PIÈCE EGI-1

***DIRECT TESTIMONY OF DR. BENTE VILLADSEN*, DATÉ DU 5 NOVEMBRE 2021**

BEFORE THE

RÉGIE DE L'ÉNERGIE DU QUÉBEC

DIRECT TESTIMONY
OF
DR. BENTE VILLADSEN

For
Énergir, s.e.c.
Gazifère Inc.
Intragaz LP

EXHIBIT ÉGI-1

November 5, 2021

Brattle

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GLOSSARY OF ACRONYMS

BPS	Basis Points
BCEI	Blue Chip Economic Indicators
CAPM	Capital Asset Pricing Model
DCF	Discounted Cash Flow
EBITDA	Earnings Before Interest Tax Depreciation and Amortization
EBIT	Earnings Before Interest and Tax
ECAPM	Empirical Capital Asset Pricing Model
FFO	Funds From Operations
LDC	Local Distribution Company
MRP	Market Risk Premium
O&M	Operation & Maintenance
ROE	Return on Equity

I. INTRODUCTION

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

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

Q2: Briefly describe your education and professional qualifications.

A2: I have more than 20 years of experience working with regulated utilities on cost of capital and related matters. My practice focuses on cost of capital, regulatory finance, and accounting issues. I am the co-author of the text, "Risk and Return for Regulated Industries", and a frequent speaker on regulated finance at conferences and webinars. I have testified or filed expert reports on cost of capital before the Alberta Utilities Commission, the Ontario Energy Board and provided white papers on cost of capital for the British Columbia Utilities Commission and the Canadian Transportation Agency. In the U.S., I have provided testimony before regulators in Alaska, Arizona, California, Hawaii, Illinois, Iowa, Michigan, New Mexico, New York, Oregon, and Washington, as well as before the Bonneville Power Administration, Federal Energy Regulatory Commission ("FERC"), and the Surface Transportation Board. I have also provided white papers or expert reports on cost of capital before Barbados Fair Trading Commission, Mexico's Comisión Reguladora de Energía as well as in Australia and Europe. I have testified or filed testimony on regulatory accounting issues before FERC, the Regulatory Commission of Alaska, the Michigan Public Service Commission, the Texas Public Utility Commission, as well as in international and U.S. arbitrations, and have regularly provided advice to utilities on regulatory matters and risk management.

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

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

A3: I have been asked by Énergir s.e.c., Gazifère Inc., and Intragaz LP (jointly, the "Utilities") to estimate the cost of equity and capital structure that the Régie de l'énergie du Québec ("Régie" or the "Commission") should allow the Utilities an opportunity to earn on the equity finance portion of their respective rate bases. Specifically, I perform a cost of equity analysis and provide return on equity ("ROE") estimates derived from market data for a proxy group of Canadian domiciled utilities. Further, I provide additional estimates based on a proxy group of natural gas and water utilities domiciled in the United States. I also calculate the impact of the deemed capital structure on the Utilities' credit metric and consider this information in my capital structure information. Lastly, I consider Dr. Toby Brown's assessment of the relative risk of the Utilities to arrive at my recommended allowed ROE and capital structure.[1]

II. SUMMARY OF CONCLUSIONS

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

A4: The current determination of the Utilities' allowed ROE takes place during a time of uncertain economic and financial conditions resulting from the on-going COVID-19 pandemic. The pandemic led to historically low interest rates in Canada and the U.S. and substantial declines in stock and commodity prices in 2020, while at the same time measures of volatility spiked to all-time highs and remained elevated for some time. Measures of risk premiums that investors require above the risk-free rate to invest in equities and bonds have increased as well. Going forward, the length and extent of the financial and economic impacts of the pandemic are not known.[2] However recent indications by the Bank of Canada and the U.S. Federal Reserve suggest economic conditions are improving and that monetary policy responses enacted during the pandemic may soon be scaled back. Equity and

[1] Direct Testimony of Dr. Toby Brown ("Brown Testimony")

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

commodity markets are also recovering relative to the height of the pandemic, although recent increases in inflation has created additional uncertainties.[3] In light of the heightened uncertainty, it is important to assure investors that the allowed ROE and capital structure is such that the Utilities can continue to raise the capital needed to provide safe, adequate, and reliable service to their customers, while also providing a return that is comparable to those of other utilities with comparable risks.

Of note, the last year has seen substantial changes in financial markets with increases in the amount utility investors require to invest in utilities over and above the yield on government bonds increase. Specifically, the market equity risk premium has increased from that of pre-COVID-19, as has the systematic (or non-diversifiable) risk for utilities.

Q5: Do you have any preliminary conclusions and opinions regarding the appropriate allowed ROE and capital structure?

A5: Based on my estimation of the cost of equity at 40 and 46 percent equity, which are the currently allowed equity in the Utilities' capital structure,[4] I find that at 40 percent equity a Canadian utility reasonably has a cost of equity of 9.75 to 11.25 percent, while the ranges for U.S. natural gas and water utilities is wider, but supportive of the range. At 46 percent equity, a Canadian utility reasonably has a cost of equity of 9.0 to 10.25 percent. Again, the U.S. natural gas and water utilities have a wider, but supportive range. Therefore, at the currently allowed capital structures a reasonable range for the allowed ROE is, assuming capital structure is used to adjust for any business risk differences, 9.0 percent to 10.75 percent.[5]

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[3] According to a recent report by BBC News, the inflation rate as measured by consumer prices reached 4.4% in September. Source: BBC News, "Canada's inflation rate hits a fresh 18-year high," October 20, 2021 https://www.bbc.com/news/business-58986399

[4] Énergir: 38.5% common equity, 7.5% preferred equity, 54% debt; Intragaz: 46% equity, 54% debt; Gazifère: 40% equity, 60% debt.

[5] In all cases, I determined the lower and upper bound as the average of the results from the CAPM/ ECAPM and DCF rounding to the nearest ¼ percent.

FIGURE 1: SUMMARY OF REASONABLE RANGES AT 40% EQUITY

	Canadian Sample	Natural Gas Sample	Water Sample
CAPM/ ECAPM	8.25% - 10.5%	9.5% - 12.5%	9.5% - 12.5%
DCF*	10.5% - 12.0%	9.75% - 12.25%	8.75% - 14.5%

FIGURE 2: SUMMARY OF REASONABLE RANGES AT 46% EQUITY

	Canadian Sample	Natural Gas Sample	Water Sample
CAPM/ ECAPM	7.75% - 9.75%	9.0% - 11.5%	8.75% - 11.5%
DCF*	9.5% - 10.75%	9.0% - 11.0%	8.0% - 13.0%

*The lower DCF estimate is from the multi-stage DCF model, while the upper estimate is from the single-stage DCF model. The single-stage DCF results are non-trivially higher.

In his testimony, Dr. Brown assesses the business risks faced by the three Utilities and compares them to the business risks faced by the utilities in the natural gas utility sample.[6] Dr. Brown concludes that business risks faced by Énergir and Intragaz are above average, relative to the proxy sample, and Gazifère's risks are near the top of the range.[7] Taken together with the above reasonable ranges of ROE results, I recommend the Régie authorize a benchmark ROE of 10.0% for Énergir and Gazifère. Intragaz is proposing a 10-year rate period, which creates additional risks that capital market or business conditions may change during the rate period. I recommend that the Régie add a maturity premium to the authorized benchmark ROE of 50 basis points based on a portion of the yield spread on 10-year and 2-year Government of Canada and Canadian utility bonds.[8] This results in an ROE of 10.5% for Intragaz (the benchmark ROE plus a maturity premium).

[6] Business risks relate to the operations and business environment of a company.

[7] Brown Testimony, Section IV

[8] The proposed structure and quantification of 50 basis points is further explained in Section 0.

Regarding the Utilities capital structure, I recommend that Énergir is regulated using debt and equity only, with the current level of preferred equity allocated 60% to equity and 40% to debt,[9] for a capital structure of 43% equity and 57% debt. For Intragaz I recommend the entity similarly is regulated on 43% equity and 57% debt.[10] For Gazifère, which the Régie in the past has considered the riskiest gas utility, I recommend an equity percentage of 45% and a debt percentage of 55%. The higher equity percentage for Gazifère recognizes Gazifère's higher business risk and challenges meeting current credit metrics as specified by DBRS.[11]

FIGURE 3: RECOMMENDED ALLOWED ROE AND DEEMED CAPITAL STRUCTURE

	Allowed ROE	Common Equity	Preferred Equity	Debt
Énergir	10.0%	43%	0%	57%
Intragaz	10.0% Base + 0.50% Adder	43%	0%	57%
Gazifère	10.0%	45%	0%	55%

Q6: How is the remainder of your testimony organized?

A6: Section III formally defines the cost of capital and explains the techniques for estimating it in the context of utility rate regulation. Section IV discusses the relationship between capital structure and required return and explains how I account for this in order to ensure comparability of returns consistent with the fair return standard. Section V discusses conditions and trends in Canadian and U.S. capital markets and their impacts on the cost of capital. Section VI explains my cost of equity analysis and presents the results. Section VII explains my capital structure analysis and presents the results. Finally, Section VIII concludes my testimony with a summary of my recommended ROE and capital structure for the Utilities.

[9] I note that, for example, DBRS treats 75% of preferred as equity, so the allocation above is conservative. Source: DBRS Rating Report, "Fortis Inc.," May 15, 2019, p. 1.

[10] I acknowledge that Intragaz in the past has had an equity percentage of 46% and a lower ROE than both Énergir and Gazifère. Therefore, should the Régie find against granting Intragaz the same ROE as that allowed Énergir and Gazifère, I recommend maintaining its currently allowed equity percentage.

[11] Again, should the Régie determine a lower equity percentage for Gazifère, I recommend maintaining a higher ROE than that awarded to other gas utilities.

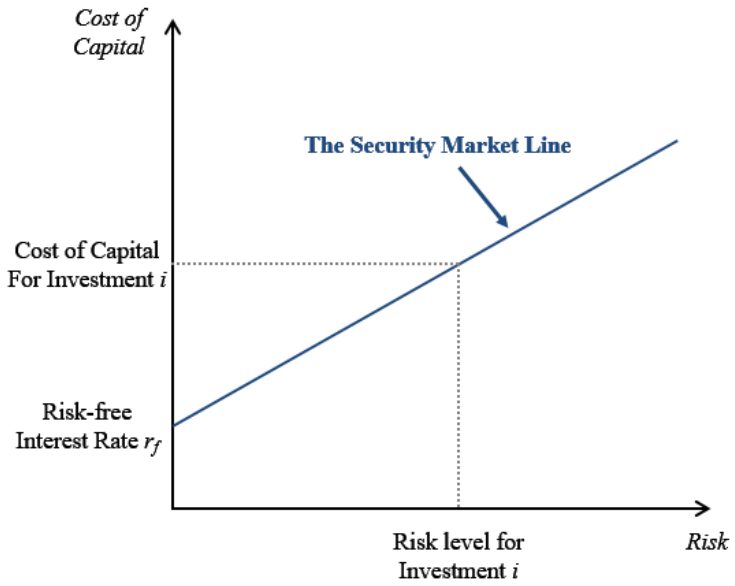
III. COST OF CAPITAL PRINCIPLES AND APPROACH

Q7: How is the "Cost of Capital" defined?

A7: The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. Put differently, it is the rate of return investors require based on the risk-return alternatives available in competitive capital markets. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect" and "expected," as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return that can be represented by the "security market risk-return line" or "security market line" for short. The line is depicted in Figure 4 below. The higher the risk, the higher cost of capital required.

FIGURE 4: THE SECURITY MARKET LINE



Q8: Please define systematic risk and its relevance for an equity investment.

A8: Systematic risk is the risk that an investor cannot diversify away. Specifically, it is the risk inherent in market movements, so even if an investor holds a diversified portfolio of assets, the exposure to that risk remains.

Importantly, for the purpose of estimating the cost of equity for a given asset or business venture, two categories of risk are important. The first is systematic risk, which is the degree to which the cash flows generated by the business (and its assets) vary in response to moves in the broader market. In the context of the CAPM, systematic risk can be quantified in terms of an "asset beta" or "unlevered beta." For a company with an asset beta of 1.0, the value of its enterprise will increase (decrease) by 1% for a 1% increase (decrease) in the market index. This risk inherent to movements in the broader market is called systematic risks.[12]

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

Q9: What is the relationship between the allowed return on equity for a utility and the expected return for investors in that utility?

A9: The allowed (or authorized) return on equity is a component of the authorized rates that the utility will charge its customers. Prospectively, investors will expect to earn a return equal to the allowed return provided that investors expect the costs that the utility will incur in providing utility service to customers to be equal to the amounts provided for in the authorized rates. For example, if investors expect that the utility will incur more Operation and Maintenance (O&M) expenses than the level adopted by the regulator in determining authorized rates, investors will expect to earn a return on equity *below* the level of the allowed return on equity.

[12] Additional discussion of Systematic Risk can be found in the Technical Appendix, Exhibit BV-1

Utility regulators usually aim to include in authorized rates a reasonable estimate of the cost of providing utility service in the test period. Thus, provided that the test period is representative of future conditions, investors will expect to earn a return equal to the allowed return. However, because utility assets are long-lived, investors need to be concerned about the possibility of failing to recover investment in these assets over an extended period of time. This concept is referred to as "capital recovery risk", and is addressed further in the evidence of Dr. Brown.

Q10: What are the guiding principles for determining allowed utility returns?

A10: The Supreme Court of Canada (as well as the U.S. Supreme Court) has acknowledged and confirmed that one part of a "fair return" is that the return is comparable to what investors would receive if investing in alternative securities with the same risk characteristics. That is, the fair return standard recognizes the generally accepted principals of regulatory finance that the cost of capital reflects the opportunity costs to investors of forgoing the opportunity to earn a return from an alternative investment of similar risk. As noted in the seminal Supreme Court of Canada case *Northwestern Utilities*:

> By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise (which will be net to the company) as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise.[13] [emphasis added]

In addition to this comparability standard, there are two additional components of the fair return standard, which the Régie has also affirmed in prior regulatory decisions. In Gaz Métro's 2009 rate modification request, the Régie acknowledged and confirmed that the fair return criteria includes:[14]

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[13] *Northwestern Utilities Limited v. City of Edmonton*, (1929) S.C.R. 186 ("*Northwestern"*). A similar sentiment is reflected in the U.S. Supreme Court decisions of *Bluefield Water Works Co. v. Public Service Commission*, 262 U.S. 679 (1923) (*Bluefield*); and *Federal Power Com'n* v. *Hope Natural Gas Co*., 320 U.S. 591 (1944) (*Hope*).

[14] Régie de l'énergie du Québec D-2009-156, R-3690-2009, 2009 12 07, ¶173 and ¶ 189.

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

In the seminal U.S. Supreme Court cases *Hope* and *Bluefield,* the Court echoed these three components of the fair return standard.[15] That is, the "fair return standard" is a central component of the regulatory framework in both Canada and the U.S. regulatory jurisdictions.

Q11: How does the standard for a reasonable rate of return relate to the cost of capital?

A11: The "comparable investments" component of the fair return standard defines comparability in terms of "equal attractiveness, stability, and uncertainty." That is, the "comparability" of investments and returns must be considered on a risk-adjusted basis and consider the risk factors that affect both the potential variability in expected returns as well as the average level of those returns. It is important to note that the Supreme Court of Canada did not distinguish between sources of stability and sources of uncertainty in its *Northwest Utilities* decision.[16]

The impact of risk on investors' required returns is central to the financial concept of the opportunity cost of capital, and to the "comparable investments" and "capital attraction" components of the fair return standard. Put simply, a fair return must be sufficiently attractive to compensate investors for forgoing the opportunity to earn a return from an alternative investment of comparable risk. The return that investors require to compensate for this

[15] *Hope,* 320 U.S. at 603 and *Bluefield,* 262 U.S. at 680.

[16] *Northwestern* (1929) S.C.R. 186

opportunity cost is the cost of capital. Therefore, a fair allowed return must be at least as high as that available on comparable investments (*i.e.*, it must meet the comparability criteria).

The third component of the fair return standard requires that the allowed return be sufficient to maintain the company's financial integrity, such that its operations are not hampered by inadequate cash flows. This is necessary component of a fair return, but not a sufficient one, as even a return that provides cash flow adequate to support operations may not be sufficient to attract investment capital in competition with comparably risky alternative investments. Even if an allowed return and deemed equity thickness[17] allow a utility to maintain a high quality credit profile and raise debt capital on reasonable terms, it does not necessarily ensure that the return on equity—when appropriately accounting for the risk-impact of financial leverage inherent in the regulatory capital structure—is competitive with that available for alternative investments of comparable risk.

Q12: Are there additional economic considerations that affect the relationship between allowed return and the cost of capital?

A12: Yes, beyond the basic elements of the fair return standard discussed above, utility regulators and customers must concern themselves with the broader economic consequences of providing an inadequate return to the company's investors. In the short-run, deviations from the expected rate of return on the rate base from the cost of capital may seemingly create a "zero-sum game"—the perceptions investor gain if customers are overcharged, and customers gain if investors are shortchanged. This view is not valid. In the longer term, inadequate returns are likely to expose customers—and society generally—to risks that cost far more than may be saved in the short-run. Inadequate returns lead to inadequate investment, whether for maintenance or for new plant and equipment. Without access to investor capital, the company may be forced to forego opportunities to maintain, upgrade, and expand its system in facilities that decrease long-run costs. Indeed, the costs to consumers of an undercapitalized industry can be far greater than any short-run gains from

[17] Equity thickness refers to the proportion of equity in a company's capital structure.

shortfalls in the cost of capital. This is especially true for capital-intensive industries (such as natural gas utilities), which feature systems that take a long time to decay. Such long-lived infrastructure assets cannot be repaired or replaced overnight because of the time necessary to plan and construct the facilities.

Q13: What guides your choice of methodologies for estimating the cost of capital and informing your recommendations for the Utilities' allowed returns?

A13: There are multiple methodologies to estimate the cost of capital, each with its own advantages and disadvantages. I find it reasonable to use more than one methodology in the estimation process. This sentiment is echoed by well-known academics such as Steward C. Meyers, the Robert C. Merton Professor of Finance at MIT, who has concisely and eloquently stated:

> Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.[18]

Other scholars agree. For example, Professors Berk and DeMarzo of Stanford University in their corporate finance textbook comment on the use of the Capital Asset Pricing Model (CAPM), Discounted Cash Flow (DCF) Model and other models by practitioners:

> It is not difficult to see why there is so little consensus in practice about which technique to use. All the techniques we covered are imprecise. Financial economics has not yet reached the point where we can provide a theory of expected returns that gives a precise estimate of the cost of capital. Consider, too, that all techniques are not equally simple to implement. Because the tradeoff between simplicity and precision varies across sectors, practitioners apply the techniques that best suit their particular circumstances.[19]

[18] Stewart C. Myers, "On the Use of Modern Portfolio Theory in Public Utility Rate Cases: Comment," Financial Management, Autumn 1978, p. 67

[19] Jonathan Berk and Peter DeMarzo, Corporate Finance: The Core, 3rd edition, 2013, (Berk & DeMarzo 2014) p. 466.

In the *Northwest Utilities* decision, the Supreme Court of Canada did not specify a methodology for determining a reasonable return.[20] The Régie has in the past recognized the importance of looking to multiple models and stated, "Régie also takes into account the results of other models for the purpose of its estimate of the rate of return to be granted to Gaz Métro."[21]

The view that multiple tests are preferable is also consistent with the approach taken by other provincial regulators in Canada as well as the U.S. Federal regulator.[22] The weight assigned to each methodology varies across jurisdiction and time.

Q14: Please summarize how you considered risk when estimating the cost of capital.

A14: To assess the cost of capital for the Utilities, I start by selecting proxy groups of publicly traded companies that provide regulated utility services. Specifically, I selected proxy groups consisting of Canadian domiciled utility holding companies (Canadian Sample) as well as samples of U.S. natural gas utilities (Natural Gas Sample) and U.S. water utilities (Water Sample). Each of the utility proxy groups have a high proportion of regulated assets and revenues with the majority having more than 80 percent of their assets subject to regulations.

Amongst the samples, the Natural Gas Sample is the closest to a pure play operator of utility natural gas distribution infrastructure assets. The Canadian Sample reflects the risks faced by utilities operating within Canada; however, I note that these companies are increasingly

[20] *Northwestern* (1929) S.C.R. 186

[21] Régie D-2009-156, ¶300 (free translation).

[22] See, for example, British Columbia Utilities Commission, "Generic Cost of Capital Proceeding (Stage 1) Decision," Decided May 10, 2013 (BCUC 2013 Decision), p. 80 and confirmed in British Columbia Utilities Commission, "Decision and Order G-129-16," August 10, 2016, p. 47; Ontario Energy Board, EB-2009-0084, "Report of the Board on the Cost of Capital for Ontario's Regulated Utilities," December 11, 2009, p. 36, and Newfoundland & Labrador Board of Commissioners of Public Utilities, "Order No. P.U. 18(2016); issued June 8, 2016, p. 27. It is also consistent with the U.S. Federal Energy Regulatory Commission ("FERC') revised methodology for electric transmission ROE, which in recent decisions has relied on two (FERC Opinion 569, Docket No. EL14-12, EL15-45, December 19, 2019), four methods (FERC Opinion 531, Docket No. EL11-66-001 et al., October 16, 2018) or more recently three methods (FERC Opinion 569-A, issued May 21, 2020 and 569-B, issued November 19, 2020).

diversified both geographically—owing to acquisitions that grant them substantial ownership of regulated network operations in the United States and elsewhere—and in terms of exposure to non-utility business operations. Given the de-carbonization risks faced by natural gas utilities, the Water Sample reflects the risk faced by a decarbonized utility that uses a network of pipes to deliver commodities to end users. I discuss each sample and the selection process in further detail in Section VI.

To arrive at my final ROE recommendation, I consider (i) the range of estimates I have derived, (ii) the current economic outlook, (iii) financial risk differences, and (iv) the business risks of the Utilities relative to that of the benchmark samples. I rely on Dr. Brown's Testimony assessing the Utilities' risk to inform my placement of my recommendations relative to the sample estimates.

As discussed extensively in Section IV below, shareholders of a company with more debt face more equity risk and the return on equity needs to increase. The deemed equity thickness applied to the Utilities imposes significantly greater financial leverage—and thus greater financial risk—compared to the less levered capital structures of the benchmark sample companies. (Indeed the difference is between 15 and 40 percentage points in terms of debt ratio depending on the sample.) To account for the differences in financial leverage and associated risk differences, I apply standard finance techniques to unlever and relever the cost of equity estimates and betas. I discuss the finance principles underlying these adjustments in the next section and provide additional technical detail and theoretical background in the Technical Appendix to this evidence.

IV. CAPITAL STRUCTURE AND THE FAIR RETURN STANDARD

Q15: What is your understanding of the Régie's approach to determining the capital structure for the Utilities?

A15: In prior decisions, the Régie has considered the business risks faced by the utility and the capital structure (and returns) of other utilities that face similar risks.[23] Higher (lower) business risks can increase (decrease) the variability of returns. This can negatively affect the financial integrity of a utility, particularly if it has a larger proportion of fixed obligations (*e.g.*, debt) all else equal. Therefore, the Régie also evaluates the impact of the capital structure and allowed ROE on implied credit rating metrics of the utilities.[24] Specifically, the Régie aims to set the capital structure and allowed ROE such that the utilities can maintain their financial integrity, which in my view is a credit rating in the A-range.[25] By doing so, the Régie minimizes financing costs for the utility and its customers and ensures comparability of returns to other utilities.[26]

Q16: How should capital structure be taken into account with respect to ensuring that the allowed returns meet the fair return standard?

A16: As discussed further below, the proportion of debt in the capital structure—also known as financial leverage—influences the risk borne by equity investors. For a given degree of business risk, a higher proportion of debt financing (*i.e.*, lower equity thickness) increases the expected variability of equity returns. Thus, an ROE that is fair at a given capital structure will **not** be comparable on a risk-adjusted basis if applied to an otherwise identical firm with a more debt-laden capital structure.

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[23] For example, D-2003-93, pp. 50-51 and D-2013-081, p. 137.

[24] D-2011-182, p. 252, 254 and D-2009-159, p. 53.

[25] D-2009-156 ¶173.

[26] D-2011-182, p. 252, 254 and D-2009-159, p. 53.

Put differently, if more debt is used, the greater financial risk imposed by the greater financial leverage must be compensated by a commensurately higher expected return on equity. Otherwise, the more leveraged firm will not receive a fair return and will be at a disadvantage in the competition to attract capital in equity markets.

Q17: What is the current return on equity and deemed equity ratios for the Utilities?

A17: Figure 5 below summarizes the current allowed ROE and deemed equity ratios approved by the Régie for Énergir, Intragaz, and Gazifère.

FIGURE 5: ALLOWED ROE AND DEEMED EQUITY RATIOS

	Allowed Return on Equity	Deemed Equity Capital Structure
Énergir	8.9%	38.5% (+7.5% Preferred)
Intragaz	8.5%	46.0%
Gazifère	9.1%	40.0%

Q18: Are the Utilities' allowed returns and capital structure comparable to those awarded in other North American utility regulatory jurisdictions?

A18: No. Figure 6 below summarizes the allowed ROE and capital structure granted by provincial and state regulators for Canadian and U.S. utilities in the last four years.

As the table shows, the allowed ROE for Énergir, Intragaz, and Gazifère are below that for natural gas utilities in both Canada (9.49% in 2020) and the United States (9.46%). At the same time, the deemed common equity ratios for Énergir and Gazifère are also below that of natural gas utilities in Canada (41.9%) and the United States (51.9%).[27] Stated another way, the higher financial leverage relative to other North American gas utilities is not compensated by a commensurately higher equity return and can result in a *lower* return on the utility's equity rate base. This is inconsistent with the "comparable return" component of the fair return standard. I note that Intragaz' common equity ratio is above that of the average

[27] Énergir currently has 38.5% common equity and 7.5% preferred in its deemed capital structure.

Canadian gas utility and below that of U.S. natural gas utilities; however, it's allowed ROE is below the natural gas average in North America.

FIGURE 6: ALLOWED ROE AND CAPITAL STRUCUTRES IN CANADA AND THE U.S.

Service	2020		2019		2018		2017		2016	
	Allowed ROE (%)	Common Equity Ratio (%)	Allowed ROE (%)	Common Equity Ratio (%)	Allowed ROE (%)	Common Equity Ratio (%)	Allowed ROE (%)	Common Equity Ratio (%)	Allowed ROE (%)	Common Equity Ratio (%)
U.S.										
Natural Gas	9.46	51.86	9.71	51.75	9.59	50.12	9.72	49.88	9.54	50.06
Electric	9.44	49.69	9.66	49.94	9.60	49.02	9.74	48.90	9.77	48.91
Electric T&D	9.10	49.22	9.37	50.38	9.38	49.92	9.44	48.84	9.31	49.12
All	9.45	50.54	9.68	50.73	9.59	49.54	9.73	49.23	9.68	49.36
All - Settled	9.46	50.91	9.73	49.99	9.58	49.50	9.72	48.86	9.65	48.04
All - Fully Litigated	9.43	50.15	9.63	51.37	9.61	49.59	9.75	49.66	9.70	50.50
Canada										
Natural Gas	9.49	41.93	9.43	42.31	9.31	41.72	9.31	40.32	9.27	40.32
Electric	8.65	37.57	8.70	37.57	8.78	37.88	8.75	38.94	8.71	39.04
All	9.02	39.47	9.07	39.78	9.09	39.79	9.07	39.61	9.05	39.65
All (excluding Quebec and Crown Corp.)	9.07	39.75	9.09	40.10	9.10	40.09	9.09	39.84	9.05	39.89

Sources: for U.S. data: averages calculated using S&P Global Market Intelligence data accessed September 9, 2021
For Canadian data: commission filings, company financial documents, 2020. Concentric Energy Advisors, Authorized Return on Equity for Canadian and U.S. Gas and Electric Utilities.

Q19: How does the degree of financial leverage for the Utilities compare to that inherent in the market data observed for your proxy companies?

A19: As shown in Figure 7 below, the deemed common equity ratios for the Utilities are much lower than the publicly traded equity of the comparator companies that make up my proxy groups. Of particular note, the common equity ratios for the Natural Gas sample is almost 10 percent higher than that of the Utilities. Even the more diversified sample of Canadian utilities has higher common equity ratios that are above that of the Utilities.

FIGURE 7: AVERAGE CAPITAL STRUCTURES OF PROXY GROUP COMPANIES

Proxy Sample	DCF Capital Structure			3-Year Average Capital Structure		
	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio
	[1]	[2]	[3]	[4]	[5]	[6]
Canadian Sample Average	48.8%	3.4%	47.8%	45.6%	4.4%	50.0%
U.S Natural Gas Sample Average	55.2%	1.2%	43.6%	61.1%	0.8%	38.1%
U.S Water Utility Sample Average	69.5%	0.0%	30.5%	70.8%	0.0%	29.2%

Sources and Notes:
[1], [4]:Workpaper #1 to Schedule No. BV-4.
[2], [5]:Workpaper #2 to Schedule No. BV-4.
[3], [6]:Workpaper #3 to Schedule No. BV-4.
Values in this table may not add up exactly to 1.0 because of rounding.

Therefore, the cost of equity estimates based on the market-derived model inputs (*i.e.*, stock prices, dividends, betas) for the proxy companies reflect substantially lower financial risk than the Utilities. An equity investment in the Utilities is subject to a capital structure with a debt component that is about 6 to 15 percentage points higher compared to an equity investment in other publicly traded natural gas utilities in North America, imposing higher financial risk on investors. Consequently, absent an adjustment to account for differences in financial leverage, the raw model results are *not* comparable for purposes of determining a fair return, even to the extent the underlying business risk is comparable.

Q20: Are there standard financial techniques to account for differences in financial leverage when using proxy companies to estimate a risk-comparable rate of return for a target company?

A20: Yes. The techniques for adjusting cost of equity estimates measured based on one capital structure for application at a different capital structure of the target company are taught in Corporate Finance textbooks as fundamental tools for valuation and capital budgeting analysis.[28] The approach is as follows:

- First, estimate the cost of equity (or equity beta) for the proxy company at its observed capital structure.
- Second, unlever this cost of equity (or equity beta) by calculating the overall cost of capital (or "asset beta") that would apply if the company's assets were financed entirely with equity.[29]

[28] *See*, for example, Brealey, Myers, and Allen, *Principles of Corporate Finance*, 10th Ed. (2011), pp. 482-86 and 491-92.

[29] As discussed below, finance theory (based on the original Nobel Prize winning work of Modigliani and Miller) posits that the *unlevered cost of capital* is constant across a broad middle range of capital structures, representing the required return for an investment in the firm's assets as a whole, independent of the particular financing decisions employed. The precise formulation of the equation representing the unlevered cost of capital depends on specific assumptions made regarding the value of tax shields from tax-deductible corporate debt, the role of personal income tax, and the cost of financial distress. Whichever formula is selected should be used both to *unlever* the observed sample company cost of equity and to *relever* at the target capital structure. Sensitivities can be performed using the various versions of the formula.

- Finally, relever the all-equity cost of capital (or asset beta) based on the leverage ratio associated with the target capital structure.

If the target capital structure has less debt than the capital structures of the proxy companies whose market data is used to estimate the cost of equity, then this process will adjust the measured cost of equity downward to reflect the reduced risk from lower financial leverage. Conversely, if—as is the case in this proceeding—the target (deemed regulatory) capital structure imposes greater financial leverage than is observed in the capital structures of the proxy companies, the raw estimates of the cost of equity must be adjusted upward by the unlevering/ relevering technique to reflect the commensurate higher financial risk.

Q21: Can you provide an example to illustrate how increased financial leverage increases the variability (and thus the risk) of equity returns, even in circumstances when the greater leverage does not substantially worsen credit conditions?

A21: Yes. Consider two hypothetical cost of service regulated utility companies: utilities A and B. Assume both utilities have the same business risk, and that they are awarded the same 10 percent allowed return on equity, but different deemed equity thicknesses—35 percent and 45 percent, respectively. Further suppose that the deemed equity thicknesses were determined consistent with a policy of maintaining Funds From Operations (FFO)-to-debt credit metrics above an assumed target threshold of 9.0%, and assume for the sake of illustration that this is sufficient to provide both utilities access to credit on similar terms.[30] (In a realistic setting, the greater debt leverage for Utility A would likely also manifest in at least *some* increased borrowing cost or other deterioration in terms of access to debt capital; nevertheless, this example conservatively assumes such credit consequences away in order to emphasize that the increased financial risk consequences of greater leverage to *equity investors* occurs even in the absence of materially adverse credit consequences.) Figure 8

[30] While utility B will have a higher FFO-to-debt as a result of the higher equity thickness, this analysis assumes for the sake of illustration that the forecast metrics of both utilities earn the same credit rating and thus both utilities are able to issue debt at the same cost.

summarizes the assumed inputs for this example, along with the calculated FFO-to-debt metric and overall allowed return on rate base for each hypothetical utility.

FIGURE 8: CAPITAL RECOVERY PARAMETERS FOR HYPOTHETICAL UTILITIES A AND B

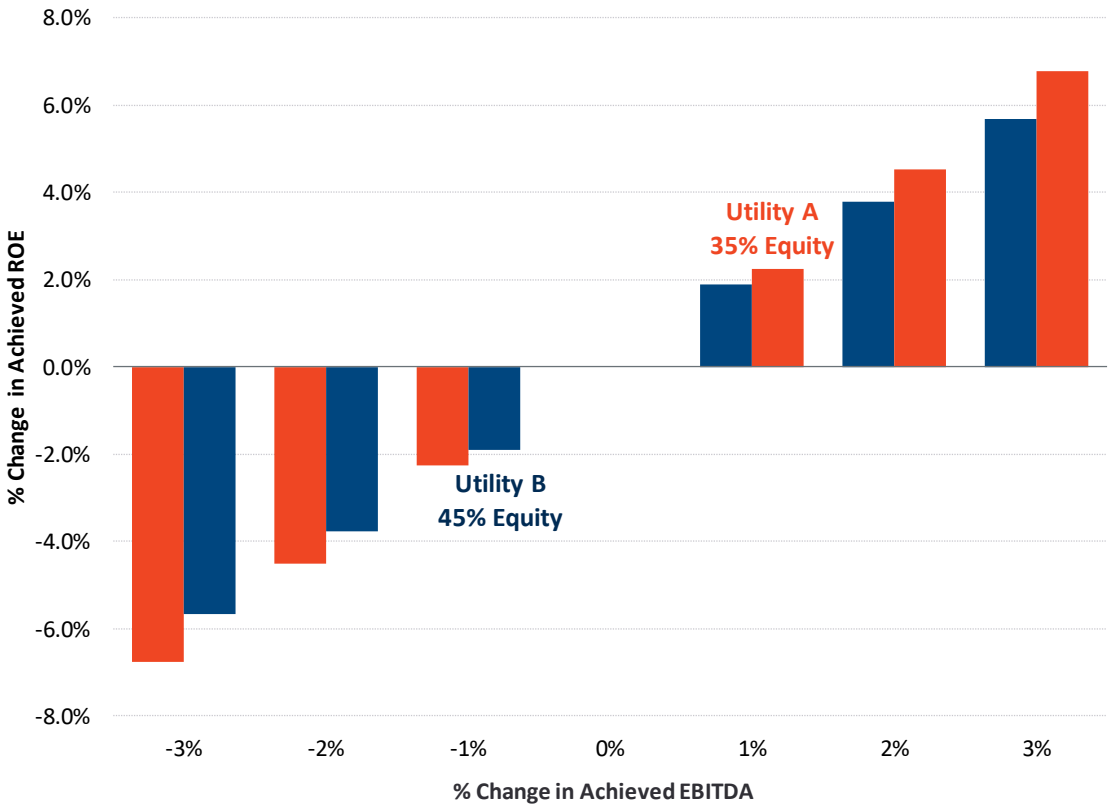
		Utility A	Utility B
Equity Ratio	[1]	35.0%	45.0%
Debt Ratio	[2]	65.0%	55.0%
Return on Equity	[3]	10.0%	10.0%
Return on Debt	[4]	5.0%	5.0%
Tax Rate	[5]	23.5%	23.5%
Depreciation Rate	[6]	2.5%	2.5%
Return on Rate Base	[7]	6.75%	7.25%
Assumed Rate Base	[8]	1,000	1,000
FFO	[9]	$60	$70
FFO-to-Debt	[10]	9.2%	12.7%

Notes:
[1] through [6], [8] are assumptions.
[7] =[1]*[3] + [2]*[4]
[9] = ([1]*[3] + [6])*[8]
[10] = [9]/([8]*[2])

In the illustrative example set out above, the two utilities have different overall allowed returns on rate base and their rates will contain provision for recovery of different levels of EBITDA,[31] but they all expect to achieve the same return on equity—10 percent—if actual revenues and costs turn out to match the revenue requirement. Importantly however, if capital recovery cash flows vary from the expected levels on which rates are based, the variation impacts the equity holders of the two utilities differently. Specifically, shareholders in utility A face greater variability in realized return on equity than utility B's shareholders. Figure 9 below illustrates this effect, showing the percent change in realized return on equity (relative to the allowed ROE of 10 percent) for a given change in the expected level of EBITDA.

[31] I focus on EBITDA in this example because in this simplified setup it represents the level of revenue allowed—or actually earned—net of operating expenses, which do not factor into capital recovery calculations or credit metrics.

FIGURE 9: PERCENT CHANGE IN REALIZED RETURN ON EQUITY FOR A GIVEN PERCENT CHANGE IN REALIZED CASH FLOWS



As the example illustrates, capital structure affects the risk of an equity investment in a manner distinct from its influence on credit metrics and default risk. Figure 9 shows that the expected equity return of 10 percent does not constitute a "comparable return" for both utilities, because there is *more equity risk* inherent in the lower equity ratio for utility A. The more leveraged returns are simply more sensitive to variability due to business risk factors (which are common to both utilities in the example), even though both meet similar credit standards.

Consequently, meeting the requirements for financial integrity is not sufficient to ensure that returns are comparable on a risk-adjusted basis. To address the comparability component of the fair return standard when setting the allowed equity ratio, it is necessary to additionally consider how the financial risk inherent in a given capital structure—when combined with

an allowed return on equity—compares to the returns equity investors can earn on alternative investments of comparable business and financial risk.[32]

Q22: Does established finance theory provide a framework to account for differences in financial leverage when estimating the cost of equity?

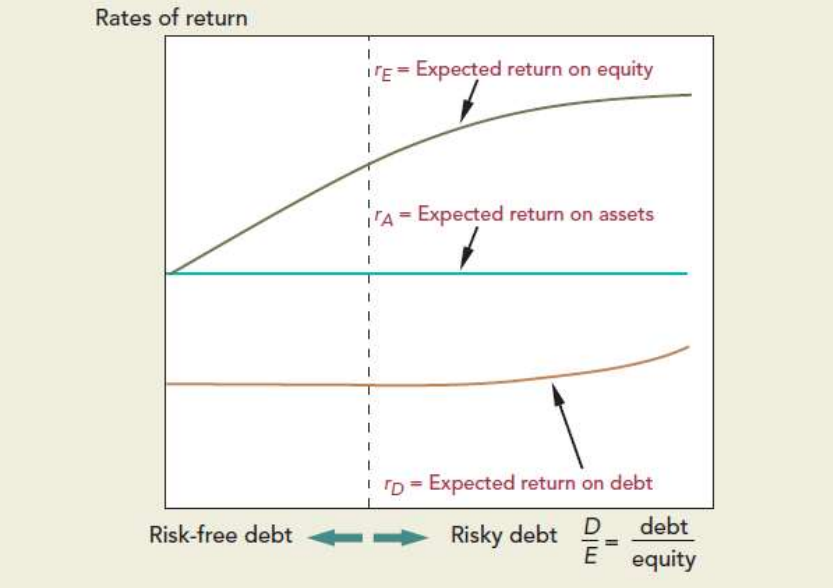
A22: Yes. The principle that financial leverage amplifies the variability of equity returns and thereby increases the financial risk to equity investors is a firmly established core principle of corporate finance. It is directly connected to the Modigliani Miller proposition that, except as influenced by the tax-deductibility of debt and the cost of financial distress, the value of a firm's assets is independent of its choice of financing. This intuitive framework means that some measure of the *overall* cost of capital for firms with comparable systematic business should be the same regardless of capital structure,[33] even if the costs of the *equity* and/or *debt components* of financing vary in proportion to the degree of financial leverage.

In its simplest form, this relationship is illustrated in Figure 10, reproduced from the seminal textbook *Principles of Corporate Finance* by Brealey, Myers, and Allen. It illustrates that as the capital structure shifts to use a greater proportion of lower cost debt financing, the investor required return on equity (and debt, especially at higher leverage ratios) increases to compensate for the greater financial risk, such that the overall required return on assets remains unchanged.

[32] In addition, satisfaction of the capital attraction component of the fair return standard may require an evaluation of whether investors perceive a heightened risk of non-recovery of capital or if additional asymmetric risk factors affect the utility's ability to attract equity capital. More fundamentally, if equity investors cannot receive a comparable return for investing in a given firm (*e.g.*, Utility A), that firm will be at a disadvantage in attracting equity capital, and may face higher costs to raise capital.

[33] Except in cases of extremely high or low leverage, where the tax and financial distress effects may dominate.

FIGURE 10: ILLUSTRATION OF THE MODIGLIANI MILLER PRINCIPLE[34]



Q23: Can you provide a numerical example to illustrate this principle?

A23: Yes. Consider the simple hypothetical example below, where only the financial leverage of a company varies. I assume the return on equity is 10% at a 50% equity capital structure and determine the return on equity that would result in the same overall return if the percentage of equity in the capital structure were reduced to 40%.

[34] Brealey, Myers, and Allen, *Principles of Corporate Finance*, 10th Ed. (2011), p 429, Figure 17.2.

FIGURE 11: ILLUSTRATION OF THE IMPACT OF FINANCIAL RISK ON ALLOWED ROE

	Company A (50% Equity)	Company B (40% Equity)
Rate Base	$1,000	$1,000
Equity	$500	$400
Debt	$500	$600
Cost of Debt (5%)	$25	$30
Return on Equity	$50	$45
Total Cost of Capital (7.5%)	**$75**	**$75**
ROE / Implied ROE	10%	11.25%

The table above illustrates how financial risk affects returns and the allowed ROE: the overall return does not change, but the allowed ROE required to produce the same return goes up in recognition of the increased risk to equity investors caused by the higher degree of financial leverage.

The principle illustrated in Figure 11 is exemplary of the rationale for the adjustments I perform using standard unlevering / relevering formulas to account for differences in financial risk when conducting estimates of the cost of equity applicable to the Utilities.

Q24: What is your recommended approach to determining a deemed capital structure and allowed ROE consistent with the comparability fair return standard?

A24: I account for comparability for business risk by selecting samples of companies with identifiable business risks characteristics and, as informed by Dr. Brown's business risk analysis, placing my ROE recommendation within the ranges of cost of equity estimates for those samples.

To ensure comparability of financial risk, I employ standard techniques for unlevering and relevering betas and returns to account for differences in capital structure among the sample companies and compare that to the deemed capital structure for the Utilities.

I recommend that the benchmark equity thickness be set at 43% for Énergir and Intragaz and at 45% for Gazifère. I believe doing so will ensure that the Utilities can maintain credit

quality above the minimum thresholds for an A-range rating, and thus be robust to potential financial pressure in event of adverse capital market conditions.

Further, provided the recommended equity percentage is applied along with an appropriately risk-comparable allowed ROE (in accordance with my cost of capital analysis), this 43% to 45% equity thickness (along with the ROE) will appropriately reflect the business risk characteristics of the Utilities' as analyzed by Dr. Brown. In my opinion, my recommended benchmark capital structure has the further benefit of being in line with the deemed equity ratios in other Canadian jurisdictions (as shown in Figure 6), and closer to (though still at the low end of) the level of equity typically included in the regulatory capital structure of comparable U.S. regulatory utilities.

Even my recommended 43% equity or 45% equity regulatory capital structure has much greater financial leverage compared to levered equity investments in the stock of U.S. Gas LDCs. However, by applying standard finance techniques to account for these differences in financial leverage, I base my ROE recommendations on cost of equity estimates that are calculated to be risk-comparable at a target capital structure (40% and 46% equity thickness) that is typical of Canadian utility regulatory regimes.

Because my cost of equity estimates (and therefore my ROE recommendation) depend on the degree of financial leverage in the capital structure to which they will be applied, I emphasize that if the Régie sets the benchmark deemed equity ratio below 43%, my ROE recommendation must increase to account for the increased financial risk. For comparison, I note that the average U.S. gas LDC has a regulatory capital structure that includes approximately 50 percent equity.[35]

As I discussed above, the Utilities' current deemed equity capital structure and the allowed ROE do not provide a levered equity return consistent with that investors could expect to earn in capital markets on alternative equity investments of equivalent risk. Consequently,

[35] According to S&P Global Insight, the average gas LDC had an allowed equity percentage of 51.8% in 2020 and 50.8% year-to-date in 2021.

in reporting my results and recommendations (below in Section VI and Section VII), I indicate what they are if the Régie adopts my 43% and 45% equity recommendation or if the Régie maintains the Utilities' current equity ratios shown in Figure 5 above.

V. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL

Q25: What do you cover in this section?

A25: In this section, I address recent changes in capital market conditions, the increased volatility in equity and debt markets, how these factors affect the cost of equity and its estimation. Specifically, I address (i) interest rate developments; (ii) recent changes in utility credit spreads; and (iii) investors perception of the market risk premium.

Q26: Why do you discuss capital market conditions in a testimony aimed at determining the Utility's ROE and capital structure?

A26: Capital market conditions are important to cost of equity estimation methodologies and can affect the inputs to the cost of equity models. For example, inputs to the DCF models are affected by the economy in general as economic growth will affect growth rates and utility stock prices. Consequently, the capital market developments affect the growth rates, dividend yield, and assessment of estimates' reasonableness.

Furthermore, the risk-free rate is an input to the risk premium model and CAPM, so that recent and expected developments in government bond yields are important to assess the validity of any measure of the risk-free rate. Similarly, the MRP is an input to the CAPM, so factors that affect the MRP (*e.g.*, volatility and changes in investors' risks perceptions) are vital for accurate determination of the ROE.

Q27: Can you provide a summary of recent events that have impacted capital market conditions?

A27: Since the start of the COVID-19 pandemic, capital markets in Canada and the U.S. have undergone historic changes. Following the World Health Organization's declaration that the COVID-19 outbreak was a pandemic, many governments around the world, including Canada and the U.S., sought measures to limit the health and economic impacts from the pandemic. On March 9, 2020, flight-to-quality behaviors by investors had pushed yields on 10-year Canadian Government bond to 0.225%[36] and on the same day the entire U.S. Treasury yield curve settled below 1.00% for the first time in history.[37] By-mid March 2020, local and provincial governments began issuing stay-at-home orders and major portions of the North American economy shut down. In mid-March 2020, the border between Canada and U.S. was closed to non-essential travel. Unemployment increased significantly and has yet to recover to pre-pandemic levels: despite the sizable recuperation of jobs in June, the employment rate remains 1.7% below where it was in February 2020.[38] To help mitigate the economic impacts, the Canadian government announced over C$100 billion in stimulus package aimed at supporting citizens and businesses.[39] The Bank of Canada also cut its policy rate from 1.75% in January 2020 to 0.25% in March 2020.[40] The Bank of Canada also launched a range of quantitative easing programs aimed at supporting the financial markets.[41] Similar actions were undertaken in the U.S. The U.S. Federal Government passed

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[36] Esteban Duarte, "Massive bond rally pushes Canadian yields to record lows," Bloomberg News, March 9, 2020, accessed August 19, 2021, https://www.bnnbloomberg.ca/massive-bond-rally-pushes-canada-yields-to-record-lows-1.1402576.

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

[38] Bank of Canada, Monetary Policy Report, July 2021, p. 15

[39] Al Jazeera, "Canada's new budget sets aside billions for pandemic support," April 19, 2021, accessed August 19, 2021, https://www.aljazeera.com/economy/2021/4/19/canada-new-budget-billions-pandemic-support-surging-third-wave.

[40] Bank of Canada, Policy Interest Rate, accessed August 19, 2021, https://www.bankofcanada.ca/core-functions/monetary-policy/key-interest-rate/.

[41] Bank of Canada, "Bank of Canada lowers overnight rate target to ¼ percent," March 27, 2021, accessed August 19, 2021, https://www.bankofcanada.ca/2020/03/press-release-2020-03-27/.

the US$2.1 trillion CARES Act on March 27, 2020.[42] The U.S. Federal Reserve also cut its policy rate to 0 to 0.25 percent and announced extensive quantitative easing and emergency liquidity programs to support financial markets.[43] Amidst the economic disruptions, the supply and demand in global oil markets became unbalanced. On April 19, 2020, West Texas Intermediate (WTI) oil prices settled at a negative price (-US$37.63) for the first time in history, creating further challenges for Canadian oil producing provinces.[44] Despite the fiscal and monetary policy responses, the Canadian and U.S. economies contracted substantially in 2020. According to the Bank of Canada, real GDP declined by 5.3% in 2020[45] A study by Statistics Canada in October 2020 found that closure of the Canada-U.S. border had reduced Canada's GDP by C$27.9 to C$37.1 billion, which accounted for 14% of the total decline in GDP due to the pandemic (through the time of the study).[46] In the U.S., real GDP declined by 3.5% in 2020.[47]

In December 2020, the Canadian government gave approval to the first COVID-19 vaccine, the distribution of which has allowed social distancing measures to be relaxed and portions of the Canadian economy to reopen. In addition, the Canadian-U.S. border partially reopened in August 2021. While economic activity has rebounded and "downside risks associated with the pandemic have significantly diminished", the Bank of Canada notes that growth in the first half of 2021 is slower than estimated.[48] Real GDP growth in Q1 2021 was 5.6% (quarter-

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42 The White House, "Statement by the President," March 27, 2020, accessed August 19, 2021, https://trumpwhitehouse.archives.gov/briefings-statements/statement-by-the-president-38/.

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

44 Stephanie Kelly, "Oil price crashes into negative territory for the first time in history amid pandemic," Reuters, April 19, 2020, accessed August 30, 2021, https://www.reuters.com/article/us-global-oil/oil-price-crashes-into-negative-territory-for-the-first-time-in-history-amid-pandemic-idUSKBN2210V9.

45 Bank of Canada, Monetary Policy Report, July 2021, p. 12

46 Statistics Canada, "Study: The Economic Impact of Travel Restrictions on the Canadian Economy due to the COVID-19 pandemic," October 23, 2020, https://www150.statcan.gc.ca/n1/daily-quotidien/201023/dq201023b-eng.htm.

47 Bureau of Economic Analysis, "Gross Domestic Product, (Third Estimate), GDP by Industry, and Corporate Profits, Fourth Quarter and Year End", U.S. Department of Commerce, March 25, 2021. Accessed August 30, 2021, https://www.bea.gov/news/2021/gross-domestic-product-third-estimate-gdp-industry-and-corporate-profits-4th-quarter-and

48 Bank of Canada, Monetary Policy Report, July 2021, p. 2

over-quarter) compared to the Bank of Canada's April Monetary Policy Report estimate of 7.0%.[49] In addition, Statistics Canada reported a decline in GDP of 0.3% from Q1 2021 to Q2 2021 after increasing for the prior months due to an increase in COVID-19 infections, suggesting the pace and timing of economy recovery remains uncertain.[50] At the same time, inflationary concerns have increased with the Consumer Price Index (CPI) at approximately 3%, well above the 2% target CPI rate.[51] However, on July 14, 2021, the Bank of Canada began to scale back its quantitative easing program to a target pace of $2 billion per week but left its policy rate unchanged at 0.25%.[52] Similarly, in the U.S. progress has been made on distributing vaccines, which has led to the reopening of portions of the U.S. economy. In fact, Canada recorded a record export of goods to the U.S. in C$39.7 billion driven by U.S. demand for crude oil, passenger cars, and light trucks.[53] Real GDP increased at an annualized rate of 6.6% in Q2 2021.[54] Inflation is also increasing in the U.S.; CPI is at 5.4% as of the end of July 2021.[55] Despite the recovery, the U.S. Federal Reserve has maintained its policy rate at 0 to 0.25 percent and its quantitative easing program.[56]

Q28: What are the expectations going forward?

A28: The extent and length of the economic and financial impacts from the pandemic are still unknown. The Bank of Canada notes that the "negative effects [of the pandemic] are waning, and the downside risks associated with the pandemic have significantly diminished," but

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49 *Id*., p. 13.

50 Peter Evans, "Canada's GDP shrank by 0.3% in 2nd quarter, ending 9-month streak of expansion," *CBC*, August 31, 2021, accessed October 12, 2021, https://www.cbc.ca/news/business/gdp-second-quarter-1.6159411

51 *Id*., p. 17.

52 Bank of Canada, "Bank of Canada maintains policy rate and forward guidance, adjusts quantitative easing program," July 14, 2021, https://www.bankofcanada.ca/2021/07/fad-press-release-2021-07-14/.

53 Statistics Canada, "Canadian international merchandise trade, June 2021," August 5, 2021, https://www150.statcan.gc.ca/n1/daily-quotidien/210805/dq210805a-eng.htm

54 U.S. Bureau of Economic Analysis, "Gross Domestic Production (Second Estimate) Corporate Profits (Preliminary Estimates) Second Quarter 2021," August 26, 2021, https://www.bea.gov/news/blog/2021-08-26/gross-domestic-product-second-estimate-corporate-profits-preliminary-estimate

55 U.S. Bureau of Labor Statistics, "Economic New Release: Consumer Price Index Summary," August 11, 2021, https://www.bls.gov/news.release/cpi.nr0.htm#.

56 U.S. Federal Reserve, July 2021 FOMC Statement, July 28, 2021, https://www.federalreserve.gov/monetarypolicy/files/monetary20210728a1.pdf.

cautions that "achieving a full and inclusive economic recovery will, however, take time."[57] Certain sectors of the economy may face uncertain near-term futures, particularly as new virus variants emerge. In addition, challenges in the labor market, supply chain issues, and inflation continue to put pressure on the economy.[58] Despite this, the Bank of Canada projects that real GDP will grow by 6.0% in 2021.[59] The U.S. Economy is facing similar economic and labor market concerns as it recovers.[60] However, the Congressional Budget Office forecasts that U.S. real GDP will grow by 7.4% in 2021.[61] As the Canadian and U.S. Economy begin to recover and accommodative monetary policies are scaled back, yields on Government bonds are expected to increase. Importantly, the Canadian and U.S. stock markets have historically exhibited a very large amount of co-movement. As discussed below, the correlation between the Canadian TSX and the U.S. S&P 500 indices is very high.

Q29: How does this impact the cost of equity estimation for the Utilities?

A29: It is important to remember that the cost of equity and capital structure established for the Utilities in this proceeding are expected to be in effect beyond the current extraordinary impacts of the COVID-19 pandemic. The analysis and recommendations should reflect expected market conditions that will prevail over the relevant rate period and not exclusively current market conditions. As discussed further below, many of the inputs to the cost of equity estimation methodologies are currently at unprecedented levels. Sole reliance on current economic and financial conditions to estimate the Utilities' cost of equity would unfairly lock them and their customers into the current economic and financial environment. Doing so would also not provide a fair return, especially when compared to other utilities that did not undergo a cost of capital proceeding during this period. However, the current

[57] Bank of Canada, Monetary Policy Report, July 2021, p. 11.

[58] *Ibid.*

[59] *Ibid.*, p. 12

[60] U.S. Federal Reserve, "Transcript of Chair Powell's Press Conference," July 28, 2021, https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20210728.pdf

[61] U.S. Congressional Budget Office, "An Update to the Budget and Economic Outlook: 2021 to 2031," July 2021, https://www.cbo.gov/system/files/2021-07/57218-Outlook.pdf

conditions create an exorbitant amount of uncertainty about the future and, if the financial crisis can be used as a guide, investors' heightened perception of risk are likely to linger.

A. Interest Rates

Q30: How do interest rates affect the cost of equity?

A30: The current interest rate environment affects the cost of equity estimation in several ways. Most directly, the CAPM takes as one of its inputs a measure of the risk-free rate. The estimated cost of equity using the CAPM decreases (increases) by one percentage point when the risk free rate decreases (increases) by one percentage point. Therefore, to the extent that prevailing government yields are depressed due to economic uncertainties related to COVID-19 or the monetary policy responses, using current yields as the risk-free rate will depress the CAPM estimate below what is representative of the forward-looking cost of equity, which will be in effect during the relevant regulatory period. Put another way, with current government bond yields downwardly biased due to flight-to-quality behavior by investors and unprecedented quantitative easing levels by the Bank of Canada, using current yields in the CAPM will also downward bias the cost of equity estimate. At the same time, a low interest rate is associated with a high market risk premium, so that these two measures offset one another to a degree. To avoid any bias in the cost of equity estimate, it is important to use a forecasted risk-free rate and consider whether the rate needs to be normalized (or the risk premium investors require needs to be adjusted) to ensure the resulting CAPM estimate reflects a non-biased estimate of the Utilities' cost of equity over the relevant regulatory period. As the economy begins to recover, as forecasted, in 2021 and 2022 interest rates are expected to increase from current lows. Therefore, the allowed fair return on equity for utilities should reflect the future interest rate environment.

Q31: What are the relevant developments regarding interest rates?

A31: Interest rates are currently near historic lows due to flight-to-quality behaviors by investors as well as the monetary policy actions by the Bank of Canada, including lowering the policy

rate and expansion of its quantitative easing programs.[62] Interest rates on 10-year Canadian Government bond yields were 1.7% at the end of 2019.[63] As large parts of the economy began to shut down in response to the pandemic, investors fled riskier assets for safer investments. The demand for Canadian Government bonds caused yields to decrease rapidly. By August 2020, yields on 10-year Government bonds had fallen 130 basis points to a low of 0.43%.[64] Similarly, in the U.S., 10-year Government bond yields were 1.92% at the end of 2019[65] but fell to a record intraday low of 0.339% on March 9, 2020.[66] Since then, long-term government bond yields have increased somewhat—10-year government bond yields are about 1.13% in Canada[67] and about 1.24% in the U.S.[68]

Most economists expect the economy to begin to recover in 2021 and 2022. Despite recent upticks in COVID-19 infections, the Bank of Canada expects that "the negative effects [on the Canadian economy] are waning, and the downside risks associated with the pandemic have significantly diminished," but the recovery will be "lengthy and uneven."[69] As the economy recovers, interest rates are expected to rise from near-historic lows. *Consensus Forecasts* expects the 10-year Canadian government bond yield to increase 75 basis points

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62 Bank of Canada, COVID-19: Actions to Support the Economy and Financial System, accessed August 19, 2021, https://www.bankofcanada.ca/markets/market-operations-liquidity-provision/covid-19-actions-support-economy-financial-system/

63 Bank of Canada, Selected Bond Yields, accessed August 19, 2021, https://www.bankofcanada.ca/rates/interest-rates/canadian-bonds/

64 *Ibid.*

65 FRED, 10-Year Constant Maturity Rate (DGS10), U.S. Federal Reserve Bank of St. Louis, accessed August 19, 2021, https://fred.stlouisfed.org/series/DGS10

66 Sunny Oh, "Treasury yield curve sinks below 1% after oil and coronavirus worries rout stocks," *Market Watch*, March 9, 2020, accessed August 19, 2021, https://www.marketwatch.com/story/30-year-treasury-yield-tumbles-below-1-after-oil-and-coronavirus-worries-rout-stocks-2020-03-09

67 Bank of Canada, Selected Bond Yields, accessed August 20, 2021, https://www.bankofcanada.ca/rates/interest-rates/canadian-bonds/

68 FRED, 10-Year Constant Maturity Rate (DGS10), U.S. Federal Reserve Bank of St. Louis, accessed August 20, 2021, https://fred.stlouisfed.org/series/DGS10

69 Bank of Canada, Monetary Policy, July 2021, p. 11, https://www.bankofcanada.ca/wp-content/uploads/2021/07/mpr-2021-07-14.pdf

to 1.9% by June 2022.[70] Similarly, *Blue Chip Economic Indicators* (BCEI) forecasts 10-year U.S. Government bond yields to increase to 2.1% in 2022.[71]

Lastly, it is important to note recent inflationary trends, which introduces new uncertainties to the financial markets and increase the returns required by investors to hold risky assets. The Bank of Canada expects CPI inflation to remain at or over 3% through the remainder of 2021 due to the pandemic—well above its 2% inflationary target.[72] Inflation is expected to remain at or slightly above target through 2024.[73] In the U.S., the Federal Reserve projects a very similar trajectory.[74] To the extent that inflation remains elevated, it will put upward pressure on Government bond yields and returns required by investors. I note that the longer the period for which the allowed return on equity is fixed, the more inflation becomes a risk factor.

B. Yield Spreads

Q32: Why are bond yield spreads relevant to your cost of equity analysis?

A32: Bond yield spreads (also called credit spreads) reflect the premium that investors demand to hold debt securities (specifically corporate or utility bonds) that are not risk free. Analogously, the MRP—which is a key input to the CAPM cost of equity estimation—represents the risk premium that investors require to hold equities rather than risk-free government bonds.[75]

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[70] Consensus Forecasts, June 2021, p. 17

[71] Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, June 2021, p. 3.

[72] Of note, the inflation rate as measured by the Consumer Price Index was 4.4% as of September 2021 – well above the targeted 2%. See footnote 3.

[73] Bank of Canada, Monetary Policy, July 2021, pp. 21-22, https://www.bankofcanada.ca/wp-content/uploads/2021/07/mpr-2021-07-14.pdf

[74] U.S. Federal Reserve, Summary of Economic Projects, June 16, 2021, p. 2 https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20210616.pdf

[75] The MRP is in further detail in Section V.C

If bond yields are influenced to some extent by the same underlying market factors that drive the systematic risk premium for equities, shifts in directly observable credit spreads can assist with inference about changes in the MRP, which itself must be estimated.[76] More specifically, if both credit spreads and equity premiums are determined in part by the general premium required by investors for bearing systematic risk, then an increase in credit spreads may indicate an increase in the forward-looking MRP.

Q33: How does the current spread between utility and Canadian government bond yields compare to historical spreads?

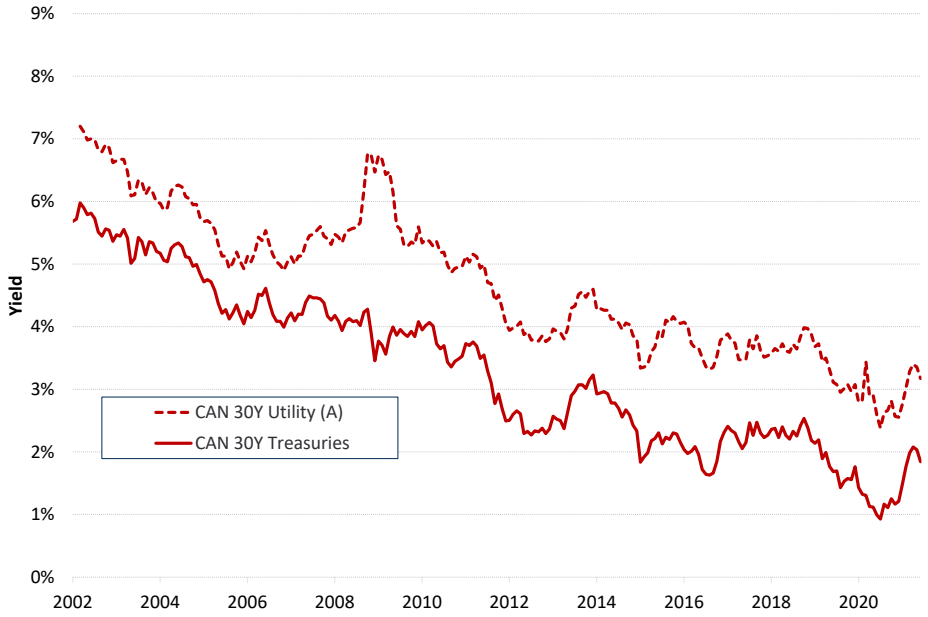
A33: As interest rates have declined, the spread between A-rated utility bonds and government bond yields has increased in both Canada and the U.S. As shown in Figure 12 below, the spread between 30-year A-rated utility bond yields and 30-year Government bond yields are currently approximately 1.33% in Canada. This compares to a long-term historic average spread of 0.99% in Canada prior to the financial crisis.[77] An elevated spread suggests that either government bond yields remain artificially low, the premium investors require to hold risky assets has increased relative to its long-term average, or some combination thereof.

[76] This is the same issue as in cost of capital estimation more generally: the cost of debt can often be directly observed in the form of market bond yields, whereas the cost of equity must be estimated based on financial models. See Section V.C and Exhibit BV-2 for further discussion of the MRP

[77] See Exhibit BV-7. Spread between Canadian A-rated utility bonds and 30-year Canadian Government Bond yields.

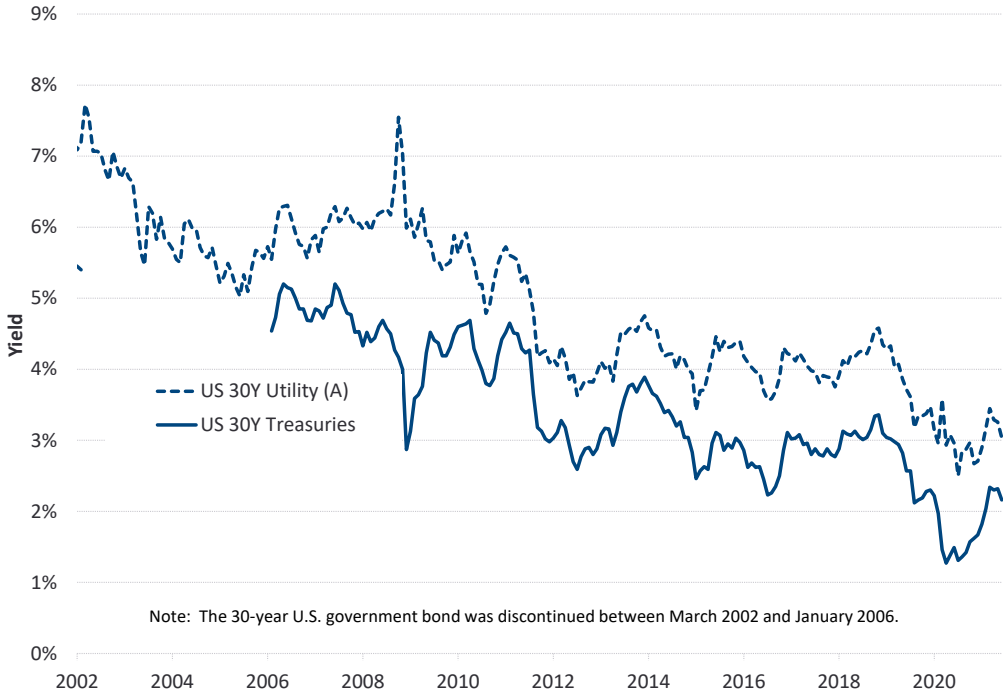
FIGURE 12: YIELD SPREAD BETWEEN UTILITY A-RATED AND GOVERNMENT BOND YIELDS

PANEL A--CANADIAN BONDS (2002-2021)



Source: Bloomberg, as of June 30, 2021.

PANEL B--U.S. BONDS (2002-2021)



Note: The 30-year U.S. government bond was discontinued between March 2002 and January 2006.

Source: Bloomberg, as of June 30, 2021.

Q34: What are the implications of the elevated yield spread relative to pre-crisis levels?

A34: The increase in yield spreads indicates that (i) the current long-term government bond yields are depressed relative to their normal levels and/or (ii) investors are demanding a premium higher than historical premiums to hold securities that are not risk free. The latter is an indication that the market equity risk premium may be elevated relative to its historic pre-recession levels. The consequence is that if the cost of equity is estimated using the risk-free rate and a market equity risk premium based on historic data, then it will downwardly bias the estimates. Hence, it is necessary to "normalize" the risk-free rate by taking into account the elevated spread or alternatively rely on a market equity risk premium that is higher than its historical average. An alternative way is to reflect a portion of the elevated yield spread in the risk-free rate and the remainder in the market risk premium.[78]

C. Risk Premiums

Q35: How do risk premiums affect the cost of equity estimation?

A35: Risk premiums provide an indication of the compensation investors expect to hold securities that are not risk free. If an investor demands a larger risk premium then the cost of equity will be larger. There are several indicators of risk premium magnitudes in addition to the yield spreads discussed above. For example, indicators such as stock market volatility (*e.g.* VIX in the U.S.) provide insights into the risk premium required by investors. SKEW provides a useful indicator of volatility over the next 12 months whereas, the MRP measures the compensation required to hold a security over a long investment horizon (*e.g.* more than one year), such as when rates are expected to be in effect. For this reason, the forecasted MRP is the most informative for determining the cost of equity in this proceeding.

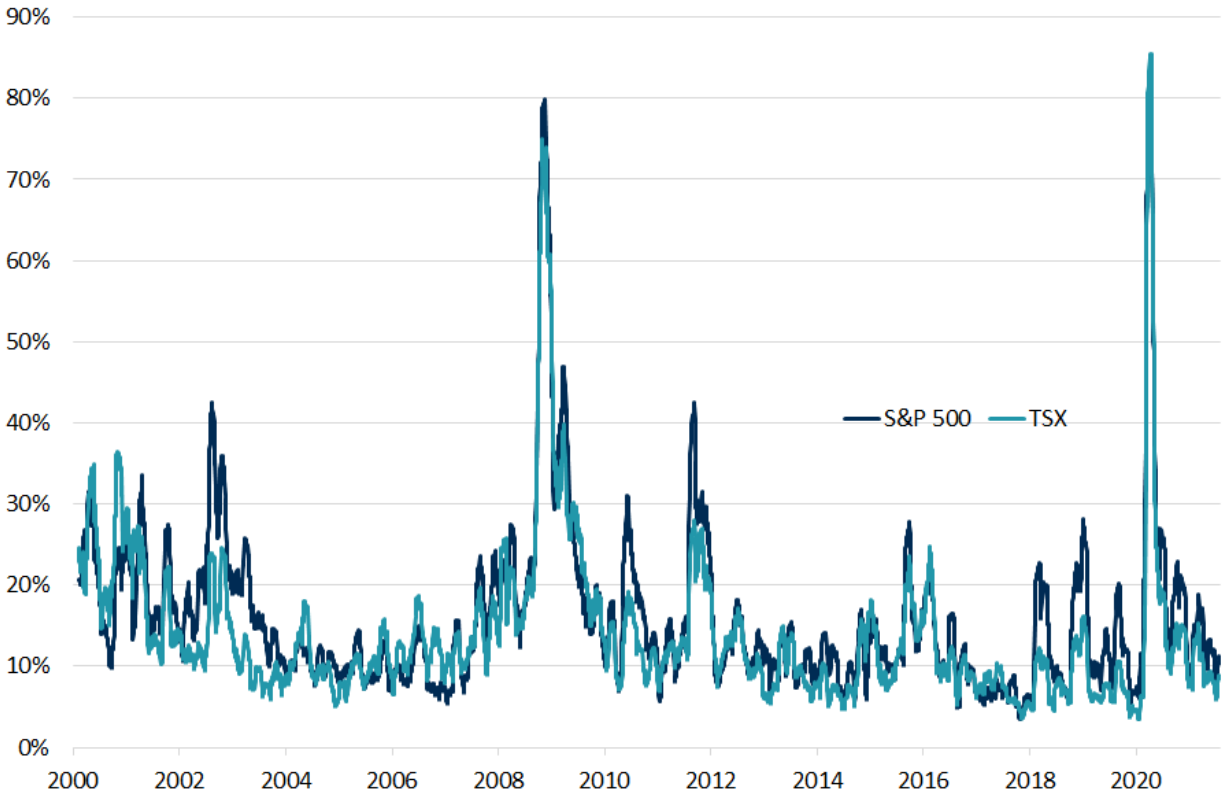
[78] I note that if a combination interpretation is used, it becomes important to make sure that the overall (total) "normalization" takes into account the elevated yield spread once and only once.

Q36: What is the current evidence regarding market volatility?

A36: Recently, financial markets have become extremely volatile as a result of the economic and financial impacts from the COVID-19 pandemic. Figure 13 below displays the 30-day trailing average volatility of the TSX and S&P 500.[79] Volatility in both the Canadian and U.S. markets peaked in early 2020 at the height of the COVID-19 pandemic, surpassing the peak during the financial crisis of 2008. In fact, the U.S. based VIX, which is frequently referred to as the market's fear index, reached an all-time high of 82.69 on March 16, 2020. Volatility in both Canada and U.S. remained elevated for some time but has recently returned to pre-COVID-19 levels.

[79] A common volatility measure in the U.S. is Cboe's VIX (https://www.cboe.com/tradable_products/vix/). However, the similar volatility index in Canada (VIXC) is no longer active as of January 2020.

FIGURE 13: VOLATILITY



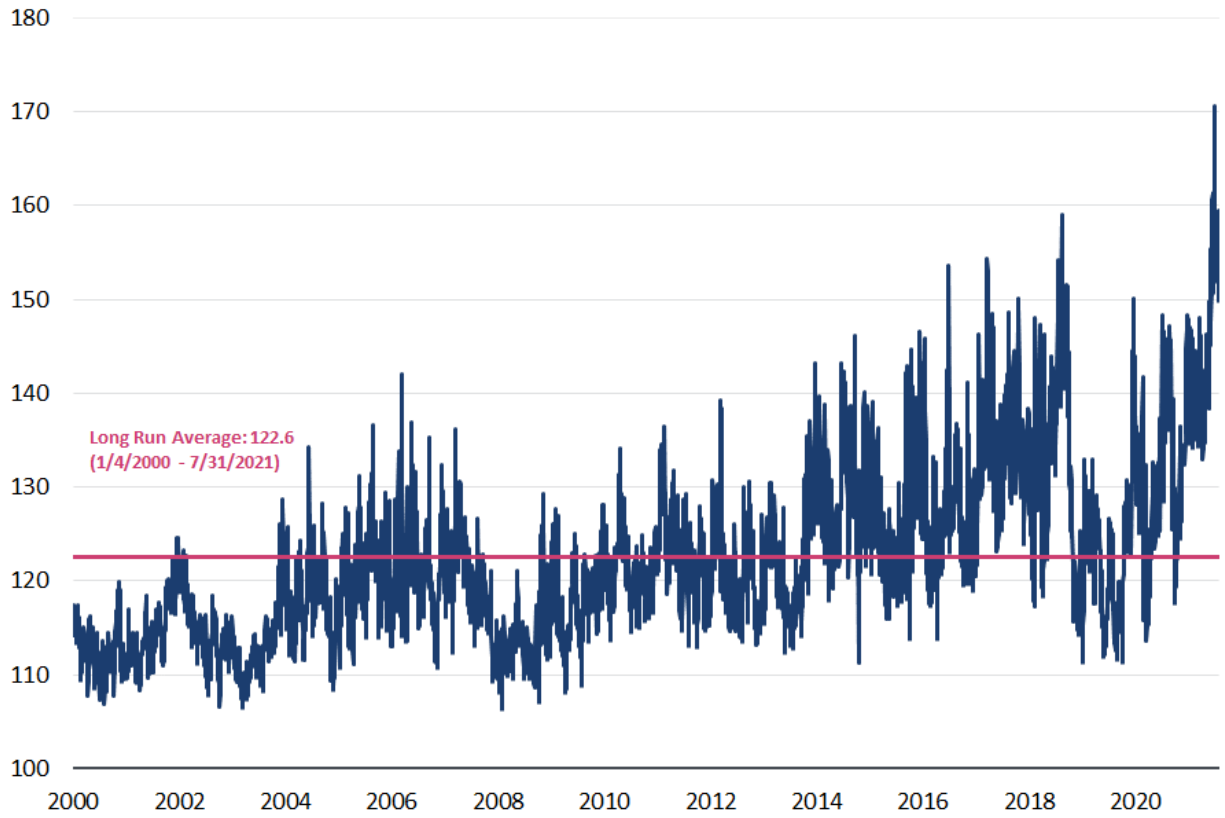
Source: Bloomberg as of 7/31/2021

Similarly, the SKEW index, which measures the market's willingness to pay for protection against negative "black swan" stock market events (i.e., sudden substantial downturns),[80] shows that investors are cautious. A SKEW value of 100 indicates outlier returns are unlikely, but as the SKEW increases, the probability of outlier returns becomes more significant. Figure 14 below shows the development in the SKEW since 2000 and that the index has recently increased following a period of declining SKEW. The index spiked over 170.6 on June 25, 2021, which is 48 points above its long run average of 122.6. This indicates that despite current volatility levels returning to pre-pandemic levels, investors are willing to pay for increasingly expensive hedges to protect against downturns in the market. If the

[80] For example, http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew.

returns that investors received for this level of risk were appropriate, then they would be less willing to pay for expensive hedges.

FIGURE 14: SKEW



Source: Bloomberg as of 7/31/2021

Q37: What is the Market Risk Premium?

A37: In general, a risk premium is the amount of "excess" return—above the risk-free rate of return—that investors require to compensate them for taking on risk. As illustrated in Figure 4 above, the riskier the investment, the larger the risk premium investors will require.

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

investors,[81] the MRP is a highly relevant benchmark indicating the level of risk compensation demanded by capital market participants. It is also a direct input necessary to estimating the cost of equity using the CAPM and other risk-positioning models.

Q38: Please explain the current evidence related to the Market Risk Premium.

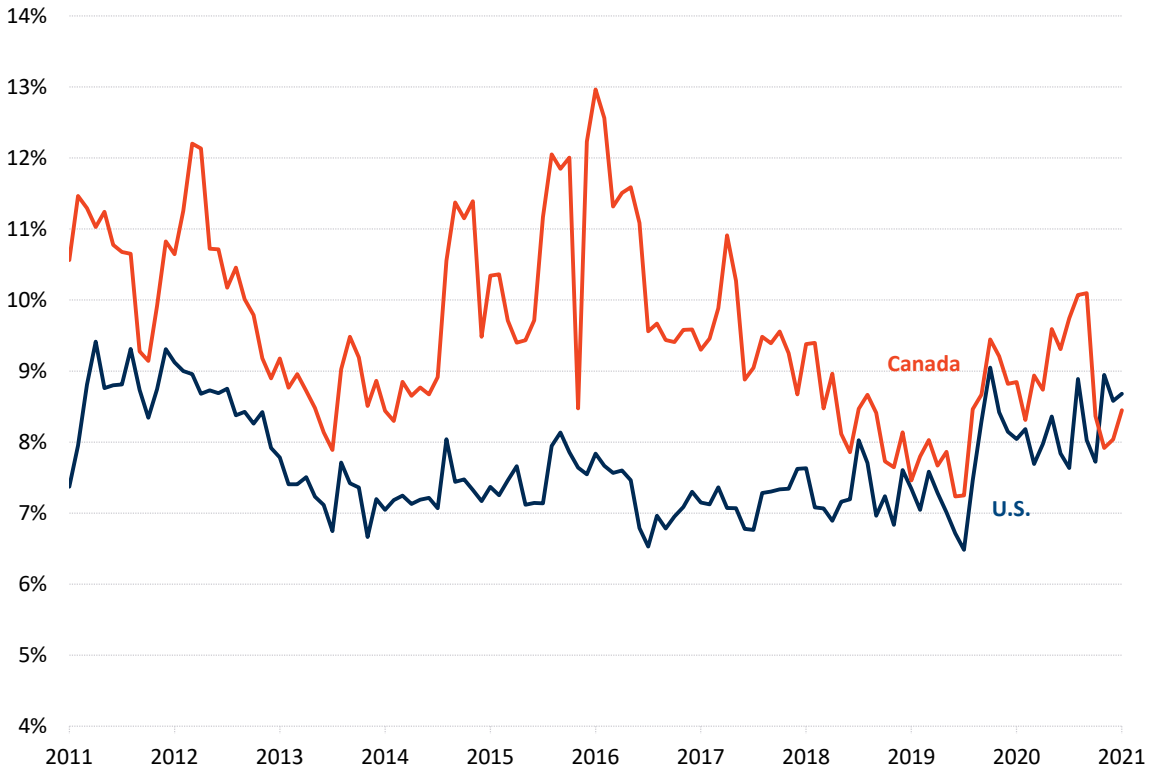
A38: The heightened volatility has increased the premium that investors require to hold risky assets, especially when measured utilizing forward-looking methodologies that estimate expected market returns with reference to current dividend yields. Since the beginning of the pandemic, Bloomberg's forward looking estimate of the MRP reached 10.10% in Canada and 9.05% in the U.S (see Figure 15 below).[82] Currently, the forecasted MRP is 8.45% in Canada and 8.68% in the U.S.[83] Clearly, the heightened financial and economic uncertainty resulting from the COVID-19 pandemic has increased the premium that investors require to hold risky assets such as the equity in the Utilities.

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

[82] Bloomberg, measured over a 10-year government bond yield.

[83] *Id.*, as of June 2021.

FIGURE 15: FORECASTED CANADIAN AND U.S. MARKET EQUITY RISK PREMIUM



Source: Bloomberg as of June 2021.

Q39: Are higher risk premiums relevant given that Treasuries are near historic lows?

A39: Yes—this is highly relevant for cost of equity estimation as current risk-free rates are extremely low. On March 9, 2020, the entire U.S. yield curve settled below 1.00% for the first time in history.[84] On the same day, Canadian 10-year Canadian government bond yields fell as low as 0.225%.[85] Since then, Canadian and U.S. Government bond yields have increased somewhat but remain near historic lows—10-year government bond yields are

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

[85] Esteban Duarte, "Massive bond rally pushes Canadian yields to record lows," Bloomberg News, March 9, 2020, accessed August 19, 2021, https://www.bnnbloomberg.ca/massive-bond-rally-pushes-canada-yields-to-record-lows-1.1402576.

about 1.13% in Canada[86] and about 1.24% in the U.S.[87] This decrease in bond yields has occurred as investors fled to safer assets due to the heightened market uncertainty. At the same time, the MRP has also increased as risk-free rates decreased.

Further, as shown in both academic and industry analysis, the allowed risk premium over the risk-free rate is inversely related to the risk-free rate. For example, Villadsen et al. (2017) found that the allowed risk premium increases by approximately 0.44% for each 1% decline in the risk-free rate using data for the period 1990 through 2015.[88] Morin finds that the risk premium increases by 0.52% for each 1% decline in the risk-free rate.[89] Thus, the risk premium is likely to increase as the risk-free rate declines. This phenomenon is also documented in the forward-looking market risk premium calculated by Bloomberg. According to Bloomberg, the current market risk premium is 8.45% in Canada,[90] which is substantially higher than the historical average Canadian MRP of about 5.68%.[91] It is also an increase over the forward-looking MRP in Canada at the end of 2019 of 7.25%.[92] Notably, the forward-looking MRP is a clear indication that the historical MRP is below what investors currently expect.

Q40: Is there evidence that the MRP will remain elevated going forward?

A40: Yes. In 2015, Duarte and Rosa of the Federal Reserve Bank of New York performed a study that aggregated the results of many models of the required MRP in the United States and

[86] Bank of Canada, Selected Bond Yields, accessed August 19, 2021, https://www.bankofcanada.ca/rates/interest-rates/canadian-bonds/

[87] FRED, 10-Year Constant Maturity Rate (DGS10), U.S. Federal Reserve Bank of St. Louis, accessed August 19, 2021, https://fred.stlouisfed.org/series/DGS10

[88] Bente Villadsen, Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe, "*Risk and Return for Regulated Industries*," Academic Press, 2017, pp. 118-119.

[89] Roger A. Morin, "*New Regulatory Finance*," Public Utilities Reports, Inc., 2006, pp. 123-125.

[90] Bloomberg, as of June 2021.

[91] *Duff & Phelps*, International Cost of Capital Navigator 2021.

[92] Bloomberg, as of June 2021.

tracked them over time.[93] This analysis found a very high MRP after the financial crisis, relative to time periods prior the financial crisis of 2008.

The authors estimated the MRP that resulted from a range of models each year from 1960 through the time of their study. The authors then reported the average as well as the first principal component of the results.[94] The authors found that the models used to determine the risk premium were converging to provide comparable estimates and that the average annual estimate of the MRP had reached an all-time high in 2012-2013. (Figure 16 below is a copy of the summary chart from Duarte and Rosa's 2015 paper). These directional trends identified by Duarte and Rosa are reasonably consistent with those observed from Bloomberg and they further support the proposition that the elevation of the MRP over its historical pre-crisis levels was a persistent feature of capital markets in the time following the financial crisis. Specifically, the financial crisis saw high volatility and a flight to quality – similar to conditions seen in 2020 in response to the COVID-19 pandemic. Therefore, it is reasonable to expect that the current MRP will remain elevated compared to historical levels, especially given the uncertainty related to the extent of economic and financial impacts from COVID-19 and the historically low interest rates.

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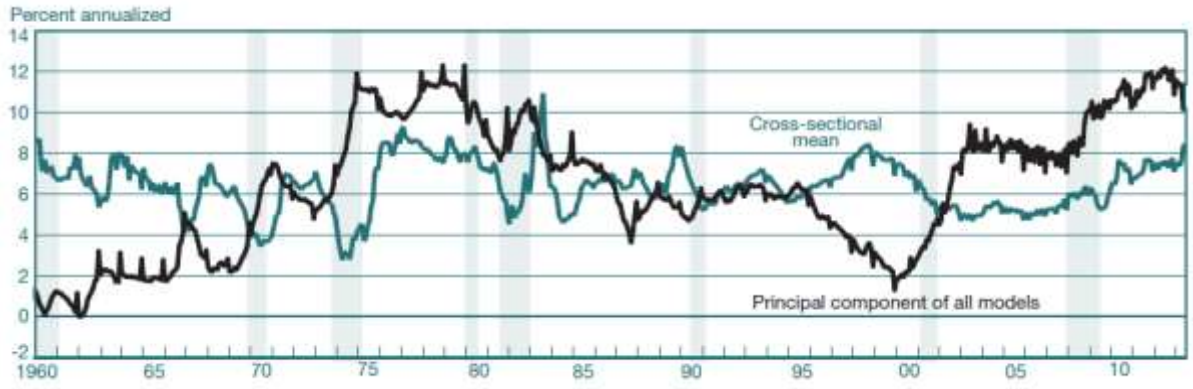
[93] Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models," *Federal Reserve Bank of New York*, December 2015 ("Duarte and Rosa, 2015")
https://www.newyorkfed.org/research/staff_reports/sr714.html.

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

FIGURE 16: DUARTE AND ROSA'S CHART 3
ONE-YEAR AHEAD MRP AND CROSS-SECTIONAL MEAN OF MODELS



Q41: Please summarize how the economic developments discussed above have affected the return on equity and debt that investors require.

A41: Utilities rely on investors in capital markets to provide funding to support their capital expenditure programs and efficient business operations. Investors consider the risk-return tradeoff in choosing how to allocate their capital among different investment opportunities. It is therefore important to consider how investors view the current economic conditions, including the plausible developments in the risk-free rate and the growth in the U.S. GDP.

These investors have been dramatically affected by the ongoing market uncertainty, so there are reasons to believe that their risk aversion remains elevated relative to pre-COVID-19 levels. As the Utilities are expected to be compensated on the equity component of their respective rate bases, the same factors would affect the Utilities' equity.

D. Canadian and U.S. Market Integration

Q42: How does the Canadian and U.S. Market integration affect the cost of equity estimation?

A42: Because of the interaction of financial markets and cross-border investments, there is a strong link between financial markets in Canada and in the U.S. As a result, investors consider not only Québec or Canadian utilities but also comparable U.S. investments. Since

investors clearly consider investment opportunities regardless of jurisdiction, it becomes important to include both Canadian and U.S. companies as comparable proxy companies in the cost of equity study. As shown in Figure 19, Canadian utilities own substantial assets in the U.S., so the cross-border investment considerations are valid for utilities as well as investments in general. The North American capital markets are integrated and investors have options to seek alternative investments in markets with the highest expected returns that are available to them. This integrated market relationship is fundamental to the fair return standard and provides insight to the "comparable investments" and "capital attraction" criteria of the standard. Furthermore, I also consider this fact when assessing, for example, what MRP to employ in my CAPM analysis. Put simply, if U.S. and Canadian markets are highly integrated, I need to rely on comparable set of companies from both countries, rather than from just Canada.[95]

Q43: Please summarize the relationship between the Canadian and U.S. capital markets.

A43: While the Canadian and U.S. market have experienced the financial and economic impacts of the COVID-19 pandemic differently, there are many similarities. For example, as illustrated in Figure 12 and Figure 15 above, interest rates declined and the forecasted MRP increased substantially following the start of the pandemic. Similarly, the 30-day trailing volatility for both the S&P/TSX and the S&P 500 track one another closely and reached levels higher than during the financial crisis (see Figure 13). Similarly, the S&P/TSX and the S&P 500 are highly correlated with a correlation coefficient of 0.85 since 2000.[96]

As further evidence of the integration of the two markets, the Bank of Canada's Canadian effective exchange rate is a weighted average of bilateral exchange rates for the Canadian dollar against currencies of Canada's major trading partners. The exchange rate weighs the U.S. the highest because of the large trading activity between the two countries.[97]

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[95] I note that while my recommended ROE is in line with that relied upon in the U.S., my recommended equity percentage is lower than what is commonly allowed in the U.S.

[96] See Villadsen Exhibit BV-7.

[97] Bank of Canada, Canadian Effective Exchange Rates, accessed August 23, 2021, https://www.bankofcanada.ca/rates/exchange/canadian-effective-exchange-rates/

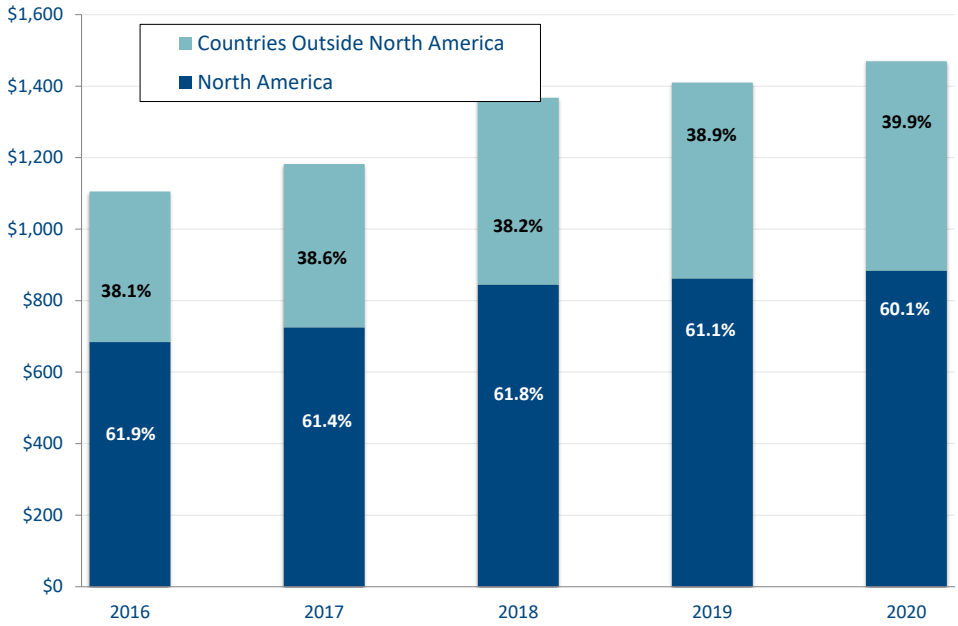
Q44: Do you have evidence of the magnitude of investments from the U.S. into Canada or Canada into the U.S.?

A44: Yes. Figure 17 summarizes Canada's international investment position by region. It is clear from Panel A that a significant portion (60%) of Canada's international direct investment abroad are into North America (primarily the U.S.). It is also worth noting that the magnitude of the investment into North America has been increasing. Further, the majority of the international investments are into equity.[98] Panel B also shows the origins of foreign direct investment into Canada are split approximately evenly between North America and elsewhere.

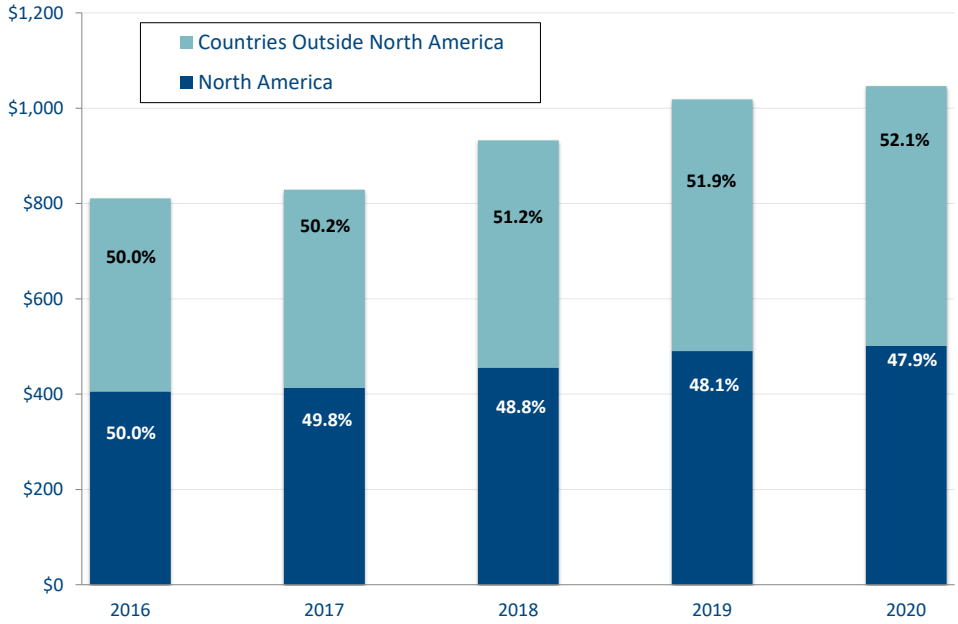
[98] Statistics Canada, Table 36-10-0474-01 International Investment position, book value, annual (x 1,000,000), accessed August 23, 2021, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610047401

FIGURE 17 SUMMARY OF DIRECT INVESTMENT: CANADA

PANEL A: CANADIAN DIRECT INVESTMENT ABROAD ($CAD BILLION)



PANEL B: CANADIAN DIRECT INVESTMENT IN CANADA ($CAD BILLION)



Q45: Do Canadian direct investments in U.S. equity pertain to utilities?

A45: Yes. Importantly, of the eight companies I consider for my Canadian Sample, six (75%) own more regulated assets in the U.S. than in Canada,[99] so those companies are better characterized as North American than Canadian. In addition, Canadian pension funds as well as Canadian utilities have invested in U.S.-based regulated assets. For example, four Canadian pension funds hold the majority of the equity in Puget Sound Energy in the state of Washington.[100] Most recently, in July 2021 the Ontario Teachers' Pension Plan Board and Macquarie Asset Management signed an agreement to acquire 31.6% stake in Puget Sound Energy from the Canadian Pension Plan Investment Board (CPPIB).[101] In addition, the British Columbia Investment Management Corporation (BCI) is part of a group that acquired CLECO in the state of Louisiana,[102] and the CPPIB teamed up with Aqua America to acquire Peoples in 2019.[103] Examining the infrastructure portfolios of Canadian pension funds (which include utility and energy sector investments) further illuminates that investors are seeking out higher returns in foreign markets. For example, the Public Sector Pension Investment Board (PSP) has invested 21.5% of its infrastructure portfolio in the U.S. but only 8.6% in Canada.[104] La Caisse de dépôt et placement du Québec has invested 35% of its infrastructure fund in the U.S. and 32% in Canada.[105] Similarly, the Alberta Investment

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99 See Figure 17.

100 Puget Energy and Puget Sound Energy, June 2021 Puget Energy Fixed Income Investor Presentation, June 2021, p. 18.

101 Macquarie Asset Management Press Release, Macquarie Asset Management and Ontario Teachers' Sign Agreement to Acquire Stake in Puget Holdings," July 7, 2021, https://www.businesswire.com/news/home/20210707005789/en/Macquarie-Asset-Management-and-Ontario-Teachers%E2%80%99-Sign-Agreement-to-Acquire-Stake-in-Puget-Holdings

102 CLECO Press Release, "Cleco and investor group enhance commitments to create additional value for customers and obtain approval of the Louisiana Public Service Commission," January 4. 2016, https://www.cleco.com/media/press-releases/detail/2016/01/04/cleco-and-investor-group-enhance-commitments-to-create-additional-value-for-customers-and-obtain-approval-of-the-louisiana-public-service-commission

103 CPP Investment Board Press Release, "Aqua announces $750 million investment from CCPIB," March 29, 2019, https://www.cppinvestments.com/public-media/headlines/2019/aqua-announces-750-million-investment-cppib

104 Public Sector Pension Investment Board, 2021 Annual Report, p. 50 https://www.investpsp.com/media/filer_public/documents/PSP-2021-annual-report-en.pdf.

105 Caisse de Dépôt et Placement du Québec, 2020 Annual Report, p. 2 https://www.cdpq.com/en/performance/annual-reports/2020.

Management Corporation's largest investment exposure outside of Canada is the United States (31.3%).[106]

Investment trends are similarly evident for Canadian energy companies. Fortis Inc. acquired Arizona-based UNS Energy in 2014, CH Energy Group in 2013, and ITC Holdings in 2016;[107] Emera Inc. acquired Florida-based TECO Energy Inc. as well as New Mexico Gas in 2015,[108] TransCanada and Enbridge acquired U.S. pipeline companies Columbia Pipeline and Spectra Energy Corp respectively in 2016.[109] AltaGas acquired WGL Holdings in 2018.[110] Algonquin Power acquired Empire District Electric in 2017 and Enbridge St. Lawrence Gas in 2019.[111] In March 2019, ENMAX's announced the acquisition of Emera Maine.[112] Finally, in November 2019, Algonquin Power announced its subsidiary Liberty Utilities would acquire American Water's regulated operations in New York.[113] Thus, there are plenty of Canadian investments in U.S. utilities. This shows the interconnectedness of investment decisions between the two countries particularly as it relates to utility assets. This also demonstrates that it is appropriate to consider both Canadian and U.S. utilities when estimating the cost of equity. Of importance to this filing, Dr. Brown finds that the Natural

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106 Alberta Investment Management Corporation, 2020 Annual Report, p. 3, https://annualreports.aimco.ca/2020/pdfs/AIMCo-AR2020.pdf.

107 Fortis Inc., "History," accessed August 18, 2021, https://www.fortisinc.com/about-us/fortis-history.

108 Albuquerque Business First, "One of NM's biggest-ever acquisition deals is finally about to close," June 22, 2016, accessed August 18, 2021, https://www.bizjournals.com/albuquerque/news/2016/06/22/prc-approves-emera-acquisition-teco.html.

109 TC Energy, "Columbia Gas Transmission," accessed August 18, 2021, https://www.tcenergy.com/operations/natural-gas/columbia-gas-transmission/. *See also*, Enbridge, "Enbridge and Spectra Energy combine to create North America's premier energy infrastructure company," accessed August 18, 2021, https://www.enbridge.com/enbridge-and-spectra.

110 AltaGas, "AltaGas Ltd. announces closing of its acquisition of WGL Holdings, Inc.," July 6, 2018, accessed August 18, 2021, https://www.altagas.ca/newsroom/news-releases/altagas-ltd-announces-closing-its-acquisition-wgl-holdings-inc.

111 Algonquin Power & Utilities Corp., "Asset Summaries," accessed August 18, 2021, http://investors.algonquinpower.com/MNA.

112 ENMAX Corporation Press Release, "ENMAX to Purchase Emera's Operations in Maine for 1.3 Billion USD," March 25, 2019, https://www.enmax.com/news-events/news/enmax-completes-emera-maine-acquisition.

113 Algonquin Power & Utilities Corp. Press Release, "Liberty Utilities Co. Expands Water Utility Presence with an Agreement to Acquire American Water's Regulated Operations in New York," November 20, 2019, https://www.newswire.ca/news-releases/liberty-utilities-co-expands-water-utility-presence-with-an-agreement-to-acquire-american-water-s-regulated-operations-in-new-york-822669747.html.

Gas Sample, which consists of U.S. gas LDCs, has the most comparable business risk to the Utilities.[114]

E. Impact on the Cost of Equity Estimation

Q46: Please summarize how the economic developments discussed above affect the return on equity and debt that investors require.

A46: Utilities rely on investors in capital markets to provide funding to support their capital expenditure programs and efficient business operations, and investors consider the risk-return tradeoff when choosing how to allocate their capital among different investment opportunities. There is evidence of investors moving capital away from Canada to other North American markets (see Figure 17), which could have long-term impacts on capital intensive industries. It is therefore important to consider how investors view the current economic conditions, including the plausible development in the risk-free rate and the MRP. These investors have been dramatically affected by the ongoing market uncertainty, so there are reasons to believe that their risk aversion remains elevated relative to pre-COVID-19 pandemic levels.

VI. ESTIMATING THE COST OF EQUITY

A. Proxy Group Selection

Q47: How do you identify sample companies of comparable business risk to the Utilities?

A47: The Utilities are engaged in the regulated distribution and storage of natural gas. As discussed by Dr. Brown, the business risks associated with these Utilities include the specific characteristics of the utility's operations, the regulatory environment in which the provider of these services operates, supply risk, demand risk, and competitive risks.[115] Consequently,

[114] Brown Testimony, Section IV.

[115] Brown Testimony, Section II

it is obviously not possible to identify publicly traded sample companies that replicate every aspect of the Utilities' risk profiles. However, ensuring that the sample companies have their business operations concentrated in similar lines of business and/or business environments is an appropriate starting point for selecting a proxy group of comparable risk to the target companies.

To this end, I have selected three samples—a Canadian utility sample, a U.S. Gas Utility sample, and a U.S. Water Distribution sample—each with different advantages when it comes to capturing relevant comparable business risk characteristics for estimating the Utilities' cost of capital. The proxy companies are similar to the Utilities in that they are regulated by provincial or state utility commissions, provide customers a product through a network of assets, and rely on substantial capital to provide service.

It is important that a proxy group used to assess the cost of equity for the Utilities (absent of any unique Quebec, Canadian, or company characteristics) is regulated, because regulation tends to place both substantial requirements and protections on the companies. I also believe the physical characteristics of the industry—for example, network, capital intensive, serving different customer groups (residential, commercial, industrial)—is a characteristic of each of the Utilities and each of the selected proxy utility companies. The network characteristic implies that assets cannot readily be employed in a different capacity, capital intensity affects the operating risks through the split between fixed and variable costs, and the customer composition affects the demand risk. For example, many natural gas and water utilities face declining per-customer demand due to conservation. Dr. Brown discuss how the natural gas utility industry is also undergoing substantial changes as customers, regulators, and legislative bodies focus on climate and energy policy goals, including in Québec.[116] As a result, the U.S. Water Utilities sample also serves as a low-carbon network utility benchmark to assess whether the estimates from the U.S. Gas Utility sample are reasonable.

[116] Brown Testimony, Section III

Q48: Please describe the Canadian Utility Sample.

A48: The Canadian Utility sample contains companies that have utility operations in Canadian regulatory jurisdictions and therefore provides insights into the risk and return of Canadian-based utilities. These companies' common equity shares are publicly traded on the Toronto Stock Exchange,[117] and in general the sample companies have long histories of paying periodic dividends to shareholders. The majority of the Canadian Utility sample companies are quite diversified and have some business segments engaged in unregulated operations (such as merchant power generation or the gathering and processing of natural gas) or regulated activities other than gas and electric distribution and transmission (such as natural gas storage facilities or common carrier oil pipelines). In addition to their Canadian business operations, many of these companies also have significant operations in the U.S., and other international jurisdictions. As I previously noted (in Section V.D), there have been significant amounts of recent acquisitions of U.S. utilities by Canadian energy companies. As a result, the business operations of the Canadian Utility sample are increasingly geographically diverse.

Figure 18 reports the proxy companies' annual revenues for the most recent four quarters, as of Q2 2021, and also the market capitalization, credit rating, beta, and analyst growth rate estimates. It also includes a categorization of regulated (R) or mostly regulated (MR) based on the percentage of each utilities' assets that are devoted to regulated activities. The annual revenue and market cap figures were obtained from Bloomberg. Betas are 3-year adjusted historical betas obtained from Bloomberg. The S&P credit rating is as reported by Bloomberg. Finally, the long-term (3- to 5-year) earnings per share growth estimate for each company is a weighted average between estimates from Thomson Reuters and Value Line Investment Analyzer ("Value Line").

[117] In some cases, the stock may also trade on other exchanges.

FIGURE 18: CANADIAN UTILITY SAMPLE[118]

Company	Annual Revenues (CAD million) [1]	Regulated Assets [2]	Market Cap. 2021 Q2 (CAD million) [3]	Betas [4]	S&P Credit Rating [5]	Long Term Growth Est. [6]
Algonquin Power & Utilities Corp.	$2,594	MR	$11,729	0.89	BBB	7.2%
AltaGas Ltd.	$7,753	MR	$7,221	1.23	BBB-	9.9%
Canadian Utilities Limited	$3,305	R	$9,541	0.96	A-	0.3%
Emera Incorporated	$5,449	R	$14,608	0.74	BBB	5.5%
Enbridge Inc.	$42,253	R	$99,901	1.00	BBB+	8.6%
Fortis Inc.	$9,136	R	$26,502	0.77	A-	4.9%
Hydro One Limited	$7,303	R	$18,224	0.71	A-	2.5%
TC Energy Corporation	$13,055	R	$29,824	1.00	BBB+	3.6%
Average	$11,356		$27,194	0.91	BBB+	5.3%

Sources and Notes:
[1]: Bloomberg as of 06/30/2021. Most recent four quarters.
[2]: See Schedule No. BV-2. Key:
R - Regulated (80% or more of assets regulated).
MR - Mostly Regulated (less than 80% of assets regulated).
[3]: See Schedule No. BV-3 Panels A through H.
[4]: See Schedule No. BV-10.
[5]: S&P Rating from Bloomberg as of 2021 Q2.
[6]: See Schedule No. BV-5.

Q49: Why do you consider U.S. based samples in addition to the Canadian utility sample?

A49: The Canadian Utility sample is limited because it is composed of a relatively small number of companies whose business operations and geographic jurisdictions are increasingly diversified relative to the Utilities. First, there is a relatively small number of publicly traded natural gas-only utilities in Canada; such small proxy samples can introduce significant estimation errors to the analysis. Second, the business operations of the Canadian Utility sample are concentrated approximately 48% in Canada, 48% in the U.S., and 4% elsewhere (see Figure 19). Thus, while this sample consists of companies domiciled in Canada and with stock traded on Canadian exchanges, their utility operations are predominately in both the U.S. and Canada, rather than strictly Canada.

[118] As Canadian Utilities Ltd. is a publicly traded entity within the ATCO Group, I cannot include both companies. Canadian Utilities is closer to being a pure-play utility, so I choose that company. For organizational details, see https://www.atco.com/en-ca/about-us/corporate-structure.html

FIGURE 19: CANADIAN UTILITY COMPANIES GEOGRAPHIC DISTRIBUTION

	Revenue			Assets		
Company	**Canada**	**United States**	**Other**	**Canada**	**United States**	**Other**
	[1]	[2]	[3]	[4]	[5]	[6]
Algonquin Power & Utilities Corp.	9%	88%	3%	11%	80%	9%
AltaGas Ltd.	27%	73%	0%	29%	71%	0%
Canadian Utilities Limited	93%	0%	7%	92%	0%	8%
Emera Incorporated	28%	64%	8%	22%	73%	4%
Enbridge Inc.	42%	58%	0%	49%	51%	0%
Fortis Inc.	38%	52%	9%	35%	63%	2%
Hydro One Limited	100%	0%	0%	100%	0%	0%
TC Energy Corporation	42%	53%	6%	35%	57%	9%
Average	**48%**	**48%**	**4%**	**47%**	**49%**	**4%**

Sources and Notes:
S&P CapIQ, accessed August 26, 2021

In addition, the U.S. and Canadian utility business and regulatory models are increasingly similar and thus the business risk and regulatory environments are comparable. The Utilities have supportive regulatory mechanisms that allow for timely recovery of prudently incurred costs, similar to those awarded to utilities in the U.S. For example, Énergir has a decoupling mechanism and earning sharing mechanism,[119] which are common amongst U.S. Gas LDCs. For example, among the fifty U.S. states, 36 (72 percent) allow some form of decoupling.[120]

Finally, investors in Canada consider investment alternatives in both the U.S. and Canada, which makes U.S.-based samples relevant investment alternatives to Canadian utilities, such as the Utilities. As such, the Utilities would be expected to have similar returns relative to their levels of business and financial risks.

Q50: Why did you select separate U.S. samples for natural gas utilities and water distribution utilities?

A50: The various U.S. based samples have different advantages (and disadvantages) in estimating the cost of capital for the Utilities. The natural gas utility sample is essentially a pure-play local distribution proxy sample, with the majority of business activities centered on rate regulated distribution activities, which makes it a close analog to the Utilities. In addition, I

[119] S&P Global Ratings, Énergir Inc., December 21, 2020, p. 2.

[120] See, for example, RRA Regulatory Focus, "Alternative ratemaking plans in the U.S.," April 16, 2020.

note that the Natural Gas Sample is relatively small due to the smaller number of publicly traded natural gas utility companies in the U.S.

Similar to the natural gas utility sample, the water utility sample consists of pure-play distribution companies. To an even greater extent than the natural gas utility sample, the publicly traded U.S. water companies are more or less dedicated to providing a utility distribution service and earn the vast majority of their cash flows from rate regulated operations. In the U.S., rate regulation of investor-owned water utilities is generally quite similar to regulation of natural gas distribution utilities (and electric distribution utilities). For example, they tend to have the same type of regulation as regulated gas utilities in the jurisdiction. As with U.S. gas utility regulation, the cost of service regimes for water utilities increasingly incorporates mechanisms for decoupling revenue from sales and capital trackers to allow recovery of major infrastructure expenditures outside the context of a general rate case.[121]

In addition, the natural gas distribution industry is expected to undergo substantial changes as customers, regulators and the legislature focus on carbon reductions. As discussed by Dr. Brown, the calls for reductions in natural gas used in home heating is just beginning in Quebec,[122] the focus on climate policy initiatives to reduce greenhouse gas ("GHG") emissions and limit the development of natural gas infrastructure in many jurisdictions impacts all natural gas utilities. I therefore selected a group of water utilities, where there are no carbon considerations, to assess whether the estimates from the gas LDCs are reasonable and what premium, if any, carbon considerations merit.

In light of the relative advantages and limitations of these various groups of sample companies, I believe each sample provides a useful point of comparison when estimating the cost of equity for the Utilities. In making my recommendation, I consider the model results for each sample individually and use my judgement—informed by Dr. Brown's business risk

[121] RRA Water Advisory – Major Rate Case Decisions January – December 2020, S&P Global Market Intelligence, February 8, 2021, p. 2.

[122] Brown Testimony, Section III

analysis—in deciding which results are most helpful in determining a reasonable range for the Utilities' cost of equity.

Q51: Why did you not include a sample of natural gas storage companies?

A51: Currently there are no publicly traded pure-play natural gas storage companies. Most natural gas storage assets are owned by pipeline companies or gas distribution utilities, whose primary business activity is not natural gas storage. For example, Intragaz is 60% owned by Énergir. Other companies in the Canadian Utility sample and Natural Gas Sample, including AltaGas, Enbridge, TC Energy, Atmos Energy, New Jersey Resources, NW Natural, and Spire own regulated natural gas storage businesses.[123] In addition, Dr. Brown assesses the business risk profile of Intragaz in his testimony. He finds Intragaz to have the same business risk profile as Énergir's business risk profile (a Canadian gas distribution utility) because of the contractual and operational links between the two companies.[124] Lastly, I note in previous decisions the Régie has dismissed prior gas storage samples arguing that they evolve in a competitive environment, while Intragaz does not.[125] Taken together, I find that the Canadian Utility, U.S. Natural Gas, and U.S. Water Samples are relevant proxy groups to estimate the ROE for Intragaz.

Q52: Please summarize how you selected the Natural Gas and Water Samples?

A52: To identify companies suitable for inclusion in each proxy sample, I started with Value Line's list of publicly traded companies classified as natural gas LDCs or water utilities in the U.S. Next, I reviewed business descriptions and financial reports of these companies and eliminated companies that had less than 50 percent of their assets dedicated to regulated utility activities in their industry; e.g., natural gas or water utility services.

[123] Company Annual Reports and 10-Ks; Fortis and Canadian Utilities own non-regulated natural gas storage facilities.

[124] Brown Testimony, Section III.

[125] Régie D-2013-081, paragraphs 131-132.

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

Further, I require companies that have an investment grade credit rating[126] and more than $300 million in market capitalization (i.e., not a micro-cap) for liquidity purposes.[127] A final, and fundamental, requirement is that the proxy companies have the necessary data available for estimation.[128]

Q53: What are the characteristics of the Gas and Water Utility Proxy Groups?

A53: I calculate my results for both the gas proxy group and for the combined Gas and Water Utility Proxy Group. The proxy groups are comprised of gas and water utilities whose primary source of revenues and majority of assets are subject to regulation. The final proxy group consists of the nine gas and eight water utilities listed in Figure 20 and Figure 21 below.

[126] In some cases, a proxy company does not have a credit rating from any of the major rating agencies (Artesian Res Corp, Global Water Resources, and Chesapeake Utilities). However, if they were to be rated, they would receive an investment grade rating. In these instances, I assign the company the average credit rating of the rest of the proxy group.

[127] I relax my $300 annual revenue screening criteria to include Artesian Res Corp, Global Water Resources, Middlesex Water in recognition that these companies have very stable finances despite relatively low revenue.

[128] I exclude York Water, which lacks sufficient data for estimation.

All companies are engaged in the distribution of a commodity to end customers through a network of pipes and mains. While the product differs across gas and water utilities, they are all focused on distribution, have a mix of residential, commercial and industrial customers, and all are regulated by state regulatory commissions. Further, the natural gas and water utility proxy group companies have average credit ratings of approximately BBB+ and A, respectively, which is in-line with the Régie's goal of maintain the financial integrity of the utilities operating in Quebec, which in my view is a credit rating in the A-range.[129]

Figure 20 and Figure 21 report the proxy natural gas and water utilities' annual revenues for the most recent four quarters, as of Q2 2021, and also the market capitalization, credit rating, beta, and analyst growth rate estimates. It also includes a categorization of regulated (R) or mostly regulated (MR) based on the percentage of each utilities' assets that are devoted to regulated activities. The annual revenue as well as the market cap was obtained from Bloomberg. Betas are 3-year adjusted historical betas obtained from Bloomberg. The S&P credit rating is reported by Bloomberg. Lastly, the long-term (3- to 5-year) earnings per share growth estimate for each company is a weighted average between estimates from Thomson Reuters and Value Line.

[129] D-2009-159 ¶ 173

1 **FIGURE 20: NATURAL GAS UTILITY PROXY GROUP**

Company	Annual Revenue (Q2 2021) (USD Million)	Regulated Assets	Market Cap. (Q2 2021) (USD Million)	Beta	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]	[6]
Atmos Energy	$4,028	R	$12,959	0.87	A-	6.9%
Chesapeake Utilities	$621	R	$2,113	0.77	A-	6.3%
New Jersey Resources	$2,459	MR	$4,025	0.98	A-	5.2%
NiSource Inc.	$5,205	R	$9,947	0.99	BBB+	8.1%
Northwest Natural	$985	R	$1,643	0.87	BBB+	4.4%
ONE Gas Inc.	$1,979	R	$4,062	0.96	BBB+	6.1%
South Jersey Inds.	$2,096	R	$3,017	1.03	BBB	7.7%
Southwest Gas	$3,477	R	$3,860	1.06	BBB+	6.8%
Spire Inc.	$2,974	R	$3,804	0.99	A-	4.9%
Gas Sample	$2,647		$5,048	0.95	BBB+	6.3%

Sources and Notes:
[1]: Bloomberg as of June 30, 2021.
[2]: Key R - Regulated (80% or more of assets regulated).
MR - Mostly Regulated (less than 80% of assets regulated).
[3]: See Schedule No. BV-3 Panels A through I.
[4]: See Schedule No. BV-10
[5]: Bloomberg as of June 30, 2021.
2 [6]: See Schedule No. BV-5.

3 **FIGURE 21: WATER UTILITY PROXY GROUP**

Company	Annual Revenue (Q2 2021) (USD Million)	Regulated Assets	Market Cap. (Q2 2021) (USD Million)	Beta	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$492	R	$3,000	0.59	A+	5.4%
Amer. Water Works	$3,778	R	$28,735	1.00	A	7.6%
Artesian Res Corp	$88	R	$360	0.69	A	4.0%
California Water	$854	R	$2,942	0.63	A+	9.5%
Essential Utilities	$1,990	MR	$11,635	1.06	A	5.7%
Global Water Resources Inc	$39	R	$382	0.92	A	15.0%
Middlesex Water	$140	R	$1,481	0.87	A	4.0%
SJW Group	$531	R	$1,928	0.95	A-	11.3%
Water Sample	$989		$6,308	0.84	A	7.8%

Sources and Notes:
[1]: Bloomberg as of June 30, 2021.
[2]: Key R - Regulated (80% or more of assets regulated).
MR - Mostly Regulated (less than 80% of assets regulated).
[3]: See Schedule No. BV-3 Panels A through I.
[4]: See Schedule No. BV-10
[5]: Bloomberg as of June 30, 2021.
4 [6]: See Schedule No. BV-5.

B. The CAPM Based Cost of Equity Estimates

Q54: Please briefly explain the CAPM.

A54: CAPM assumes the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line (see Figure 4 in Section III), in which the required expected return on an asset (above the risk-free return) is proportional to that asset's relative risk as measured by that asset's beta.

More precisely, the CAPM states that the cost of capital for an investment, S (*e.g.*, a particular common stock), is determined by the risk-free rate plus the stock's systematic risk (as measured by beta) multiplied by the market risk premium. Mathematically, the relationship is given by the following equation:

$$\boldsymbol{r_s = r_f + \beta_s \times MRP} \quad (1)$$

- $\boldsymbol{r_S}$ is the cost of capital for investment S;
- $\boldsymbol{r_f}$ is the risk-free interest rate;
- $\boldsymbol{\beta_S}$ is the beta risk measure for the investment S; and
- $\boldsymbol{MRP}$ is the market equity risk premium.

The CAPM is a "risk-positioning model," which operates on the principle (corroborated by empirical data) that investors price risky securities to offer a higher expected rate of return than safe securities. It says that an investment, whose returns do not vary relative to market returns, should receive the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 4), whereas investments of the same risk as the overall market (*i.e.*, those that by definition have average systematic market risk) are priced so as to expect to return the risk-free rate plus the MRP. Further, it says that the risk premium of a security over the risk-free rate equals the product of the beta of that security and the MRP.

1. Inputs to the CAPM

Q55: What inputs does your implementation of the CAPM require?

A55: As demonstrated by equation (1) above, estimating the cost of equity for a given company requires a measure of the risk-free rate of interest and the MRP, as well as a measure of the stock's beta. There are several choices and sources of data that inform the selection of these inputs. I discuss these issues below. (Additional technical detail, along with a discussion of the finance theory underlying the CAPM is provided in Exhibit BV-1).

Q56: What values do you use for the risk-free rate of interest?

A56: I use the yield on a 30-year Canadian Government Bond as the risk-free rate for purposes of my analysis. Recognizing the fact that the cost of capital set in this proceeding will begin in 2022, I rely on the forecasted yield on Canadian Government bond yields in 2022. Specifically, Consensus Forecasts predicts that the yield on a 10-year Canadian government bond yield will be 1.9% in 2022.[130] I then adjust this forecasted yield upwards by 40 basis points, which is my estimate of the representative maturity premium for the 30-year over the 10-year Canadian Government Bond.[131] This gives me a lower bound on the risk-free rate of 2.30%.

Additionally, I consider a scenario where the risk-free rate of interest is 2.47%. Thus, I consider a scenario where the lower bound risk free rate of 2.30% is adjusted upwards by 17 basis points to reflect downward pressure on government bond yields or an increase in the MRP.[132] It also reflects that (as discussed above in Section V) economic conditions are expected to improve as the economy recovers from the COVID-19 pandemic and 10-year government bond yields are forecasted to increase by 40 bps over the next three years to

[130] Consensus Forecasts, June 2021, p. 17.

[131] This maturity premium is estimated by comparing the average excess yield on 30-year versus 10-year Canadian Government Bonds over the period 1990 - 2021, using data from Bloomberg.

[132] As of June 2021, the spread between A-rated utility and government bond yields was elevated by approximately 34 basis points relative to historic levels, so the application of only 17 basis points as an upward adjustment to the risk-free rate is conservative. See Exhibit BV-7.

2.10% by 2024.[133] This is consistent with a forecasted increase of U.S. 10-year government bond yields by about 1.00 percent to 2.5% by 2024.[134]

Q57: What value did you use for the MRP?

A57: Like the cost of capital itself, the market equity risk premium is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can *expect* to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable, and must be inferred or forecasted based on known market information. One commonly used method for estimating the MRP is to measure the historical average premium of market returns over the income returns on government bonds over some long historical period. *Duff & Phelps* performs such a calculation of the Canadian MRP using data from several sources.[135] The average Canadian MRP from 1935 to the present is 5.68% with slightly shorter or longer periods resulting in slightly higher or lower MRPs.[136] I use this value of the MRP in one input scenario to my CAPM analyses.

However, investors may require a higher or lower risk premium, reflecting the investment alternatives and aggregate level of risk aversion at any given time. As explained in Section V, there is evidence that investors' level of risk aversion is elevated relative to the time before the COVID-19 pandemic and may remain elevated for some time. In recognition of this evidence, together with forward-looking measurements of the expected market equity risk premium that are higher than the long-term historical average, I also perform CAPM calculations using Bloomberg's 8.05% for the Canadian MRP.[137] The 8.05% forecasted Canadian MRP is in line with Bloomberg's forecasted U.S. MRP of 8.18%.[138]

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133 TD Economics, Long-Term Economic Forecasts, June 17, 2021, p.4.

134 Blue Chip Economic Indicators, March 2021, pp. 3 and 14.

135 *Duff & Phelps* International Cost of Capital Navigator 2021.

136 *Id.*

137 Bloomberg, adjusted to be measured over a 30-year government bond (See Exhibit BV-7)

138 *Id.*

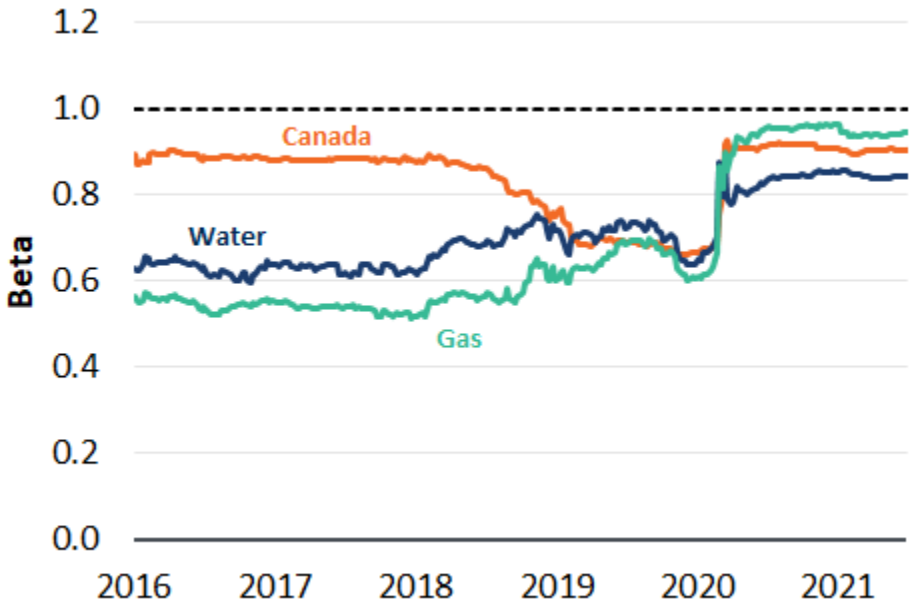
Q58: Given recent market volatility, are current estimates of utility betas relevant to estimate the cost of equity for the Utilities?

A58: Yes. The relative risk of utilities, such as the Utilities, has increased as demonstrated by substantial increase in the systematic risk (measured by beta) with natural gas utility betas moving closer to the level of systematic risk to the broader market (beta of 1.0) as shown in Figure 22 below. Today's utility betas of approximately 0.85 to 0.95 are higher than in the past after the sudden increase at the onset of the COVID-19 pandemic.[139] Despite recent improvements to financial and economic conditions (relative to the start of the pandemic), the systematic risk for utilities have persisted at higher levels. The persistent increase in systematic risk is consistent with other risk measures, such as the MRP or SKEW that also remain elevated relative to pre-pandemic levels, as discussed in Section V.C. Put simply, currently elevated betas are consistent with other risk measurements and indicates that the return over and above the risk-free rate that utility investors require has increased. This is especially true given that all measures have stabilized and given the research by Duarte and Rosa (2015),[140] which demonstrated that the impact of the 2008-09 financial crisis on the MRP lasted for an extended period.

[139] Natural Gas Sample average as of June 30, 2021, see Figure 20.

[140] See Section V.C for details.

FIGURE 22: UTILITY BETAS – 2016 TO 2021



Source: Bloomberg, data through June 30, 2021.

Q59: Please summarize the parameters of the scenarios and variations you considered in your CAPM and ECAPM analyses.

A59: The parameters are displayed in Figure 23 below. In my CAPM and ECAPM analyses, I consider two sets of scenarios based on the empirical observation that the yield spread is higher than normal as is the forecasted MRP, as discussed above in Section V. The increase yield spreads could reflect the increase in MRP or downward pressure on the yield of government bonds due to monetary policy and flight-to-quality behaviors. Therefore, I use an unadjusted historic average MRP with the increased estimate of the risk-free rate in one scenario; whereas, in the second scenario I use an unadjusted forecasted risk-free rate with a higher estimate of the MRP. To be conservative, I do not simultaneously normalize the risk-free rate and use a forecasted MRP.

Scenario 1 uses the forecasted 30-year Canadian government bond yield for 2022 and then adjusts this to include half of the current spread between utility and government bond yields. This results in a Scenario 1 risk-free rate of 2.47%. I pair this with the long-term average

historic Canadian MRP of 5.68%, as estimated by Duff & Phelps. Betas are 3-year adjusted historical betas obtained from Bloomberg.

In Scenario 2, I use an unadjusted risk-free rate based on the forecasted 30-year Canadian government bond yield for 2022 of 2.30%. I then use Bloomberg's forecasted Canadian MRP of 8.05%. The betas are the same as those used in Scenario 1.

FIGURE 23: CAPM AND ECAPM SCENARIOS

	Scenario 1	Scenario 2
Risk-Free Interest Rate	2.47%	2.30%
Market Risk Premium	5.68%	8.05%
Canadian Sample Avg. Beta	0.91	0.91
U.S. Gas Sample Avg. Beta	0.95	0.95
U.S. Water Sample Avg. Beta	0.84	0.84

Q60: What Betas did you use for the companies in your sample?

A60: I used adjusted historical betas obtained from Bloomberg, using weekly returns over a three-year historical estimation period.[141] For the Canadian Utility Sample, I used the S&P/TSX as the measure of overall market returns, but for the U.S. samples, I relied on the S&P 500 as the market proxy. An important observation is that the beta estimates for both Canadian and U.S. utilities have increased over the last 2 years.[142]

The levered equity betas for the sample companies and the simple average betas for each sample are reported above in Figure 18, Figure 20, and Figure 21. Importantly, however, the financial leverage inherent in the sample company capital structures varies both within and across the samples. Consequently, I apply two formulations of the Hamada equation to

[141] Bloomberg's standard is to report betas using "Blume Adjustment" to improve predictive accuracy relative to the use of raw historical betas. Betas adjusted in this manner are also reported by *Value Line* and other investment services, are routinely relied upon in practical applications of the CAPM, including in many regulatory jurisdictions See Appendix B, section IV for more detail on the estimation of betas.

[142] See Figure 22.

unlever the individual sample company betas and relever each sample's average asset beta at the Utilities' current regulatory capital structure.

2. The Empirical CAPM

Q61: What other equity risk premium model do you use?

A61: Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted.[143] A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

The second version on the CAPM that I employ makes use of these empirical findings. It estimates the cost of capital with the equation,

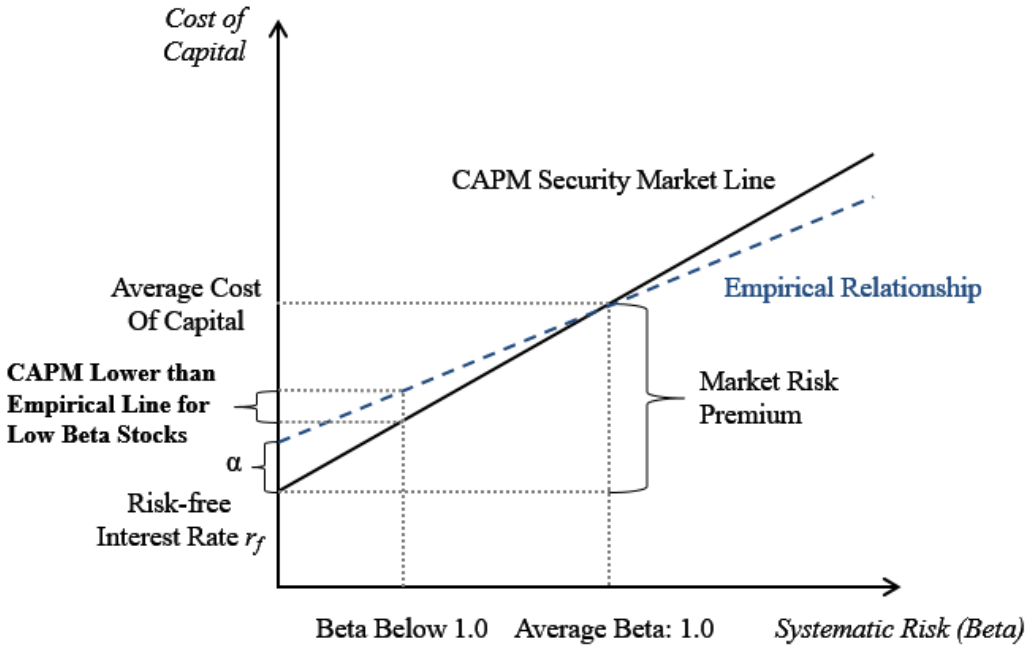
$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \quad (2)$$

where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see equation (1) above).

I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line, which results in a Security Market Line that more closely matches the results of empirical tests, as shown in Figure 24 below. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

[143] Figure A-3 in Exhibit BV-1 (Technical Appendix) to this evidence for references to relevant academic articles.

FIGURE 24: THE EMPIRICAL SECURITY MARKET LINE



Q62: Why do you use the ECAPM?

A62: Academic research finds that the CAPM has not generally performed well as an empirical model. One of its shortcomings is directly addressed by the ECAPM, which recognizes the consistent empirical observation that the CAPM underestimates the cost of capital for low beta stocks. In other words, the ECAPM is based on recognizing that the actual observed risk-return line is flatter and has a higher intercept than that predicted by the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact, which has been established by repeated empirical tests of the CAPM. In summary, these studies estimate alpha parameters that range between 1%[144] and 7.32%.[145] I apply an alpha parameter of 1.5% in my application of the ECAPM. Exhibit BV-1 provides further discussion of the empirical findings that have

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

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

tested the CAPM and also provides documentation for the magnitude of the adjustment, α. I use the lower end of the adjustment to be conservative.

3. Results from the CAPM Based Models

Q63: Please summarize the results of the CAPM-based models.

A63: The results of the CAPM and ECAPM estimation for the three proxy groups are presented in Figure 25, Figure 26, and Figure 27 below.[146] The range of results for each model (CAPM and ECAPM) reflect the application of different specific versions of the textbook formulas used to account for the impact of differences in financial leverage on financial risk. In the figures below, I show two sets of results. One set is measured relative to a 40.0% equity capital structure and the second is measured relative to a 46.0% equity capital structure.[147]

FIGURE 25: CANADIAN UTILITY SAMPLE CAPM RESULTS AT 40% AND 46% EQUITY

Estimated Return on Equity	Deemed Common Equity Percentage			
	40.0%		46.0%	
	Scenario 1 [1]	Scenario 2 [2]	Scenario 1 [1]	Scenario 2 [2]
Canadian Sample				
Financial Risk Unlevered Method				
CAPM	8.5%	10.7%	7.7%	9.6%
ECAPM (α = 1.5%)	8.7%	10.9%	7.9%	9.8%
Hamada Unlevered Without Taxes				
CAPM	8.5%	10.8%	7.7%	9.7%
ECAPM (α = 1.5%)	8.4%	10.7%	7.8%	9.8%
Hamada Unlevered With Taxes				
CAPM	8.2%	10.4%	7.6%	9.5%
ECAPM (α = 1.5%)	8.2%	10.4%	7.7%	9.7%

Sources and Notes:
Scenario 1: Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%.
Scenario 2: Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%.

[146] The U.S. based CAPM and ECAPM estimates were implemented using Canadian benchmarks.

[147] I use Intragaz and Gazifère's current authorized capital structures as bookend scenarios. Énergir's current authorized capital structure of 38.5% equity, 7.5% preferred equity, and 54% debt. For estimating the ROE, I allocate the 7.5% preferred equity 40% to debt and 60% to equity resulting in a 43% equity and 57% debt capital structure, which is between the two scenarios I modeled. Results at 43% are discussed below and provided in BV-4 and BV-5.

FIGURE 26: U.S. NATURAL GAS UTILITY SAMPLE CAPM RESULTS AT 40% AND 46% EQUITY

Estimated Return on Equity	Deemed Common Equity Percentage 40.0% Scenario 1 [1]	40.0% Scenario 2 [2]	46.0% Scenario 1 [3]	46.0% Scenario 2 [4]
Gas Sample				
Financial Risk Adjusted Method				
CAPM	10.6%	13.7%	9.5%	12.3%
ECAPM (α = 1.5%)	10.7%	13.9%	9.6%	12.4%
Hamada Adjustment Without Taxes				
CAPM	10.2%	13.3%	9.3%	11.9%
ECAPM (α = 1.5%)	9.7%	12.7%	9.0%	11.6%
Hamada Adjustment With Taxes				
CAPM	9.8%	12.6%	9.0%	11.6%
ECAPM (α = 1.5%)	9.3%	12.2%	8.8%	11.3%

Sources and Notes:
[1]: Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%.
[2]: Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%.

FIGURE 27: U.S. WATER UTILITY SAMPLE CAPM RESULTS AT 40% AND 46% EQUITY

Estimated Return on Equity	Deemed Common Equity Percentage 40.0% Scenario 1 [1]	40.0% Scenario 2 [2]	46.0% Scenario 1 [3]	46.0% Scenario 2 [4]
Water Sample				
Financial Risk Adjusted Method				
CAPM	10.7%	13.9%	9.6%	12.4%
ECAPM (α = 1.5%)	11.2%	14.3%	10.0%	12.8%
Hamada Adjustment Without Taxes				
CAPM	10.2%	13.2%	9.2%	11.9%
ECAPM (α = 1.5%)	9.6%	12.7%	9.0%	11.6%
Hamada Adjustment With Taxes				
CAPM	9.6%	12.4%	8.9%	11.3%
ECAPM (α = 1.5%)	9.2%	12.0%	8.7%	11.2%

Sources and Notes:
[1]: Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%.
[2]: Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%.

Q64: How do you interpret the results of your CAPM and ECAPM analyses?

A64: The estimates measured relative to a 40% equity capital structure range from 8.2% to 14.3%; whereas, the estimates measured relative to the 46% equity capital structure range from 7.6%

to 12.8%. To narrow the range of results, I first look to the estimates from the Canadian Utility Sample and the Natural Gas Sample. Within these samples, I give more weight to the estimates from the ECAPM model that use the Hamada methodology to adjust for financial leverage. This narrows the range of estimates measured relative to the 40% equity capital structure to 8.25% to 10.5% for the Canadian Utility Sample and 9.5% to 12.5% for the Natural Gas Sample. Similarly, this narrows the range of estimates measured relative to the 46% equity capital structure to 7.75% to 9.75% for the Canadian Utility Sample and 9.0% to 11.5% for the Natural Gas Sample.[148] I note that the estimates from the U.S. Water Utility sample supports the range of estimates from both the Canadian and Natural Gas Samples, albeit towards the higher end of the range. For a utility with 43% equity this translates into a range in between that for 40 and 46 percent equity for a range of approximately 9.75% to 11.25%.[149]

C. DCF Based Estimates

1. Single- and Multi-Stage DCF Models

Q65: Please describe the DCF model's approach to estimating the cost of equity.

A65: The DCF method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow—literally a stream of expected "cash flows" discounted at a risk-appropriate discount rate. When the cash flows are dividends, that discount rate is the cost of equity capital:

[148] Both ranges are based on the average of Scenario 1 and Scenario 2 estimates.

[149] See Exhibit BV-4 and BV-5 for results at 43% equity capital structure.

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

Where,

$\boldsymbol{P_0}$ is the current market price of the stock;

$\boldsymbol{D_t}$ is the dividend cash flow expected at the end of period $\boldsymbol{t}$;

$\boldsymbol{T}$ is the last period in which a dividend cash flow is to be received; and

$\boldsymbol{r}$ is the cost of equity capital.

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

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

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

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

Equation (4) says that if equation (3) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the single-stage DCF model; it is also known as the Gordon Growth model, in honor of its originator, Professor Myron J Gordon.

Q66: Are there other versions of the DCF model?

A66: Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).[150] One such alternative expands the Gordon Growth model to three stages. In the multi-stage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period.[151] Importantly, the DCF model works best for companies, such as utilities, that are mature and stable.

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

2. DCF Inputs

Q67: What growth rate information do you use?

A67: The first step in my DCF analysis (either constant growth or multi-stage formulations) is to examine a sample of investment analysts' forecasted earnings growth rates for companies in my samples. For the single-stage DCF and for the first stage of the multi-stage DCF, I use investment analyst forecasts of company-specific growth rates sourced from *Value Line* and Thomson Reuters IBES.[152]

For the long-term growth rate for the final, constant-growth stage of the multi-stage DCF estimates, I use the long-term nominal Canadian GDP growth forecast of 3.7% from TD

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

[151] See Exhibit BV-1 for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

[152] Since *Value Line* does not cover all Canadian companies in my sample, for those companies not followed by *Value Line*, I used only the consensus mean EPS growth rate estimates from Thomson Reuters IBES.

Economics.[153] I use the most recent long-run U.S. GDP growth forecast of 4.0% from TD Economics for the U.S. samples.[154] Thus, the long-run (or terminal) growth rate in the multi-stage model is nominal GDP growth.

Q68: Please explain how input data can affect the DCF models.

A68: The Gordon Growth/single-stage DCF models require forecast growth rates that reflect investor expectations about the pattern of dividend growth for the companies over a sufficiently long horizon, but estimates are typically only available for 3-5 years. In addition, an assumption of the DCF model is that the growth rates reflect stable economic conditions.

An issue with the data is that it solely includes dividend payments as cash distributions to shareholders, while some companies also use share repurchases to distribute cash to shareholders. To the extent that companies in my samples use share repurchases, the DCF model using dividend yields will underestimate the cost of equity for these companies. While there are companies in my sample that have engaged in share buybacks in the past, the magnitude is currently not large.

3. Results from the DCF Based Models

Q69: Please summarize the DCF-based cost of equity estimates for the proxy groups?

A69: The results of the DCF based estimation for the proxy groups are displayed below in Figure 28, Figure 29, and Figure 30. Similar to my implementation of the CAPM/ECAPM, one set of estimates is measured relative to a 40.0% equity capital structure and the second is measured relative to a 46.0% equity capital structure.

[153] TD Economics, Long-Term Economic Forecasts, June 17, 2021, p.3.

[154] Id., p. 2.

FIGURE 28: CANADIAN UTILITY SAMPLE DCF RESULTS AT 40% AND 46% EQUITY

	Deemed Common Equity Percentage			
	40.0%		46.0%	
	Simple	Multi-Stage	Simple	Multi-Stage
	[1]	[2]	[1]	[2]
Canadian Sample	12.0%	10.5%	10.8%	9.4%

FIGURE 29: NATURAL GAS UTILITY SAMPLE DCF RESULTS AT 40% AND 46% EQUITY

	Deemed Common Equity Percentage			
	40.0%		46.0%	
	Simple	Multi-stage	Simple	Multi-stage
	[1]	[2]	[3]	[4]
Gas Sample	12.3%	9.8%	11.0%	8.8%

FIGURE 30: WATER UTILITY SAMPLE DCF RESULTS AT 40% AND 46% EQUITY

	Deemed Common Equity Percentage			
	40.0%		46.0%	
	Simple	Multi-stage	Simple	Multi-stage
	[1]	[2]	[3]	[4]
Water Sample	14.5%	8.7%	12.9%	7.9%

Q70: How do you interpret the results of your DCF analyses?

A70: The estimates from the DCF model measures relative to a 40% equity capital structure range from 8.7% to 14.5% and the estimates measured relative to a 46% equity capital structure range from 7.9% to 12.9%. I again look to the results from the Canadian Utility Sample and Natural Gas Sample to narrow the range. This narrows the range to 9.8% to 10.5% at 40% equity and 9.4% to 10.8% at 46% equity. The DCF results from the Water Sample support

the results from the Canadian and Natural Gas Utility samples. At 43% equity, a reasonable range is in between at about 9.9 to 11.4 percent.[155]

D. Summary of Results

Q71: Please summarize your results and your preliminary reasonable range for an allowed ROE.

A71: Figure 31 and Figure 32, below, display the reasonable range of ROE results at a 40% equity capital structure and at a 46% equity capital structure.

FIGURE 31: SUMMARY OF REASONABLE RANGES AT 40% EQUITY

	Canadian Sample	Natural Gas Sample	Water Sample
CAPM/ ECAPM	8.25% - 10.5%	9.5% - 12.5%	9.5% - 12.5%
DCF*	10.5% - 12.0%	9.75% - 12.25%	8.75% - 14.5%

FIGURE 32: SUMMARY OF REASONABLE RANGES AT 46% EQUITY

	Canadian Sample	Natural Gas Sample	Water Sample
CAPM/ ECAPM	7.75% - 9.75%	9.0% - 11.5%	8.75% - 11.5%
DCF*	9.5% - 10.75%	9.0% - 11.0%	8.0% - 13.0%

*The lower DCF estimate is from the multi-stage DCF model, while the upper estimate is from the single-stage DCF model. The single-stage DCF results are non-trivially higher.

As the Utilities are Canadian natural gas utilities, I look to the ROE estimates from both the Canadian utility sample and Natural Gas Sample to inform my preliminary estimate of a reasonable range. The CAPM/ECAPM and DCF estimates for the Canadian Sample show a reasonable range of 9.5%% to 11.25% at 40% equity and 8.75% to 10.25% at 46% equity. Similarly, the CAPM/ECAPM and DCF estimates for the U.S. Natural Gas Utility sample has a reasonable range of 9.75% to 12.5% at 40% equity and 9.0% to 11.25% at 46% equity.

[155] Based on Canadian and Utility Sample and Natural Gas Sample, see Exhibit BV-4 and BV-5

I find that the results from the Water Sample are in line with and support the reasonable ranges from the other two samples at each capital structure. Consequently, I find a reasonable range of ROEs for the sample (prior to any business risk considerations) to be 9.75% to 11.25% at a 40% equity capital structure and an initial reasonable range of ROEs to 9.0% to 10.25% at a 46% equity capital structure.[156] At the recommended 43% equity the range is approximately 9.25% to 10.75%.

I note that the DCF results from the Natural Gas Utility and Water Samples were estimated using the U.S. long-term nominal GDP growth estimate, which is approximately 30 basis higher than Canada's long-term nominal GDP growth estimate.[157] If I were to adjust for this different by removing 30 bps from the reasonable range of the U.S. based DCF estimates, the midpoints of the estimates remain above 10.0% at 40% and approximately 10.0% at 46% equity.[158] They would still then support the overall reasonable range of 9.75% to 11.25% at 40% equity and 9.0% to 10.25% at 46%.

Next, before recommending an allowed ROE, I must first evaluate if these cost of equity estimates are consistent with a deemed capital structure sufficient for the utilities to satisfy the credit rating agencies requirements to obtain an A-range ratings and offer a comparable risk-adjusted return to investors.

[156] The ranges were determined as the overlapping ranges widened symmetrically to include at least 100 basis points.

[157] According to TD Economics, Canada's long-term nominal GDP growth forecast is 3.7% versus 4.0% in the U.S.

[158] At 40% equity, the Natural Gas Sample reasonable range becomes 9.45% to 11.95% with a midpoint of 10.7% and the Water Sample reasonable range becomes 8.45% to 14.2% with a midpoint of 11.3%. At 46% equity, the Natural Gas Sample reasonable range becomes 8.5% to 10.7% with a midpoint of 9.6% and the Water Sample reasonable range becomes 7.7% to 12.7% with a midpoint of 10.2%.

VII. CAPITAL STRUCTURE

A. Background

Q72: What are the Utilities' current regulatory capital structures?

A72: Each of the Utilities' deemed capital structures are shown in Figure 33 below. Gazifère has the most leverage in its capital structure with 60% debt. Énergir and Intragaz have similar levels of debt in their regulatory capital structure (54%), however their composition of equity differs. Énergir's regulatory capital structure includes 7.5% preferred equity, whereas Intragaz's capital structure only includes common equity. Preferred equity is a hybrid security that has characteristics similar to both common equity and debt. I note that Énergir's corporate capital structure does not include any preferred equity.[159] Furthermore, the amount of preferred equity in Énergir's regulatory capital structure is above the average of the Canadian utility sample of 3.4% (see Figure 7 above).

FIGURE 33: THE UTILITY'S CURRENTLY DEEMED CAPITAL STRUCTURES

	Common Equity	Preferred Equity	Debt
Énergir	38.5%	7.5%	54.0%
Intragaz	46.0%	0.0%	54.0%
Gazifère	40.0%	0.0%	60.0%

B. Approach

Q73: How do you propose to determine reasonable equity ratios for the Utilities?

A73: I agree with the Régie that is important to set the capital structure and allowed ROE such that the utilities can maintain their financial integrity.[160] To that end, credit ratios are an

[159] Énergir, s.e.c., 2020 Annual Information Form, Fiscal year ended on September 30, 2020, p. 71, https://www.energir.com/~/media/Files/Corporatif/Politiques%20et%20directives/Energir%20-%20Notice%20annuelle%20en.pdf?la=en

[160] D-2009-156 ¶173

important measure of the Utilities' ability to satisfy the credit rating agencies requirements to obtain an A-range rating. However, it is also important to consider that the overall return that is available to investors needs to be comparable to what investors can obtain in other investments of comparable risk. Thus, an equity ratio that results in a credit metric that meets the minimum standard for obtaining an A-range rating is not sufficient—the equity ratio also needs to be such that investors on a risk-adjusted basis find that investments in Utilities are as attractive as other alternatives. Because the dollar return that accrues to investors is determined as a multiple of the equity ratio and the percentage return, both components are important and there is commonly a tradeoff between the two.

Q74: How do you determine appropriate equity ratios?

A74: First, I look to the guidance of credit rating agencies as an indication of the criteria that the Utilities must meet to be rated in the A-range.[161] Second, I consider the historic credit metrics of A-range rated Canadian utilities and investment grade U.S. utilities. Third, I provide forecasted benchmarks using the reasonable parameters for the credit metric inputs, the most recently allowed ROE, and my recommended ROE for a range of capital structures. I use the information derived from this analysis to recommend a benchmark capital structure for the Utilities.

Q75: Please summarize the credit metrics used by the credit rating agencies.

A75: Figure 34 below summarizes expectations for an A-rating used by the credit rating agencies. It is important to note that the comparison ranges do not necessarily consider the typical level for an A-range rated utility or whether the resulting return to investors is comparable to what they would receive if they were investing in similarly-risked investments.

[161] See Standard & Poor's, "Key Credit Factors for The Regulated Utilities Industry," November 13, 2013 (republished July 25, 2019) for the approach to rating utilities.

FIGURE 34: SUMMARY OF CREDIT RATIO BENCHMARKS FOR A-RATINGS

	EBIT Coverage	FFO Coverage	FFO to Debt
DBRS	1.8 – 2.8	N/A	12.5% - 17.5%
Moody's	N/A	4.5 – 6.0	17.0% - 25.0%
S&P	N/A	N/A	13.0% - 23.0%

The comparison also does not consider the equity ratios credit rating agencies use as benchmarks. For example, DBRS uses 10 factors when considering the regulatory framework in which a utility does business. The first factor is the deemed equity ratio and a "Satisfactory" ratio is 40.00% to 44.99% equity to rate base. Higher ratios are "Good" or "Excellent," while lower ratios are "Below Average" or "Poor."[162] I consider it important that a utility has at least a "Satisfactory" ratio.

Standard & Poor's criteria links the regulatory profile and the credit ratio needed, but I note that S&P observes that a "Strong" regulatory advantage is required to consider ratios pertaining to low volatility companies. For such companies, an FFO to Debt ratio below 13%, combined with an excellent business profile, the anchor rating is "BBB."[163] Thus, S&P expects ratios above that for "A" range ratings.

Similarly, Moody's benchmark for an A range rating for a low business risk gas utility is 40-50% debt to capitalization (so 50-60% equity)[164] and Moody's benchmark for regulated electric and gas networks is that net debt to rate base is 45-60% (so 40-55% equity) for an A-range rating.[165] Based on these credit rating benchmarks, I consider, absent unique circumstances, that equity ratios below 40 percent lead to challenging credit metrics for utilities.

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[162] DBRS, "Rating Companies in the Regulated Electric, Natural Gas and Water Utilities Industry," October 2014, p. 11. This same document notes that DBRS does award A ratings for a wider range of benchmark debt to capital ratios.

[163] Standard & Poor's, "Assessing Regulatory Advantage in Canada," April 21, 2015, p. 13.

[164] Moody's, "Regulated Electric and Gas Utilities," last updated November 4, 2019, p. 22.

[165] Moody's, "Regulated Electric and Gas Networks," last updated November 4, 2019, p. 29.

It is important to note that the low end of the credit ratio range makes the utilities vulnerable to credit issues as the low end of the credit metrics commonly are associated with utilities, jurisdictions, and economic circumstances that are stable and expected to remain stable.

Q76: What are typical credit ratio benchmarks for North American utilities?

A76: Figure 35 shows DBRS and S&P credit ratios for A-rated Canadian and U.S. utilities. Canadian utilities are near the upper range of DBRS' EBIT Coverage range (1.8 – 2.8) but near the middle of the FFO to Debt benchmark (12.5% to 17.5%). The U.S. utilities generally have higher FFO to Debt metrics that are in the upper-half of S&P's range (13% - 23%). All together, the metrics show that it is important to establish an equity capital structure and allowed ROE that results in credit metrics in the middle of the credit ratio ranges.

FIGURE 35: CREDIT RATIOS OF A-RATED CANADIAN AND U.S. UTILITIES[166]

	EBIT Coverage	FFO to Debt
Canadian Utilities (DBRS Average)	2.67	16.1%
Canadian Utilities (DBRS Median)	2.49	14.8%
U.S. Gas Utilities (S&P Average)	4.43	21.4%
U.S. Electric Utilities (S&P Average)	3.22	19.2%

Q77: Is there other relevant information regarding credit metrics and credit rating agency actions?

A77: Currently, Énergir is the only Utility that is covered by the credit rating agencies. In S&P Global Ratings, most recent rating report, S&P discusses Énergir's weakening FFO to Debt credit metrics over their forecast period.[167] This is related to a refund to ratepayers of

[166] DBRS credit reports, S&P CapIQ accessed August 30, 2021. Excludes Crown Corporations. See Exhibit BV-9

[167] S&P Global Ratings, Énergir Inc., December 21, 2020, pp. 2-3.

overearnings and weather normalization variations in addition to elevated forecasted capital spend. S&P forecasts that this will lower Énergir's FFO to Debt to 14% - 16%, which is near the bottom end of S&P's range for A-rated utilities. This is important because the fact that credit rating agencies have not downgraded Énergir is not sufficient to ensure that the combined equity ratio and allowed ROE is comparable to the return available to comparable equity investments S&P, as well as other credit rating agencies, look forward and assess their ratings continually. It is therefore important not to target historical or low-end benchmark credit ratios.

Q78: What do you make of the analysis above?

A78: Based on the benchmarks from DBRS, Moody's, Standard & Poor's and to a lesser extent Fitch Ratings, target benchmarks that are towards the middle of the ranges listed by the credit rating agencies and recognize that credit rating agencies base their ratings on not only observed metrics but also on forecasted trends. In his testimony, Dr. Brown discusses the potential risks facing regulated utilities in Quebec, particularly as related to the future of natural gas in the province. The utilities need some flexibility to consistently achieve the minimum ratio (or higher) and should meet not just DBRS' benchmark but also that of other credit rating agencies. I recommend that the Régie at a minimum seek to obtain credit ratios towards the middle of the range DBRS recommends and well above the low end of Moody's / Standard & Poor's range such as:[168]

- EBIT Coverage of at least **2.5** times.
- FFO Interest Coverage of **3.5 to 4.0** times with the higher end being preferable.
- FFO to Debt of at least **15%**.

[168] The recommendation takes the midpoint of DBRS' range except for FFO interest coverage, which uses Moody's and S&P's benchmarks.

Q79: Please describe how you estimate the credit ratios for the Utilities.

A79: I estimate the credit ratios that would result from using reasonable parameters for inputs such as the tax rate, embedded cost of debt, depreciation rate, and Capital Work in Progress (CWIP) as a percentage of rate base. I combine the Utilities' current allowed ROE as well as my recommended ROE with a range of capital structures to determine at what level the credit ratio benchmarks are satisfied. For illustrative purposes, I use a hypothetical utility with a rate base of $1,000 (not including CWIP) and calculate the credit ratios as following using a hypothetical ROE of 9.25% and 10.0%. I calculate the ratios without regard to leases or other adjustments:

EBIT Interest Coverage = EBIT / Interest

FFO Interest Coverage = (FFO + Interest) / Interest

FFO-to-Debt = FFO / Debt

where, FFO equals Net Income plus depreciation and EBIT is calculated as Net Income divided by (1 – tax rate) plus interest.

The specifics of the calculation are shown in Appendix B, Section V.

Q80: Please summarize your input parameters and results

A80: My inputs are summarized below in Figure 36. I find that the CWIP to rate base ratio and depreciation rate for each of the Utilities.[169] Similarly, I find each Utilities' average embedded cost of debt.

[169] See Villadsen Exhibit BV-10 for details.

FIGURE 36: PARAMETERS RELIED UPON TO DETERMINE CREDIT RATIOS

	Énergir	Intragaz	Gazifère
Allowed ROE	9.25% and 10.0%	9.25% and 10.0%	9.25% and 10.0%
Embedded Cost of Debt	4.56%	5.21%	3.64%
Tax Rate	26.5%	26.5%	26.5%
Depreciation Rate	5.28%	2.62%	3.02%
CWIP / Rate Base	3.38%	12.94%	7.26%

Q81: What are the results of your capital structure analysis?

A81: Using the parameters above, I calculate credit metrics resulting from a range of selected capital structures for each of the utilities in Figure 37, Figure 38, and Figure 39 below. In the table, I evaluate the minimum credit ratios that meet the benchmarks listed above and observe that to be consistent with the benchmarks for an A-range rating at a ROE of 10.0%, it is necessary for the equity ratio to be at least 42.5% for Énergir, 52.5% for Gazifère, and above 55% for Intragaz.

FIGURE 37: CREDIT METRICS RESULTING FROM SELECTED CAPITAL STRUCTURES - ENERGIR

9.25% Allowed ROE									
Equity % of Cap Structure	*35.0%*	*37.5%*	*40.0%*	*42.5%*	*45.0%*	*47.5%*	*50.0%*	*52.5%*	*55.0%*
EBIT Coverage Ratio [1]	2.41	2.57	2.74	2.93	3.13	3.35	3.59	3.85	4.14
FFO Interest Coverage [2]	3.73	3.91	4.11	4.32	4.55	4.80	5.07	5.37	5.70
FFO to Debt [3]	12.5%	13.3%	14.2%	15.1%	16.2%	17.3%	18.6%	19.9%	21.4%
10.0% Allowed ROE									
Equity % of Cap Structure	*35.0%*	*37.5%*	*40.0%*	*42.5%*	*45.0%*	*47.5%*	*50.0%*	*52.5%*	*55.0%*
EBIT Coverage Ratio [1]	2.53	2.70	2.88	3.08	3.30	3.54	3.80	4.08	4.39
FFO Interest Coverage [2]	3.82	4.01	4.21	4.43	4.67	4.94	5.22	5.54	5.89
FFO to Debt [3]	12.8%	13.7%	14.6%	15.7%	16.7%	17.9%	19.3%	20.7%	22.3%

FIGURE 38: CREDIT METRICS RESULTING FROM SELECTED CAPITAL STRUCTURES - INTRAGAZ

9.25% Allowed ROE									
Equity % of Cap Structure	*35.0%*	*37.5%*	*40.0%*	*42.5%*	*45.0%*	*47.5%*	*50.0%*	*52.5%*	*55.0%*
EBIT Coverage Ratio [1]	2.09	2.20	2.33	2.46	2.60	2.75	2.92	3.10	3.29
FFO Interest Coverage [2]	2.44	2.55	2.66	2.79	2.92	3.06	3.21	3.38	3.56
FFO to Debt [3]	7.5%	8.1%	8.7%	9.3%	10.0%	10.7%	11.5%	12.4%	13.3%
10.0% Allowed ROE									
Equity % of Cap Structure	*35.0%*	*37.5%*	*40.0%*	*42.5%*	*45.0%*	*47.5%*	*50.0%*	*52.5%*	*55.0%*
EBIT Coverage Ratio [1]	2.17	2.30	2.43	2.58	2.73	2.90	3.08	3.27	3.48
FFO Interest Coverage [2]	2.51	2.62	2.74	2.87	3.01	3.16	3.33	3.50	3.69
FFO to Debt [3]	7.9%	8.4%	9.1%	9.8%	10.5%	11.3%	12.1%	13.0%	14.0%

FIGURE 39: CREDIT METRICS RESULTING FROM SELECTED CAPITAL STRUCTURES - GAZIFERE

9.25% Allowed ROE									
Equity % of Cap Structure	*35.0%*	*37.5%*	*40.0%*	*42.5%*	*45.0%*	*47.5%*	*50.0%*	*52.5%*	*55.0%*
EBIT Coverage Ratio [1]	2.67	2.86	3.06	3.27	3.50	3.75	4.02	4.31	4.64
FFO Interest Coverage [2]	3.38	3.55	3.74	3.95	4.17	4.41	4.67	4.95	5.26
FFO to Debt [3]	8.7%	9.3%	10.0%	10.7%	11.5%	12.4%	13.3%	14.4%	15.5%
10.0% Allowed ROE									
Equity % of Cap Structure	*35.0%*	*37.5%*	*40.0%*	*42.5%*	*45.0%*	*47.5%*	*50.0%*	*52.5%*	*55.0%*
EBIT Coverage Ratio [1]	2.81	3.01	3.22	3.45	3.70	3.97	4.26	4.58	4.93
FFO Interest Coverage [2]	3.48	3.66	3.87	4.08	4.32	4.57	4.85	5.15	5.48
FFO to Debt [3]	9.0%	9.7%	10.4%	11.2%	12.1%	13.0%	14.0%	15.1%	16.3%

Q82: What do you conclude from the analysis above?

A82: Based on the analysis above and the fact that 40% equity is the lowest level at which DBRS considers a capital structure "Satisfactory," I recommend an equity percentage of at least 40 percent. As mentioned above, Énergir has 7.5% preferred equity in its regulatory capital structure but does not have preferred equity in its actual capital structure. Therefore, I recommend the preferred equity from Énergir's capital structure be removed to better reflect its actual capitalization. Specifically, I recommend that Énergir's capital structure include 43% equity and 57% debt.[170] This would provide Énergir a similar level of return and allow it to meet the credit metrics consistent with an A-rated utility.

For Intragaz, I recommend a capital structure of 43% equity and 57% debt. Currently, Intragaz has a 46% equity capital structure but an ROE of 8.5%, lower than both Énergir and

[170] As noted above, based on DBRS's standard of considering preferred 75% equity this is a conservative recommendation.

Gazifère. Authorizing a 43% equity capital structure and an ROE of 10.5% (my ROE recommendation for Intragaz is discussed further in the next section) would move Intragaz towards a capital structure that meets the credit rating benchmarks for an A-rating.

For Gazifère, the minimum equity ratio at which all three credit metrics meet the A benchmark is quite a bit higher than their currently deemed equity percentage. Because the analysis is based on current accounting measures and because consistency in regulation is important, I recommend moving the companies towards a capital structure that ensures the credit metrics meet the credit agencies benchmark for an A-rating. Therefore, I recommend Gazifère be allowed a deemed equity percentage of 45%. This provides a gradual movement of the companies towards a capital structure that would meet the benchmark credit metrics for an A rating.[171]

FIGURE 40: RECOMMENDED CAPITAL STRUCTURES

	Common Equity	Preferred Equity	Debt
Énergir	43%	0%	57%
Intragaz	43%	0%	57%
Gazifère	45%	0%	55%

I note that this structure allows the utilities the same return on equity (with Intragaz getting a maturity premium for its 10-year rate) while business risk differences are reflected in the equity percentage. At the same time, the capital structure is being streamlined to include only debt and equity.

[171] I note that the reduction in Intragaz' equity percentage assumes the Company will be allowed the same base ROE as the other gas utilities and a 50 basis points adder for the 10-year horizon of its rate.

VIII. RECOMMENDED ROE AND CAPITAL STRUCTURE

A. Main Conclusions

Q83: Please briefly reiterate your recommendation with respect to capital structure?

A83: I recommend that the equity thickness be set to meet all components of the fair return standard, including consideration of comparable returns as well as capital attraction and financial integrity.

I recommend that the Régie establish deemed equity thicknesses as indicated in Figure 40, which would (if combined with an appropriate ROE) permit the Utilities meet or move toward credit metric thresholds for an A-range rating and at the same time offer risk-comparable equity returns.

Q84: What do you conclude regarding the required ROE?

A84: Based on my analysis, I recommend an allowed ROE of 10.0% for Énergir and Gazifère, which is based on my analysis of cost of equity for a Canadian Utility Sample and an U.S. Gas LDC sample, supported by a regulated Water Utility sample. As Dr. Brown concludes, the business risks for the Utilities is above that of the Natural Gas Sample, which has the most comparable business risk. The selection of the 10% is based on the fact that 10% is supported by (i) both the CAPM and DCF model, (ii) is part of the range of a reasonable ROE at both 40% and 46% equity, (iii) is consistent with what has recently been allowed other utilities in North America (when the equity percentage is considered), and (iv) is in the middle of the range using the forward-looking MRP. For Intragaz, I recommend an ROE of 10.5%, which I discuss in more detail next.

B. Intragaz' 10-Year Rate Horizon

Q85: How do you recommend that Intragaz' allowed ROE be adjusted to reflect its longer rate horizon?

A85: Intragaz's ROE authorized in this proceeding is expected to be in place for a 10-year rate period. This creates a risk that the capital market conditions or Intragaz's business risks characteristics may change and the authorized ROE will no longer reflect the return required by investors. Therefore, I recommend that the Régie implement an adjustment mechanism that will provide a fair rate of return to Intragaz over the 10-year rate period, given that financial, economic, and business risks conditions are likely to change during that time.

Specifically, I recommend that the Régie add a maturity premium to the authorized benchmark ROE of 50 basis points. Intragaz would then have the opportunity to earn the fixed all-in ROE over the duration of the rate horizon. The premium should be sized to reflect the expected financial and economic risks during the rate period by comparing the yield spread on long- and short-duration bonds that match the rate horizon. 41 compares the yield spread on 10-year and 2-year Government of Canada and Canadian utility bonds.[172] This indicates a premium of up to 100-140 basis points of which a portion (e.g., 50 basis points) should be reflected in the fixed ROE.

[172] As a common rate cycle in North America is 3 years, I use the middle of the cycle vs. the longer rate term. I.e., the additional maturity.

FIGURE 41: YIELD SPREAD – CANADIAN GOVERNMENT AND UTILITY BONDS

		Canadian Government Bonds	A-Rated Canadian Utility Bonds	BBB-Rated Canadian Utility Bonds
		[A]	[B]	[C]
10 Year Maturity	[1]	5.79%	5.33%	5.58%
2 Year Maturity	[2]	4.81%	3.90%	4.23%
Maturity Premium	[3]	1.00%	1.40%	1.40%

Sources and Notes:
[1]-[2]: From Bloomberg as of 6/30/2021. Average of monthly bond yields from December 1990 through June 2021.
[3]: [1] - [2].

Regulators in other jurisdictions have allowed for a premium for projects that receive a fixed ROE over a long period. For example, the Iowa Utilities Board rely on the so-called Advanced Ratemaking for renewable energy projects and sets the ROE for the full economic life of the asset. In 2017, the Iowa Utilities Board authorized a ROE of 11.0% for Interstate Power and Light Company's New Wind II Project, which was 125 basis points higher than the average allowed ROE for integrated electric utilities (9.75%).[173] Similarly, in 2014, the Iowa Utilities Board awarded MidAmerican Energy Company an ROE of 11.5% for its 162 MW Wind IX project, which was above the average authorized ROE for integrated electric utilities at the time (9.85%).[174] In the settlement agreement for this project, both MidAmerican and the consumer advocate agreed that the ROE should be higher than current capital costs because the project's ROE was fixed for 30-years.[175] The Iowa Utilities Board did not specify how they arrived at the premium, but the magnitude is consistent with the prevailing yield spread between 20-year and 3-year U.S. government or utility bonds.

[173] Iowa Utilities Board, Final Order and Decision, Docket No. RPU-2017-0002, April 17, 2018, pp. 52-53.

[174] Iowa Utilities Board, Order Approving Settlement, Docket No. RPU-2014-0002, January 20, 2015, pp. 11-12.

[175] *Ibid.*

The premium recognizes that financial and economic conditions will change during Intragaz's 10-year rate horizon. Under one approach, the Régie can apply the full premium to Intragaz' ROE in the later years of the rate period. However, as a more conservative approach, I recommend that the Régie apply a portion of the current 100 to 140 basis points premium to each of the 10 years in Intragaz' rate period; e.g., 50 basis points to be conservative. This results in a recommended ROE for Intragaz of 10.5%.

Should the Régie prefer to not grant Intragaz a maturity premium, I find it is reasonable to link Intragaz's ROE to that of Énergir, so that in case Énergir's ROE changes by a specific number of basis points then Intragaz's ROE changes by the same number of basis points.

Q86: Does this conclude your evidence?

A86: Yes

List of Exhibits - Villadsen

Exhibit No. BV-1	Technical Appendix to the Direct Testimony of Dr. Bente Villadsen
Exhibit No. BV-2	Resume of Dr. Bente Villadsen
Exhibit No. BV-3	Cost of Capital Schedules
Exhibit No. BV-4	Canadian Cost of Capital Model
Exhibit No. BV-5	U.S. Cost of Capital Model
Exhibit No. BV-6	Regulated Asset Summary
Exhibit No. BV-7	Bond Yields & Market Risk Premium
Exhibit No. BV-8	Volatility Charts
Exhibit No. BV-9	Credit Metrics Benchmarks
Exhibit No. BV-10	Credit Metrics Analysis
Exhibit No. BV-11	Canadian Foreign Direct Investment
Exhibit No. BV-12	Canadian Utility Geographic Distribution
Exhibit No. BV-13	Utility Allowed ROEs & Equity Ratios

BEFORE THE

RÉGIE DE L'ÉNERGIE DU QUÉBEC

TECHNICAL APPENDIX TO THE DIRECT TESTIMONY OF DR. BENTE VILLADSEN

For
Énergir, s.e.c.
Gazifère Inc.
Intragaz LP

EXHIBIT BV-1

November 5, 2021

Brattle

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GLOSSARY OF ACRONYMS

BPS	Basis Points
CAPM	Capital Asset Pricing Model
DCF	Discounted Cash Flow
ECAPM	Empirical Capital Asset Pricing Model
MRP	Market Risk Premium
ROE	Return on Equity

Appendix B: Technical Appendix

I. Sample Selection

To identify publicly traded U.S. companies that engaged in the lines of business I am interested in, I rely on industry classifications provided by the *Value Line Investment Survey*. *Value Line* identifies 16 companies as gas distribution companies and 11 companies as water utility companies.

To include a company, I require that over a three year study period and up to the date of the analysis, the sample companies have investment grade credit ratings, a high percentage of regulated assets (generally greater than 50 percent),[1] no dividend cuts, and no substantial mergers and acquisitions or other activity that could cause the growth rates or beta estimates to be biased. I also require that each of the sample companies has more than $300 million in market capitalization to avoid micro companies, as. very small (in terms of market capitalization) publicly traded companies have been shown to have a higher cost of equity.[2],[3] Finally, I require that data from S&P or Moody's, Value Line, and Bloomberg — each widely known and utilized by investors — be available for all sample companies.

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1 I use the Edison Electric Institute's classification of electric utilities as Regulated (greater than 80 percent of total assets are regulated) or Mostly Regulated (less than 80 percent of total assets are regulated).

2 I relax my $300 market capitalization screening criteria to include Artesian Res Corp, Global Water Resources, Middlesex Water in recognition that these companies have very stable finances despite relatively low revenue.

3 I also exclude York Water, which lacks sufficient data for estimation.

The Canadian Utilities sample consists of those Canadian utilities I know have publicly traded stock and sufficient data available for estimation. I found nine companies with publicly traded stock: Algonquin Power & Utilities Corporation, AltaGas Ltd., ATCO, Canadian Utilities Ltd., Emera Inc., Enbridge Inc., Fortis Inc., Hydro One Ltd., and TC Energy Corporation. As Canadian Utilities Ltd. is a publicly traded entity within the ATCO Group, I cannot include both companies.[4] Because Canadian Utilities Ltd. is close to being a pure-play in the utility sector, I include Canadian Utilities. As a result, I end up with a sample of eight Canadian utility companies: Algonquin, AltaGas, Canadian Utilities, Emera, Enbridge, Fortis, Hydro One, and TC Energy.

II. Risk Positioning Models – CAPM and ECAPM

A. The Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) is a theoretical model stating that the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line (see Figure 1 in my Written Evidence), in which the required expected return on an asset is proportional to that asset's risk relative to the market as measured by its "beta". More precisely, the CAPM states that the cost of capital for an investment *S* (e.g., a particular common stock), is given by the following equation:

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

where r_S is the required return on investment S;
r_f is the risk-free interest rate;
β_S is the beta risk measure for the investment S; and
$MERP$ is the market equity risk premium.

The CAPM is based on portfolio theory, and recognizes two fundamental principles of finance: (1) investors seek to minimize the possible variance of their returns for a given level of expected returns (or alternatively, they demand higher *expected* returns when there is greater uncertainty about those returns), and (2) investors can reduce the variability of their returns by diversifying—constructing portfolios of many assets that do not all go up or down at the same time or to the same degree. Under the assumptions of the CAPM, the market participants will construct portfolios of risky investments that minimize risk for a given return so that the aggregate holdings of all

[4] https://www.atco.com/en-ca/about-us/corporate-structure.html.https://www.atco.com/en-ca/about-us/corporate-structure.html.

investors represent the "market portfolio". The risk-return trade-off faced by investors then concerns their exposure to the risk inherent in the market portfolio, as they weight their investment capital between the portfolio of risky assets and the risk-free asset.

Because of the effects of diversification, the relevant measure of risk for an individual security is its *contribution* to the risk of the market portfolio. Therefore, beta (β) is defined to capture the sensitivity of the security's returns to the market's returns. Formally,

$$\boldsymbol{\beta_s} = \frac{covariance(\boldsymbol{r_s}, \boldsymbol{R_m})}{variance(\boldsymbol{R_m})} \quad (2)$$

where $\boldsymbol{R_m}$ is the return on the market portfolio.

Beta is usually calculated by statistically comparing (using regression analysis) the excess (positive or negative) of the return on the individual security over the government bond rate with the excess of the return on a market index such as the S&P/TSX composite index (or the S&P 500 in the U.S.) over a government bond rate.[5]

The basic idea behind beta is the risk that cannot be diversified away in large portfolios is what matters to investors. Beta is a measure of the risks that *cannot* be eliminated by diversification. It is this non-diversifiable risk, or "systematic risk", for which investors require compensation in the form of higher expected returns. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk; its returns vary to the same degree as those on the market as a whole. According to the CAPM, the required return demanded by investors (i.e., the cost of equity) for investing in that stock will match the expected return on the market as a whole. Similarly, stocks with betas above 1.0 have more than average risk, and so have a cost of equity greater than the expected market return; those with betas below 1.0 have less than average risk, and are expected to earn lower than market levels of return.

B. INPUTS TO THE CAPM

1. The Risk-free Interest Rate

The precise meaning of a "risk-free" asset according to the finance theory underlying the CAPM is an investment whose return is guaranteed, with no possibility that it will vary around its expected value in response to the movements of the broader market. (Equivalently, the CAPM beta of a risk-free asset is zero.) In developed economies like Canada and the U.S., government debt (i.e., bonds backed by the full faith and credit of the sovereign government) are generally considered have no

[5] Value Line relies on the New York Stock Exchange index to calculate its betas, while Bloomberg by default uses the S&P 500 for U.S. companies.

default risk. In this sense they are "risk-free;" however, unless they are held to maturity, the rate of return on government bonds may in fact vary around their stated or expected yields.[6]

The theoretical CAPM is a single period model, meaning that it posits a relationship between risk and return over a single "holding period" of an investment. Because investors can rebalance their portfolios over short horizons, many academic studies and practical applications of the CAPM use the short-term government bond as the measure of the risk-free rate of return. However, regulators frequently use a version based on a measure of the long-term risk-free rate; e.g., a long-term government bond. In accordance with common regulatory practice in Canada, I rely on the 30-year Canadian Government bond as a measure of the risk-free asset in this proceeding. I use the term "risk-free rate" as describing the yield on the 30-year Canadian Government bond.

However, I do not believe the *current* yield on long-term Canadian Government bonds is a good estimate for the risk-free rate that will prevail over the time period relevant to this proceeding.[7] As discussed extensively in my evidence, currently prevailing bond yields are low for a variety of circumstances that should not be expected to persist. Consensus Forecasts, June 2021 forecasts the Canadian 10-year bond yield to increase to 1.9% by June 2022,[8] while Blue Chip Economic Indicators, June 2021 forecasts the yield on the U.S. 10-year government bond to increase to 2.1% by 2022.[9] For this reason and because the Régie in the past has used Consensus Forecasts, I utilize a rate of 1.9% which is Consensus Forecasts' forecast of the yield on a 10-year Canadian Government bonds in 2022.[10] I adjust this value upward by 40 basis points, which is my estimate of the maturity premium for the 30-year over the 10-year Government Bond.[11] This gives me a base input of 2.30% for the risk-free rate of interest before considering any downward pressure on government bond yields.

Additionally, it is important to recognize the implications of the elevated level of spread between yields on Canadian utility bonds and Canadian Government bonds of the same horizon. Figure A-1 below shows that this yield spread is 0.34% higher relative to historic levels. One way to account for this observation is if the prevailing and near-term expected government bond yields are

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6 This is due to interest rate fluctuations that can change the market value of previously issued debt in relation to the yield on new issuances

7 Since the allowed ROE established in this proceeding is expected to remain in effect for several years, current bond yields may not reflect the opportunity cost of investors unless yields are expected to remain at their present levels over the next several years.

8 Consensus Forecast, June 2021, page 17.

9 Wolters Kluwer Blue Chip Economic Indicators and PwC Analysis, June 2021, p. 3.

10 Consensus Forecasts, June 2021, p. 17.

11 This maturity premium is estimated by comparing the average excess yield on 30-year versus 10-year Canadian Government Bonds over the period 1990 - 2021, using data from Bloomberg. See Exhibit BV-7.

artificially depressed relative to longer-term market expectations. Therefore, I consider a scenario with the risk-free rate (conservatively) 17 basis points higher at 2.47% when performing my CAPM-based analyses. The reason I include only approximately half of the elevation in yield spread is that as interest rates increase the yield spread may decline. Thus, I choose a conservative 17 basis points.

FIGURE A-1

Spreads between CAN Utility Bond (30 year maturity) and CAN Government Bond (30 year maturity) - %

Periods	A-Rated Utility and Treasury	BBB-Rated Utility and Treasury	Notes
Period 1 - Average Mar-2002 - 2007	0.99	1.52	[1]
Period 2 - Average Aug-2008 - Jun-2021	1.55	1.80	[2]
Period 3 - Average Jun-2021	1.33	1.56	[3]
Period 4 - Average 15-Day (Jun 10, 2021 to Jun 30, 2021)	1.33	1.56	[4]
Spread Increase between Period 2 and Period 1	0.56	0.28	[5] = [2] - [1]
Spread Increase between Period 3 and Period 1	0.33	0.05	[6] = [3] - [1]
Spread Increase between Period 4 and Period 1	**0.34**	**0.05**	[7] = [4] - [1]

Sources and Notes:
Spreads for the periods are calculated from Bloomberg's yield data.
Average monthly yields for the indices were retrieved from Bloomberg as of June 30, 2021.

2. The Market Equity Risk Premium

a. Historical Average Market Equity Risk Premium

Like the cost of capital itself, the market equity risk premium is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can *expect* to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable, and must be inferred or forecasted based on known market information.

One commonly use method for estimating the MRP is to measure the historical average premium of market returns over the income returns on risk-free government bonds over some long historical period. *Duff and Phelps* performs such a calculation of the Canadian MRP using data from several sources.[12] The arithmetic average of annual observed market equity risk premiums from 1935 to the present is 5.68% with slightly shorter or longer periods resulting in slightly higher or lower MRPs.[13]

[12] *Duff and Phelps* Cost of Capital Navigator, International Cost of Capital Module, 2020.

[13] *Id.*, I use data from 1935 to today as it is a very long period. I note that the longest period of 1919-2020 resulting in an MRP of 5.54%, while the post-war period, 1945-2021 results in an MRP of 5.80%.

b. Forward Looking Market Equity Risk Premium

An alternative approach to estimating the MRP eschews historical averages in favor of using current market information and forecasts to infer the expected return on the market as a whole, which can then be compared to prevailing government bond yields to estimate the equity risk premium. Bloomberg performs such estimates of country-specific MRPs by implementing the DCF model on the market as a whole—using forecast market-wide dividend yields and current level on market indexes (e.g., the S&P500 or the S&P / TSX Index) to infer the expected market return.

The forward-looking market-implied MRP has increased substantially following the COVID-19 pandemic and, as a result, Bloomberg's estimate of the forward-looking MRP is substantially elevated. Bloomberg measures the forecasted Canadian MRP at 8.45% as of June 2021. The same data service measures the U.S. MRP at about 8.68%. The Bloomberg MRP measure is over a 10-year government bond, so converting that to the forecasted MRP over a 30-year government bond results in approximately 8.05% for Canada and approximately 8.18% for the U.S.[14]

c. Yield Spread Adjustments to the Market Equity Risk Premium

Figure 12 in my Direct Evidence shows that the yield spread for A-rated Canadian utility debt over Government Bonds is currently approximately 1.33% in Canada. This compares to a long-term historic average spread of 0.99% in Canada prior to the financial crisis.[15] An elevated spread suggests that either government bond yields remain artificially low, the premium investors require to hold risky assets has increased relative to its long-term average, or some combination thereof.

This information can be used to provide a quantitative benchmark for the implied increase in MRP based on a paper by Edwin J. Elton, et al., which documents that the yield spread on corporate bonds is normally a combination of a default premium, a tax premium, and a systematic risk premium.[16] Of these components, it is the systematic risk premium that likely explains the vast majority of the yield spread increase. In other words, unless the risk-free rate is underestimated as described above, the market equity risk premium has increased relative to its "normal" level.[17]

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[14] Estimates of the MRP over a 30-year bond is obtained by subtracting the maturity premium of the Canadian (U.S.) 30-year over the 10-year government bond from the figure reported by Bloomberg. This maturity premium is about 40 (50) basis points in Canada (the U.S).

[15] See Exhibit BV-7.

[16] "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, *The Journal of Finance*, February 2001, pp. 247-277.

[17] In theory, some of the increase in yield spread for A-range rated debt may be due to an increase in default risk, but the increase in default risk for A-range rated debt is undoubtedly very small because utilities with A range rated debt have a low default risk. This means that the vast majority—if not all—of the increase in A-rated yield

Therefore, I consider a scenario allocating part of the approximately 34 bps increase in A-rated utility spreads to an increase in the MRP (which drives the increase in systematic risk premium on A-rated debt).[18]

Assuming a beta of 0.25 for A-rated debt[19] means that an increase in the MRP of one percentage point translates into a ¼ percentage point increase in the risk premium on A-rated debt (*i.e.*, 0.25 (debt beta) times 1 percentage point (increase in MRP) = ¼ percentage point increase in yield spread). The current yield spread elevation of about 34 bps would be consistent with a 1.4 percentage point increase in the MRP.[20] Adjusting the long-term historical average estimate of the Canadian MRP (5.68 percent) upward by this amount suggests a current MRP of approximately 7 percent, which is closer to, albeit below the current forecasted MRP for Canada as discussed above. I find this evidence supportive of my reliance (in one scenario of my CAPM analysis) on a forward-looking MRP of 8.05%.

d. Beta Measurement

Bloomberg reports betas that are estimated using the method outlined by Professor Marshall Blume,[21] which reflected his empirical observation that historical measurements of a company's beta are not the best predictors of what that company's systematic risk *will be* going forward. Professor Blume was able to apply a consistent adjustment procedure to historical betas that increased their accuracy in forecasting eventual realized betas. Essentially, Professor Blume's adjustment transforms a historical beta into a better estimate of expected future beta. It is this expected "true" beta that drives investors' expected returns according to the CAPM. It is important to note that the Professor Blume did not adjust betas for a convergence towards 1 but rather made

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spreads is due to a combination of the increased systematic risk premium and the downward pressure on the yields of government debt. Although there is no increase in the tax premium discussed in the Elton et al. paper due to coupon payments, there may be some increase due to a small tax effect resulting from the probability of increased capital gains taxes when the debt matures.

18 Importantly, the scenario in which I allocate some of the yield spread elevation to the MRP is distinct from the scenario in which I conservatively attribute 17 bps of the spread elevation to downward pressure on the risk free rate. (*See* Section II.B.1.) I do not simultaneously adjust both the risk-free rate and the MRP based on the yield spread evidence.

19 Elton, *et al*. estimates the average beta on BBB-rated corporate debt as 0.26 over the period of their study, and A-rated debt will have a slightly lower beta than BBB-rated debt. I note that 0.25 is a conservatively high estimate of the beta on A-rated utility debt. Most academic estimates, including those presented in *Berk and Demarzo* that I utilize for my Hamada adjustments are significantly lower: in the range of 0.05 – 0.10 percent.

20 Using the Elton, *et al.* debt beta approximation, the calculation is $\frac{0.34\%}{0.25} = 1.36\%$. I note that if I instead used my standard debt beta of 0.05 to 0.10, the elevation in yield spread would be consistent with an increase in the MRP of over 4 percentage points, since each 10 basis point elevation in yield spread could be interpreted as consistent with an MERP could increase by up to 1 percent.

21 Blume, M. E. (1971), "On the Assessment of Risk," *Journal of Finance*, 26, pp. 1-10.

an adjustment for sampling error. It is appropriate to use Bloomberg's adjusted betas, when employing the CAPM to estimate the forward-looking cost of equity capital.

To explain this phenomenon, note that when a company's beta is estimated using historical market data, there is some sampling error caused by "noise" in the data and estimation process. The market-weighted average beta for all assets is by definition 1.0, and repeated measurements indicate that the betas for individual stocks are clustered between 0.5 and 1.5. Given this information about the distribution of true betas across the entire market, a particularly high or low estimate of beta is more likely to reflect measurement (sampling) error than an accurate measurement of the security's systematic risk.

In recognition of this fact, Professor Blume performed a linear regression analysis comparing betas measured in one time period to betas measured in a subsequent time period.[22] He found that the first period betas were not the best predictor of the subsequent period betas. Rather his analysis indicated that second-period betas were better predicted by taking a weighted average of the first-period beta estimates and the market-average beta of 1.0. The estimated coefficients of his regression equations suggested a weight of 2/3 on the first-period beta estimate and 1/3 on the market beta of 1.0. This regression analysis was the basis for calculating a "Blume adjusted" beta from the "raw" beta estimated based on historical market data.

The Blume adjustment procedure is routinely performed by providers of financial data and analysis, such as Bloomberg and *Value Line*. It is therefore widely relied upon by financial practitioners and accepted by many regulatory agencies.

e. *Choice of Market Index for Estimating Beta*

A stock's beta measures its contribution to the risk of the "market portfolio", which according to the theory underlying the CAPM represents the value-weighted portfolio of all risky assets available for investment: stocks, bonds, commodities, real estate, etc. However, because many of these asset classes are not liquidly traded with easily measured prices, standard practice is to define the market portfolio in terms of a stock market index. When choosing an index to proxy for the market portfolio in the CAPM, the analyst's goal is to capture—to the greatest extent possible—the universe of investment opportunities open to investors that might consider buying the security whose cost of equity she is estimating. For this reason, the index should be both broad and accessible.

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22 *Ibid*.

When measuring betas for I rely on betas measured against S&P/TSX Composite Index[23] (TSX). Figures 18, 20, and 21 in my written evidence summarizes the equity betas for my samples and Exhibits BV-4 and BV-5 show levered equity and asset betas for the individual companies.

C. THE EMPIRICAL CAPM

1. Description of the ECAPM

Empirical research has shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted. A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

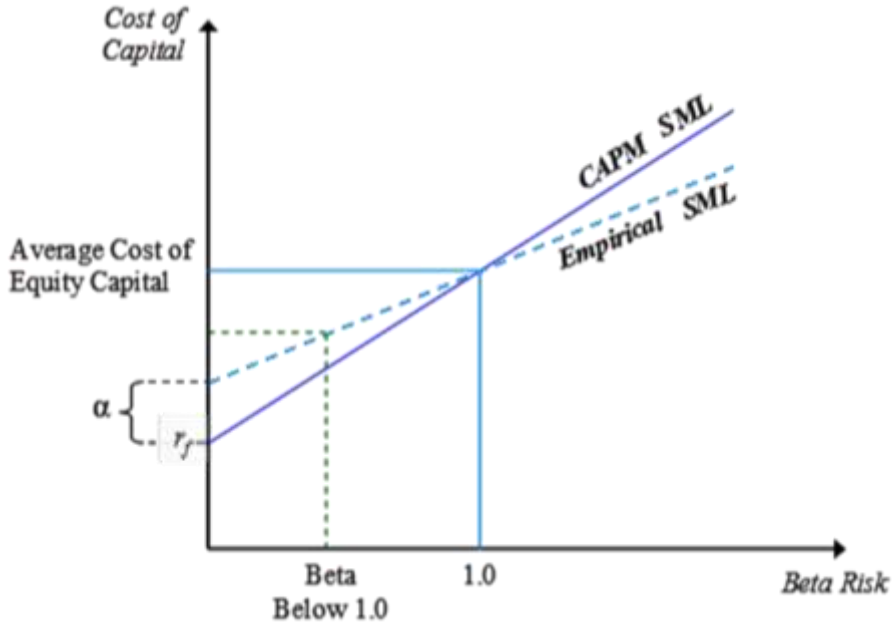
The Empirical CAPM (ECAPM) makes use of these empirical findings. It estimates the cost of capital with the equation,

$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MERP - \alpha)} \qquad (3)$$

where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see Equation (1)). The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line, which results in a Security Market Line that more closely matches the results of empirical tests. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

[23] The S&P/TSX composite index became the key index on the Toronto Stock Exchange on May 1, 2002. The number of companies in the index consists of those companies that meet Standard & Poor's criteria for inclusion.

FIGURE A-2
THE EMPIRICAL SECURITY MARKET LINE



2. Academic Evidence on the Alpha Term in the ECAPM

Figure A-3 below summarizes the empirical results of tests of the CAPM, including their estimates of the "alpha" parameter necessary to improve the accuracy of the CAPM's predictions of realized returns.

FIGURE A-3

EMPIRICAL EVIDENCE ON THE ALPHA FACTOR IN ECAPM*

AUTHOR	RANGE OF ALPHA	PERIOD RELIED UPON
Black (1993)[1]	1% for betas 0 to 0.80	1931-1991
Black, Jensen and Scholes (1972)[2]	4.31%	1931-1965
Fama and McBeth (1972)	5.76%	1935-1968
Fama and French (1992)[3]	7.32%	1941-1990
Fama and French (2004)[4]	N/A	
Litzenberger and Ramaswamy (1979)[5]	5.32%	1936-1977
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 3.91%	1926-1978
Pettengill, Sundaram and Mathur (1995)[6]	4.6%	1936-1990

*The figures reported in this table are for the longest estimation period available and, when applicable, use the authors' recommended estimation technique. Many of the articles cited also estimate alpha for sub-periods and those alphas may vary.

[1]Black estimates alpha in a one step procedure rather than in an un-biased two-step procedure.

[2]Estimate a negative alpha for the subperiod 1931-39 which contain the depression years 1931-33 and 1937-39.

[3]Calculated using Ibbotson's data for the 30-day treasury yield.

[4]The article does not provide a specific estimate of alpha; however, it supports the general finding that the CAPM underestimates returns for low-beta stocks and overestimates returns for high-beta stocks.

[5]Relies on Lizenberger and Ramaswamy's before-tax estimation results. Comparable after-tax alpha estimate is 4.4%.

[6]Pettengill, Sundaram and Mathur rely on total returns for the period 1936 through 1990 and use 90-day treasuries. The 4.6% figure is calculated using auction averages 90-day treasuries back to 1941 as no other series were found this far back.

Sources:

Black, Fischer. 1993. Beta and Return. *The Journal of Portfolio Management* 20 (Fall): 8-18.

Black, F., Michael C. Jensen, and Myron Scholes. 1972. The Capital Asset Pricing Model: Some Empirical Tests, from Studies in the theory of Capital Markets. In *Studies in the Theory of Capital Markets*, edited by Michael C. Jensen, 79-121. New York: Praeger.

Fama, Eugene F. and James D. MacBeth. 1972. Risk, Returns and Equilibrium: Empirical Tests. *Journal of Political Economy* 81 (3): 607-636.

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

Fama, Eugene F. and Kenneth R. French. 2004. The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives* 18 (3): 25-46.

Litzenberger, Robert H. and Krishna Ramaswamy. 1979. The Effect of Personal Taxes and Dividends on Capital Asset Prices, Theory and Empirical Evidence. *Journal of Financial Economics* XX (June): 163-195.

Litzenberger, Robert H. and Krishna Ramaswamy and Howard Sosin. 1980. On the CAPM Approach to Estimation of a Public Utility's Cost of Equity Capital. *The Journal of Finance* 35 (2): 369-387.

III. DCF Models

A. DCF Estimation of Cost of Equity

The DCF method for estimating the cost of equity capital assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T} \quad (4)$$

where P_0 is the current market price of the stock; D_t is the dividend cash flow expected at the end of period t; r is the cost of equity capital; and T is the last period in which a dividend cash flow is to be received. The formula simply says that the stock price is equal to the sum of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received. Since the current market price is known, it is possible to infer the cost of equity that corresponds to that price and a forecasted pattern of expected future dividends. In terms of Equation (4, if P_0 is known and $D_1, D_2, \ldots D_T$ are estimated, an analyst can "solve for" the cost of equity capital r.

B. Versions of the DCF Model

1. The Single-stage DCF Model

Perhaps the most widely known and used application of the DCF method assumes that the expected rate of dividend growth remains constant forever. In the so-called Gordon Growth Model, the relationship expressed in Equation (4) is such that the present value equation can be rearranged algebraically into a formula for estimating the cost of equity. Specifically, if investors expect a dividend stream that will grow forever at a steady rate, then the market price of the stock will be given by

$$P_0 = \frac{D_1}{r-g} \quad (5)$$

where D_1 is the dividend expected at the end of the first period, g is the perpetual growth rate, and P_0 and r are the market price and the cost of capital, as before. Equation (5) is a simplified version of Equation (4) that can be solved algebraically to yield the well-known "DCF formula" for the cost of equity capital,

$$r = \frac{D_1}{P_0} + g = \frac{D_0 \times (1+g)}{P_0} + g \tag{6}$$

2. Multi-stage DCF Models

There are other versions of the DCF model that relax this restrictive assumption and posit a more complex or nuanced pattern of expected future dividend payments. For example, if there is reason to believe that investors do *not* expect a company's dividends to grow at a steady rate forever, but rather have different growth rate expectations in the near term (e.g., over the next five or ten years), compared to the distant future (e.g., a period *starting* ten years from the present moment), a "multi-stage" growth pattern can be modeled in the present value formula (Equation (4)).

In my implementation of the multi-stage DCF model, I model the first 5-years of dividends at a growth rate specific to the company whose cost of equity I am estimating. I then taper the growth rate towards that of the economy (GDP growth) over the next 5-years. Finally, from year 10 onwards I use the GDP growth rate as the perpetual growth rate for dividends. Formally, the "multi-stage" DCF approach assumes the following pattern for expected future dividends in the present value formula.

$$P_0 = \frac{D_1}{1+r} + \cdots + \frac{D_5}{(1+r)^5} + \frac{D_6}{(1+r)^6} + \cdots + \frac{D_{10}+P_{10}}{(1+r)^{10}} \tag{7}$$

where D_1 through D_{10} are determined as described above, and P_{10} is the "terminal value" representing the expected price of the stock at the end of year 10. This value is determined by applying the Gordon Growth formula for perpetual growth from that point on:

$$P_{10} = \frac{D_{10}(1+g_{perp})}{r - g_{perp}} \tag{8}$$

While Equation (7) cannot easily be manipulated to provide a formula for the cost of equity, the value of r implied by the assumed dividend growth pattern can be determined numerically using a computer. The increased complexity of the multi-stage DCF model is the trade-off for greater flexibility in modeling investors' expectations. This can be advantageous when there is reason to believe that investors perceive different growth prospects in the near and long term.

3. Dividends, Cash Flows, and Share Repurchases

In addition to the single- and multi-stage implementations of the DCF model described above, there are many alternative formulations. Notable among these are versions of the model that use free cash flows rather than dividends in the present value formula (Equation (4)).[24]

Because investors are interested in cash flow, it is technically important to capture *all* cash flows that are distributed to shareholders when estimating the cost of equity using the DCF method. In some circumstances, investors may expect to receive cash in forms other than dividends. An important example concerns the fact that many companies distribute cash to shareholders through share buybacks in addition to dividends. To the extent such repurchases are expected by investors, but not captured in the forecasted pattern of future dividends; a dividend-based implementation of the DCF model will underestimate the cost of equity.

Similarly, if investors have reason to suspect that a company's dividend payments will not reflect a full distribution of its available cash free cash flows in the period they were generated, it may be appropriate replace the forecasted dividends with estimated free cash flows to equity in the present value formula (Equation (4)). Focusing on *available* cash rather than that actually distributed in the form of dividends can help account for instances when near-term investing and financing activities (e.g., capital expenditures or asset sales, debt issuances or retirements, or share repurchases) may cause dividend growth patterns to diverge from growth in earnings.

Many utility companies such as those included in my samples have long histories of paying a dividend. In fact, as mentioned in Section I of this Appendix, one of my requirements for inclusion in my samples is that a company pays dividends for 3-years without a gap or a dividend cut (on per share basis). Additionally, although some utility companies have recently engaged in share repurchase programs, the companies in my samples do not distribute substantial cash flows by means other than dividends.[25] Therefore, in the present proceeding it is reasonable to rely on the cost of equity estimates derived from my dividend-based implementation of the single-stage (Equation (6) and multi-stage DCF models (Equations (7) and (8).

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[24] For an example in a regulatory context, the U.S. Surface Transportation Board uses a cash flow based model with three stages to estimate the cost of equity for the railroads. See Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009. The exact implementation of the method is currently the subject of a STB inquiry.

[25] While a number of companies in my samples have or have had share repurchase programs, the magnitude tends to be relatively small, so that an inclusion of the cash flow from repurchases would likely have a minimal impact on the average results for the samples. However, it is clear that not including such repurchases downwardly biases the estimated cost of equity.

C. DCF MODEL INPUTS

1. Dividends and Prices

As described above, DCF models are forward-looking, comparing the *current* price of a stock to its expected *future* dividends to estimate the required expected return demanded by the market for that stock (i.e., the cost of equity). Therefore, the models demand the current market price and currently prevailing forecasts of future dividends as inputs.

The stock price input I employ for each sample company is the average of the closing stock prices for the 15 trading days ending on the date of my analysis. This guards against biases that may arise on a single trading day, yet is consistent with using current stock prices.

The dividend forecasts used in my single- and multi-stage DCF models are determined starting from the last recorded dividend payments (as reported by Bloomberg) prior to the date of my analysis. This dividend is grown at the forecasted growth rate (compounded quarterly) to estimate the expected future dividend inputs (D_1, etc.…) required by the DCF models.

2. Company Specific Growth Rates

a. Analysts' Forecasted Growth Rates

Finding the right growth rate(s) is usually the "hard part" of applying the DCF model, which is sometimes criticized due to what has been called "optimism bias" in the earnings growth rate forecasts of security analysts. Optimism bias is related to the observed tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. This tendency to overestimate growth rates is perhaps related to incentives faced by analysts that provide rewards not strictly based upon the accuracy of the forecasts. To the extent optimism bias is present in the analysts' earnings forecasts the cost of capital estimates from the DCF model would be too high.

While academic researchers during the 1990s as well as in early 2000s found evidence of analysts' optimism bias, there is some evidence that regulatory reforms have eliminated the issue. A recent paper by Hovakimina and Saenyasiri (2010) found that recent efforts to curb analysts' incentive to provide optimistic forecasts have worked, so that "the median forecast bias essentially disappeared."[26] Thus, some recent research indicates that the analyst bias may be a problem of the past.

[26] A. Hovakimian and E. Saenyasiri, "Conflicts of Interest and Analyst Behavior: Evidence from Recent Changes in Regulation," *Financial Analysts Journal*, vol. 66, 2010.

The findings of several academic studies[27] show that analyst earnings forecasts turn out to be too optimistic for stocks that are more difficult to value, for instance, stocks of smaller firms, firms with high volatility or turnover, younger firms, or firms whose prospects are uncertain. Coincidentally, stocks with greater analyst disagreement have higher analyst optimism bias—all of these describe companies that are more volatile and/or less transparent—none of which is applicable to most utility companies with wide analyst coverage and information transparency.

b. Sources for Forecasted Growth Rates

For the reasons described above, I rely on analyst forecasts of earnings growth for the company-specific growth rate inputs to my implementations of the single- and multi-stage DCF models. All of the companies in my samples have coverage from equity analysts reporting to Thomson Reuters IBES, so I use the consensus 3-5 year EPS growth rate provided by that service. For the U.S. based samples, I supplement these consensus values with growth rates based on EPS estimates from *Value Line*.[28, 29]

3. Perpetual Growth Rates for the Multi-stage DCF Model

For the perpetual stage of the multi-stage DCF model, I model the dividends of all companies as growing at the rate of the overall economy.

For the companies in my Canadian Utility sample, I use the long-term Canadian GDP growth forecast of 3.7% and the long-term U.S. GDP growth forecast of 4.0% for the U.S. samples from TD Economics.[30]

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[27] These studies include the following: (i) Hribar, P, McInnis, J. "Investor Sentiment and Analysts' Earnings Forecast Errors," *Management Science* Vol. 58, No. 2 (February 2012): pp. 293-307; (ii) Scherbina, A. (2004), "Analyst Disagreement, Forecast Bias and Stock Returns," downloaded from Harvard Business School Working Knowledge: http://hbswk.hbs.edu/item/5418.html; and (iii) Michel, J-S., Pandes J.A. (2012), "Are Analysts Really Too Optimistic?" downloaded from http://www.efmaefm.org.

[28] Most of the companies in the Canadian Utility sample are not covered by *Value Line*. Therefore, I rely only on the IBES growth rates for these companies.

[29] Specifically, I compute the growth rate implied by *Value Line*'s current year EPS estimate and its projected 3-5 year EPS estimate. I then average this in with the IBES consensus estimate as an additional independent estimate, giving it a weight of 1 and weighting the IBES consensus according to the number of analysts who contributed estimates.

[30] TD Economics, Long-Term Economic Forecasts, June 17, 2021, p.3.

IV. Financial Risk and the Cost of Equity

A common issue in regulatory proceedings is how to apply data from a benchmark set of comparable securities when estimating a fair return on equity for the target/regulated company.[31] It may be tempting to simply estimate the cost of equity capital for each of the sample companies (using one of the above approaches) and average them. After-all, the companies were chosen to be comparable in their business risk characteristics, so why would an investor necessarily prefer equity in one to the other (on average)?

The problem with this argument is that it ignores the fact that underlying asset risk (i.e., the risk inherent in the lines of business in which the firm invests its assets) for each company is typically divided between debt and equity holders. The firm's debt and equity are therefore financial derivatives of the underlying asset return, each offering a differently structured claim on the cash flows generated by those assets. Even though the risk of the underlying assets may be comparable, a different capital structure splits that risk differently between debt and equity holders. The relative structures of debt and equity claims are such that higher degrees of debt financing increase the variability of returns on equity, *even when the variability of asset returns remains constant*. As a consequence, otherwise identical firms with different capital structures will impose different levels of risk on their equity holders. Stated differently, increased leverage adds financial risk to a company's equity.[32]

A. The Effect of Financial Leverage on the Cost of Equity

To develop an intuition for the manner in which financial leverage affects the risk of equity, it is helpful to consider a concrete example. Figure A-4 and Figure A-5 below demonstrate the impact of leverage on the risk and return for equity by comparing equity's risk when a company uses no debt to finance its assets, and when it uses a 50-50 capital structure (i.e., it finances 50 percent of its assets with equity, 50 percent with debt). For illustrative purposes, the figures assume that the cash flows will be either $5 or $15 and that these two possibilities have the same chance of occurring (e.g., the chance that either occurs is ½).

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[31] This is also a common valuation problem in general business contexts.

[32] I refer to this effect in terms of *financial risk* because the additional risk to equity holders stems from how the company chooses to finance its assets. In this context financial risk is distinct from and independent of the *business risk* associated with the manner in which the firm deploys its cash flow generating assets. The impact of leverage on risk is conceptually no different than that faced by a homeowner who takes out a mortgage. The equity of a homeowner who finances his home with 90% debt is much riskier than the equity of one who only finances with 50% debt.

FIGURE A-4: ALL EQUITY CAPITAL STRUCTURE

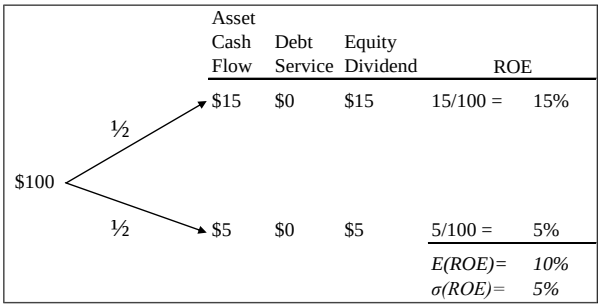
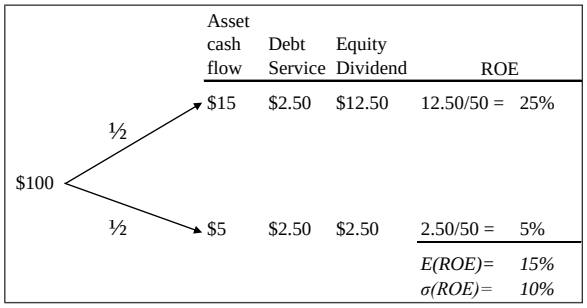


FIGURE A-5: 50/50 CAPITAL STRUCTURE.



In the figures, E(ROE) indicates the mean return and σ(ROE) represents the variance. This simple example illustrates that the introduction of debt increases both the mean (expected) return to equity holders and the variance of that return, even though the firm's expected cash flows—which are a property of the line of business in which its assets are invested—are unaffected by the firm's financing choices. The "magic" of financial leverage is not magic at all—leveraged equity investors can only earn a higher return because they take on greater risk.

B. METHODS TO ACCOUNT FOR FINANCIAL RISK

1. Cost of Equity Implied by the Overall Cost of Capital

If the companies in a sample are truly comparable in terms of the systematic risks of the underlying assets, then the overall cost of capital of each company should be about the same across companies (except for sampling error), so long as they do not use extreme leverage or no leverage. The intuition here is as follows. A firm's asset value (and return) is allocated between equity and debt holders.[33] The expected return to the underlying asset is therefore equal to the value weighted average of the expected returns to equity and debt holders – which is the overall cost of capital ($\boldsymbol{r}^*$), or the expected return on the assets of the firm as a whole.[34]

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[33] Other claimants can be added to the weighted average if they exist. For example, when a firm's capital structure contains preferred equity, the term $\frac{P}{V} \times r_p$ is added to the expression for the overall cost of capital shown in Equation (9), where P refers to the market value of preferred equity, r_P is the cost of preferred equity and $V = E + D + P$. In my analysis, I attribute the same implied yield to the cost of preferred equity as to the cost of debt.

[34] As this is on an after-tax basis, the cost of debt reflects the tax value of interest deductibility. Note that the precise formulation of the weighted average formula representing the required return on the firm's *assets* independent of financing (sometimes called the *unlevered* cost of capital) depends on specific assumptions made regarding the value of tax shields from tax-deductible corporate debt, the role of personal income tax, and the cost of financial distress. *See* Taggart, Robert A., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management*, 1991; 20(3) for a detailed discussion of these

$$\boldsymbol{r}^* = \frac{E}{V} \times r_E + \frac{D}{V} \times r_D(1 - \tau_c) \quad (9)$$

where r_D is the market cost of debt,
r_E is the market cost of equity,
τ_c is the corporate income tax rate,
D is the market value of the firm's debt,
E is the market value of the firm's equity, and
$V = E + D$ is the total market value of the firm.

Since the overall cost of capital is the cost of capital for the underlying asset risk, and this is comparable across companies, it is reasonable to believe that the overall cost of capital of the underlying companies should also be comparable, so long as capital structures do not involve unusual leverage ratios compared to other companies in the industry.[35]

The notion that the overall cost of capital is constant across a broad middle range of capital structures is based upon the Modigliani-Miller theorem that choice of financing does not affect the firm's value. Franco Modigliani and Merton Miller eventually won Nobel Prizes in part for their work on the effects of debt.[36] Their 1958 paper made what is in retrospect a very simple point: if there are no taxes and no risk to the use of excessive debt, use of debt will have no effect on a company's operating cash flows (i.e., the cash flows to investors as a group, debt and equity combined). If the operating cash flows are the same regardless of whether the company finances mostly with debt or mostly with equity, then the value of the firm cannot be affected at all by the debt ratio. In cost of capital terms, this means the overall cost of capital is constant regardless of the debt ratio, too.

Obviously, the simple and elegant Modigliani-Miller theorem makes some counterfactual assumptions: no taxes and no cost of financial distress from excessive debt. However, subsequent research, including some by Modigliani and Miller,[37] showed that while taxes and costs to financial

assumptions and formulations. Equation (9) represents the overall cost of capital to the firm, which can be assumed to be constant across a relatively broad range of capital structures.

35 Empirically, companies within the same industry tend to have similar capital structures, while typical capital structures may vary between industries, so whether a leverage ratio is "unusual" depends upon the company's line of business.

36 Franco Modigliani and Merton H. Miller (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48, pp. 261-297.

37 Franco Modigliani and Merton H. Miller (1963), "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53, pp. 433-443.

distress affect a firm's incentives when choosing its capital structure as well as its overall cost of capital,[38] the latter can still be shown to be constant across a broad range of capital structures.

This reasoning suggests that one could compute the overall cost of capital for each of the sample companies and then average to produce an estimate of the overall cost of capital associated with the underlying asset risk. Assuming that the overall cost of capital is constant, one can then re-arrange the overall cost of capital formula to estimate what the implied cost of equity is at the target company's capital structure.

2. Unlevering and Relevering Betas in the CAPM (Hamada Adjustment)

An alternative approach to account for the impact of financial risk is to examine the impact of leverage on beta. Notice that this means working within the CAPM framework as the methodology cannot be applied directly to the DCF models.

Recognizing that under general conditions, the value of a firm can be decomposed into its value with and without a tax shield, I obtain:[39]

$$V = V_U + PV(ITS) \tag{10}$$

where $V = E + D$ is the total value of the firm as in Equation (9),
V_U is the "unlevered" value of the firm—its value if financed entirely by equity
$PV(ITS)$ represents the present value of the interest tax shields associated with debt

For a company with a fixed book-value capital structure and no additional costs to leverage, it can be shown that the formula above implies:

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[38] When a company uses a high level of debt financing, for example, there is significant risk of bankruptcy and all the costs associated with it. The so called costs of financial distress that occurs when a company is over-leveraged can increase its cost of capital. In contrast a company can generally decrease its cost of capital by taking on reasonable levels of debt, owing in part to the deductibility of interest from corporate taxes.

[39] This follows development in Fernandez (2003). Other standard papers in this area include Hamada (1972), Miles and Ezzell (1985), Harris and Pringle (1985), Fernandez (2006). (See Fernandez, P., "Levered and Unlevered Beta," IESE Business School Working Paper WP-488, University of Navarra, Jan 2003 (rev. May 2006); Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock," *Journal of Finance*, 27, May 1972, pp. 435-452; Miles, J.A. and J.R. Ezzell, "Reformulating Tax Shield Valuation: A Note," *Journal of Finance*, XL5, Dec 1985, pp. 1485-1492; Harris, R.S. and J.J. Pringle, "Risk-Adjusted Discount Rates Extensions from the Average-Risk Case," *Journal of Financial Research*, Fall 1985, pp. 237-244; Fernandez, P., "The Value of Tax Shields Depends Only on the Net Increases of Debt," IESE Business School Working Paper WP-613, University of Navarra, 2006.) Additional discussion can be found in Brealey, Myers, and Allen (2014).

$$r_E = r_U + \frac{D}{E}(1 - \tau_c)(r_U - r_D) \quad (11)$$

where r_U is the "unlevered cost of capital"—the required return on assets if the firm's assets were financed with 100% equity and zero debt—and the other parameters are defined as in Equation (9).

Replacing each of these returns by their CAPM representation and simplifying them gives the following relationship between the "levered" equity beta β_L for a firm (i.e., the one observed in market data as a consequence of the firm's actual market value capital structure) and the "unlevered" beta β_U that would be measured for the same firm if it had no debt in its capital structure:

$$\beta_L = \beta_U + \frac{D}{E}(1 - \tau_c)(\beta_U - \beta_D) \quad (12)$$

where β_D is the beta on the firm's debt. The unlevered beta is assumed to be constant with respect to capital structure, reflecting as it does the systematic risk of the firm's assets. Since the beta on an investment grade firm's debt is much lower than the beta of its assets (i.e., $\beta_D < \beta_U$), this equation embodies the fact that increasing financial leverage (and thereby increasing the debt to equity ratio) increases the systematic risk of *levered* equity (β_L).

An alternative formulation derived by Harris and Pringle (1985) provides the following equation that holds when the market value capital structures (rather than book value) are assumed to be held constant:

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D) \quad (13)$$

Unlike Equation (12), Equation (13) does not include an adjustment for the corporate tax deduction. However, both equations account for the fact that increased financial leverage increases the systematic risk of equity that will be measured by its market beta. And both equations allow an analyst to adjust for differences in financial risk by translating back and forth between β_L and β_U. In principal, Equation (12) is more appropriate for use with regulated utilities, which are typically deemed to maintain a fixed book value capital structure. However, I employ both formulations when adjusting my CAPM estimates for financial risk, and consider the results as sensitivities in my analysis.

It is clear that the beta of debt needs to be determined as an input to either Equation (12), or Equation (13). Rather than estimating debt betas, I rely on the standard financial textbook of Professors Berk and DeMarzo, who report a debt beta of 0.05 for A rated debt and a beta of 0.10 for BBB rated debt.[40]

Once a decision on debt betas is made, the levered equity beta of each sample company can be computed (in this case by Bloomberg) from market data and then translated to an unlevered beta at the company's market value capital structure. The unlevered betas for the sample companies are comparable on an "apples to apples" basis, since they reflect the systematic risk inherent in the assets of the sample companies, independent of their financing. The unlevered betas are averaged to produce an estimate of the industry's unlevered beta. To estimate the cost of equity for the regulated target company, this estimate of unlevered beta can be "re-levered" to the regulated company's capital structure, and CAPM reapplied with this levered beta, which reflects both the business and financial risk of the target company.

Hamada adjustment procedures—so-named for Professor Robert S. Hamada who contributed to their development[41]—are ubiquitous among finance practitioners when using the CAPM to estimate discount rates. They are also utilized by many regulatory bodies. The U.K. Competition Commission as well as other U.K regulators and the Western Australia Economic Regulation Authority rely on an unlevering / relevering technique to determine the cost of equity capital for the entities they regulate.

V. Credit Ratio Analyses

A. Ratios

I present results and calculate the EBIT Interest Coverage, the FFO Interest Coverage, and the FFO to Debt ratios. The fact that I look only at those three ratios does not imply that other ratios are irrelevant.

- EBIT Coverage = EBIT / Interest;
- FFO-to-Debt = FFO / Total Debt;

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40 Berk, J. and DeMarzo, P., *Corporate Finance, 3rd Edition.* 2014 Pearson Education, p. 413.

41 Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock", *The Journal of Finance*, 27(2), 1971, pp. 435-452.

- FFO Coverage = (FFO + Interest) / Interest.

where FFO is calculated as net income plus depreciation and EBIT is calculated as Net Income divided by (1- tax rate) plus interest.

In order to derive these three ratios as a function of the Allowed ROE and Equity percentage, I need to determine several parameters. I assume a hypothetical rate base of $1,000 and a Quebec statutory tax rate of 26.5%. I also take as inputs CWIP to rate base, depreciation to rate base, and the embedded cost of debt as provided by the Utilities. I then use book assumptions for the Allowed ROE of 9.25% and 10.0%

Using the parameters above, I calculate the following:

EBIT = Net Income before Tax + Interest

Where

Net Income = Allowed ROE × Equity % × Rate Base

Net Income before Tax = Net Income / (1 – Tax Rate)

Interest = Embedded Cost of Debt × Debt % × Rate Base
+ CWIP Rate × Embedded Cost of Debt × Rate Base

Further,

FFO = Net Income + Depreciation

Where

Depreciation = Depreciation Rate × Rate Base

Having determined these inputs to the calculations shown above, I can determine the three ratios. I note that I do not make several adjustments that are commonly made by credit rating agencies. This is important because the market considers the measures commonly reported by, for example, credit rating agencies and they adjust for certain off-balance sheet items such as certain leases, long-term agreements, and pensions. These adjustments tend to increase the amount of debt, so that it becomes more difficult to meet a specific benchmark ratio. Put differently, the ratios that I calculate based on the parameters above are likely to overstate the resulting credit ratio and hence my capital structure recommendations are conservative.

BENTE VILLADSEN
Principal

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Dr. Bente Villadsen's work concentrates in the areas of regulatory finance and accounting. Her recent work has focused on accounting issues, damages, cost of capital and regulatory finance. Dr. Villadsen has testified on cost of capital and accounting, analyzed credit issues in the utility industry, risk management practices as well the impact of regulatory initiatives such as energy efficiency and de-coupling on cost of capital and earnings. Among her recent advisory work is assisting entities in the acquisition of regulated utilities regarding issues such the return on equity, capital structure, recovery of costs and capital expenditures, growth opportunities, and regulatory environments as well as the precedence for regulatory approval in mergers or acquisitions. Dr. Villadsen's accounting work has pertained to disclosure issues and principles including impairment testing, fair value accounting, leases, accounting for hybrid securities, accounting for equity investments, cash flow estimation as well as overhead allocation. Dr. Villadsen has estimated damages in the U.S. as well as internationally for companies in the construction, telecommunications, energy, cement, and rail road industry. She has filed testimony and testified in federal and state court, in international and U.S. arbitrations and before state and federal regulatory commissions on accounting issues, damages, discount rates and cost of capital for regulated entities.

Dr. Villadsen holds a Ph.D. from Yale University's School of Management with a concentration in accounting. She has a joint degree in mathematics and economics (BS and MS) from University of Aarhus in Denmark. Prior to joining The Brattle Group, Dr. Villadsen was a faculty member at Washington University in St. Louis, University of Michigan, and University of Iowa.

She has taught financial and managerial accounting as well as econometrics, quantitative methods, and economics of information to undergraduate or graduate students. Dr. Villadsen serves as the president of the Society of Utility Regulatory Financial Analysts for 2016-2018.

AREAS OF EXPERTISE

- Regulatory Finance
  - Cost of Capital
  - Cost of Service (including prudence)
  - Energy Efficiency, De-coupling and the Impact on Utilities Financials
  - Relationship between regulation and credit worthiness
  - Risk Management
  - Regulatory Advisory in Mergers & Acquisitions
- Accounting and Corporate Finance
  - Application of Accounting Standards
  - Disclosure Issues
  - Forensics
  - Credit Issues in the Utility Industry

- Damages and Valuation (incl. international arbitration)
  - Utility valuation
  - Lost Profit for construction, oil&gas, utilities
  - Valuation of construction contract
  - Damages from the choice of inaccurate accounting methdology

EXPERIENCE

Regulatory Finance

- Dr. Villadsen has testified on cost of capital and capital structure for many regulated entities including electric and gas utilities, pipelines, railroads, water utilities and barges in many jurisdictions including at the FERC, the Surface Transportation Board, the states of Alaska, Arizona, California, Hawaii, Illinois, Michigan, New Mexico, New York, Oregon, and Washington as well as in the provinces of Alberta and Ontario.
- On behalf of the Association of American Railroads, Dr. Villadsen appeared as an expert before the Surface Transportation Board (STB) and submitted expert reports on the determination of the cost of equity for U.S. freight railroads. The STB agreed to continue to use two estimation methods with the parameters suggested.
- On behalf of two taxpayers, Dr. Villadsen has testified on the methodology used to estimate the discount rate for the income approach to property valuation in Utah district court.
- For several electric, gas and transmission utilities as well as pipelines in Alberta, Canada, Dr. Villadsen filed evidence and appeared as an expert on the cost of equity and appropriate capital structure for 2015-17. Her evidence was heard by the Alberta Utilities Commission.
- For potential acquirers of electric, natural gas, and water utilities, Dr. Villadsen has conducted regulatory due diligence in the form of an assessment of the regulatory environment in the jurisdictions at issue including the ability to earn the allowed return and recover costs associated with operations or capital expenditures. Her evaluations also involved an assessment of needed capital expenditures and the recovery of such expenditure through rates or specific adjustment clauses. Her prior work includes more than 15 US states, the FERC, and several Canadian provinces.
- Dr. Villadsen has estimated the cost of capital and recommended an appropriate capital structure for natural gas and liquids pipelines in Canada, Mexico, and the US. using the jurisdictions' preferred estimation technique as well as other standard techniques. This work has been used in negotiations with shippers as well as before regulators.

- For the Ontario Energy Board Staff, Dr. Villadsen submitted evidence on the appropriate capital structure for a power generator that is engaged in a nuclear refurbishment program.
- Dr. Villadsen has advised many acquirers and potential acquirers of regulated utilities regarding the return on equity, capital structure, recovery of costs and capital expenditures, growth opportunities, and regulatory environments as well as the precedence for regulatory approval in mergers or acquisitions. Her work has pertained to many jurisdiction in the U.S. and Canada including more than 20 states and three provinces as well as the Federal Energy Regulatory Commission. She has worked on electric, natural gas, pipeline, transmission, and water utility acquisitions.
- She has estimated the cost of equity on behalf of entities such as Anchorage Municipal Light and Power, Arizona Public Service, Portland General Electric, Anchorage Water and Wastewater, NW Natural, Nicor, Consolidated Edison, Southern California Edison, American Water, California Water, and EPCOR in state regulatory proceedings. She has also submitted testimony before the FERC on behalf of electric transmission and natural gas pipelines as well as Bonneville Power Authority. Much of her testimony involves not only cost of capital estimation but also capital structure, the impact on credit metrics and various regulatory mechanisms such as revenue stabilization, riders and trackers.
- In Australia, she has submitted led and co-authored a report on cost of equity and debt estimation methods for the Australian Pipeline Industry Association. The equity report was filed with the Australian Energy Regulator as part of the APIA's response to the Australian Energy Regulator's development of rate of return guidelines and both reports were filed with the Economic Regulation Authority by the Dampier Bunbury Pipeline. She has also submitted a report on aspects of the WACC calculation for Aurizon Network to the Queensland Competition Authority.
- In Canada, Dr. Villadsen has co-authored reports for the British Columbia Utilities Commission and the Canadian Transportation Agency regarding cost of capital methodologies. Her work consisted partly of summarizing and evaluating the pros and cons of methods and partly of surveying Canadian and world-wide practices regarding cost of capital estimation.
- Dr. Villadsen worked with utilities to estimate the magnitude of the financial risk inherent in long-term gas contracts. In doing so, she relied on the rating agency of Standard & Poor's published methodology for determining the risk when measuring credit ratios.

- She has worked on behalf of infrastructure funds, pension funds, utilities and others on understanding and evaluating the regulatory environment in which electric, natural gas, or water utilities operate for the purpose of enhancing investors ability to understand potential investments. She has also provided advise and testimony in the approval phase of acquisitions.
- On behalf of utilities that are providers of last resort, she has provided estimates of the proper compensation for providing the state-mandated services to wholesale generators.
- In connection with the AWC Companies application to construct a backbone electric transmission project off the Mid-Atlantic Coast, Dr. Villadsen submitted testimony before the Federal Energy Regulatory Commission on the treatment the accounting and regulatory treatment of regulatory assets, pre-construction costs, construction work in progress, and capitalization issues.
- On behalf of ITC Holdings, she filed testimony with the Federal Energy Regulatory Commission regarding capital structure issues.
- For a FERC-regulated entity, Dr. Villadsen undertook an assessment of the company's classification of specific long-term commitments, leases, regulatory assets, asset retirement obligations, and contributions / distributions to owners in the company's FERC Form 1.
- Testimony on the impact of transaction specific changes to pension plans and other rate base issues on behalf of Balfour Beatty Infrastructure Partners before the Michigan Public Service Commission.
- On behalf of financial institutions, Dr. Villadsen has led several teams that provided regulatory guidance regarding state, provincial or federal regulatory issues for integrated electric utilities, transmission assets and generation facilities. The work was requested in connection with the institutions evaluation of potential investments.
- For a natural gas utility facing concerns over mark to market losses on long term gas hedges, Dr. Villadsen helped develop a program for basing a portion of hedge targets on trends in market volatility rather than on just price movements and volume goals. The approach was refined and approved in a series of workshops involving the utility, the state regulatory staff, and active intervener groups. These workshops evolved into a forum for quarterly updates on market trends and hedging positions.
- She has advised the private equity arm of three large financial institutions as well as two infrastructure companies, a sovereign fund and pension fund in connection with their acquisition of regulated transmission, distribution or integrated electric assets in the U.S. and Canada. For these clients, Dr. Villadsen evaluated the regulatory climate and the treatment of

acquisition specific changes affecting the regulated entity, capital expenditures, specific cost items and the impact of regulatory initiatives such as the FERC's incentive return or specific states' approaches to the recovery of capital expenditures riders and trackers. She has also reviewed the assumptions or worked directly with the acquirer's financial model.

- On behalf of a provider of electric power to a larger industrial company, Dr. Villadsen assisted in the evaluation of the credit terms and regulatory provisions for the long-term power contract.
- For several large electric utility, Dr. Villadsen reviewed the hedging strategies for electricity and gas and modeled the risk mitigation of hedges entered into. She also studies the prevalence and merits of using swaps to hedge gas costs. This work was used in connection with prudence reviews of hedging costs in Colorado, Oregon, Utah, West Virginia, and Wyoming.
- She estimated the cost of capital for major U.S. and Canadian utilities, pipelines, and railroads. The work has been used in connection with the companies' rate hearings before the Federal Energy Regulatory Commission, the Canadian National Energy Board, the Surface Transportation Board, and state and provincial regulatory bodies. The work has been performed for pipelines, integrated electric utilities, non-integrated electric utilities, gas distribution companies, water utilities, railroads and other parties. For the owner of Heathrow and Gatwick Airport facilities, she has assisted in estimating the cost of capital of U.K. based airports. The resulting report was filed with the U.K. Competition Commission.
- For a Canadian pipeline, Dr. Villadsen co-authored an expert report regarding the cost of equity capital and the magnitude of asset retirement obligations. This work was used in arbitration between the pipeline owner and its shippers.
- In a matter pertaining to regulatory cost allocation, Dr. Villadsen assisted counsel in collecting necessary internal documents, reviewing internal accounting records and using this information to assess the reasonableness of the cost allocation.
- She has been engaged to estimate the cost of capital or appropriate discount rate to apply to segments of operations such as the power production segment for utilities.
- In connection with rate hearings for electric utilities, Dr. Villadsen has estimated the impact of power purchase agreements on the company's credit ratings and calculated appropriate compensation for utilities that sign such agreements to fulfill, for example, renewable energy requirements.
- Dr. Villadsen has been part of a team assessing the impact of conservation initiatives, energy efficiency, and decoupling of volumes and revenues on electric utilities financial performance.

Specifically, she has estimated the impact of specific regulatory proposals on the affected utilities earnings and cash flow.

- On behalf of Progress Energy, she evaluated the impact of a depreciation proposal on an electric utility's financial metric and also investigated the accounting and regulatory precedent for the proposal.
- For a large integrated utility in the U.S., Dr. Villadsen has for several years participated in a large range of issues regarding the company's rate filing, including the company's cost of capital, incentive based rates, fuel adjustment clauses, and regulatory accounting issues pertaining to depreciation, pensions, and compensation.
- Dr. Villadsen has been involved in several projects evaluating the impact of credit ratings on electric utilities. She was part of a team evaluating the impact of accounting fraud on an energy company's credit rating and assessing the company's credit rating but-for the accounting fraud.
- For a large electric utility, Dr. Villadsen modeled cash flows and analyzed its financing decisions to determine the degree to which the company was in financial distress as a consequence of long-term energy contracts.
- For a large electric utility without generation assets, Dr. Villadsen assisted in the assessment of the risk added from offering its customers a price protection plan and being the provider of last resort (POLR).
- For several infrastructure companies, Dr. Villadsen has provided advice regarding the regulatory issues such as the allowed return on equity, capital structure, the determination of rate base and revenue requirement, the recovery of pension, capital expenditure, fuel, and other costs as well as the ability to earn the allowed return on equity. Her work has spanned 14 U.S. states as well as Canada, Europe, and South America. She has been involved in the electric, natural gas, water, and toll road industry.
- For an electric utility, Dr. Villadsen provided guidance regarding the regulatory accounts needed as the utility was separated into separate generation, transmission, and distribution entities with each their accounting records.

Accounting and Corporate Finance

- For an electric utility subject to international arbitration, Dr. Villadsen submitted expert testimony on the application of IFRS as it pertains to receivables, the classification of liabilities and contingencies.

- In international arbitration, she submitted an expert report on IFRS' requirements regarding carve out financials, impairment, the allocation of costs to segments, and disclosure issues.
- On behalf of a construction company in arbitration with a sovereign, Dr. Villadsen filed an expert report report quantifying damages in the form of lost profit and consequential damages.
- In arbitration before the International Chamber of Commerce Dr. Villadsen testified regarding the true-up clauses in a sales and purchase agreement, she testified on the distinction between accruals and cash flow measures as well as on the measurement of specific expenses and cash flows.
- On behalf of a taxpayer, Dr. Villadsen recently testified in federal court on the impact of discount rates on the economic value of alternative scenarios in a lease transaction.
- On behalf of a taxpayer, Dr. Villaden has provided an expert report on the nature of the cost of equity used in regulatory proceedings as well as the interest rate regine in 2014.
- In an arbitration matter before the International Centre for Settlement of Investment Disputes, she provided expert reports and oral testimony on the allocation of corporate overhead costs and damages in the form of lost profit. Dr. Villadsen also reviewed internal book keeping records to assess how various inter-company transactions were handled.
- Dr. Villadsen provided expert reports and testimony in an international arbitration under the International Chamber of Commerce on the proper application of US GAAP in determining shareholders' equity. Among other accounting issues, she testified on impairment of long-lived assets, lease accounting, the equity method of accounting, and the measurement of investing activities.
- In a proceeding before the International Chamber of Commerce, she provided expert testimony on the interpretation of certain accounting terms related to the distinction of accruals and cash flow.
- In an arbitration before the American Arbitration Association, she provided expert reports on the equity method of accounting, the classification of debt versus equity and the distinction between categories of liabilities in a contract dispute between two major oil companies. For the purpose of determining whether the classification was appropriate, Dr. Villadsen had to review the company's internal book keeping records.

- In U.S. District Court, Dr. Villadsen filed testimony regarding the information required to determine accounting income losses associated with a breach of contract and cash flow modeling.
- Dr. Villadsen recently assisted counsel in a litigation matter regarding the determination of fair values of financial assets, where there was a limited market for comparable assets. She researched how the designation of these assets to levels under the FASB guidelines affect the value investors assign to these assets.
- She has worked extensively on litigation matters involving the proper application of mark-to-market and derivative accounting in the energy industry. The work relates to the proper valuation of energy contracts, the application of accounting principles, and disclosure requirements regarding derivatives.
- Dr. Villadsen evaluated the accounting practices of a mortgage lender and the mortgage industry to assess the information available to the market and ESOP plan administrators prior to the company's filing for bankruptcy. A large part of the work consisted of comparing the company's and the industry's implementation of gain-of-sale accounting.
- In a confidential retention matter, Dr. Villadsen assisted attorneys for the FDIC evaluate the books for a financial investment institution that had acquired substantial Mortgage Backed Securities. The dispute evolved around the degree to which the financial institution had impaired the assets due to possible put backs and the magnitude and estimation of the financial institution's contingencies at the time of it acquired the securities.
- In connection with a securities litigation matter she provided expert consulting support and litigation consulting on forensic accounting. Specifically, she reviewed internal documents, financial disclosure and audit workpapers to determine (1) how the balance's sheets trading assets had been valued, (2) whether the valuation was following GAAP, (3) was properly documented, (4) was recorded consistently internally and externally, and (5) whether the auditor had looked at and documented the valuation was in accordance with GAAP.
- In a securities fraud matter, Dr. Villadsen evaluated a company's revenue recognition methods and other accounting issues related to allegations of improper treatment of non-cash trades and round trip trades.
- For a multi-national corporation with divisions in several countries and industries, Dr. Villadsen estimated the appropriate discount rate to value the divisions. She also assisted the

company in determining the proper manner in which to allocate capital to the various divisions, when the company faced capital constraints.

- Dr. Villadsen evaluated the performance of segments of regulated entities. She also reviewed and evaluated the methods used for overhead allocation.
- She has worked on accounting issues in connection with several tax matters. The focus of her work has been the application of accounting principles to evaluate intra-company transactions, the accounting treatment of security sales, and the classification of debt and equity instruments.
- For a large integrated oil company, Dr. Villadsen estimated the company's cost of capital and assisted in the analysis of the company's accounting and market performance.
- In connection with a bankruptcy proceeding, Dr. Villadsen provided litigation support for attorneys and an expert regarding corporate governance.

Damages and Valuation

- For the Alaska Industrial Development and Export Authority, Dr. Villadsen co-authored a report that estimated the range of recent acquisition and trading multiples for natural gas utilities.
- On behalf of a taxpayer, Dr. Villadsen testified on the economic value of alternative scenarios in a lease transaction regarding infrastructure assets.
- For a foreign construction company involved in an international arbitration, she estimated the damages in the form of lost profit on the breach of a contract between a sovereign state and a construction company. As part of her analysis, Dr. Villadsen relied on statistical analyses of cost structures and assessed the impact of delays.
- In an international arbitration, Dr. Villadsen estimated the damages to a telecommunication equipment company from misrepresentation regarding the product quality and accounting performance of an acquired company. She also evaluated the IPO market during the period to assess the possibility of the merged company to undertake a successful IPO.

- On behalf of pension plan participants, Dr. Villadsen used an event study estimated the stock price drop of a company that had engaged in accounting fraud. Her testimony conducted an event study to assess the impact of news regarding the accounting misstatements.

- In connection with a FINRA arbitration matter, Dr. Villadsen estimated the value of a portfolio of warrants and options in the energy sector and provided support to counsel on finance and accounting issues.

- She assisted in the estimation of net worth of individual segments for firms in the consumer product industry. Further, she built a model to analyze the segment's vulnerability to additional fixed costs and its risk of bankruptcy.

- Dr. Villadsen was part of a team estimating the damages that may have been caused by a flawed assumption in the determination of the fair value of mortgage related instruments. She provided litigation support to the testifying expert and attorneys.

- For an electric utility, Dr. Villadsen estimated the loss in firm value from the breach of a power purchase contract during the height of the Western electric power crisis. As part of the assignment, Dr. Villadsen evaluated the creditworthiness of the utility before and after the breach of contract.

- Dr. Villadsen modeled the cash flows of several companies with and without specific power contract to estimate the impact on cash flow and ultimately the creditworthiness and value of the utilities in question.

BOOKS

"*Risk and Return for Regulated Industries*," (with Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe) Elsevier, May 2017.

PUBLICATIONS AND REPORTS

"A Review of International Approaches to Regulated Rates of Return," (with J. Anthony, T. Brown, L. Figurelli, D. Harris, and N. Nguyen) published by the *Australian Energy Regulator*, September 2020.

"Global Impacts and Implications of COVID-19 on Utility Finance," (with R. Mudge, F. Graves, J. Figueroa, T. Counts, L. Mwalenga, and S. Pant), *The Brattle Group*, July 2020.

"Impact of New Tax Law on Utilities' Deferred Taxes," (with Mike Tolleth and Elliott Metzler), *CRRI 37'th Annual Eastern Conference*, June, 2018.

"Implications of the New Tax Law for Regulated Utilities," The Brattle Group, January 2018.

"Using Electric and Gas Forwards to Manage Market Risks: When a power purchase agreement with a utility is not possible, standard forward contracts can act as viable hedging instruments*," North American Windpower*, May 2017, pp. 34-37.

"*Managing Price Risk for Merchant Renewable Investments: Role of Market Interactions and Dynamics on Effective Hedging Strategies*," (with Onur Aydin and Frank Graves), Brattle Whitepaper, January 2017.

"Aurizon Network 2016 Access Undertaking: Aspects of the WACC," (with Mike Tolleth), filed with the *Queensland Competition Authority*, Australia, November 2016.

"Report on Gas LDC multiples," with Michael J. Vilbert, *Alaska Industrial Development and Export Authority*, May 2015.

"Aurizon Network 2014 Draft Access Undertaking: Comments on Aspects of the WACC," prepared for Aurizon Network and submitted to the *Queensland Competition Authority*, December 2014

"Brattle Review of AE Planning Methods and Austin Task Force Report." (with Frank C. Graves) September 24, 2014.

Report on "Cost of Capital for Telecom Italia's Regulated Business" with Stewart C. Myers and Francesco Lo Passo before the *Communications Regulatory Authority of Italy* ("AGCOM"), March 2014. *Submitted in Italian.*

"Alternative Regulation and Ratemaking Approaches for Water Companies: Supporting the Capital Investment Needs of the 21st Century," (with J. Wharton and H. Bishop), prepared for the *National Association of Water Companies*, October 2013.

"Estimating the Cost of Debt," (with T. Brown), prepared for the Dampier Bunbury Pipeline and filed with the *Economic Regulation Authority*, Western Australia, March 2013.

"Estimating the Cost of Equity for Regulated Companies," (with P.R. Carpenter, M.J. Vilbert, T. Brown, and P. Kumar), prepared for the Australian Pipeline Industry Association and filed with the *Australian Energy Regulator* and the *Economic Regulation Authority*, Western Australia, February 2013.

"Calculating the Equity Risk Premium and the Risk Free Rate," (with Dan Harris and Francesco LoPasso), prepared for *NMa and Opta, the Netherlands*, November 2012.

"Shale Gas and Pipeline Risk: Earnings Erosion in a More Competitive World," (with Paul R. Carpenter, A. Lawrence Kolbe, and Steven H. Levine), *Public Utilities Fortnightly*, April 2012.

"Survey of Cost of Capital Practices in Canada," (with Michael J. Vilbert and Toby Brown), prepared for *British Columbia Utilities Commission*, May 2012.

"Public Sector Discount Rates" (with rank Graves, Bin Zhou), *Brattle* white paper, September 2011

"FASB Accounting Rules and Implications for Natural Gas Purchase Agreements," (with Fiona Wang), *American Clean Skies Foundation*, February 2011.

"IFRS and You: How the New Standards Affect Utility Balance Sheets," (with Amit Koshal and Wyatt Toolson), *Public Utilities Fortnightly*, December 2010.

"Corporate Pension Plans: New Developments and Litigation," (with George Oldfield and Urvashi Malhotra), Finance Newsletter, Issue 01, *The Brattle Group*, November 2010.

"Review of Regulatory Cost of Capital Methodologies," (with Michael J. Vilbert and Matthew Aharonian), *Canadian Transportation Agency*, September 2010.

"Building Sustainable Efficiency Businesses: Evaluating Business Models," (with Joe Wharton and Peter Fox-Penner), *Edison Electric Institute*, August 2008.

"Understanding Debt Imputation Issues," (with Michael J. Vilbert and Joe Wharton and *The Brattle Group* listed as an author), *Edison Electric Institute*, June 2008.

"Measuring Return on Equity Correctly: Why current estimation models set allowed ROE too low," *Public Utilities Fortnightly*, August 2005 (with A. Lawrence Kolbe and Michael J. Vilbert).

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," (with A. Lawrence Kolbe and Michael J. Vilbert, and with "*The Brattle Group*" listed as author), *Edison Electric Institute,* April 2005.

"Communication and Delegation in Collusive Agencies," *Journal of Accounting and Economics*, Vol. 19, 1995.

"Beta Distributed Market Shares in a Spatial Model with an Application to the Market for Audit Services" (with M. Hviid), *Review of Industrial Organization*, Vol. 10, 1995.

SELECTED PRESENTATIONS

"Current Issues in Cost of Capital" presented to *EEI Members*, July, 2018-19, 2021.

"The Future of Gas: Options and Regulatory Strategies in a Carbon-Constrained Future," (with Ahmad Faruqui, Josh Figueroa, Long Lam), Presented to Executive Team at Gas Utility, June 2021.

"FERC's new ROE methodology for pipelines and electric transmission," (with Michael J. Vilbert) *UBS Fireside Chat*, June 24, 2020.

"Managing Price Risk for Merchant Renewable Investments," (with Onur Aydin) *EIA Electricity Pricing Workgroup* (webinar), April 30, 2019.

"Decoupling and its Impact on Cost of Capital" presented to *SURFA Members and Friends*, February 27, 2019.

"Introduction to Capital Structure & Liability Management", *the American Gas Association/Edison Electric Institute "Introduction and Advanced Public Utility Accounting Courses",* August 2018-2019.

"Lessons from the U.S. and Australia" presented at *Seminar on the Cost of Capital in Regulated Industries: Time for a Fresh Perspective?* Brussels, October 2017.

"Should Regulated Utilities Hedge Fuel Cost and if so, How?" presented at *SURFA's 49 Financial Forum*, April 20-21, 2017.

"Transmission: The Interplay Between FERC Rate Setting at the Wholesale Level and Allocation to Retail Customers," (with Mariko Geronimo Aydin) presented at *Law Seminars International: Electric Utility Rate Cases*, March 16-17, 2017.

"Capital Structure and Liability Management," *American Gas Association and Edison Electric Institute Public Utility Accounting Course*, August 2015-2017.

"Current Issues in Cost of Capital," *Edison Electric Institute Advanced Rate School*, July 2013-2017.

"Alternative Regulation and Rate Making Approaches for Water Companies," *Society of Depreciation Professionals Annual Conference*, September 2014.

"Capital Investments and Alternative Regulation," *National Association of Water Companies Annual Policy Forum*, December 2013.

"Accounting for Power Plant," *SNL's Inside Utility Accounting Seminar*, Charlotte, NC, October 2012.

"GAAP / IFRS Convergence," *SNL's Inside Utility Accounting Seminar*, Charlotte, NC, October 2012.

"International Innovations in Rate of Return Determination," *Society of Utility Financial and Regulatory Analysts' Financial Forum*, April 2012.

"Utility Accounting and Financial Analysis: The Impact of Regulatory Initiatives on Accounting and Credit Metrics," 1.5 day seminar, EUCI, Atlanta, May 2012.

"Cost of Capital Working Group Eforum," *Edison Electric Institute webinar*, April 2012.

"Issues Facing the Global Water Utility Industry" Presented to Sensus' Executive Retreat, Raleigh, NC, July 2010.

"Regulatory Issues from GAAP to IFRS," NASUCA *2009 Annual Meeting*, Chicago, November 2009.

"Subprime Mortgage-Related Litigation: What to Look for and Where to Look," *Law Seminars International: Damages in Securities Litigation*, Boston, May 2008.

"Evaluating Alternative Business / Inventive Models," (with Joe Wharton). *EEI Workshop, Making a Business of Energy Efficiency: Sustainable Business Models for Utilities*, Washington DC, December 2007.

"Deferred Income Taxes and IRS's NOPR: Who should benefit?" *NASUCA Annual Meeting*, Anaheim, CA, November 2007.

"Discussion of 'Are Performance Measures Other Than Price Important to CEO Incentives?'" *Annual Meeting of the American Accounting Association*, 2000.

"Contracting and Income Smoothing in an Infinite Agency Model: A Computational Approach," (with R.T. Boylan) *Business and Management Assurance Services Conference*, Austin 2000.

TESTIMONY

Direct Testimony on Cost of Equity for Advanced Ratemaking on behalf of Interstate Power and Light Company, *Iowa Utilities Board*, RPU-2021-0003, November 2021.

Expert Report on Cost of Equity and the Weighted Average Cost of Capital on behalf of Barbados Light and Power Company, *Barbados Fair Trading Commission*, September 2021.

Direct Testimony on California's Cost of Capital Mechanism and Cost of Equity on behalf of Southern California Edison, *California Public Utilities Commission*, Application A.21-08-013, August 2021.

Expert Report on Contingent Liabilities and Materiality under IFRS on behalf of of Norilsk Nickel Mauritius, *LCIA Arbitration* No. 163506, August 2021.

Deposition Testimony re. rate of return and bypass rates on behalf on Southwest Gas Corporation, *Superior Court for the state of Arizona, County of Maricopa*, CV2012-050939, August 2021.

Direct Testimony on Cost of Equity on behalf of Portand General Electric, *Oregon Public Utility Commission*, UE-324, July 2021.

Direct Testimony on Cost of Capital on behalf of California-American Water Company, *California Public Utilities Commission*, Application No. 21-05-, May 2021.

Prefiled Direct Testimony on cost of equity on behalf of Southern Star Central Gas Pipeline, *Federal Energy Regulatory Commission*, Docket RP21-778-000, April 2021.

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Direct Testimony on the cost of equity and capital structure on behalf of Anchorage Water and Wastewater Utility submitted to the *Regulatory Commission of Alaska*, Matters TA168-122 and 168-126, December 2020.

Direct Testimony on the cost of equity on behalf of NW Natural submitted to the *Washington Transportation and Utilities Commission*, Docket No. UG-200994, December 2020.

Written Evidence in Review and Variance of Decision 22570-D01-2018 Stage 2 (AltaGas' capital structure) (joint with Paul R. Carpenter) on behalf of AltaGas Utilities Inc. Filed with the *Alberta Utilities Commission*, Proceeding 25031, January 2020.

Written Evidence on Cost of Equity and Capital Structure on behalf of ATCO, AltaGas and FortisAlberta in 2021-2022 Generic Cost of Capital Proceeding. Filed with the *Alberta Utilities Commission*, Proceeding No. 24110, January 2020.

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Verified Statement and Reply Verified Statement regarding Revisions to the Board's Methodology for Determining the Railroad Industry's Cost of Capital on behalf of the American Association of Railroads before the *Surface Transportation Board*, Docket No. EP 664 (Sub-No. 4), January, February 2020.

Affidavit regarding the creation of a regulatory asset for earthquake related costs on behalf of Anchorage Water and Wastewater submitted to the *Regulatory Commission of Alaska*, December 2019.

Expert Report and Hearing Appearance on Going Concern and Impairment, *American Arbitration Association*: International Engineering & Construction S.A., Greenville Oil & Gas Co. Ltd and GE Oil & Gas, Inc., November, December 2019.

Direct Testimony and Rebuttal Testimony on the cost of equity on behalf of DTE Gas submitted to the *Michigan Public Service Commission*, Docket No. U-20642, November 2019.

Expert Report on IFRS Issues and Forensics. *SIAC Arbitration* No. 44 of 2018, October 2019.

Expert Report, Reply Report and Hearing Appearance on IFRS issues. *ICC Arbitration* No. 23896/GSS, September 2019, September and November 2020.

Direct Testimony on the cost of debt and equity capital as well as capital structure on behalf of Young Brothers, LLC. submitted to the *Public Utilities Commission of the State of Hawaii*, Docket No. 2019-0117, September 2019.

Direct Testimony on Cost of Equity on behalf of DTE Gas submitted to the *Michigan Public Service Commission*, Docket No. U-20940, February 2021.

Expert Report on discount rates in property tax matter for Union Pacific Company in *Union Pacific Railroad Co. v. Utah State Tax Comm'n, et. al.*, Case No. 2:18-cv-00630-DAK-DBP, Utah August 2019.

Answering Testimony on the Cost of Equity on behalf of Northern Natural Gas Company submitted to the *Federal Energy Regulatory Commission*, Docket No. RP19-59-000, August 2019.

Direct Testimony, Rebuttal Testimony, and Hearing Appearance on Cost of Equity on behalf of DTE Electric Company submitted to the *Michigan Public Service Commission*, Docket No. U-20561, July, November, December 2019.

Prepared Direct Testimony on Cost of Capital for Northern Natural Gas Company submitted to the *Federal Energy Regulatory Commission*, Docket No. RP19-1353-000, July 2019.

Prepared Direct Testimony on Cost of Capital and Term Differentiated Rates for Paiute Pipeline Company submitted to the *Federal Energy Regulatory Commission*, Docket No. RP19-1291-000, May 2019.

Expert report, deposition, and oral trial testimony on behalf of PacifiCorp in the Matter of *PacifiCorp, Inc. v. Utah State Tax Comm'n*, Case No. 180903986 TX, *Utah District Court* April, May, September 2019.

Direct Testimony, Rebuttal Testimony, and hearing appearance on the cost of capital for Southern California Edison submitted to the *California Public Utilities Commission*, Docket No. A.19-04-014, April 2019, August 2019.

Prepared Direct Testimony on the cost of equity for Southern California Edison's transmission assets submitted to the *Federal Energy Regulatory Commission*, Docket No. ER19-1553, April 2019.

Direct and Rebuttal Testimony on cost of equity for Consolidated Edison of New York submitted to the *New York Public Service Commission*, Matter No. 19-00317, January, June 2019.

Direct Testimony on cost of capital and capital structure for Northwest Natural Gas Company submitted to the *Washington Utilities and Transportation Commission*, Docket No. 181053, December 2018.

Pre-filed Direct Testimony and Reply Testimony on cost of capital and capital structure for Anchorage Water Utility and Anchorage Wastewater Utility submitted to the *Regulatory Commission of Alaska*, TA163-122 and TA164-126, December 2018, October 2019.

Direct Testimony on cost of capital for Portland General Electric Company submitted to the *Oregon Public Utility Commission* on behalf of Portland General Electric Company (with Hager and Liddle), UE 335, February 2018.

Direct Testimony and Rebuttal Testimony on cost of capital for NW Natural submitted to the *Oregon Public Utility Commission* on behalf of NW Natural, UG 344, December 2017, May 2018.

Direct Pre-filed Testimony and Reply Pre-filed Testimony on cost of equity and capital structure for Anchorage Water and Wastewater Utilities before the *Regulatory Commission of Alaska*, TA161-122 and TA162-126, November 2017, September 2018.

Direct Testimony, Rebuttal Testimony, deposition, and hearing appearance on wholesale water rates for Petitioner Cities, *Texas Public Utility Commission*, PUC Docket 46662, SOAH Docket 473-17-4964.WS, November 2017, January, June, July, October 2018.

Affidavit on Lifting the Dividend Restriction for Anchorage Water Utility for AWWU, *Regulatory Commission of Alaska*, U-17-095, November 2017.

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Affidavit on the Creation of a Regulatory Assets for PRV Rebates for Anchorage Water Utility, submitted to the *Regulatory Commission of Alaska*, U-17-083, August 2017.

Direct and Rebuttal Testimony, Hearing Appearance on Cost of Capital for California-American Water Company for California-American Water submitted to the *California Public Utilities Commission*, Application 17-04-003, April, August, September 2017.

Direct, Rebuttal, Surrebuttal, Supplemental, Supplemental Rebuttal Testimony and Hearing Appearance on the Cost of Capital for Northern Illinois Gas Company submitted to the *Illinois Commerce Commission*, GRM #17-055, March, July, August, September, and November 2017.

Direct and Rebuttal Testimony on Cost of Capital for Portland General Electric Company submitted to the *Oregon Public Utility Commission* on behalf of Portland General Electric Company, Docket No. UE 319, February, July 2017.

Pre-filed Direct and Reply Testimony and Hearing Appearance on Cost of Equity and Capital Structure for Anchorage Municipal Light and Power, *Regulatory Commission of Alaska*, Docket No. TA357-121, December 2016, August and December 2017.

Expert report and Hearing Appearance regarding the Common Equity Ratio for OPG's Regulated Generation for OEB Staff, *Ontario Energy Board*, EB-2016-0152, November 2016, April 2017.

Pre-filed Direct Testimony on Cost of Equity and Capital Structure for Anchorage Municipal Wastewater Utility, *Regulatory Commission of Alaska*, Docket No. 158-126, November 2016.

Expert Report, Reply Expert Report and Hearing on damages (quantum) in exit arbitration (with Dan Harris), *International Center for the Settlement of Investment Disputes*, October 2016, October 2018, July 2019.

Direct Testimony on capital structure, embedded cost of debt, and income taxes for Detroit Thermal, Michigan Public Service Commission, Docket No. UE-18131, July 2016.

Direct Testimony on return on equity for Arizona Public Service Company, Arizona Corporation Commission, Docket E-01345A-16-0036, June 2016.

Written evidence, rebuttal evidence and hearing appearance regarding the cost of equity and capital structure for Alberta-based utilities, the *Alberta Utilities Commission*, Proceeding No. 20622 on behalf of AltaGas Utilities Inc., ENMAX Power Corporation, FortisAlberta Inc., and The ATCO Utilities, February, May and June 2016.

Verified Statement, Verified Reply Statement, and Hearing Appearance regarding the cost of capital methodology to be applied to freight railroads, the *Surface Transportation Board* on behalf of the Association of American Railroads, Docket No. EP 664 (Sub-No. 2), July 2015, September and November 2015.

Direct Testimony on cost of capital submitted to the Oregon Public Utility Commission on behalf of Portland General Electric, Docket No. UE 294, February 2015.

Supplemental Direct Testimony and Reply Testimony on cost of capital submitted to the *Regulatory Commission of Alaska* on behalf of Anchorage Water and Wastewater utilities, Docket U-13-202, September 2014, March 2015.

Expert Report and hearing appearance on specific accrual and cash flow items in a Sales and Purchase Agreement in international arbitration before the *International Chamber of Commerce*. Case No. 19651/TO, July and November 2014. (*Confidential*)

Rebuttal Testimony regarding Cost of Capital before the *Oregon Public Utility Commission* on behalf of Portland General Electric, Docket No. UE 283, July 2014.

Direct Testimony on the rate impact of the pension re-allocation and other items for Upper Peninsula Power Company in connection with the acquisition by BBIP before the *Michigan Public Service Commission* in Docket No. U-17564, March 2014.

Expert Report on cost of equity, non-recovery of operating cost and asset retirement obligations on behalf of oil pipeline in arbitration, April 2013. (with A. Lawrence Kolbe, Michael J. Vilbert, *Confidential*)

Direct Testimony on the treatment of goodwill before the *Federal Energy Regulatory Commission* on behalf of ITC Holdings Corp and ITC Midwest, LLC in Docket No. PA10-13-000, February 2012.

Direct and Rebuttal Testimony on cost of capital before the *Public Utilities Commission of the State of California* on behalf of California-American Water in Application No. 11-05, May 2011.

Direct Testimony, Rebuttal Testimony, and Hearing Appearance on cost of capital before the *New Mexico Public Regulation Commission* on behalf of New Mexico-American Water in Case No. 11-00196-UT, May 2011, November 2011, and December 2011.

Direct Testimony on regulatory assets and FERC accounting before the *Federal Energy Regulatory Commission* on behalf of AWC Companies, EL11-13-000, December 2010.

Expert Report and deposition in Civil Action No. 02-618 (GK/JMF) in the *United States District Court for the District of Columbia*, November 2010, January 2011. (*Confidential*)

Direct Testimony, Rebuttal Testimony, and Rejoinder Testimony on the cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-10-0448, November 2010, July 2011, and August 2011.

Direct Testimony on the cost of capital before *the New Mexico Public Regulation Commission* on behalf of New Mexico-American Water in Docket No. 09-00156-UT, August 2009.

Direct and Rebuttal Testimony and Hearing Appearance on the cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-09-0343, July 2009, March 2010 and April 2010.

Rebuttal Expert Report, Deposition and Oral Testimony re. the impact of alternative discount rate assumptions in tax litigation. *United States Court of Federal Claims*, Case No. 06-628 T, January, February, April 2009. (*Confidential*)

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Direct Testimony on cost of capital and carrying charge on damages, U.S. Department of Energy, *Bonneville Power Administration*, BPA Docket No. WP-07, March 2008.

Direct Testimony, Rebuttal Testimony, Rejoinder Testimony and Hearing Appearance on cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-08-0227, April 2008, February 2009, March 2009.

Expert Report, Supplemental Expert Report, and Hearing Appearance on the allocation of corporate overhead and damages from lost profit. *The International Centre for the Settlement of Investment Disputes*, Case No. ARB/03/29, February, April, and June 2008 (*Confidential*).

Expert Report on accounting information needed to assess income. *United States District Court* for the District of Maryland (Baltimore Division), Civil No. 1:06cv02046-JFM, June 2007 (*Confidential*)

Expert Report, Rebuttal Expert Report, and Hearing Appearance regarding investing activities, impairment of assets, leases, shareholder' equity under U.S. GAAP and valuation. *International Chamber of Commerce* (ICC), Case No. 14144/CCO, May 2007, August 2007, September 2007. (Joint with Carlos Lapuerta, *Confidential*)

Direct Testimony, Rebuttal Testimony, and Hearing Appearance on cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-06-0491, July 2006, July 2007.

Direct Testimony, Rebuttal Testimony, Rejoinder Testimony, Supplemental Rejoinder Testimony and Hearing Appearance on cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-06-0403, June 2006, April 2007, May 2007.

Direct Testimony, Rebuttal Testimony, Rejoinder Testimony, and Hearing Appearance on cost of capital before *the Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-06-0014, January 2006, October 2006, November 2006.

Expert report, rebuttal expert report, and deposition on behalf of a major oil company regarding the equity method of accounting and classification of debt and equity, *American Arbitration Association*, August 2004 and November 2004. (*Confidential*).

Note:

Exhibit BV-3 contains the public schedules from confidential Exhibit BV-4 (Canadian Cost of Capital Model) and confidential Exhibit BV-5 (U.S. Cost of Capital Model)

Schedule No. BV-4.1

Table of Contents

Schedule No. BV-4.2

Canadian Sample

Classification of Companies by Assets

Company	Company Category
Algonquin Power & Utilities Corp.	MR
AltaGas Ltd.	MR
Canadian Utilities Limited	R
Emera Incorporated	R
Enbridge Inc.	R
Fortis Inc.	R
Hydro One Limited	R
TC Energy Corporation	R

Sources and Notes:
Calculations based on 2021 EEI definitions and Company 10K filings:
R = Regulated (80 percent or greater of total assets are regulated).
MR = Mostly Regulated (Less than 80 percent of total assets are regulated).

Schedule No. BV-4.4

Canadian Sample

Capital Structure Summary of the Canadian Sample

Company	DCF Capital Structure			3-Year Average Capital Structure		
	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio
	[1]	[2]	[3]	[4]	[5]	[6]
Algonquin Power & Utilities Corp.	0.61	0.01	0.38	0.65	0.01	0.34
AltaGas Ltd.	0.42	0.06	0.51	0.39	0.10	0.51
Canadian Utilities Limited	0.43	0.07	0.51	0.44	0.07	0.49
Emera Incorporated	0.44	0.04	0.53	0.42	0.03	0.55
Enbridge Inc.	0.54	0.04	0.42	0.53	0.05	0.43
Fortis Inc.	0.46	0.03	0.51	0.45	0.03	0.52
Hydro One Limited	0.52	0.00	0.48	0.50	0.01	0.49
TC Energy Corporation	0.50	0.03	0.48	0.28	0.05	0.67
Full Sample Average	0.49	0.03	0.48	0.46	0.04	0.50

Sources and Notes:
[1], [4]:Workpaper #1 to Schedule No. BV-4.4.
[2], [5]:Workpaper #2 to Schedule No. BV-4.4.
[3], [6]:Workpaper #3 to Schedule No. BV-4.4.
Values in this table may not add up exactly to 1.0 because of rounding.

Schedule No. BV-4.5

Canadian Sample

Estimated Growth Rates of the Canadian Sample

	Thomson Reuters IBES Estimate		Value Line			
Company	Long-Term Growth Rate	Number of Estimates	EPS Year 2021 Estimate	EPS Year 2024-2026 Estimate	Annualized Growth Rate	Combined Growth Rate
	[1]	[2]	[3]	[4]	[5]	[6]
Algonquin Power & Utilities Corp.	7.2%	3	n/a	n/a		7.2%
AltaGas Ltd.	9.9%	2	n/a	n/a		9.9%
Canadian Utilities Limited	0.3%	2	n/a	n/a		0.3%
Emera Incorporated	5.5%	4	n/a	n/a		5.5%
Enbridge Inc.	8.5%	2	2.70	3.80	8.9%	8.6%
Fortis Inc.	5.2%	2	2.75	3.25	4.3%	4.9%
Hydro One Limited	2.5%	2	n/a	n/a		2.5%
TC Energy Corporation	3.6%	3	n/a	n/a		3.6%

Sources and Notes:
[1] - [2]: Thomson Reuters as of 06/30/2021.
[3] - [4]: From Value Line Investment Analyzer as of 06/30/2021.
[5]: ([4] / [3]) ^ (1/4) - 1.
[6]: ([1] x [2] + [5]) / ([2] + 1).
Weighted average growth rate. If information is missing from one source, the weighted average is based solely on the other source.

Schedule No. BV-4.6

DCF Cost of Equity of the Canadian Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Algonquin Power & Utilities Corp.	$18.99	$0.21	1.14%	7.2%	1.8%	12.1%
AltaGas Ltd.	$25.78	$0.08	0.33%	9.9%	2.4%	11.3%
Canadian Utilities Limited	$35.43	$0.44	1.24%	0.3%	0.1%	5.3%
Emera Incorporated	$57.04	$0.64	1.13%	5.5%	1.4%	10.3%
Enbridge Inc.	$49.31	$0.84	1.73%	8.6%	2.1%	16.2%
Fortis Inc.	$56.24	$0.51	0.91%	4.9%	1.2%	8.7%
Hydro One Limited	$30.46	$0.27	0.88%	2.5%	0.6%	6.1%
TC Energy Corporation	$63.52	$0.87	1.38%	3.6%	0.9%	9.4%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. BV-4.6.
[2]: Workpaper #2 to Schedule No. BV-4.6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Schedule No. BV-4.5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel A: Algonquin Power & Utilities Corp.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,990	$4,990	$3,856	$3,164	$2,866	$2,075	$1,227	[a]
Shares Outstanding (in millions) - Common	618	618	536	493	472	386	273	[b]
Price per Share - Common	$19	$19	$18	$16	$13	$14	$12	[c]
Market Value of Common Equity	$11,729	$11,729	$9,820	$8,018	$5,980	$5,390	$3,220	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$11,729	$11,729	$9,820	$8,018	$5,980	$5,390	$3,220	[f]= [d] + [e]
Market to Book Value of Common Equity	2 35	2 35	2 55	2 53	2 09	2 60	2 62	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$184	$184	$184	$184	$184	$165	$165	[h]
Market Value of Preferred Equity	$184	$184	$184	$184	$184	$165	$165	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$841	$841	$466	$466	$436	$402	$407	[j]
Current Liabilities	$1,359	$1,359	$749	$454	$405	$500	$236	[k]
Current Portion of Long-Term Debt	$517	$517	$222	$8	$13	$22	$8	[l]
Net Working Capital	($0)	($0)	($61)	$20	$44	($76)	$178	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$0	[n]
Levered Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$6,128	$6,128	$3,947	$3,773	$3,434	$3,378	$1,687	[p]
Book Value of Long-Term Debt	$6,645	$6,645	$4,169	$3,782	$3,447	$3,401	$1,695	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$807	$807	$467	$25	$230	$86	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$7,452	$7,452	$4,636	$3,807	$3,677	$3,487	N/A	[s] = [q] + [r]
Market Value of Debt	$7,452	$7,452	$4,636	$3,807	$3,677	$3,487	N/A	[t] = [s]
MARKET VALUE OF FIRM	$19,365	$19,365	$14,640	$12,010	$9,842	$9,041	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	60 57%	60 57%	67 07%	66 76%	60 76%	59 62%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	0 95%	0 95%	1 26%	1 53%	1 87%	1 82%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	38 48%	38 48%	31 67%	31 70%	37 36%	38 56%	N/A	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of 06/30/2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-4 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel B: AltaGas Ltd.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$5,941	$5,941	$6,645	$6,161	$3,758	$3,461	$3,483	[a]
Shares Outstanding (in millions) - Common	280	280	279	277	181	171	146	[b]
Price per Share - Common	$26	$26	$16	$19	$26	$30	$31	[c]
Market Value of Common Equity	$7,221	$7,221	$4,375	$5,393	$4,734	$5,114	$4,513	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$7,221	$7,221	$4,375	$5,393	$4,734	$5,114	$4,513	[f]= [d] + [e]
Market to Book Value of Common Equity	1 22	1 22	0 66	0 88	1 26	1 48	1 30	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1,077	$1,077	$1,277	$1,319	$1,278	$1,280	$985	[h]
Market Value of Preferred Equity	$1,077	$1,077	$1,277	$1,319	$1,278	$1,280	$985	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,977	$1,977	$1,660	$2,656	$1,284	$628	$557	[j]
Current Liabilities	$1,929	$1,929	$1,845	$3,866	$769	$634	$795	[k]
Current Portion of Long-Term Debt	$447	$447	$453	$1,538	$214	$190	$373	[l]
Net Working Capital	$495	$495	$268	$328	$729	$183	$135	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$48	$48	$122	$736	$0	$0	$22	[n]
Levered Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$7,462	$7,462	$6,591	$5,998	$3,249	$3,464	$3,363	[p]
Book Value of Long-Term Debt	$7,909	$7,909	$7,044	$7,536	$3,463	$3,654	$3,736	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$825	$825	$336	($27)	$132	$134	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$8,734	$8,734	$7,380	$7,509	$3,595	$3,788	N/A	[s] = [q] + [r]
Market Value of Debt	$8,734	$8,734	$7,380	$7,509	$3,595	$3,788	N/A	[t] = [s]
MARKET VALUE OF FIRM	$17,032	$17,032	$13,032	$14,221	$9,607	$10,182	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	42 40%	42 40%	33 57%	37 92%	49 28%	50 23%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	6 32%	6 32%	9 80%	9 27%	13 30%	12 57%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	51 28%	51 28%	56 63%	52 80%	37 42%	37 20%	N/A	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of 06/30/2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-4 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel C: Canadian Utilities Limited

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$5,043	$5,043	$5,180	$5,005	$4,661	$4,825	$4,485	[a]
Shares Outstanding (in millions) - Common	269	269	273	273	272	268	268	[b]
Price per Share - Common	$35	$35	$32	$38	$32	$41	$37	[c]
Market Value of Common Equity	$9,541	$9,541	$8,776	$10,297	$8,771	$11,093	$9,898	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$9,541	$9,541	$8,776	$10,297	$8,771	$11,093	$9,898	[f]= [d] + [e]
Market to Book Value of Common Equity	1 89	1 89	1 69	2 06	1 88	2 30	2 21	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1,483	$1,483	$1,483	$1,483	$1,483	$1,483	$1,670	[h]
Market Value of Preferred Equity	$1,483	$1,483	$1,483	$1,483	$1,483	$1,483	$1,670	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,105	$1,105	$1,530	$3,886	$1,181	$1,056	$1,021	[j]
Current Liabilities	$913	$913	$636	$3,384	$1,070	$1,031	$957	[k]
Current Portion of Long-Term Debt	$299	$299	$115	$372	$200	$169	$19	[l]
Net Working Capital	$491	$491	$1,009	$874	$311	$194	$83	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$3	$3	$2	$554	$54	$179	$287	[n]
Levered Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$8,773	$8,773	$8,918	$8,378	$9,740	$8,159	$7,932	[p]
Book Value of Long-Term Debt	$9,072	$9,072	$9,033	$8,750	$9,940	$8,328	$7,951	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$2,343	$2,343	$1,641	$643	$1,180	$919	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$11,415	$11,415	$10,674	$9,393	$11,120	$9,247	N/A	[s] = [q] + [r]
Market Value of Debt	$11,415	$11,415	$10,674	$9,393	$11,120	$9,247	N/A	[t] = [s]
MARKET VALUE OF FIRM	$22,439	$22,439	$20,933	$21,173	$21,374	$21,823	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	42 52%	42 52%	41 92%	48 63%	41 04%	50 83%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	6 61%	6 61%	7 08%	7 00%	6 94%	6 80%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	50 87%	50 87%	50 99%	44 36%	52 03%	42 37%	N/A	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of 06/30/2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-4 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel D: Emera Incorporated

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$8,205	$8,205	$8,224	$7,382	$6,903	$6,131	$3,535	[a]
Shares Outstanding (in millions) - Common	256	256	246	239	232	212	149	[b]
Price per Share - Common	$57	$57	$54	$54	$42	$49	$47	[c]
Market Value of Common Equity	$14,608	$14,608	$13,194	$12,823	$9,655	$10,303	$7,053	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$14,608	$14,608	$13,194	$12,823	$9,655	$10,303	$7,053	[f]= [d] + [e]
Market to Book Value of Common Equity	1 78	1 78	1 60	1 74	1 40	1 68	2 00	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1,200	$1,200	$1,004	$1,004	$1,004	$709	$710	[h]
Market Value of Preferred Equity	$1,200	$1,200	$1,004	$1,004	$1,004	$709	$710	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$2,145	$2,145	$2,318	$2,367	$2,213	$2,159	$10,079	[j]
Current Liabilities	$3,209	$3,209	$4,054	$3,939	$3,987	$3,805	$1,161	[k]
Current Portion of Long-Term Debt	$123	$123	$716	$828	$708	$1,175	$273	[l]
Net Working Capital	($941)	($941)	($1,020)	($744)	($1,066)	($471)	$9,191	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$1,223	$1,223	$1,394	$1,298	$1,447	$1,039	$4	[n]
Levered Short-Term Debt	$941	$941	$1,020	$744	$1,066	$471	$0	[o] = See Sources and Notes
Long-Term Debt	$13,934	$13,934	$13,588	$13,135	$13,455	$13,446	$11,683	[p]
Book Value of Long-Term Debt	$14,998	$14,998	$15,324	$14,707	$15,229	$15,092	$11,956	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$2,766	$2,766	$1,869	$497	$1,336	$979	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$17,764	$17,764	$17,193	$15,204	$16,565	$16,071	N/A	[s] = [q] + [r]
Market Value of Debt	$17,764	$17,764	$17,193	$15,204	$16,565	$16,071	N/A	[t] = [s]
MARKET VALUE OF FIRM	$33,572	$33,572	$31,391	$29,031	$27,224	$27,083	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	43 51%	43 51%	42 03%	44 17%	35 46%	38 04%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	3 57%	3 57%	3 20%	3 46%	3 69%	2 62%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	52 91%	52 91%	54 77%	52 37%	60 85%	59 34%	N/A	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of 06/30/2021
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[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel E: Enbridge Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$54,279	$54,279	$58,879	$61,607	$54,385	$51,424	$13,704	[a]
Shares Outstanding (in millions) - Common	2,026	2,026	2,025	2,024	1,715	1,645	934	[b]
Price per Share - Common	$49	$49	$42	$46	$43	$51	$54	[c]
Market Value of Common Equity	$99,901	$99,901	$85,082	$93,733	$73,154	$84,528	$50,311	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$99,901	$99,901	$85,082	$93,733	$73,154	$84,528	$50,311	[f]= [d] + [e]
Market to Book Value of Common Equity	1 84	1 84	1 45	1 52	1 35	1 64	3 67	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$7,747	$7,747	$7,747	$7,747	$7,747	$7,255	$6,515	[h]
Market Value of Preferred Equity	$7,747	$7,747	$7,747	$7,747	$7,747	$7,255	$6,515	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$8,162	$8,162	$6,957	$8,393	$7,984	$9,147	$6,809	[j]
Current Liabilities	$13,550	$13,550	$11,440	$13,368	$14,313	$12,890	$13,588	[k]
Current Portion of Long-Term Debt	$3,739	$3,739	$3,097	$4,743	$4,779	$2,607	$5,105	[l]
Net Working Capital	($1,649)	($1,649)	($1,386)	($232)	($1,550)	($1,136)	($1,674)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$1,410	$1,410	$355	$916	$1,014	$1,977	$1,100	[n]
Levered Short-Term Debt	$1,410	$1,410	$355	$232	$1,014	$1,136	$1,100	[o] = See Sources and Notes
Long-Term Debt	$63,090	$63,090	$63,680	$60,731	$59,940	$62,081	$34,298	[p]
Book Value of Long-Term Debt	$68,239	$68,239	$67,132	$65,706	$65,733	$65,824	$40,503	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$9,000	$9,000	$6,100	$500	$3,400	$3,100	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$77,239	$77,239	$73,232	$66,206	$69,133	$68,924	N/A	[s] = [q] + [r]
Market Value of Debt	$77,239	$77,239	$73,232	$66,206	$69,133	$68,924	N/A	[t] = [s]
MARKET VALUE OF FIRM	$184,887	$184,887	$166,061	$167,686	$150,034	$160,707	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	54 03%	54 03%	51 24%	55 90%	48 76%	52 60%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	4 19%	4 19%	4 67%	4 62%	5 16%	4 51%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	41 78%	41 78%	44 10%	39 48%	46 08%	42 89%	N/A	[x] = [t] / [u]

Sources and Notes:
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[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel F: Fortis Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$17,330	$17,330	$17,902	$15,636	$14,391	$13,691	$8,031	[a]
Shares Outstanding (in millions) - Common	471	471	465	436	425	418	284	[b]
Price per Share - Common	$56	$56	$52	$52	$42	$46	$42	[c]
Market Value of Common Equity	$26,502	$26,502	$23,965	$22,701	$17,652	$19,177	$11,998	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$26,502	$26,502	$23,965	$22,701	$17,652	$19,177	$11,998	[f]= [d] + [e]
Market to Book Value of Common Equity	1 53	1 53	1 34	1 45	1 23	1 40	1 49	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1,623	$1,623	$1,623	$1,623	$1,623	$1,623	$1,820	[h]
Market Value of Preferred Equity	$1,623	$1,623	$1,623	$1,623	$1,623	$1,623	$1,820	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$3,031	$3,031	$2,481	$2,125	$2,069	$2,063	$1,694	[j]
Current Liabilities	$3,480	$3,480	$3,499	$3,418	$3,508	$4,080	$2,147	[k]
Current Portion of Long-Term Debt	$723	$723	$1,090	$619	$1,083	$1,254	$442	[l]
Net Working Capital	$274	$274	$72	($674)	($356)	($763)	($11)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$269	$269	$25	$305	$69	$568	$234	[n]
Levered Short-Term Debt	$0	$0	$0	$305	$69	$568	$11	[o] = See Sources and Notes
Long-Term Debt	$24,272	$24,272	$23,887	$22,596	$22,188	$20,368	$11,603	[p]
Book Value of Long-Term Debt	$24,995	$24,995	$24,977	$23,520	$23,340	$22,190	$12,056	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$4,600	$4,600	$3,000	$879	$1,946	$1,304	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$29,595	$29,595	$27,977	$24,399	$25,286	$23,494	N/A	[s] = [q] + [r]
Market Value of Debt	$29,595	$29,595	$27,977	$24,399	$25,286	$23,494	N/A	[t] = [s]
MARKET VALUE OF FIRM	$57,720	$57,720	$53,565	$48,723	$44,561	$44,294	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	45 92%	45 92%	44 74%	46 59%	39 61%	43 29%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	2 81%	2 81%	3 03%	3 33%	3 64%	3 66%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	51 27%	51 27%	52 23%	50 08%	56 74%	53 04%	N/A	[x] = [t] / [u]

Sources and Notes:
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Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel G: Hydro One Limited

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$10,734	$10,734	$10,377	$9,204	$9,929	$9,640	$9,475	[a]
Shares Outstanding (in millions) - Common	598	598	598	597	596	595	595	[b]
Price per Share - Common	$30	$30	$25	$23	$20	$23	$25	[c]
Market Value of Common Equity	$18,224	$18,224	$15,192	$13,648	$11,841	$13,843	$14,763	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$18,224	$18,224	$15,192	$13,648	$11,841	$13,843	$14,763	[f]= [d] + [e]
Market to Book Value of Common Equity	1 70	1 70	1 46	1 48	1 19	1 44	1 56	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$418	$418	$418	$418	$418	[h]
Market Value of Preferred Equity	$0	$0	$418	$418	$418	$418	$418	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,355	$1,355	$1,061	$1,122	$2,329	$1,030	$1,077	[j]
Current Liabilities	$3,114	$3,114	$2,751	$2,714	$2,951	$2,223	$1,925	[k]
Current Portion of Long-Term Debt	$616	$616	$819	$1,161	$981	$602	$50	[l]
Net Working Capital	($1,143)	($1,143)	($871)	($431)	$359	($591)	($798)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$1,330	$1,330	$860	$598	$1,048	$715	$948	[n]
Levered Short-Term Debt	$1,143	$1,143	$860	$431	$0	$591	$798	[o] = See Sources and Notes
Long-Term Debt	$12,165	$12,165	$11,179	$10,843	$10,966	$10,072	$9,551	[p]
Book Value of Long-Term Debt	$13,924	$13,924	$12,858	$12,435	$11,947	$11,265	$10,399	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$2,997	$2,997	$1,997	$956	$1,501	$1,330	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$16,921	$16,921	$14,855	$13,391	$13,448	$12,595	N/A	[s] = [q] + [r]
Market Value of Debt	$16,921	$16,921	$14,855	$13,391	$13,448	$12,595	N/A	[t] = [s]
MARKET VALUE OF FIRM	$35,145	$35,145	$30,465	$27,457	$25,707	$26,856	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	51 85%	51 85%	49 87%	49 71%	46 06%	51 55%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	1 37%	1 52%	1 63%	1 56%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	48 15%	48 15%	48 76%	48 77%	52 31%	46 90%	N/A	[x] = [t] / [u]

Sources and Notes:
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[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.3

Market Value of the Canadian Sample

Panel H: TC Energy Corporation

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$28,522	$28,522	$28,478	$26,034	$23,283	$20,506	$13,828	[a]
Shares Outstanding (in millions) - Common	979	979	940	929	904	871	703	[b]
Price per Share - Common	$64	$30	$25	$23	$20	$23	$25	[c]
Market Value of Common Equity	$62,187	$29,824	$23,897	$21,251	$17,964	$20,265	$17,443	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$62,187	$29,824	$23,897	$21,251	$17,964	$20,265	$17,443	[f]= [d] + [e]
Market to Book Value of Common Equity	2 18	1 05	0 84	0 82	0 77	0 99	1 26	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$3,487	$3,487	$3,980	$3,980	$3,980	$3,980	$2,992	[h]
Market Value of Preferred Equity	$3,487	$3,487	$3,980	$3,980	$3,980	$3,980	$2,992	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$8,345	$8,345	$5,704	$5,676	$5,430	$4,899	$4,608	[j]
Current Liabilities	$13,721	$13,721	$9,780	$12,966	$10,431	$10,052	$9,851	[k]
Current Portion of Long-Term Debt	$6,013	$6,013	$2,706	$2,832	$2,812	$3,270	$773	[l]
Net Working Capital	$637	$637	($1,370)	($4,458)	($2,189)	($1,883)	($4,470)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$1,692	$1,692	$1,457	$4,568	$2,359	$1,559	$1,421	[n]
Levered Short-Term Debt	$0	$0	$1,370	$4,458	$2,189	$1,559	$1,421	[o] = See Sources and Notes
Long-Term Debt	$44,590	$44,590	$46,369	$42,873	$41,867	$38,494	$41,416	[p]
Book Value of Long-Term Debt	$50,603	$50,603	$50,445	$50,163	$46,868	$43,323	$43,610	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$9,169	$9,169	$6,202	$2,313	$5,439	$4,897	#N/A	[r] = See Sources and Notes
Market Value of Long-Term Debt	$59,772	$59,772	$56,647	$52,476	$52,307	$48,220	N/A	[s] = [q] + [r]
Market Value of Debt	$59,772	$59,772	$56,647	$52,476	$52,307	$48,220	N/A	[t] = [s]
MARKET VALUE OF FIRM	$125,446	$93,083	$84,524	$77,707	$74,251	$72,465	N/A	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	49 57%	32 04%	28 27%	27 35%	24 19%	27 96%	N/A	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	2 78%	3 75%	4 71%	5 12%	5 36%	5 49%	N/A	[w] = [i] / [u]
Debt - Market Value Ratio	47 65%	64 21%	67 02%	67 53%	70 45%	66 54%	N/A	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of 06/30/2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-4 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-4.6

DCF Cost of Equity of the Canadian Sample

Panel B: Multi-Stage DCF (Using TD Bank Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price	Most Recent Dividend	Combined Long-Term Growth Rate	Growth Rate: Year 6	Growth Rate: Year 7	Growth Rate: Year 8	Growth Rate: Year 9	Growth Rate: Year 10	GDP Long-Term Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Algonquin Power & Utilities Corp.	$18.99	$0.21	7.2%	6.6%	6.1%	5.5%	4.9%	4.3%	3.7%	9.6%
AltaGas Ltd.	$25.78	$0.08	9.9%	8.8%	7.8%	6.8%	5.8%	4.7%	3.7%	5.7%
Canadian Utilities Limited	$35.43	$0.44	0.3%	0.8%	1.4%	2.0%	2.6%	3.1%	3.7%	7.9%
Emera Incorporated	$57.04	$0.64	5.5%	5.2%	4.9%	4.6%	4.3%	4.0%	3.7%	9.0%
Enbridge Inc.	$49.31	$0.84	8.6%	7.8%	7.0%	6.2%	5.3%	4.5%	3.7%	13.1%
Fortis Inc.	$56.24	$0.51	4.9%	4.7%	4.5%	4.3%	4.1%	3.9%	3.7%	7.8%
Hydro One Limited	$30.46	$0.27	2.5%	2.7%	2.9%	3.1%	3.3%	3.5%	3.7%	7.1%
TC Energy Corporation	$63.52	$0.87	3.6%	3.6%	3.6%	3.6%	3.7%	3.7%	3.7%	9.5%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. BV-4.6.
[2]: Workpaper #2 to Schedule No. BV-4.6.
[3]: Schedule No. BV-4.5, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: TD Bank, Long Term Economic Forecast, June 2021 This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Schedule No. BV-4.6.

Schedule No. BV-4.7

Overall After-Tax DCF Cost of Capital of the Canadian Sample

Panel A: Simple DCF Method (Quarterly)

Company	2nd Quarter, 2021 S&P Bond Rating	2nd Quarter, 2021 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Algonquin Power & Utilities Corp.	BBB	BBB	12.1%	0.61	3.4%	0.01	3.4%	0.38	26.5%	8.4%
AltaGas Ltd.	BBB	BBB	11.3%	0.42	3.4%	0.06	3.4%	0.51	26.5%	6.3%
Canadian Utilities Limited	A	A	5.3%	0.43	3.2%	0.07	3.2%	0.51	26.5%	3.7%
Emera Incorporated	BBB	BBB	10.3%	0.44	3.4%	0.04	3.4%	0.53	26.5%	6.0%
Enbridge Inc.	BBB	BBB	16.2%	0.54	3.4%	0.04	3.4%	0.42	26.5%	10.0%
Fortis Inc.	A	A	8.7%	0.46	3.2%	0.03	3.2%	0.51	26.5%	5.3%
Hydro One Limited	A	-	6.1%	0.52	-	0.00	3.2%	0.48	26.5%	4.3%
TC Energy Corporation	BBB	BBB	9.4%	0.50	3.4%	0.03	3.4%	0.48	26.5%	5.9%
Simple Full Sample Average			9.9%	0.49	3.4%	0.03	3.4%	0.48	26.5%	6.2%

Sources and Notes:
[1]: Bloomberg as of June 30, 2021.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. BV-4.6; Panel A, [6].
[4]: Schedule No. BV-4.4, [1].
[5]: Workpaper #2 to Schedule No. BV-4.11, Panel C.
[6]: Schedule No. BV-4.4, [2].
[7]: Workpaper #2 to Schedule No. BV-4.11, Panel B.
[8]: Schedule No. BV-4.4, [3].
[9]: Provided by The Utilities.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 150 basis points

Schedule No. BV-4.7

Overall After-Tax DCF Cost of Capital of the Canadian Sample

Panel B: Multi-Stage DCF (Using TD Bank Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	2nd Quarter, 2021 S&P Bond Rating	2nd Quarter, 2021 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Algonquin Power & Utilities Corp.	BBB	BBB	9.6%	0.61	3.4%	0.01	3.4%	0.38	26.5%	6.8%
AltaGas Ltd.	BBB	BBB	5.7%	0.42	3.4%	0.06	3.4%	0.51	26.5%	3.9%
Canadian Utilities Limited	A	A	7.9%	0.43	3.2%	0.07	3.2%	0.51	26.5%	4.8%
Emera Incorporated	BBB	BBB	9.0%	0.44	3.4%	0.04	3.4%	0.53	26.5%	5.4%
Enbridge Inc.	BBB	BBB	13.1%	0.54	3.4%	0.04	3.4%	0.42	26.5%	8.3%
Fortis Inc.	A	A	7.8%	0.46	3.2%	0.03	3.2%	0.51	26.5%	4.9%
Hydro One Limited	A	-	7.1%	0.52	-	0.00	3.2%	0.48	26.5%	4.8%
TC Energy Corporation	BBB	BBB	9.5%	0.50	3.4%	0.03	3.4%	0.48	26.5%	6.0%
Multi-Stage Full Sample Average			8.7%	0.49	3.4%	0.03	3.4%	0.48	26.5%	5.6%

Sources and Notes:
[1]: Bloomberg as of June 30, 2021.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. BV-4.6, Panel B, [10].
[4]: Schedule No. BV-4.4, [1].
[5]: Workpaper #2 to Schedule No. BV-4.11, Panel C.
[6]: Schedule No. BV-4.4, [2].
[7]: Workpaper #2 to Schedule No. BV-4.11, Panel B.
[8]: Schedule No. BV-4.4, [3].
[9]: Provided by The Utilities.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 150 basis points

Schedule No. BV-4.8

DCF Cost of Equity at The Utilities's Representative Capital Structure

Canadian Sample

	Overall After - Tax Cost of Capital	The Utilities's Representative Regulatory % Debt	Representative Cost of A Rated Utility Debt	The Utilities' Representative Income Tax Rate	The Utilities' Representative Regulatory % Equity	Estimated Return on Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Simple DCF Quarterly	6.2%	60.0%	3.2%	26.5%	40.0%	12.0%
Multi-Stage DCF - Using the TD Bank Long-Term GDP Growth Forecast as the Perpetual Rate	5.6%	60.0%	3.2%	26.5%	40.0%	10.5%

Sources and Notes:
[1]: Schedule No. BV-4.7; Panels A-B, [10].
[2]: Provided by The Utilities.
[3]: Based on a A rating. Yield from Bloomberg as of June 30, 2021.
[4]: Provided by The Utilities.
[5]: Provided by The Utilities.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. BV-4.9 Risk-Free Rates

Consensus Forecast of 10 year Canadian Treasury Yield	**[a]**	**1.90%**
Long-run Average of 30 year Canadian Treasury Yield	[b]	4.77%
Long-run Average of 10 year Canadian Treasury Yield	[c]	4.36%
Maturity Premium	**[d] = [b] - [c]**	**0.40%**
Base Projection of 30 year Canadian Treasury Yield	**[e] = [a] + [d]**	**2.30%**

Sources and Notes:
[a]: Consensus Forecasts, June 2021.
[b], [c]: Bloomberg as of 6/30/2021, see Workpaper #1 to Schedule No. BV-4.9.

Schedule No. BV-4.10

Risk Positioning Cost of Equity of the Canadian Sample (Using Bloomberg Betas)

Panel A: Scenario 1 - Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%

Company	Long-Term Risk-Free Rate	Bloomberg Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Algonquin Power & Utilities Corp.	2.47%	0.89	5.68%	7.5%	7.7%
AltaGas Ltd.	2.47%	1.23	5.68%	9.5%	9.1%
Canadian Utilities Limited	2.47%	0.96	5.68%	7.9%	8.0%
Emera Incorporated	2.47%	0.74	5.68%	6.7%	7.1%
Enbridge Inc.	2.47%	0.92	5.68%	7.7%	7.8%
Fortis Inc.	2.47%	0.77	5.68%	6.8%	7.2%
Hydro One Limited	2.47%	0.71	5.68%	6.5%	6.9%
TC Energy Corporation	2.47%	1.00	5.68%	8.1%	8.1%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: Bloomberg as of 06/30/2021
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-4.10

Risk Positioning Cost of Equity of the Canadian Sample (Using Bloomberg Betas)

Panel B: Scenario 2 - Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%

Company	Long-Term Risk-Free Rate	Bloomberg Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Algonquin Power & Utilities Corp.	2.30%	0.89	8.05%	9.5%	9.6%
AltaGas Ltd.	2.30%	1.23	8.05%	12.2%	11.9%
Canadian Utilities Limited	2.30%	0.96	8.05%	10.0%	10.1%
Emera Incorporated	2.30%	0.74	8.05%	8.3%	8.7%
Enbridge Inc.	2.30%	0.92	8.05%	9.7%	9.8%
Fortis Inc.	2.30%	0.77	8.05%	8.5%	8.8%
Hydro One Limited	2.30%	0.71	8.05%	8.0%	8.5%
TC Energy Corporation	2.30%	1.00	8.05%	10.3%	10.3%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: Bloomberg as of 06/30/2021
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-4.11

Overall After-Tax Risk Positioning Cost of Capital of the Canadian Sample (Using Bloomberg Betas)

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	3-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	3-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	3-Year Average Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1.5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Algonquin Power & Utilities Corp.	7.5%	7.7%	0.65	3.4%	0.01	3.4%	0.34	26 5%	5.8%	5.9%
AltaGas Ltd.	9.5%	9.1%	0.39	3.4%	0.10	3.4%	0.51	26 5%	5.3%	5.2%
Canadian Utilities Limited	7.9%	8.0%	0.44	3 2%	0.07	3.2%	0.49	26 5%	4.9%	4.9%
Emera Incorporated	6.7%	7.1%	0.42	3.4%	0.03	3.4%	0.55	26 5%	4.3%	4.5%
Enbridge Inc.	7.7%	7.8%	0.53	3.4%	0.05	3.4%	0.43	26 5%	5.3%	5.4%
Fortis Inc.	6.8%	7.2%	0.45	3 2%	0.03	3.2%	0.52	26 5%	4.4%	4.5%
Hydro One Limited	6.5%	6.9%	0.50	3 2%	0.01	3.2%	0.49	26 5%	4.4%	4.6%
TC Energy Corporation	8.1%	8.1%	0.28	3.4%	0.05	3.4%	0.67	26 5%	4.1%	4.1%
Full Sample Average	7.6%	7.7%	0.46	3.4%	0.04	3.4%	0.50	26 5%	4.8%	4.9%

Sources and Notes:
[1]: Schedule No. BV-4.10; Panel A, [4].
[2]: Schedule No. BV-4.10; Panel A, [5].
[3]: Schedule No. BV-4.4, [4].
[4]: Workpaper #2 to Schedule No. BV-4.11, Panel C.
[5]: Schedule No. BV-4.4, [5].
[6]: Workpaper #2 to Schedule No. BV-4.11, Panel B.
[7]: Schedule No. BV-4.4, [6].
[8]: Provided by The Utilities.
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. BV-4.11

Overall After-Tax Risk Positioning Cost of Capital of the Canadian Sample (Using Bloomberg Betas)

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	3-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	3-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	3-Year Average Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1.5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Algonquin Power & Utilities Corp.	9.5%	9.6%	0.65	3.4%	0.01	3.4%	0.34	26 5%	7.0%	7.2%
AltaGas Ltd.	12.2%	11.9%	0.39	3.4%	0.10	3.4%	0.51	26 5%	6.4%	6.3%
Canadian Utilities Limited	10.0%	10.1%	0.44	3 2%	0.07	3.2%	0.49	26 5%	5.8%	5.8%
Emera Incorporated	8.3%	8.7%	0.42	3.4%	0.03	3.4%	0.55	26 5%	5.0%	5.1%
Enbridge Inc.	9.7%	9.8%	0.53	3.4%	0.05	3.4%	0.43	26 5%	6.4%	6.4%
Fortis Inc.	8.5%	8.8%	0.45	3 2%	0.03	3.2%	0.52	26 5%	5.1%	5.3%
Hydro One Limited	8.0%	8.5%	0.50	3 2%	0.01	3.2%	0.49	26 5%	5.2%	5.4%
TC Energy Corporation	10.3%	10.3%	0.28	3.4%	0.05	3.4%	0.67	26 5%	4.7%	4.8%
Full Sample Average	9.6%	9.7%	0.46	3.4%	0.04	3.4%	0.50	26 5%	5.7%	5.8%

Sources and Notes:
[1]: Schedule No. BV-4.10; Panel B, [4].
[2]: Schedule No. BV-4.10; Panel B, [5].
[3]: Schedule No. BV-4.4, [4].
[4]: Workpaper #2 to Schedule No. BV-4.11, Panel C.
[5]: Schedule No. BV-4.4, [5].
[6]: Workpaper #2 to Schedule No. BV-4.11, Panel B.
[7]: Schedule No. BV-4.4, [6].
[8]: Provided by The Utilities.
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. BV-4.12

Risk Positioning Cost of Equity at The Utilities' Representative Capital Structure

Canadian Sample

Using Bloomberg Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	The Utilities's Representative Regulatory % Debt	Representative Cost of A-Rated Utility Debt	The Utilities's Representative Income Tax Rate	The Utilities's Representative Regulatory % Equity	Estimated Return on Equity (Scenario 1)	Estimated Return on Equity (Scenario 2)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Full Sample								
CAPM using Bloomberg Betas	4.8%	5.7%	60.0%	3.2%	26.5%	40.0%	8.5%	10.7%
ECAPM (1.50%) using Bloomberg Betas	4.9%	5.8%	60.0%	3.2%	26.5%	40.0%	8.7%	10.9%

Sources and Notes:
[1]: Schedule No. BV-4.11; Panel A, [9] - [10].
[2]: Schedule No. BV-4.11; Panel B, [9] - [10].
[3]: Provided by The Utilities.
[4]: Based on a A rating. Yield from Bloomberg as of June 30, 2021.
[5]: Provided by The Utilities.
[6]: Provided by The Utilities.
[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6]
[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6]

Scenario 1: Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%.
Scenario 2: Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%.

Schedule No. BV-4.13

Unlevered Asset Beta

Company	Bloomberg Betas	Debt Beta	3-Year Average Common Equity to Market Value Ratio	3-Year Average Preferred Equity to Market Value Ratio	3-Year Average Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Algonquin Power & Utilities Corp.	0.89	0.10	0.65	0.01	0.34	26.5%	0.61	0.66
AltaGas Ltd.	1.23	0.10	0.39	0.10	0.51	26.5%	0.54	0.61
Canadian Utilities Limited	0.96	0.05	0.44	0.07	0.49	26.5%	0.45	0.51
Emera Incorporated	0.74	0.10	0.42	0.03	0.55	26.5%	0.37	0.42
Enbridge Inc.	0.92	0.10	0.53	0.05	0.43	26.5%	0.53	0.59
Fortis Inc.	0.77	0.05	0.45	0.03	0.52	26.5%	0.37	0.42
Hydro One Limited	0.71	0.05	0.50	0.01	0.49	26.5%	0.38	0.43
TC Energy Corporation	1.00	0.10	0.28	0.05	0.67	26.5%	0.35	0.40
Full Sample Average	0.90	0.08	0.46	0.04	0.50	26.5%	0.45	0.51

Sources and Notes:
[1]: Workpaper # 1 to Schedule No. BV-4.10, [1].
[2]: Workpaper #1 to Schedule No. BV-4.13, [6].
[3]: Schedule No. BV-4.4, [4].
[4]: Schedule No. BV-4.4, [5].
[5]: Schedule No. BV-4.4, [6].
[6]: The Utilities's Representative Tax Rate.
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Schedule No. BV-4.14

Canadian Sample Average Asset Beta Relevered at The Utilities' Representative Capital Structure

	Asset Beta	Assumed Debt Beta	The Utilities' Representative Regulatory % Debt	The Utilities' Representative Income Tax Rate	The Utilities' Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Canadian Sample						
Asset Beta Without Taxes	0.45	0.05	60.0%	26.5%	40.0%	1.05
Asset Beta With Taxes	0.51	0.05	60.0%	26.5%	40.0%	1.01

Sources and Notes:
[1]: Schedule No. BV-4.13, [7] - [8].
[2]: Villadsen Testimony.
[3]: Provided by The Utilities.
[4]: The Utilities's Representative Tax Rate.
[5]: Provided by The Utilities.
[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Schedule No. BV-4.15

Risk-Positioning Cost of Equity using Hamada-Unlevered Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%

Company	Long-Term Risk-Free Rate	Hamada Unlevered Equity	Long-Term Market Risk	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	2.47%	1.05	5.68%	8.5%	8.4%
Asset Beta With Taxes	2.47%	1.01	5.68%	8.2%	8.2%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-4.14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-4.15

Risk-Positioning Cost of Equity using Hamada-Unlevered Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%

Company	Long-Term Risk-Free Rate	Hamada Unlevered Equity	Long-Term Market Risk	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	2.30%	1.05	8.05%	10.8%	10.7%
Asset Beta With Taxes	2.30%	1.01	8.05%	10.4%	10.4%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-4.14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-5.1

Table of Contents

Schedule No. BV-5.2

US Sample Gas and Water

Classification of Companies by Assets

Company	Company Category
Amer. States Water	R
Amer. Water Works	R
Artesian Res Corp	R
Atmos Energy	R
California Water	R
Chesapeake Utilities	R
Essential Utilities	MR
Global Water Resources Inc	R
Middlesex Water	R
New Jersey Resources	MR
NiSource Inc.	R
Northwest Natural	R
ONE Gas Inc.	R
SJW Group	R
South Jersey Inds.	R
Southwest Gas	R
Spire Inc.	R

Sources and Notes:
Calculations based on EEI definitions and Company 10K filings:
R = Regulated (80 percent or greater of total assets are regulated).
MR = Mostly Regulated (Less than 80 percent of total assets are regulated).

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel A: Amer. States Water

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$664	$664	$619	$579	$539	$513	$477	[a]
Shares Outstanding (in millions) - Common	37	37	37	37	37	37	37	[b]
Price per Share - Common	$81	$81	$77	$74	$57	$49	$42	[c]
Market Value of Common Equity	$3,000	$3,000	$2,849	$2,735	$2,095	$1,779	$1,523	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$3,000	$3,000	$2,849	$2,735	$2,095	$1,779	$1,523	[f]= [d] + [e]
Market to Book Value of Common Equity	4 52	4 52	4 60	4 72	3 89	3 47	3 19	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$136	$136	$137	$122	$141	$150	$133	[j]
Current Liabilities	$111	$111	$159	$106	$130	$140	$160	[k]
Current Portion of Long-Term Debt	$2	$2	$2	$2	$40	$0	$0	[l]
Net Working Capital	$27	$27	($20)	$18	$52	$9	($27)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$49	$49	$49	$0	$0	$44	$64	[n]
Adjusted Short-Term Debt	$0	$0	$20	$0	$0	$0	$27	[o] = See Sources and Notes
Long-Term Debt	$609	$609	$491	$476	$358	$321	$321	[p]
Book Value of Long-Term Debt	$612	$612	$513	$478	$398	$321	$348	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$115	$115	$91	$63	$99	$98	$78	[r] = See Sources and Notes
Market Value of Long-Term Debt	$727	$727	$604	$541	$497	$419	$426	[s] = [q] + [r]
Market Value of Debt	$727	$727	$604	$541	$497	$419	$426	[t] = [s]
MARKET VALUE OF FIRM	$3,728	$3,728	$3,453	$3,276	$2,592	$2,198	$1,949	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	80 49%	80 49%	82 50%	83 48%	80 82%	80 93%	78 13%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	19 51%	19 51%	17 50%	16 52%	19 18%	19 07%	21 87%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel B: Amer. Water Works

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$6,690	$6,690	$6,338	$6,027	$5,736	$5,384	$5,153	[a]
Shares Outstanding (in millions) - Common	181	181	181	181	180	178	178	[b]
Price per Share - Common	$158	$158	$127	$117	$83	$81	$79	[c]
Market Value of Common Equity	$28,735	$28,735	$23,036	$21,123	$14,903	$14,362	$14,130	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$28,735	$28,735	$23,036	$21,123	$14,903	$14,362	$14,130	[f]= [d] + [e]
Market to Book Value of Common Equity	4 30	4 30	3 63	3 50	2 60	2 67	2 74	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,570	$1,570	$1,896	$741	$833	$808	$691	[j]
Current Liabilities	$1,710	$1,710	$2,113	$1,317	$2,951	$2,661	$1,740	[k]
Current Portion of Long-Term Debt	$55	$55	$75	$33	$364	$686	$54	[l]
Net Working Capital	($85)	($85)	($142)	($543)	($1,754)	($1,167)	($995)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$606	$606	$920	$397	$1,649	$1,117	$950	[n]
Adjusted Short-Term Debt	$85	$85	$142	$397	$1,649	$1,117	$950	[o] = See Sources and Notes
Long-Term Debt	$10,425	$10,425	$9,677	$8,745	$6,352	$5,659	$5,861	[p]
Book Value of Long-Term Debt	$10,565	$10,565	$9,894	$9,175	$8,365	$7,462	$6,865	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$2,151	$2,151	$1,106	$283	$834	$724	$843	[r] = See Sources and Notes
Market Value of Long-Term Debt	$12,716	$12,716	$11,000	$9,458	$9,199	$8,186	$7,708	[s] = [q] + [r]
Market Value of Debt	$12,716	$12,716	$11,000	$9,458	$9,199	$8,186	$7,708	[t] = [s]
MARKET VALUE OF FIRM	$41,451	$41,451	$34,036	$30,581	$24,102	$22,548	$21,838	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69 32%	69 32%	67 68%	69 07%	61 83%	63 70%	64 70%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	30 68%	30 68%	32 32%	30 93%	38 17%	36 30%	35 30%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel C: Artesian Res Corp

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$172	$172	$163	$155	$148	$143	$135	[a]
Shares Outstanding (in millions) - Common	9	9	9	9	9	9	9	[b]
Price per Share - Common	$38	$38	$35	$37	$38	$39	$31	[c]
Market Value of Common Equity	$360	$360	$326	$343	$353	$362	$287	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$360	$360	$326	$343	$353	$362	$287	[f]= [d] + [e]
Market to Book Value of Common Equity	2 09	2 09	2 00	2 22	2 39	2 54	2 12	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$16	$16	$15	$11	$16	$13	$14	[j]
Current Liabilities	$50	$50	$36	$44	$39	$44	$17	[k]
Current Portion of Long-Term Debt	$2	$2	$2	$2	$1	$26	$1	[l]
Net Working Capital	($32)	($32)	($20)	($31)	($22)	($5)	($2)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$26	$26	$15	$26	$20	$6	$6	[n]
Adjusted Short-Term Debt	$26	$26	$15	$26	$20	$5	$2	[o] = See Sources and Notes
Long-Term Debt	$144	$144	$144	$115	$105	$81	$103	[p]
Book Value of Long-Term Debt	$172	$172	$160	$144	$126	$113	$106	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$27	$27	$12	($1)	$4	$8	$15	[r] = See Sources and Notes
Market Value of Long-Term Debt	$199	$199	$172	$143	$130	$121	$122	[s] = [q] + [r]
Market Value of Debt	$199	$199	$172	$143	$130	$121	$122	[t] = [s]
MARKET VALUE OF FIRM	$559	$559	$498	$486	$483	$482	$409	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	64 42%	64 42%	65 42%	70 58%	73 14%	74 96%	70 20%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	35 58%	35 58%	34 58%	29 42%	26 86%	25 04%	29 80%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
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[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel D: Atmos Energy

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$7,774	$7,774	$6,461	$5,642	$4,760	$3,902	$3,467	[a]
Shares Outstanding (in millions) - Common	131	131	123	118	111	106	104	[b]
Price per Share - Common	$99	$99	$100	$105	$88	$84	$77	[c]
Market Value of Common Equity	$12,959	$12,959	$12,331	$12,430	$9,783	$8,918	$7,998	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$12,959	$12,959	$12,331	$12,430	$9,783	$8,918	$7,998	[f]= [d] + [e]
Market to Book Value of Common Equity	1 67	1 67	1 91	2 20	2 06	2 29	2 31	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,115	$1,115	$602	$504	$453	$534	$649	[j]
Current Liabilities	$1,063	$1,063	$703	$901	$1,466	$746	$1,530	[k]
Current Portion of Long-Term Debt	$200	$200	$34	$125	$450	$0	$250	[l]
Net Working Capital	$253	$253	($66)	($273)	($563)	($211)	($631)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$0	$0	$0	$75	$245	$259	$670	[n]
Adjusted Short-Term Debt	$0	$0	$0	$75	$245	$211	$631	[o] = See Sources and Notes
Long-Term Debt	$7,147	$7,147	$4,732	$3,529	$2,618	$3,067	$2,206	[p]
Book Value of Long-Term Debt	$7,348	$7,348	$4,766	$3,729	$3,313	$3,278	$3,087	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$1,135	$1,135	$656	$77	$297	$385	$209	[r] = See Sources and Notes
Market Value of Long-Term Debt	$8,482	$8,482	$5,422	$3,806	$3,610	$3,663	$3,296	[s] = [q] + [r]
Market Value of Debt	$8,482	$8,482	$5,422	$3,806	$3,610	$3,663	$3,296	[t] = [s]
MARKET VALUE OF FIRM	$21,442	$21,442	$17,753	$16,236	$13,393	$12,581	$11,294	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	60 44%	60 44%	69 46%	76 56%	73 04%	70 88%	70 82%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	39 56%	39 56%	30 54%	23 44%	26 96%	29 12%	29 18%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
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Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel E: California Water

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$997	$997	$782	$723	$686	$662	$637	[a]
Shares Outstanding (in millions) - Common	52	52	49	48	48	48	48	[b]
Price per Share - Common	$57	$57	$46	$50	$39	$37	$33	[c]
Market Value of Common Equity	$2,942	$2,942	$2,287	$2,414	$1,898	$1,760	$1,569	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$2,942	$2,942	$2,287	$2,414	$1,898	$1,760	$1,569	[f]= [d] + [e]
Market to Book Value of Common Equity	2 95	2 95	2 92	3 34	2 77	2 66	2 46	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$306	$306	$267	$206	$190	$171	$159	[j]
Current Liabilities	$362	$362	$578	$331	$622	$361	$202	[k]
Current Portion of Long-Term Debt	$5	$5	$22	$7	$105	$36	$6	[l]
Net Working Capital	($52)	($52)	($289)	($119)	($328)	($154)	($37)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$145	$145	$375	$165	$325	$190	$75	[n]
Adjusted Short-Term Debt	$52	$52	$289	$119	$325	$154	$37	[o] = See Sources and Notes
Long-Term Debt	$1,060	$1,060	$785	$821	$415	$520	$556	[p]
Book Value of Long-Term Debt	$1,117	$1,117	$1,096	$946	$845	$710	$599	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$158	$158	$64	$35	$76	$73	$82	[r] = See Sources and Notes
Market Value of Long-Term Debt	$1,275	$1,275	$1,160	$981	$920	$783	$680	[s] = [q] + [r]
Market Value of Debt	$1,275	$1,275	$1,160	$981	$920	$783	$680	[t] = [s]
MARKET VALUE OF FIRM	$4,217	$4,217	$3,447	$3,395	$2,818	$2,543	$2,249	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69 77%	69 77%	66 35%	71 12%	67 34%	69 21%	69 75%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	30 23%	30 23%	33 65%	28 88%	32 66%	30 79%	30 25%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
The DCF Capital structure is calculated using 2nd Quarter, 2021 balance sheet information and a 15-trading day average closing price ending on 6/30/2021
Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel F: Chesapeake Utilities

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$742	$742	$593	$544	$508	$462	$380	[a]
Shares Outstanding (in millions) - Common	18	18	16	16	16	16	15	[b]
Price per Share - Common	$120	$120	$85	$94	$78	$75	$61	[c]
Market Value of Common Equity	$2,113	$2,113	$1,396	$1,538	$1,271	$1,225	$933	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$2,113	$2,113	$1,396	$1,538	$1,271	$1,225	$933	[f]= [d] + [e]
Market to Book Value of Common Equity	2 85	2 85	2 35	2 83	2 50	2 65	2 46	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$111	$111	$99	$124	$116	$102	$87	[j]
Current Liabilities	$322	$322	$430	$512	$389	$272	$284	[k]
Current Portion of Long-Term Debt	$15	$15	$17	$77	$10	$12	$12	[l]
Net Working Capital	($196)	($196)	($314)	($311)	($263)	($157)	($185)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$169	$169	$286	$301	$235	$146	$180	[n]
Adjusted Short-Term Debt	$169	$169	$286	$301	$235	$146	$180	[o] = See Sources and Notes
Long-Term Debt	$507	$507	$440	$287	$243	$202	$144	[p]
Book Value of Long-Term Debt	$692	$692	$744	$665	$488	$359	$336	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$26	$26	$18	($3)	$10	$16	$11	[r] = See Sources and Notes
Market Value of Long-Term Debt	$717	$717	$762	$662	$498	$375	$347	[s] = [q] + [r]
Market Value of Debt	$717	$717	$762	$662	$498	$375	$347	[t] = [s]
MARKET VALUE OF FIRM	$2,830	$2,830	$2,158	$2,200	$1,769	$1,600	$1,281	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	74 66%	74 66%	64 68%	69 92%	71 83%	76 57%	72 88%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	25 34%	25 34%	35 32%	30 08%	28 17%	23 43%	27 12%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
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Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel G: Essential Utilities

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,837	$4,837	$4,636	$3,825	$2,004	$1,897	$1,791	[a]
Shares Outstanding (in millions) - Common	246	246	245	216	178	178	177	[b]
Price per Share - Common	$47	$47	$43	$41	$34	$34	$34	[c]
Market Value of Common Equity	$11,635	$11,635	$10,491	$8,887	$6,087	$5,981	$6,058	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$11,635	$11,635	$10,491	$8,887	$6,087	$5,981	$6,058	[f]= [d] + [e]
Market to Book Value of Common Equity	2 41	2 41	2 26	2 32	3 04	3 15	3 38	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$305	$305	$312	$2,118	$189	$138	$132	[j]
Current Liabilities	$469	$469	$448	$399	$254	$333	$179	[k]
Current Portion of Long-Term Debt	$80	$80	$88	$223	$119	$144	$38	[l]
Net Working Capital	($85)	($85)	($48)	$1,942	$54	($51)	($9)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$85	$85	$35	$28	$16	$67	$26	[n]
Adjusted Short-Term Debt	$85	$85	$35	$0	$0	$51	$9	[o] = See Sources and Notes
Long-Term Debt	$5,700	$5,700	$5,234	$2,761	$2,181	$1,823	$1,776	[p]
Book Value of Long-Term Debt	$5,865	$5,865	$5,356	$2,984	$2,300	$2,017	$1,823	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$736	$736	$247	$24	$120	$108	$126	[r] = See Sources and Notes
Market Value of Long-Term Debt	$6,600	$6,600	$5,603	$3,008	$2,420	$2,125	$1,949	[s] = [q] + [r]
Market Value of Debt	$6,600	$6,600	$5,603	$3,008	$2,420	$2,125	$1,949	[t] = [s]
MARKET VALUE OF FIRM	$18,235	$18,235	$16,094	$11,895	$8,507	$8,106	$8,007	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	63 80%	63 80%	65 18%	74 71%	71 56%	73 78%	75 66%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	36 20%	36 20%	34 82%	25 29%	28 44%	26 22%	24 34%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
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Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel H: Global Water Resources Inc

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$31	$31	$34	$27	$16	$13	$18	[a]
Shares Outstanding (in millions) - Common	23	23	23	22	20	20	18	[b]
Price per Share - Common	$17	$17	$10	$10	$9	$10	$8	[c]
Market Value of Common Equity	$382	$382	$236	$221	$183	$192	$142	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$382	$382	$236	$221	$183	$192	$142	[f]= [d] + [e]
Market to Book Value of Common Equity	12 33	12 33	6 93	8 25	11 74	14 49	7 89	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$25	$25	$21	$17	$9	$14	$20	[j]
Current Liabilities	$14	$14	$9	$10	$9	$10	$13	[k]
Current Portion of Long-Term Debt	$4	$4	$0	$0	$0	$0	$2	[l]
Net Working Capital	$15	$15	$12	$7	($1)	$4	$8	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$111	$111	$115	$115	$114	$114	$103	[p]
Book Value of Long-Term Debt	$115	$115	$115	$115	$115	$114	$105	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$15	$15	$6	($7)	$1	($7)	$12	[r] = See Sources and Notes
Market Value of Long-Term Debt	$130	$130	$121	$108	$116	$108	$117	[s] = [q] + [r]
Market Value of Debt	$130	$130	$121	$108	$116	$108	$117	[t] = [s]
MARKET VALUE OF FIRM	$512	$512	$357	$329	$299	$300	$258	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	74 61%	74 61%	66 07%	67 15%	61 23%	64 08%	54 88%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	25 39%	25 39%	33 93%	32 85%	38 77%	35 92%	45 12%	[x] = [t] / [u]

Sources and Notes:
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[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel I: Middlesex Water

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$355	$355	$333	$263	$236	$222	$212	[a]
Shares Outstanding (in millions) - Common	17	17	17	17	16	16	16	[b]
Price per Share - Common	$85	$85	$67	$60	$43	$40	$40	[c]
Market Value of Common Equity	$1,481	$1,481	$1,170	$992	$699	$652	$656	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$1,481	$1,481	$1,170	$992	$699	$652	$656	[f]= [d] + [e]
Market to Book Value of Common Equity	4 17	4 17	3 51	3 77	2 96	2 93	3 09	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$2	[h]
Market Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$2	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$37	$37	$44	$32	$31	$30	$28	[j]
Current Liabilities	$81	$81	$84	$103	$82	$55	$39	[k]
Current Portion of Long-Term Debt	$8	$8	$8	$8	$7	$6	$6	[l]
Net Working Capital	($36)	($36)	($32)	($62)	($43)	($20)	($5)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$32	$32	$38	$59	$39	$17	$11	[n]
Adjusted Short-Term Debt	$32	$32	$32	$59	$39	$17	$5	[o] = See Sources and Notes
Long-Term Debt	$277	$277	$243	$170	$142	$136	$131	[p]
Book Value of Long-Term Debt	$317	$317	$284	$237	$188	$160	$142	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$12	$12	$10	$1	$3	$2	$3	[r] = See Sources and Notes
Market Value of Long-Term Debt	$328	$328	$294	$238	$191	$162	$145	[s] = [q] + [r]
Market Value of Debt	$328	$328	$294	$238	$191	$162	$145	[t] = [s]
MARKET VALUE OF FIRM	$1,811	$1,811	$1,465	$1,233	$892	$816	$803	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	81 77%	81 77%	79 82%	80 46%	78 32%	79 89%	81 68%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	0 12%	0 12%	0 14%	0 20%	0 27%	0 30%	0 30%	[w] = [i] / [u]
Debt - Market Value Ratio	18 12%	18 12%	20 04%	19 34%	21 41%	19 81%	18 02%	[x] = [t] / [u]

Sources and Notes:
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[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel J: New Jersey Resources

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,682	$1,682	$1,839	$1,572	$1,450	$1,285	$1,171	[a]
Shares Outstanding (in millions) - Common	96	96	96	90	88	86	86	[b]
Price per Share - Common	$42	$42	$32	$50	$43	$42	$37	[c]
Market Value of Common Equity	$4,025	$4,025	$3,056	$4,491	$3,815	$3,610	$3,186	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$4,025	$4,025	$3,056	$4,491	$3,815	$3,610	$3,186	[f]= [d] + [e]
Market to Book Value of Common Equity	2 39	2 39	1 66	2 86	2 63	2 81	2 72	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$518	$518	$521	$510	$737	$638	$605	[j]
Current Liabilities	$614	$614	$902	$582	$507	$776	$601	[k]
Current Portion of Long-Term Debt	$28	$28	$30	$125	$41	$186	$11	[l]
Net Working Capital	($68)	($68)	($351)	$53	$270	$48	$15	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$176	$176	$553	$99	$57	$263	$245	[n]
Adjusted Short-Term Debt	$68	$68	$351	$0	$0	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$2,332	$2,332	$1,761	$1,212	$1,220	$898	$968	[p]
Book Value of Long-Term Debt	$2,427	$2,427	$2,142	$1,336	$1,261	$1,084	$979	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$352	$352	$91	($3)	$1	$24	$1	[r] = See Sources and Notes
Market Value of Long-Term Debt	$2,779	$2,779	$2,233	$1,334	$1,262	$1,108	$981	[s] = [q] + [r]
Market Value of Debt	$2,779	$2,779	$2,233	$1,334	$1,262	$1,108	$981	[t] = [s]
MARKET VALUE OF FIRM	$6,804	$6,804	$5,289	$5,825	$5,077	$4,718	$4,167	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59 15%	59 15%	57 78%	77 11%	75 15%	76 52%	76 47%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	40 85%	40 85%	42 22%	22 89%	24 85%	23 48%	23 53%	[x] = [t] / [u]

Sources and Notes:
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[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel K: NiSource Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,804	$4,804	$4,782	$5,096	$5,069	$4,123	$3,811	[a]
Shares Outstanding (in millions) - Common	392	392	383	373	363	326	322	[b]
Price per Share - Common	$25	$25	$23	$29	$25	$26	$25	[c]
Market Value of Common Equity	$9,947	$9,947	$8,852	$10,787	$9,006	$8,423	$8,165	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$9,947	$9,947	$8,852	$10,787	$9,006	$8,423	$8,165	[f]= [d] + [e]
Market to Book Value of Common Equity	2 07	2 07	1 85	2 12	1 78	2 04	2 14	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1,719	$1,719	$880	$880	$394	$0	$0	[h]
Market Value of Preferred Equity	$1,719	$1,719	$880	$880	$394	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,384	$1,384	$2,860	$1,578	$1,316	$1,281	$1,260	[j]
Current Liabilities	$1,707	$1,707	$3,228	$3,814	$2,560	$2,778	$2,696	[k]
Current Portion of Long-Term Debt	$45	$45	$16	$20	$598	$561	$312	[l]
Net Working Capital	($277)	($277)	($353)	($2,216)	($647)	($936)	($1,125)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$0	$0	$1,164	$2,081	$600	$901	$1,101	[n]
Adjusted Short-Term Debt	$0	$0	$353	$2,081	$600	$901	$1,101	[o] = See Sources and Notes
Long-Term Debt	$9,202	$9,202	$8,810	$7,159	$7,093	$6,777	$5,857	[p]
Book Value of Long-Term Debt	$9,247	$9,247	$9,178	$9,260	$8,290	$8,240	$7,270	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$1,791	$1,791	$895	$73	$807	$643	$594	[r] = See Sources and Notes
Market Value of Long-Term Debt	$11,038	$11,038	$10,073	$9,333	$9,097	$8,883	$7,863	[s] = [q] + [r]
Market Value of Debt	$11,038	$11,038	$10,073	$9,333	$9,097	$8,883	$7,863	[t] = [s]
MARKET VALUE OF FIRM	$22,704	$22,704	$19,805	$21,000	$18,497	$17,306	$16,028	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	43 81%	43 81%	44 69%	51 37%	48 69%	48 67%	50 94%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	7 57%	7 57%	4 44%	4 19%	2 13%	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	48 62%	48 62%	50 86%	44 44%	49 18%	51 33%	49 06%	[x] = [t] / [u]

Sources and Notes:
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[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel L: Northwest Natural

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$923	$923	$884	$877	$760	$865	$800	[a]
Shares Outstanding (in millions) - Common	31	31	31	30	29	29	28	[b]
Price per Share - Common	$54	$54	$56	$69	$61	$62	$61	[c]
Market Value of Common Equity	$1,643	$1,643	$1,724	$2,094	$1,770	$1,766	$1,684	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$1,643	$1,643	$1,724	$2,094	$1,770	$1,766	$1,684	[f]= [d] + [e]
Market to Book Value of Common Equity	1 78	1 78	1 95	2 39	2 33	2 04	2 10	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$274	$274	$316	$239	$181	$192	$202	[j]
Current Liabilities	$572	$572	$487	$307	$298	$235	$314	[k]
Current Portion of Long-Term Debt	$62	$62	$36	$109	$75	$62	$25	[l]
Net Working Capital	($237)	($237)	($134)	$41	($42)	$19	($87)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$240	$240	$233	$20	$47	$0	$153	[n]
Adjusted Short-Term Debt	$237	$237	$134	$0	$42	$0	$87	[o] = See Sources and Notes
Long-Term Debt	$996	$996	$999	$807	$684	$658	$570	[p]
Book Value of Long-Term Debt	$1,294	$1,294	$1,170	$915	$801	$720	$682	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$181	$181	$76	$26	$73	$74	$0	[r] = See Sources and Notes
Market Value of Long-Term Debt	$1,475	$1,475	$1,246	$941	$874	$794	$682	[s] = [q] + [r]
Market Value of Debt	$1,475	$1,475	$1,246	$941	$874	$794	$682	[t] = [s]
MARKET VALUE OF FIRM	$3,119	$3,119	$2,970	$3,035	$2,644	$2,560	$2,366	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	52 70%	52 70%	58 05%	68 98%	66 93%	68 98%	71 19%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	47 30%	47 30%	41 95%	31 02%	33 07%	31 02%	28 81%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
Capital structure from 2nd Quarter, 2021 calculated using respective balance sheet information and 15-day average prices ending at period end
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Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel M: ONE Gas Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,317	$2,317	$2,192	$2,108	$2,022	$1,933	$1,876	[a]
Shares Outstanding (in millions) - Common	53	53	53	53	53	52	52	[b]
Price per Share - Common	$76	$76	$76	$91	$73	$71	$63	[c]
Market Value of Common Equity	$4,062	$4,062	$4,039	$4,782	$3,835	$3,719	$3,296	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$4,062	$4,062	$4,039	$4,782	$3,835	$3,719	$3,296	[f]= [d] + [e]
Market to Book Value of Common Equity	1 75	1 75	1 84	2 27	1 90	1 92	1 76	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$604	$604	$347	$377	$351	$412	$381	[j]
Current Liabilities	$369	$369	$491	$578	$749	$293	$218	[k]
Current Portion of Long-Term Debt	$6	$6	$6	$6	$300	$0	$0	[l]
Net Working Capital	$241	$241	($137)	($195)	($99)	$119	$163	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$0	$0	$231	$293	$185	$79	$0	[n]
Adjusted Short-Term Debt	$0	$0	$137	$195	$99	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$4,083	$4,083	$1,582	$1,317	$894	$1,193	$1,192	[p]
Book Value of Long-Term Debt	$4,089	$4,089	$1,725	$1,518	$1,292	$1,193	$1,192	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$400	$400	$214	$100	$100	$0	$0	[r] = See Sources and Notes
Market Value of Long-Term Debt	$4,489	$4,489	$1,939	$1,618	$1,392	$1,193	$1,192	[s] = [q] + [r]
Market Value of Debt	$4,489	$4,489	$1,939	$1,618	$1,392	$1,193	$1,192	[t] = [s]
MARKET VALUE OF FIRM	$8,551	$8,551	$5,978	$6,401	$5,228	$4,911	$4,488	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	47 50%	47 50%	67 56%	74 72%	73 37%	75 71%	73 44%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	52 50%	52 50%	32 44%	25 28%	26 63%	24 29%	26 56%	[x] = [t] / [u]

Sources and Notes:
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[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel N: SJW Group

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$990	$990	$895	$894	$465	$436	$396	[a]
Shares Outstanding (in millions) - Common	30	30	29	28	21	21	20	[b]
Price per Share - Common	$65	$65	$62	$61	$67	$51	$38	[c]
Market Value of Common Equity	$1,928	$1,928	$1,758	$1,740	$1,378	$1,048	$771	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$1,928	$1,928	$1,758	$1,740	$1,378	$1,048	$771	[f]= [d] + [e]
Market to Book Value of Common Equity	1 95	1 95	1 96	1 95	2 96	2 40	1 95	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$147	$147	$146	$504	$73	$73	$93	[j]
Current Liabilities	$274	$274	$258	$127	$125	$70	$120	[k]
Current Portion of Long-Term Debt	$26	$26	$22	$0	$0	$0	$12	[l]
Net Working Capital	($101)	($101)	($90)	$377	($51)	$2	($16)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$139	$139	$147	$55	$59	$0	$56	[n]
Adjusted Short-Term Debt	$101	$101	$90	$0	$51	$0	$16	[o] = See Sources and Notes
Long-Term Debt	$1,372	$1,372	$1,316	$511	$431	$431	$364	[p]
Book Value of Long-Term Debt	$1,500	$1,500	$1,428	$511	$483	$431	$392	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$283	$283	$112	$59	$107	$69	$119	[r] = See Sources and Notes
Market Value of Long-Term Debt	$1,783	$1,783	$1,541	$569	$590	$500	$511	[s] = [q] + [r]
Market Value of Debt	$1,783	$1,783	$1,541	$569	$590	$500	$511	[t] = [s]
MARKET VALUE OF FIRM	$3,711	$3,711	$3,299	$2,310	$1,968	$1,548	$1,282	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	51 96%	51 96%	53 29%	75 35%	70 04%	67 73%	60 15%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	48 04%	48 04%	46 71%	24 65%	29 96%	32 27%	39 85%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
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Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel O: South Jersey Inds.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,887	$1,887	$1,666	$1,476	$1,304	$1,279	$1,278	[a]
Shares Outstanding (in millions) - Common	112	112	101	92	86	80	79	[b]
Price per Share - Common	$27	$27	$25	$33	$32	$35	$30	[c]
Market Value of Common Equity	$3,017	$3,017	$2,510	$3,070	$2,749	$2,815	$2,418	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$3,017	$3,017	$2,510	$3,070	$2,749	$2,815	$2,418	[f]= [d] + [e]
Market to Book Value of Common Equity	1 60	1 60	1 51	2 08	2 11	2 20	1 89	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$527	$527	$423	$429	$2,425	$356	$376	[j]
Current Liabilities	$590	$590	$926	$1,646	$2,115	$734	$758	[k]
Current Portion of Long-Term Debt	$91	$91	$119	$480	$1,369	$16	$245	[l]
Net Working Capital	$28	$28	($385)	($737)	$1,679	($362)	($138)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$25	$25	$453	$680	$336	$296	$145	[n]
Adjusted Short-Term Debt	$0	$0	$385	$680	$0	$296	$138	[o] = See Sources and Notes
Long-Term Debt	$3,177	$3,177	$2,567	$1,799	$1,404	$1,067	$831	[p]
Book Value of Long-Term Debt	$3,268	$3,268	$3,071	$2,960	$2,773	$1,379	$1,214	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$128	$128	($50)	$2	$17	$33	$43	[r] = See Sources and Notes
Market Value of Long-Term Debt	$3,396	$3,396	$3,021	$2,961	$2,789	$1,412	$1,257	[s] = [q] + [r]
Market Value of Debt	$3,396	$3,396	$3,021	$2,961	$2,789	$1,412	$1,257	[t] = [s]
MARKET VALUE OF FIRM	$6,413	$6,413	$5,531	$6,032	$5,538	$4,228	$3,675	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	47 04%	47 04%	45 38%	50 90%	49 63%	66 60%	65 79%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	52 96%	52 96%	54 62%	49 10%	50 37%	33 40%	34 21%	[x] = [t] / [u]

Sources and Notes:
Bloomberg as of June 30, 2021
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Prices are reported in Workpaper #1 to Schedule No BV-5 6
[e] = Market Value of GP equity is not estimated here
[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel P: Southwest Gas

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,847	$2,847	$2,611	$2,419	$1,933	$1,717	$1,644	[a]
Shares Outstanding (in millions) - Common	59	59	56	54	49	48	47	[b]
Price per Share - Common	$65	$65	$67	$89	$76	$75	$75	[c]
Market Value of Common Equity	$3,860	$3,860	$3,767	$4,830	$3,729	$3,576	$3,568	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$3,860	$3,860	$3,767	$4,830	$3,729	$3,576	$3,568	[f]= [d] + [e]
Market to Book Value of Common Equity	1 36	1 36	1 44	2 00	1 93	2 08	2 17	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$1,007	$1,007	$867	$752	$696	$484	$432	[j]
Current Liabilities	$1,272	$1,272	$918	$727	$664	$490	$583	[k]
Current Portion of Long-Term Debt	$319	$319	$172	$46	$32	$27	$50	[l]
Net Working Capital	$54	$54	$121	$72	$64	$21	($101)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$318	$318	$58	$0	$23	$3	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes
Long-Term Debt	$2,479	$2,479	$2,639	$2,430	$2,038	$1,686	$1,428	[p]
Book Value of Long-Term Debt	$2,798	$2,798	$2,811	$2,476	$2,070	$1,713	$1,477	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	($577)	($577)	($146)	$48	$121	$130	$94	[r] = See Sources and Notes
Market Value of Long-Term Debt	$2,221	$2,221	$2,665	$2,523	$2,191	$1,843	$1,572	[s] = [q] + [r]
Market Value of Debt	$2,221	$2,221	$2,665	$2,523	$2,191	$1,843	$1,572	[t] = [s]
MARKET VALUE OF FIRM	$6,081	$6,081	$6,432	$7,353	$5,920	$5,419	$5,140	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	63 48%	63 48%	58 56%	65 68%	63 00%	65 99%	69 42%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	36 52%	36 52%	41 44%	34 32%	37 00%	34 01%	30 58%	[x] = [t] / [u]

Sources and Notes:
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[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.3

Market Value of the US Sample Gas and Water

Panel Q: Spire Inc.

($MM)

	DCF Capital Structure	2nd Quarter, 2021	2nd Quarter, 2020	2nd Quarter, 2019	2nd Quarter, 2018	2nd Quarter, 2017	2nd Quarter, 2016	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,455	$2,455	$2,316	$2,371	$2,308	$2,028	$1,802	[a]
Shares Outstanding (in millions) - Common	52	52	51	51	51	48	46	[b]
Price per Share - Common	$74	$74	$67	$84	$69	$71	$68	[c]
Market Value of Common Equity	$3,804	$3,804	$3,426	$4,288	$3,498	$3,427	$3,109	[d] = [b] x [c]
Market Value of GP Equity	$0	$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes
Total Market Value of Equity	$3,804	$3,804	$3,426	$4,288	$3,498	$3,427	$3,109	[f]= [d] + [e]
Market to Book Value of Common Equity	1 55	1 55	1 48	1 81	1 52	1 69	1 73	[g] = [f] / [a]
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$242	$242	$242	$242	$0	$0	$0	[h]
Market Value of Preferred Equity	$242	$242	$242	$242	$0	$0	$0	[i] = [h]
MARKET VALUE OF DEBT								
Current Assets	$898	$898	$559	$650	$585	$629	$453	[j]
Current Liabilities	$1,292	$1,292	$1,108	$1,220	$814	$910	$492	[k]
Current Portion of Long-Term Debt	$111	$111	$5	$165	$156	$0	$0	[l]
Net Working Capital	($283)	($283)	($543)	($405)	($74)	($281)	($38)	[m] = [j] - ([k] - [l])
Notes Payable (Short-Term Debt)	$461	$461	$478	$434	$191	$451	$98	[n]
Adjusted Short-Term Debt	$283	$283	$478	$405	$74	$281	$38	[o] = See Sources and Notes
Long-Term Debt	$2,939	$2,939	$2,478	$2,042	$2,025	$1,925	$1,840	[p]
Book Value of Long-Term Debt	$3,333	$3,333	$2,961	$2,612	$2,254	$2,206	$1,878	[q] = [l] + [o] + [p]
Adjustment to Book Value of Long-Term Debt	$491	$491	$251	($2)	$115	$173	$93	[r] = See Sources and Notes
Market Value of Long-Term Debt	$3,824	$3,824	$3,212	$2,611	$2,369	$2,379	$1,971	[s] = [q] + [r]
Market Value of Debt	$3,824	$3,824	$3,212	$2,611	$2,369	$2,379	$1,971	[t] = [s]
MARKET VALUE OF FIRM	$7,870	$7,870	$6,880	$7,141	$5,867	$5,807	$5,080	[u] = [f] + [i] + [t]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	48 34%	48 34%	49 79%	60 05%	59 62%	59 02%	61 21%	[v] = [f] / [u]
Preferred Equity - Market Value Ratio	3 08%	3 08%	3 52%	3 39%	-	-	-	[w] = [i] / [u]
Debt - Market Value Ratio	48 59%	48 59%	46 69%	36 56%	40 38%	40 98%	38 79%	[x] = [t] / [u]

Sources and Notes:
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[o] =
(1): 0 if [m] > 0
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n]
(3): [n] if [m] < 0 and |[m]| > [n]
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K Data for adjustment is from 2016 to 2020 10-Ks

Schedule No. BV-5.4

US Sample Gas and Water

Capital Structure Summary of the US Sample Gas and Water

Company	DCF Capital Structure			3-Year Average Capital Structure		
	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio	Common Equity - Value Ratio	Preferred Equity - Value Ratio	Debt - Value Ratio
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	0.80	0.00	0.20	0.82	0.00	0.18
Amer. Water Works	0.69	0.00	0.31	0.67	0.00	0.33
Artesian Res Corp	0.64	0.00	0.36	0.68	0.00	0.32
Atmos Energy	0.60	0.00	0.40	0.71	0.00	0.29
California Water	0.70	0.00	0.30	0.69	0.00	0.31
Chesapeake Utilities	0.75	0.00	0.25	0.69	0.00	0.31
Essential Utilities	0.64	0.00	0.36	0.69	0.00	0.31
Global Water Resources Inc	0.75	0.00	0.25	0.67	0.00	0.33
Middlesex Water	0.82	0.00	0.18	0.80	0.00	0.20
New Jersey Resources	0.59	0.00	0.41	0.67	0.00	0.33
NiSource Inc.	0.44	0.08	0.49	0.47	0.04	0.48
Northwest Natural	0.53	0.00	0.47	0.62	0.00	0.38
ONE Gas Inc.	0.48	0.00	0.52	0.68	0.00	0.32
SJW Group	0.52	0.00	0.48	0.63	0.00	0.37
South Jersey Inds.	0.47	0.00	0.53	0.48	0.00	0.52
Southwest Gas	0.63	0.00	0.37	0.62	0.00	0.38
Spire Inc.	0.48	0.03	0.49	0.55	0.03	0.43
Gas Sample Average	0.55	0.01	0.44	0.61	0.01	0.38
Water Sample Average	0.70	0.00	0.30	0.71	0.00	0.29

Sources and Notes:
[1], [4]:Workpaper #1 to Schedule No. BV-5.4.
[2], [5]:Workpaper #2 to Schedule No. BV-5.4.
[3], [6]:Workpaper #3 to Schedule No. BV-5.4.
Values in this table may not add up exactly to 1.0 because of rounding.

Schedule No. BV-5.5

US Sample Gas and Water

Estimated Growth Rates of the US Sample Gas and Water

	Thomson Reuters IBES Estimate		Value Line			
Company	Long-Term Growth Rate	Number of Estimates	EPS Year 2021 Estimate	EPS Year 2024-2026 Estimate	Annualized Growth Rate	Combined Growth Rate
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	5.2%	1	2.45	3.05	5.6%	5.4%
Amer. Water Works	8.6%	1	4.25	5.50	6.7%	7.6%
Artesian Res Corp	4.0%	1	n/a	n/a	n/a	4.0%
Atmos Energy	7.2%	3	5.10	6.50	6.3%	6.9%
California Water	11.7%	1	1.70	2.25	7.3%	9.5%
Chesapeake Utilities	4.7%	1	4.55	6.15	7.8%	6.3%
Essential Utilities	6.4%	1	1.65	2.00	4.9%	5.7%
Global Water Resources Inc	15.0%	1	n/a	n/a	n/a	15.0%
Middlesex Water	2.7%	1	2.20	2.70	5.3%	4.0%
New Jersey Resources	6.0%	1	2.15	2.55	4.4%	5.2%
NiSource Inc.	3.5%	1	1.40	2.25	12.6%	8.1%
Northwest Natural	3.8%	1	2.55	3.10	5.0%	4.4%
ONE Gas Inc.	5.0%	1	3.80	5.00	7.1%	6.1%
SJW Group	7.0%	1	2.05	3.65	15.5%	11.3%
South Jersey Inds.	4.8%	1	1.80	2.70	10.7%	7.7%
Southwest Gas	4.0%	1	4.50	6.50	9.6%	6.8%
Spire Inc.	7.3%	1	5.00	5.50	2.4%	4.9%

Sources and Notes:

[1] - [2]: Thomson Reuters as of June 30, 2021.

[3] - [4]: From Valueline Investment Analyzer as of June 30, 2021.

[5]: ([4] / [3]) ^ (1/4) - 1.

[6]: ([1] x [2] + [5]) / ([2] + 1).

Weighted average growth rate. If information is missing from one source, the weighted average is based solely on the other source.

Schedule No. BV-5.6

DCF Cost of Equity of the US Sample Gas and Water

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	$81.24	$0.34	0.42%	5.4%	1.3%	7.2%
Amer. Water Works	$158.32	$0.60	0.39%	7.6%	1.9%	9.3%
Artesian Res Corp	$38.30	$0.26	0.69%	4.0%	1.0%	6.9%
Atmos Energy	$99.09	$0.63	0.64%	6.9%	1.7%	9.7%
California Water	$57.09	$0.23	0.41%	9.5%	2.3%	11.3%
Chesapeake Utilities	$120.29	$0.48	0.41%	6.3%	1.5%	8.0%
Essential Utilities	$47.34	$0.25	0.54%	5.7%	1.4%	7.9%
Global Water Resources In	$16.90	$0.02	0.15%	15.0%	3.6%	15.7%
Middlesex Water	$84.66	$0.27	0.33%	4.0%	1.0%	5.3%
New Jersey Resources	$41.77	$0.33	0.81%	5.2%	1.3%	8.6%
NiSource Inc.	$25.35	$0.22	0.88%	8.1%	2.0%	11.9%
Northwest Natural	$53.58	$0.48	0.91%	4.4%	1.1%	8.2%
ONE Gas Inc.	$75.93	$0.58	0.78%	6.1%	1.5%	9.3%
SJW Group	$64.70	$0.34	0.54%	11.3%	2.7%	13.6%
South Jersey Inds.	$26.83	$0.30	1.15%	7.7%	1.9%	12.7%
Southwest Gas	$65.32	$0.60	0.93%	6.8%	1.7%	10.8%
Spire Inc.	$73.61	$0.65	0.89%	4.9%	1.2%	8.6%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. BV-5.6.
[2]: Workpaper #2 to Schedule No. BV-5.6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Schedule No. BV-5.5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Schedule No. BV-5.6

DCF Cost of Equity of the US Sample Gas and Water

Panel B: Multi-Stage DCF - Using TD Bank Forecast, June 2021 as the Perpetual Rate

Company	Stock Price	Most Recent Dividend	Combined Long-Term Growth Rate	Growth Rate: Year 6	Growth Rate: Year 7	Growth Rate: Year 8	Growth Rate: Year 9	Growth Rate: Year 10	GDP Long-Term Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	$81.24	$0.34	5.4%	5.2%	4.9%	4.7%	4.5%	4.2%	4.0%	5.9%
Amer. Water Works	$158.32	$0.60	7.6%	7.0%	6.4%	5.8%	5.2%	4.6%	4.0%	6.0%
Artesian Res Corp	$38.30	$0.26	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	6.9%
Atmos Energy	$99.09	$0.63	6.9%	6.4%	6.0%	5.5%	5.0%	4.5%	4.0%	7.2%
California Water	$57.09	$0.23	9.5%	8.6%	7.7%	6.7%	5.8%	4.9%	4.0%	6.4%
Chesapeake Utilities	$120.29	$0.48	6.3%	5.9%	5.5%	5.1%	4.8%	4.4%	4.0%	5.9%
Essential Utilities	$47.34	$0.25	5.7%	5.4%	5.1%	4.8%	4.6%	4.3%	4.0%	6.5%
Global Water Resources Inc	$16.90	$0.02	15.0%	13.2%	11.3%	9.5%	7.7%	5.8%	4.0%	5.3%
Middlesex Water	$84.66	$0.27	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	5.3%
New Jersey Resources	$41.77	$0.33	5.2%	5.0%	4.8%	4.6%	4.4%	4.2%	4.0%	7.6%
NiSource Inc.	$25.35	$0.22	8.1%	7.4%	6.7%	6.0%	5.4%	4.7%	4.0%	8.7%
Northwest Natural	$53.58	$0.48	4.4%	4.3%	4.3%	4.2%	4.1%	4.1%	4.0%	7.9%
ONE Gas Inc.	$75.93	$0.58	6.1%	5.7%	5.4%	5.0%	4.7%	4.3%	4.0%	7.7%
SJW Group	$64.70	$0.34	11.3%	10.0%	8.8%	7.6%	6.4%	5.2%	4.0%	7.5%
South Jersey Inds.	$26.83	$0.30	7.7%	7.1%	6.5%	5.9%	5.2%	4.6%	4.0%	10.0%
Southwest Gas	$65.32	$0.60	6.8%	6.3%	5.9%	5.4%	4.9%	4.5%	4.0%	8.6%
Spire Inc.	$73.61	$0.65	4.9%	4.7%	4.6%	4.4%	4.3%	4.1%	4.0%	7.9%

Sources and Notes:
[1]: Workpaper #1 to Schedule No. BV-5.6.
[2]: Workpaper #2 to Schedule No. BV-5.6.
[3]: Schedule No. BV-5.5, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: TD Bank Forecast, June 2021 is assumed to be the perpetual growth rate
[10]: Workpaper #3 to Schedule No. BV-5.6.

Schedule No. BV-5.7

Overall After-Tax DCF Cost of Capital of the US Sample Gas and Water

Panel A: Simple DCF Method (Quarterly)

Company	2nd Quarter, 2021 S&P Bond Rating	2nd Quarter, 2021 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	A	-	7.2%	0.80	-	0.00	3.0%	0.20	26.5%	6.2%
Amer. Water Works	A	-	9.3%	0.69	-	0.00	3.0%	0.31	26.5%	7.1%
Artesian Res Corp	A	-	6.9%	0.64	-	0.00	3.0%	0.36	26.5%	5.2%
Atmos Energy	A	-	9.7%	0.60	-	0.00	3.0%	0.40	26.5%	6.7%
California Water	A	-	11.3%	0.70	-	0.00	3.0%	0.30	26.5%	8.5%
Chesapeake Utilities	A	-	8.0%	0.75	-	0.00	3.0%	0.25	26.5%	6.5%
Essential Utilities	A	-	7.9%	0.64	-	0.00	3.0%	0.36	26.5%	5.9%
Global Water Resources Inc	A	-	15.7%	0.75	-	0.00	3.0%	0.25	26.5%	12.2%
Middlesex Water	A	A	5.3%	0.82	3.0%	0.00	3.0%	0.18	26.5%	4.8%
New Jersey Resources	A	-	8.6%	0.59	-	0.00	3.0%	0.41	26.5%	6.0%
NiSource Inc.	BBB	BBB	11.9%	0.44	3.3%	0.08	3.3%	0.49	26.5%	6.6%
Northwest Natural	BBB	-	8.2%	0.53	-	0.00	3.3%	0.47	26.5%	5.5%
ONE Gas Inc.	BBB	-	9.3%	0.48	-	0.00	3.3%	0.52	26.5%	5.7%
SJW Group	A	-	13.6%	0.52	-	0.00	3.0%	0.48	26.5%	8.1%
South Jersey Inds.	BBB	-	12.7%	0.47	-	0.00	3.3%	0.53	26.5%	7.2%
Southwest Gas	BBB	-	10.8%	0.63	-	0.00	3.3%	0.37	26.5%	7.7%
Spire Inc.	A	A	8.6%	0.48	3.0%	0.03	3.0%	0.49	26.5%	5.3%
Simple Water Sample Average			9.6%	0.70	3.0%	0.00	3.0%	0.30	26.5%	7.3%
Simple Gas Sample Average			9.7%	0.55	3.1%	0.01	3.2%	0.44	26.5%	6.4%

Sources and Notes:
[1]: Bloomberg as of June 30, 2021.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. BV-5.6; Panel A, [6].
[4]: Schedule No. BV-5.4, [1].
[5]: Workpaper #2 to Schedule No. BV-5.11, Panel C.
[6]: Schedule No. BV-5.4, [2].
[7]: Workpaper #2 to Schedule No. BV-5.11, Panel B.
[8]: Schedule No. BV-5.4, [3].
[9]: Provided by The Utilities.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 150 basis points

Schedule No. BV-5.7

Overall After-Tax DCF Cost of Capital of the US Sample Gas and Water

Panel B: Multi-Stage DCF - Using TD Bank Forecast, June 2021 as the Perpetual Rate

Company	2nd Quarter, 2021 S&P Bond Rating	2nd Quarter, 2021 Preferred Equity Rating	DCF Cost of Equity	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer. States Water	A	-	5.9%	0.80	-	0.00	3.0%	0.20	26.5%	5.2%
Amer. Water Works	A	-	6.0%	0.69	-	0.00	3.0%	0.31	26.5%	4.9%
Artesian Res Corp	A	-	6.9%	0.64	-	0.00	3.0%	0.36	26.5%	5.2%
Atmos Energy	A	-	7.2%	0.60	-	0.00	3.0%	0.40	26.5%	5.2%
California Water	A	-	6.4%	0.70	-	0.00	3.0%	0.30	26.5%	5.1%
Chesapeake Utilities	A	-	5.9%	0.75	-	0.00	3.0%	0.25	26.5%	5.0%
Essential Utilities	A	-	6.5%	0.64	-	0.00	3.0%	0.36	26.5%	4.9%
Global Water Resources Inc	A	-	5.3%	0.75	-	0.00	3.0%	0.25	26.5%	4.5%
Middlesex Water	A	A	5.3%	0.82	3.0%	0.00	3.0%	0.18	26.5%	4.8%
New Jersey Resources	A	-	7.6%	0.59	-	0.00	3.0%	0.41	26.5%	5.4%
NiSource Inc.	BBB	BBB	8.7%	0.44	3.3%	0.08	3.3%	0.49	26.5%	5.2%
Northwest Natural	BBB	-	7.9%	0.53	-	0.00	3.3%	0.47	26.5%	5.3%
ONE Gas Inc.	BBB	-	7.7%	0.48	-	0.00	3.3%	0.52	26.5%	4.9%
SJW Group	A	-	7.5%	0.52	-	0.00	3.0%	0.48	26.5%	5.0%
South Jersey Inds.	BBB	-	10.0%	0.47	-	0.00	3.3%	0.53	26.5%	6.0%
Southwest Gas	BBB	-	8.6%	0.63	-	0.00	3.3%	0.37	26.5%	6.3%
Spire Inc.	A	A	7.9%	0.48	3.0%	0.03	3.0%	0.49	26.5%	5.0%
Multi-Stage Water Sample Average			6.2%	0.70	3.0%	0.00	3.0%	0.30	26.5%	4.9%
Multi-Stage Gas Sample Average			7.9%	0.55	3.1%	0.01	3.2%	0.44	26.5%	5.4%

Sources and Notes:
[1]: Bloomberg as of June 30, 2021.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. BV-5.6, Panel B, [10].
[4]: Schedule No. BV-5.4, [1].
[5]: Workpaper #2 to Schedule No. BV-5.11, Panel C.
[6]: Schedule No. BV-5.4, [2].
[7]: Workpaper #2 to Schedule No. BV-5.11, Panel B.
[8]: Schedule No. BV-5.4, [3].
[9]: Provided by The Utilities.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the utility was excluded from the full sample average calculation as a result of its cost of equity not exceeding its cost of debt by 150 basis points

Schedule No. BV-5.8

DCF Cost of Equity at The Utilities's Representative Capital Structure

US Sample Gas and Water

	Overall After - Tax Cost of Capital	The Utilities's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	The Utilities's Representative Income Tax Rate	The Utilities's Representative Regulatory % Equity	Estimated Return on Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Gas Sample						
Simple DCF Quarterly	6.4%	60.0%	3.3%	26.5%	40.0%	12.3%
Multi-Stage DCF - Using TD Bank Forecast, June 2021 as the Perpetual Rate	5.4%	60.0%	3.3%	26.5%	40.0%	9.8%
Water Sample						
Simple DCF Quarterly	7.3%	60.0%	3.3%	26.5%	40.0%	14.5%
Multi-Stage DCF - Using TD Bank Forecast, June 2021 as the Perpetual Rate	4.9%	60.0%	3.3%	26.5%	40.0%	8.7%

Sources and Notes:
[1]: Schedule No. BV-5.7; Panels A-B, [10].
[2]: Provided by The Utilities.
[3]: Based on a BBB rating. Yield from Bloomberg as of June 30, 2021.
[4]: Provided by The Utilities.
[5]: Provided by The Utilities.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. BV-5.9 Risk-Free Rates

Consensus Forecast of 10 year Canadian Treasury Yield	**[a]**	**1.90%**
Long-run Average of 30 year Canadian Treasury Yield	[b]	4.77%
Long-run Average of 10 year Canadian Treasury Yield	[c]	4.36%
Maturity Premium	**[d] = [b] - [c]**	**0.40%**
Base Projection of 30 year Canadian Treasury Yield	**[e] = [a] + [d]**	**2.30%**

Sources and Notes:

[a]: Consensus Forecasts, June 2021.

[b], [c]: Bloomberg as of 6/30/2021, see Workpaper #1 to Schedule No. BV-5.9.

Schedule No. BV-5.10

Risk Positioning Cost of Equity of the US Sample Gas and Water (Using Bloomberg Betas)

Panel A: Scenario 1 - Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%

Company	Long-Term Risk-Free Rate	Bloomberg Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Amer. States Water	2.47%	0.59	5.68%	5.8%	6.4%
Amer. Water Works	2.47%	1.00	5.68%	8.1%	8.1%
Artesian Res Corp	2.47%	0.69	5.68%	6.4%	6.8%
Atmos Energy	2.47%	0.87	5.68%	7.4%	7.6%
California Water	2.47%	0.63	5.68%	6.1%	6.6%
Chesapeake Utilities	2.47%	0.77	5.68%	6.9%	7.2%
Essential Utilities	2.47%	1.06	5.68%	8.5%	8.4%
Global Water Resources Inc	2.47%	0.92	5.68%	7.7%	7.8%
Middlesex Water	2.47%	0.87	5.68%	7.4%	7.6%
New Jersey Resources	2.47%	0.98	5.68%	8.0%	8.0%
NiSource Inc.	2.47%	0.99	5.68%	8.1%	8.1%
Northwest Natural	2.47%	0.87	5.68%	7.4%	7.6%
ONE Gas Inc.	2.47%	0.96	5.68%	7.9%	8.0%
SJW Group	2.47%	0.95	5.68%	7.9%	7.9%
South Jersey Inds.	2.47%	1.03	5.68%	8.3%	8.3%
Southwest Gas	2.47%	1.06	5.68%	8.5%	8.4%
Spire Inc.	2.47%	0.99	5.68%	8.1%	8.1%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: Bloomberg SPTSX betas pulled as of 6/30/2021
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-5.10

Risk Positioning Cost of Equity of the US Sample Gas and Water (Using Bloomberg Betas)

Panel B: Scenario 2 - Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%

Company	Long-Term Risk-Free Rate	Bloomberg Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Amer. States Water	2.30%	0.59	8.05%	7.1%	7.7%
Amer. Water Works	2.30%	1.00	8.05%	10.3%	10.3%
Artesian Res Corp	2.30%	0.69	8.05%	7.8%	8.3%
Atmos Energy	2.30%	0.87	8.05%	9.3%	9.5%
California Water	2.30%	0.63	8.05%	7.4%	8.0%
Chesapeake Utilities	2.30%	0.77	8.05%	8.5%	8.9%
Essential Utilities	2.30%	1.06	8.05%	10.8%	10.7%
Global Water Resources Inc	2.30%	0.92	8.05%	9.7%	9.8%
Middlesex Water	2.30%	0.87	8.05%	9.3%	9.5%
New Jersey Resources	2.30%	0.98	8.05%	10.2%	10.2%
NiSource Inc.	2.30%	0.99	8.05%	10.3%	10.3%
Northwest Natural	2.30%	0.87	8.05%	9.3%	9.5%
ONE Gas Inc.	2.30%	0.96	8.05%	10.0%	10.1%
SJW Group	2.30%	0.95	8.05%	9.9%	10.0%
South Jersey Inds.	2.30%	1.03	8.05%	10.6%	10.5%
Southwest Gas	2.30%	1.06	8.05%	10.9%	10.8%
Spire Inc.	2.30%	0.99	8.05%	10.3%	10.3%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: Bloomberg SPTSX betas pulled as of 6/30/2021
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-5.11

Overall After-Tax Risk Positioning Cost of Capital of the US Sample Gas and Water (Using Bloomberg Betas)

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%

Company	CAPM Cost of Equity	ECAPM (1 5%) Cost of Equity	3-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	3-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	3-Year Average Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1 5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer States Water	5 8%	6 4%	0 82	-	0 00	3 0%	0 18	26 5%	5 2%	5 7%
Amer Water Works	8 1%	8 1%	0 67	-	0 00	3 0%	0 33	26 5%	6 2%	6 2%
Artesian Res Corp	6 4%	6 8%	0 68	-	0 00	3 0%	0 32	26 5%	5 1%	5 4%
Atmos Energy	7 4%	7 6%	0 71	-	0 00	3 0%	0 29	26 5%	5 9%	6 0%
California Water	6 1%	6 6%	0 69	-	0 00	3 0%	0 31	26 5%	4 9%	5 2%
Chesapeake Utilities	6 9%	7 2%	0 69	-	0 00	3 0%	0 31	26 5%	5 4%	5 7%
Essential Utilities	8 5%	8 4%	0 69	-	0 00	3 0%	0 31	26 5%	6 5%	6 5%
Global Water Resources Inc	7 7%	7 8%	0 67	-	0 00	3 0%	0 33	26 5%	5 9%	6 0%
Middlesex Water	7 4%	7 6%	0 80	3 0%	0 00	3 0%	0 20	26 5%	6 4%	6 5%
New Jersey Resources	8 0%	8 0%	0 67	-	0 00	3 0%	0 33	26 5%	6 1%	6 1%
NiSource Inc	8 1%	8 1%	0 47	3 3%	0 04	3 3%	0 48	26 5%	5 2%	5 2%
Northwest Natural	7 4%	7 6%	0 62	-	0 00	3 3%	0 38	26 5%	5 5%	5 7%
ONE Gas Inc	7 9%	8 0%	0 68	-	0 00	3 1%	0 32	26 5%	6 1%	6 1%
SJW Group	7 9%	7 9%	0 63	-	0 00	3 0%	0 37	26 5%	5 8%	5 8%
South Jersey Inds	8 3%	8 3%	0 48	-	0 00	3 3%	0 52	26 5%	5 3%	5 2%
Southwest Gas	8 5%	8 4%	0 62	-	0 00	3 3%	0 38	26 5%	6 2%	6 2%
Spire Inc	8 1%	8 1%	0 55	3 0%	0 03	3 0%	0 43	26 5%	5 4%	5 4%
Water Sample Average	7 2%	7 5%	70 8%	3 0%	0 0%	3 0%	29 2%	26 5%	5 7%	5 9%
Gas Sample Average	7 8%	7 9%	61 1%	3 1%	0 8%	3 1%	38 1%	26 5%	5 7%	5 7%

Sources and Notes:
[1]: Schedule No BV-5 10; Panel A, [4]
[2]: Schedule No BV-5 10; Panel A, [5]
[3]: Schedule No BV-5 4, [4]
[4]: Workpaper #2 to Schedule No BV-5 11, Panel C
[5]: Schedule No BV-5 4, [5]
[6]: Workpaper #2 to Schedule No BV-5 11, Panel B
[7]: Schedule No BV-5 4, [6]
[8]: Provided by The Utilities
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. BV-5.11

Overall After-Tax Risk Positioning Cost of Capital of the US Sample Gas and Water (Using Bloomberg Betas)

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%

Company	CAPM Cost of Equity	ECAPM (1 5%) Cost of Equity	3-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	3-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	3-Year Average Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Overall After-Tax Cost of Capital (CAPM)	Overall After-Tax Cost of Capital (ECAPM 1 5%)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Amer States Water	7 1%	7 7%	0 82	-	0 00	3 0%	0 18	26 5%	6 2%	6 7%
Amer Water Works	10 3%	10 3%	0 67	-	0 00	3 0%	0 33	26 5%	7 7%	7 7%
Artesian Res Corp	7 8%	8 3%	0 68	-	0 00	3 0%	0 32	26 5%	6 1%	6 4%
Atmos Energy	9 3%	9 5%	0 71	-	0 00	3 0%	0 29	26 5%	7 3%	7 4%
California Water	7 4%	8 0%	0 69	-	0 00	3 0%	0 31	26 5%	5 8%	6 2%
Chesapeake Utilities	8 5%	8 9%	0 69	-	0 00	3 0%	0 31	26 5%	6 6%	6 8%
Essential Utilities	10 8%	10 7%	0 69	-	0 00	3 0%	0 31	26 5%	8 2%	8 1%
Global Water Resources Inc	9 7%	9 8%	0 67	-	0 00	3 0%	0 33	26 5%	7 2%	7 3%
Middlesex Water	9 3%	9 5%	0 80	3 0%	0 00	3 0%	0 20	26 5%	7 9%	8 0%
New Jersey Resources	10 2%	10 2%	0 67	-	0 00	3 0%	0 33	26 5%	7 6%	7 6%
NiSource Inc	10 3%	10 3%	0 47	3 3%	0 04	3 3%	0 48	26 5%	6 2%	6 2%
Northwest Natural	9 3%	9 5%	0 62	-	0 00	3 3%	0 38	26 5%	6 7%	6 8%
ONE Gas Inc	10 0%	10 1%	0 68	-	0 00	3 1%	0 32	26 5%	7 5%	7 6%
SJW Group	9 9%	10 0%	0 63	-	0 00	3 0%	0 37	26 5%	7 1%	7 1%
South Jersey Inds	10 6%	10 5%	0 48	-	0 00	3 3%	0 52	26 5%	6 3%	6 3%
Southwest Gas	10 9%	10 8%	0 62	-	0 00	3 3%	0 38	26 5%	7 7%	7 6%
Spire Inc	10 3%	10 3%	0 55	3 0%	0 03	3 0%	0 43	26 5%	6 6%	6 6%
Water Sample Average	9 0%	9 3%	0 71	3 0%	0 00	3 0%	0 29	26 5%	7 0%	7 2%
Gas Sample Average	9 9%	10 0%	0 61	3 1%	0 01	3 1%	0 38	26 5%	6 9%	7 0%

Sources and Notes:
[1]: Schedule No BV-5 10; Panel B, [4]
[2]: Schedule No BV-5 10; Panel B, [5]
[3]: Schedule No BV-5 4, [4]
[4]: Workpaper #2 to Schedule No BV-5 11, Panel C
[5]: Schedule No BV-5 4, [5]
[6]: Workpaper #2 to Schedule No BV-5 11, Panel B
[7]: Schedule No BV-5 4, [6]
[8]: Provided by The Utilities
[9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])

Schedule No. BV-5.12

Risk Positioning Cost of Equity at The Utilities's Representative Capital Structure

US Sample Gas and Water

Using Bloomberg Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	The Utilities's Representative Regulatory % Debt	Representative Cost of BBB-Rated Utility Debt	The Utilities's Representative Income Tax Rate	The Utilities's Representative Regulatory % Equity	Estimated Return on Equity (Scenario 1)	Estimated Return on Equity (Scenario 2)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Gas Sample								
CAPM using Bloomberg Betas	5.685%	6.944%	60.0%	3.3%	26.5%	40.0%	10.6%	13.7%
ECAPM (1.50%) using Bloomberg Betas	5.740%	6.998%	60.0%	3.3%	26.5%	40.0%	10.7%	13.9%
Water Sample								
CAPM using Bloomberg Betas	5.736%	7.010%	60.0%	3.3%	26.5%	40.0%	10.7%	13.9%
ECAPM (1.50%) using Bloomberg Betas	5.915%	7.189%	60.0%	3.3%	26.5%	40.0%	11.2%	14.3%

Sources and Notes:
[1]: Schedule No. BV-5.11; Panel A, [9] - [10].
[2]: Schedule No. BV-5.11; Panel B, [9] - [10].
[3]: Provided by The Utilities.
[4]: Based on a BBB rating. Yield from Bloomberg as of June 30, 2021.
[5]: Provided by The Utilities.
[6]: Provided by The Utilities.
[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6]
[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6]

Scenario 1: Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%.
Scenario 2: Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%.

Schedule No. BV-5.13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Bloomberg Betas	Debt Beta	3-Year Average Common Equity to Market Value Ratio	3-Year Average Preferred Equity to Market Value Ratio	3-Year Average Debt to Market Value Ratio	The Utilities's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Amer. States Water	0.59	0.05	0.82	0.00	0.18	26.5%	0.49	0.52
Amer. Water Works	1.00	0.05	0.67	0.00	0.33	26.5%	0.69	0.75
Artesian Res Corp	0.69	0.05	0.68	0.00	0.32	26.5%	0.49	0.53
Atmos Energy	0.87	0.05	0.71	0.00	0.29	26.5%	0.63	0.68
California Water	0.63	0.05	0.69	0.00	0.31	26.5%	0.45	0.49
Chesapeake Utilities	0.77	0.05	0.69	0.00	0.31	26.5%	0.55	0.60
Essential Utilities	1.06	0.05	0.69	0.00	0.31	26.5%	0.75	0.81
Global Water Resources Inc	0.92	0.05	0.67	0.00	0.33	26.5%	0.63	0.69
Middlesex Water	0.87	0.05	0.80	0.00	0.20	26.5%	0.71	0.74
New Jersey Resources	0.98	0.05	0.67	0.00	0.33	26.5%	0.67	0.73
NiSource Inc.	0.99	0.10	0.47	0.04	0.48	26.5%	0.52	0.58
Northwest Natural	0.87	0.10	0.62	0.00	0.38	26.5%	0.58	0.64
ONE Gas Inc.	0.96	0.07	0.68	0.00	0.32	26.5%	0.67	0.73
SJW Group	0.95	0.05	0.63	0.00	0.37	26.5%	0.62	0.68
South Jersey Inds.	1.03	0.10	0.48	0.00	0.52	26.5%	0.55	0.62
Southwest Gas	1.06	0.10	0.62	0.00	0.38	26.5%	0.70	0.77
Spire Inc.	0.99	0.05	0.55	0.03	0.43	26.5%	0.56	0.63
Water Sample Average	0.84	0.05	0.71	0.00	0.29	0.27	0.60	0.65
Gas Sample Average	0.95	0.07	0.61	0.01	0.38	0.27	0.60	0.66

Sources and Notes:

[1]: Workpaper # 1 to Schedule No. BV-5.10, [1].
[2]: Workpaper #1 to Schedule No. BV-5.13, [5].
[3]: Schedule No. BV-5.4, [4].
[4]: Schedule No. BV-5.4, [5].
[5]: Schedule No. BV-5.4, [6].
[6]: The Utilities's Representative Tax Rate.
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Schedule No. BV-5.14

US Sample Gas and Water Average Asset Beta Relevered at The Utilities's Representative Capital Structure

	Asset Beta	Assumed Debt Beta	The Utilities's Representative Regulatory % Debt	The Utilities's Representative Income Tax Rate	The Utilities's Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Gas Sample						
Asset Beta Without Taxes	0.60	0.10	60.0%	26.5%	40.0%	1.36
Asset Beta With Taxes	0.66	0.10	60.0%	26.5%	40.0%	1.28
Water Sample						
Asset Beta Without Taxes	0.60	0.10	60.0%	26.5%	40.0%	1.36
Asset Beta With Taxes	0.65	0.10	60.0%	26.5%	40.0%	1.26

Sources and Notes:
[1]: Schedule No. BV-5.13, [7] - [8].
[2]: Villadsen Testimony.
[3]: Provided by The Utilities.
[4]: The Utilities's Representative Tax Rate.
[5]: Provided by The Utilities.
[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Schedule No. BV-5.15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 2.47%, Long-Term Market Risk Premium of 5.68%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Gas Sample					
Asset Beta Without Taxes	2.47%	1.36	5.68%	10.2%	9.7%
Asset Beta With Taxes	2.47%	1.28	5.68%	9.8%	9.3%
Water Sample					
Asset Beta Without Taxes	2.47%	1.36	5.68%	10.2%	9.6%
Asset Beta With Taxes	2.47%	1.26	5.68%	9.6%	9.2%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-5.14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-5.15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 2.30%, Long-Term Market Risk Premium of 8.05%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Gas Sample					
Asset Beta Without Taxes	2.30%	1.36	8.05%	13.3%	12.7%
Asset Beta With Taxes	2.30%	1.28	8.05%	12.6%	12.2%
Water Sample					
Asset Beta Without Taxes	2.30%	1.36	8.05%	13.2%	12.7%
Asset Beta With Taxes	2.30%	1.26	8.05%	12.4%	12.0%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-5.14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

BV-4

CANADIAN COST OF CAPITAL MODEL

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BV-5

U.S. COST OF CAPITAL MODEL

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REGULATED ASSET SUMMARY

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BOND YIELDS & MARKET RISK PREMIUM

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VOLATILITY CHARTS

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CREDIT METRICS BENCHMARKS

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BV-10

CREDIT METRICS ANALYSIS

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Fig 7A- Canadian Direct Inv

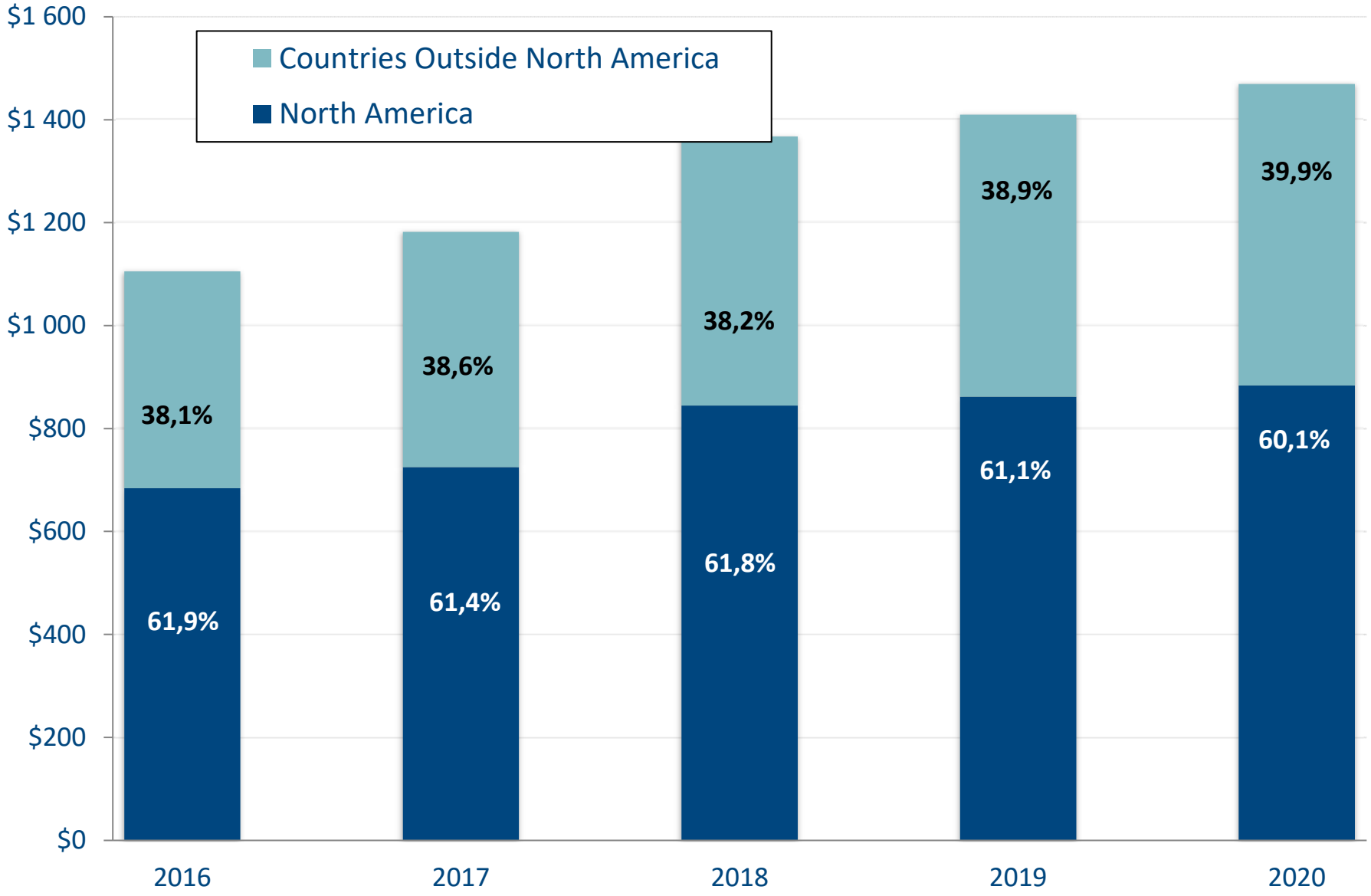

Fig 7B - Foreign Direct Inv

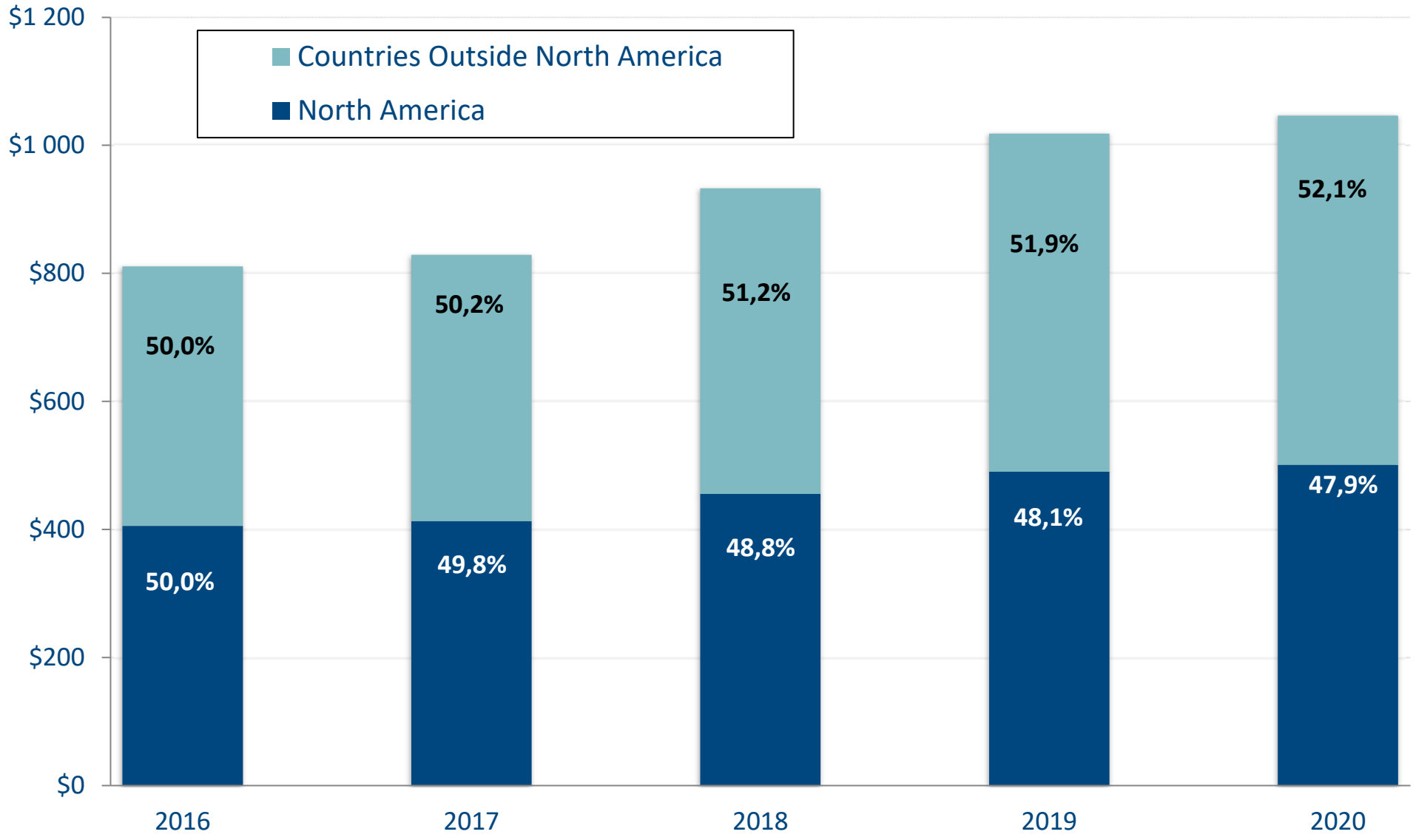

Chart Data

International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by country, annual (x 1,000,000)
Annual
Table: 36-10-0008-01 (formerly CANSIM 376-0051)
Geography: Canada

Canadian and foreign direct investment1	Countries or regions	2016	2017	2018	2019	2020
Canadian direct investment abroad - Total Book	All countries	$ 1 105 175	$ 1 181 911	$ 1 367 237	$ 1 409 733	$ 1 469 288
	Canadian Direct Investment Abroad: Countries outside North America	$ 421 341	$ 456 757	$ 522 677	$ 547 801	$ 585 541
	Canadian Direct Investment Abroad: North America	$ 683 834	$ 725 154	$ 844 560	$ 861 932	$ 883 747
	Canadian Direct Investment Abroad: Countries outside North America (%)	38,1%	38,6%	38,2%	38,9%	39,9%
	Canadian Direct Investment Abroad: North America (%)	61,9%	61,4%	61,8%	61,1%	60,1%

		2016	2017	2018	2019	2020
Foreign direct investment in Canada - Total Boo	All countries	$ 810 668	$ 828 991	$ 932 643	$ 1 018 340	$ 1 046 301
	Foreign direct investment in Canada: Countries outside North America	$ 405 220	$ 416 100	$ 477 207	$ 528 016	$ 545 397
	Foreign direct investment in Canada: North America	$ 405 448	$ 412 891	$ 455 436	$ 490 324	$ 500 904
	Foreign direct investment in Canada: Countries outside North America (%)	50,0%	50,2%	51,2%	51,9%	52,1%
	Foreign direct investment in Canada: North America (%)	50,0%	49,8%	48,8%	48,1%	47,9%

Footnotes (Table 36-10-0008-01):

1 Users are cautioned that in general data for smaller countries (generally defined as countries with foreign direct investment below 500 million dollars) is subject to higher sampling variability.

2 Exclude, prior to 1983, Canadian banks' equity in foreign subsidiaries and associates which is included in deposits assets. Exclude, prior to 1979, investments held abroad, for tax or administrative reasons, by wholly-owned Canadian subsidiaries of foreign corporations.

3 Include, prior to 1975, foreign portfolio investment in Canadian corporations which originated from the country of residence of the foreign direct investors. From 1975 onward, foreign portfolio investment in these Canadian corporations is included in portfolio Canadian bonds and stocks. Include, prior to 1964, inter-company and other liabilities of sales finance and consumer loan companies; from 1964 to 1969 they are included in other liabilities and from 1970 onward in loans, liabilities. Include, from 1964 onward, an increase of some 400 companies in the coverage.

Source:
Statistics Canada. Table 36-10-0008-01 International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by country, annual (x 1,000,000)
(accessed: August 23, 2021)

Table 36-10-0008-01 (Formerly CANSIM 376-0051) International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by country, annual (dollars x 1,000,000)
Survey or program details:

Geography	Canadian and foreign direct investment1	Countries or regions	2016	2017	2018	2019	2020
Canada	Canadian direct investment abroad - Total Book Value 2	All countries	1 105 175	1 181 911	1 367 237	1 409 733	1 469 288
Canada	Canadian direct investment abroad - Total Book Value 2	North America	683 834	725 154	844 560	861 932	883 747
Canada	Canadian direct investment abroad - Total Book Value 2	South and Central America	58 362	63 345	70 816	69 180	65 164
Canada	Canadian direct investment abroad - Total Book Value 2	Europe	276 973	292 836	334 276	361 282	387 862
Canada	Canadian direct investment abroad - Total Book Value 2	Africa	6 532	8 954	9 770	10 763	11 607
Canada	Canadian direct investment abroad - Total Book Value 2	Asia/Oceania	79 474	91 622	107 815	106 577	120 908
Canada	Foreign direct investment in Canada - Total Book Value 3	All countries	810 668	828 991	932 643	1 018 340	1 046 301
Canada	Foreign direct investment in Canada - Total Book Value 3	North America	405 448	412 891	455 436	490 324	500 904
Canada	Foreign direct investment in Canada - Total Book Value 3	South and Central America	17 559	15 700	15 273	14 161	15 760
Canada	Foreign direct investment in Canada - Total Book Value 3	Europe	305 440	310 625	352 790	398 077	418 516
Canada	Foreign direct investment in Canada - Total Book Value 3	Africa	2 415	1 854	2 484	2 394	2 538
Canada	Foreign direct investment in Canada - Total Book Value 3	Asia/Oceania	79 805	87 922	106 660	113 385	108 583

Footnotes:

1 Users are cautioned that in general data for smaller
Exclude, prior to 1983, Canadian banks' equity in foreign subsidiaries and associates which is included in deposits assets. Exclude, prior to 1979, investments held abroad, for tax or administrative reasons, by wholly-owned Canadian subsidiaries of foreign
2 corporations.
3 Include, prior to 1975, foreign portfolio investment in

How to cite: Statistics Canada. Table 36-10-0008-01 International investment position, Canadian direct investment abroad and foreign direct investment in Canada, by country, annual (x 1,000,000)
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610000801
DOI: https://doi.org/10.25318/3610000801-eng

BV-12

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