%.

TABLE 4: COST OF EQUITY MODEL RESULTS

DCF	**Low**	**High**
Constant Growth	9.48%	9.54%
Non-Constant Growth	10.71%	11.45%
CAPM		
Spot (Dec. 31, 2020)		
Risk-Free Rate - 3-Month T Bill	7.05%	7.36%
Risk-Free Rate - 30-Yr T Bond	7.53%	7.80%
3-Mo. Weighted Average (Oct. to Dec. 2020)		
Risk-Free Rate - 3-Month T Bill	6.61%	6.88%
Risk-Free Rate - 30-Yr T Bond	7.20%	7.43%
Average	**8.10%**	**8.41%**

Schedule ALR-2

Q. HOW DO CURRENT FINANCIAL MARKETS AFFECT YOUR COST OF EQUITY RECOMMENDATIONS?

A. It is always critical to consider the results of cost of equity models in the context of financial markets in general. It is particularly important to consider market data in the current economic environment because the spread of COVID-19 has drastically increased the

[7] Order Ruling on Application for Adjustment in Rates, Docket No. 2019-290-WS, Order No. 2020-306, April 9, 2020, page 43.
[8] Schedule ALR-2.

speed and intensity of financial market change. Table 5 on page 14 shows a summary of how COVID-19 has impacted financial markets between December 31, 2019 and December 31, 2020.

Line 1 of Table 5 shows how the overall stock market (S&P 500) sharply declined during the initial spread of COVID-19, but it has nearly fully recovered. Line 2 shows that interest rates have declined (30-year U.S. Treasury yields have fallen from 2.39% to 1.46%), but as shown on line 3 investors are demanding a credit spread to invest in riskier corporate bonds (31 basis point increase). Line 4 shows that investors' volatility expectations have increased significantly (13.78 to over 20.57) which indicates higher market risk. However, as shown on line 6, option-implied betas have decreased from 0.90 to 0.66 which indicates that investors expect gas utility stock price movements to be less correlated with the overall market than before the pandemic and therefore less risky relative to the market. Line 5 shows that stock option prices indicate that the equity risk premiums have likely increased over that time-period which is consistent with the increase in credit-spreads shown on line 3. Table 5 on page 14 includes a much of the market data I use in my cost of equity models to estimate investors' actual return expectations.

TABLE 3: COST OF EQUITY IN TODAY'S FINANCIAL MARKET - SUMMARY
MEASURING COVID-19'S IMPACT ON THE COST OF EQUITY

	31-Dec-19	19-Feb-20	17-Mar-20	30-Apr-20	30-Jun-20	30-Sep-20	31-Dec-20	
	Pre-Crisis	COVID-19 Crisis						Dec '19 - Dec '20 Delta
		Mkt Peak	Trough	"Recovery"				
1. Stock Prices (S&P 500)	$3,230.78	$3,386.15	$2,529.19	$2,912.43	$3,100.29	$3,363.00	$3,756.07	**$525.29**
2. Interest Rates (30-Yr) [1]	2.39%	2.01%	1.63%	1.28%	1.41%	1.46%	1.65%	**-0.74%**
3. Credit Spreads (Baa vs. 10-Yr) [2]	1.98%	2.05%	3.49%	3.23%	2.93%	2.75%	2.20%	**0.22%**
4. Volatility Expectations (30-Day) [3]	13.78	14.38	75.91	34.15	30.43	26.37	22.75	**8.97**
5. Market Risk Premium [4]	4.56%	4.99%	10.71%	10.01%	9.14%	10.21%	8.57%	**4.01%**
6. Gas Proxy Group - Fwd. Beta (6-Mo.) [5]	0.90	0.82	0.23	0.76	0.63	0.65	0.72	**-0.18**

[1] 30-year U.S. Treasury Yield
www.treasury.gov
[2] Baa rated corporate bond yield - 10-year U.S. Treasury Yield
https://fred.stlouisfed.org/series/BAA
https://fred.stlouisfed.org/series/GS10
[3] VIX Index - 30 days
[4] Annualized option-implied market risk premium vs. 30-year Treasury RFR - weighted across all traded expirations as of last Tuesday before date, assuming 50.0% cumulative probability (median)
[5] Option-implied beta - 6-month, as of last Tuesday before date
Schedule ALR-4

See Section IV. COST OF EQUITY IN TODAY'S FINANCIAL MARKETS on page 17 for a more in-depth analysis of how the spread of COVID-19 has impacted financial markets and the cost of equity for gas utility companies.

Q. WHY DO YOU AND MS. BULKLEY HAVE SUCH DIFFERETN COST OF EQUITY RECOMMENDATIONS?

A. Ms. Bulkley and I recommend a different cost of equity for Montana-Dakota because we have fundamentally different analytical approaches. I focus on using market data (e.g., stock prices, bond yields, stock option prices) to measure investors' expectations as much as possible. On the other hand, Ms. Bulkley relies almost exclusively on non-market data, including economists' interest rate forecasts even when market data is available. She correctly states, "current market conditions affect the results of ROE estimation models."[9] A cost of equity model that is not impacted by market conditions could not provide a

[9] Ms. Bulkley's Direct Testimony, page 11, lines 3-4.

market-based cost of equity. However, she views this influence as a problem. She claims to know that utility stock valuations are unsustainably high and interest rates are low. To correct for the expectations of apparently misinformed investors (investors are purchasing utility stocks even though they are overpriced) Ms. Bulkley claims that non-market-based data should be used such as the interest rate forecasts of economists. She has been making similar claims regarding the sustainability of high utility stock valuations and low interest rates for years. In NSP's 2012 rate case, Ms. Bulkley claimed "high stock valuations (associated with unusually low long-term interest rates) will tend to reduce dividend yields and, therefore, the estimated ROE."[10]

In other words, Ms. Bulkley is asking for a 10.200% cost of equity based on "projected" figures (e.g., interest rates) instead of current market data because she considers market conditions that have existed for over a decade to be "unsustainable." Her 10.200% cost of equity is analogous to charging tenants of an apartment building above market rates now because, in her opinion, these market rates are unsustainable despite remaining so for over a decade. If interest rates increase in the future the Company can file a rate case.

We do not agree on the appropriate cost of equity for Montana-Dakota for many reasons. The primary reasons we have come to different conclusions include: (1) Ms. Bulkley's use of non-market data such as interest rate forecasts; (2) the growth rates applied in the Constant Growth DCF model; (3) the implementation of the CAPM; and (4) the inclusion of a non-market-based model, the Expected Earnings Analysis.

[10] Ms. Bulkley's NSP Direct Testimony, page 33, lines 24-27. December 18, 2012, Case No. PU-12-813.

III. CAPITAL STRUCTURE AND COST OF DEBT

Q. WHAT CAPITAL STRUCTURE DO YOU RECOMMEND AND WHY?

A. Ms. Bulkley proposes using a capital structure of 50.306% common equity, 7.324% short-term debt, and 42.370% long-term debt. I use of this capital structure to calculate my overall rate of return recommendation, but I adjust my cost of equity because the common equity ratio of Montana-Dakota's requested capital structure contains a greater common equity ratio than the average of the 10 regulated gas utility companies in my proxy group (46.3%).[11]

Q. WHY DO YOU ADJUST MONTANA-DAKOTA'S COST OF EQUITY TO ACCOUNT FOR ITS REQUESTED CAPITAL STRUCTURE?

A. A higher common equity ratio means less debt, a lower chance of financial stress (financial risk), and therefore a lower cost of equity.[12] On the other hand, a lower common equity ratio means more debt, a higher chance of financial stress (financial risk), and therefore a higher cost of equity. Based on a regression analysis of dozens of utility companies, I found a 0.04% reduction in the DCF cost of equity results for every 1% increase in the common equity ratio. Because Montana-Dakota's requested capital structure has a higher 50.306% common equity than the average of the 10 regulated gas utility companies in my proxy group (46.3%), I have deceased my cost of equity estimate from 8.25%[13] for my proxy group to a cost of equity of 8.09%[14] for Montana-Dakota.

A.

[11] Schedule ALR-5, page 4.
[12] I found a 0.04% reduction in the DCF cost of equity results for every 1% increase in the common equity ratio.
[13] Schedule ALR-2.
[14] Ibid.

Q. WHAT COST OF DEBT DO YOU RECOMMEND?

A. Ms. Bulkley proposes using a cost of debt of 4.718%. I do not object to the use of this rate and have used this rate in my analyses.

IV. COST OF EQUITY IN TODAY'S FINANCIAL MARKETS

Q. HOW DOES YOUR COST OF EQUITY RECOMMENDATION RELATE TO THE CURRENT FINANCIAL MARKET?

A. The ongoing pandemic has fundamentally changed capital markets. It has increased uncertainly and as a result stock prices have been volatile. In the first half of March 2020, stock prices crashed, but by mid-August, the S&P 500 had already fully recovered, reaching a new high on January 8, 2021. The unemployment rate increased to nearly 15% in April 2020 but has fallen to under 7%[15] as of December 2020. In the first and second quarters of 2020 real gross domestic product fell sharply. In response, the Federal Reserve has cut short-term Treasury yields to 0% and Congress has passed a $2 trillion stimulus package.

During a financial crisis, many investors panic and sell shares in companies without regard for their economics. Others are forced to sell because of margin calls. Many unnerved investors purchase the safest (least risky) securities they can find, including treasury bonds and utility stocks, in a "flight-to-safety" response. All of these developments can impact the cost of equity.

[15] Federal Reserve estimates that unemployment rate for lowest paid workers is likely above 20%.

Q. HOW HAS THE RECENT FINANCIAL CRISIS IMPACTED THE COST OF EQUITY FOR GAS UTILITY COMPANIES?

A. Gas Utility stocks have been impacted along with the overall market. As shown in Chart 2 on page 21, the stocks in my Gas Proxy Group have underperformed the overall market since the pre-pandemic S&P-500 peak reached on February 19, 2020. The Gas Proxy Group is down -18.38% between February 19, 2020 and December 31, 2020 while the S&P 500 is up 10.92% over the same time period.

Q. PLEASE DISCUSS SOME OF CURRENT MARKET DEVELOPMENTS THAT IMPACT THE COST OF EQUITY.

A. Below I will discuss in more depth the data presented in Table 5 on page 14. It is important to consider the results of my cost of equity models (DCF and CAPM) in the context of current financial market conditions as follows:

1. **Stock prices crashed and fully recovered.** The S&P 500, Dow Jones Industrial Average, and other stock indices fell faster in the second half of March 2020 than during the 2007-2008 financial crisis, the crash of 1987, or the Great Depression. As of March 23, 2020, the S&P 500 had fallen approximately 34% from its all-time high reached on February 19, 2020. On August 8, 2020, the S&P 500 set a new high which represents the fastest recovery (126 trading days) from a bear market. gas utility stocks initially fell more than the overall market (about 33% off their peak versus 34% for the overall market). As of the end of December 31, 2020, gas utility stock prices have significantly lagged the overall market.

2. **Low interest rates and a steep yield curve.** As short-term Treasury yields reach 0%, long-term rates have dropped sharply as well. The difference between long-

term and short-term yields, referred to as the yield curve, has increased. A steep yield curve (where long-term yields are significantly higher than short-term yields) indicates investors expect the economy to improve.

3. **Credit spreads increased sharply, declined, and remain elevated.** The spread between the yield investors demand to purchase U.S. Corporate bonds and U.S. Treasury bonds (see Chart 5 on page 24) increased significantly in the initial phases of the COVID-19 pandemic, but never got as high as it did during the financial crisis of 2007-2008. As of the end of December 31, 2020, the yield spread between Baa Corp bonds is about 2.75%. It reached a high of over 4.0% in March 2020.

4. **Investors' stock price volatility expectations have fallen from highs reached during initial phases of the pandemic**. In March 2020, the Market Volatility Index ("VIX") reached levels not seen since the financial crisis of 2007-2008, and even set all-time records. Volatility expectations remain higher than before COVID-19 but have declined significantly since peaks reached in March.

5. **Market Risk Premiums.** As discussed in the CAPM section below, stock option data indicates that the premium investors require to invest in stock has likely increased because volatility expectations have increased since the spread of the coronavirus.

6. **Gas Proxy Group Forward 6-month Betas have decreased.** As discussed in depth in the CAPM section below, stock option data indicates that investors expect gas utility stock price movements to be less correlated to the overall market. This development indicates that the cost of equity for gas utility companies has been impacted less than the overall market.

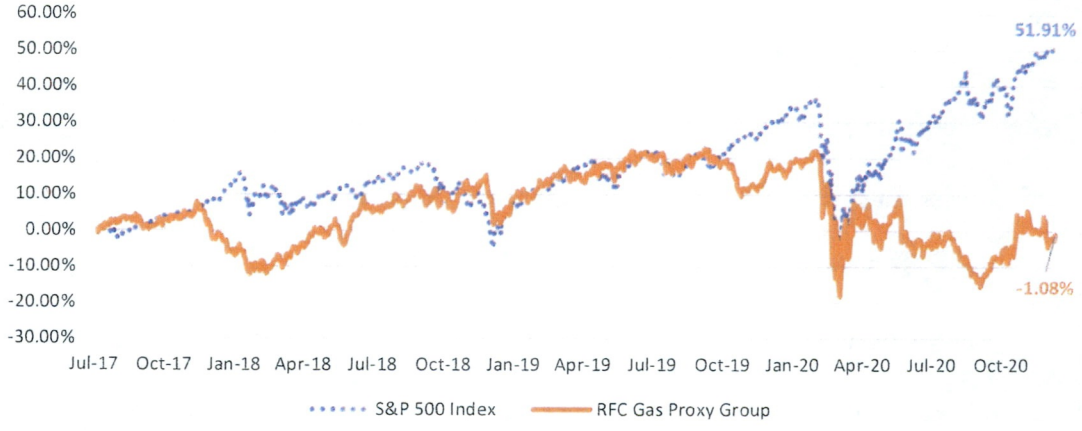
A. Stock Price Trends

Q. WHAT, IF ANYTHING, DOES STOCK MARKET DATA INDICATE WITH REGARD TO THE COST OF EQUITY?

A. As stock prices have increased significantly in recent years, the price-to-earnings (P/E) ratios have increased as well. This indicates that the cost of equity may be decreasing along with the higher stock prices because investors are paying a higher price for the same earnings. For example, an investor paying $100 for a share of a stock with $10 per year of earnings will earn a 10% annual return, assuming no growth. If this stock goes up to $200 per share the annual earnings decrease to 5%. As shown in Chart 1 on page 21, until the recent COVID-19-related crash, stock prices for the S&P 500 and the Gas Proxy Group increased significantly in the more than three years since Montana-Dakota filed its last rate case on July 21, 2017.[16] At their peaks, the Gas Proxy Group had increased about 22% while the S&P 500 had increased about 35%. After the significant losses due to COVID-19, the Gas Proxy Group is down about 1% as of December 31, 2020. In comparison, the S&P 500 is nearly 52% higher than it was as of July 21, 2017.

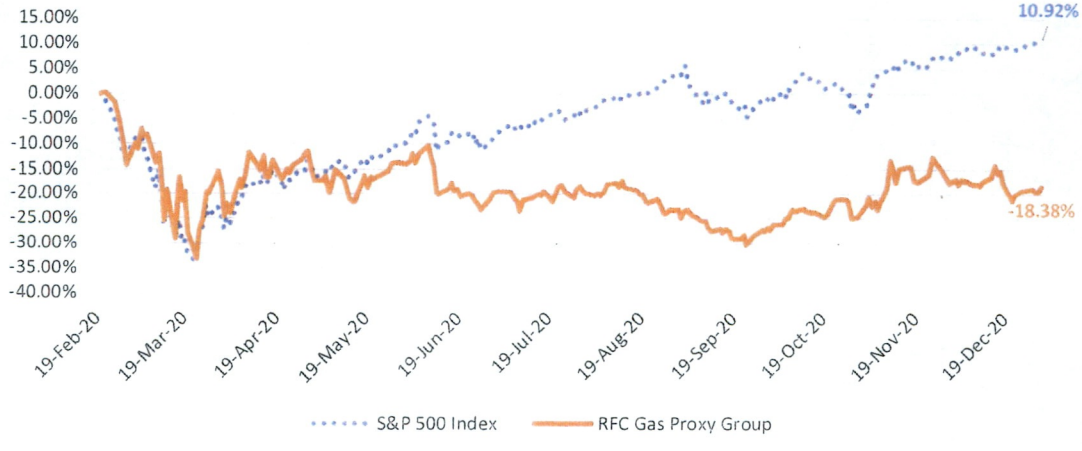
[16] Case No. PU-17-295.

Chart 1:
Gas Proxy Group Portfolio Performance vs. S&P 500 Index
July 2017 to December 2020



Focusing on the drop in stock prices since the market's peak on February 19,2020 as of December 31, 2020, the Gas Proxy Group was down over -18.38% compared to a gain of 10.92% for the overall market, as shown in Chart 2 below.

Chart 2:
Gas Proxy Group Portfolio Performance vs. S&P 500 Index
February 19 to December 31, 2020

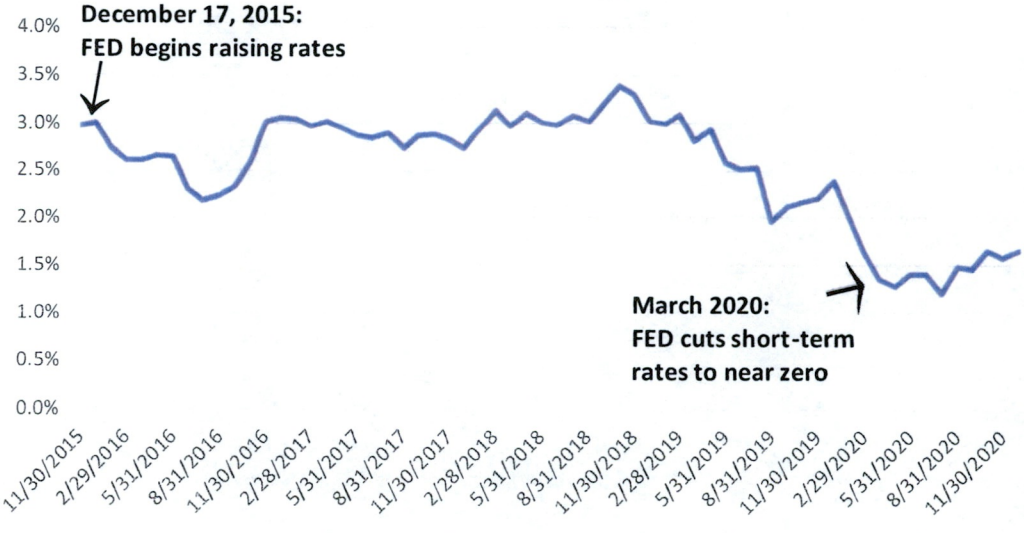


B. Interest Rates

Q. PLEASE DISCUSS THE CURRENT INTEREST RATE ENVIRONMENT AND WHAT IT INDICATES REGARDING THE COST OF EQUITY.

A. There are two significant interest rate developments occurring in response to COVID-19. First, interest rates have fallen significantly. Short-term interest rates are near 0%. Starting in early March 2020, as shown on Chart 3 below, yields on 30-year U.S. Treasuries have fallen from about 2.30% at the beginning of 2020 to about 1.70% in December 2020. Federal Reserve officials pledged to support economic recovery by holding rates near zero for at least three years.[17] Lower interest rates indicate a lower cost of equity for gas utility companies because many bond investors sell bonds and purchase utility stocks as interest rates decline.

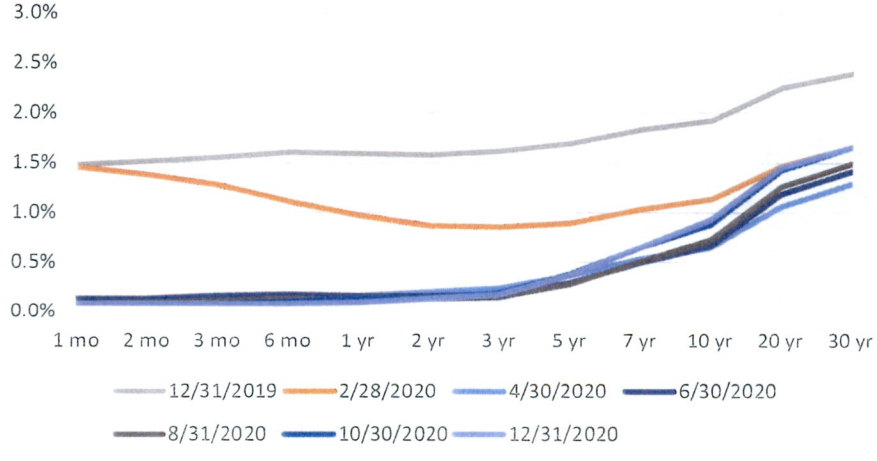
Chart 3: 30-Year U.S. Treasury Yield
November 2015 - December 2020



[17] Fed Says Virus Poses Considerable Risks, Maintains Low-Rates Pledges, WSJ, November 5, 2020.

The second development, as shown in Chart 4 below, is that the yield curve has steepened[18] significantly as a result of the Coronavirus-induced financial crisis.[19] Before the crisis, the yield on the 1-month Treasury bill was about 1.5%, increasing to less than 2.5% for the 30-year Treasury bond, which is less than a double. On the other hand, as of April 30, 2020, the yield curve increased from nearly 0% for the 1-month Treasury bill to 1.28% for the 30-year U.S Treasury bond. A steep yield curve indicates investors expect economic conditions to improve because, with expected profitable investment opportunities, they require a significant premium in order to commit their money for long periods of time. On the other hand, when the yield curve is "flat" they do not require a premium to commit their money for long periods of time because they do not expect as many opportunities.

Chart 4: U.S. Treasury Yield Curves



[18] The difference between short-and long-term interest rates is the slope of the yield curve. As this difference increases, the yield curve becomes steeper.

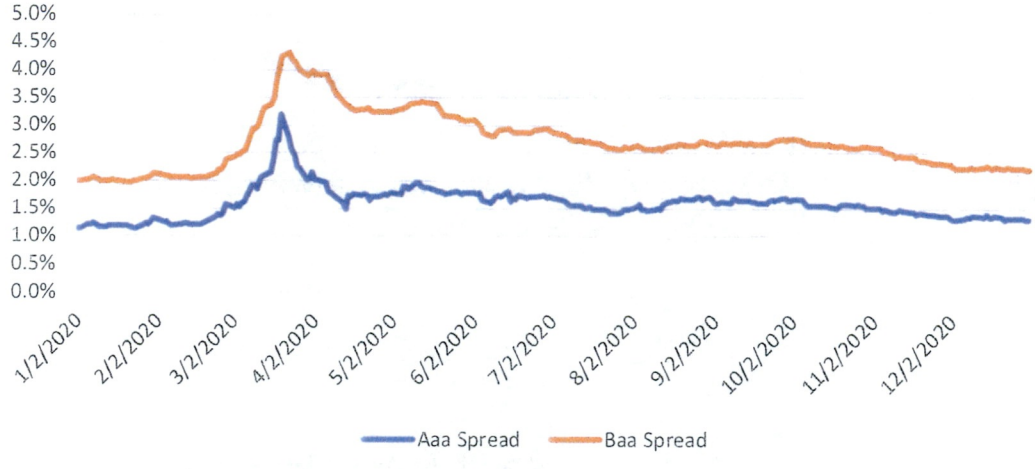
[19] The yield curve was even steeper for years (2009-2017) after the financial crisis of 2007-2008. It was relatively flat (short-term rates were about the same as long-term rates) for most of 2019 and early 2020 before the COVID-19 pandemic.

C. Increasing Credit Spreads

Q. WHAT DOES AN INCREASING CREDIT SPREAD MEAN FOR THE COST OF EQUITY?

A. As shown in Chart 5 below, the yield spread between Corporate bonds and Treasury bonds increased significantly as the Coronavirus has spread throughout the world. The interest rate spread between Baa Corp bonds and 10-year U.S. Treasuries peaked at over 4% mid-March. This chart clearly shows that yield spreads have declined since their peak. As of December 31, 2020, the yield spread between Baa Corp bonds and 10-year U.S. Treasuries is 2.75%, nearly 200 basis points lower than the peak reached in March 2020 and about 77 basis points higher than before the pandemic. A declining yield spread indicates that investors' appetite for risk has increased since mid-March 2020. As investors' appetite for risk increases the cost of equity tends to decline.

Chart 5: Corporate Bond Yield Spread
Aaa and Baa Rated Bond Yields - 10-Year U.S. Treasury Yield
January - December 2020



D. Volatility Expectations

Q. PLEASE DISCUSS CURRENT STOCK PRICE VOLATILITY EXPECTATIONS AND WHAT THEY INDICATE REGARDING THE COST OF EQUITY.

A. Volatility, uncertainty, and risk are synonymous. There are two primary types of volatility: "realized volatility" and "implied volatility." The former is based on historical returns which may or may not represent future volatility. For example, the current high volatility in the markets will most likely decrease after the spread of the Coronavirus is contained and people return to work. On the other hand, implied volatility is calculated from options data, which indicates investors' future expectations for volatility. As discussed below, the "term structure" of volatility indicates investors' volatility expectations over different forward-looking time periods (e.g., 1-month, 1-year).

Q. PLEASE EXPLAIN THE TERM STRUCTURE OF VOLATILITY.

A. Investors can expect volatility to increase or decrease in the future. During a crisis, investors often expect volatility to decrease in coming months or years. In other words, investors expect the current capital market hurricane to pass and the winds to die down. In general (i.e., in "normal" financial markets), investors expect higher volatility for longer time horizons. For example, investors generally expect the chance stock prices will increase or decrease by 10% in 1 year (on an annual basis) to be greater than the chance of a 10% move over the next 30 days (on an annual basis). This makes sense because there is more uncertainty regarding economic and stock market changes the further in the future you look out.

However, during the peak of implied volatility (to date) in mid-March 2020, shortly after the World Health Organization declared COVID-19 a pandemic, the data indicated

that investors expected stock price volatility to decrease over time (see Chart 8 on page 28). This implies that investors expected the riskiness of equity investments to decrease over time. As shown in Chart 6 below, before the COVID-19 outbreak, investors expected volatility to increase from less than 15% annually at the 1-month time frame to about 20% annually at the 24-month time frame. Post COVID-19 outbreak, investors expected volatility to decrease from over 70% at the 1-month time frame to about 38% at the 24-month time frame.

Chart 6: Term Structure of Volatility
Before and After COVID-19 Pandemic Onset

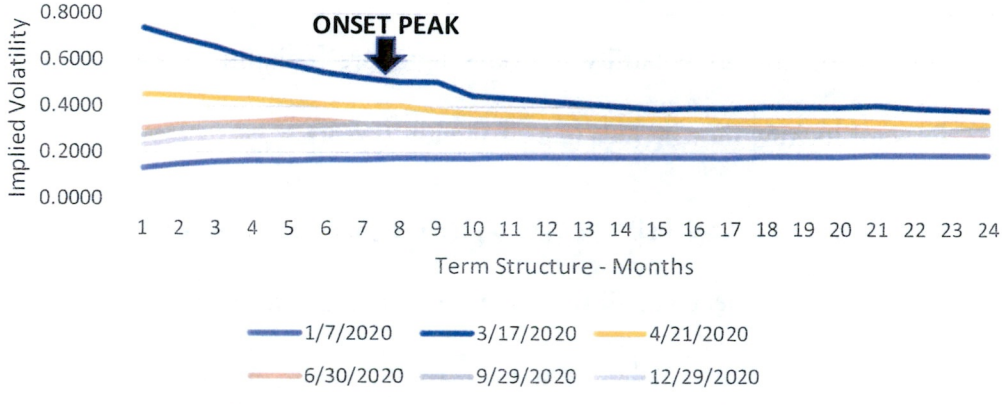
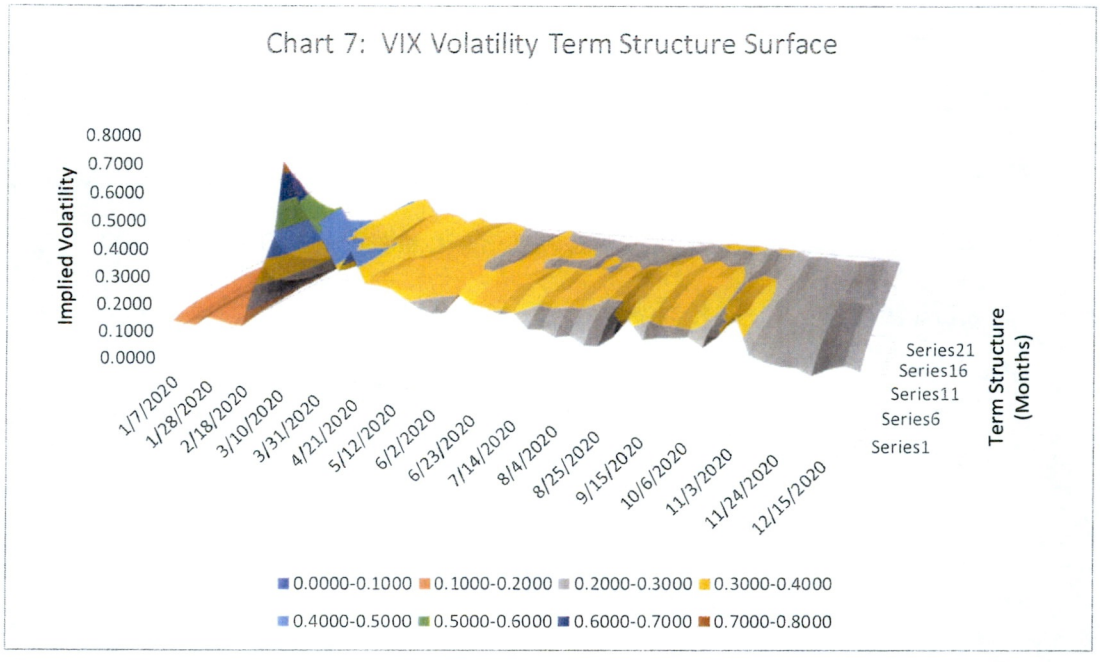


Chart 7[20] on page 27 provides a 3-dimensional surface to show how the term-structure of volatility has evolved since before the COVID-19 outbreak and how it has changed during the outbreak. One can see that on January 7th, the term structure of volatility is almost flat, increasing slightly from 1-month to the 24-month time frame. In mid-March 2020, the implied volatility increased over every time period in comparison to January 7th, but one can see that investors expected a declining term structure of volatility. By the end of July 2020, the implied volatility for all time periods had decreased, and the

[20] The X axis shows the implied volatility. The Y axis shows the data. The Z axis shows market expectation of future implied volatility of different time frames. Series1 = 1 month and Series31 = 31 months.

declining term structure moved to a more typical structure in which investors expected higher volatility over longer time periods.



A declining term structure of volatility is important data to consider in determining the appropriate cost of equity for Montana-Dakota because it shows that investors expected risk to decline during the peak (so far) of the pandemic's impact on financial markets. Lower risk means a lower cost of equity. Investors market volatility expectations turned out to be correct. Investors expected implied volatility to decline, and it did.

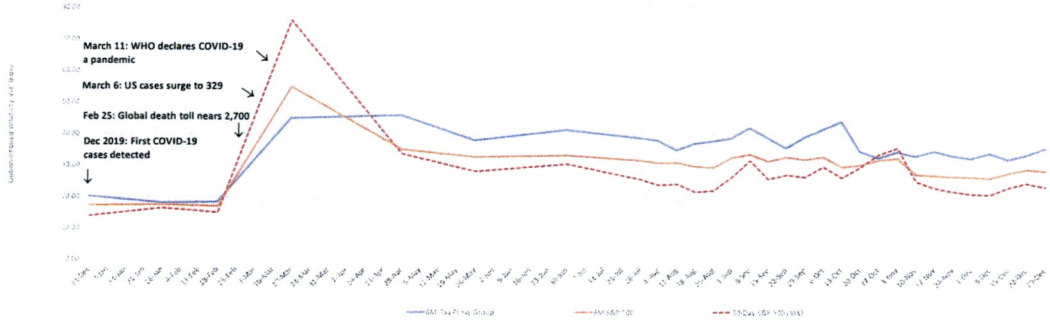
Q. HOW HAVE VOLATILITY EXPECTATIONS FOR GAS UTILITY COMPANIES COMPARED TO VOLATILITY EXPECTATIONS FOR THE S&P 500?

A. The dashed red line and the solid orange line in Chart 8 on page 28 show investors' stock price volatility expectations for the overall market (S&P 500) increased significantly as COVID-19 infections spread to the U.S. and continued to grow exponentially around the world. The dashed red line and solid orange line show volatility expectations over the next

30 days and 6 months, respectively. In the middle of February 2020, investors expected an annualized change of about 13.00% over the next 30 days. In mid-March 2020, investors' volatility expectations peaked at over 80.00%. As of December 31, 2020, investors expected an annualized change of about 25.00%. The blue line in Chart 8 shows that investors' volatility expectations for my Gas Proxy Group, as indicated by their stock option prices, increased along with the market, but to a significantly lesser degree in mid-March 2020.

Investors' volatility expectations for gas utility companies were higher than the overall market for the most part from April to December 2020. .

Chart 8: Gas Proxy Group 6-Month 'VIX' Index
December 2019 through December 2020



But note that the implied volatility of gas utility companies is higher than the S&P 500 even before the COVID-19 outbreak. The implied volatility for individual stocks and small groups of stocks is almost always higher than the overall market because of the effects of diversification. Therefore, the relative volatilities, do not indicate that gas utility companies were or are riskier than the S&P 500 before or after the breakout of COVID-19 and in fact accentuate even more the difference between the expected volatilities at the peak of the COVID-19 outbreak. As discussed below, changes in implied volatility do not paint the full cost of equity picture. We must consider implied covariance, or how

correlated investors expect the volatility of returns for gas utility companies and the overall market (e.g., S&P 500) to be.

Q. HOW IS COVID-19 IMPACTING FINANCIAL MARKETS AND THE COST OF EQUITY FOR GAS UTILITY COMPANIES?

A. The spread of COVID-19 has caused a historical financial crisis. Yet, financial data indicates that the current capital market upheaval has not significantly impacted the cost of equity for gas utility companies. Investors know that gas utility companies provide an essential service that will be used and paid for even during a financial crisis.

Although stock and bond prices remain more volatile than before COVID-19, market data shows that investors' volatility expectations have declined for both the overall market and gas utility companies since mid-March 2020. Investors' volatility expectations are important, but as explained in my CAPM section on page 48, investors' expectations regarding the co-variance between gas utility stocks and the overall market are more relevant to cost of equity than volatility expectations alone. Option-implied betas indicate that investors expect gas utility stock price movements to be less correlated with the overall market than before the pandemic. As explained below, I use stock option data to calculate an "option-implied beta" which is a measurement to determine what investors' expectations are regarding the covariance between the expected returns for the Gas Proxy Group and for the S&P 500. In December 2019, the average option-implied beta for my Gas Proxy Group was approximately 0.77. As of September 30, 2020, the average option-implied beta of these 10 companies was 0.62. In other words, investors expect gas utility stocks to move only a little more than a half a percent for every percent the market moves. Before the pandemic, investors expected that gas utility stocks would move about 0.77%

for every 1.0% move. Declining gas utility option-implied betas indicates that investors understand that gas utility companies provide an essential service that will be relatively unimpacted by the overall economy. This also indicates that the cost of equity for gas utility companies has not increased and possibly even declined since before the pandemic.

Every financial crisis is unique, and this one is no exception. But it seems that, as has been the case during financial crises in the past, investors do not require a higher cost of equity for gas utility companies despite the current market turbulence.

V. COST OF EQUITY CALCULATION

A. Overview

Q. PLEASE PROVIDE YOUR DEFINITION OF THE COST OF CAPITAL.

A. The cost of capital is the return investors require to provide capital to Montana-Dakota based on current capital markets. The spread of COVID-19 has made it more challenging to determine the current cost of capital because it has drastically increased the speed and intensity of capital market change. In order to measure the cost of equity accurately during rapid change, it is critical to use current market data. Because of the current financial crisis, it is particularly important to consider model results in the context of extreme financial turbulence. In order to do this, it is critical to consider how model results change over time throughout this crisis.

My cost of equity ("COE") recommendation is my opinion of the return investors require to provide equity capital to Montana-Dakota based on current capital markets. My

recommendation is consistent with the following legal standards set by the United States Supreme Court for a fair rate of return:

> The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.[21]

And

> ...sufficient to...support its credit and...raise the money necessary for the proper discharge of its public duties.[22]

Because the cost of equity is not a published figure like a bond yield, some interpretation is required to determine the appropriate market price. My cost of equity recommendation is based on my computation of what the market indicates investors require (return on investment) to provide capital to companies with comparable risk to Montana-Dakota.

As explained below, I use current market prices (e.g., stocks, bonds, options), which measures investors' expectations directly, instead of relying solely on historical data and analyst forecasts.

A cost of equity based on market prices (market-based) is superior to a cost of equity based on historical data (non-market-based) for two reasons:

1. The cost of equity that Montana-Dakota has to pay investors is based on capital markets. Interest rates remain at historical low levels after a persistent downtrend since the early 1980s. It is possible interest rates will increase, but if the marketplace expected interest rates to change, then that would already be part of current prices.

[21] Federal Power Commission v. Hope Natural Gas Company 320 U.S. 591, 603. (1944)
[22] Bluefield Water Works & Improvement Company v. Public Service Commission of the State of West Virginia 262 U.S. 679, 692-693 (1923).

2. Capital markets are unpredictable. Regarding capital markets' unpredictability, investment guru Warren Buffet recently gave the following advice to investors:

> They should not listen to a lot of the jabbering about what the market is going to do tomorrow, or next week or next month because nobody knows.[23]

Current capital markets are our best source of investors' expectations regarding future capital markets. Current market prices of stocks and bonds reflect investors' forecasts for long-term interest rates and capital markets in general. If, indeed, investors in the aggregate should be expecting an increase in interest rates, adding a separate factor for this on top of what is already indicated in market prices would amount to a double-count.

Q. HOW DID YOU ARRIVE AT YOUR COST OF EQUITY RECOMMENDATIONS?

A. To arrive at my recommendations, I applied the Discounted Cash Flow Model ("DCF"), including a Constant Growth and a Non-Constant Growth method and a Capital Asset Pricing Model ("CAPM") analysis to a group of similar companies (Gas Proxy Group) using data available through December 31, 2020 as discussed below.

[23] PBS News Hour, June 26, 2017, Part 1 – America should stand for more than just wealth, says Warren Buffett.

B. Proxy Group Selection

Q. WHICH COMPANIES DID YOU INCLUDE IN YOUR COMPARABLE PROXY GROUP TO DETERMINE YOUR COST OF EQUITY RECOMMENDATION?

A. I chose to include the same 10 publicly traded gas utility companies used by Ms. Bulkley in my comparable proxy group, referred to as the Gas Proxy Group. These 10 companies are listed on Table 6 below.

TABLE 6: GAS PROXY GROUP COMPOSITION

	Company Name	Ticker
1	ATMOS ENERGY CORP.	ATO
2	CHESAPEAKE UTIL.	CPK
3	NISOURCE INC.	NI
4	NEW JERSEY RES.	NJR
5	N. W. NATURAL	NWN
6	ONE GAS, INC.	OGS
7	SOUTH JERSEY INDS.	SJI
8	SPIRE INC.	SR
9	SOUTHWEST GAS	SWX
10	UGI CORP.	UGI

C. Discounted Cash Flow

Q. HOW DID YOU ARRIVE AT YOUR DCF-BASED COST OF EQUITY RECOMMENDATION?

A. I used both the constant growth form of the Discounted Cash Flow ("DCF") method, which determines growth based on the sustainable retention growth procedure, and a non-constant DCF method. My constant growth form DCF analysis indicates a cost of equity range of

between 9.48% and 9.54% for the Gas Proxy Group.[24] The results of my non-constant DCF method indicates a cost of equity of between 10.71% and 11.45% for the Gas Proxy Group.[25]

Q. WHAT IS THE DISCOUNTED CASH FLOW METHOD?

A. The DCF method, is an approach to determining the cost of equity. The method recognizes that investors purchase common stock to receive future cash payments. These payments come from: (a) current and future dividends, and (b) proceeds from selling stock. A rational investor will buy stock to receive dividends and to ultimately sell the stock to another investor at a gain. The price the new owner is willing to pay for stock is related to that buyer's expectation of future flow of dividends and the future expected selling price. The value of the stock is the discounted value of all future dividends until the stock is sold plus the value of proceeds from the sale of the stock.

Q. HAVE INVESTORS ALWAYS USED THE DCF METHOD?

A. While investors who buy stock have always done so for future cash flow, the DCF approach first appeared in the 1937 Harvard Ph.D. thesis of John Burr Williams titled *The Theory of Investment Value*. Author Peter L. Bernstein once stated, Williams' model for valuing a security calls for the investor to make a long-run projection of a company's future dividend payments..."[26] The Williams DCF model separately discounts each and every future expected cash flow. Dividends and proceeds from the sale of stock are the expected cash flows. Its accuracy is therefore unaffected by non-constant growth rates. Myron Gordon

[24] See Schedule ALR-3, page 1.
[25] See Schedule ALR-3, page 2 and Schedule ALR-3, page 3.
[26] P. BERNSTEIN, *Capital Ideas: The Improbable Origins of Modern Wall Street* (The Free Press, © 1992).

and Eli Shapiro who helped to make this method widely used, referred to Williams' work in their paper published in 1956 "Equipment Analysis: The Required Rate of Profit."

D. Constant Growth Form of the DCF Model

Q. YOU STATE YOU USED THE CONSTANT GROWTH FORM OF THE DCF MODEL. WHAT IS THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. The constant growth form of the DCF model is a form of the DCF method that can be used in determining the cost of equity when investors can reasonably expect that the growth of retained earnings and dividends will be constant.

Retained earnings are funds that a company keeps in its treasury, so that they are available for future needs, such as operating expenses, capital expenditures, debt payments, and new investments. These retained earnings show investors whether the company is growing which, in turn, is a measure of the future indicator of dividends and the value of a company's stock.

Q. DESCRIBE HOW THE CONSTANT GROWTH MODEL WORKS.

A. The constant growth model is described by this equation $k = D/P + g$, where: [27]

k= cost of equity;
D=Dividend; and
P=Market price of stock at time of the analysis.

and where:

g=the growth rate, where $g = br + sv$;
b=the earnings retention rate;
r=return on common equity investment (referred to below as "book equity");
v=the fraction of funds raised by the sale of stock that increases the book value of the existing shareholders' common equity; and

[27] M. GORDON, *Cost of Capital to a Public Utility*, at 32-33 (MSU Public Utility Studies 1974).

s=the rate of continuous new stock financing.
The constant growth model is therefore correctly recognized to be:
$k=D/P + (br +sv)$

The cost of equity demanded by investors is the sum of two factors. The first factor is the dividend yield. The second factor is growth (dividends and stock price). The logical relationship among these factors is as follows: the dividend yield is calculated based on current dividend payments while growth indicates what dividends and stock price will be in the future.

Q. WHAT OTHER FACTORS IMPACT HOW ONE USES THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. Sufficient care must be taken to be sure that the growth rate "g" is representative of the constant sustainable growth. To obtain an accurate constant growth DCF result, the mathematical relationship between earnings, dividends, book value and stock price must be respected.

Suppose one is faced with a situation where Value Line forecasts of growth are being used as a source for inputs and Value Line projects different growth rates for earnings per share and dividends per share. Under such conditions, the earnings per share growth rate does not provide a reasonable proxy for earnings per share growth, and dividends per share and stock price growth as well. Consider the following:

1. It is the lower dividend growth rate that makes it possible for more earnings to be retained, which in turn makes the earnings per share growth rate higher than it would be if dividends had in fact been modeled by Value Line to keep pace with earnings per share growth.

2. A dividend growth rate that is lower than both the earnings per share growth rate and the stock price growth rate means that the dividend yield will be going down. However, the constant growth form of the DCF model has no mechanism to account for the lower dividend yield investors would get if the Value Line projections were correct.

Using an earnings per share growth rate in the constant growth form of the DCF model will therefore result in an overstatement of the cost of equity whenever the earnings per share growth rate that has been modeled is derived along with an expectation of a lower dividend growth rate. This is because, under these conditions, the dividend yield portion of the constant growth form of the equation will be overstated.

The basic difference between the use of an analysts' earnings per share growth rate in the constant growth DCF formula and using the "br" (**b** (the earnings retention rate) X **r** (rate of return on common equity investment)) approach is that the "br" form, if properly applied, eliminates the mathematical error caused by an inconsistency between the expectations for earnings per share growth and dividends per share growth. Because it eliminates that error, the results of a properly applied "br" approach will be superior to the answer obtained from other approaches to the constant growth form of the DCF model. This is not to say that even a properly applied "br" approach will be perfect. The self-correcting nature of a properly applied "br" to forecasted differences in earnings per share and dividends per share growth rates helps mitigate the resultant error but should not be viewed as the perfect way to quantify the impact of expected non-constant growth rates.

Q. ARE YOU AWARE OF CLAIMS ALLEGING THAT THE "BR" APPROACH TO THE CONSTANT GROWTH DCF MODEL IS FLAWED BECAUSE IT RELIES

ON THE VALUE OF THE FUTURE EXPECTED RETURN ON BOOK EQUITY "R" TO ESTIMATE WHAT THE EARNED RETURN ON EQUITY SHOULD BE?

A. Yes. One common criticism is that it is not reasonable for the DCF to indicate a cost of equity (market return) that is different (lower or higher) than the expected return on book equity (accounting). There are multiple reasons why this concern is unfounded:

1. The constant growth form of the equation using "br" is:

   $$k = D/P + (br + sv).$$

   In this equation, "k" is the variable for the cost of equity, and "r" is the future expected return on equity. The cost of equity, "k," is not the same variable as the future expected earned return on equity, "r." In fact, there often is a large difference between the two.

2. The correct value to use for "r" is the return on book equity expected by investors as of the time the stock price and dividend data is used to quantify the D/P term in the equation. Therefore, even if future events occur that may change what investors expect for "r," the computation of the cost of equity "k" remains correct as of the time the computation was made.

3. The ability of a commission's ROE decision to influence future cash flow expectations is not unique to the retention growth DCF approach. The five-year analysts' earnings per share growth rate is a computation that is directly influenced by what earnings per share will be in five years. Allowed ROE's impact earning – higher allowed returns lead to higher earnings growth because the higher allowed returns the more earnings that are available for reinvestment.

Q. CAN CHANGES IN THE ACTUAL EARNED RETURNS IMPACT GROWTH ABOVE AND BEYOND WHATEVER GROWTH RESULTS FROM EARNINGS RETENTION?

A. Yes, but large short-term changes in earnings per share caused by a perceived change in the future expected earned returns are unsustainable. The new perceived earned return on book equity should be part of the computation, but the one-time growth spurt to get there is no more indicative of the sustainable growth required in the constant growth DCF formula than the temporary negative growth that occurs when a company has a bad year.

Q. HOW HAVE YOU IMPLEMENTED THE CONSTANT GROWTH FORM OF THE DCF MODEL IN THIS CASE?

A. I have applied the constant growth form of the DCF model by staying true to the mathematically derived "k=D/P + (br + sv)" form of the DCF model. I have also taken care to fully allocate all future expected earnings to either future cash flow in the form of dividends ("D") or to retained earnings (the retention rate, "b"). This extra accuracy is obtained only when the retention rate "b" is derived from the values used for "D" and "r," rather than independently.

Q. PLEASE EXPLAIN HOW YOU OBTAINED THE VALUES YOU USED IN THE CONSTANT GROWTH FORM OF THE DCF METHOD.

A. The DCF model generally calls for the use of the dividend expected over the next year. A reasonable way to estimate next year's dividend rate is to increase the quarterly dividend rate by ½ of the current actual quarterly dividend rate. This is a good approximation of the

rate that would be obtained if the full prior year's dividend were escalated by the entire growth rate.[28]

I obtained the stock price—"P"—used in my DCF analysis from the closing prices of the stocks on December 31, 2020. I also obtained an average stock price for the 12 months ending December 31, 2020 by averaging the high and low stock prices for the year.

I based the value of the future expected return on equity— "r" —on the average return on book equity expected by Value Line, adjusted in consideration of recent returns. I also made a computation that was based on a review of both the earned return on equity consistent with analysts' consensus earnings growth rate expectations and on the actual earned returns on equity. For a stable industry such as utility companies, investors will typically look at actual earned returns on equity as one meaningful input into what can be expected for future earned returns on book equity. See Schedule ALR-3, page 1.

This return on book equity expectation used in the DCF method to compute growth must *not* be confused with the cost of equity. Since the stock prices for the comparative companies are substantially higher than their book value, the return investors expect to receive on their market price investment is considerably less than the anticipated return on book value. If the market price is low relative to book value, the cost of equity will be

[28] For example, assume a company paid a dividend of $0.50 in the first quarter a year ago, and has a dividend growth rate of 4 % per year. This dividend growth rate equals (1.04)^4-1=0.00985 % per quarter. Thus, the dividend is $0.5049 in the second quarter, $0.5099 in the third quarter, and $0.5149 in the fourth quarter. If that 4 % per annum growth continues into the following year, then the dividend would be $0.5199 in the 1st quarter, $0.5251 in the 2nd quarter, $0.5303 in the 3rd quarter, and $0.5355 in the 4th quarter. Thus, the total dividends for the following year equal $2.111 (0.5199 + 0.5251 + 0.5303 + 0.5355). I computed the dividend yield by taking the current quarter (the $0.5149 in the 4th quarter in this example) and multiplying it by 4 to get an annual rate of $2.06. I then escalated this $2.06 by ½ the 4 % growth rate, which means it is increased by 2 %. $2.06 x 1.02= $2.101, which is within one cent of the $2.111 obtained in the example.

higher than the future expected return on book equity, and if the market price is high, then the return on book equity will be less than the cost of equity.

In addition to growing through the retention of earnings, utility companies also grow by selling new common stock. Selling new common stock increases a company's growth. I quantified this growth caused by the sale of new common stock by multiplying the amount that the actual market-to-book ratio exceeds 1.0, by the compound annual growth rate of stock that Value Line forecasts. The results of that computation are shown on line 4 of Schedule ALR-3, page 1.

Pure financial theory prefers concentrating on the results from the most current price because investors cannot purchase stock at historical prices. There is a legitimate concern, however, about the potential distortion of using just a single price. I present DCF results based on the most recent stock pricing data (December 31, 2020) as well as the average of the high and low stock price over the past 12 months to obtain a range of reasonable values. As shown in Schedule ALR-3, page 1, the DCF result based on the average of the high and low stock price for the year ending December 31, 2020 is 9.54%. The DCF result based on the stock price as of December 31, 2020 is 9.48%. Schedule ALR-3, page 1, shows more of the specifics of how I implemented the constant growth form of the DCF model for the Gas Proxy Group.

Q. PLEASE EXPLAIN HOW YOU DETERMINED WHAT VALUE TO USE FOR "R" WHEN COMPUTING GROWTH IN YOUR CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The inputs I considered are shown in Footnote [C] of Schedule ALR-3, page 1. The value of "r" that is appropriate to use in the DCF formula is the value anticipated by investors to

be maintained on average in the future. This Schedule shows that the average future return on equity forecasted by Value Line for the Gas Proxy Group between 2020 and 2023-25 is 9.75%. The same footnote also shows that the future expected return on equity derived from the Zacks consensus forecast is 11.37%, and that the actual returns on equity earned by the Gas Proxy Group on average were 7.60% in 2017, 10.91% in 2018, and 9.52% in 2019. Based on the combination of the forecasted return on equity derived from the Zacks consensus, the recent historical actual earned returns, and Value Line's forecast, I made the DCF growth computation using a 10.00%[29] value of "r".

Q. WHAT COST OF EQUITY IS INDICATED BY THE CONSTANT GROWTH FORM OF THE DCF METHOD THAT YOU RELY ON FOR YOUR RECOMMENDATION?

A. The result of my DCF analysis using the Constant Growth form of the DCF indicates a cost of equity range of between 9.48% and 9.54% for the Gas Proxy Group.[30] Since these DCF findings use analysts' forecasts to derive sustainable growth (in part) and on analysts' forecasts of dividend growth and book value growth in the non-constant form of the DCF method, the results should be considered as conservatively high. This is because, as previously mentioned above, analysts' forecasts of such growth have been notoriously overstated.

My results are not as influenced by over-optimistic analysts' forecasts as would have been the case had I merely used analysts' five-year earnings growth rate forecasts as a proxy for long-term growth. This is because the DCF methods I use compute sustainable

[29] I used 10.00% in consideration of historical returns, allowed returns, and Value Line projected returns for the Gas Proxy Group.
[30] Schedule ALR-3, page 1.

growth rates, rather than growth rates that can exaggerate the growth rate due to assuming that a relatively short-term forecast (five-years) will remain indefinitely.

E. Non-Constant Growth Form of the DCF Model

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE NON-CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The non-constant growth form of the DCF model determines the return on investment expected by investors based on an estimate of each separate annual cash flow the investor expects to receive. For the purpose of this computation, I have incorporated Value Line's detailed annual forecasts to arrive at the specific non-constant growth expectations that an investor who trusts Value Line would expect. This implementation is shown on Schedule ALR-3, page 2 and Schedule ALR-3, page 3. In the first stage, cash flow entry is the cash outflow an investor would experience when buying a share of stock at the market price. The subsequent years of cash flow are equal to the dividends per share that Value Line forecasts. For the intermediate years of the forecast period in which Value Line does not provide a specific dividend, the annual dividends were obtained by estimating that dividend growth would persist at a compound annual rate. The cash flow at the end of the forecast period consists of both the last year's dividend forecast by Value Line, and the proceeds from the sale of the stock. The stock price used to determine the proceeds from selling the stock was obtained by estimating that the stock price would grow at the same rate at which Value Line forecasts book value to grow.

Q. WHY DID YOU USE BOOK VALUE GROWTH TO PROVIDE THE ESTIMATE OF THE FUTURE STOCK PRICE?

A. For any given earned return on book equity, earnings are directly proportional to the book value. Furthermore, book value growth is the net result after the company produces earnings, pays a dividend and also, perhaps, either sells new common stock at market price or repurchases its own common stock at market price.

Once these cash flows are entered into an Excel spreadsheet, the compound annual return an investor would achieve as a result of making this investment was obtained by using the Internal Rate of Return (IRR) function built into the spreadsheet. As shown on Schedule ALR-3, page 2 and Schedule ALR-3, page 3, this multi-stage DCF model produced an average indicated cost of equity of 10.71% based on the year-end stock price, and 11.45% based on average prices for the year ending December 31, 2020 for the Gas Proxy Group.

Q. YOUR NON-CONSTANT GROWTH DCF MODEL USES ANNUAL EXPECTED CASH FLOWS. SINCE DIVIDENDS ARE PAID QUARTERLY RATHER THAN ANNUALLY, HOW DOES THIS SIMPLIFICATION IMPACT YOUR RESULTS?

A. I used the annual model because it is easier to input the data and for observers to visualize what is happening. By modeling cash flows to be annual rather than when they are actually expected to occur causes a small overstatement of the cost of equity.

Q. WHY IS IT A SMALL OVERSTATEMENT OF THE COST OF EQUITY IF YOU HAVE MODELED DIVIDENDS TO BE RECEIVED SOME MONTHS AFTER INVESTORS ACTUALLY EXPECT TO RECEIVE THEM?

A. The process of changing from an annual model to a quarterly model would require two changes, not just one. A quarterly model would show dividends being paid sooner and would also show earnings being available sooner. A company that receives its earnings sooner, rather than at the end of the year, has the opportunity to compound them. Since revenues, and therefore earnings, are essentially received every day, a company that is supposed to earn an annual rate of 9.00% on equity would have to earn only 8.62% if the return were compounded daily.[31] This reduction from 9.00% to 8.62% would then be partially offset by the impact of the quarterly dividend payment to bring the result of switching from the simplifying annual model closer to, but still a bit below 9.00%.

Q. BY USING CASH FLOW EXPECTATIONS AS THE VALUATION PARAMETER, DOES THE NON-CONSTANT DCF MODEL STILL RELY ON EARNINGS?

A. Yes. It relies on an expectation of future cash flows. Future cash flows come from dividends during the time the stock is owned and capital gains from the sale of the stock once it is sold. Since earnings impact both dividends and stock price, the non-constant DCF model still relies on earnings.

Every dollar of earnings is used for the benefit of stockholders, either in the form of a dividend payment, or earnings reinvested for future growth in earnings and/or dividends. Earnings paid out as a dividend have a different value to investors than earnings retained in the business. Recognizing this difference and properly considering it in the

[31] (1+.0862/365)^365=1.09=9.00 %.

quantification process is a major strength of the DCF model and is why the non-constant DCF model as I have set forth is an improvement over either the price-to-earnings ratio (P/E ratio) or dividend/price (D/P) methods. Comparing the P/E ratios and the dividend yield (D/P) are helpful as a rule of thumb, but they must be used with caution because, among other reasons, two companies with the same dividend yield can have a different cost of equity if they have different retention rates. A DCF model is more reliable than these rules of thumb because it can account for different retention rates, among other factors.

Q. WHY IS THERE A DIFFERENCE TO INVESTORS IN THE VALUE OF EARNINGS PAID OUT AS A DIVIDEND COMPARED TO THE VALUE OF EARNINGS RETAINED IN THE BUSINESS?

A. The return on earnings retained in the business depends upon the opportunities available to that company. If a regulated utility reinvests earnings in needed used and useful utility assets, then those reinvested earnings have the potential to earn at whatever return is consistent with ratemaking procedures allowed and the skill of management in prudently operating the system.

When an investor receives a dividend, he can either reinvest it in the same or another company or use it for other things, such as paying down debt or paying living expenses. Although an investor could theoretically use the proceeds from any dividend payments to simply buy more stock in the same company, when an investor increases her investment in a company by purchasing more stock, the transaction occurs at market price. However, when the same investor sees her investment in a company increase because earnings are retained rather than paid as a dividend, the reinvestment occurs at book value. Stated within the context of the DCF terminology: earnings retained in the business earn at

the future expected return on book equity "r," and dividends used to purchase new stock earn at the rate "k." When the market price exceeds book value (that is, the market-to-book ratio exceeds 1.0), retained earnings are worth more than earnings paid out as a dividend because "r" will be higher than "k." Conversely, when the market price is below book value, "k" will be higher than "r," meaning that earnings paid out as a dividend earn a higher rate than retained earnings.

Q. IF RETAINED EARNINGS WERE MORE VALUABLE WHEN THE MARKET-TO-BOOK RATIO IS ABOVE 1.0, WHY WOULD A COMPANY WITH A MARKET-TO-BOOK RATIO ABOVE 1.0 PAY A DIVIDEND RATHER THAN RETAIN ALL OF THE EARNINGS?

A. Retained earnings are more valuable than dividends only if there are sufficient opportunities to profitably reinvest those earnings. Regulated utility companies are allowed to earn the cost of capital only on assets that are used and useful in providing utility service. Investing in assets that are not needed may not produce any return at all. For unregulated companies, opportunities to reinvest funds are limited by the demands of the business. For example, how many new computer chips can Intel profitably develop at the same time?

Q. UNDER THE NON-CONSTANT DCF MODEL, IS IT NECESSARY FOR EARNINGS AND DIVIDENDS TO GROW AT A CONSTANT RATE FOR THE MODEL TO BE ABLE TO ACCURATELY DETERMINE THE COST OF EQUITY?

A. No, because the non-constant form of the DCF model separately discounts each and every future expected cash flow, it does *not* rely on any assumptions of constant growth. The

dividend yield can be different from period to period, and growth can bounce around in any imaginable pattern without harming the accuracy of the answer obtained from quantifying those expectations. When the non-constant DCF model is correctly used, the answer obtained is as accurate as the estimates of future cash flow.

Q. WHAT COST OF EQUITY DOES YOUR NON-CONSTANT GROWTH DCF METHOD INDICATE?

A. My non-constant growth DCF method indicates a cost of equity of between 10.71% and 11.45%.[32] However, it is worth pointing out that one company in the Gas Proxy Group, Chesapeake Utilities Corporation, has a market-to-book ratio (2.94x as of December 31, 2020) that is considerably higher than the average (1.57x) or even the maximum (1.80x) of its peers. This high market-to-book ratio is most likely not sustainable and is distorting the results of this approach as it assumes market-to-book ratios will remain constant over the next four years. Adjusting the projected 2024 market-to-book ratio[33] of Chesapeake to a conservative and still high multiple of 2.0x would lower the results of my non-constant growth DCF method to a range of 9.69% to 10.80%. To be conservative, I have used the higher unadjusted results in the calculation of my cost of equity recommendation.

F. Capital Asset Pricing Model

Q. PLEASE DESCRIBE THE CAPM.

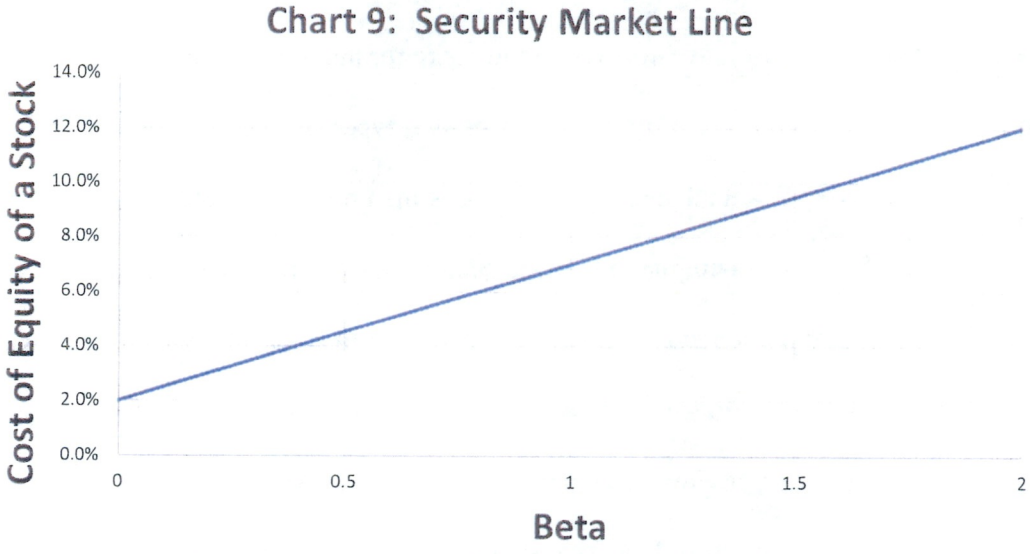
A. CAPM stands for "Capital Asset Pricing Model." The CAPM relates return to risk; specifically, it relates the expected return on an investment in a security to the risk of

[32] Schedule ALR-3, page 2 and Schedule ALR-3, page 3.
[33] For both end-of-year and yearly average approaches.

investing in that security. The riskier the investment, the greater the expected return (*i.e.*, the cost of equity) investors require to make for that investment.

Investors in a firm's equity face two types of risks: (1) firm-specific risk and (2) market risk (financial analysts refer to this market risk as systematic risk). Firm-specific risk refers to risks unique to the firm such as management performance and losing market share to a new competitor. Investors can reduce firm-specific risk by purchasing stocks as part of a diverse portfolio of companies if they construct the portfolio to cause the firm-specific risk of individual companies to balance out. Market-related risk refers to potential impacts from the overall market such as a recession or interest rate changes. This risk cannot be removed by diversification, so the investor must bear it no matter what. Because the investor has no option but to bear market risk, the investor's cost of equity will reflect that risk. The CAPM predicts that for a given equity security, the cost of equity has a positive linear relationship to how sensitive the stock's returns are to movements in the overall market (e.g., S&P 500). A security's market sensitivity is measured by its **Beta.**[34] As shown in Chart 9 on page 50, the higher the beta of a stock, the higher the company's cost of equity—the return required by the investor to invest in the stock.

[34] The covariation of the return on an individual security with the return on the market portfolio.



Here is the standard CAPM formula:

$$K = Rf + \beta i * (Rm - Rf)$$

Where:

K is the cost of equity;
Rf is the risk-free interest rate;
Rm is the expected return on the overall market (e.g., S&P 500);
[Rm – Rf] is the premium investors expect to earn above the risk-free rate for investing in the overall market ("equity risk premium" or "market risk premium"); and
βi (Beta) is a measure of non-diversifiable, or systematic, risk.

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE CAPM.

A. First, I determined appropriate values or ranges for each of the three model inputs: (a) Risk-Free Rate, (b) Beta, and (c) Equity Risk Premium. Second, I used the equation above to calculate the cost of equity implied by the model. Below I will explain how I calculated the three model inputs and summarize the CAPM cost of equity numbers resulting from those inputs. Table 7 and Table 8 on page 69 show the results of my CAPM.

Risk-Free Rate

Q. WHAT RISK-FREE RATE DID YOU USE IN YOUR CAPM?

A. It is generally preferable to use the market yield on short-term U.S. Treasury yields as the risk-free rate because these bonds have a beta close to zero. *Principles of Corporate Finance* states "The CAPM… calls for a short-term interest rate."[35] I chose to use a risk-free rate based on both long- and short-term Treasury yields, however, because, as indicated by the steepness of the yield curve,[36] investors with a longer investment horizon would likely use a higher risk-free rate as an opportunity cost for their investment decisions. My short-term risk-free rate is based on the yield of 3-month U.S. Treasury bills and my long-term risk-free rate is based on the yield of 30-year U.S. Treasury bonds. In line with my Spot and Weighted Average CAPM approaches, I use both spot values as of December 31, 2020 and weighted averages over the three months ending on that date for these two yields.

As outlined in Schedule ALR-4, page 2, my spot and weighted average short-term risk-free rates are 0.09% and 0.09%, respectively. My spot and weighted average long-term risk-free rates are 1.65% and 1.63%, respectively.

U.S. government bonds are reasonable to use as a risk-free rate because they have a negligible risk of default. The value of short-term U.S. Treasury bills has a relatively low exposure to swings in the overall market. The value of long-term U.S. Treasury bonds is relatively more exposed to the market and therefore must be used with caution. I considered using a risk-free rate based on subtracting the historical spread between long-

[35] Brealey, Myers, and Allen (2017), Principles of Corporate Finance, 12th Edition, McGraw-Hill Irwin, New York, page 228.

[36] The yield curve on U.S. Treasury bonds relates the yield to its time to maturity. We say the current yield curve is steep because the difference in yield between short-term (near 0%) and long-term (over 1%) bonds is large in percentage terms.

term and short-term U.S. Treasury bills from current long-term yields, as recommended by some financial textbooks.[37] I did not use this method because in the current capital markets, this method results in an unreasonably low risk-free rate (under 0%).

Regarding my weighted average risk-free rates, it is worth noting that any form of averaging or weighing approach applied to the last eight months of historical yield data would not have any significant effect on my CAPM results.

Q. WHAT IS YOUR RESPONSE TO ANALYSTS WHO CLAIM THAT THE CAPM MUST BE IMPLEMENTED WITH A LONG-TERM INTEREST RATE (E.G., YIELD ON 30-YEAR TREASURY BOND) AS AN ESTIMATE OF THE RISK-FREE RATE COMPONENT OF THE CAPM?

A. When looking for a security to calculate an estimate of the risk-free rate, it could be argued that it is appropriate to find one with a term or maturity that best matches the life of the asset being financed. In that sense, the 30-year Treasury bond yield can be argued to be ideal for this specific application. However, it is equally important to find a security that has a beta coefficient with the overall market as close to zero as possible, because by the very definition of the risk-free rate in the CAPM model, its movements should have no correlation to the movements of the market. And this is where the problem with the 30-year Treasury bond yield arises, as it has an established non-zero beta. The 3-month Treasury bill yield has a considerably lower beta, and therefore is superior in that respect to the 30-year Treasury bond yield. Neither one is a perfect fit on both fronts, which is

[37] Brealey, Myers, and Allen (2017), Principles of Corporate Finance, 12th Edition, McGraw-Hill Irwin, New York, page 228.

why I have chosen to consider both as proxies for the risk-free rate to establish a range for my CAPM results.

Q. HOW DO YOU RESPOND TO ANALYSTS WHO CLAIM THAT THE RISK-FREE RATE SHOULD BE BASED ON INTEREST RATE FORECASTS FROM FIRMS SUCH AS BLUE CHIP FINANCIAL?

A. It is important to recognize that current long-term Treasury bond yields represent a direct observation of investor expectations and there is no need to use "expert" forecasts such as Blue Chip to determine the appropriate risk-free rate to use in a CAPM analysis or any other cost of equity calculations.

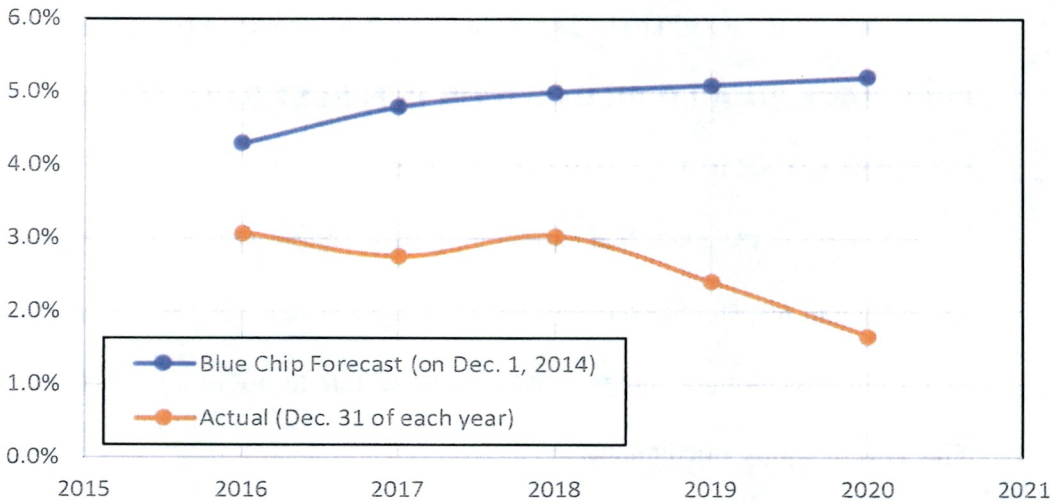
Many economists and forecasters will continue to be quoted in the press prognosticating on possible developments that are truly unpredictable. The Nobel Laureate Economist Daniel Kahneman stated the following regarding forecasting:

> It is wise to take admissions of uncertainty seriously, but declarations of high confidence mainly tell you that an individual has constructed a coherent story in his mind, not necessarily that the story is true.[38]

As Chart 10 on page 54 shows, Blue Chip Financial forecasted in 2014 that 30-Year U.S. Treasury bonds would be over 5% by 2018 while in fact they turned out to be under 2%.

[38] Daniel Kahneman, *Thinking Fast and Slow* (New York: Farrar, Straus and Giroux, 2011): 212.

Chart 10: Blue Chip Financial Forecasts vs. Actual 30-Year U.S. Treasury Yields



The time covered in Chart 10 above was chosen to provide a concrete example. Blue Chip's interest rate forecasts have been persistently inaccurate for decades. A recent paper published by the Congressional Budget Office determined Blue Chip consensus forecasts exhibited "significant positive bias" between 1984 and 2012 and "have become more biased and less accurate over time."[39]

Beta

Q. WHAT BETA DID YOU USE IN YOUR CAPM?

A. Since the cost of equity should be based on investor expectations, I chose to use two betas. My "forward beta" is based on forward-looking investor expectations of non-diversifiable risk. My "hybrid beta" is based on both forward-looking investor expectations and historical return data.

[39] Did Treasury Debt Markets Anticipate the Persistent Decline in Long-Term Interest Rates?, Congressional Budget Office, Edward N. Gamber, page 2. This paper can be found at: https://www.cbo.gov/system/files/115th-congress-2017-2018/workingpaper/53153-interestrateswp.pdf

Most published betas are based exclusively on historical return data. For example, Value Line publishes a 5-year historical beta for each of the companies it covers. However, it is also possible to calculate betas based on investors' expectations of the probability distribution of future returns. This probability distribution of future returns expected by investors can be calculated based on the market prices of stock options.

Q. WHAT IS A STOCK OPTION?

A. A stock option is the right to buy or sell a stock at a specific price for a specified amount of time. A call option is the right to buy a stock at a specified exercise or strike price on or before a maturity date. A put option is the right to sell a stock at a specified exercise or strike price on or before a maturity date. For example, a call option to purchase Apple Computer stock for $230 on January 17, 2020 allows the owner the option (not the obligation) to buy Apple stock for $230 on that date. At the end of July 2019, Apple stock was trading at about $215 per share. Why would anyone pay for the right to buy a stock higher than the current price? Investors who purchased those call options thought there was a chance Apple stock would be trading higher than $230 on January 17, 2020, and those options gave those investors the right to buy Apple stock for $230 and profit by selling it at the market price on that date, if it was higher. The price of Apple's stock was $317.98 at the close of trading on January 17, 2020. Therefore, the investor who purchased this call option for $635 on July 31, 2019 earned a profit of $8,163[40] at expiry on January 17, 2020. On the other hand, the investor who purchased an Apple put option with the same expiration date and strike price on July 31, 2019 would have lost the price of the

[40] $8,163 profit from exercising call option ($31,798 from selling at $317.98 market price - $23,000 cost to purchase at $230) - $635 ($6.35 X 100) option purchase price. Note: Each call option is the right to purchase 100 shares.

option ($2,248) and gained nothing on the expiration date because the right to sell Apple stock for $230 when the price is over $300 is worthless.

The market prices of put options and call options provide information regarding the probability distribution of future stock prices expected by investors. Using established techniques, I am able to use price data for stock options of my Gas Proxy Group companies and the S&P 500 Index to determine investors' return expectations, including the relationship (covariance) between the return expectations for individual Gas Proxy Group companies and those for the overall market (S&P 500). This covariance between the expected returns for my Gas Proxy Group and for the S&P 500 indicates what investors expect betas will be in the future. I refer to betas based on option price calculations as "option-implied betas."

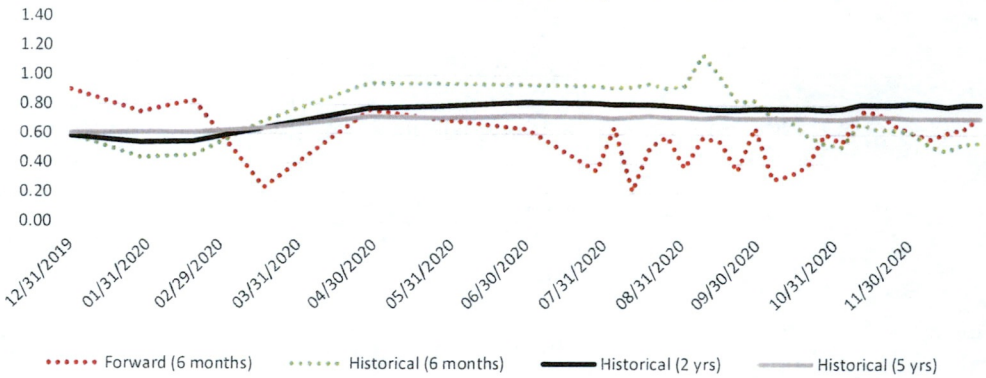
Q. PLEASE EXPLAIN HOW YOU CALCULATED THE BETAS USED IN YOUR CAPM.

A. Traditionally, the betas used in CAPM calculations are calculated from historical returns. This approach has strengths and weaknesses. An alternative way to calculate betas is to incorporate investors' return expectations by calculating option-implied betas as explained in the previous paragraph. As discussed below, I have chosen to use both historical and option-implied betas in my CAPM analysis. I chose to use option-implied betas in my CAPM analysis because, among other reasons, studies have found that betas calculated based on investor expectations (option-implied) provide information regarding future perceived risks and expectations.[41]

[41] Bo-Young Chang & Peter Christoffersen & Kris Jacobs & Gregory Vainberg. (2011) Option-Implied Measures of Equity Risk, *Review of Finance* 16: 385-428.

As shown in Chart 11 below, stock option prices indicate that investors likely expect lower betas for the Gas Proxy Group in the future.

Chart 11: Gas Proxy Group Betas
Forward vs. Historical
December 2019 through December 2020



See Schedule ALR-4, page 3 for data used in creating Chart 11 above.

I used the following two betas in my CAPM analysis:

1. **Hybrid Beta:** 50% Option-Implied Beta (6 months) + 25% Historical Beta (6 months) + 15% Historical Beta (2 years) + 10% Historical Beta (5 years).
2. **Forward Beta:** 100% Option-Implied Beta (6 months).

Q. PLEASE EXPLAIN HOW YOU CALCULATED HISTORICAL BETAS.

A. I calculate historical betas following the methodology used by Value Line. Specifically, I use the following guidelines:

1. Returns for each security are regressed against returns for the overall market in the following form:

$$Ln\left(p^{I}_{t} / p^{I}_{t-1}\right) = a_{I} + B_{I} * Ln\left(p^{m}_{t} / p^{m}_{t-1}\right)$$

Where:

- p^{I}_{t} is the price of the security I at time t

- p^{I}_{t-1} is the price of the security I one week before time t
- p^{m}_{t} and p^{m}_{t-1} are the corresponding values of the market index
- B_I is the regression estimate of Beta for the security against the market index

2. The natural log of the price ratio is used as an approximation of each return and no adjustment is made for dividends paid during the week.
3. Weekly returns are calculated weekly on Tuesdays to minimize the effect of holidays as much as possible.
4. Betas calculated using the regression method above are adjusted as per Blume (1971) using the following formula:

$$\text{Adjusted } B_I = 0.35 + 0.67 * \text{Calculated } B_I$$

The only significant difference between my beta calculations and Value Line's calculations is that, whereas Value Line uses the NYSE Composite Index as the market index, I use the S&P 500 Index. S&P 500 Index has a much larger number of options traded, making the calculation of option-implied betas more reliable, and I wanted to make my historical betas as comparable as possible to my option-implied betas. Value Line only calculates betas every three months and always uses a five year period for the return regression in their company reports,[42] whereas I use the same consistent methodology to calculate betas every week during the most recent three complete months (May, June, and July 2020October through December 2020) and calculate historical betas for periods of six months, two years, and five years, as shown in Chart 11 on page 57.

[42] They offer betas calculated over different time periods on their website, including 3 years and 10 years.

Q. PLEASE EXPLAIN HOW YOU CALCULATED OPTION-IMPLIED BETAS.

A. Calculating option-implied betas of a company requires (1) obtaining stock option data for that company and a market index, (2) filtering the stock option data, (3) calculating the option-implied volatility for the company and for the index, (4) calculating the option-implied skewness for the company and for the index, and (5) calculating option-implied betas for the company based on implied volatility and skewness for the company and for the index. There are various ways one could choose to perform the steps above, but I chose to filter stock option data and calculate option-implied volatility[43] and skewness[44] following exactly the same methodology used by the Chicago Board of Options Exchange (CBOE) in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

I start my process with publicly available trading information for all the options for a given security (company or index) for a complete trading day. I then filter the option data as described by the CBOE using the following guidelines:

1. Use the mid-quote or mark (average of bid and ask) as the option price.
2. Use only out-of-the-money call and put options.
    - Determine the "moneyness" threshold where absolute difference between call and put prices is smallest (using CBOE "Forward Index Price" formula).
    - Include "at-the-money" call and put options and use average of call and put prices as price for "blended" option.

[43] CBOE Volatility Index White Paper, 2018. Cover page says "proprietary information." The author has had access to this document in the public domain for at least 3 years.
[44] The CBOE SKEW Index, 2010. Cover page says "proprietary information." The author has had access to this document in the public domain for at least 3 years.

3. Exclude all zero bids.
4. Exclude remaining (more out-of-the-money) options when two sequential zero bids are found.

I then apply the series of formulas clearly described in both of the CBOE's white papers to the remaining options to calculate Option-Implied Volatility and Option-Implied Skewness. In the words of the CBOE, each of its two indices is "an amalgam of the information reflected in the prices of all of the selected options." To be clear, Implied Volatility is not exactly the same as the VIX Index and Implied Skewness is not exactly the same as the SKEW Index, but both indices are directly based on their corresponding statistical value.

Option-Implied Volatility reflects investors' expectations regarding future stock price movements. Option-Implied Skewness reflects investors' expectations regarding how implied volatility changes for strike prices that are closer and further to the current value of the underlying stock price.

The CBOE calculates Times to Expiration by the minute—as do I. The Time to Expiration of traded options cannot be changed and varies from day to day. For the sake of consistency, the CBOE calculates the VIX and SKEW indices on a "30-day" basis by interpolating for two sets of options with Times to Expiration closest to the 30-day mark. I prefer to focus on as long of a time horizon as possible for forecasting purposes. Option Times to Expiration vary significantly for various stocks but can relatively consistently be found to go out to 6 months (180 days) for utility companies. Therefore, for the sake of consistency, I have chosen to interpolate to calculate 6-month volatility and skewness where possible. Occasionally, Times to Expiration for a given stock do not go out to 180

days. If the greatest Time to Expiration available is 171 days (95%) or greater, I use the volatility and skewness for that group of options as a proxy for the 180-day volatility and skewness, respectively.

Finally, once I have calculated the option-implied volatility and skewness for each company and index using the methodology described above, I calculate option-implied betas using the following formula developed by Christoffersen, Chang, Jacobs and Vaninberg (2011):[45]

$$\beta_i = \left(\frac{SKEW_i}{SKEW_m}\right)^{1/3} \left(\frac{VAR_i}{VAR_m}\right)^{1/2}$$

Where:

β_i: $option - implied\ beta\ of\ security\ (e.g. stock, fund)$;
$SKEW_i$: $skewness\ of\ security$;
$SKEW_m$: $skewness\ of\ overall\ market\ (S\&P\ 500)$;
VAR_i: $variance\ of\ company$;
VAR_m: $variance\ of\ overall\ market\ (S\&P\ 500)$.

Q. YOU CALCULATE YOUR OPTION-IMPLIED BETAS BASED ON A SIX-MONTH HORIZON. WOULD IT NOT BE BETTER TO USE A LONGER FORECASTING HORIZON?

A. The methodology I use to calculate my option-implied betas "allows for the computation of a complete term structure of beta for each company so long as the options data are available,"[46] so there is nothing inherent in the methodology that limits it to a certain time horizon.

[45] Bo-Young Chang & Peter Christoffersen & Kris Jacobs & Gregory Vainberg. (2011) Option-Implied Measures of Equity Risk, *Review of Finance* 16: 385-428.
[46] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, "Forward-Looking Betas", April 25, 2008, Page 24.

For many applications, including cost of capital, one could argue that the longer the time horizon for the option-implied betas, the better. However, the limitation on the forecasting horizon is always set by the longest expiration period of the options currently traded in the market. Some companies trade options with expiration periods up to two years or more into the future. As evidenced by the exhaustive option data in my working papers, the maximum expiration period for the options of the companies in my Gas Proxy Group is between six and twenty-seven months. Only 12 of the 6 companies trade options with expiration periods of eight months or more, so for consistency across companies in my proxy group, I chose to use six months for the time horizon of my option-implied betas.

Simply because it may be better to use longer time horizons in place or in addition to a six-month horizon, it does not mean that a six-month option-implied beta is of no relevance or cannot be used. That would be paramount to saying you cannot use a one-year Value Line Earnings Per Share estimate, or that the minimum relevant forecast is two or three years. In fact, for purposes of option-implied betas, it would be difficult to say if a time horizon of one year, for instance, is necessarily always better than a time horizon of six months. An option-implied forward-looking beta, even with a time horizon of less than six months, is still a useful tool in interpreting the current expectations of investors at any given time.

A final strong argument in support of using six-month option-implied betas in a cost of capital calculation looking years into the future is that, as expanded upon on page 64, the authors of the paper on which I based my option-implied betas concluded that their predictive powers are not limited to six months into the future. In fact, they conclude that six-month option-implied betas have stronger predictive power than six-month, one-year,

or five-year historical betas when attempting to forecast betas one or two years into the future.

Q. WHY DIDN'T YOU USE LONG-TERM EQUITY ANTICIPATION SECURITIES (LEAPS), WHICH ARE OPTIONS CONTRACTS WITH AN EXPIRATION DATE OF TYPICALLY MORE THAN ONE YEAR?

A. It is not possible to use LEAPS to calculate option-implied betas for all utility companies because these contracts are not traded for many of them. Only 12 of the 6 companies in my Gas Proxy Group trade options with expiration periods of eight months or more. For consistency across companies in my proxy group, I chose to use six months for the time horizon of my option-implied betas. As explained above, option-implied betas calculated from options contracts with expiration periods less than one year, in my case six months, are still a useful tool in interpreting investors' current expectations and are superior to the historical betas used exclusively by Ms. Bulkley. As a further note, I use LEAPS in my CAPM when the data is available. The risk premium portion of my CAPM is based on options contracts with expiration periods exceeding one year, and as far out as 32 Months.

Q. HOW DID YOU DECIDE ON THE RELATIVE WEIGHTS YOU ALLOCATE TO EACH COMPONENT OF YOUR HYBRID BETAS? IS THERE ANY ACADEMIC SUPPORT FOR YOUR APPROACH?

A. I am not aware of any academic study specifically focused on the optimal relative weight of historical betas to predict future betas. However, the authors of the paper I relied upon for guidance on the calculation of my option-implied betas did attempt to quantify the predictive power of six-month option-implied ("forward-looking") betas as well as that of six-month ("180-day"), one-year, and five-year historical betas by back-testing historical

predictions with actual *expost* results, or "realized" betas, for the 30 companies in the Dow Jones Index. In addition to using each of the betas above independently, they also measured the predictive power of a "mixed" beta consisting of a simple average of the six-month option-implied beta and the six-month historical beta.

Their conclusions for predicting six-month future betas are as follows:

> The forward-looking beta outperforms the other methods ten times, and the same is true for the 180-day historical beta. The mixed beta is the best performer in seven cases, and the 1-year historical beta in three cases. The 5-year historical beta is always outperformed by at least one other method, and it often ranks last. The 180-day historical beta clearly dominates the two other historical methods.[47]

Their conclusions for predicting one-year and two-year future betas are as follows:

> Somewhat unexpectedly, the performance of the forward-looking beta compared to that of the 180-day historical beta is much better [for the one-year prediction] than [for the six-month prediction], and this conclusion carries over to [the two-year prediction]. The mixed beta also perform [sic] well. It is perhaps not surprising that the performance of the 180-day historical beta [for the one- and two-year predictions] is poorer than [for the six-month prediction], because the horizons used in the construction of realized betas are no longer equal to 180 days. What is harder to explain is why the correlation between realized beta and forward-looking beta is in many cases higher [for the one- and two-year predictions] than [for the six-month prediction]. Finally, it is also interesting that the 1-year and 5-year historical betas do not perform well [for the one-and two-year predictions]. In summary, [for the one-year prediction] either the forward-looking beta or the mixed beta is the best performer in nineteen out of thirty cases. [For the two-year prediction], this the case twenty-two times out of thirty.[48]

Their conclusions strongly support the use of six-month historical betas, six-month option-implied betas, and/or an average of the two as predictors of future betas six months, one year, or two years into the future. They also seem to indicate that historical betas lose predictive power the longer the period that is used.

[47] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, "Forward-Looking Betas", April 25, 2008, Page 16.
[48] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, "Forward-Looking Betas", April 25, 2008, Page 17.

I decided on the composition of my hybrid betas primarily based on the conclusions of the authors above. A mixed or hybrid beta made up of 50% historical betas and 50% forward-looking option-implied betas seemed to be the best way to go. Though the predictive power of longer-term historical betas seems to be quite reduced, it is not zero, so in an effort to preserve the effect of longer-term market trends in my hybrid betas, I chose to further subdivide the historical component into 50% (25% of the hybrid) for the stronger predicting six-month historical betas, 30% (15% of the hybrid) for the two-year historical betas, and 20% (10% of the hybrid) for the five-year historical betas.

Market Risk Premium

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE EQUITY RISK PREMIUM USED IN YOUR CAPM.

A. Traditionally, the risk premium used in CAPM calculations is calculated from historical returns and/or equity analyst projections. The former approach is historically accurate but does not take into account investors' expectations for future market risks and returns. The latter approach is based on analyst projections, which are not market-based and do not reflect current investor expectations. A superior market-based way to calculate the equity risk premium is to use option-implied return expectations, which is the approach I have used.

My equity risk premium is the expected return on the S&P 500 minus the risk-free rate. I calculate an expected return on the S&P 500 by using stock options traded on this index. To begin with, I use exactly the same methodology used by the CBOE to filter stock option data and calculate option-implied volatility and skewness,[49] as described in detail in

[49] As used in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

the Beta section on page 59. The volatility and skewness calculated in this way describe a probability function representing the possible trajectories for the S&P 500 implied by the options market. The resulting skewed probability function can be closely approximated by a log-normal function using established statistical formulas, which then make it straightforward to calculate the expected growth for the S&P 500 for any given cumulative probability. A cumulative probability of 50% represents the median of the probability distribution, or the option-implied market consensus, which is how I arrive at my calculation of expected market growth.

Once the option-implied growth rate of the S&P 500 has been estimated as described above, I add the dividend yield and subtract the risk-free rate in order to arrive at the market risk premium, as laid out in Schedule ALR-4, page 4 and Schedule ALR-4, page 6. In line with my Spot and Weighted Average CAPM approaches, I use both spot values as of December 31, 2020 and weighted averages over the three months ending on that date for option-implied growth, dividend yields, and short- and long-term risk-free rates in these calculations to arrive at a total of four values for the market risk premium. The market risk premia I use in my Weighted Average CAPM analysis with short- and long-term risk-free rates are 10.59% and 9.05%, respectively. The market risk premia I use in my Spot CAPM analysis with short- and long-term risk-free rates are 10.13% and 8.57%, respectively.

Q. DID YOU TAKE INTO CONSIDERATION THE DIFFERENCE IN VOLATILITIES ACROSS EXPIRATION PERIODS IN THE OPTIONS TRADED ON THE S&P 500?

A. Yes. The volatility implied by the options market changes over time as investors' perception of risk changes. For example, during a crisis, implied volatility generally increases as investors expect that stock market prices have a greater chance of large swings compared to times when there is no crisis. As discussed earlier, investors also often have different volatility expectations over different time periods. For example, on any given day, investors might expect volatility to be relatively high over the next 30 days and to decrease over the next year or longer. The same holds true for skewness, even though it is less intuitive to understand changes in skewness than in volatility. Because of these changes across option expiration periods, I take a weighted average of the entire term structure of the option-implied volatility and skewness, which for the S&P 500 typically goes out to 26 to 35 months, interpolating where necessary, and giving the most weight to the option expiration period of 12 months.

Q. WHICH CUMULATIVE PROBABILITY DID YOU USE TO ESTIMATE THE OPTION-IMPLIED GROWTH OF THE S&P 500 IN THE CALCULATION OF YOUR MARKET RISK PREMIUM AND WHY?

A. I used a cumulative probability of 50.0% in the calculation of my option-implied growth for the S&P 500, which results in a value of 8.65% as of December 31, 2020 and a value of 9.03% for the weighted average of the three months ending on that date. As stated above, a cumulative probability of 50% represents the median of the probability

distribution, or in this case the option-implied market consensus, which is why I have chosen to use this level.

As a matter of fact, using the same probability distribution derived from the options market described above, one can also calculate the cumulative probability implied by a given cost of capital. For instance, using the same risk-free rates and betas in my CAPM analysis, the rate of return on equity of 10.2% recommended by Ms. Bulkley implies an average market risk premium of 14.9%, an average overall market return of 15.7%, average growth for the S&P 500 of 14.1%, and a cumulative probability of 61.1%. In other words, to achieve the required growth of 14.1%, reality would have to exceed 61.1% of the scenarios investors see as plausible for the market in aggregate, considerably more than the median market consensus at 50%. To put this into perspective, it is important to note that values on the tails of the probability function get increasingly separated, requiring an ever-increasing growth rate for every additional percentage in the cumulative probability, and making it impossible to ever arrive at 100%.

Using exactly the same methodology, the midpoint of my recommended cost of equity (8.08%) implies an average market risk premium of 12.0%, an average overall market return of 12.8%, average growth for the S&P 500 of 11.1%, and a cumulative probability of 53.5%.

CAPM Results

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR CAPM.

A. Table 7 and Table 8 on page 69 show the results of my Weighted Average CAPM and Spot CAPM Analyses, respectively.

Weighted Average CAPM

TABLE 7: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY
WEIGHTED - All Inputs Weighted From October to December 2020

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	Forward Beta	Hybrid Beta	Forward Beta
Risk-Free Rate	0.09%	0.09%	1.63%	1.63%
Beta	0.64	0.62	0.64	0.62
Risk Premium	10.59%	10.59%	9.05%	9.05%
CAPM	6.88%	6.61%	7.43%	7.20%

Source: Schedule ALR-4, page 1

Spot CAPM

TABLE 8: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY (SPOT)
SPOT - All Inputs Based on Last Available Data as of December 31, 2020

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	Forward Beta	Hybrid Beta	Forward Beta
Risk-Free Rate	0.09%	0.09%	1.65%	1.65%
Beta	0.69	0.72	0.69	0.72
Risk Premium	10.13%	10.13%	8.57%	8.57%
CAPM	7.05%	7.36%	7.53%	7.80%

Source: Schedule ALR-4, page 5

VI. ADDITIONAL COMMENTS ON MS. BULKLEY'S TESTIMONY

Q. PLEASE SUMMARIZE THE TESTIMONY OF MS. BULKLEY.

A. Ms. Bulkley has recommended that the Company be allowed a return on equity of 10.200% and an overall cost of capital of 7.304%.[50] She arrived at her recommendation by applying

[50] Ms. Bulkley's Direct Testimony, page 78, lines 4-8. Montana-Dakota Utilities Co. & Great Plains Natural Gas Co. Workpapers Index Statement F-2, page 3 of 5 shows a 7.304% cost of capital.

her own versions of the Discounted Cash Flow ("DCF") Model, Risk Premium approach, and Capital Asset Pricing Model ("CAPM Analysis") to a proxy group of 6 publicly traded gas utility companies.[51] As outlined in Table 9 below, these approaches provide equity cost rate estimates between 9.07% and 12.62%.

TABLE 9: MS. BULKLEY'S COST OF EQUITY RESULTS

METHOD	Ave Mean Low	Ave Mean	Ave Mean High
DCF	9.67%	10.01%	11.10%
	Current Risk-Free Rate	Q4 2020-Q4 2021 Projected Risk-Free Rate	2022-2026 Projected Risk-Free Rate
CAPM	11.91%	11.97%	12.17%
ECAPM	12.42%	12.46%	12.62%
Risk Premium Analysis	9.07%	9.22%	9.78%
Expected Earnings		10.08%	

Source: Ms. Bulkley's Direct Testimony, page 78, Figure 14.

Q. DOES MS. BULKLEY CLAIM THAT THE COST OF EQUITY IS MARKET-BASED?

A. Yes. Ms. Bulkley states that "the cost of equity is a market-based concept."[52] She explains that "the practitioner uses current and projected market data" to estimate this market based required return.[53] She explains that in order for Montana-Dakota to attract capital it should be given an opportunity to earn a return that is "commensurate with returns on investments in enterprises with similar risk."[54] She states that the interests of consumers and the Company are balanced when the company is given an opportunity to earn its "market-based" cost of capital.[55]

[51] Ibid. page 40, Figure 11
[52] Ibid. page 32, lines 16-17.
[53] Ibid. page 10, lines 20-21.
[54] Ibid. page 10, lines 10-11.
[55] Ibid. page 10, lines 11-12.

Q. DOES MS. BULKLEY CLAIM THAT THE COST OF EQUITY SHOULD BE FORWARD- LOOKING?

A. Yes. Ms. Bulkley claims that "If investors do not expect current market conditions to be sustained in the future, it is possible that the ROE estimation models will not provide an accurate estimate of investors' required return during that rate period. "[56] Therefore, according to Ms. Bulkley, it is important to use projected market data to estimate returns for that forward-looking period.[57]

Q. HOW DOES MS. BULKLEY DESCRIBE CURRENT CAPITAL MARKETS?

A. Regarding current market conditions, Ms. Bulkley states that Covid-19 has caused increased volatility[58] and a "flight to quality"[59] is causing unsustainably high utility valuations and lower interest rates.[60] She states "If investors do not expect current market conditions to be sustained in the future, it is possible that the ROE estimation models will not provide an accurate estimate of investors' required return during that rate period."[61]

Q. DOES MS. BULKLEY CLAIM THERE ARE ADDITIONAL RISK FACTORS THAT APPLY TO MONTANA-DAKOTA?

A. Yes. Ms. Bulkley claims the following are "regulatory and business risks": (1) Montana-Dakota's small size; (2) flotation costs; and (3) regulatory risk.[62] She also claims that the Company's proposed multi-year rate plan will increase risk and the effect of the Tax Cuts

[56] Ibid. page 11, lines 6-9.
[57] Ibid. lines 9-11.
[58] Ibid. page 13, lines 18-20.
[59] Ibid. page 14, line 11.
[60] Ibid. page 16, line 6 and page 17, line 5.
[61] Ibid. page 11, lines 6-9.
[62] Ibid. pages 56-74.

and Jobs Act should be considered in determining the cost of equity.[63] She does not make any specific adjustments to her cost of equity recommendation as a result of these factors, however.

Q. DOES MS. BULKLEY RELY ON THE DCF MODEL?

A. No. She claims that it is appropriate to rely on several cost of equity models because investors and regulators are concerned that DCF results are not reasonable in current capital markets.[64] Ms. Bulkley claims that DCF results are too low because high utility stock valuations are depressing dividend yields.[65]

Q. WHAT IS YOUR OVERALL RESPONSE TO MS. BULKLEY'S TESTIMONY?

A. Ms. Bulkley's 10.200% cost of equity and 7.304% cost of capital recommendations significantly overstate Montana-Dakota's market-based cost of equity. If her recommendations are used to set rates, consumers will be significantly overcharged. Ms. Bulkley's 10.200% cost of equity recommendation is excessive largely because: (1) her cost of equity recommendation is based on a flawed analytical approach and an inappropriate definition of the cost of equity, despite defining it correctly in considerable portions of filed testimony, and (2) her interpretation of current capital markets include unknowable and/or speculative predictions.

[63] Ibid. page 27, lines 6-7.
[64] Ibid. page 3, lines 9-12.
[65] Ibid. page 24, lines 9-11.

A. Analytical Approach

Q. IS MS. BULKLEY'S STATED ANALYTICAL APPROACH CONSISTENT WITH HER STATED PRINCIPLES?

A. No. Ms. Bulkley creates the appearance of a scientific approach to determining the cost of capital by correctly stating important basic premises. She states that "The required ROE is estimated by using one or more analytical techniques that rely on market-based data to quantify investor expectations…"[66] However, when it comes time to make her computations, she fails to follow those principles. Ms. Bulkley says that the cost of equity is market-based,[67] but when applying her approaches, there are key places where she fails to actually use market data. Two thirds of her CAPM results (4 of 6) are based on interest rate forecasts ("Q4 2020-Q4 2021" and "2022-2026") instead of directly observable market yields.[68]

Ms. Bulkley explains that the required return "Informed judgment is then applied to determine where the company's cost of equity falls within the range of results."[69] However, her claims regarding high P/E ratios and the possibility they will decline, she does not directly measure the cost of equity assuming investors see the world as she does and expect these unsustainably high P/E ratios to decline in the future. A Multi-Stage DCF model would be able to measure this impact, but she does not use this model.

[66] Ibid. page 36, lines 2-3.
[67] Ibid. page 11, line 4.
[68] Ibid. page 78, Figure 14.
[69] Ibid. page 36, lines 4-5.

B. DCF Method

Q. WHAT FORMULA DOES MS. BULKLEY USE IN HER DCF ANALYSIS?

A. $$k = \frac{D_0(1+g)}{P_0} + \text{g}$$ [70]

Where:

P_0: *stock price*;
D_0: *dividend*;
g: *growth rate*.

Q. DOES MS. BULKLEY PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Ms. Bulkley explains correctly that the constant growth DCF method "assumes" a single growth rate in perpetuity and that "one must assume that the payout ratio remains constant and that earnings per share, dividends per share, and book value per share all grow at the same constant rate."[71] Her DCF method contradicts her own description of how the constant growth model should be implemented, however. Her growth estimate relies entirely on analyst five-year EPS growth forecasts.[72] The correct application of the DCF method requires that the dividend yield be computed properly, and that the growth rate used be derived from a careful study of what future *sustainable* growth in cash flow is anticipated by investors. As discussed in Section II on page 3, major financial institutions like J.P. Morgan Chase do not use a growth rate based on analyst 5-year EPS growth rates as Ms. Bulkley has done.

[70] Ibid. page 39, line 11.
[71] Ibid. page 41, lines 7-10.
[72] Ibid. Schedule 4, pages 1-3.

Q. HOW DID MS. BULKLEY CALCULATE THE GROWTH RATE FOR HER DCF METHOD?

A. Ms. Bulkley's DCF growth rates are based upon projected (five-year) EPS growth rates from Zacks Investment Research, Thomson First Call, and Value Line.[73] Table 10 below summarizes the five-year projected earnings per share growth rates from the three investment research firms she chose:

TABLE 10: MS. BULKLEY'S DCF GROWTH RATES

	Mean	Median
Zacks Investment Research:	6.28%	6.24%
Yahoo Finance:	6.54%	6.46%
Value Line:	7.84%	7.01%

Source: Ms. Bulkley's Direct Testimony, Schedules 3-5.

Q. IS MS. BULKLEY'S METHODOLOGY FOR DETERMINING THE GROWTH RATE TO USE IN HER DCF MODEL APPROPRIATE?

A. No. As stated above, Ms. Bulkley uses analyst five-year earnings per share growth without attempting to reconcile the retention rate used for computing growth with the retention rate she used to compute the dividend yield. This is analogous to failing to reconcile the money you are taking out of your checking account with your future balance, i.e., the basic balancing of a checkbook.

Q. CAN YOU PLEASE SUMMARIZE WHY A FUTURE-ORIENTED "B X R" METHOD IS SUPERIOR TO A FIVE-YEAR EARNINGS PER SHARE GROWTH

[73] Ibid. page 41, lines 13-16.

RATE FORECAST IN PROVIDING A LONG-TERM SUSTAINABLE GROWTH RATE?

A. Yes. The primary cause of sustainable earnings growth is the retention of earnings. A company is able to create higher future earnings by retaining a portion of the prior year's earnings in the business and purchasing new business assets with those retained earnings. There are many factors that can cause short-term swings in earnings growth rates, but the long-term sustainable growth is caused by retaining earnings and reinvesting those earnings. Factors that cause short-term swings include anything that causes a company to earn a return on book equity at a rate different from the long-term sustainable rate. Assume, for example, that a particular utility company is regulated so that it is provided with a reasonable opportunity to earn 9% on its equity. Should the company experience an event such as the loss of several key customers, or unfavorable weather conditions, which cause it to earn only 6% on equity in a given year, the drop from a 9% earned return on equity to a 6% earned return on equity would be concurrent with a very large drop in earnings per share. In fact, if a company did not issue any new shares of stock during the year, a drop from a 9% earned return on book equity to a 6% earned return on book equity would result in a 33.3% decline in earnings per share over the period.[74] However, such a drop in earnings would not be an indication of what is a long-term sustainable earnings per share growth rate. If the drop were caused by weather conditions, the drop in earnings would be immediately offset once normal weather conditions return. If the drop were from the loss of some key customers, the company would replace the lost earnings by filing for a rate

[74] By definition, earned return on equity is earnings divided by book value. Therefore, whatever level of earnings is required to produce earnings of 6% of book would have to be 33.3% lower than the level of earnings required to produce a return on book equity of 9%.

increase to bring revenues up to the level required for the company to be given a reasonable opportunity to recover its cost of equity.

For the reasons above, changes in earnings per share growth rates that are caused by non-recurring changes in the earned return on book equity are inconsistent with long-term sustainable growth, but changes in earnings per share because of the reinvestment of additional assets is a cause of sustainable earnings growth. The "b x r" term in the DCF equation computes sustainable growth because it measures only the growth which a company can expect to achieve when its earned return on book equity "r" remains in equilibrium. If analysts have sufficient data to be able to forecast varying values of "r" in future years, then a complex, or multi-stage DCF method must be used to accurately quantify the effect. Averaging growth rates over sub-periods, such as averaging growth over the first five years with a growth rate expected over the subsequent period, will not provide an appropriate representation of the cash flows expected by investors in the future and, therefore, will not provide an acceptable method of quantifying the cost of equity using the DCF method. The choices are either a constant growth DCF, in which one growth rate derived using "b x r" should be used, or a complex DCF method in which the cash flow anticipated in each future year is separately estimated. Ms. Bulkley has done neither. Instead, she mechanically adds analysts' five-year earnings per share growth rate to the dividend yield which overstates the cost of equity.

Q. WHY ARE ANALYSTS' FIVE-YEAR CONSENSUS GROWTH RATES NOT INDICATIVE OF LONG-TERM SUSTAINABLE GROWTH RATES?

A. Analysts' five-year earnings per share growth rates are earnings per share growth rates that measure earnings growth from the most currently completed fiscal year to projected

earnings five years into the future. These growth rates are not indicative of future sustainable growth rates in part because the sources of cash flow to an investor are dividends and stock price appreciation. While both stock price and dividends are impacted in the long run by the level of earnings a company is capable of achieving, earnings growth over a period as short as five years is rarely in synchronization with the cash flow growth from increases in dividends and stock prices. For example, if a company experiences a year in which investors perceive that earnings temporarily dipped below normal trend levels, stock prices generally do not decline at the same percentage that earnings decline, and dividends are usually not cut just because of a temporary decline in a company's earnings. Unless both the stock price and dividends mirror every down swing in earnings, they cannot be expected to recover at the same growth rate that earnings recover. Therefore, growth rates such as five-year projected growth in earnings per share are not indicative of long-term sustainable growth rates in cash flow. As a result, they are not applicable for direct use in the simplified DCF method.

Q. IS THE USE OF FIVE-YEAR EARNINGS PER SHARE GROWTH RATES IN THE DCF MODEL ALSO IMPROPER?

A. Yes. A raw, unadjusted, five-year earnings per share growth rate is usually a poor proxy for either short-term or long-term cash flow growth that an investor expects to receive. When implementing the DCF method, the time value of money is considered by equating the current stock price of a company to the present value of the future cash flows that an investor expects to receive over the entire time that he or she owns the stock. The discount rate required to make the future cash flow stream, on a net present value basis, equal to the current stock price is the cost of equity. The only two sources of cash flow to an investor

are dividends and the net proceeds from the sale of stock at whatever time in the future the investor finally sells. Therefore, the DCF method is discounting future cash flows that investors expect to receive from dividends and from the eventual sale of the stock. Five-year earnings growth rate forecasts are especially poor indicators of cash flow growth, even over the five years being measured by the five-year earnings per share growth rate number.

Q. WHY IS A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATOR OF THE FIVE-YEAR CASH DIVIDEND GROWTH EXPECTATIONS?

A. The board of directors of a company changes dividend rates based upon long-term earnings expectations combined with the capital needs of a company. Most companies do not decrease dividends simply because a company has a year in which earnings were below sustainable trends, and similarly they do not increase dividends simply because earnings for one year happened to be above long-term sustainable trends. Therefore, over any given five-year period, earnings growth is frequently very different from dividend growth. In order for earnings growth to equal dividend growth, at a minimum, earnings per share in the first year of the five-year earnings growth rate period would have to be exactly on the long-term earnings trend line expected by investors. Since earnings in most years are above or below the trend line, the earnings per share growth rate over most five-year periods is different from what is expected for dividend growth.

Q. WHY IS THE FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATION OF FUTURE STOCK PRICE GROWTH?

A. If a company happens to experience a year in which earnings decline below what investors believe is consistent with the long-term trend, then the stock price does not drop anywhere

near as much as earnings drop. Similarly, if a company happens to experience a year in which earnings are higher than the investor-perceived long-term sustainable trend, the stock price will not increase as much as the earnings. In other words, the P/E ratio of a company will increase after a year in which investors believe earnings are below sustainable levels, and the P/E ratio will decline in a year in which investors believe earnings are higher than expected. Since stock price is one of the important cash flow sources to an investor, a five-year earnings growth rate is a poor indicator of cash flow, both because it is a poor indicator of stock price growth over the five years being examined, and because it is equally a poor predictor of dividend growth over the period.

Q. ARE YOU SAYING THAT ANALYSTS' CONSENSUS EARNINGS PER SHARE GROWTH RATES ARE USELESS AS AN AID TO PROJECTING THE FUTURE?

A. No. Analysts' EPS growth rates are, however, very dangerous if used in a simplified DCF without proper interpretation. While they are not useful if used in their "raw" form, they can be very useful in computing estimates of what earned return on equity investors expect will be sustained in the future, and as such, are useful in developing long-term sustainable growth rates. This is exactly what I do in the application of my Constant Growth DCF Analysis.

C. CAPM Method

Q. PLEASE DESCRIBE MS. BULKLEY'S CAPM METHOD.

A. Ms. Bulkley explains that the CAPM method "estimates the cost of equity for a given security as a function of a risk-free return plus a risk premium to compensate investors for

the non-diversifiable or 'systematic' risk of that security."[75] She says that this method is defined by the following four components:

$$K_s = r_f + \beta\,(r_m - r_f)$$

Where:

K_s = the required market ROE;
β = Beta coefficient of an individual security;
r_f = the risk-free ROE; and
r_m = the required return on the market as a whole.[76]

She also considers an Empirical CAPM (ECAPM). Ms. Bulkley claims the ECAPM is necessary because academic research indicates that the risk return relationship is different than the one estimated by the CAPM.[77] This method includes the same four components as the CAPM, but she applies a 75% weighting to the beta coefficient and the market risk premium portion of the equation and a 25% weighting to the market risk premium, without the beta coefficient impact. ECAPM formula:

$$K_s = r_f + 0.75\beta\,(r_m - r_f) + 0.25\,(r_m - r_f)$$[78]

Q. WHAT RISK-FREE RATE DOES MS. BULKLEY USE IN HER CAPM?

A. She uses the following three risk-free rates: (1) Current yield on 30-year Treasury bonds (1.34%), (2) Projected (Q4 2020 through Q4 2021) yield 30-year Treasury bonds (1.7%), and (3) Projected (between 2022 and 2026) yield 30-year Treasury bonds (3.00%).[79]

[75] Ms. Bulkley's Direct Testimony, page 43, lines 15-16 and page 44, line 1.
[76] Ibid. page 44, lines 6-11.
[77] Ibid. page 48, lines 14-18.
[78] Ibid. page 48, line 6.
[79] Ibid. page 50, Figure 12.

Q. WHAT BETA COEFFICIENT DOES MS. BULKLEY USE IN HER CAPM?

A. She uses the following two historical beta coefficients: (1) Bloomberg 10-year weekly return relative to the S&P 500 index, and (2) Value Line 5-year historical weekly return relative to the New York stock exchange composite index.[80]

Q. WHAT RISK PREMIUM DOES MS. BULKLEY USE IN HER CAPM?

A. Ms. Bulkley uses a "forward-looking" market risk premium in her CAPM analysis which she defines as the expected returned on the S&P 500 less the 30-year Treasury bond yield.[81] She calculates the expected return on the S&P 500 Index by plugging S&P's published dividend yield forecasts and five-year growth rate projections into a DCF model.[82] Her market risk premium results range from 10.95% to 12.60%.[83]

Q. DO YOU AGREE WITH THE RESULTS OF MS. BULKLEY'S CAPM ANALYSIS?

A. No, I do not agree with the results (11.86% - 12.21%)[84] of Ms. Bulkley's CAPM analysis because they are not based on investor expectations. She uses historical data (e.g., betas) and analyst forecasts (e.g., interest rates, S&P's dividend, and earnings forecasts) instead of investor expectations as revealed by market data. Ms. Bulkley's use of historical and non-market-based data in her "forward-looking" CAPM analysis contradicts her statement that the cost of equity should rely on market-based data to quantify investor expectations. Stock option data indicates that investors expect betas for gas utility stocks to be lower than historical betas over the time periods used by Ms. Bulkley (5 years and 10 years). Low

[80] Ibid. page 46, lines 3-8.
[81] Ibid. page 49, lines 1-3 and Schedule 5, page 7.
[82] Ibid. page 46, lines 11-16.
[83] Ibid. lines 16-19.
[84] Ibid. page 50, Figure 12.

yields on long-term U.S. Treasury bonds indicate that investors do not expect interest rates to increase any time soon because when interest rates increase the owner of a long-term bond will lose money.

Q. DOES MS. BULKLEY USE AN APPROPRIATE RISK-FREE RATE IN HER CAPM?

A. No. The risk-free rate component of Ms. Bulkley's CAPM is not appropriate because it is based primarily on economist published projections and not investors' expectations as indicated by current market yields. As of December 31, 2020, the yield on 30-year Treasury Bonds was 1.65%. Ms. Bulkley includes projected yields of 1.7% and 3.0%, instead of relying on current market yields, because she claims the cost of equity should be "forward-looking" and the CAPM should "reflect the expectations of the market at that time."[85] But the current yield on the 30-year U.S. Treasury bond indicates market expectations. If investors started to believe that the yield on long-term U.S. Treasuries was going to increase to 3.0% next year, the price of 30-year U.S. Treasury bonds would fall until the yield was about 3.0%. The current yield would be nearly the same as next year's yield because the price of bonds moves inversely to yields. Buying a 30-year bond today expecting interest rates to increase (more than double according to Ms. Bulkley), would be the same as giving money away. Of course it is possible that interest rates will increase, but it is safe to say that the market does not expect that it is highly probable that interest rates will increase from 1.65% to 3.0% any time soon.

[85] Ibid. page 45, lines 17-18.

In NSP's 2012 rate case, Ms. Bulkley stated that "long-term interest rates on government bonds are projected to substantially increase over the next few years"[86]. Long-term interest rates were higher in 2014, but by the end of 2014 they had fallen below rates in 2012.

Q. DO MS. BULKLEY'S BETA COEFFICIENTS OVERSTATE THE COST OF EQUITY?

A. Yes. Ms. Bulkley's historical beta coefficients are higher than currently anticipated by investors and therefore overstate the cost of equity. Option-implied betas indicate that investors expect gas utility stock price movements to be less correlated with the overall market than before the pandemic. In December 2019, the average option-implied beta for my Gas Proxy Group was 0.90. As of December 31, 2020, the average option-implied beta of these 10 gas utility companies was 0.72. In other words, investors expect gas utility stocks to move less than three quarters of a percent for every percent the market moves. Ms. Bulkley's CAPM results likely overstate the cost of equity by hundreds of basis points because she uses 5-year historical betas (averaging 0.85 for her proxy group[87]) instead of betas based on current investor expectations.

[86] Ms. Bulkley's Direct Testimony (Case No. PU-12-813), page 33, lines 16-18.
[87] Mr. Bulkley's Direct Testimony, Schedule 5.

D. Expected Earnings Analysis

Q. PLEASE EXPLAIN THE EXPECTED EARNINGS ANALSYIS PRESENTED BY MS. BULKLEY.

A. Ms. Bulkley's expected earnings approach consists of estimating what investors expect to earn on the book value for the stocks of the 7 companies in her proxy group. She claims that return on book equity is relevant to the cost of equity. In order to estimate investors expected return on book equity, she relied exclusively on Value Line's projections. She starts with the publications future expected return on book equity forecasts for the period from 2023-2025 for gas utility companies. She increases these forecasts to account for the growth in new common stock.

Q. IS THIS METHOD VALID?

A. No. The overriding problem with Ms. Bulkley's expected earnings analysis is that it did not address the cost of equity at all. It simply considered the returns on book equity that were achieved and are expected to be achieved by Value Line in the next 3 to 5 years. The earned return on book equity is an entirely different concept from the cost of equity.

E. Regulatory and Business Risks

Q. PLEASE LIST THE ADDITIONAL FACTORS MS. BULKLEY CLAIMS MUST BE TAKEN INTO CONSIDERATION WHEN DETERMINING THE COMPANY'S COST OF EQUITY.

A. Ms. Bulkley considers the following additional factors must be considered when determining Montana-Dakota's Cost of Equity:

A. Small Size

B. Flotation Cost

C. Capital Expenditures

D. Regulatory Risk.[88]

Ms. Bulkley does not make a specific adjustment to her cost of equity recommendation to account for the additional factors listed above. However, she claims that impact of these additional factors supports an ROE toward the higher end of the reasonable range of ROEs.

Q. DO YOU AGREE WITH MS. BULKLEY THAT THE ADDITIONAL REGULATORY AND BUSINESS RISK FACTORS DISCUSSED IN HER DIRECT TESTIMONY SUPPORT AN ROE IN THE UPPER END OF THE RANGE OF REASONABLENESS?

A. I do not address the specific reasons why I do not agree with Ms. Bulkley that these factors impact Montana-Dakota's cost of equity for two reasons. First, she does not make a specific adjustment to her 10.200% to account for these additional factors. Second, her 10.200% cost of equity recommendation is so far beyond a reasonable estimate for the Company's cost of equity, as discussed throughout my testimony above, that it would be distracting to address relatively minor factors.

[88] Ibid. pages 56-74.

VII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS IN THIS CASE.

A. Based on the evidence presented in my testimony, I conclude that the cost of equity allowed for the Company's gas utility operations should be between 7.93% and 8.25% (recommended at 8.09%) with an overall cost of capital of between 6.16% and 6.32% (recommended at 6.24%) based on the average common equity ratio of the Gas Proxy Group (See Table 1 on page 4). My recommended cost of equity of 8.09%[89] is the midpoint of the range above (7.93% to 8.25%).

Ms. Bulkley's cost of equity recommendation of 10.200% is unreasonably high, primarily because of her use of inflated "projected" data instead of investor expectations as indicated by capital market data, and technical flaws with her cost of equity models.

My 8.09% (7.93% to 8.25%) cost of equity recommendation satisfies the requirements of *Hope* and *Bluefield* that regulated utility companies should have the opportunity to earn a return commensurate with returns on investments in other enterprises having corresponding risks. My recommendations are consistent with legal standards set by the United States Supreme Court and market data. My 8.09% (7.93% to 8.25%) cost of equity and an overall cost of capital (rate of return) of 6.24% (6.16% to 6.32%) will allow Montana-Dakota to raise capital on reasonable terms while fulfilling their obligation to provide safe and reliable service.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

[89] Schedule ALR-2.

EXHIBIT ALR-1: RESUME OF AARON L. ROTHSCHILD

SUMMARY

Financial professional providing expert rate of return testimony in utility (water, electric and gas) rate case proceedings, applied mathematics research for utility industry as an affiliate of the New England Complex Systems Institute, and industry experience includes Head of Business Analysis for a major US telecom firm in Asia Pacific.

EXPERIENCE

Rothschild Financial Consulting, Ridgefield, CT **November 2001- present**
Independent consulting firm specializing in utility sector
President

- Providing technical and expert witness services to the California Public Advocates Office to evaluate the financial health, basic operation, wildfire cost recovery and organizational culture/governance of gas and electric utilities (I.15-08-019), including evaluating alternatives to PG&E.
- Provide financial testimony (e.g. rate of return and M&A) to state governments in utility rate cases, including the 2020 California energy cost of capital proceedings.
- Present at utility regulation conferences (NARUC/NASUCA and MARC) regarding rate of return, power purchase agreements, complex systems science, and subsidy auctions.

360 Networks, Hong Kong **January 2001 - October 2001**
Pioneer of the fiber optic telecommunications industry
Senior Manager

- Business development and investment evaluation
- Negotiated landing rights and formed local partnerships in Korea, Japan, Singapore, and Hong Kong for $1 billion undersea cable project
- Structured fiber optic bandwidth swapping agreement with Enron and Global Crossing
- Established relationships with Hong Kong based Investment Bankers to communicate Asia Pacific objectives and accomplishments to Wall Street

Dantis, Chicago, IL **July 2000- December 2000**
Start-up managed data-hosting services provider
Director

- Built capital raise valuation models and negotiated with potential investors
- Team raised $100M from venture capital firm through valuation negotiations and internal strategic analysis

MFS, MCI-WorldCom, Chicago, Hong Kong, Tokyo **September 1996- July 2000**
American Telecommunications Company
Head of Business Analysis for Japan operations

- Managed staff of 5 business development analysts
- Raised $80M internally for Japanese national fiber network expansion plan by conducting an investment evaluation and presenting findings to CEO of international operations in London, UK
- Built financial model for local fiber optic investment evaluation that was used by business development offices in Oak Brook, IL and Sydney, Australia

EDUCATION

Vanderbilt University, Nashville, TN **1994-1996**
MBA, Finance

- Completed business plan for Nextlink Communications in support of their national fiber optic network expansion, including identifying opportunities from passage of Telecom Act of 1996
- Developed analytical framework to evaluate predictability of rare events
- Provided financial and accounting analysis to Chicago's consumer advocate, the Citizens Utility Board (CUB) as a summer intern

Clark University, Worchester, MA **1990 - 1994**
BA, Mathematics

EXHIBIT ALR-1: TESTIFYING EXPERIENCE OF AARON L. ROTHSCHILD

Filed Rate of Return Testimonies:

California
- Pacific Gas and Electric Company, Application 20-04-023, Securitization, October 2020
- Southern California Edison, Application 20-07-008, Securitization, September 2020
- San Diego Gas & Electric Company, Application 19-04-017, Rate of Return, August 2019
- Southern California Gas Company, Application 19-04-016, Rate of Return, August 2019
- Pacific Gas and Electric Company, Application 19-04-015, Rate of Return, August 2019
- Southern California Edison, Application 19-04-014, Rate of Return, August 2019
- Liberty Utilities, Application A.18-05-006, Rate of Return, August 2018
- San Gabriel Water Company, Application 18-05-005, Rate of Return, August 2018
- Suburban Water Company, Application 18-05-004, Rate of Return, August 2018
- Great Oaks Water Company, Application 18-05-001, Rate of Return, August 2018
- California Water Service Company, Application 17-04-006, Rate of Return, August 2017
- California American Water Company, Application 17-04-003, Rate of Return, August 2017
- Golden State Water Company, Application 17-04-002, Rate of Return, August 2017
- San Jose Water Company, Application 17-04-001, Rate of Return, August 2017

Colorado
- Public Service Company of Colorado, Docket No. 11AL-947E, Rate of Return, March 2012

Connecticut
- United Water Connecticut, Docket No. 07-05-44, Rate of Return, November 2008
- Valley Water Systems, Docket No. 06-10-07, Rate of Return, May 2007

Delaware
- Tidewater Utilities, Inc., PSC Docket No. 11-397, Rate of Return, April 2012
- Delmarva Power & Light, PSC Docket No. 09-414, Rate of Return, February 2010
- Delmarva Power & Light, PSC Docket No. 09-276T, Rate of Return, February 2010

Florida
- Florida Power & Light (FPL), Docket No. 070001-EI, October 2007
- Florida Power Corp., Docket No. 060001 Fuel Clause, September 2007

New Jersey
- Aqua New Jersey, Inc., BPU Docket No. WR11120859, Rate of Return, April 2012

Maryland
- Delmarva Power & Light, Case No. 9317, Rate of Return, June 2013
- Columbia Gas of Maryland, Case No. 9316, Rate of Return, May 2013
- Potomac Electric Power Company, Case No. 9286, Rate of Return, March 2012

- Delmarva Power & Light, Case No. 9285, Rate of Return, March 2012

North Dakota

- Otter Tail Power Company, Case No. PU-17-398, Rate of Return, May 2018
- Montana-Dakota Utilities Co., Case No. PU-15-90, Rate of Return, August 2015
- Northern States Power, Case No. PU-400-04-578, Rate of Return, March 2005

Pennsylvania

- Audubon Water Company, Docket No. R-2020-3020919, Rate of Return, November 2020
- Pennsylvania American Water Company, Docket No. R-2020-3019369 and R-2020-3019371, Rate of Return, September 2020
- Twin Lakes Utilities, Inc., Docket No. R-2019-3010958, Rate of Return, October 2019
- City of Lancaster Sewer Fund, Docket No. R-2019-3010955, Rate of Return, October 2019
- Community Utilities of Pennsylvania Inc. Wastewater Division, Docket No. R-2019-3008948, Rate of Return, July 2019
- Community Utilities of Pennsylvania Inc. Water Division, Docket No. R-2019-3008947, Rate of Return, July 2019
- Newtown Artesian Water Company, Docket No. R-20019-3006904, Rate of Return, May 2019
- Hidden Valley Utility Services, L.P. – Wastewater Division, Docket No. R-2018-3001307, Rate of Return, September 2018
- Hidden Valley Utility Services, L.P. – Water Division, Docket No. R-2018-3001306, Rate of Return, September 2018
- The York Water Company, Docket No. R-2018-3000019, Rate of Return, August 2018
- SUEZ PA Pennsylvania, Inc., Docket No. R-2018-000834, Rate of Return, July 2018
- UGI Utilities, Inc. – Electric Division, Docket No. R-2017-2640058, Rate of Return, April 2018
- Wellsboro Electric Company, Docket No. R-2016-2531551, Rate of Return, December 2016
- Citizens' Electric Company of Lewisburg, PA, Docket No. R-2016-2531550, Rate of Return, December 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2016-2529660, Rate of Return, June 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2015-2468056, Rate of Return, June 2015
- Pike County Light & Power Company, Docket No. R-2013-2397353 (gas), Rate of Return, April 2014
- Pike County Light & Power Company, Docket No. R-2013-2397237 (electric), Rate of Return, April 2014
- Columbia Water Company, Docket No. R-2013-2360798, Rate of Return, August 2013
- Peoples TWP LLC, Docket No. R-2013-2355886, Rate of Return, July 2013
- City of Dubois – Bureau of Water, Docket No. R-2013-2350509, Rate of Return, July 2013

- City of Lancaster – Sewer Fund, Docket No. R-2012-2310366, Rate of Return, December 2012
- Wellsboro Electric Company, Docket No. R-2010-2172665, Rate of Return, September 2010
- Citizens' Electric Company of Lewisburg, PA, Docket No. R-2010-2172662, Rate of Return, September 2010
- T.W. Phillips Gas and Oil Company, Docket No. R-2010-2167797, Rate of Return, August 2010
- York Water Company, Docket No. R-2010-2157140, Rate of Return, August 2010
- Joint Application of The Peoples Natural Gas Company, Dominion Resources, Inc. and Peoples Hope Gas Company LLC, Docket No. A-2008-2063737, Financial Analysis, December 2008
- York Water Company, Docket No. R-2008-2023067, Rate of Return, August 2008

South Carolina

- Dominion Energy South Carolina, Inc., Docket No. 2020-125-E, Rate of Return November 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Rate of Return, May 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Accounting, May 2020
- Blue Granite Water Company, Docket No. 2019-290-WS, Rate of Return, January 2020

Vermont

- Central Vermont Public Service Corp., Docket No. 7321, Rate of Return, September 2007

Schedule ALR-1

OVERALL COST OF CAPITAL
Montana-Dakota Utilities Co.

	Ratios		Cost Rate		Weighted Cost Rate
					[D]
Long-Term Debt	42.37%	[A]	4.72%	[B]	2.00%
Short-Term Debt	7.32%	[B]	2.38%	[B]	0.17%
Common Equity	50.31%	[A]	8.09%	[C]	4.07%
	100.00%				**6.24%**

Sources:
[A] Montana-Dakota Utilities Co. & Great Plains Natural Gas Co. Workpapers Index Statement F-2, page 3 of 5
[B] Montana-Dakota Utilities Co. & Great Plains Natural Gas Co. Workpapers Index Statement F-2, page 3 of 5
[C] Schedule ALR-2
[D] Ratios times Cost Rate

COST OF EQUITY SUMMARY

Gas Proxy Group (10 Companies)

		Low		High
DCF				
Constant Growth	[A]	9.48%		9.54%
Non-Constant Growth	[B]	10.71%		11.45%
CAPM				
3-Mo. Weighted Average (Oct. to Dec. 2020)				
3-Month Treasury Bill Risk-Free Rate	[C]	6.61%		6.88%
30-Year Treasury Bond Risk-Free Rate	[C]	7.20%		7.43%
Spot (Dec. 31, 2020)				
3-Month Treasury Bill Risk-Free Rate	[D]	7.05%		7.36%
30-Year Treasury Bond Risk-Free Rate	[D]	7.53%		7.80%
Average		**8.10%**		**8.41%**
Proxy Group Average of Low / High Averages			**8.25%**	

Montana-Dakota Utilities Co.

Capital Structure Risk Adjustment	[E]		-0.16%	
Adjusted Recommended Cost of Equity Range		**7.93%**		**8.25%**
Company Specific Cost of Equity Recommendation			**8.09%**	

Sources:
[A] Schedule ALR-3, page 1
[B] Schedule ALR-3, page 2 and Schedule ALR-3, page 3
[C] Schedule ALR-4, page 1
[D] Schedule ALR-4, page 5
[E] Based on estimate of 0.04% change in Cost of Equity for each 1% difference in Common Equity Ratio compared to the Proxy Group (Schedule ALR-1 vs. Schedule ALR-5, page 4).

CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
Gas Proxy Group (10 Companies)

		Based on Average Market Price For Year Ending 12/31/2020	Based On Market Price As Of 12/31/2020
1 Dividend Yield On Market Price	[A]	3.34%	3.55%
2 Retention Rate:			
a) Market-to-Book Ratio	[A]	1.83	1.71
b) Dividend Yield on Book	[B]	6.11%	6.08%
c) Expected Return on Equity	[C]	10.00%	10.00%
d) Retention Rate	[D]	38.87%	39.23%
3 Reinvestment Growth	[E]	3.89%	3.92%
4 New Financing Growth	[F]	2.21%	1.90%
5 Total Estimate of Investor Anticipated Growth	[G]	6.10%	5.82%
6 Increment to Dividend Yield for Growth to Next Year	[H]	0.10%	0.10%
7 Indicated Cost of Equity	**[I]**	**9.54%**	**9.48%**

Sources:

[A] Schedule ALR-5, page 1

[B] Line 1 x Line 2a

[C] Some of the considerations for determining Future Expected Return on Equity:

	Median	Mean	From
Value Line Expectation	**9.25%**	**9.75%**	Schedule ALR-5, page 2
Return on Equity to Achieve Zacks Growth	10.81%	11.37%	Schedule ALR-5, page 3
Average Historical Growth	9.43%	9.34%	
Earned Return on Equity in 2019	9.25%	9.52%	Schedule ALR-5, page 2
Earned Return on Equity in 2018	10.04%	10.91%	Schedule ALR-5, page 2
Earned Return on Equity in 2017	8.98%	7.60%	Schedule ALR-5, page 2

[D] 1 - Line 2b / Line 2c

[E] Line 2c x Line 2d

[F] S x V = (Ext. Fin Rate) x (Line 2a - 1) Ext. Fin. Rate = 2.67% From Schedule ALR-3, page 4

S = rate of continuous new stock financing

V = fraction of funds raised by sale of stock that increases the book value of existing shareholders' common equity

[G] Line 3 + Line 4

[H] Line 1 x one-half of Line 5

[I] Line 1 + Line 5 + Line 6

NON-CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
(BASED ON VALUE LINE FORECASTS AND CLOSING STOCK PRICE)
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
		Forecasted Dividends per Share					Growth	Book Value		Closing Stock Price		Cash Flow From Buying and Selling Stock (At Closing Price)					
		2020	2021	2022	2023	2024	2021-24	2020	2024	12/31/2020	12/31/2024	2020	2021	2022	2023	2024	IRR / DCF
		[A]	[A]	[B]	[B]	[A]	[B]	[A]	[A]	[C]	[D]	[E]	[E]	[E]	[E]	[E]	[F]
ATMOS ENERGY CORP.	ATO	$2.30	$2.50	$2.70	$2.92	$3.15	8.01%	$54.80	$66.20	$95.43	$115.28	($95.43)	$2.50	$2.70	$2.92	$118.43	7.58%
CHESAPEAKE UTIL.	CPK	$1.69	$1.83	$1.97	$2.13	$2.30	7.92%	$36.75	$60.15	$108.21	$177.11	($108.21)	$1.83	$1.97	$2.13	$179.41	14.69%
NISOURCE INC.	NI	$0.86	$0.92	$0.99	$1.07	$1.16	8.03%	$13.75	$16.20	$22.94	$27.03	($22.94)	$0.92	$0.99	$1.07	$28.19	8.42%
NEW JERSEY RES.	NJR	$1.27	$1.34	$1.41	$1.49	$1.57	5.42%	$20.50	$25.80	$35.55	$44.74	($35.55)	$1.34	$1.41	$1.49	$46.31	9.66%
N. W. NATURAL	NWN	$1.91	$1.92	$1.94	$1.95	$1.97	0.86%	$29.70	$38.40	$45.99	$59.46	($45.99)	$1.92	$1.94	$1.95	$61.43	10.49%
ONE GAS, INC.	OGS	$2.16	$2.32	$2.47	$2.63	$2.80	6.47%	$42.70	$54.10	$76.77	$97.27	($76.77)	$2.32	$2.47	$2.63	$100.07	9.13%
SOUTH JERSEY INDS.	SJI	$1.20	$1.25	$1.30	$1.35	$1.40	3.85%	$16.60	$20.45	$21.55	$26.55	($21.55)	$1.25	$1.30	$1.35	$27.95	11.04%
SPIRE INC.	SR	$2.49	$2.60	$2.73	$2.86	$3.00	4.89%	$48.50	$72.00	$64.04	$95.07	($64.04)	$2.60	$2.73	$2.86	$98.07	14.16%
SOUTHWEST GAS	SWX	$2.26	$2.35	$2.45	$2.55	$2.65	4.09%	$47.80	$61.55	$60.75	$78.23	($60.75)	$2.35	$2.45	$2.55	$80.88	10.27%
UGI CORP.	UGI	$1.32	$1.34	$1.38	$1.42	$1.46	2.90%	$19.65	$26.85	$34.96	$47.77	($34.96)	$1.34	$1.38	$1.42	$49.23	11.69%
Maximum		$2.49	$2.60	$2.73	$2.92	$3.15	8.03%	$54.80	$72.00	$108.21	$177.11	($21.55)	$2.60	$2.73	$2.92	$179.41	14.69%
Minimum		$0.86	$0.92	$0.99	$1.07	$1.16	0.86%	$13.75	$16.20	$21.55	$26.55	($108.21)	$0.92	$0.99	$1.07	$27.95	7.58%
Median		$1.80	$1.88	$1.96	$2.04	$2.14	5.15%	$33.23	$46.25	$53.37	$68.84	($53.37)	$1.88	$1.96	$2.04	$71.15	10.38%
Average		$1.75	$1.84	$1.93	$2.04	$2.15	5.24%	$33.08	$44.17	$56.62	$76.85	($56.62)	$1.84	$1.93	$2.04	$79.00	**10.71%**

Sources:

[A] Value Line: Most current data available at time of schedule preparation. 2024 data is VL forecast for 2023-25.

[B] Calculations based on Value Line data, assuming constant dividend growth for 2021-24.

[C] EOD Data: Market Data as of December 31, 2020.

[D] Stock Price projected assuming constant Market to Book Ratio (Schedule ALR-5, page 1) and using VL projected Book Value.

[E] Cash Flow from purchasing stock on January 1, 2021, receiving dividends through 2024, and selling on December 31, 2024.
Negative number in 2020 reflects cash outflow required to purchase stock.
Cash flow sources are 1) dividends and 2) proceeds of stock sale.
0 of 4 dividends assumed received in 2020 and 4 of 4 in 2024 based on purchase and sale date.

[F] Total return on equity to investor who purchased, held, and sold stock as described above,
assuming Value Line projections of Dividends and Book Value are correct and
assuming Stock Price grows at same rate as Book Value.
DCF result is an Internal Rate of Return computation made using the "IRR" function built into Microsoft Excel
based on projected cash flows from 2020 to 2024.

NON-CONSTANT GROWTH DISCOUNTED CASH FLOW (DCF) - INDICATED COST OF EQUITY
(BASED ON VALUE LINE FORECASTS AND LTM AVERAGE STOCK PRICE)
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
		Forecasted Dividends per Share					Growth	Book Value		LTM Avg. Stock Price		Cash Flow From Buying and Selling Stock (At LTM Average Price)					
		2020	2021	2022	2023	2024	2021-24	2020	2024	12/31/2020	12/31/2024	2020	2021	2022	2023	2024	IRR / DCF
		[A]	[A]	[B]	[B]	[A]	[B]	[A]	[A]	[C]	[D]	[E]	[E]	[E]	[E]	[E]	[F]
ATMOS ENERGY CORP.	ATO	$2.30	$2.50	$2.70	$2.92	$3.15	8.01%	$54.80	$66.20	$99.50	$127.93	($99.50)	$2.50	$2.70	$2.92	$131.08	9.05%
CHESAPEAKE UTIL.	CPK	$1.69	$1.83	$1.97	$2.13	$2.30	7.92%	$36.75	$60.15	$90.44	$153.27	($90.44)	$1.83	$1.97	$2.13	$155.57	15.97%
NISOURCE INC.	NI	$0.86	$0.92	$0.99	$1.07	$1.16	8.03%	$13.75	$16.20	$25.01	$29.89	($25.01)	$0.92	$0.99	$1.07	$31.05	8.42%
NEW JERSEY RES.	NJR	$1.27	$1.34	$1.41	$1.49	$1.57	5.42%	$20.50	$25.80	$32.95	$44.90	($32.95)	$1.34	$1.41	$1.49	$46.47	11.97%
N. W. NATURAL	NWN	$1.91	$1.92	$1.94	$1.95	$1.97	0.86%	$29.70	$38.40	$59.80	$79.01	($59.80)	$1.92	$1.94	$1.95	$80.98	10.16%
ONE GAS, INC.	OGS	$2.16	$2.32	$2.47	$2.63	$2.80	6.47%	$42.70	$54.10	$80.32	$104.64	($80.32)	$2.32	$2.47	$2.63	$107.44	9.71%
SOUTH JERSEY INDS.	SJI	$1.20	$1.25	$1.30	$1.35	$1.40	3.85%	$16.60	$20.45	$25.84	$33.01	($25.84)	$1.25	$1.30	$1.35	$34.41	11.00%
SPIRE INC.	SR	$2.49	$2.60	$2.73	$2.86	$3.00	4.89%	$48.50	$72.00	$69.27	$106.52	($69.27)	$2.60	$2.73	$2.86	$109.52	14.81%
SOUTHWEST GAS	SWX	$2.26	$2.35	$2.45	$2.55	$2.65	4.09%	$47.80	$61.55	$63.65	$83.93	($63.65)	$2.35	$2.45	$2.55	$86.58	10.70%
UGI CORP.	UGI	$1.32	$1.34	$1.38	$1.42	$1.46	2.90%	$19.65	$26.85	$33.55	$47.50	($33.55)	$1.34	$1.38	$1.42	$48.96	12.76%
Maximum		$2.49	$2.60	$2.73	$2.92	$3.15	8.03%	$54.80	$72.00	$99.50	$153.27	($25.01)	$2.60	$2.73	$2.92	$155.57	15.97%
Minimum		$0.86	$0.92	$0.99	$1.07	$1.16	0.86%	$13.75	$16.20	$25.01	$29.89	($99.50)	$0.92	$0.99	$1.07	$31.05	8.42%
Median		$1.80	$1.88	$1.96	$2.04	$2.14	5.15%	$33.23	$46.25	$61.72	$81.47	($61.72)	$1.88	$1.96	$2.04	$83.78	10.85%
Average		$1.75	$1.84	$1.93	$2.04	$2.15	5.24%	$33.08	$44.17	$58.03	$81.06	($58.03)	$1.84	$1.93	$2.04	$83.21	**11.45%**

Sources:

[A] Value Line: Most current data available at time of schedule preparation. 2024 data is VL forecast for 2023-25.

[B] Calculations based on Value Line data, assuming constant dividend growth for 2021-24.

[C] EOD Data: Market Data as of December 31, 2020.

[D] Stock Price projected assuming constant Market to Book Ratio (Schedule ALR-5, page 1) and using VL projected Book Value.

[E] Cash Flow from purchasing stock on January 1, 2021, receiving dividends through 2024, and selling on December 31, 2024.
Negative number in 2020 reflects cash outflow required to purchase stock.
Cash flow sources are 1) dividends and 2) proceeds of stock sale.
0 of 4 dividends assumed received in 2020 and 4 of 4 in 2024 based on purchase and sale date.

[F] Total return on equity to investor who purchased, held, and sold stock as described above,
assuming Value Line projections of Dividends and Book Value are correct and
assuming Stock Price grows at same rate as Book Value.
DCF result is an Internal Rate of Return computation made using the "IRR" function built into Microsoft Excel
based on projected cash flows from 2020 to 2024.

COMMON SHARES OUTSTANDING AND EXTERNAL FINANCING RATE
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
		Common Stock Outstanding (Millions of Shares)								Annual Growth Rate		
		2015	2016	2017	2018	2019	2020	2021	2024	2015-19	2019-24	2015-24
		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[B]	[B]	[B]
ATMOS ENERGY CORP.	ATO	101.5	103.9	106.1	111.3	119.3	124.0	130.0	145.0	4.14%	3.97%	4.04%
CHESAPEAKE UTIL.	CPK	15.3	16.3	16.3	16.4	16.4	17.5	18.0	20.0	1.80%	4.05%	3.04%
NISOURCE INC.	NI	319.1	323.2	337.0	372.4	382.1	383.0	384.0	385.0	4.61%	0.15%	2.11%
NEW JERSEY RES.	NJR	85.2	85.9	86.3	87.7	89.3	96.0	97.0	100.0	1.20%	2.28%	1.80%
N. W. NATURAL	NWN	27.4	28.6	28.7	28.9	30.5	31.0	31.0	32.0	2.66%	0.98%	1.73%
ONE GAS, INC.	OGS	52.3	52.3	52.3	52.6	52.8	53.0	53.5	55.0	0.24%	0.83%	0.57%
SOUTH JERSEY INDS.	SJI	71.0	79.5	79.6	85.5	92.4	101.0	103.0	110.0	6.82%	3.55%	4.99%
SPIRE INC.	SR	43.4	45.7	48.3	50.7	51.0	52.0	52.5	55.0	4.13%	1.53%	2.68%
SOUTHWEST GAS	SWX	47.4	47.5	48.1	53.0	55.0	57.0	59.0	65.0	3.80%	3.39%	3.58%
UGI CORP.	UGI	173.1	173.2	174.0	174.1	209.0	210.0	210.0	210.0	4.82%	0.09%	2.17%
Maximum		319.1	323.2	337.0	372.4	382.1	383.0	384.0	385.0	6.82%	4.05%	4.99%
Minimum		15.3	16.3	16.3	16.4	16.4	17.5	18.0	20.0	0.24%	0.09%	0.57%
Median		61.6	65.9	65.9	69.3	72.2	76.5	78.0	82.5	3.96%	1.91%	2.42%
Average		93.6	95.6	97.7	103.3	109.8	112.5	113.8	117.7	3.42%	2.08%	2.67%
								Sustainable Growth [C]				**2.67%**

Sources:
[A] Value Line: Most current data available at time of schedule preparation.
[B] Annualized Growth Rate calculation.
[C] Estimated Sustainable Growth in Common Stock based on analysis of historical and projected growth rates.

CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY

WEIGHTED - All Inputs Weighted From October to December 2020

Gas Proxy Group

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	Forward Beta	Hybrid Beta	Forward Beta
Risk-Free Rate	0.09%	0.09%	1.63%	1.63%
Beta	0.64	0.62	0.64	0.62
Risk Premium	10.59%	10.59%	9.05%	9.05%
CAPM (Weighted)	6.88%	6.61%	7.43%	7.20%

CAPITAL ASSET PRICING MODEL (CAPM) - RISK-FREE RATE

Spot (Dec. 31, 2020)	
3-Month Treasury Bill	0.09%
30-Year Treasury Bond	1.65%
3-Mo. Weighted Average (Oct. to Dec. 2020)	
3-Month Treasury Bill	0.09%
30-Year Treasury Bond	1.63%

Source: www.treasury.gov

CAPITAL ASSET PRICING MODEL (CAPM) - BETAS
(BASED ON HISTORICAL AND OPTION-IMPLIED RETURNS)
Gas Proxy Group

Betas	09/29/2020	10/06/2020	10/13/2020	10/20/2020	10/27/2020	11/03/2020	11/10/2020	11/17/2020	11/24/2020	12/01/2020	12/08/2020	12/15/2020	12/22/2020	12/29/2020	Average	Time Avg.
Forward (6 months)	0.65	0.29	0.31	0.38	0.60	0.53	0.75	0.74	0.66	0.61	0.57	0.61	0.64	0.72	0.576	0.615
Historical (6 months)	0.83	0.72	0.69	0.60	0.53	0.52	0.67	0.64	0.63	0.61	0.52	0.49	0.54	0.54	0.610	0.572
Historical (2 yrs)	0.77	0.77	0.77	0.77	0.77	0.77	0.80	0.80	0.80	0.81	0.80	0.79	0.80	0.80	0.789	0.796
Historical (5 yrs)	0.71	0.71	0.71	0.71	0.70	0.70	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.709	0.710
Weighting																
Forward (6 months)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%		
Historical (6 months)	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%		
Historical (2 yrs)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%		
Historical (5 yrs)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%		
Hybrid Beta (Forward & Historical)	**0.72**	**0.51**	**0.52**	**0.52**	**0.62**	**0.58**	**0.74**	**0.72**	**0.68**	**0.65**	**0.61**	**0.62**	**0.64**	**0.69**	0.630	0.641
Slope	15%															
Points	0.00	1.00	1.15	1.32	1.52	1.75	2.01	2.31	2.66	3.06	3.52	4.05	4.65	5.35		
Time Weight	0.0%	2.9%	3.3%	3.8%	4.4%	5.1%	5.9%	6.7%	7.7%	8.9%	10.2%	11.8%	13.5%	15.6%		

CAPM Betas	Spot (Dec 29, 2020)	Weighted (Oct - Dec 2020)
Forward	0.72	0.62
Hybrid	0.69	0.64

Note: Historical betas are calculated on Tuesdays, following Value Line's methodology. Forward (option-implied) betas are also calculated on Tuesdays for the sake of compatibility.

CAPITAL ASSET PRICING MODEL (CAPM) - MARKET RISK PREMIUM

WEIGHTED - All Inputs Weighted From October to December 2020

Cumulative Probability	50.00%	
S&P 500 Option-Implied Growth Rate	9.03%	
S&P 500 Dividend Yield	1.64%	
S&P 500 Market Return	10.68%	
	3-Month Treasury Bill	**30-Year Treasury Bond**
Risk-Free Rate	0.09%	1.63%
Option-Implied Market Risk Premium (Weighted)	10.59%	9.05%

CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY

SPOT - All Inputs Based on Last Available Data as of December 31, 2020

Gas Proxy Group

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	Forward Beta	Hybrid Beta	Forward Beta
Risk-Free Rate	0.09%	0.09%	1.65%	1.65%
Beta	0.69	0.72	0.69	0.72
Risk Premium	10.13%	10.13%	8.57%	8.57%
CAPM (Spot)	7.05%	7.36%	7.53%	7.80%

CAPITAL ASSET PRICING MODEL (CAPM) - MARKET RISK PREMIUM

SPOT - All Inputs Based on Last Available Data as of December 31, 2020

Cumulative Probability	50.00%	
S&P 500 Option-Implied Growth Rate	8.65%	
S&P 500 Dividend Yield	1.57%	
S&P 500 Market Return	10.22%	
	3-Month Treasury Bill	**30-Year Treasury Bond**
Risk-Free Rate	0.09%	1.65%
Option-Implied Market Risk Premium (Spot)	10.13%	8.57%

MARKET TO BOOK RATIO AND DIVIDEND YIELD
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
		Book Value per Share															
		Actual				Estimated			Market Price			Mkt. to Book Ratio		Dividend Rate		Dividend Yield	
		12/31/16	12/31/17	12/31/18	12/31/19	12/31/19	12/31/20	12/31/20	12/31/20	LTM High	LTM Low	12/31/20	LTM Avg.	MRQ	Annual	12/31/20	LTM Avg.
		[A]	[A]	[A]	[A]	[B]	[B]	[A]	[C]	[C]	[C]	[D]	[D]	[A]	[E]	[F]	[F]
ATMOS ENERGY CORP.	ATO	$33.32	$36.74	$42.87	$48.18	$48.18	$54.80	$54.80	$95.43	$121.08	$77.92	1.74	1.93	$0.625	$2.500	2.62%	2.51%
CHESAPEAKE UTIL.	CPK	$27.36	$29.75	$31.65	$34.23	$34.23	$36.75	$36.75	$108.21	$111.40	$69.47	2.94	2.55	$0.440	$1.760	1.63%	1.95%
NISOURCE INC.	NI	$12.60	$12.82	$13.08	$13.36	$13.36	$13.75	$13.75	$22.94	$30.46	$19.56	1.67	1.85	$0.210	$0.840	3.66%	3.36%
NEW JERSEY RES.	NJR	$13.58	$14.33	$16.18	$17.37	$17.37	$20.50	$20.50	$35.55	$44.76	$21.14	1.73	1.74	$0.333	$1.330	3.74%	4.04%
N. W. NATURAL	NWN	$29.71	$25.85	$26.41	$28.42	$28.42	$29.70	$29.70	$45.99	$77.26	$42.33	1.55	2.06	$0.480	$1.920	4.17%	3.21%
ONE GAS, INC.	OGS	$36.12	$37.47	$38.86	$40.35	$40.35	$42.70	$42.70	$76.77	$96.97	$63.67	1.80	1.93	$0.540	$2.160	2.81%	2.69%
SOUTH JERSEY INDS.	SJI	$16.22	$14.99	$14.82	$15.41	$15.41	$16.60	$16.60	$21.55	$33.43	$18.24	1.30	1.61	$0.295	$1.180	5.48%	4.57%
SPIRE INC.	SR	$38.73	$41.26	$44.51	$45.14	$45.14	$48.50	$48.50	$64.04	$87.96	$50.58	1.32	1.48	$0.623	$2.490	3.89%	3.59%
SOUTHWEST GAS	SWX	$35.03	$37.74	$42.47	$45.56	$45.56	$47.80	$47.80	$60.75	$81.62	$45.68	1.27	1.36	$0.570	$2.280	3.75%	3.58%
UGI CORP.	UGI	$16.46	$18.18	$21.14	$18.27	$18.27	$19.65	$19.65	$34.96	$45.34	$21.75	1.78	1.77	$0.330	$1.320	3.78%	3.94%
Maximum		$38.73	$41.26	$44.51	$48.18	$48.18	$54.80	$54.80	$108.21	$121.08	$77.92	2.94	2.55	$0.625	$2.500	5.48%	4.57%
Minimum		$12.60	$12.82	$13.08	$13.36	$13.36	$13.75	$13.75	$21.55	$30.46	$18.24	1.27	1.36	$0.210	$0.840	1.63%	1.95%
Median		$28.54	$27.80	$29.03	$31.33	$31.33	$33.23	$33.23	$53.37	$79.44	$44.01	1.70	1.81	$0.460	$1.840	3.75%	3.47%
Average		$25.91	$26.91	$29.20	$30.63	$30.63	$33.08	$33.08	$56.62	$73.03	$43.03	1.71	1.83	$0.445	$1.778	3.55%	3.34%

Sources:
[A] Value Line: Most current data available at time of schedule preparation.
[B] Straight-line interpolation of Actual and Estimated VL year-end values.
[C] EOD Data: Market Data as of December 31, 2020.
[D] Market Price divided by Book Value per Share.
[E] Most Recent Quarterly Dividend multiplied by 4.
[F] Dividend Rate divided by Market Price.

EARNINGS PER SHARE AND RETURN ON EQUITY
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
		Earnings per Share				Return on Equity			
		2016	2017	2018	2019	2017	2018	2019	VL Future Exp.
		[A]	[A]	[A]	[A]	[B]	[B]	[B]	[A]
ATMOS ENERGY CORP.	ATO	$3.38	$3.60	$4.00	$4.35	10.28%	10.05%	9.56%	9.00%
CHESAPEAKE UTIL.	CPK	$2.86	$2.68	$3.45	$3.72	9.39%	11.24%	11.29%	9.00%
NISOURCE INC.	NI	$1.00	$0.39	$1.30	$1.32	3.07%	10.04%	9.98%	11.00%
NEW JERSEY RES.	NJR	$1.61	$1.73	$2.72	$1.96	12.40%	17.83%	11.68%	9.50%
N. W. NATURAL	NWN	$2.12	($1.94)	$2.33	$2.19	-6.98%	8.92%	7.99%	8.50%
ONE GAS, INC.	OGS	$2.65	$3.02	$3.25	$3.51	8.21%	8.52%	8.86%	8.50%
SOUTH JERSEY INDS.	SJI	$1.34	$1.23	$1.38	$1.12	7.88%	9.26%	7.41%	12.00%
SPIRE INC.	SR	$3.24	$3.43	$4.33	$3.52	8.58%	10.10%	7.85%	7.00%
SOUTHWEST GAS	SWX	$3.18	$3.62	$3.68	$3.94	9.95%	9.18%	8.95%	10.00%
UGI CORP.	UGI	$2.05	$2.29	$2.74	$2.28	13.22%	13.94%	11.57%	13.00%
Maximum		$3.38	$3.62	$4.33	$4.35	13.22%	17.83%	11.68%	13.00%
Minimum		$1.00	($1.94)	$1.30	$1.12	-6.98%	8.52%	7.41%	7.00%
Median		$2.39	$2.49	$3.00	$2.90	8.98%	10.04%	9.25%	9.25%
Average		$2.34	$2.01	$2.92	$2.79	7.60%	10.91%	9.52%	9.75%

Sources:
[A] Value Line: Most current data available at time of schedule preparation.
[B] Earnings per Share divded by average Book Value. Book Values shown on Schedule ALR-5, page 1.

RETURN ON EQUITY IMPLIED BY ZACKS GROWTH RATES

Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
				Annual	Analyst	Analyst-Implied		Analyst-Implied		Implied	Analyst-
		Book Value	EPS	Dividend	5 Year	Book Value before SV		Book Value Incl. SV		EPS	Implied
		12/31/19	2019	Rate	Growth Rate	12/31/2023	12/31/2024	12/31/2023	12/31/2024	2024	ROE
		[A]	[A]	[A]	[B]	[C]	[C]	[C]	[C]	[C]	[C]
ATMOS ENERGY CORP.	ATO	$48.18	$4.35	$2.500	7.10%	$56.99	$59.60	$74.55	$83.38	$6.13	7.76%
CHESAPEAKE UTIL.	CPK	$34.23	$3.72	$1.760	NA	NA	NA	NA	NA	NA	NA
NISOURCE INC.	NI	$13.36	$1.32	$0.840	5.60%	$15.56	$16.19	$15.70	$16.37	$1.73	10.81%
NEW JERSEY RES.	NJR	$17.37	$1.96	$1.330	6.00%	$20.29	$21.13	$21.77	$23.08	$2.62	11.69%
N. W. NATURAL	NWN	$28.42	$2.19	$1.920	3.10%	$29.59	$29.90	$31.07	$31.79	$2.55	8.12%
ONE GAS, INC.	OGS	$40.35	$3.51	$2.160	5.50%	$46.53	$48.30	$49.73	$52.48	$4.59	8.98%
SOUTH JERSEY INDS.	SJI	$15.41	$1.12	$1.180	24.50%	$14.98	$14.80	$16.73	$16.99	$3.35	19.87%
SPIRE INC.	SR	$45.14	$3.52	$2.490	16.50%	$51.26	$53.47	$55.20	$58.65	$7.55	13.27%
SOUTHWEST GAS	SWX	$45.56	$3.94	$2.280	5.00%	$53.07	$55.19	$62.67	$67.93	$5.03	7.70%
UGI CORP.	UGI	$18.27	$2.28	$1.320	8.00%	$22.94	$24.35	$22.94	$24.35	$3.35	14.17%
Maximum		$48.18	$4.35	$2.500	24.50%	$56.99	$59.60	$74.55	$83.38	$7.55	19.87%
Minimum		$13.36	$1.12	$0.840	3.10%	$14.98	$14.80	$15.70	$16.37	$1.73	7.70%
Median		$31.33	$2.90	$1.840	6.00%	$29.59	$29.90	$31.07	$31.79	$3.35	10.81%
Average		$30.63	$2.79	$1.778	9.03%	$34.58	$35.88	$38.93	$41.67	$4.10	11.37%

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Zacks: Data as of January 05, 2021.

[C] Analyst-Implied Book Value and Return on Equity is obtained by escalating both Dividends and Earnings per Share by the stated Analyst Growth Rate and adding Earnings and subtracting Dividends for each projected year.
"SV" = S X V, where S = rate of continuous new stock financing and V = rate of return on common equity investment.

CAPITAL STRUCTURE WITH SHORT TERM DEBT
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
		% Common Equity					($ millions)						Percentage			
		2015	2016	2017	2018	2019	Total Debt	LT Debt	ST Debt	Pfd Stock	Equity	Total Capital	LT Debt	ST Debt	Pfd Stock	Equity Ratio
		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[B]	[B]	[B]	[B]
ATMOS ENERGY CORP.	ATO	56.5%	61.3%	56.0%	65.7%	62.0%	$ 4,531.5	$ 4,531.3	$ 0.2	$ -	$ 7,393.2	$ 11,924.7	38.0%	0.0%	0.0%	62.0%
CHESAPEAKE UTIL.	CPK	70.6%	76.5%	71.1%	62.1%	56.1%	$ 752.0	$ 520.0	$ 232.0	$ -	$ 664.5	$ 1,416.5	36.7%	16.4%	0.0%	46.9%
NISOURCE INC.	NI	39.3%	40.2%	36.5%	37.9%	36.9%	$ 10,618.5	$ 9,208.9	$ 1,409.6	$ 880.0	$ 5,899.8	$ 17,398.3	52.9%	8.1%	5.1%	33.9%
NEW JERSEY RES.	NJR	56.8%	52.3%	55.4%	54.6%	50.2%	$ 2,243.6	$ 1,664.5	$ 579.1	$ -	$ 1,677.9	$ 3,921.5	42.4%	14.8%	0.0%	42.8%
N. W. NATURAL	NWN	57.5%	55.6%	52.1%	51.9%	51.8%	$ 1,178.4	$ 860.2	$ 318.2	$ -	$ 924.4	$ 2,102.8	40.9%	15.1%	0.0%	44.0%
ONE GAS, INC.	OGS	60.5%	61.3%	62.2%	61.4%	62.3%	$ 1,890.2	$ 1,582.2	$ 308.0	$ -	$ 2,614.6	$ 4,504.8	35.1%	6.8%	0.0%	58.0%
SOUTH JERSEY INDS.	SJI	50.8%	61.5%	51.5%	37.6%	40.8%	$ 3,271.4	$ 2,531.6	$ 739.8	$ -	$ 1,744.8	$ 5,016.2	50.5%	14.7%	0.0%	34.8%
SPIRE INC.	SR	47.0%	49.1%	50.0%	54.3%	55.0%	$ 2,961.3	$ 2,478.3	$ 483.0	$ 242.0	$ 3,324.8	$ 6,528.1	38.0%	7.4%	3.7%	50.9%
SOUTHWEST GAS	SWX	50.7%	51.8%	50.2%	51.7%	52.1%	$ 2,784.6	$ 2,685.7	$ 98.9	$ -	$ 2,921.2	$ 5,705.8	47.1%	1.7%	0.0%	51.2%
UGI CORP.	UGI	43.9%	43.1%	44.2%	47.0%	39.8%	$ 6,410.3	$ 5,961.4	$ 448.9	$ -	$ 3,941.3	$ 10,351.6	57.6%	4.3%	0.0%	38.1%
Maximum		70.6%	76.5%	71.1%	65.7%	62.3%	$ 10,618.5	$ 9,208.9	$ 1,409.6	$ 880.0	$ 7,393.2	$ 17,398.3	57.6%	16.4%	5.1%	62.0%
Minimum		39.3%	40.2%	36.5%	37.6%	36.9%	$ 752.0	$ 520.0	$ 0.2	$ -	$ 664.5	$ 1,416.5	35.1%	0.0%	0.0%	33.9%
Median		53.7%	54.0%	51.8%	53.1%	52.0%	$ 2,873.0	$ 2,505.0	$ 383.6	$ -	$ 2,767.9	$ 5,361.0	41.7%	7.8%	0.0%	45.4%
Average		53.4%	55.3%	52.9%	52.4%	50.7%	$ 3,664.2	$ 3,202.4	$ 461.8	$ 112.2	$ 3,110.6	$ 6,887.0	43.9%	8.9%	0.9%	**46.3%**

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Percentage calculated on Total Capital including Short Term Debt.

CAPITAL STRUCTURE WITHOUT SHORT TERM DEBT
Gas Proxy Group

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
		% Common Equity					($ millions)						Percentage			
		2015	2016	2017	2018	2019	Total Debt	LT Debt	ST Debt	Pfd Stock	Equity	Total Capital	LT Debt	ST Debt	Pfd Stock	Equity Ratio
		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[B]	[A]	[A]	[A]	[B]	[B]	[B]	[B]
ATMOS ENERGY CORP.	ATO	56.5%	61.3%	56.0%	65.7%	62.0%	$ 4,531.5	$ 4,531.3		$ -	$ 7,393.2	$ 11,924.5	38.0%	0.0%	0.0%	62.0%
CHESAPEAKE UTIL.	CPK	70.6%	76.5%	71.1%	62.1%	56.1%	$ 752.0	$ 520.0		$ -	$ 664.5	$ 1,184.5	43.9%	0.0%	0.0%	56.1%
NISOURCE INC.	NI	39.3%	40.2%	36.5%	37.9%	36.9%	$ 10,618.5	$ 9,208.9		$ 880.0	$ 5,899.8	$ 15,988.7	57.6%	0.0%	5.5%	36.9%
NEW JERSEY RES.	NJR	56.8%	52.3%	55.4%	54.6%	50.2%	$ 2,243.6	$ 1,664.5		$ -	$ 1,677.9	$ 3,342.4	49.8%	0.0%	0.0%	50.2%
N. W. NATURAL	NWN	57.5%	55.6%	52.1%	51.9%	51.8%	$ 1,178.4	$ 860.2		$ -	$ 924.4	$ 1,784.6	48.2%	0.0%	0.0%	51.8%
ONE GAS, INC.	OGS	60.5%	61.3%	62.2%	61.4%	62.3%	$ 1,890.2	$ 1,582.2		$ -	$ 2,614.6	$ 4,196.8	37.7%	0.0%	0.0%	62.3%
SOUTH JERSEY INDS.	SJI	50.8%	61.5%	51.5%	37.6%	40.8%	$ 3,271.4	$ 2,531.6		$ -	$ 1,744.8	$ 4,276.4	59.2%	0.0%	0.0%	40.8%
SPIRE INC.	SR	47.0%	49.1%	50.0%	54.3%	55.0%	$ 2,961.3	$ 2,478.3		$ 242.0	$ 3,324.8	$ 6,045.1	41.0%	0.0%	4.0%	55.0%
SOUTHWEST GAS	SWX	50.7%	51.8%	50.2%	51.7%	52.1%	$ 2,784.6	$ 2,685.7		$ -	$ 2,921.2	$ 5,606.9	47.9%	0.0%	0.0%	52.1%
UGI CORP.	UGI	43.9%	43.1%	44.2%	47.0%	39.8%	$ 6,410.3	$ 5,961.4		$ -	$ 3,941.3	$ 9,902.7	60.2%	0.0%	0.0%	39.8%
Maximum		70.6%	76.5%	71.1%	65.7%	62.3%	$ 10,618.5	$ 9,208.9		$ 880.0	$ 7,393.2	$ 15,988.7	60.2%	0.0%	5.5%	62.3%
Minimum		39.3%	40.2%	36.5%	37.6%	36.9%	$ 752.0	$ 520.0		$ -	$ 664.5	$ 1,184.5	37.7%	0.0%	0.0%	36.9%
Median		53.7%	54.0%	51.8%	53.1%	52.0%	$ 2,873.0	$ 2,505.0		$ -	$ 2,767.9	$ 4,941.6	48.1%	0.0%	0.0%	52.0%
Average		53.4%	55.3%	52.9%	52.4%	50.7%	$ 3,664.2	$ 3,202.4		$ 112.2	$ 3,110.6	$ 6,425.3	48.3%	0.0%	1.0%	**50.7%**

Sources:

[A] Value Line: Most current data available at time of schedule preparation.

[B] Percentage calculated on Total Capital excluding Short Term Debt.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Montana-Dakota Utilities Co.
2020 Natural Gas Rate Increase
Application

Case No. PU-20-379

VERIFICATION

STATE OF ___Connecticut_____)
) ss.
COUNTY OF __Fairfield_____)

Aaron L. Rothschild, being first duly sworn on oath, deposes and states that he has read the testimony and exhibits submitted in the above captioned matters under his name, that they were prepared by him or under his direction, that he knows the contents thereof, and that the same are true and correct to the best of his knowledge and belief.

Aaron L. Rothschild
Aaron L. Rothschild

Subscribed and sworn to before me this 15th day of January 2021.

Linda M. Rothschild
Notary Public
My Commission Expires: 5/31/22

Subscribed and Sworn to before me, a Notary Public, in and for County of Fairfield and State of Connecticut, this 15th day of January 2021

Linda M Rothschild
Notary Public

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Montana-Dakota Utilities Co.
2020 Natural Gas Rate Increase
Application

Case No. PU-20-[illegible]

VERIFICATION

STATE OF __Connecticut________)
) ss.
COUNTY OF __Fairfield________)

Aaron L. Rothschild, being first duly sworn on oath, deposes and states that he has read the testimony and exhibits submitted in the above captioned matters under his name; that they were prepared by him or under his direction; that he knows the contents thereof; and that the same are true and correct to the best of his knowledge and belief.

Aaron L. Rothschild

Subscribed and sworn to before me this 12th day of January, 2021.

Notary Public
My Commission Expires: