STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. 22-0175-TF

Tariff filing of Green Mountain Power requesting a 2.34% increase in base rates effective on bills rendered on or after October 1, 2022

Case No. 21-3707-PET

Petition of Green Mountain Power Corporation for approval of a Multi-Year Rate Plan (MYRP) pursuant to 30 V.S.A. Sections 209, 218, and 218d

PREFILED DIRECT TESTIMONY OF ZHEN ZHU ON BEHALF OF THE VERMONT DEPARTMENT OF PUBLIC SERVICE

April 20, 2022

Summary: Mr. Zhu discusses in detail Green Mountain Power's ("GMP") proposed cost of capital in this proceeding and, in particular, the proposed return on equity. Mr. Zhu maintains that GMP's cost of capital and return on equity proposals are just and reasonable.

Mr. Zhu Sponsors the Following Exhibits:

Exhibit PSD-ZZ-1	Professional Resume of Dr. Zhen Zhu
Exhibit PSD-ZZ-2	Long-Term and Short-Term Interest Rates
Exhibit PSD-ZZ-3	Capital Structure
Exhibit PSD-ZZ-4	IBES Growth Rate and DCF Model
Exhibit PSD-ZZ-5	Nominal GDP Growth
Exhibit PSD-ZZ-6	Market Risk Premium
Exhibit PSD-ZZ-7	CAPM Model
Exhibit PSD-ZZ-8	The Risk Premium Model

Q1. Please state your name, position, and business address.

A1. My name is Zhen Zhu. I am a Managing Consultant. My business address is 5555 North Grand Blvd., Oklahoma City, Oklahoma 73112.

Q2. By whom are you employed?

A2. I am employed by C. H. Guernsey & Company. I am also the Dr. Michael Metzger Chair Professor of Economics at the University of Central Oklahoma.

Q3. What is your educational background?

A3. I have a B.A. in Business Administration from Renmin University in China, an M.A. in Economics from Bowling Green State University, and a Ph.D. in Economics from the University of Michigan.

Q4. Please describe your professional background.

A4. From 2000 to present, I have been an Economist, Consultant, Senior Consultant and Managing Consultant with C.H. Guernsey & Company. From 1994 to 2000, I was an Assistant Professor of Economics at the University of Oklahoma. From 2000 to present, I have been an Assistant Professor, Associate Professor, Department Chairperson, and the Dr. Michael Metzger Chair Professor of Economics at the University of Central Oklahoma. I have performed many academic and applied studies of the energy market and of regulatory policy, along with studies of international financial markets and commodity markets. Please refer to **Exhibit PSD-ZZ-1** for a list of my more recent publications and studies.

Q5. What is your regulatory experience?

A5. As a consultant, I have performed a variety of research studies and provided direct testimony, support, and engagement in many projects related to gas and electric utility regulatory matters. I have provided support and testimony in gas and electric cost of capital cases. I have also provided testimonies on issues related to Integrated Resource Planning, natural gas prices, and load forecasts before a number of regulatory bodies.

Q6. Before what regulatory authorities have you testified as an expert witness?

A6. I have testified before the Michigan Public Service Commission, Georgia Public Service Commission, Oklahoma Corporation Commission, and South Carolina Public Service Commission. I also testified before the Vermont Public Utility Commission ("Commission") in the area of cost of capital on the rate case of Vermont Gas Systems, Inc. ("VGS") in 2021. I testified on behalf of the Vermont Department of Public Service ("Department").

Q7. What is the nature of your testimony in this case and on behalf of whom you are testifying?

A7. Green Mountain Power ("GMP" or the "Company") is an electric utility in the State of Vermont that is subject to the regulatory and rate setting authority of the Commission. GMP, a subsidiary of Northern New England Energy Corporation ("NNEEC"), filed a rate case for a FY23 base rate change of 2.34%, to be effective October 1, 2022. In addition, GMP is applying for approval of its new Multi-Year Regulation Plan ("MYRP") pursuant to 30 V.S.A. §§ 209,

218, and 218d. Included in the rate filing, the Company is requesting a ROE of 8.57% with an equity ratio of 50%.

The Company's ROE is determined by an automatic adjustment method or an indexation method. GMP's ROE for the prior FY21 was 8.2% based on the automatic adjustment formula that is tied to the 10-year Treasury Bond ("T-Bond") yield change. Specifically, the formula determines the ROE by adding to the base ROE one half of the change in the T-bond yield.

In addition, GMP provided a prefiled ROE testimony by its cost of capital witness Ms. Julie F. Lieberman. Ms. Lieberman provided the analyses of ROE under the current market conditions and suggested that both the 8.2% ROE for FY21 and the most recently updated ROE of 8.57% for FY22 are lower than her ROE recommendations. Ms. Lieberman concluded that GMP could rebase its ROE formula at the updated ROE of 10.25%. However, GMP is willing to hold the ROE at the level of 8.57% under the assumption that it will continue to operate under the MYRP in FY23 and going forward.

I was asked by the Department to provide an independent evaluation of the cost of capital in this case, in particular, the ROE as determined under the indexation method. As the Company's ROE was obtained through a non-conventional method, I was asked to evaluate the market required return for GMP employing conventional methodologies. In addition, I was asked to provide an assessment of the ROE determination as analyzed by Ms. Lieberman in her direct testimony.

Q8. Please describe the organization of your testimony.

A8. First, I describe the standard in setting the cost of capital and the general principles in calculating the cost of the capital. I also examine the current state of the economy and capital markets because economic and capital market conditions set a global environment for firms to operate, thus influencing the value of cost of capital. I then describe the capital structure and cost of debt of the Company. I provide evidence to support my recommendations regarding capital structure. Next, I detail the calculation of the cost of equity by using several generally accepted methodologies. Specifically, I calculate the Company's cost of equity by applying a Constant Growth Discounted Cash Flow ("DCF") model and Capital Asset Pricing Model ("CAPM") to a group of proxy companies. I also provide a form of risk premium ("RP") analysis using the past authorized ROE and interest rate. After carrying out these calculations, I provide my summary evaluations regarding the Company's cost of capital and comment on the 8.57% ROE as requested by the Company. In the last part of my testimony, I provide a critical assessment of Ms. Lieberman's methodologies and her ROE results.

Q9. Please summarize how you developed your return on equity recommendation for GMP.

A9. I reviewed the Company's financial conditions including the cost of debt and capital structure. I calculated the cost of equity for a group of comparable companies based on several different models. The models I used include a Constant Growth DCF model. I used a two-step methodology that considers a long-term Earnings Per Share ("EPS") growth rate as represented by Gross Domestic Product ("GDP") growth rate. In addition, I calculated the required cost of capital based on the CAPM model. In applying the CAPM model, I used a measure of market

risk premium obtained by applying a two-step forward-looking DCF model to companies in the S&P 500 market index to generate expected market return, and then subtracting interest rate from the expected market return. Then I obtained the ROE by adding a long-term interest rate to the adjusted risk premium which is the product of company's beta and market risk premium. Finally, I used a form of bond yield plus RP model to produce another measurement of ROE to support my cost of capital recommendation.

Q10. Please describe how you assessed the methodologies and results of Ms. Lieberman's ROE analysis.

A10. Ms. Lieberman employed several models including constant and multi-stage DCF models, CAPM models with historical and forward-looking market RPs, and a RP model based on the historical relationship between RP (as measured by the difference between authorized ROE and long-term interest rate) and the interest rate. I will point out the major differences in her and my methodologies and provide arguments why some of her assumptions are not valid thus leading to upward-biased ROE estimates.

Q11. Please summarize your testimony and recommendations.

A11. The Company proposal of 8.57% ROE was based on an automatic adjustment method indexed to an interest rate. My calculations, based on sound economic principles, indicate that the Company's required cost of equity, or the opportunity cost of equity, is in the range of 8.36% to 9.01%, with an average mean value of 8.65%, an average median of 8.69%, and the midpoint of 8.1%. Considering that GMP is a lower risk company compared to the majority of the utilities

in the proxy group, the required return on ROE for GMP should be lower than these central tendency values. In this sense, my calculations suggest that the Company's requested ROE of 8.57% is very close to the numbers generated from economic models applied to the current market conditions, thus in my opinion, an ROE of 8.57% is just and reasonable and I recommend the Commission to accept the 8.57% ROE as proposed by GMP.

My calculations show that the reasonable ROE for GMP is lower than the 10.25% ROE suggested by Ms. Lieberman. There are many issues in Ms. Lieberman's modeling including the inappropriate use of one-step DCF model, the use of forecasted interest rate instead of actual interest rate, an inappropriately calculated market risk premium, the use of high value of beta, in addition to other issues. I will deal with each of these in the last part of this testimony.

Table 1: ROE Estimation Summary

	DCF	CAPM	RP	Average
Min	5.54%	7.20%		6.37%
Max	10.30%	9.36%		9.83%
Median	8.88%	8.49%		8.69%
Average	8.59%	8.36%	9.01%	8.65%
Midpoint	7.92%	8.28%		8.10%

The Company's long-term debt cost ranges from 1.99% to 6.83% with a weighted average cost of long-term debt of 4.52%, according to the Company filing. In addition, the Company's short-term loan carries a cost of 0.85%. With the long-term debt accounting for a total of 43.20% and short-term debt accounting for 6.82% of the total capital. The weighted average cost of the debt is 4.02%. I accept these embedded costs of debt.

The Company also requested a capital structure of 50% equity and 50% debt based on the actual equity-debt structure of 49.98 equity and 50.02% debt. Based on my analysis of capital structure of comparable companies, I recommend accepting the Company's proposed capital structure. Therefore, given the capital structure, cost of debts, and cost of equity, my recommended overall cost of capital is 6.30%, the same as the Company has proposed. Table 2 below shows the summary of recommended overall cost of capital.

Table 2: Overall Cost of Capital

	Ratio	Cost	Weighted Average Cost of Capital
Debt	50.00%	4.02%	2.01%
Equity	50.00%	8.57%	4.29%
Total	100%		6.30%

Q12. Are you sponsoring any exhibits?

A12. Yes, I am sponsoring the following exhibits:

Exhibit PSD-ZZ-1: Dr. Zhen Zhu's resume

Exhibit PSD-ZZ-2: Long-term and short-term interest rates

Exhibit PSD-ZZ-3: Capital structure

Exhibit PSD-ZZ-4: IBES earnings growth estimate and DCF model

Exhibit PSD-ZZ-5: Nominal GDP growth

Exhibit PSD-ZZ-6: Market risk premium

Exhibit PSD-ZZ-7: CAPM model

Exhibit PSD-ZZ-8: Risk premium model

Q13. Did you or someone under your direct supervision prepare these exhibits?

A13. Yes.

II. REGULATORY STANDARD AND METHODOLOGY OF THE ANALYSIS

Q14. What is the purpose of establishing a rate of return when setting a utility's rates?

A14. The purpose of a rate of return, also commonly called "cost of capital" or "opportunity cost of capital," is to compensate investors who have committed capital to finance the plant and equipment necessary for utility service to customers. Investors commit these funds in anticipation of earning a return on their investment that is consistent with that of other investment alternatives with comparable risks. This regulatory standard is well-recognized and was addressed by the U.S. Supreme Court in the cases of *Bluefield Water Works & Improvement Co.* (1923) and *Hope Natural Gas Co.* (1944). It provides the utility an opportunity to earn a rate of return sufficient to: (1) fairly compensate capital currently invested in the utility; (2) enable the utility to attract new capital on reasonable terms; and (3) maintain the utility's financial integrity.

Q15. How does the Commission recognize this principle?

A15. The Commission has repetitively cited the Bluefield and Hope standards in various proceedings. For example, the Commission stated, citing the Bluefield:[1]

[1] Final Order, Investigation into Green Mountain Power Corporation's tariff filing requesting an overall rate decrease in the amount of 0.03%, to take effect October 1, 2014, and Petition of Green Mountain Power Corporation for approval of an Alternative Regulation Plan, pursuant to 30 V.S.A. § 218d., Case Nos: 8190 and 8191, August 25, 2014.

The basic standard for an appropriate rate of ROE is as follows:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties." Bluefield Water Works & Improvement Co. v. Public Serv. Comm'n, 262 U.S. 679, 692-93 (1923). See also Duquesne Light Company v. Barasch, 488 U.S. 299, 310 (1989).
>
> These principles have been incorporated into Vermont statute and have been endorsed repeatedly by the Vermont Supreme Court.

The Commission fully realizes the importance of balancing the interests of investors and customers.

Q16. Does the regulatory standard include guidelines on setting a company's rates?

A16. Yes. Utilities are a natural monopoly. If left unregulated, companies in the utility industry have every incentive to charge customers prices that maximize the company's profit. The amount of product that a utility would provide to the customers would be at a level that is lower than socially optimum, and the price will be higher than the price level of a perfectly competitive industry. Thus, utility firms are typically regulated by jurisdictional authorities. The jurisdictional authorities set rules to make sure that customers will be able to obtain services at reasonable rates and customers will not be charged too high a price. In the meantime, utilities would still earn a fair return for their investors, and they can make investments for the long-term benefit of the consumers. Standards have been set from these guidelines:

1. The most important factor in determining the required ROE of a utility is risk. Utilities face smaller degrees of risk compared to most other businesses; a utility's return, therefore, should be lower than other riskier businesses.
2. Utilities should earn returns comparable to other businesses with similar degrees of risk in order to maintain their financial soundness, including maintaining their credit standing, and attracting capital for investment.

These guidelines ensure that utility customers receive adequate service at a reasonable price and companies make reasonable returns on their investment.

Q17. Is your estimation of required return based on these standards?

A17. Yes, my estimation of the required ROE is based on these standards. I recommend the Commission award a ROE based on the required market return so the Company can maintain its financial integrity. In the meantime, utility customers can obtain the service at a reasonable cost.

Q18. What analytical methodology do you employ in this case to analyze GMP's cost of capital?

A18. GMP is not an independent, publicly traded company. It is a subsidiary of NNEEC, which means that GMP's financial condition is not regularly reported to the market. However, the standard cost of capital analysis still applies – potential investors will consider the expected financial returns on an investment in comparison to the market returns on other available alternatives. GMP operates in the general economic and industry environment, thus its financial performances are also related to the overall economic and industry performances. For this

reason, my analysis was broad in scope. I studied the underlying economic environment, Federal Reserve policy, the investors' likely expectation of future returns, and the utility industry's expected returns in the current market.

Q19. How did you take market risks into account when performing the cost of capital analysis for GMP?

A19. I utilized standard DCF, CAPM, and RP methodologies to evaluate a group of comparable companies. In particular, the CAPM model and the RP model take the market risk explicitly into consideration. Financial theory suggests that investors are compensated for bearing systematic market risks, but not individual company risks. Even though it can be argued that GMP may face some unique risks, as every company does, it is the systematic market risk (such as risks associated with market-wide environmental policies, regulations, general capital market, economic conditions, etc.) GMP faces that should be taken into consideration. This risk-reward principle is the basis for the analysis of required cost of capital for the company, as in other industries. In addition, the RP methodology recognizes a relationship between interest rate and a RP based on the utilities' authorized ROE and market interest rate. I will go over the detailed methodologies in later sections.

Q20. Do you believe any of the models you used are better than the others?

A20. Economic models are theories describing the real world. The models have their underlying assumptions and focus more on specific aspects of the markets than others. As market conditions are complicated, it is difficult for any single economic/financial model to capture all aspects of the expected returns of the investors. In this sense, a combination of models gives a better measurement of the expected returns of the investors. The recent Federal Energy Regulatory Commission ("FERC") Opinion No. 569-A clearly recognizes this need to incorporate more than one model to determine the expected ROE: "We continue to find that ROE determinations should consider multiple models, both to capture the variety of models used by investors and to mitigate model risk."[2]

I agree with FERC's policy statement.

In the past, this Commission has considered the evidence on ROE presented by the use of several standard models such as DCF, CAPM, and RP models. [3]

Q21. Did you select a proxy group for the estimation of the Company's return on equity?

A21. Yes, GMP is a subsidiary of NNEEC and it is not publicly traded. A conventional approach for companies like GMP is to select a proxy group of comparable companies, which would enable a reliable analysis that avoids the potential bias associated with a small set of companies. Therefore, I have selected a group of electric utility companies that are similar to the target company, GMP.

[2] FERC Opinion N0. 569-A Order on Rehearing (Issued May 21, 2020), par 43.
[3] In the past, the Commission has considered the results obtained from various models presented by ROE witnesses representing the utilities and the Department in various cases such as Case No. 19-0513-TF, Docket Nos. 8190 and 8191, Case No. 21-0898-TF.

Q22. What criteria did you rely on to select the group of comparable companies when you performed the analysis of the cost of capital for GMP?

A22. I selected electric distribution utilities that are representative of the risk characteristics of GMP. I selected companies that are publicly traded and whose main business is electric distribution and selling to end-users. The starting list is comprised of the electric utility companies by *Value Line*. I avoided companies that were involved in merger and acquisition activities during the study period as the stocks of those companies would be evaluated by investors differently than under market conditions in the absence of the mergers and acquisitions. Analysts typically would exclude companies that had reduced or halted dividend payment and companies that have negative dividend growth projections for the DCF analysis; I used the same set of the companies for both the DCF and CAPM analysis.

Q23. Why did you use V*alue Line*-listed companies as a starting point for the selection of the comparable companies?

A23. *Value Line* represents a respected, broadly available, and specialized source of financial information. In addition, *Value Line* provides an independent source of information for the investment community because it does not have any financial interest in the companies it covers.

Q24. Please list the group of electric distribution utilities that you identified for the proxy group.

A24. I selected 22 regulated electric utilities – see Table 2. For the convenience of comparison, I have also listed the proxy group by Ms. Lieberman. Ms. Lieberman included a total of 14

companies in the group. As I will show later, the difference in the selection of the proxy group company does not lead to significant differences in the ROE estimates. The difference in my ROE results and hers is mainly due to differences in methodologies in modeling.

I also listed the bond rating of the selected companies.

Q25. Why did you provide bond credit rating information of the companies?

A25. Bond ratings provide a measurable metric that the capital market can use to evaluate the overall risks of a utility company and that bond investors utilize to assess the risks of default related to the bond investment. However, as the ratings consider all the risk factors faced by both the bond and equity investors, in my opinion, bond credit ratings provide an extremely useful information set that all investors utilize to make their investment decision. When a company is not able to generate enough income to cover debt, equity investors will need to make up the difference. When a company's bond ratings are changed unexpectedly, equity investors react to that news significantly as well, not just the bond investors. In this sense, bond credit rating is a measurement of overall risks including operating, financial and other risks that investors consider on a particular company. Utilities have different business, financial and market characteristics which pose challenges for cross-sectional comparison as no two companies are exactly the same. A sound method is to rely on a general measure of risk accepted by investors to gauge the relative degree of risks a firm faces. Bond ratings is such a broad and general measurement of the risks.

Table 2: Proxy Group Comparison

	Zhu Group		S&P Bond Rating		Lieberman Group		S&P Bond Rating
1	Allete Inc	ALE	BBB	1	Allete Inc	ALE	BBB
2	Avista Corp	AVA	BBB	2	Alliant Energy Corp	LNT	A-
3	Black Hills Corp	BKH	BBB+	3	Ameren Corp	AEE	BBB+
4	Consolidated Edison Inc	ED	A-	4	American Electric Power Company Inc	AEP	A-
5	DTE Energy Company	DTE	BBB+	5	Duke Energy Corp	DUK	BBB+
6	Duke Energy Corp	DUK	BBB+	6	Entergy Corp	ETR	BBB+
7	Edison International	EIX	BBB	7	Evergy	EVRG	A-
8	Entergy Corp	ETR	BBB+	8	Hawaiian Electric Industries Inc	HE	BBB-
9	Evergy	EVRG	A-	9	IDACORP Inc	IDA	BBB
10	Fortis Inc	FTS	A-	10	NextEra Energy	NEE	A-
11	Hawaiian Electric Industries Inc	HE	BBB-	11	Pinnacle West	PNW	BBB+
12	IDACORP Inc	IDA	BBB	12	Portland General Electric Company	POR	BBB+
13	MGE Energy Inc	MGEE	A-	13	Southern Co	SO	A-
14	NextEra Energy	NEE	A-	14	Xcel Energy Inc	XEL	A-
15	NorthWestern Corporation	NWE	BBB				
16	Otter Tail Corp	OTTR	BBB				
17	Pinnacle West	PNW	BBB+				
18	Portland General Electric Company	POR	BBB+				
19	Sempra	SRE	BBB+				
20	Southern Co	SO	A-				
21	WEC Energy Group	WEC	A-				
22	Xcel Energy Inc	XEL	A-				
	A-		8		A-		6
	BBB+		7		BBB+		5
	BBB		6		BBB		2
	BBB-		1		BBB-		1
	Total		22		Total		14

Credit ratings have been used by investors to measure risks of the companies. In addition, some agencies such as FERC formally adopt credit rating as a general measure to classify companies into different risk groups.[4]

Q26. Why did you choose the ratings by S&P Global but not others?

A26. GMP only has a credit rating by S&P, not by Moody's and/or Fitch. GMP has a rating of A-, which is an investment grade. S&P has investment grade classified as AAAA, AA, A, and BBB groups.

[4] Opinion No. 569 Order on briefs, rehearing, and initial decision (issued November 21, 2019), par. 365.

Q27. How does GMP's rating compare to the ratings of companies in the proxy group?

A27. Table 2 shows that among the 22 companies I have selected, there are 8 companies rated A-, 7 companies rated BBB+, 7 companies rated BBB or BBB-. As the degree of risks decreases when bond ratings go from BBB- to A-, GMP can be considered to be a company that has lower risks than an average company in the group. Similarly, in Ms. Lieberman's group, GMP is also a company that has risks lower than an average company.

II. THE GENERAL ECONOMIC CONDITION

Q28. Could you explain how economic conditions can affect the cost of capital of GMP at the present time?

A28. The public utility industry is characterized by large capital investment because it is capital-intensive. The most relevant economic variables to the cost of capital are interest rate and expected inflation, as both are critical factors considered by investors to set their expected returns when making investment decisions. As in standard economic theory, what matters to investors is the real return. Both the interest rate and expected inflation influence the real return on investment directly.

In the current economic environment, both interest rate (especially the short-term interest rate) and expected inflation are influenced by Federal Reserve economic policies and its accompanying actions in the financial market to achieve its set objectives, even though economic variables can be influenced to different degrees.

Q29. What are the Federal Reserve's objectives and actions in an economic cycle?

A29. In the past, at the onset of and during the recession, the Federal Reserve provided mostly short-term credit to add liquidity to the market to counteract the effect of recession. In the early period of the recovery from the 2008-2009 recession, the Federal Reserve continued its accommodative monetary policy as the unemployment level was still higher than the objective set by the Federal Reserve. For example, the Federal Reserve stated in its July 2013 Monetary Policy Report:[5]

> With unemployment still well above normal levels and inflation below its longer-run objective, the Federal Open Market Committee ("FOMC") has continued its highly accommodative monetary policy this year by maintaining its forward guidance with regard to the target for the federal funds rate and continuing its program of large-scale asset purchases.

The Federal Reserve's monetary easing has injected a large amount of liquidity to the financial market.

The Federal Reserve started to scale back its quantitative easing ("QE"), or accommodative monetary policy, due to improvement in labor market conditions in 2014. As the U.S. economy continued to cruise through expansion, the Federal Reserve has changed its policy stance from being accommodative to tightening. In 2019 however, the Federal Reserve cut interest rates three times to fend off possible slowdowns in the U.S. economy brought on by the trade wars between China and the United States.

[5] http://www.federalreserve.gov/monetarypolicy/mpr_20130717_part2.htm.

Q30. What are some of the major consequences of the Federal Reserve's recent policies since 2019?

A30. The injection of a large amount of liquidity into the financial market since 2019 has caused short-term interest rates to fall to a historically low level as during the period between 2008 and 2015. In addition, the short-term interest rates are cyclical as they respond to the Federal Reserve's monetary policy manipulations, but the long-term interest rate is significantly less so. I illustrate the changes in interest rates in ExhibitPSD-ZZ-2.

Exhibit PSD-ZZ-2 shows that the short-term interest rate, in this case the 3-month T-Bond yield, fluctuated in response to business cycle and the monetary policy change. For example, at the onset of the last recession, when the Federal Reserved adopted quantitative ease, the short-term interest rate dropped precipitously to a level that was almost zero; however, the long-term interest rate, in this case the 30-year T-Bond yield, continued its downward trend. One can hardly see the cyclical behavior in the long-term interest rate as in the short-term interest rate. However, through all its movement, a downward trend in the long-term interest rate is clearly observable. Up until 2019, the Federal Reserve started to relax its QE policy, the short-term interest rate responded by going up from almost 0.0% to over 2% before declining again as the Federal Reserve started to cut interest rates to offset the impact of Covid-19 on the U.S. economy. However, the long-term interest rate shows no obvious sign of responding to the Federal Reserve's monetary policy changes. As we can observe from Exhibit PSD-ZZ-2, the short-term interest rate dropped again to almost 0% in the beginning of 2021 while the long-term interest rate inched up and moved in the opposite direction of the short-term interest rate change.

Q31. What is the consequence of the Federal Reserve policy on inflation rate and what is the Federal Reserve's stance on inflation rate?

A31. Another possible consequence of the Federal Reserve's monetary accommodation policy is inflation. If the monetary policy does not tighten in a timely fashion in response to economic expansion, then it creates an upward pressure on inflation; however, there is no evidence of expected inflation rate change, and the market expectation of inflation is quite stable during the recovery period of last recession. For example, the Federal Reserve September 20, 2017 Statement[6] reported:

> On a 12-month basis, overall inflation and the measure excluding food and energy prices have declined this year and are running below 2 percent. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance.

The Federal Reserve continued to pursue the same set of policies towards employment and inflation. In its November 5, 2020 Press Release, the Federal Reserve Board stated[7]:

> The Committee seeks to achieve maximum employment and inflation at the rate of 2 percent over the longer run. With inflation running persistently below this longer-run goal, the Committee will aim to achieve inflation moderately above 2 percent for some time so that inflation averages 2 percent over time and longer-term inflation expectations remain well anchored at 2 percent. The Committee expects to maintain an accommodative stance of monetary policy until these outcomes are achieved.

In its April 28, 2021 Statement[8], the Federal Reserve Board reiterated the same language exactly, signaling that the policy stance of the Federal Reserve will not change and the inflation

[6] https://www.federalreserve.gov/newsevents/pressreleases/monetary20170920a.htm.
[7] https://www.federalreserve.gov/newsevents/pressreleases/monetary20201105a.htm.
[8] https://www.federalreserve.gov/newsevents/pressreleases/monetary20210428a.htm.

target is maintained at exactly the same level. Despite the fact that inflation rate has increased significantly due to supply constraints and Russian invasion of Ukraine more recently, I believe the Federal Reserve will continue to focus on maintaining employment and price level stability.

Q32. How will the consequences of the Federal Reserve's policy concern investors?

A32. Investors are concerned about their investment returns. The Federal Reserve increased the money supply to add liquidity to the financial market, but it will need to decrease the money supply in order to drain the liquidity and reduce inflation pressure. A reduction in the money supply will cause short-term interest rates to increase, as is the case for the period of late 2015 until late 2019. It is also shown in Exhibit PSD-ZZ-2. However, investors focus on long-term interest rate as investments in the utility industry are long term.

Q33. When the Federal Reserve tightens money supply and short-term interest rate increases, do the required returns for investors increase?

A33. Not necessarily. There are two kinds of interest rates in the marketplace: short-term interest rates and long-term interest rates. In the case of determining required returns for investors, it is the long-term interest rates that matter. Investors in the utility industry face long-term investment decisions rather than short-term investment decisions. In this consideration, how the short-term interest rates fare is less relevant to them.

As the Federal Reserve tightens the money supply, interest rates generally will increase; however, the Federal Reserve policies that were used to counteract business cycles are generally considered short-term policies and they mainly influence short-term interest rates. As I discussed

above, the short-term interest rates are very responsive to the Federal Reserve policy, while the long-term interest rates (such as 30-year T-Bond yield) are not responsive to the QE policy or tightening monetary policy. The opposite movements in the short-term interest rate and long-term interest rate since mid-2021 in Exhibit PSD-ZZ-2 demonstrate just that. For this reason, it is not expected that the countercyclical monetary policy will have much effect on the long-term interest rates, and thus, the required return on capital.

It is critically important to note that the long-term interest rates have been declining, irrespective of the monetary policy during the business cycles. And, again, it is the long-term interest rates that matter to investors. Therefore, the current monetary policy, or the future monetary policy that targets short-term economic fluctuations, has little effect on the required return on equity. It is erroneous to argue that an interest rate increase leads to higher required cost of capital without distinguishing between short-term interest rates and long-term interest rates.

Q34. Are there any reasons for the steady decline in the long-term interest rates in the last 40 years?

A34. Yes, many economic factors have contributed to the long-term decline of long-term interest rates. Professors and Economists Obstfeld and Tesar, in an article they wrote when they were serving on the Council of Economic Advisers under President Obama, have summarized these factors succinctly. They named the following factors whose effects on interest rates are likely to be transitory:

- Fiscal, monetary, and exchange rate policies;

- Inflation risk and the term premium; and
- Private-sector deleveraging.

They also named some factors that are likely longer-lived:

- Lower long-run growth in output and productivity;
- Shifting demographics;
- The global saving glut;
- Shortage of safe assets; and
- Tail risks and "unknown unknowns."

In conclusion, they suggest "there is no definitive answer to how long current long-term interest rates will persist and whether they will settle at levels below those previously expected. Most factors, however, suggest that long-term interest rates will be lower in the long run compared with their levels before the financial crisis."[9]

Q35. How has the Federal Reserve responded to Covid-19?

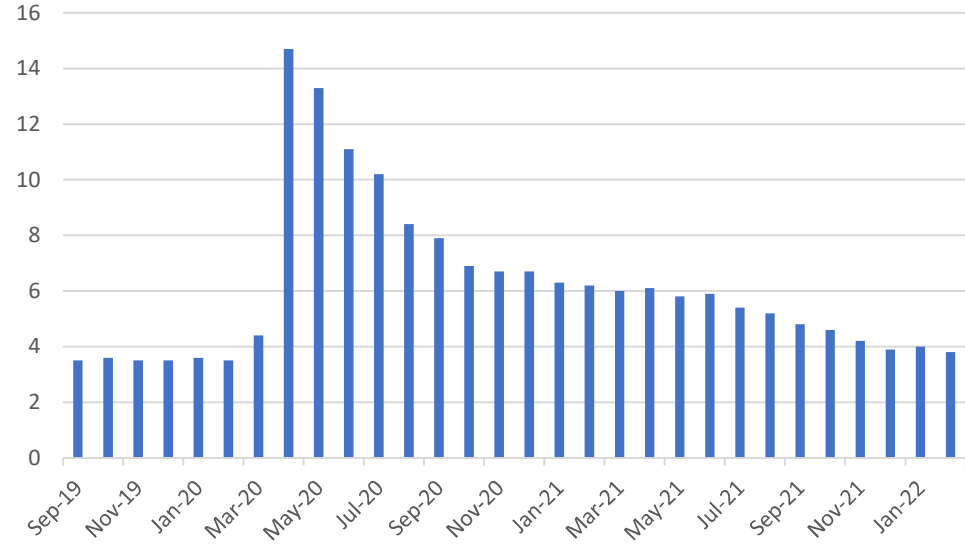
A35. Since its outbreak in Wuhan, China on December 31, 2019 and subsequent identification as the Covid-19 virus, commonly referred to as the Coronavirus, hundreds of millions people worldwide have been infected and millions of people have died unfortunately. The economic impact of the virus has been staggering as well to say the least.

The impact on the U.S. financial markets has been severe. Since all-time highs in February 2020, the Dow Jones Industrial Average, NASDAQ Composite, and S&P 500 Index

[9] Maurice Obstfeld and Linda Tesar, "The decline in long-term interest rate," whitehouse.gov, 2015. https://obamawhitehouse.archives.gov/blog/2015/07/14/decline-long-term-interest-rates.

have declined approximately 27%, 25%, and 30%, respectively. As a result, the U.S. equity markets have lost $11.5 trillion in capitalization since peaking in February 2020. In April 2020, the U.S. unemployment rate reached 14.7%, followed by gradual declines in subsequent months (see Figure 1 below). As of March 2022, the unemployment rate has declined to roughly the pre-pandemic levels, however.

Figure 1: Unemployment Rate in the U.S.



As a result of the Covid pandemic, the U.S. economy suffered significantly with steep GDP declines. The GDP declined in the second quarter of 2020 at an annual rate of 32.9% as restaurants and retailers closed their doors in a desperate effort to slow the spread of the virus. This decline was more than three times as sharp as the previous record — 10% in 1958 — and nearly four times more than the worst quarter during the Great Recession.

On March 15, 2020, and in response to the Covid-19 virus risk, the Federal Reserve Open Market Committee decided to lower the target range for the federal funds rate to 0% to 0.25%. The Committee expects to maintain this target range until it is confident that the economy has

weathered recent events and is on track to achieve its maximum employment and price stability goals.

The supply chain problems caused the shortage of supplies in many sectors of the economy. Along with the quantitative ease, the U.S. inflation rate started to increase to a 40-year high. Annual inflation rate in the U.S. increased to 7.9% in February of 2022, the highest since January of 1982. As the market was expecting the inflation to be peaking, Russian invasion of Ukraine pushed up energy prices to the highest level in several years. The geopolitical event, along with the continued supply constraint, strong demand and labor shortages are likely to continue to put upward pressure on general price level.

In faces of the higher inflation rate, the Federal Research has switched to monetary tightening with the first increase in short term rate target announced on March 16, 2022:

> The Committee seeks to achieve maximum employment and inflation at the rate of 2 percent over the longer run. With appropriate firming in the stance of monetary policy, the Committee expects inflation to return to its 2 percent objective and the labor market to remain strong. In support of these goals, the Committee decided to raise the target range for the federal funds rate to 1/4 to 1/2 percent and anticipates that ongoing increases in the target range will be appropriate. In addition, the Committee expects to begin reducing its holdings of Treasury securities and agency debt and agency mortgage-backed securities at a coming meeting.[10]

The above message suggests that the Federal Reserve still maintains its long-term objective of employment and price stability. The long-term inflation rate is still targeted at 2%. To achieve this objective, a series of increases in federal funds rate target will be needed. Even though the timing of achieving these objectives is not certain, I believe that the long-term inflation rate will be returning to a more normal level despite of the short-term pressure for

[10] https://www.federalreserve.gov/newsevents/pressreleases/monetary20220316a.htm.

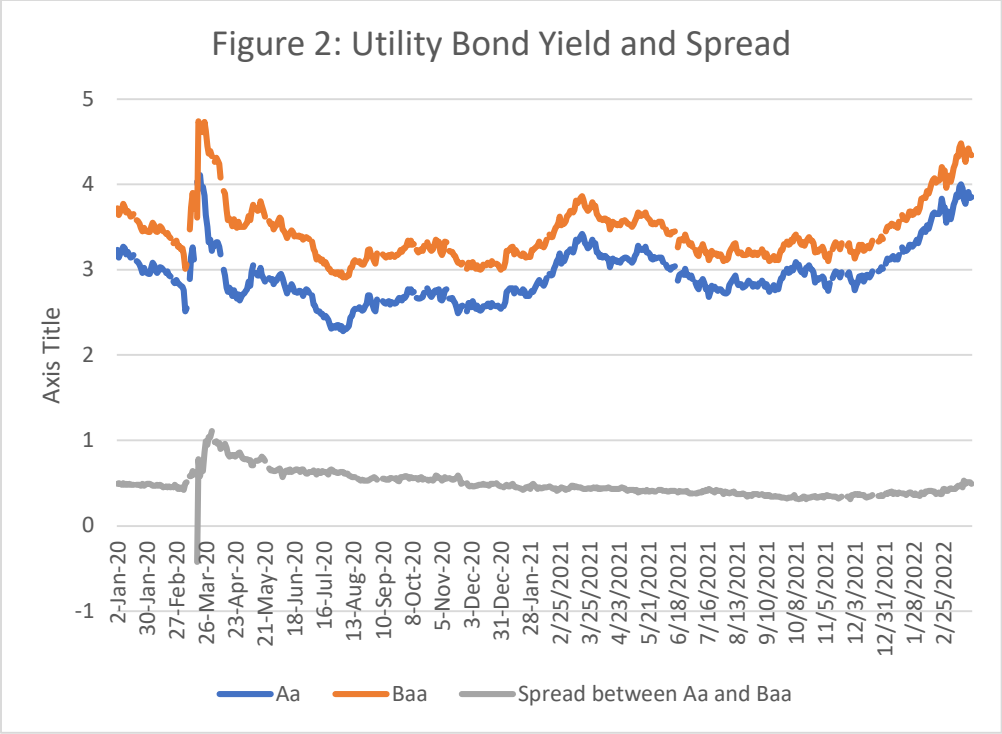
higher inflation. It appears that the investors also held this idea. Ms. Lieberman, in her testimony, agreeing with my view on long-term inflation rate, provided evidence as well that investors were expecting inflation rate to return to a more normal level in 2022 and 2023.[11]

Q36. How has Covid-19 impacted the capital market and the required returns on equity of utility companies?

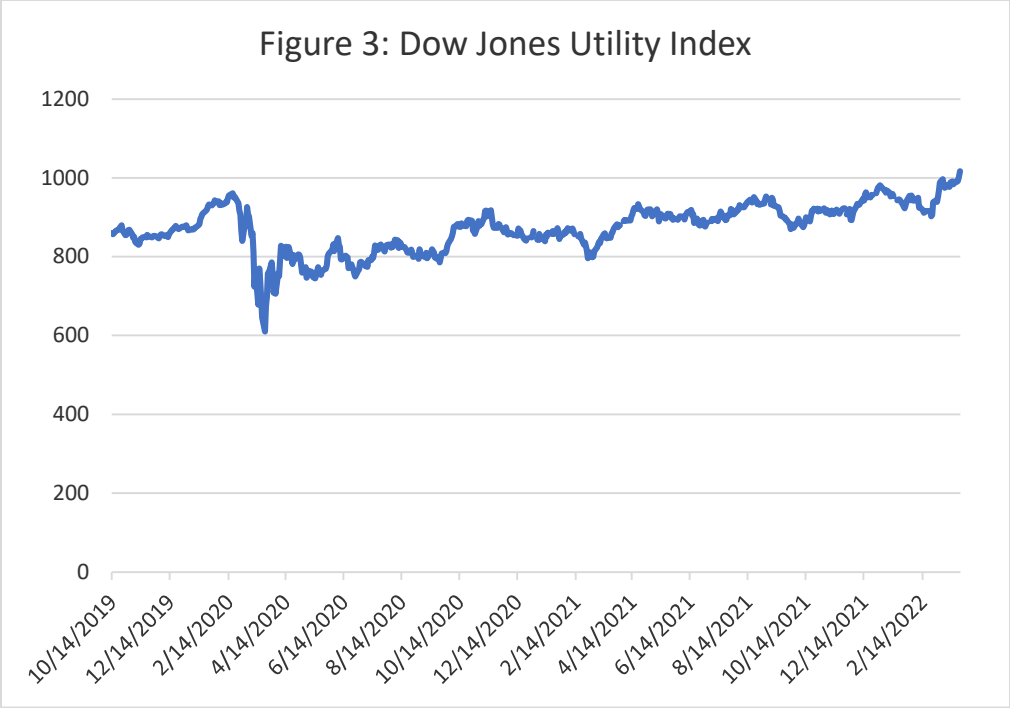
A36. The utility industry and the capital market in general have been affected significantly by the Covid-19 pandemic. There are at least several changes that have impacted the required returns on capital.

The utility bond yield and spread increased noticeably at the breakout of the pandemic. The following chart shows that both the yields and the spread increased significantly in March of 2020; however, the bond market has stabilized since as both the utility bond yield and spread have declined to the pre-pandemic levels up to the end of 2021 followed by the increase in the bond yield in more recent months (see Figure 2 below). As a matter of fact, the spread, the measure of relative risks between the bonds of different grade, has declined to a level that is slightly lower than the spread before the onset of the pandemic, signaling the recognition of a more stable market by the investors.

[11] Prefiled Direct & Supplemental Testimony of Julie F. Lieberman, first paragraph, page 20.



In addition, utility stock prices have declined and rebounded since March 2020. Figure 3 below shows the Dow Jones utility index for the last year. There was a sharp decline in utility stock prices in March of 2020, followed by volatilities in the stock prices with the index hovering around 800. This has implications concerning the dividend yield as dividend yield is a part of return on equity in the DCF model. As stock prices decline with no changes in the dividend payout, utility companies' dividend yields would increase; however, the stock prices of the utility stocks have surpassed the pre-pandemic levels as recent as March 2022. This would lead to lower dividend yields, causing the expected return to utilities equity to be lower holding everything else constant. However, as dividend yield decreases, utility stocks' earnings growth prospect usually improves. Therefore, it is premature to conclude that the investors flocking to utility stocks would lower the required ROE.

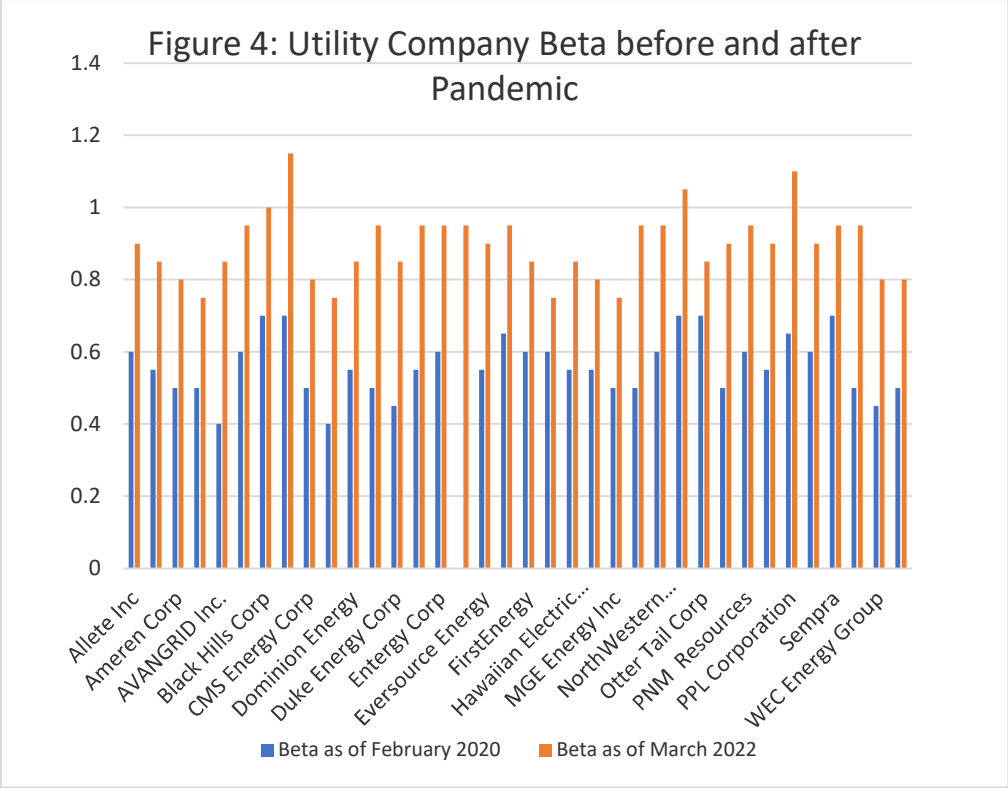


Q37. Do you think the market risks faced by the utility industry have increased as well?

A37. One measure of the utility company stock price risk is the association of its stock price fluctuation with market price movement; this is measured by the so-called beta. Figure 4 shows the beta value change for each electric utility company in *Value Line* group before and during the pandemic. The average value of beta before the pandemic was 0.56 as of February 2020 while the average value in early October 2020 was 0.86, a substantial increase in the risk of the utility stocks. The average beta value continued to stay high, and it was 0.89 as of March 2022. In my opinion, the substantial increase in these beta values is only temporary and the measured beta values will return to a more normal level after the effect of the pandemic rolls out of the five-year regression period.

Q38. Why does the increase in beta value have anything to do with the utilities' ROE?

A38: Financial theory suggests investors are compensated by bearing risks. Beta is an accepted measurement of risk. When beta values are higher during the pandemic, the ROE estimated by the CAPM model will be higher. I argue that the high beta values are temporary and will show that there is evidence to suggest that beta values will decline in a longer term. Specifically, we would expect beta values to return to normal levels when the initial effect of the pandemic dissipates.

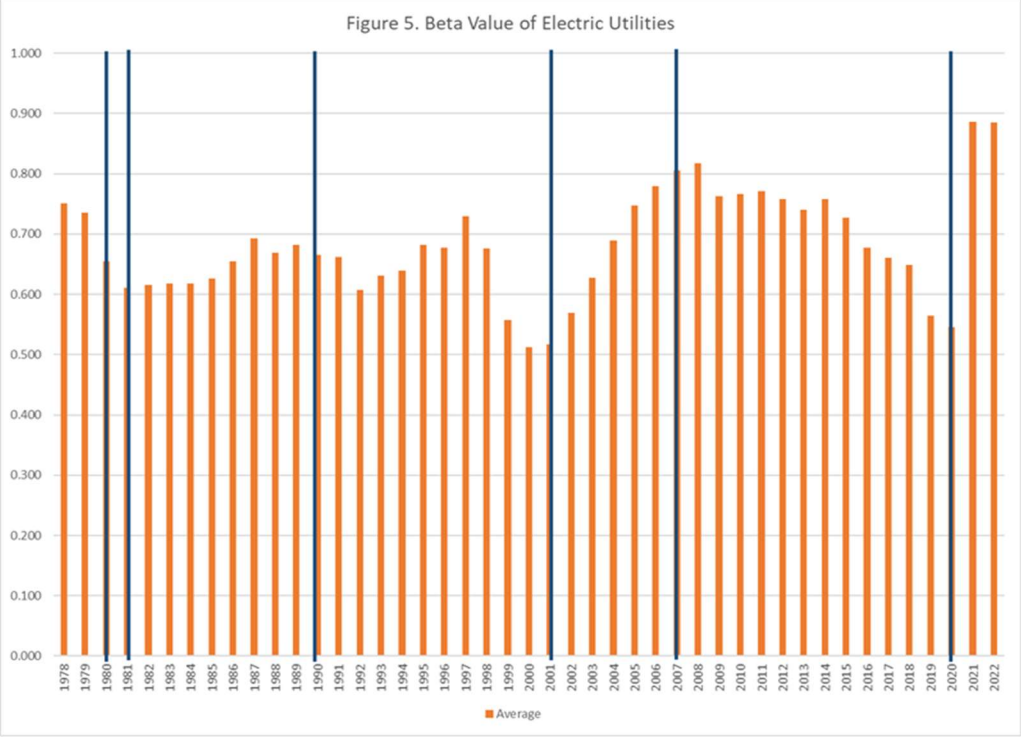


Q39. Why do you suggest that the higher beta values are temporary?

A39. The Covid-19 pandemic is an unprecedented episode in many ways. As we have shown earlier, the pandemic has increased the risks of the electric utilities as shown by the increased yield spread, and decreased stock prices of the utility firms as well as other companies in general.

We also have shown, since then, that the utility yield spread has returned to pre-pandemic levels (Figure 2) and the utility stock index has returned to roughly the pre-pandemic level as well (Figure 3). This suggests that the increased riskiness of the utility stocks should have declined. However, the average beta value of electric utility stocks today still remain elevated at about the same level in October 2020.

In Figure 5, I show that the electric utility stock beta could increase at the onset of the changing economic conditions, then it declines afterwards. For example, around the time of the 2007-2008 economic recession, electric utility beta value has increased to a new high level. However, the beta value declined during the economic recovery and when the economy returned to the normal. In comparison, the Covid pandemic was largely an unexpected event that carried a tremendously negative impact that is unseen before, which caused the beta value to increase substantially in a very short period.



Q40. How did you estimate the electric utility beta shown in Figure 5?

A40. I followed the method adopted by *Value Line* to produce the beta values for each of the companies in my proxy group. Due to the fact that several companies do not have stock prices going back to 1973, I have only included 14 electric utilities in my estimation (Allete, Avista, Black Hill, Consolidated Edison, DTE Energy, Edison International, Entergy, Evergy, Hawaiian Electric, IDAcorp, NextEra Energy, Otter Tail, Pinnacle West, and Xcel). However, as every electric utility experienced the same pattern of change in beta, these companies are representative enough to show the changes in beta values for the whole industry.

Value Line "derive(s) the Beta coefficient from a regression analysis of the relationship between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Composite Index over a period of five years."[12] To replicate the *Value Line* estimation of beta, I downloaded stock price data for the electric utilities and the NYSE Composite Index for the period of January 1, 1973 to the end of December 2021. I then calculated the weekly percentage changes of the stock prices and ran a regression of the stock returns on the composite index return. I ran the regression for a five-year period with the period ending on December 31 of each year, and I have run the regression once a year for the period of 1978 to 2021. Therefore, in my notation, the beta for 2022 is the beta value at the beginning of 2022, obtained from the regression using the sample data for the period of January 1, 2017 to December 31, 2021. The rest of the beta values were obtained the same way. Figure 5 below shows the beta values over the period of 1978 to 2022. Note the blue line indicate the beginning of each economic downturn.

[12] https://www.valueline.com/tools/educational_articles/stocks/using_beta.aspx#.YKXTlqhKhPZ.

There was a gradual increase in the beta value before 2008 followed by declines in beta values. The beta values stayed low for more than 10 years during the period of economic recovery and growth. The large spike for 2021 (covering the period of 2016 through end of 2020) captured the increase in the volatility or the risk of utility stocks.

This simple exercise produced beta values very similar to the *Value Line* beta values. Table 3 shows the average beta value from *Value Line* and the average beta value generated by my regressions using the *Value Line* approach.

Table 3: Beta by Value Line and Zhu Regression

Year Ending	Vaule Line	Zhu Regression
2019	0.56	0.55
2020	0.86	0.89
2021	0.89	0.88

Figure 5 also shows that the electric utility beta values fluctuated around an unseen mean value. This is what is called mean reversion. The average value of beta for the 44-year period including the high beta years of 2021 and 2022 is 0.68, which is consistent with the notion that utility is a low beta or low risk industry.

The high beta values for 2021 (five years data including 2016 through end of 2020, the first year of Covid pandemic) and 2022 (five-year data covering the period of 2017 to 2021) are not normal. In this regard, the Company's witness Ms. Lieberman also believes that the beta values are too high, which leads her to discount the ROE estimate generated by the CAPM model utilizing the latest beta values from *Value Line*.

In answering the discovery question DPS1.Q128, Ms. Lieberman wrote:

> Ms. Lieberman believes the level of the market risk premium and betas are above normal levels due to the pandemic and will revert to more normal levels (though may remain slightly elevated) in the next several years. As such, she has placed less weight on her CAPM analysis as it appears to be capturing somewhat transitory market information.

Ms. Lieberman is correct in stating that the current beta values are too high compared to normal levels, not representing the degree of risks faced by the utility industry correctly. Using the current values of beta will bias ROE upward, rendering the ROE estimates unreliable and excessive.

Q41. Do you have any direct evidence of current beta values being too high? Maybe the risks of the electric utilities are permanently higher due to the pandemic?

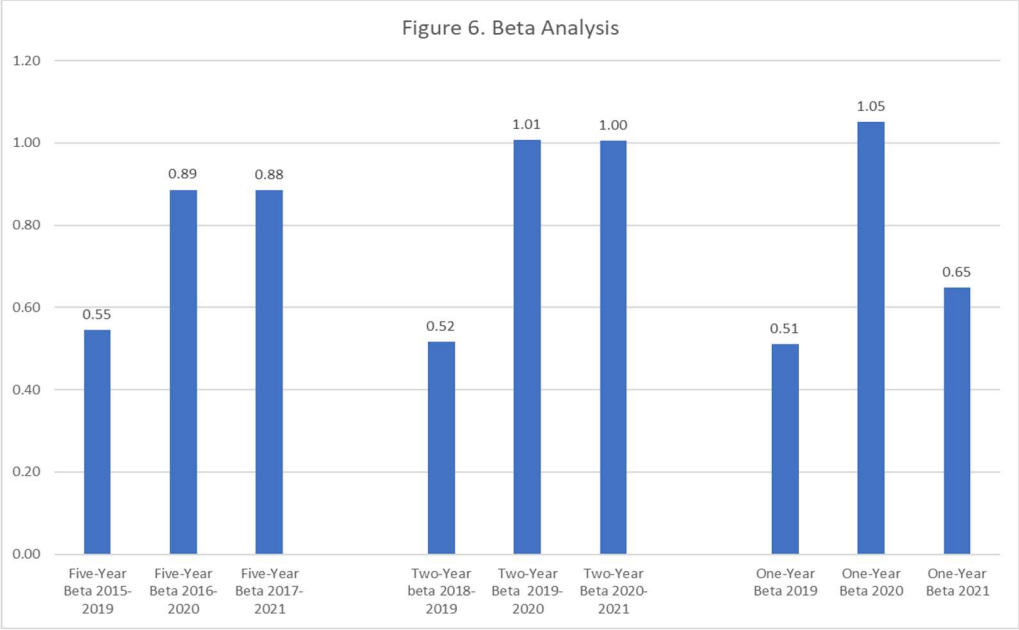
A41. I do not believe the risks of the electric utilities are permanently higher. The currently high beta is the artifact of the regression approach taken by *Value Line* or any other financial services that generate and report beta values using the same approach in regression. As I have stated earlier, the *Value Line* regression coefficient is obtained by running a 5-year regression. The inclusion of the highly volatile period of 2020 pandemic year influenced the beta estimate significantly.

Q42. How would the data from a specific time period affect the regression coefficient?

A42. Regression is a statistical method that estimates an *average* relationship between/among variables, in this case, the relationship between the stock return of a company and the stock return of a market index. Just like calculating an average value, if in a dataset there is a large value, the large value will tend to influence the average value. The large value will have a smaller influence on the average value if there is a larger number of values in the dataset. This is

usually the reason that a beta regression tends to cover a longer period (like five-year period) to mitigate the impact of any abnormal event. However, the impact of the large value on the average value will not disappear unless the large number is no longer included in the dataset.

Similarly, the pandemic in 2020 is a special event that lasted longer than just a few days. It has influenced the beta estimate very significantly in the same way as described above about the large value.



Q43. How can you show that the same thing you described about a large value above has happened to the beta estimate?

A43. I have performed regressions with different lengths of the sample period to show the impact of pandemic 2020 on the beta estimate. Figure 6 above shows the impact of inclusion of the 2020 data in each regression. The first three numbers show the beta value obtained from a five-year regression. Without the 2020 pandemic data, the beta value for period ending December 2019 is only 0.55. The beta values for years ending 2020 and 2021 increased to 0.89

and 0.88, respectively when the time period included year 2020. When I ran the two-year regressions, these three numbers became 0.52, 1.01, and 1.00. The beta values for the last two years increased significantly. The reason for that is the second set of regressions only cover a shorter period of 2 years, and the 2020 pandemic year data has a much larger impact (having a weight of ½) on the regression results compared to the five-year regression where year 2020 only carried a 1/5 weight. When I ran the one-year regression, the three numbers became 0.51, 1.05 and 0.65. The beta value for year ending 2021 dropped significantly to 0.65 when the 2020 pandemic period was not included in the regression. This suggests that the unsettling market condition of 2020 right after the breakout of the Covid virus was extremely abnormal and it distorted the normal relationship between utility stocks and the overall market represented by beta values. It showed that the market risk of the utility stocks increased substantially as the estimated beta value increased significantly. However, that increase is only transitory. Now the market has returned to a more normal condition, but the five-year regression by *Value Line* still has the 2020 data "contaminating" the regression relationship. The five-year regression instead of using a shorter period regression by *Value Line* was intended to lessen the influence of some anomalies in the data. However, in this case, it has created a very undesirable adverse effect in the presence of an extreme abnormality.

The decline in the measured one-year beta value to the level close to the pre-pandemic level reflects the market's perception of utility's ability to deal with the impact of the pandemic. Utilities can manage the risk associated with the pandemic through existing recovery mechanisms. Rate cases and the creation of deferred regulatory assets can be expected by the utilities to collect the lost cash flows.

Q44. What do you suggest to correctly reflect the risk of the utility industry after the pandemic?

A44. I believe it is very important to mitigate the impact of the incorrect indication of the riskiness of the utilities by the current beta values. As the current values of the beta reported by information providers including *Value Line* are biased upward, I correct that bias by averaging the beta value before the pandemic and the currently reported beta value. The average beta value calculated this way is 0.73 (see Exhibit PSD-ZZ-7), which is still slightly higher than the historical average of 0.68. But the 0.73 beta value reflects the true state of the utility stock riskiness with respect to the overall market movement much better than the unadjusted beta value.

III. CAPITAL STRUCTURE AND COST OF DEBT

Q45. What is GMP's proposed capital structure?

A45. The Company proposed a capital structure of 50% equity, 50% long-term debt, which is very close to the actual capital structure of the company. The currently approved capital structure by the Commission is 49.8%.

Q46. Do you agree with the company's proposed capital structure?

A46. I have studied the capital structure of the comparable companies. Exhibit PSD-ZZ-3 presents the equity ratio of the companies for the past 10 years as well as the expected equity ratio by *Value Line*. The equity ratio of 50% is slightly higher than but within a reasonable range of the values for the proxy group. I consider that to be consistent with the industry norm, so I accept the Company's proposed capital structure.

Q47. What is the cost of debt?

A47. GMP's cost of debt is 4.02%. As this is the cost of the debt of the Company at the filing date, I accept this embedded cost.

IV. COST OF COMMON STOCK

Q48. What measures of cost of common stock equity have you used to calculate the Company's cost of capital?

A48. I used three common methods of cost of equity calculations, namely, the DCF method, the CAPM, and the RP model. The first two methods examine an individual company's financial information. I also use the RP method to obtain the equity premium for the whole electric utility capital market. All three methods are market based and they are recognized methods used in cost of capital proceedings.

The DCF method is based on anticipation of a company's future earnings and growth opportunities, so one requirement for the selection of the company is that company needs to pay dividends to equity owners. The CAPM model is based on the risk premium concept. Both the DCF and CAPM models take into account the investors' understanding and expectation of the economic environment, at present and in the future, and the current industry and company-specific information. The RP model utilizes the negative empirical relationship between interest rate and the expected risk premium which is the difference between the expected return (one representation is the utility's authorized ROE) and interest rate.

Q49. Please define and explain the DCF methodology for measuring the cost of common equity.

A49. The DCF method calculates the required return for an investor as follows:

$$K = \frac{D}{P} + g$$

where: K = cost of common equity
D = expected next-period dividend per share
P = price per share and
g = growth rate of dividends, or alternatively, common stock earnings.

In the equation, "K" is the required rate of return on investment by investors. It is also the discount rate that is used to convert the future cash flows from the investment into the present value. "D" is the expected next-period amount of dividend paid to equity holders. "P" is the current market price of the common stock, representing the current valuation of the company by the market. So "D/P" is the expected next-period dividend yield on the company's common stock. And "g" is the expected growth rate of the dividend or earnings.

Q50. What does the cost of equity calculated from DCF represent?

A50. The DCF method, as cited in the most common form, generates an estimate of the return required for an investor to measure against alternative investment opportunities. This represents the minimal return in order for a company to attract and maintain investment in the company's common equity. It represents the investor's expectation based on available current market information.

Q51. What forms of the DCF model have you used in calculating the cost of equity?

A51. When the DCF model is used to calculate required return on equity, the appropriate EPS growth rate must be used because the model looks at the perpetual EPS growth rate. The constant growth DCF model is a standard DCF model used in practically all cost of capital proceedings. The correct use of the growth rate is essential to the correct valuation of the required return. I used a two-step DCF model to estimate ROE which I will explain more in the next section.

V. CONSTANT GROWTH DCF MODEL

Q52. What stock price did you use in your constant growth DCF model?

A52. I have reviewed and used the six-month average of stock prices. Stock prices vary on a daily basis. The use of a six-month average reduces the impact of price volatility and reasonably represents the normal market condition concerning the value of the stock. As the market price can be volatile on a daily basis, I first calculated the average of monthly highs and lows as the monthly price. A six-month average limits the impact of abnormal stock price fluctuations. This method of calculating the average stock price is also the method adopted by FERC. The sample period I used for the stock prices runs from September 1, 2021 through February 28, 2022.

Q53. How did you calculate dividend yield?

A53. The dividend yield is calculated as the ratio of expected dividend at the end of the first period to the stock price at the beginning of the period. I collected the quarterly dividend for the same six-month period with the ending date matching the ending date of the stock price. I annualized the quarterly dividend by multiplying the quarterly dividend by 4. Then for each month, I calculated the dividend yield by dividing the annual dividend by the monthly stock

price. The dividend yield for the six-month period is the average of the monthly dividend yield during the period. In the DCF model, dividend yield is the expected next-period dividend. I multiplied the dividend yield by one half of the expected dividend growth rate to reflect the fact that the dividend is paid quarterly.

Q54. What growth rate information did you use in the calculation of the ROE?

A54. The stock price and dividend information are known to the investors; however, the expected dividend growth rate is not directly observable and needs to be estimated. Investors project the dividend growth rate based on all available information; therefore, I have chosen the projected 3-5-year EPS growth rate by Institutional Brokers Estimate System ("IBES"). The IBES provides some of the most comprehensive financial information in business investment. IBES projected growth rates represent a consensus of multiple analysts, including some of the analysts included in First Call and Zacks. The IBES source of projected earnings is widely used by the market and is publicly available. The IBES growth rates are reported in Exhibit PSD-ZZ-4.

Q55. Did you use IBES projected EPS growth rate as the final form of earnings growth rate?

A55. No, I did not adopt the IBES earnings forecast as the final estimate of the earnings growth rate, and I have only used the IBES projected earnings growth rate in projecting the expected dividend yield at the end of the first period. As IBES earnings forecast is typically not of very long term – 3 to 5 years maximum - I also used the long-term growth rate to correctly

calculate the earnings growth rate in the long term. To obtain a more reliable measure of EPS growth in the long term, I have used a weighting scheme known as the two-step DCF method.

Q56. What is the two-step DCF method?

A56. In the two-step method, relatively short-term earnings growth forecasts, such as IBES projections, are obtained first. In the second step, the constant growth rate (g) is augmented by a measure of the long-term growth, and then the overall earnings growth rate is the weighted average of relatively short-term growth rate projection and the long-term growth projection.

Q57. What is the long-term growth rate you used and how did you determine the weights?

A57. I used the GDP growth rate as the measure of the long-term growth rate. In perpetuity, the value of the stock market should grow at the same rate as the economy grows. The two sources of the expected growth I used are: [1] Energy Information Administration, Annual Energy Outlook ("AEO") 2022 and [2] Social Security Administration, 2022 OASDI Trustees Report. These two sources are frequently cited in cost of capital proceedings. For example, FERC requires the calculation of the EPS growth rate incorporating these two sources of long-term economic projections in addition to the projections by IHS Global Insight.

When calculating the expected future earnings growth rate, I used the weights of 2/3 and 1/3 for the IBES growth rate and the GDP growth rate respectively. The detailed calculation of the long-term growth rate is shown in Exhibit PSD-ZZ-5. My assessment of the long-term economic growth, based on most recent available information from these sources, is 4.27%.

Q58. Please summarize your ROE result based on the constant growth DCF models.

A58. After adding the expected dividend yield to expected earnings growth rate for the two-step DCF models, I obtained a ROE of 8.88% based on the median and 8.59% based on the average value. Exhibit PSD-ZZ-6 shows the calculation of the ROE by the DCF model, and the table below summarizes the result of the DCF model. I also presented the ROE result based on the Lieberman sample. The results are similar based on the two samples. This suggests that the proxy group selection is not the sources of the difference between the ROE result I obtained, and the result Ms. Lieberman obtained. I will address the methodological issues of Ms. Lieberman in later sections.

Table 3: DCF ROE results

	Zhu Sample DCF	Lieberman Sample DCF
Min	5.54%	5.54%
Max	10.30%	10.19%
Median	8.88%	9.15%
Average	8.59%	8.50%
Midpoint	7.92%	7.87%

VI. THE CAPM METHOD

Q59. Please describe the CAPM method in the calculation of the cost of common equity.

A59. The CAPM method is based on the analysis of risks. There are two types of risks to consider; one is the kind of risk that investors can diversify away or reduce by combining different investments into a portfolio, the other is the market risk an investor cannot reduce by diversification. Therefore, the CAPM method is a risk premium model based on the calculation of the risk differential between investments on the market portfolio and the individual stock.

The calculation of the required rate of return on the company's stock is as follows:

$$K = R_F + \beta (R_M - R_F)$$

Where:
- K = the required return.
- R_F = the risk-free rate.
- R_M = the required overall market return; and
- β = beta, a measure of a given security's risk relative to that of the overall market.

The idea of calculating the required return on the individual investment from CAPM is to find the equivalent return for an investor based on the relative risk of the investment as compared to the alternative investment opportunities. Here, the alternative investment opportunity is usually assumed to be the market portfolio. This is a model that suggests investors should be compensated for bearing risks. Typically, the risk-free rate is a benchmark investment on which investors can be compensated for not bearing any risks. The benchmark risk-free rates are typically Treasury security yields. The market return is the return on all other available investment alternatives to the investor. This is typically a rate generated from a relevant market index. The risk of the firm's common stock is reflected in the beta of the company, which measures the relative stock price volatility of the company compared to the overall market. Therefore, the CAPM model has two general components: one is the risk-free rate, and the other is the company RP, which is the product of the company's beta and market risk premium ("βxMRP"). The market risk premium ("MRP") is the difference between the expected market return and the risk-free rate ("$R_M - R_F$").

Q60. Please explain your CAPM calculations.

A60. I used the 30-year T-Bond yield as the benchmark risk-free rate. I obtained the beta for the comparable companies from *Value Line*. Finally, I developed a measure of market risk premium based on the DCF model applied to S&P 500 dividend paying companies.

Q61. Please describe the risk-free rate.

A61. I used the six-month average yield on 30-year T-Bonds. As utility investments are usually long term, a longer-term Treasury bond would reflect the market condition better for the investments. The yield reflects all market information known to investors at the time including the possibility of future interest rate increase. Thus, the 30-year T-Bond yield is a best measure of the required return on risk-free instrument.

Q62. Please explain the beta of the comparable companies.

A62. Betas measure the connection between the company's stock volatility and the overall market volatility. Many professional financial services, including *Value Line,* provide the estimate of the company beta. As it is generally known that a raw beta obtained from the regression of the company stock returns on market returns tends to move toward 1, *Value Line* has adjusted its estimated beta accordingly (the so-called Blume adjustment). The *Value Line* beta values are appropriately estimated to measure the company's stock price variations compared to the overall market index in normal economic conditions. Therefore, the product of the company's beta and market risk premium is supposedly to produce the company's RP.

Q63. You stated earlier that the most recent beta values from V*alue Line* are too high and may not reflect the normal riskiness of the utility stocks. How did you correct this problem?

A63. As I explained earlier, the current electric utility beta values from *Value Line* are too high, not reflecting the true riskiness of the electric utility stocks. The estimates of beta are heavily influenced by the transitory impact of the Covid pandemic mostly during year 2020. As the economy started to return to normal, beta values of the electric utilities should have declined from the abnormally high level. As I explained in an earlier section, *Value Line* calculates the beta value based on data for a five-year period, thus it will take some time for the pandemic effect to be transitioned out. I have also shown that the betas from one-year regression (excluding the period of 2020) have already gone down. Therefore, the still elevated betas from the five-year regression are an artifact of the estimation, so the betas as reported do not reflect the true riskiness of the utility stocks. For this reason, I have calculated the average value of beta for each company based on the beta value as of March 2022 and February 2020.

Q64. Please describe your analysis of market risk premium.

A64. As the CAPM model estimates the expected ROE, the market risk premium should be the expected equity market return over the risk-free rate. The estimate of the market equity risk premium is perhaps the most contentious issue for the financial market; however, there are generally accepted ways to estimate the equity risk premium. One method is to obtain the expected market return via DCF method. Many jurisdictional authorities, including FERC,

accept the market return calculated using a DCF method. A very important feature of this methodology is that it is forward looking.

Q65. Please explain what market index you have used.

A65. I have used the S&P 500 index to represent the overall equity market. After obtaining the name of the companies included in the market index, I have excluded the companies that do not pay dividends and the companies that have negative projected earnings growth rates and growth rates higher than 20%. If a company has a negative earnings growth rate, it will not be sustainable in the long run. Similarly, it is not possible for a company to have an earnings growth rate of 20% forever; therefore, I have eliminated those companies from the list. The final sample included more than 300 companies, which is large enough to represent the broad spectrum of the businesses in the U.S. economy.

Q66. Why did you exclude non-dividend paying companies from the calculations?

A66. The DCF model is based on the premise that a company's value is based on the stream of future dividends to the investors. The model breaks down if no dividend is issued to the investors. In other words, the DCF model cannot be applied to companies that do not issue dividends. The expected market return is then the weighted average of individual company returns (ROE derived from the DCF model) with the market capitalization being the weight.

Q67. Did you use a one-step DCF model or a two-step DCF model to obtain the individual company's ROE?

A67. I used a two-step DCF model to calculate the ROE of an individual company. A weighted growth rate by the short-term and long-term growth rate can better capture the nature of the expected long-term dividend growth rate. I used the IBES projected earnings growth rate as the short-term expected earnings growth rate and the weighted value of IBES projected earnings growth and expected GDP growth rate as the long-term growth rate.

Q68. What is your estimated market risk premium?

A68. My estimated market return is 10.65% and market risk premium is 8.64% by the two-step DCF method. These results are presented in Exhibit PSD-ZZ-7.

Q69. What is your estimated ROE based on the CAPM model?

A69. I used the following method to obtain the estimates of the ROE: I applied the market risk premium obtained from the two-step DCF model to each comparable company's beta to obtain beta-adjusted company RP and then added to the risk-free rate. Then I calculated the average and median of the individual company's ROE based on the CAPM model. The final result of ROE in Exhibit PSD-ZZ-8 shows the application and the results of the method.

Table 4 below shows the summary of the CAPM model result.

Table 4: CAPM ROE Results

	Zhu Sample	Lieberman Sample
Lower End	7.20%	7.20%
Upper End	9.36%	9.36%
Median	8.49%	8.38%
Average	8.36%	8.34%
Midpoint	8.28%	8.28%

The median from the calculation is 8.49%, and the mean value ROE estimate is 8.36%. The use of the current beta values without adjustment would have led to a much higher but incorrect ROE estimate. My use of average beta value mitigated the problem, leading to a much more reasonable estimate of required ROE. Again, table 4 shows the ROE results based on Lieberman sample. The two sets of results are very much similar, suggesting again proxy group selection is not the cause of the differences in ROE estimations between me and Ms. Lieberman.

VII. THE RISK PREMIUM MODEL

Q70. Have you used any other method to estimate the ROE?

A70. Yes. The other method that I used is the RP, or bond return plus equity risk premium model, which is another risk-based model.

Q71. Please describe the principal idea behind the RP model.

A71. The RP model is based on the idea that equity owners or stockholders require higher returns than the bond holders who simply hold less risky bonds. Therefore, this risk-reward relationship reflects the basic principle in financial economics. The ROE is then equal to bond yield plus a form of expected RP which is the difference between expected returns of the stocks and bond yield.

Q72. How can this model be estimated to generate expected ROE?

A72. There are many versions of the RP models, depending on the stock returns and interest rates used. One typical form of the risk premium is measured by the difference between a utility's authorized ROE and a particular kind of long-term interest rate, frequently being the 30-year bond yield. The relationship between equity risk premium and bond yield is empirically obtained through regression of risk premium on bond yield. Then, the estimated regression equation coefficients are used to obtain the expected ROE given the bond yield.

Q73. Please explain how you obtained the RP data and how you empirically estimated the relationship between risk premium and interest rate.

A73. I used the authorized ROEs from past electric utility rate cases since 1980 to represent the expected returns and then subtracted the long-term interest rate, in this case, the 30-year Treasury bond yield, to generate the RP. I have included only past rate cases of fully integrated and distribution electric utilities in my sample. I have included both fully litigated and settled cases. The inclusion of the settled cases or not does not make any material difference as the obtained ROEs are essentially the same using either the fully litigated sample or litigated plus settled sample.

Then I regressed the risk premium on interest rate to obtain the relationship between the RP and the interest rate. In order to capture the interest rate for the rate case as closely as possible, I have averaged the 30-year T-Bond yield for the period of each rate case, i.e., from the filing date to the decision date. This estimated relationship has been utilized to estimate the risk premium given the current interest rate. I have calculated the average length of a typical rate case

and my result revealed that the average period is about 9 months. I then used the average T-Bond yield during the last 9 months (up to February 28, 2022) as the interest rate. The estimated RP then is added to the interest rate to yield the expected ROE.

Q74. Using the current 30-year bond yield, what is your estimate of ROE per RP method?

A74. My estimated RP is 6.99%. See Exhibit PSD-ZZ-9. With the 9-month average 30-year T-Bond yield at 2.01%, my estimate of the ROE using the risk premium method is 9.01%.

VIII. GMP ROE

Q75. What is the ROE that GMP is seeking?

A75. GMP is seeking an 8.57% ROE.

Q76. How did GMP calculate the ROE?

A76. GMP used an indexing method proposed in GMP's Alternative Regulation Plan ("ARP"). The baseline ROE is the ROE approved in the last rate case, 8.20%. The baseline ROE is then adjusted for this case by one-half of the change in compositive 10-year T-Bond yield.

Q77. Considering your estimated required ROE, how reasonable is GMP's requested ROE rate of 8.57%?

A77. The GMP's requested ROE of the 8.57% is well within the range of my estimates I have obtained using the well-established economic models. My average ROE from the three methods is 8.65%, the median is 8.69%, and the midpoint is 8.10%. As I have shown in the section of

proxy group selection, GMP has lower degree of risks compared to an average utility in the group, thus the expected returns of GMP should be lower than these central tendency measures I just mentioned. However, given the risk level of GMP and my estimated values of ROE, I believe the 8.57% requested ROE is largely consistent with my market value-based ROE, thus I regard the 8.57% ROE as generally reasonable and acceptable.

Q78. Is 8.57% one of the lowest authorized ROEs in the country if this rate is authorized by the Commission?

A78. Yes, 8.57% is one of the lowest if not the lowest authorized ROE in recent years in the U.S. However, the principles in setting the ROE are to enable the utilities to have access to capital for their capital investments. On the other hand, jurisdictional authorities need to consider the economic welfare of the rate payers. Thus, the ROE of the utilities should be the minimum return on equity required by the market. I have shown that 8.57% is consistent with what the market requires on the investment of GMP to maintain adequate and reliable services to Vermont customers given the risk profile of GMP. In addition, the Company is expecting to continue to operate under a MYRP in the FY23 period and going forward with similar regulatory features as proposed and filed in Case No. 21-3707-PET. These regulatory features are favorable to GMP's operations and financial conditions in general.

Q79. However, GMP's cost of capital witness Ms. Lieberman suggested that the company's requested ROE is below her estimated ROE values for GMP. What is your opinion regarding her statement?

A79. I do not think Ms. Lieberman's estimations of the ROE correctly reflect the current market required return on equity for GMP due to her many questionable assumptions and methodologies. I will review and comment on her ROE estimation and results in the next section.

IX. A CRITICAL REVIEW OF MS. LIEBERMAN ROE METHODOLIGIES AND RESULTS

Q80. What ROE does Ms. Lieberman support for GMP?

A80. Ms. Lieberman supports a ROE in the range of 10.25% to 10.76%. Due to her CAPM ROE being significantly higher than the ROEs from other analyses, Ms. Lieberman "tempered" those results by giving slightly lower weight to the CAPM ROE results even though no specific weight has been shown to be attached to any of the model outcomes. Thus, she recommended a ROE of 10.25% and suggested that GMP could rebase the ROE formula at the updated ROE of 10.25%. But she did acknowledge the Company's willingness to hold its ROE at the 8.57% level.

Q81. What are the models Ms. Lieberman utilized to estimate the cost of equity for GMP?

A81. Ms. Lieberman employed three types of models including DCF, CAPM, and RP models. However, she has presented several different results with each model with assumptions regarding type of growth rate and growth stage, interest rates, market risk premium, beta values, and so on.

Q82. Do you have issues with Ms. Lieberman's assumptions in the economic modeling of ROE?

A82. Yes, I have some major issues with Ms. Lieberman's methodologies. I will focus on several major issues and address each of them. Please note while I may not address some minor issues, it does not necessarily mean that I agree with Ms. Lieberman on those issues. And I reserve the right to address those minor issues if needed. At the present time, I believe it is more important to focus on the major issues that cause upward biases in Ms. Lieberman's ROE estimates.

Q83. What are some of the major issues you do not agree with Ms. Lieberman?

A83. These issues include the assumption in the estimation of the DCF model especially the projected earnings growth rate, the average of ROE from different competing versions of the DCF models, the use of unadjusted beta values and the estimation of the expected market returns in the CAPM model, and the use of forecasted interest rate rather than the actual interest rate in the CAPM and RP models.

The DCF ROE modeling

Q84. How did Ms. Lieberman construct her DCF ROE results?

A84. Ms. Lieberman employed two different types of DCF models: a constant growth DCF model and a multi-stage DCF model. She calculated dividend yield utilizing average stock prices for several time periods: 30-day, 90-day and 180-day. Dividend yield was then adjusted by one half of the expected dividend growth rate. The dividend growth rate was proxied by earnings per

share growth rate and the earnings per share growth rate was the consensus five-year earnings growth rate projections reported by Thomson First Call, Zacks, and *Value Line*.

Ms. Lieberman first considered a constant growth DCF model with short-term (five-year) earnings growth projections only. Her calculations with 30-day, 60-day and 90-day average stock price generated the average ROE of 9.25%, 9.27%, and 9.23% for different earnings growth projections.

Q85. Did Ms. Lieberman use a long-term earnings growth projection in her estimation of the constant growth DCF model?

A85. No. The earnings growth rate projections used in Ms. Lieberman's constant growth model are relatively short-term – 3 to 5 years. To address the "limiting assumptions" of this single stage DCF model, Ms. Lieberman employed a multi-stage DCF model. In such a model, long-term growth rate needs to be assumed and the GDP growth rate is usually used as the long-term growth rate as all sectors of the economy cannot grow faster than the economy in the long run. Ms. Lieberman provided two measures of the GDP growth rate: a forecasted GDP growth rate by Blue Chip Financial Forecast, and a historical real GDP growth rate for the period of 1929-2021. Projected inflation rate was then applied to the real DGP growth rate to generate nominal GDP growth rate. As the result, the forecasted GDP growth rate was 4.29% and historical GDP growth rate was 5.44% by Ms. Lieberman's calculations.

Ms. Lieberman's multi-stage DCF models generated the average ROE estimates of 8.25%, 8.28%, and 8.23% based on projected GDP growth rate and 9.18%, 9.21%, and 9.16% based on historical GDP growth rate for 30-day, 60-day, and 180-day stock prices, respectively.

And finally, MS. Lieberman averaged these ROEs from different versions of the DCF models to generate the average ROE from the DCF model.

Q86. What are the major issues you see in Ms. Lieberman's DCF modeling of ROE?

A86. There are two major issues. One is the lack of the long-term growth in the constant growth DCF model. The second is the use of historical GDP growth rate in the multi-stage model.

Q87. Why is the long-term growth important in the constant growth DCF model?

A87. The DCF model is based on the premise that the value of the company is based on the discounted future cash flow of the company from all future periods. The company is assumed to exist forever and grow at a constant growth rate into perpetuity. While a single growth rate for the whole period of firm's existence is a simplified assumption, as long as the growth rate is modeled appropriately, the constant growth DCF model still generates reliable ROE estimate. However, the constant growth DCF model employed by Ms. Lieberman treated the projected three to five-year growth rate as the perpetual growth rate of the company, which is not realistic and too high. The way to correct this problem (limiting assumption in Ms. Lieberman's own words[13]) is to apply a multi-stage DCF model which assumes varying stages of growth rates with the growth rate eventually converging to the GDP growth rate in the longer term (as Ms. Lieberman did in her multi-stage modeling) or adjust the earnings growth rate by incorporating a long-term growth rate (as I did) in a so-called two step procedure. Both methods are acceptable

[13] Ibid, line 2, page 45.

with some commissions such as FERC adopting the two-step DCF model as the standard DCF model.

Q88. Considering what you just described; do you believe Ms. Lieberman's application of constant growth DCF model is flawed?

A88. I believe Ms. Lieberman's application of the constant growth DCF model is flawed as she only applied the relatively short-term growth rate as the perpetual growth rate. As the short-term earnings growth projections are higher than the long-term growth rate represented by the expected GDP growth rate, Ms. Lieberman's constant growth DCF model yielded too-high ROEs. As the results are biased upward, I recommend the Commission to disregard Ms. Lieberman's constant growth DCF analysis.

Q89. What issues do you have with Ms. Lieberman's application of the multi-stage DCF model?

A89. The DCF model captures the value of the firm based on the expected value of the future cash flows and future growth rate. Therefore, all the component of the DCF model including dividend yield and growth rate should be expected future values. However, it does have a bearing on the historical dividend yield, but the historical dividend yield is adjusted by expected future growth rate to arrive at an expected future dividend yield. In this regard, Ms. Lieberman is correct in employing the expected real GDP growth and expected inflation rate in arriving at the expected nominal GDP growth rate. I believe the results generated by Ms. Lieberman's multi-stage DCF model based on projected GDP growth rate are more reliable and credible.

Q90. Did Ms. Lieberman use any other form of GDP growth rate in her multi-stage DCF model?

A90. Ms. Lieberman also utilized a historical real GDP growth rate mixed with the projected inflation rate to obtain the expected future GDP growth rate. However, this estimation method is questionable as the real GDP growth rate is based on past performance of the US economy, not the expected future growth rate.

According to Ms. Lieberman's calculation, the historical GDP growth rate for the period of 1929 to 2020 is 3.13%. Adding the expected future inflation rate of 2.31%, Ms. Lieberman arrived at an estimated future GDP growth rate of 5.44%. I believe this rate is too high.

Q91. Why do you think the estimated GDP growth based on the historical GDP growth rate is too high?

A91. Aside from the problem of mix-matching of the historical GDP growth rate and expected future inflation rate to arrive at the expected future growth rate, the use of the historical real GDP growth rate of 3.13% as the real GDP growth rate for the future is also problematic.

The U.S. real GDP growth rate has been declining over the years. From 1970 to 2020, the U.S. real GDP grew at a rate of 2.66%, while that rate for the period of 1980-2020 and 1990 to 2020 has declined to 2.53% and 2.27% respectively. The growth rate for the period of 2000 to 2020 dipped to 1.69%. The historical GDP growth rate of 3.13% does not appear to be consistent with the more recent trend in GDP growth.

The decline in the real GDP growth rate in more recent years has caught attention of many economists. For example, a leading economic growth expert Dr. Robert Gordon

documented the decline in GDP growth and tried to explain the reasons behind the GDP growth slowdown.[14] According to Dr. Gordon, productivity growth slowdown is partly a reason. Other contributing factors include "the decline of population growth as a result of falling fertility, rising mortality for some groups, a slower improvement in life expectancy than in other developed nations, and declining immigration…. The other attributable to the productivity slowdown was due to the turnaround in labor force participation from rising in the last quarter of the 20th century to falling since 2000, both because of the retirement of the baby boom generation and the decline in prime-age labor force participation."

Q92. Could there be an increase in the GDP growth rate for the future?

A92. Yes, there could be. However, the GDP growth forecasts cited by both me and Ms. Lieberman points to a growth rate in the neighborhood of 4.27%, which is much lower than the level of growth rate suggested by Ms. Lieberman based on the historical GDP growth rate. Therefore, whether it is based on the methodological argument that forecasted growth rate is the right growth rate or based on the fact that historical GDP growth rate has been declining, the correct measurement of the future GDP growth rate should be the one as forecasted by several cited sources. For this reason, I recommend the Commission to discard the historical GDP growth estimate as a measure of long-term growth rate, and the ROE analysis based on the historical GDP growth rate.

[14] "Why Has Economic Growth Slowed When Innovation Appears to be Accelerating?" Robert J. Gordon, NBER Working Paper No. 24554, April 2018.

Q93. You mentioned that Ms. Lieberman's DCF result is an average of the results from three DCF analyses. Are you in agreement with this method of obtaining the DCF ROE result?

A93. No, I am not in agreement with this methodology as the average of the three model results are logically inconsistent. To overcome the "limiting assumption" of the Lieberman constant growth model, Ms. Lieberman proposed a multi-stage DCF model. The difference between her constant growth DCF model and the multi-stage DCF model is the introduction of the long-term growth rate. In this sense, her version of the constant growth DCF is deficient and the result from that model should not be considered. However, Ms. Lieberman still attached 1/3 weight to the outcome of that deficient model.

There is no reason given by Ms. Lieberman as to why the historical GDP growth rate was used to measure the expected GDP growth rate while Ms. Lieberman has already provided the projected GDP growth rate. My understanding of her approach is that Ms. Lieberman believes expected growth rate should be the correct measure. In coming up with the expected nominal GDP growth rate, she also used the historical real GDP growth rate. But to have a hint of the expected future rate, Ms. Lieberman used the expected inflation rate instead of the historical inflation rate. However, historical GDP growth rate is not consistent with the expected future GDP growth rate as I argued above. In this sense, it is not an appropriate method to give any weight to the ROE estimate based on historical GDP growth rate.

Q94. Considering your analysis above, what do you think is the appropriate ROE estimate from Ms. Lieberman's DCF models?

A94. I believe the only credible and logically consistent DCF model result is the one from the multi-stage DCF with forecasted long-term GDP growth rate. The values are 8.25%, 8.28%, and 8.23% based on 30-day, 60-day, and 180-day stock prices. And the average DCF ROE result from the Lieberman analysis should be 8.25%.

CAPM model

Q95. In your opinion, what are the major issues in Ms. Lieberman's CAPM modeling?

A95. The CAPM model relies on three factors in estimating the required rate of ROE for the utilities: the risk-free rate, company beta, and market risk premium. The average ROE result of Ms. Lieberman from her CAPM analysis is a whopping 13.17%, which she also believes quite high.[15]

I do not agree with Ms. Lieberman on how to model all three factors. I believe her approaches have led to a very much biased upward estimate of the ROE for GMP.

Q96. Can you explain why you are not in agreement with Ms. Lieberman on the appropriate value of beta?

A96. Ms. Lieberman considered two measures of beta. One is the beta value reported by Bloomberg and another by *Value Line*. Both betas are obtained from 5-year regressions of the company weekly returns on market returns. Bloomberg uses S&P 500 index and *Value Line* uses New York Stock Exchange Index as the market index. Both also adjust for the long-term

[15] Prefiled Direct & Supplemental Testimony of Julie F. Lieberman, line 11, page 68.

reversion of the beta values to 1.0, the so-called Bloom Adjustment. The average reported Bloomberg beta for Ms. Lieberman's proxy group is 0.863 and the average reported *Value Line* beta is 0.875.

Q97. Do you have concerns with these reported beta values?

A97. While these reported beta values are very similar to the unadjusted beta values, I have obtained on my proxy groups, I do not believe these beta values reflect the current risk of the companies. Indeed, Ms. Lieberman did believe the utility risks change is not permanent as she cited Brattle's assessment of the pandemic that "it is possible that changes are transitory."[16] As I have argued before, the high beta values as reported are an artifact of the five-year regressions. To correctly gauge the risk of the utility companies, the beta values need to be adjusted. Otherwise, estimated risk premiums by the CAPM method would be incorrectly estimated and biased upward.

Q98. How did Ms. Lieberman estimate the market risk premium?

A98. Ms. Lieberman estimated the expected market returns first and then subtracted interest rate (30-year T-Bond yield) to obtain the market risk premium. In estimating the expected market return, Ms. Lieberman applied the DCF model to S&P 500 companies dividend yield companies. Ms. Lieberman first weighted the dividend yield of the companies by market capitalization to obtain a market dividend yield, and then weighted the expected growth rate of each company by market capitalization to obtain the market growth rate. She then summed up

[16] Prefiled Direct & Supplemental Testimony of Julie F. Lieberman, lines 15-16, page 9.

both components to arrive at the expected market return of 14.80%. The expected market rate of return subtracting the interest rate of 2.38% yielded a market risk premium of 12.42%.

Q99. What do you think of Ms. Lieberman's approach in determining the expected market return?

A99. There are several problems with Ms. Lieberman's approach. The first problem is that she essentially applied a one-step DCF model to the companies in the market index. As I have argued before, the two-step DCF model incorporating long-term expected earnings growth is the right version of the DCF model. The second problem is that in her application of the one-step DCF model, Ms. Lieberman has utilized unsustainable growth rates in the calculation. For example, Sealed Air Corporation has an expected growth rate of 90.91%, Discover Financial Services has an expected growth rate of 74.61%. Some companies have negative earnings growth rate. For example, Valero Energy has a negative 5.68% growth rate. These growth rates are clearly unsustainable. As there are only few companies with negative growth rate, but many more companies with unsustainably high growth rates, her calculations of the mark risk premium leads to biased upward estimate of market return and market risk premium.

Q100. Did Ms. Lieberman calculate the expected return for each of the companies in the market index and then calculate the weighted average value of the returns as the market return?

A100. No, she did not. However, her approach is the same as the approach that calculates the expected returns for individual companies in the index and then sum them up with market

capitalizations as weights. No matter what the approach is – whether to weigh the dividend yield and expected returns first or not, the DCF model required the growth rate to be a long-term sustainable rate.

Q101. Did Ms. Lieberman follow the FERC approach in modeling the required market return?

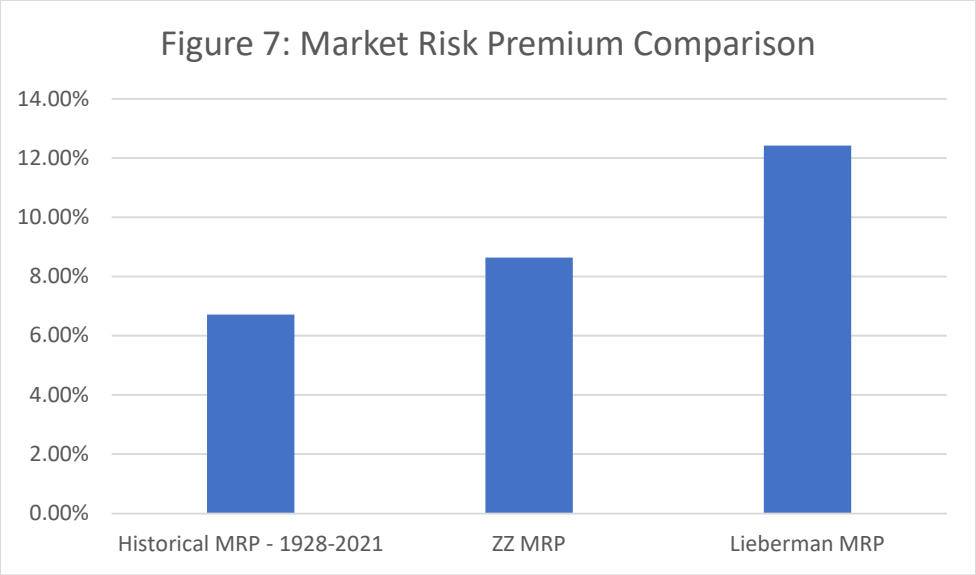
A101. Ms. Lieberman followed the general approach by FERC to calculate the market return, but she did not follow the approach exactly. Even though the FERC approach suffers from the problem of one-step DCF, it does eliminate unsustainably high growth rates and negative growth rates from the sample. Not incorporating a long-term growth rate nor excluding very high growth rate leads to unrealistically high market returns and thus unrealistically high market risk premium.

Q102. Did Ms. Lieberman also suggest that her risk premium estimate of 12.42% was higher than the normal level?

A102. Yes, Ms. Lieberman also suggested her market risk premium estimate was higher than normal in her answer to DPS1.Q128 cited in my Q&A40 in this testimony. Specifically, she believed that "the level of the market risk premium and betas are above normal levels due to the pandemic and will revert to more normal levels (though may remain slightly elevated) in the next several years. As such, she has placed less weight on her CAPM analysis as it appears to be capturing somewhat transitory market information."

Q103. How does Ms. Lieberman's market risk premium estimate compare to the historical market risk premium?

A103. Figure 7 below shows the comparison of the Lieberman MRP versus the historical MRP. It shows that the Lieberman estimated MRP is almost twice as large as the historical MRP, which is very questionable and unlikely to be true.



Interest Rate Issue

Q104. Do you agree with Ms. Lieberman's use of interest rate in the CAPM model and Risk Premium models?

A104. Ms. Lieberman employed the 30-year T-Bond Yield as the long-term interest rate. For the CAPM model, Ms. Lieberman used a forecasted interest rate, and for the RP model, she employed actual interest rate (30-day average yield) and forecasted interest rate.

Q105. In your opinion, which interest rate is more appropriate: the actual interest rate or the forecasted interest rate?

A105. For theoretical and practical reasons, I believe actual interest rates are more appropriate.

Q106. Why do you think current interest rates are more appropriate?

A106. I believe interest rates are extremely difficult to forecast and the interest rate forecasts from the past have been shown to perform poorly. The alternative to the interest rate forecast is to use the current market interest rate as what the market expects about the future interest rate.

There is serious doubt that these interest rate forecasts can outperform a simple forecast of interest rates by using the current market interest rate. The bond markets are efficient; as the result, the best expected future interest rate is the current market interest rate.

Q107. Please explain why current interest rates are the best forecast of the expected interest rate.

A107. Financial information comes into marketplace randomly and the interest rate goes up or down with equal chances. Nobody can systematically get ahead by guessing what is going to happen in the marketplace. This leads to a phenomenon called “random walk.” When a financial variable such as the interest rate follows a random walk, it implies that the best forecast of its future behavior is its immediate past. In this case, the immediately past available information is the latest interest rate or the current interest rate observable in the market.

Q108. What support do you have for the claim that the best forecast of interest rate is the current interest rate?

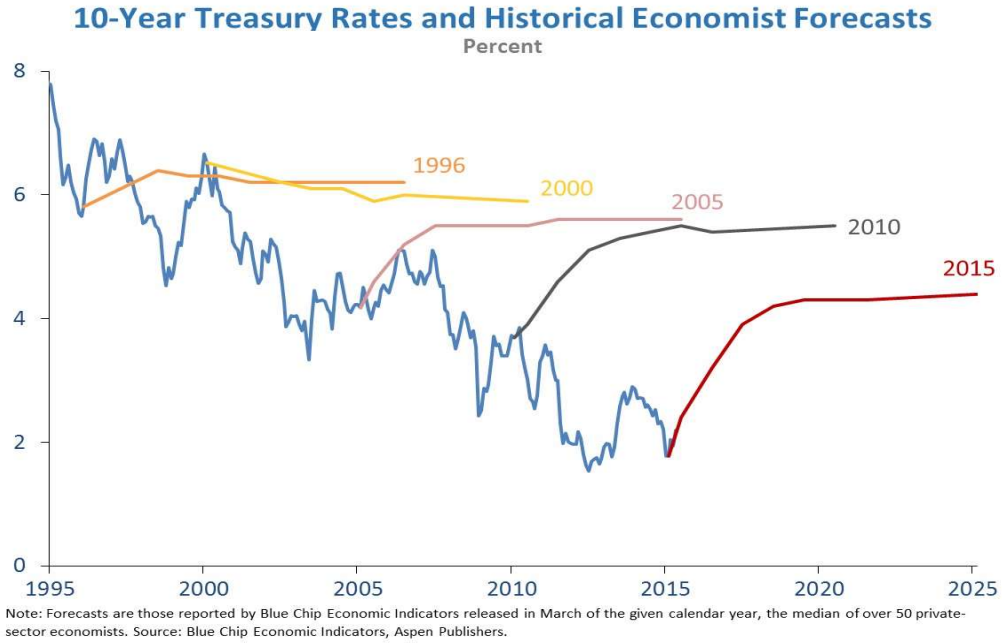
A108. There have been doubts about the predictability of long-term interest rates for a long time. As early as 1979, Professor Pesando provided reasons why it is not surprising for economic models to underperform the random walk forecast of interest rate.[17] The random walk forecast of interest rate is the current market interest rate.

In a more recent study, Baghestani, Arzaghi, and Kaya (2015) documented evidence of model blue chip predictions being inferior to random walk models.[18] In a more extensive study of U.S. interest rate forecasts, Spiwoks, Bedke and Hein (2008), after a study of 136 forecasting series with 13,800 forecast data, showed empirical evidence that the random walk model dominated the forecasts series.[19] In the article, they stated: "Not one of the forecast time series proved to be unbiased. In the majority of cases, information from the past was not efficiently integrated into the forecasts. The sign accuracy is significantly better than random walk forecasts in only a very few of the forecast time series." What this passage suggests is that the professional forecast of interest rates systematically over- or under-projected the movement of the interest rate ("not unbiased"). The majority of the forecasts could not even predict the direction of movement correctly, not to mention the magnitude of the interest rate movement.

[17] James. E. .Pesando, "On the random walk characteristics of short- and long-term interest rates in an efficient market," Journal of Money, Credit and Banking, 1979, vol. 11, 457–66.
[18] Hamid Baghestani, Mohammad Arzaghi and Ilker Kaya, "On the accuracy of Blue Chip forecasts of interest rates and country risk premiums," Applied Economics, 2015, Vol. 47, No. 2, 113–122, http://dx.doi.org/10.1080/00036846.2014.959656.
[19] Spiwoks, Markus; Bedke, Nils; Hein, Oliver, "Forecasting the Past: The Case of US Interest Rate Forecasts," Financial Markets and Portfolio Management Vol. 22, Iss. 4, (December 2008): 357-379.

Q109. How has the past forecast of interest rate fared?

A109. The long-term interest rate has been declining, so many would project that the interest rate will eventually rise again. However, this kind of projection has not been doing well. In 2015, Obstfeld and Tesar[20] presented the chart below of 10-year Treasury rates and historical forecasts which showed consistently high interest rate forecasts despite the fact that the interest rate was declining over time.



[20] M. Obstfeld and L. Tesar, (2015).” The Decline in Long-Term Interest Rates.” https://obamawhitehouse.archives.gov/blog/2015/07/14/decline-long-term-interest-rates.

Q110. Is it true everyone is expecting the Federal Reserve to tighten monetary policy to fight high inflation rate so the interest rate will be higher in the future?

A110. First, I need to point out again that Federal Reserve monetary policy targets short-term interest rate. It does not necessarily lead to changes in the long-term interest rate trend. Second, if everyone is expecting the Federal Reserve to increase the interest rate in the future, the market would have reacted to this expectation already. That is, the current interest rate should have already incorporated the future rate increase information. If it meant to increase upon the expected monetary policy, it would have already increased. It is like when one expects a stock price to increase in the future, she/he would have bought the stock upon her/his expectation. The action of the buying would have caused the stock price to increase already. It is unimaginable that the investor would wait until later to buy the stock. This is essentially the concept of market efficiency. It is generally regarded that the U.S. financial markets including the bond markets where interest rates are determined are very efficient. When bond markets are efficient, only unexpected information flow would lead the interest rate to change, let the information be that the Federal Reserve would increase interest rate more times than the market already expected due to the toughness of the high inflation to subside, or fewer times than market expected as the recessionary effect of the monetary tightening might be too fast and too large. Unfortunately, nobody can predict what is going to happen in the future.

Q111. What is your overall view of Ms. Lieberman's CAPM modeling and results then?

A111. Ms. Lieberman's forecasted interest rate is higher than the actual interest rate. Her beta values of the companies are also higher than what the true risks of the companies are, and her

market risk premium estimation method overestimates the market risk premium. All of the components of the CAPM model lead to a ROE result that is biased upward. I therefore recommend the Commission to disregard the CAPM analysis by Ms. Lieberman.

Risk Premium Model

Q112. How did Ms. Lieberman estimate the ROE via the RP model?

A112. Ms. Lieberman defined the risk premium as the difference between utility's authorized return and the interest rate, and then estimated the empirical relationship between the risk premium and interest rate. The estimated relationship was used to project the expected risk premium. Finally, the expected risk premium had been added to the interest rate to yield the required return on equity.

Q113. Can you point out the methodological differences between your RP methods and hers?

A113. Ms. Lieberman's approach was largely consistent with my approach. For example, we both used authorized returns as the measure of the return on equity. However, there are several differences. I employed past electric utility rate case since 1980, the beginning of the record from Regulatory Research Associates ("RRA") while Ms. Lieberman only started her sample from 1990. As my sample period covers more data point, I believe my estimation is more efficient, i.e., my estimation of the relationship between the risk premium and interest rate would be more accurate.

The second difference is that I used detailed case information while Ms. Lieberman used quarterly average of authorized ROEs. As the result, Ms. Lieberman used the corresponding

quarterly interest rate in the regression. However, the simple average of the ROEs on cases determined for each quarter may not correctly account for the interest rate consideration for each case. The RRA information reveals that rate case durations can be quite different, and the average length of a rate case is about 9 months. I used the interest rate matching the duration of each rate case considered, so my estimation is again more accurate than Ms. Lieberman's estimation.

Another difference is in the choice of interest rate when estimating the ROE in the final step of the RP model. While Ms. Lieberman used current interest rate, she also used the forecasted interest rate. The final result of ROE from her RP model is the average of the projected values based on the two choices of the interest rate. As the forecasted interest rate is higher than the current interest rate, her model result is biased upward.

Q114. Are there any other issues in Ms. Lieberman's ROE testimony that you do not agree with?

A114. Yes, there are others, such as the size premium issue and the flotation cost issue. As these issues do not materially affect the ROE recommendation of Ms. Lieberman as she did not incorporate these into her final ROE estimates, I choose not to address them in this testimony. But I reserve my right in rebutting these and other issues should need arise.

X. CONCLUSIONS

Q115. Could you please state the overall conclusion of your analysis?

A115. My analysis suggests that the Company's requested capital structure is consistent with the capital structure of the proxy group. The cost of debt is based on the Company's actual cost of debt. I recommend the Commission to accept the requested capital structure and cost of debt. In addition, my analysis suggests that GMP is a company whose overall risk is below the average risk of the proxy group companies, and the requested ROE of 8.57% is consistent with the range of my estimated ROE. Thus, I recommend to the Commission to accept the Company's 8.57% ROE request. In the last section of my analysis, I showed that Ms. Lieberman's ROE analysis for GMP is flawed and leads to upward-biased ROE estimate, and thus her ROE results should be disregarded by the Commission.

Q116. Does this conclude your direct testimony at this time?

A116. Yes, it does.