SOUTHERN CALIFORNIA EDISON®

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(U 338-E)

2020 Cost of Capital

Testimony on SCE's Base ROE

Before the
Public Utilities Commission of the State of California

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BEFORE THE
PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

DIRECT TESTIMONY OF DR. BENTE VILLADSEN

1 **I. INTRODUCTION AND PURPOSE**

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

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

5 **Q2. Briefly describe your present responsibilities at The Brattle Group.**

6 A2. As a Principal it is my responsibility to research and direct research into the utility
7   industry as it pertains to cost of capital and related issues. It is also my responsibility to
8   consult on utility industry issues and testify on utility industry matters. Among my other
9   duties is the supervision and training of staff and ensuring that work products are of high
10   quality and accurate.

11 **Q3. Briefly describe your educational and professional qualifications.**

12 A3. I have 20 years of experience working with regulated utilities on cost of capital and
13   related matters. My practice focuses on cost of capital, regulatory finance, and
14   accounting issues. I am the co-author of the text, "Risk and Return for Regulated
15   Industries"[1] and a frequent speaker on regulatory finance at conferences or webinars. I
16   have testified or filed expert reports on cost of capital in Alaska, Arizona, California,
17   Illinois, New Mexico, New York, Oregon, and Washington, as well as before the
18   Bonneville Power Administration, Federal Energy Regulatory Commission, the Surface
19   Transportation Board, the Alberta Utilities Commission, and the Ontario Energy Board.
20   I have provided white papers on cost of capital to the British Columbia Utilities
21   Commission, the Canadian Transportation Agency as well as to European and Australian
22   regulators on cost of capital. I have testified or filed testimony on regulatory accounting

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[1]   Bente Villadsen, Michael J. Vilbert, Dan Harris, A. Lawrence Kolbe, "Risk and Return for Regulated Industries," Academic Press, 2017.

1 issues before the Federal Energy Regulatory Commission ("FERC"), the Regulatory

2 Commission of Alaska, the Michigan Public Service Commission, the Texas Public

3 Utility Commission as well as in international and U.S. arbitrations and regularly provide

4 advice to utilities on regulatory matters as well as risk management.

5 I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus, Denmark.

6 Appendix A contains more information on my professional qualifications as well as a list

7 of my prior testimonies and publications.

8 **Q4. What is the purpose of your testimony in this proceeding?**

9 A4. I am sponsoring Exhibit SCE-02. Specifically, Southern California Edison Company

10 ("SCE" or the "Company") has asked me to estimate the cost of equity that the Public

11 Utilities Commission of the State of California ("Commission") should allow SCE an

12 opportunity to earn on the equity-financed portion of its regulated utility rate base. The

13 cost of equity estimate I provide does not include any consideration of the return investors

14 need to provide capital to a company exposed to the wildfire risks that SCE is facing.

15 **Q5. Was this material prepared by you or under your supervision?**

16 A5. Yes. It was.

17 **Q6. Insofar as this material is factual in nature, do you believe it to be correct?**

18 A6. Yes, I do.

19 **Q7. Insofar as this material is in the nature of opinion or judgment, does it represent**

20 **your best judgment?**

21 A7. Yes, it does.

1   **II. SUMMARY OF CONCLUSIONS**

2   **Q8. Do you have any preliminary comments regarding the appropriate ROE?**

3   A8. Yes. SCE's allowed ROE for 2018-2019 was 10.3%.[2] Unquestionable, the risk facing

4   SCE has increased substantially since then as manifested by, for example, three

5   downgrades by Moody's and one by Standard & Poor's since January 2018 for a total of

6   four downgrades from rating agencies.[3] These risks include the regulatory risks (e.g.,

7   changing policies from the Commission), legislative initiatives regarding climate change

8   that affects SCE's business model, and not least the impact of wildfires and the associated

9   costs and potential liabilities.

10   At the same time interest rates have risen and are expected to raise further over the next

11   few years and GDP growth has increased.[4] These are all factors that point to a higher

12   return on equity today for SCE than what SCE was granted in its last ROE award.

13   Because of the uniqueness and enormity of the wildfire risk, I shall not address the impact

14   here but simply note that even without such consideration, SCE's risks have increased

15   and economic factors point to a higher ROE today than at the time SCE was last awarded

16   an ROE.[5]

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[2]   See D.17-07-005.

[3]   Moody's Investor Service, "Moody's downgrades Southern California Edison to A3 from A2 and Edison International to Baa1from A3; outlooks stable," September 6, 2018; Moody's Investor Service, "Moody's downgrades Edison International to Baa3 and Southern California Edison to Baa2; outlooks negative," March 5, 2019, and Standard & Poor's, "Edison International And Subsidiary Southern California Edison Downgraded to 'BBB': Ratings Placed on Watch Negative," January 21, 2019. For completeness, S&P in a March 18, 2019 update maintained SCE and its parent's ratings and kept the companies on a negative outlook.

[4]   According to the Federal Reserve, the yield on 10, 20, and 30-year treasury bonds increased by 22, 11, and 0 basis points between the first week of February 2017 and the first week of March 2019. GDP growth in 2016 was 2.7%, but had increased to 5.2% in 2018 (See: https://www.bea.gov/data/gdp/gross-domestic-product)

[5]   For clarity, my testimony does not address what liability may be imposed on SCE nor does it address what return investors may require for accepting that specific risk. It simply recognizes that such risks are **not** captured in samples of regulated utilities. I understand that the specifics of the wildfire risk and the requested treatment of such risks is discussed in Exhibit SCE-01 and Exhibit SCE-03, respectively.

1 **Q9. Please summarize your recommendation for SCE's ROE.**

2 A9. I recommend that SCE be allowed to earn a 10.6 percent rate of return on the equity

3 portion of its regulated rate base including the requested 52 percent equity. This

4 recommendation is based on my implementations of standard cost of capital estimation

5 models including two versions each of the Discounted Cash Flow ("DCF") model and

6 Capital Asset Pricing Model ("CAPM"), as well as an implied risk premium analysis,

7 along with an analysis of SCE's risks. Figure 1 and Figure 2 below summarize the model

8 results using the requested 52% equity and at 48% equity. The corresponding reasonable

9 ranges that are presented and discussed in Section V below. Based on my consideration

10 of the model results in the context of California and SCE's specific risk characteristics

11 and the fact that SCE faces challenging financial circumstances, I believe it is appropriate

12 to place SCE's allowed return at or near the upper end of the range that is reasonable.

13 This consideration is consistent with the Commission's prior decision (Decision 12-12-

14 034).

15 Using SCE's requested 52% equity, I find a range of 9.5% to 10.75% to be reasonable

16 using a sample of regulated electric utilities as well as a sample of water and natural gas

17 utilities. I emphasize that my recommendation is supported by results from the electric

18 utility sample as well as by results from the water and natural gas sample.

Figure 1
Summary of Reasonable Ranges of Estimates at 52% Equity

	Low End	High End
CAPM / ECAPM	9.5%	10.5%
DCF	9.5%	10.75%
Risk Premium	10.5%	10.6%
Midpoint	10.0%	10.625%
Average	9.7%	10.62%

1   In the event that SCE is not granted an increase in its equity percentage but remains at 48

2   percent equity, I recommend a higher ROE of 10.9 percent. I note that the fact that higher

3   leverage merits a higher ROE has been recognized by the Commission in past decisions.

4   The details of my calculations using 48% equity is shown in Figure 2, below.

Figure 2
Summary of Reasonable Ranges of ROEs at 48% Equity

	Low End	High End
CAPM / ECAPM	**9.75%**	**10.75%**
DCF	**9.5%**	**11.5%**
Risk Premium	**10.5%**	**10.6%**
Midpoint	**10.0%**	**11.05%**
Average	**9.9%**	**10.95%**

5   Lastly, in addition to the results from samples of regulated utilities shown in Figure 1

6   above and Figure 2, I also calculate the return on equity that result from a sample of

7   Capital-Intensive Network Industries to illustrate the range of ROEs that result for

8   entities of higher risk than traditional electric, natural gas, and water utilities.

9 **Q10. How is the remainder of your testimony organized?**

10 A10. Section III formally defines the cost of capital and explains the techniques for estimating

11   it in the context of utility rate regulation. Section IV discusses conditions and trends in

12   capital markets and their impact on the cost of capital. Section V explains my analyses

13   and presents the results. Finally, Section VI discusses SCE's business risk characteristics,

14   unique risks facing California-based electric utilities, and other company-specific

15   circumstances relevant to my recommended allowed ROE. Finally, Section VII

16   concludes.

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

2   **A. RISK AND THE COST OF CAPITAL**

3 **Q11. How is the "Cost of Capital" defined?**

4 A11. The cost of capital is defined as the expected rate of return in capital markets on

5   alternative investments of equivalent risk. Put differently, it is the rate of return investors

6   require based on the risk-return alternatives available in competitive capital markets. The

7   cost of capital is a type of opportunity cost: it represents the rate of return that investors

8   could expect to earn elsewhere without bearing more risk. "Expected" is used in the

9   statistical sense: the mean of the distribution of possible outcomes. The terms "expect"

10   and "expected," as in the definition of the cost of capital itself, refer to the probability-

11   weighted average over all possible outcomes.

12   The definition of the cost of capital recognizes a tradeoff between risk and return that can

13   be represented by the "security market risk-return line" or "Security Market Line" for

14   short. This line is depicted in Figure 3 below. The higher the risk, the higher the cost of

15   capital required.

Figure 3
The Security Market Line
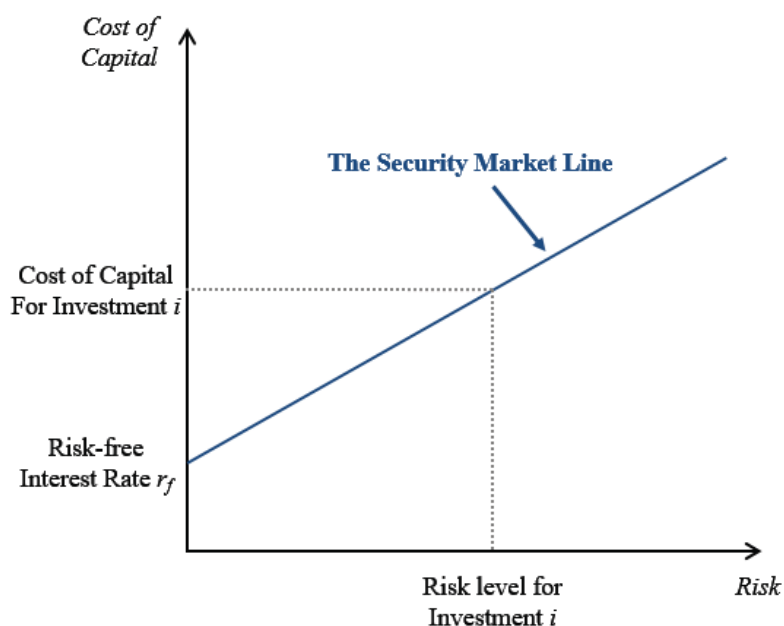
1 **Q12. What factors contribute to systematic risk for an equity investment?**

2 A12. When estimating the cost of equity for a given asset or business venture, two categories
3 of risk are important. The first is business risk, which is the degree to which the cash
4 flows generated by the business (and its assets) vary in response to moves in the broader
5 market. In context of the CAPM, business risk can be quantified in terms of an "assets
6 beta" or "unlevered beta." For a company with an assets beta of 1, the value of its
7 enterprise will increase (decrease) by 1% for a 1% increase (decline) in the market index.

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

11 **Q13. What are the guiding standards that define a just and reasonable allowed rate of**
12 **return on rate-regulated utility investments?**

13 A13. The seminal guidance on this topic was provided by the U.S. Supreme Court in the *Hope*
14 and *Bluefield* cases,[6] which found that:

15 • The return to the equity owner should be commensurate with returns on
16 investments in other enterprises having corresponding risks;[7]

17 • The return should be reasonably sufficient to assure confidence in the
18 financial soundness of the utility; and

19 • The return should be adequate, under efficient and economical
20 management for the utility to maintain and support its credit and enable
21 it to raise the money necessary for the proper discharge of its public
22 duties.[8]

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

[7] Hope, 320 U.S. at 603.

[8] Bluefield, 262 U.S. at 680.

1 **Q14. How does the standard for just and reasonable rate of return relate to the cost of**
2 **capital?**

3 A14. The first component of the *Hope* and *Bluefield* standard, as articulated above, is directly
4 aligned with the financial concept of the opportunity cost of capital.[9] The cost of capital
5 is the rate of return investors can expect to earn in capital markets on alternative
6 investments of equivalent risk.[10]

7 By investing in a regulated utility asset, investors are tying up some capital in that
8 investment, thereby foregoing alternative investment opportunities. Hence, the investors
9 are incurring an "opportunity cost" equal to the returns available on those alternative
10 investments. The allowed return on equity needs to be at least as high as the expected
11 return offered by alternative investments of equivalent risk or investors will choose these
12 alternatives instead. Consequently, the utility's ability to raise capital and fund its
13 operations will be negatively impacted. This is a fundamental concept in cost of capital
14 proceedings for regulated utilities such as SCE.

15 **Q15. Are there unique factors to consider for SCE?**

16 A15. Yes. The cost of equity capital is measured in capital markets using comparable
17 companies, but such companies do not face the unique circumstances facing SCE.
18 Specifically, the State of California and the Commission have climate policies that are
19 much more aggressive than those pertaining to the comparable companies. Such policies
20 and ongoing changes in policy necessarily elevate SCE's business risk.[11] In addition,
21 SCE and other California utilities are exposed to substantial risks of wildfires and
22 potential liabilities associated with such wildfires. The combination of aggressive

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

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

[11] For details, see Exhibit SCE-01.

1   climate change policies, extreme wildfire risks and inverse condemnation is to the best

2   of my knowledge unique to California. Again, this is a unique risk facing SCE (and other

3   California utilities) that is not present among the sample companies. Wildfires and the

4   risks associated with wildfires are events that have financial downsides for SCE but no

5   financial upside. It is therefore an asymmetric risk that SCE's investors face.[12]

6   Because of the risks facing SCE, both Moody's and Standard & Poor's downgraded the

7   Company recently.[13]   Other California electric utilities have also been downgraded and

8   Pacific Gas & Electric Company is currently in bankruptcy.

9   **Q16. Please summarize how you considered risk when estimating the cost of capital.**

10   A16. To evaluate comparable business risk, I looked to a proxy group of regulated electric

11   utilities and took a sample of highly-regulated gas distribution and water utilities. The

12   electric, natural gas and water utilities I consider have a high proportion of regulated

13   assets and revenue with the majority having more than 80% of assets subject to

14   regulation. Additionally, they all have a network of assets that are used to serve end

15   customers and they are capital intensive (meaning that each dollar in revenue requires

16   substantial investment in fixed assets). Further, (as explained in Section III.B below) I

17   analyzed and adjusted for differences in financial risk due to different levels of financial

18   leverage among the proxy companies and between the capital structures of the proxy

19   companies and the regulatory capital structure that will be applied to SCE for ratemaking

20   purposes. To determine where in the estimated range SCE's ROE reasonably falls, I

21   compared the business risk of SCE to that of the proxy group companies. However, my

22   recommended ROE does not include the additional return equity investors require due to

23   the unique asymmetric risks that arise due to the wildfire risks and associated financial

24   consequences. This issue is addressed in the testimony of Mr. Graves.[14] I do, however,

25   present cost of equity estimates for a group of Capital-Intensive Network Industry

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[12]   For details about the risk and liabilities associated with wildfires, see the Testimony of Mr. Frank Graves, Exhibit SCE-03.

[13]   Standard & Poor's Global Ratings downgraded SCE to BBB on January 21, 2019; credit watch negative. Moody's downgraded SCE on March 5, 2019 to Baa2; credit watch negative.

[14]   Exhibit SCE-03.

1 companies to illustrate the magnitude of the cost of equity investors seek when
2 companies carry a larger degree of risk than the traditional electric, natural gas, or water
3 utility. This alternative sample consists of capital-intensive companies that operate in
4 network industries meaning that they, like SCE, rely on a buildout system of
5 assets. While these companies generally do not face the same magnitude of potential and
6 imminent liabilities, as does SCE, they have a larger risk exposure than traditional
7 electric utilities and therefore are an appropriate alternative consideration for the purpose
8 of determining the return that investors in SCE may be seeking once all risks are
9 considered.

10 **B. FINANCIAL RISK AND THE COST OF EQUITY**

11 **Q17. How does capital structure affect the cost of equity?**

12 A17. Debtholders in a company have a fixed claim on the assets of the company and are paid
13 prior to the company's owners (equity holders) who hold the inherently variable residual
14 claim on the company's operating cash flows. Because equity holders only receive the
15 profit that is left over after the fixed debt payments are made, higher degrees of debt in
16 the capital structure amplify the variability in the expected rate of return earned by equity-
17 holders. This phenomenon of debt resulting in financial leverage for equity holders
18 means that, all else equal, a greater proportion of debt in the capital structure increases
19 risk for equity holders, causing them to require a higher rate of return on their equity
20 investment, even for an equivalent level of underlying business risk.

21 **Q18. How do differences in financial leverage affect the estimation of the cost of equity?**

22 A18. The CAPM and DCF models rely on market data to estimate the cost of equity for the
23 proxy companies, so the results reflect the value of the capital that investors hold during
24 the estimation period (market values).

25 The authorized ROE is applied to the regulatory equity portion of SCE's rate base.
26 Because the cost of equity is measured using a group of proxy companies, it may well be
27 the case that these companies finance their operations with a different debt and equity
28 proportion than the proportion the Commission allows in SCE's rate base. Specifically,

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

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

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

18 **Q19. How specifically do you consider financial risk in your analysis of the cost of equity**
19 **using market data for the proxy group companies?**

20 A19. The impact of financial risk is taken into account in an analysis of cost of equity using
21 market-based models such as the DCF and CAPM in several manners.[15] One way is to
22 determine the after-tax weighted-average cost of capital for the proxy group using the
23 equity and debt percentages as the weight assigned to the cost of equity and debt.
24 Financial theory holds that for a given level of business risk, the weighted average cost
25 of capital is constant over a broad set of capital structures, i.e., the weighted average cost
26 of capital is the same at, for example, 55 and 45 percent equity, as the cost of equity (and

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

1   debt) increases as the percentage of equity decreases. As a result, once the weighted cost

2   of capital is determined for the proxy group (at the proxy group's capital structures), I

3   can determine the cost of equity that is required at SCE's capital structure. This approach

4   assumes that the after-tax weighted average cost of capital is constant for a range that

5   spans the capital structures used to estimate the cost of equity and the regulatory capital

6   structure.

7   A second approach was developed by Professor Hamada, who estimated the cost of

8   equity using the CAPM and made comparisons between companies with different capital

9   structure using beta. Specifically, in the Hamada approach, I use the estimated beta to

10   calculate what beta would be associated with a 100 percent equity financed firm to obtain

11   a so-called all-equity or assets beta and then re-lever the beta to determine the beta

12   associated with the regulatory capital structure. This requires an estimate of the

13   systematic risk associated with debt (*i.e.*, the debt beta), which is usually quite small. In

14   Appendix B, I set forth additional technical details regarding the methods that can be

15   used to to account for financial risk when estimating the cost of capital.

16 **Q20. Can you provide a numerical illustration of how the cost of equity changes, all else**

17   **equal, when the degree of leverage changes?**

18 A20. Yes. I constructed a simple example below, where only the leverage of a company varies.

19   I assumed the return on equity is 11.00 percent at a 50 percent equity capital structure

20   and determine the return on equity that would result in the same overall return if

21   the percentage of equity in the capital structure were reduced to 45 percent.

Figure 4
Illustration of Impact of Financial Risk on ROE

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

1   Figure 4, above, illustrates how financial risk[16] affects returns and the ROE. The overall

2   return remains the same for Company A and B at $80. But Company B with the lower

3   equity share and higher financial leverage must earn a higher percentage ROE in order

4   to maintain the same overall return. This higher percentage allowed ROE represents the

5   increased risk to equity investors caused by the higher degree of leverage.

6   The principle illustrated in Figure 4 is an example of the adjustments I performed to

7   account for differences in financial risk when conducting estimates of the cost of equity

8   applicable to SCE.

9   **C. APPROACH TO ESTIMATING THE COST OF EQUITY**

10   **Q21. Please describe your approach for determining the cost of equity for SCE.**

11   A21. As stated above, the standard for establishing a fair rate of return on equity requires that

12   a regulated utility be allowed to earn a return equivalent to what an investor could expect

13   to earn on an alternative investment of equivalent risk. Therefore, my approach to

14   estimating the cost of equity for SCE focuses on measuring the expected returns required

15   by investors to invest in companies that face business and financial risks comparable to

16   those faced by SCE. Because certain of the models require market data, my consideration

17   of comparable companies is restricted to those that have publicly traded stock. To this

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[16]   Financial risk is risk that a company has due to its capital structure.

1   end, I have selected two proxy groups consisting of publicly traded companies. The proxy

2   group consists of companies providing (1) primarily regulated electricity services and (2)

3   providing primarily regulated natural gas or water services.[17] With these proxy groups, I

4   derive estimates of the representative cost of equity according to standard financial

5   models including two versions of the CAPM—the traditional version and a version that

6   takes into account the empirical observation that the security market line in Figure 1 is

7   too steep relative to what is observed using market data. I also implement a single-stage

8   and a multi-stage version of the DCF.

9   Lastly, I perform an analysis of historical allowed ROEs for electric utilities in relation

10   to prevailing risk-free interest rates at the time, and use the implied allowed risk-premium

11   relationship to estimate a utility cost of equity consistent with current economic

12   conditions. The results of this implied risk premium analysis (sometimes referred to

13   herein as the "Risk Premium" model) are an additional consideration that informs my

14   recommendation and serves as a check on the reasonableness of my market-based results.

15   **Q22. How do your approach and the models you employ compare to what the**

16   **Commission has considered in the most recent electric utility proceeding?**

17   A22. The Commission has in past decisions considered the DCF, CAPM and Risk Premium

18   models as do I and has also recognized that financial leverage affect the cost of equity.[18]

19   Similarly, the Commission's Policy and Planning Decision in a recent report discuss the

20   three models mentioned above and notes that the Commission considers additional risk

21   factors such as financial, business, and regulatory risk.[19] Importantly, the document

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[17] I consider both an electric utility sample because SCE is an electric utility and a sample of natural gas distributors and water utilities. The latter sample has the advantage of being highly regulated and less impacted by ongoing and fundamental changes to their industries. As a result, the estimates are less influenced by individual state policies or changing federal policies than those of the electric companies – i.e., they reflect to a larger degree the fundamental risks of regulated utilities.

[18] Public Utilities Commission of the State of California, Decision 12-12-034, December 20, 2012. In 2017, the date at which the IOUs were to file the next cost of capital application was extended to April 2019 and SCE's (and other electric utilities) was allowed an ROE for the period. Joint Petition for Modification of D.12-12-034, D.13-03-015 and D.17-07-005.

[19] California Public Utilities Commission, Policy and Planning Division, "An Introduction to Utility Cost of Capital," April 18, 2017.

1   identifies financial risk as being "determined by the amount of debt or financial leverage

2   in a company's capital structure."[20]

3   **Q23. Are there any potential concerns about how current capital market conditions may**

4   **influence the DCF model results that may caution against giving it disproportionate**

5   **weight in setting SCE's ROE?**

6   A23. Yes. To the extent utility stocks are currently acting as a *relatively* less-risky investment

7   vehicle for risk-averse investors, who look for returns during a time of volatile capital

8   markets and low government bond yields, the demand for utility stocks contribute to their

9   high price-to-earnings ratios ("PE ratios"). As a result, the dividend yields are

10   unrepresentatively low—compared to what investors might expect in a more normal

11   interest rate environment. If this is the case, implementing the DCF model using current

12   market data may produce results that understate what investors' required returns will be

13   when interest rates move higher as expected in the near future (including during the time

14   period SCE's rates set during these proceedings will be in effect).

15

16   The Federal Energy Regulatory Commission ("FERC") addressed a similar issue in a

17   recent order, where the FERC expressed its concern about the reliability of DCF model

18   results in the current market environment as follows.

19   Under [the premise of the DCF methodology], increases in a company's
20   actual earnings or projected growth in earnings would ordinarily be
21   required to justify an increase in the company's stock price. Moreover,
22   there is no evidence that investments in the utility sector have become
23   less risky during these periods. However, it appears that during the
24   periods at issue in these complaint proceedings, average utility stock
25   prices have increased by more than would be justified by any increase
26   in actual utility earnings or projected growth in earnings. From October
27   1, 2012 through December 1, 2017, the Dow Jones Utility Average
28   increased from about 450 to 762.59, an increase of almost 70 percent.
29   However, utility earnings did not increase by nearly the same amount,
30   as demonstrated in Figure 3 below, which shows the substantial increase
31   in utilities' price to earnings (PE) ratio during the same period.
32   Moreover, average IBES three to five year growth projections appear

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[20] *Ibid*., p. 8.

1   not to have increased during that period. Thus, there has not been an
2   increase in either current or projected utility earnings that would justify
3   the substantial increase in utility stock prices.[21]

4   The FERC concluded from this discussion that recent investor behavior with respect to

5   utility stocks appears to have diverged from the DCF model's predictions, a factor that

6   informs FERC's decision (discussed in Section III.C) to reconsider its primary reliance

7   on the DCF in favor of giving equal weight to four different and complementary models.

8   Similarly, this concern informs the way I consider the results of the DCF models as well

9   as the CAPM and Risk Premium models in selecting my recommendation.

10

IV. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL

12   **Q24. Why do you discuss capital market conditions in testimony aimed at determining**

13   **SCE's ROE?**

14   A24. This section discusses important market conditions that affect the inputs to the cost of

15   equity models. Because the risk-free rate is an input to the CAPM, recent and expected

16   developments in risk-free government interest rates are important to assess the validity

17   of any measure of the risk-free rate. Similarly, the Market Risk Premium ("MRP") is an

18   input to the CAPM, so factors that affect the MRP (*e.g.*, volatility and changes in

19   investors risk perception) are vital for an accurate determination of the ROE.

20   As to DCF model inputs, developments in the economy in general affect growth rates

21   and utility stock prices. Consequently, the capital market developments affect the growth

22   rates, dividend yield, and general assessment of the estimates' reasonableness.

23   Finally, the Tax Cuts and Jobs Act of 2017 ("TCJA") affected utilities differently than

24   other companies in that tax reductions generally flow to customers and, consequently,

25   impacts the utility's credit metrics and earnings volatility. As a result, it is necessary that

26   the allowed ROE and appropriate equity capital structure ratio for SCE fulfill the

---

[21]   Coakley v. Bangor Hydro-Electric Co., 165 FERC ¶61,030, October 2018 ("NETO Briefing Order"), paragraph 45 (citations omitted).

1 requirements set forth by *Hope* and *Bluefield* once the implications of the TCJA are

2 considered.

3 **Q25. Please summarize how your analysis of capital market conditions affects your**

4 **conclusions.**

5 A25. First, I conclude that interest rates are on an increasing trajectory, with practitioner

6 forecasts and bond yield spread evidence suggesting further increases in long-term

7 government bond yields. This supports my reliance on forecasts of long-term U.S.

8 Treasury yields for the risk-free rate.

9 Second, there are several indicators that the forward-looking estimates of the Market

10 Risk Premium ("MRP") are above the historical average. I base this conclusion on

11 several observations. The forecasts from Bloomberg and the forecasts that result from

12 using the methodology relied upon by the FERC in its recent NETO Briefing Order find

13 a MRP above the historical average. Further, the spread between utility bond yields and

14 Treasury bonds of the same maturity is elevated by approximately 49 basis points relative

15 to the historical spread prior to the financial crisis.

16 The elevation in the spread between utility bond yields and treasury bond yields could

17 be an indication that monetary policy has put downward pressure on risk-free rates or

18 that the MRP has increased. Under the first explanation, risk-free rates are downward

19 biased. Alternatively, the increased yield spread is an indication that investors require a

20 higher premium to hold assets that are not risk-free. Under that explanation, the historical

21 MRP is downward biased relative to the current or forward-looking MRP. Consequently,

22 I consider two scenarios, where scenario 1 considers the first explanation and

23 consequently "normalize" the risk-free rate. Scenario 2 in turn considers the second

24 explanation and looks to a forward-looking MRP. Specifically, I rely on two scenarios:

25 (i) the historical arithmetic average MRP and a forecasted risk-free rate adjusted by a

26 portion of the increase in yield spread and (ii) a forecasted MRP in combination with a

27 forecasted risk-free rate.

1   Further, I conclude that because (all else equal) the TCJA results in reduced cash flows

2   and increased volatility of cash flows for SCE, it may be appropriate to increase the

3   Company's allowed ROE, its equity capital structure, or both. While I do not make any

4   explicit adjustment for TCJA's impact in my implementation of the models, I recommend

5   this be a factor the Commission considers.

6   **A. INTEREST RATE DEVELOPMENTS**

7   **Q26. What are the relevant developments regarding interest rates?**

8   A26. Interest rates, including the long-term government bond yields that are typically used to

9   represent the risk-free rate in the context of regulated utility ratemaking, have remained

10   extremely low in the years since the global financial crisis of 2008. However, yields

11   have increased substantially over the past several years and are forecasted to continue on

12   their upward trajectory in coming years. For example, since hitting an all-time low in

13   July 2016, the yield on 20-year U.S. Treasury bonds has increased by about 120 basis

14   points to about 2.9 percent at the time of my analysis.[22]

15   Furthermore, the consensus forecast from Blue Chip Economic Indicators—which

16   surveys more than 50 institutional market analysts and participants, including major

17   banks, academic finance departments, credit rating agencies, institutional investors, and

18   Fortune 500 companies—is that the yield on ten-year Treasury bonds will increase to 3.5

19   percent by 2021 and to 3.6 percent by 2022. Figure 5 below plots these expected increases

20   in the ten-year Treasury bond yield.

---

[22]   Federal Reserve as of March 23, 2019. The first three weeks of March (3/1 – 3/21, 2019) saw an average yield on the 20-year government bond of 2.86%. On July 8, 2016, the 20-year U.S. treasury yield closed at 1.68%.

Figure 5
Historical and Projected Ten-Year Treasury Bond Yields

Source: Historical data from Bloomberg. Forecasts from Blue Chip Economic Indicators Oct. 2018 issue.
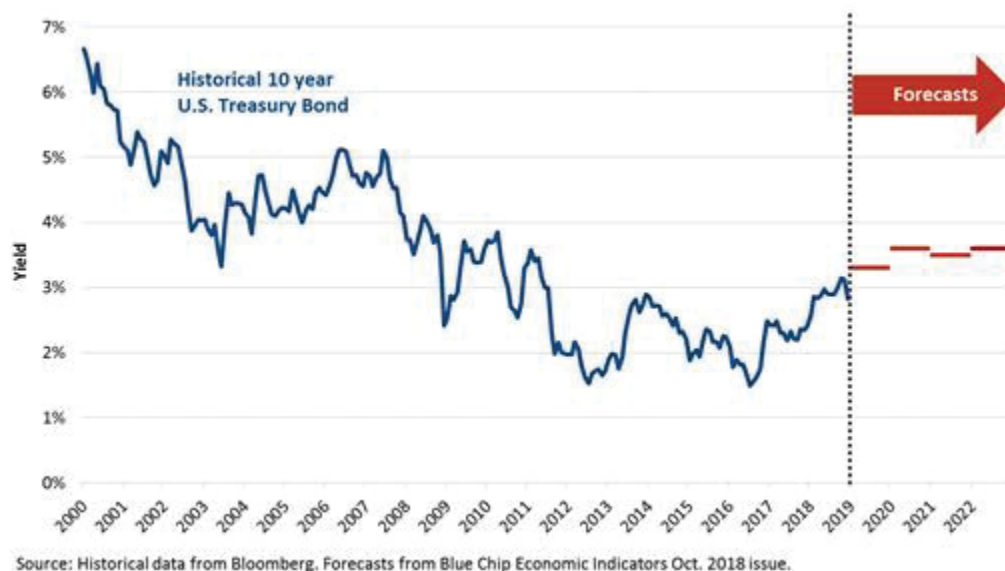
1 **Q27. What forces contributed to the sustained period of very low interest rates over the**

2 **decade following the financial crisis?**

3 A27. The monetary policy actions of the Federal Reserve (the "Fed") in response to the

4 financial crisis were a key driver of the low interest rates. The Fed's Federal Open

5 Market Committee ("FOMC") undertakes market actions to influence interest rates—

6 especially the so-called "federal funds rate"[23]—subject to its statutory mandate to

7 maximize employment and keep inflation under control. In response to the financial

8 crisis, the FOMC drastically reduced its target federal funds rate from 5.25 percent in

9 August 2007 to 0.00 – 0.25 percent starting in December 2008.[24] The Fed's zero interest

10 rate policy remained in effect for the next seven years, ending in December 2015 when

11 the FOMC finally raised its federal funds target to 0.25 - 0.50 percent.[25]

---

[23] The federal funds rate is the rate at which large banks lend and borrow funds in the short-term. It is therefore influential in determining market interest rates throughout the economy.

[24] See FOMC Statements issued August 7, 2007 and December 16, 2008 accessed at https://www.federalreserve.gov/monetarypolicy/fomc_historical.htm

[25] See FOMC Statement, December 16, 2015 accessed at https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm

1   Concurrent with its sustained monetary policy actions related to the short-term federal

2   funds rate, the Fed also implemented several unprecedented policy interventions with the

3   explicit goal of reducing interest rates on long-term borrowing instruments. This

4   "quantitative easing" program of long-term government bonds served to keep Treasury

5   yields at very low levels for an extended period of time. And importantly, even after the

6   FOMC ceased buying securities, it maintained trillions of dollars' worth of Treasuries

7   and government-backed mortgage backed securities on its balance sheet, continuing to

8   reinvest the principal when the assets matured.[26]

9   Global economic conditions also contributed to the unprecedented low rates on U.S.

10   government debt. For example, at the height of the European sovereign debt crisis in

11   2011-2012, flight from European bonds and yield-lowering actions by the European

12   Central Bank ("ECB") spurred increased demand for U.S. Treasury bonds—thus driving

13   up prices and bringing yields down. This pattern repeated in 2016 in the period leading

14   up to, and especially following, the "Brexit" vote. Indeed, on July 10, 2016, shortly after

15   Great Britain officially voted to leave the European Union, the ten-year U.S. Treasury

16   Yield reached its all-time low of 1.37%.[27]

17   **Q28. What forces have contributed to the current rising trend in interest rates?**

18   A28. As shown in Figure 5, U.S. Treasury bond yields have mostly been on an increasing trend

19   since their low point in mid-2016 albeit we have seen a slight decline in yields in 2019.

20   This is consistent with the Fed's recognition that the economy has strengthened,

21   employment conditions remain strong, and inflation—while still below its 2.0 percent

22   target—has begun to increase. The FOMC has responded by increasing the target federal

23   funds rate eight times since ending the zero interest rate policy in December 2015,

24   consistently over each subsequent quarterly meeting. After the most recent hike

---

[26] As of October 4, 2018, the Fed's long-term Treasury and Agency securities balance was at $4.0 trillion. See Board of Governors of the Federal Reserve System, Credit and Liquidity Programs and the Balance Sheet, accessed at https://www.federalreserve.gov/releases/h41/20181004/.

[27] Yield from Bloomberg. See also "U.S. 10-Year Treasury Yield Closes at Record Low" (July 5, 2016) The Wall Street Journal, accessed at https://www.wsj.com/articles/government-bond-yields-in-u-s-europe-hit-historic-lows-1467731411.

1   announced at the FOMC's December 19, 2018 meeting, the federal funds target rate
2   stands at 2.25 – 2.50 percent.[28] The Fed in its March 2019 meeting took no action on the
3   Federal Funds rate.

4   Importantly, the Fed has also recently enacted "Policy Normalization" procedures,
5   whereby it is gradually decreasing its holdings of long-term bonds by not reinvesting
6   principal from expiring securities. These procedures took effect starting in October 2017
7   and have continued at an accelerating pace ever since.[29]

8   In summary, central bank monetary policy action is aligned with and supportive of a
9   continued gradual steady increase in interest rates, including yields on risk-free long-
10   term government bonds. This is consistent with the economic forecasts of continued
11   increases in the risk-free rate at a modest pace continuing through the period at issue in
12   this proceeding.

13   **B. RISK PREMIUMS AND YIELD SPREADS**

14   **Q29. What is the Market Risk Premium?**

15   A29. In general, a risk premium is the amount of "excess" return—above the risk-free rate of
16   return—that investors require to compensate them for taking on risk. As illustrated above
17   in Figure 3, the riskier the investment, the larger the risk premium investors will require.

18   The MRP is the risk premium associated with investing in the market as a whole. Since
19   the so-called "market portfolio" embodies the maximum possible degree of
20   diversification for investors,[30] the MRP is a highly relevant benchmark indicating the
21   level of risk compensation demanded by capital market participants. It is also a direct

---

[28]   See FOMC Statement, September 19, 2018, accessed at
       https://www.federalreserve.gov/newsevents/pressreleases/monetary20181219a.htm

[29]   See FOMC Communications related to Policy Normalization, April 16, 2018, accessed at
       https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm

[30]   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.

1   input necessary to estimating the cost of equity using the CAPM and other risk-

2   positioning models.

3   **Q30. Do you have any data on how estimates of the MRP have evolved over the time**

4   **leading up to and since the 2008 financial crisis?**

5   A30. Yes. Bloomberg publishes a forward-looking estimate of the MRP based on market

6   prices and expected dividends for U.S. stocks.[31] Figure 6 displays the development of

7   Bloomberg's forecasted MRP since 2006.

8   The Bloomberg MRP increased substantially with the onset of the financial crisis and

9   has remained elevated relative to pre-crisis levels, though the November 2018 average

10   forward-looking MRP reported by Bloomberg is in line with the long-term historical

11   average MRP.[32] While the MRP has moderated since the financial crisis, it remains above

12   the historical average,[33] indicating that investors have displayed increased risk aversion

13   and demanded higher compensation for taking on risk in the time since the financial

14   crisis.

---

[31] Bloomberg's calculation of the expected market return is based on an implementation of a multi-stage DCF model (see Section Q59 below) applied to all dividend paying stocks in the S&P 500 index; Bloomberg calculates the MRP by subtracting the current ten-year Treasury bond yield from the estimated expected market return, however, it is also possible to calculate the MRP measured relative to a 20-year Treasury bond yield, which is the calculation I perform for ease of comparison to historical average risk premiums calculated by comparing the Ibbotson data on stock market returns in excess income returns on long-term U.S. Treasury yields with an approximate average maturity of 20 years.

[32] As noted below, the historical average MRP calculated using the long-established Ibbotson stock and bond market data currently published by Duff & Phelps is 7.07 percent.

[33] Average of Bloomberg forecasted MRP (relative to 20-year Treasury Bonds) for the U.S. from January 2009 - November 2018. Bloomberg as of 11/30/2018.

Figure 6
Bloomberg Forward looking MRP (2006-2018)
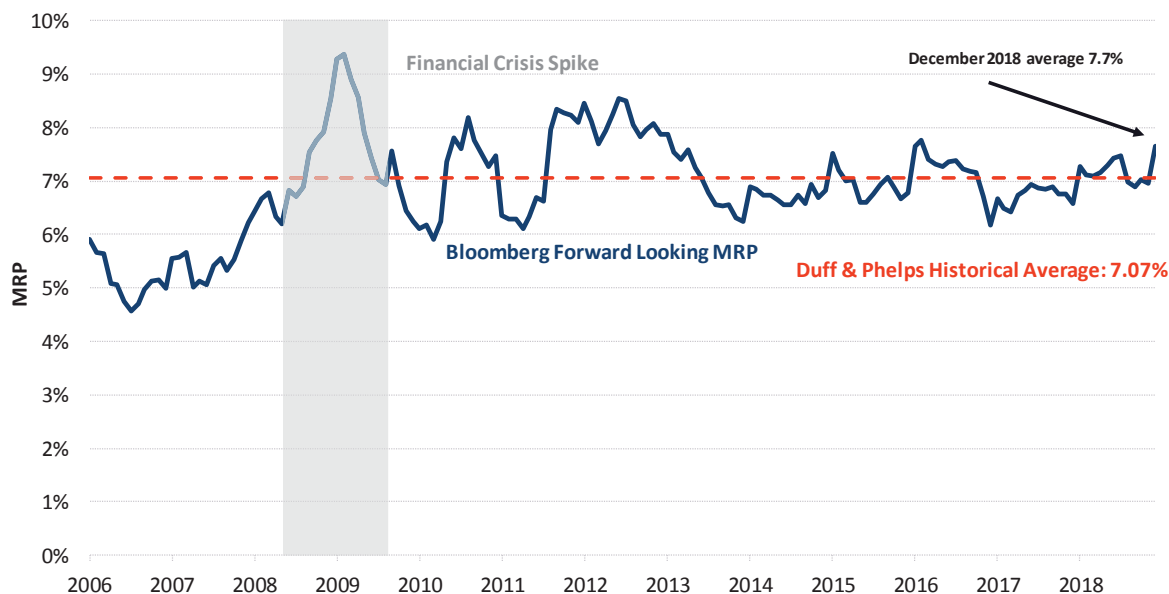
Source: Bloomberg as of 12/31/2018.

1	A somewhat higher result is obtained if I, instead of looking to Bloomberg, consider the
2	MRP that result from implementing the DCF model on the S&P 500 using IBES growth
3	rates and current dividend yields.[34] This resulted in a forecasted MRP of 9.67 percent.[35]
4	The FERC Staff in a recent filing presented an MRP of 7.65% over the 30-year treasury
5	bond or the equivalent of approximately 7.9 to 8.15 percent over the 20-year treasury
6	bond although this calculation did not follow the FERC's NETO Briefing Order.[36]
7	Consequently, empirical evidence suggests that the forward-looking MRP is
8	substantially higher than the historical average MRP.

---

[34] I can only do so for companies that pay dividends, which inherently leads to a downward bias, as many fast growing companies do not pay dividends. I eliminate companies with negative growth rates or growth rates above 20%. I also eliminate results that are below the yield on BBB rated utility bonds plus 100 basis points. Appendix BV-E shows the calculation.

[35] The Federal Energy Regulatory Commission ("FERC") in its NETO Briefing Order seemingly endorsed a forward-looking MRP of the type estimated here. For a calculation, see Prefiled Direct Testimony of Bente Villadsen in Docket No. ER19-1553, April 2019, Exhibit SCE- 27.

[36] Affidavit of Trial Staff Witness Robert J. Keyton in Dockets Nos. EL11-66-001 et al., January 11, 2019, p. 28. The MRP over a 20-year Treasury bond was calculated using the spread between 30-year and 20-year treasury bond yields as of April 4, 2019 and the average since 1990, respectively.

1 **Q31. Are these observations supported by academic research?**

2 A31. Yes, a study by Duarte and Rosa of the Federal Reserve of New York aggregates the

3 results of many models of the required MRP in the U.S. and tracks them over time.

4 The study finds a very high MRP following the financial crisis.

5 The analysis estimates the MRP that results from a range of models each year from

6 1960 through the present.[37] The analysis then reports the average as well as the first

7 principal component of results.[38] The analysis then finds that the models used to

8 determine the risk premium are converging to provide more comparable estimates and

9 that the average annual estimate of the MRP was at an all-time high in 2013. These

10 estimates show a persistent elevation of the MRP over the historical figure.   Figure 7

11 below replicates Duarte and Rosa's summary findings.

Figure 7
Duarte and Rosa's Chart 3
One-Year Ahead MRP and Cross-Sectional Mean of Models
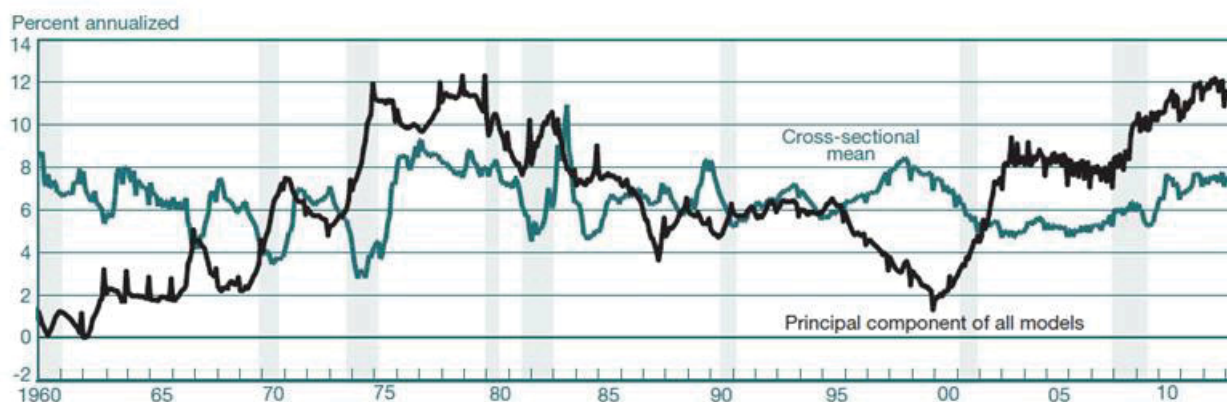
12 **Q32. Is there any other market evidence concerning risk premiums?**

13 A32. Yes. One observable risk premium is the spread between yields on risk-free Treasury

14 bonds and yields on corporate bonds of the same maturity. Unlike U.S. government

15 bonds, debt instruments issued by corporate entities come with some probability of

---

[37] Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models," Federal Reserve Bank of New York, December 2015 (Duarte & Rosa 2015).

[38] Duarte & 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 most variability among the 20 models over time.

1   default and have some associated level of systematic risk. To compensate for this risk,

2   corporate bonds—including utility bonds—offer higher expected returns (as measured

3   by the market yield) than do government bonds.

4   Figure 8 plots the yield spread for A-rated utility bonds compared to Treasury bonds for

5   the longest period of available data. As the figure shows, utility yield spreads spiked

6   dramatically with the onset of the financial crisis and have remained elevated to their

7   pre-crisis average level.

Figure 8
Spread between 20-year A-rated Utility Bond and 20-year Treasury Bond Yields
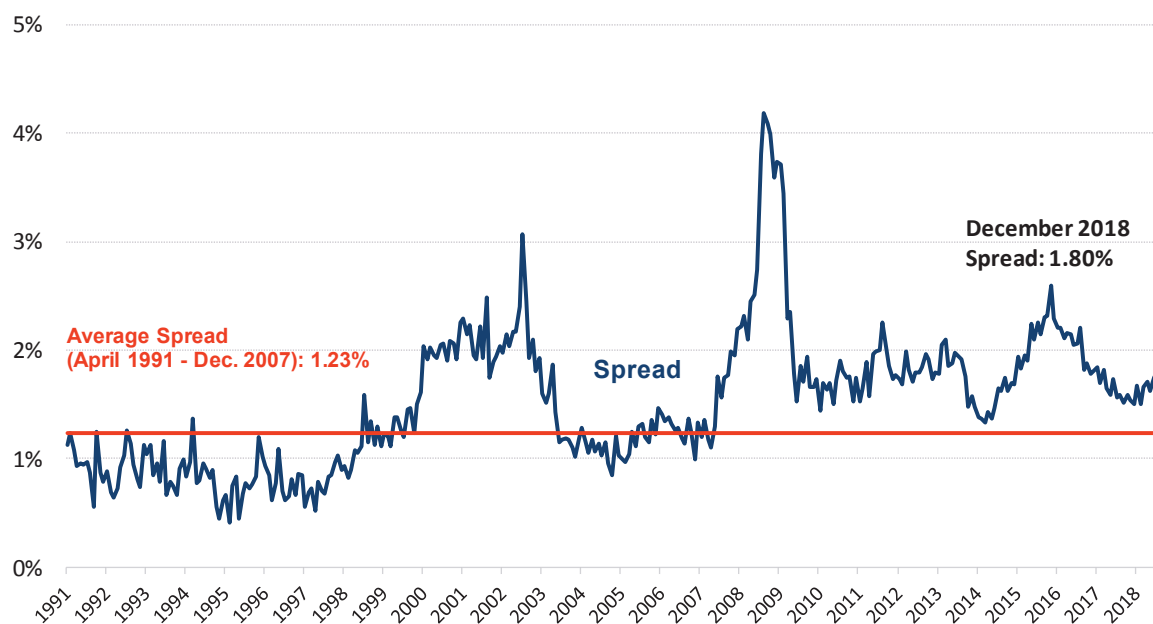
Source: Bloomberg as of 12/31/2018.

8   **Q33. What are the implications of elevated yield spreads to the cost of equity?**

9   A33. The yield spread is simply one form of risk premium, albeit for assets (corporate bonds)

10   that are relatively lower risk compared to equity securities (*i.e.,* stock). Consequently,

11   one explanation for the elevated yield spread is that investors are requiring a higher

12   premium to take on market risk than they did on average prior to the financial crisis.[39]

13   This would indicate an elevated MRP compared to the historical average.

---

[39]   See "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.

1   An alternative explanation for the elevated yield spread is that the yield on Treasury bills
2   remains artificially low due to the lingering after-effects of Fed's unprecedented
3   monetary policy. Under this explanation, the yield spread would be expected to return to
4   its historical average level as the risk-free rate returns to more normal levels.

5   Regardless of which interpretation is correct, the consequence is that if the cost of equity
6   is estimated using the current risk-free rate and a historical average MRP, the estimate
7   will be downward biased. Hence, it is necessary to "normalize" the risk-free rate in
8   CAPM model inputs, which I have done by using a forecast for what government bond
9   yields will be throughout the period at issue in this case.

10   **C. MARKET VOLATILITY**

11   **Q34. How does the stock market's volatility relate to the cost of capital?**

12   A34. Academic research has found that investors expect higher risk premiums during more
13   volatile periods,[40] indicating that the MRP may increase when market volatility is high,
14   even when investors' level of risk aversion remains unchanged. This is relevant to
15   estimating the Company's cost of equity because increased volatility suggests higher risk
16   premiums and therefore higher market-required ROE.

17   A measure of the market's expectations for volatility is the VIX index, which measures
18   the 30-day implied volatility of the S&P 500 index.[41] These indices are also referenced
19   as the "market's fear gauge."[42] While the VIX had recently been trading substantially
20   below its long term historical average of approximately 19.40, it spiked substantially

---

[40]   See, e.g., K. French, W. Schwert and R. Stambaugh (1987), "Expected Stock Returns and Volatility,"
       Journal of Financial Economics, Vol. 19, p. 3:

> We find evidence that the expected market risk premium (the expected return on
> a stock portfolio minus the Treasury bill yield) is positively related to the
> predictable volatility of stock returns. There is also evidence that unexpected
> stock returns are negatively related to the unexpected change in the volatility of
> stock returns. This negative relation provides indirect evidence of a positive
> relation between expected risk premiums and volatility.

[41]   *See, e.g.*, Chicago Board Option Exchange at http://www.cboe.com/micro/VIX/vixintro.aspx
[42]   CNBC, "VIX, the Market's Fear Gauge Plunges in Historic One-Week Move," July 5, 2016.

1   above that level in early October and again in December 2018, each time concurrent with

2   a significant drop in the stock market.[43]

Figure 9
VIX Index
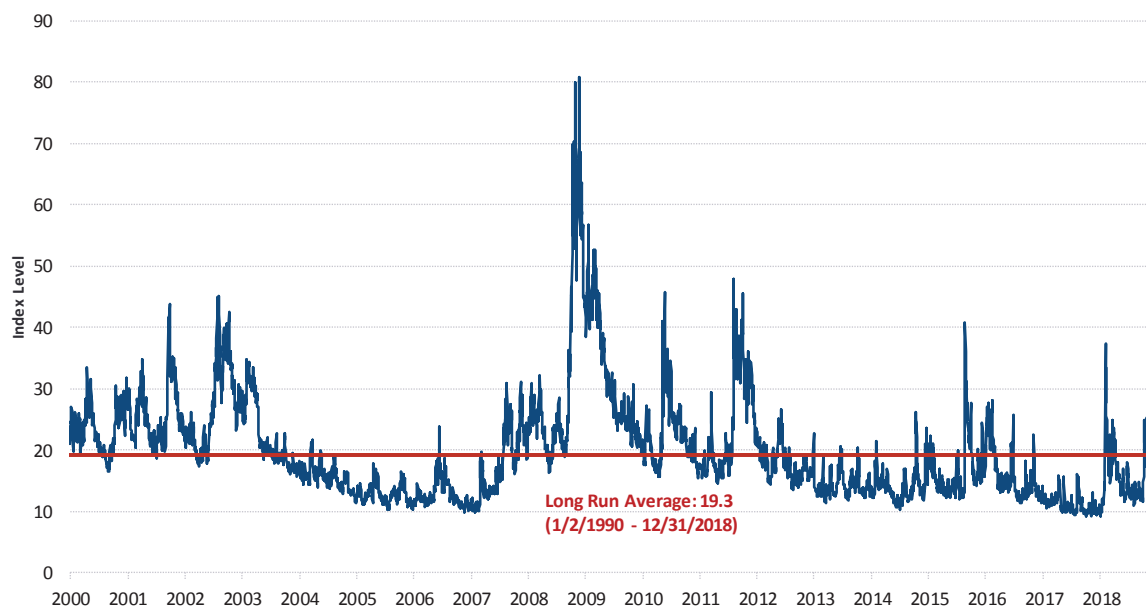
Source: Bloomberg as of 12/31/2018

3   **Q35. Do you look at any other indexes regarding market volatility?**

4   A35. Yes. The SKEW index, which measures the market's willingness to pay for protection

5   against negative "black swan" stock market events (*i.e.*, sudden substantial downturns),[44]

6   offers a reason to be cautious of interpreting recent low VIX levels as an indicator of

7   improved capital market certainty over the long term. A SKEW value of 100 indicates

8   outlier returns are unlikely, but as the SKEW increases, the probability of outlier returns

9   becomes more significant. Figure 10 shows that the SKEW currently stands at almost

10   132, while the index has averaged 119 over the last 15 years. This indicates that investors

11   are willing to pay for protection against downside risk and thus are exhibiting signs of

12   elevated risk aversion concerns of downside tail risk.

---

[43]   As an illustration of the market volatility, the S&P 500 dropped more than 350 points (12%) during the first three weeks of December.

[44]   See, for example, http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew

1   The SKEW has briefly dropped below its long-run average in November and December

2   2018, but generally has been on an upward trend since at least 2015 and is again over its

3   historical level.

Figure 10
SKEW Index

Source: Bloomberg as of 12/31/2018
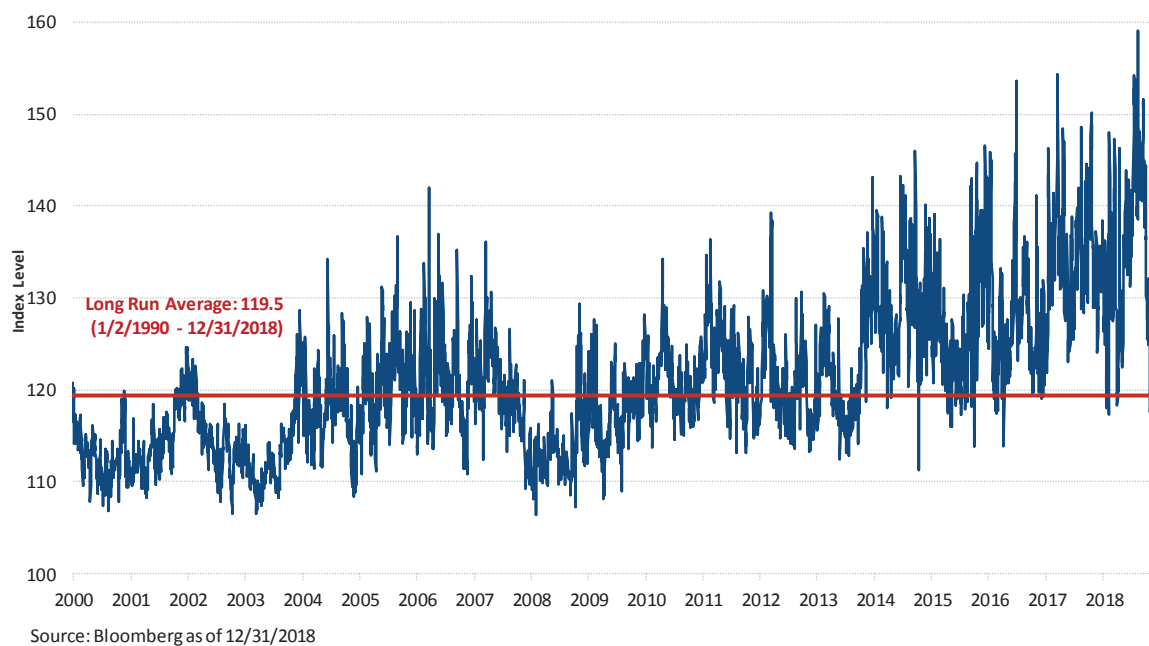
4   **Q36. Are there reasons why capital markets may exhibit high volatility going forward?**

5   A36. Yes. A few contributing reasons to capital market volatility recently include notably the

6   shut-down of the federal government, challenging tariff negotiations between the U.S.

7   and its trading partners, the uncertainty regarding Brexit, and other geopolitical events.

8   Lastly, the slow down in Europe and the lower-than-expected growth in the first few

9   months of 2019 could result in market interruptions.

10   D. IMPLICATIONS OF THE TAX CUTS AND JOBS ACT OF 2017 ("TCJA")

11   **Q37. How does implementation of the TCJA affect regulated utilities?**

12   A37. The TCJA reduced the federal corporate marginal tax rate from 35% to 21%. Although

13   the TCJA is likely to be a net positive for investors in unregulated companies, for the

14   Company, the vast majority (if not all) of the benefits will flow to customers. This is

1 because the savings in income taxes will flow through to customers in the form of lower

2 rates. At the same time, the implementation of the TCJA (including its treatment by utility

3 regulators in a ratemaking context) will likely increase the risks facing regulated

4 companies because they will experience (i) a near-term decrease in cash flows and (ii) an

5 increase in the variability of after-tax earnings (and cash flows). This is a particularly

6 important point for utilities, who are at risk for downgrades (such as SCE) or utilities

7 with potentially large risks.

8 **Q38. How does the lower corporate tax rate under the TCJA affect the expected volatility**

9 **of cash flows for regulated companies?**

10 A38. For regulated companies, as for unregulated corporate taxpayers, the change in the

11 income tax allowance will result in greater volatility of net income (and cash flow)

12 because the income tax provides a "buffer" against the impact of variations in expected

13 costs and expected revenue on net income. Consider for example the effect on net income

14 of a 10% increase in sales revenue. All else equal, net income would increase by about

15 6.5% for a 35% income tax rate, (*i.e.* 0.10 times $(1 - 0.35)$), but would increase by 7.9%

16 for a 21% income tax rate. The change would be similar and symmetrical for a decrease

17 in revenue.

18 Further, the amplified variability in net income due to the lower corporate tax rate is

19 likely to amplify systematic risk, because variations in revenue are generally related to

20 variations in the broader economy that affect the value of all risky assets, not just tax-

21 paying corporations. Since systematic risk is the type of risk that affects the cost of

22 capital, it is reasonable to expect that the TCJA will, all else equal, contribute to higher

23 required returns for corporate equity holders, including those in regulated utilities.

24 Importantly, while this increase in variability of income applies to all corporate tax-

25 paying entities, unlike unregulated corporations, regulated utilities do not benefit from

26 after-tax higher profits under the new lower tax rate, because the revenue requirement is

27 adjusted to pass the tax savings on to customers.[45]

---

[45] This discussion assumes that the revenue requirement has been adjusted to account for the lower
corporate income tax rate.

1 **Q39. How will the TCJA affect a regulated company's credit metrics?**

2 A39. Credit metrics are negatively affected by regulatory ratemaking treatment of the TCJA,

3   because such treatment causes a near-term reduction in the regulated utilities' cash flow

4   and related cash flow metrics that are closely observed by debt ratings agencies. As

5   discussed further in Section V.B below, the expected refunds of excess deferred taxes

6   and lower tax deferrals associated with new investment due to the lower tax rate and loss

7   of bonus depreciation under the TCJA will reduce cash flow. Yet the tax reform has no

8   impact on the amount of assets needed for reliability and to serve customers, a portion of

9   which will be debt-financed. Decreases in key cash flow metrics, such as the cash flow

10   to debt ratios that inform the credit rating agencies credit opinions, have negatively

11   affected the credit profile of many regulated utilities, and will continue to do so.[46] Indeed,

12   as discussed below, SCE is among the group of regulated utility companies that have had

13   their credit ratings downgraded by one or more rating agencies due to the effects of the

14   TCJA.

15 **Q40. What are the implications of the reduced cash flows and increased volatility of cash**

16   **flows in the context of these proceedings?**

17 A40. These effects suggest that it could be appropriate to increase either the allowed ROE or

18   the amount of equity in the capital structure (or possibly both) to help compensate for the

19   increased financial risk imposed on regulated utilities by the TCJA.

20   While the uncertainty surrounding the passage of the TCJA has been removed, it is

21   unlikely that impacts on the cost of capital will immediately appear in the estimation

22   models. The TCJA has not yet been in place for one complete fiscal year, and the

23   regulatory treatments in various jurisdictions have been in effect for an even shorter

---

[46] See Moody's Investor Service, Global Credit Research, "Moody's changes outlooks on 25 US regulated utilities primarily impacted by tax reform," January 19, 2018; Sector Comment, "Tax reform is credit negative for sector, but impact varies by company," January 24, 2018; Regulated Utilities - U.S., "2019 outlook shifts to negative due to weaker cash flows, continued high leverage," June 18, 2018; and Regulated Utilities - U.S., "2019 outlook negative amid growing debt and stagnant cash flow," November 8, 2018.   See also S&P Global Ratings, Rating Direct, "U.S. Tax Reform: For Utilities' Credit Quality, Challenges Abound," January 24, 2018 and Fitch Ratings, Special Report, "Tax Reform Impact on the U.S. Utilities, Power & Gas Sector: Tax Reform Creates Near-Term Credit Pressure for Regulated Utilities and Holding Companies," January 24, 2018.

1 period. A longer period of market data may be needed before the cost of capital

2 estimation models can be expected to reflect impacts of the TCJA on investors' required

3 returns.

4 Notwithstanding that decreases in cash flow metrics and increased volatility of earnings

5 both increase financial risk in ways that may not be reflected in the cost of capital model

6 results, I do not make an explicit upward adjustment to my estimate of the cost of equity

7 or my recommended allowed ROE to account for the impact of the TCJA. However, in

8 Section V.B below, I address the question of how increasing the proportion of equity in

9 SCE's regulatory capital structure could help to mitigate some of the TCJA's negative

10 effects on credit quality.

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

12   **A. PROXY GROUP SELECTION**

13 **Q41. How do you identify proxy companies of comparable business risk to SCE?**

14 A41. SCE is primarily engaged in the regulated electric utility business. The business risk

15   associated with these endeavors depends on many factors, including the specific

16   characteristics of the service territory and regulatory environment in which the provider

17   of these services operates. Consequently, it is not possible to identify publicly traded

18   proxy companies that replicate every aspect of SCE's risk profile. However, selecting

19   companies with business operations concentrated in regulated industries or having

20   similar lines of business and/or business environments is an appropriate starting point for

21   selecting one or more proxy groups of comparable risk to SCE. As a second step, I would

22   need to evaluate SCE or California-specific risks to ensure that SCE's ROE was placed

23   appropriately relative to the samples.

24   To this end I have selected two proxy groups composed of companies focused on (i) the

25   provision of electricity to end users ("Electric Utility Proxy Group") and (ii) the provision

26   of other highly-regulated utility services (*i.e.*, natural gas or water) to end customers

1   ("Other Highly Regulated Utilities Proxy Group" or "OHRU")).[47]   These two proxy

2   groups are similar to SCE in that they are rate regulated by state utility commissions,

3   serve customers through a network of assets, and rely on substantial capital to provide

4   service; i.e., they are capital intensive as is SCE.

5   I believe it is important that a proxy group used to assess the cost of equity for SCE

6   absent any unique California of Company characteristics such as wildfire risk is

7   regulated, because regulation tend to place substantial requirements and also protections

8   of the companies. I also believe the physical characteristics of the industry – e.g.,

9   network, capital intensive, serving many different customers is a characteristic of SCE

10   and of other highly regulated utilities. The network characteristic imply that assets

11   cannot readily be employed in a different capacity, capital intensity affects the operating

12   risks through the split between fixed and variable costs, and the customer composition

13   affect the demand risk. For example, electric, natural gas, and water utilities all face

14   declining per customer demand due to conservation.

15   Lastly, I report the results from a group of capital-intensive network industries that

16   broadly speaking face a higher level of risk than the two groups discussed above, but

17   because of the unique risks facing SCE, they may provide insight into the cost of equity

18   that investors in higher risk entities expect. I refer to this group of companies as the

19   Capital-Intensive Network Industries ("CINI") sample.

20   **Q42. Why are you including a sample of water and natural gas utilities when evaluating**

21   **the cost of capital for an electric utility?**

22   A42. For several reasons. First, the electric industry is currently undergoing substantial

23   changes, which means that initiatives in a specific state influences stock prices and

24   analysts' evaluations along with more fundamental operating and market conditions.

25   Because the changes are industry specific, I cannot select a sample that is completely free

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[47]   I bundle the natural gas and water utilities for two reasons. First, there are very few water utilities that meet my selection criteria and second, they share the characteristics of (i) being regulated by state commissions, (ii) providing services to ultimate customers through a network of pipes, and (iii) being capital intensive.

1   of such considerations. The ORHU sample currently faces fewer state-specific initiatives

2   and therefore I find these highly regulated utilities a compelling benchmark. Second,

3   investors make comparisons across regulated companies, so it becomes important to

4   consider whether the returns awarded SCE are comparable not only to other electric

5   utilities but also to other similar risk benchmarks. I note that the Commission specifically

6   requested a comparison of SCE to other entities and this analysis is part of that response.

7   Third, electric, natural gas, and water utilities generally share not only regulators but also

8   the characteristics of being (a) capital-intensive, (b) network industries, (c) having an

9   obligation to serve and interfacing with the local community. I therefore believe these

10   companies provide a useful benchmark when evaluating the cost of equity for SCE.

11   **Q43. Please summarize how you selected the members of the Electric Utility Proxy Group**

12   **and the OHRU Proxy Group.**

13   A43. To identify companies suitable for inclusion in the Electric Utility Proxy Group, I started

14   with the universe of publicly traded companies in the electricity utility industry as

15   identified by *Value Line Investment Analyzer* (*"Value Line"*). I started with Value Line's

16   list of publicly traded companies classified as water utility industry or natural gas

17   distribution. Next, I reviewed business descriptions and financial reports of these

18   companies and eliminated companies that had less than 50 percent of their assets

19   dedicated to regulated utility activities in their industry; e.g., electric, water or natural gas

20   services.[48]

21   With this group of companies, I applied further screening criteria to eliminate companies

22   that have had recent significant events that could affect the market data necessary to

23   perform cost of capital estimation. Specifically, I identified companies that have cut their

24   dividends or engaged in substantial merger and acquisition ("M&A") activities over the

25   relevant estimation window.[49] I eliminated companies with such dividend cuts because

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48   I rely on Edison Electric Institute (EEI), Stock Performance – 2018 Q2 Financial Update for the electric
     companies. This report gives industry financial information as well as a percentage of regulated assets
     for each of the companies. I calculate the share of assets devoted to regulated activities for the water
     and gas utilities.

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

1   the announcement of a cut may produce disturbances in the stock prices and growth rate

2   expectations in addition to potentially being a signal of financial distress. I generally

3   eliminated companies with significant M&A activities because such events typically

4   affect a company's stock price in ways that are not representative of how investors

5   perceive its business and financial risk characteristics. For example, a utility's stock

6   price will commonly jump upon the announcement of an acquisition to match the

7   acquirer's bid.

8   Further, I require companies have an investment grade credit rating[50] and more than $300

9   million in annual revenues for liquidity purposes. I also eliminated Edison International

10 from the Electric Utility Proxy Group as the owner of SCE. A final, and fundamental,

11 requirement is that the proxy companies have the necessary data available for estimation.

12 **Q44. What are the characteristics of the Electric Utility Proxy Group?**

13 A44. The Electric Utility Proxy Group is comprised of electric utilities whose primary source

14 of revenues and majority of assets are subject to regulation. The final proxy group

15 consists of the 28 electric utilities listed in Figure 11 below. These companies own

16 regulated electric utility subsidiaries and are classified by EEI as either "regulated"—

17 having at least 80% of their assets dedicated to regulated utility operations) or "mostly

18 regulated"—having at least 50% regulated assets.[51] (These EEI categories are designated

19 with an "R" or "M" in the table below). Therefore, the Electric Utility Proxy Group is

20 broadly representative of the regulated electric industry from a business risk perspective.

21 Figure 11 reports the proxy companies' annual revenues for the most recent four quarters

22 as of Q3, 2018 and also reports the market capitalization, credit rating, beta and growth

23 rate. The annual revenue as well as the market cap was obtained from Bloomberg. The

24 credit rating is reported by S&P Research Insight. The growth rate estimate is a weighted

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

51   Edison Electric Institute (EEI), Stock Performance – 2018 Q3 Financial Update.

1   average between estimates from Thomson Reuters and *Value Line*. Betas were obtained

2   from *Value Line*.

Figure 11
Electric Proxy Group

Company	Annual Revenue (Q3 2018) ($MM)	Regulated Assets	Market Cap. (Q3 2018) ($MM)	S&P Credit Rating	Long-Term Growth Estimate	Value Line Beta
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	$1,388	M	$3,878	BBB+	4.5%	0.65
Alliant Energy	$3,517	R	$10,181	A-	5.9%	0.60
Amer. Elec. Power	$16,205	R	$35,280	A-	6.0%	0.55
Ameren Corp.	$6,271	R	$15,714	BBB+	6.7%	0.55
AVANGRID Inc.	$6,346	M	$15,110	BBB+	9.7%	0.30
CMS Energy Corp.	$6,822	R	$14,027	BBB+	6.9%	0.55
Consol. Edison	$12,349	R	$24,364	A-	2.9%	0.40
DTE Energy	$13,733	M	$20,096	BBB+	5.6%	0.55
Duke Energy	$24,205	R	$57,441	A-	4.9%	0.50
Edison Int'l	$12,868	R	$22,051	BBB+	4.2%	0.55
El Paso Electric	$909	R	$2,418	BBB	4.6%	0.65
Entergy Corp.	$11,121	R	$14,961	BBB+	-0.7%	0.60
Eversource Energy	$8,309	R	$19,745	A+	5.7%	0.60
FirstEnergy Corp.	$11,425	R	$19,049	BBB	3.5%	0.60
IDACORP Inc.	$1,364	R	$5,003	BBB	2.6%	0.55
MGE Energy	$560	M	$2,260	AA-	8.1%	0.60
NextEra Energy	$16,354	M	$81,411	A-	8.5%	0.55
NorthWestern Corp.	$1,228	R	$3,184	BBB	2.7%	0.55
OGE Energy	$2,260	R	$7,331	BBB+	0.0%	0.85
Otter Tail Corp.	$902	R	$1,907	BBB	7.9%	0.75
Pinnacle West Capital	$3,695	R	$8,907	A-	4.5%	0.55
PNM Resources	$1,425	R	$3,135	BBB+	5.6%	0.65
Portland General	$1,984	R	$4,113	BBB+	4.9%	0.60
PPL Corp.	$7,772	R	$21,335	A-	3.4%	0.70
Public Serv. Enterprise	$9,335	M	$26,428	BBB+	6.7%	0.60
Southern Co.	$23,787	R	$43,762	A-	2.2%	0.50
Unitil Corp.	$434	R	$763	BBB+	3.7%	0.55
WEC Energy Group	$7,658	R	$21,308	A-	5.0%	0.50
Xcel Energy Inc.	$11,453	R	$24,475	A-	6.2%	0.50
*Southern California Edison**	*$12,611*	*R*	*na*	*BBB*	*na*	*na*

Sources and Notes:

* Southern California Edison revenue from Edison International 2018 10-K. SCE was downgraded to BBB on Jan. 21, 2019.

[1]: Bloomberg as of December 31, 2018.

[2]: Key R - Regulated (More than 80% of assets regulated).
      M - Mostly Regulated (50%-80% of assets regulated).
      D - Diversified (Less than 50% of assets regulated).
      Source: Calculations based on EEI definitions and Company 10-Ks.

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

[4]: Bloomberg as of December 31, 2018.

[5]: See Schedule No. BV-5.

1 **Q45. What are the characteristics of the OHRU Proxy Group?**

2 A45. The characteristics of the Other Highly Regulated Utilities Proxy Group is summarized
3 in below. Importantly, these utilities all serve final customers through a network of pipes
4 and mains. They are regulated by state commissions and have, compared to the electric
5 utility proxy group less unregulated assets. The final proxy group consists of the 11
6 regulated water and natural gas distribution utilities listed in below. The percentage of
7 assets that are devoted to regulated utility services was calculated from the companies'
8 annual reports or 10-K filings. A company that has at least 80% of its assets dedicated
9 to regulated utility operations is "Regulated", while a company that has at least 50%
10 regulated assets is "Mostly regulated."[52]

11 Figure 12 below reports the proxy companies' annual revenues for the most recent four
12 quarters as of Q3, 2018 and also reports the market capitalization, credit rating, beta and
13 growth rate. The annual revenue as well as the market cap were obtained from
14 Bloomberg. The credit rating is reported by S&P Research Insight. The growth rate
15 estimate is a weighted average between estimates from Thomson Reuters and *Value Line*.
16 Betas were obtained from *Value Line*.

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[52] Edison Electric Institute (EEI), Stock Performance – 2017 Q4 Financial Update.

Figure 12: Water and Gas Proxy Group Characteristics

Company	Annual Revenue (Q3 2018) ($MM)	Regulated Assets	Market Cap. (Q3 2018) ($MM)	S&P Credit Rating	Long-Term Growth Estimate
	[1]	[2]	[3]	[4]	[5]
Atmos Energy	$1,388	R	$10,426	A	5.9%
Chesapeake Utilities	$3,517	M	$1,423	A-	9.8%
NiSource Inc.	$16,205	R	$9,407	BBB+	6.6%
Northwest Natural	$6,271	R	$1,960	A	8.2%
ONE Gas Inc.	$6,346	R	$4,277	A	6.8%
Southwest Gas	$6,822	R	$3,967	BBB+	6.8%
Spire Inc.	$12,349	R	$3,779	A-	3.7%
Amer. States Water	$13,733	R	$2,205	A+	8.5%
Amer. Water Works	$24,205	R	$15,928	A	8.1%
Middlesex Water	$12,868	R	$780	A	5.9%
York Water Co. (The)	$909	R	$390	A-	9.8%
*Southern California Edison**	*$12,611*	*R*	*na*	*BBB*	*na*

Sources and Notes:
* Southern California Edison revenue from Edison International 2018 10-K. SCE was downgraded to BBB on Jan. 21, 2019.
[1]: Bloomberg as of December 31, 2018.
[2]: Key R - Regulated (More than 80% of assets regulated).
  M - Mostly Regulated (50%-80% of assets regulated).
  D - Diversified (Less than 50% of assets regulated).
  Source: Calculations based on EEI definitions and Company 10-Ks.
[3]: See Schedule No. BV-3 Panels A through I.
[4]: Bloomberg as of December 31, 2018.
[5]: See Schedule No. BV-5.

1 **Q46. How do the two proxy groups compare to SCE in terms of financial metrics?**

2 A46. SCE's electric distribution operations generated an annual revenue figure of $12.6 billion

3 over the past year, which is higher than the average for the Electric Utility Proxy Group

4 and above that of all water and gas utility proxies. SCE's unsecured credit rating at BBB

5 and a negative outlook is below that of the average electric utility proxy and more below

6 that of the OHRU.[53] Relative to the Electric Utility Proxy Group, SCE is more heavily

7 regulated, but as all but one company in the ORHU have more than 80% of assets subject

8 to regulation that group is, like SCE, heavily regulated.

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[53] Press Release, Standard & Poor's, Edison International and Subsidiary Southern California Edison
  Downgraded to 'BBB'; Ratings Placed On Watch Negative (Jan. 21, 2019) *available at*
  https://www.standardandpoors.com/en_US/web/guest/article/-/view/type/HTML/id/2155495.

1 **Q47. Are there any key differences between SCE and either proxy group?**

2 A47. Yes. No utility in the proxy groups have been downgraded multiple times over the past

3 year[54] and of none of the proxy group utilities that face the potential magnitude of

4 liabilities that may be imposed on SCE.[55] The impact of wildfires on SCE's potential

5 costs and liabilities is discussed Exhibit SCE-03, the testimony of Mr. Frank Graves.

6 Additionally, as discussed in Exhibit SCE-01, the State of California is embarking on

7 very aggressive carbon-reducing goals, Community Choice Aggregation ("CCA"),

8 Distributed Energy Resources ("DER"), etc. and the goals of the state has changed

9 relatively quickly. While each of these policies have unique characteristics, pros and

10 cons, the changing policies adds to SCE's business risk.

11 Because SCE necessarily has to face the business risks associated with the changing

12 policies described above as well as the potential for extremely large wildfire risks that

13 already have resulted in the utility being downgraded, SCE's business risk is higher than

14 that of the proxy companies. My recommendation considers California's changing

15 policies and the impact on SCE, but I make no attempt to consider wildfire risk and

16 liabilities in the ROE, I recommend.

17 **B. CAPITAL STRUCTURE**

18 **Q48. What regulatory capital structure for SCE did you use in your analysis?**

19 A48. As recommended by SCE company witness Sergio Deana (Exhibit SCE-01), I use a

20 capital structure including 52.00 percent equity in my primary recommendation.

21 However, I also calculate an alternative ROE in case SCE is required to maintain its

22 current capital structure containing 48 percent equity.

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[54] *Ibid*. See also footnote 3.

[55] For clarity, I make no recommendation regarding the magnitude of potential liability associated with wildfire risks, the recovery of such liabilities or the magnitude of the return investors may seek to take on such risks. The magnitude and impact of wildfires is discussed in the testimony of Mr. Frank Graves, Exhibit SCE-03. The treatment that SCE seeks for this risk is discussed in the testimony of Exhibit SCE-01, Section IV.

1   I understand the request for 52 percent equity reflects a greater equity ratio than the

2   capital structure most recently set for SCE.[56] I believe an increase in equity financing of

3   rate base is appropriate at this time for at least two reasons: (1) SCE faces higher business

4   risk today than in 2016-17 and (2) the Tax Cut and Jobs Act of 2017 has put pressure on

5   utilities' credit metrics.[57]

6   **C. THE CAPM BASED COST OF EQUITY ESTIMATES**

7   **Q49. Please briefly explain the CAPM.**

8   A49. CAPM assumes the collective investment decisions of investors in capital markets will

9   result in equilibrium prices for all risky assets such that the returns investors expect to

10   receive on their investments are commensurate with the risk of those assets relative to

11   the market as a whole. The CAPM posits a risk-return relationship known as the Security

12   Market Line (see Figure 3 in Section III), in which the required expected return on an

13   asset (above the risk-free return) is proportional to that asset's relative risk as measured

14   by that asset's beta.

15   More precisely, the CAPM states that the cost of capital for an investment, S (*e.g.*, a

16   particular common stock), is determined by the risk-free rate plus the stock's systematic

17   risk (as measured by beta) multiplied by the market risk premium. Mathematically, the

18   relationship is given by the following equation:

19                $$r_s = r_f + \beta_s \times MRP \tag{1}$$

20   • r_S is the cost of capital for investment S;

21   • r_f is the risk-free interest rate;

22   • β_S is the beta risk measure for the investment S; and

23   • MRP is the market equity risk premium.

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[56]   Joint Petition for Modification of D.12-12-034 and D.13-03-015, February 7, 2017, p. 4.

[57]   Moody's Investor Service, "Moody's changes outlooks on 25 U.S. regulated utilities primarily impacted by tax reform," January 19, 2018.

1   The CAPM is a "risk-positioning model," which operates on the principle (corroborated

2   by empirical data) that investors price risky securities to offer a higher expected rate of

3   return than safe securities. It says that an investment, whose returns do not vary relative

4   to market returns, should receive the risk-free interest rate (that is the return on a zero-

5   risk security, the y-axis intercept in Figure 3), whereas investments of the same risk as

6   the overall market (*i.e.*, those that by definition have average systematic market risk) are

7   priced so as to expect to return the risk-free rate plus the MRP.[58] Further, it says that the

8   risk premium of a security over the risk-free rate equals the product of the beta of that

9   security and the MRP.

10   **1. Inputs to the CAPM**

11   **Q50. What inputs does your implementation of the CAPM require?**

12   A50. As demonstrated by equation (1), estimating the cost of equity for a given company

13   requires a measure of the risk-free rate of interest and the MRP, as well as a measure of

14   the stock's beta. There are several choices and sources of data that inform the selection

15   of these inputs. I discuss these issues below. (Additional technical detail, along with a

16   discussion of the finance theory underlying the CAPM is provided in Appendix BV-B.)

17   **Q51. What value did you use for the risk-free rate of interest?**

18   A51. I use the yield on a 20-year U.S. Treasury bond as the risk-free asset for purposes of my

19   analysis. Recognizing the fact that the cost of capital set in this proceeding may be in

20   place over the period January 2020 through December 2022, I rely on a forecast of what

21   Treasury bond yields will be in 2020 as the Commission in the past has relied on an

22   adjustment mechanism to allow for movements above a certain level in interest rates.

23   Specifically, *Blue Chip Economic Indicators* projects that the yield on a ten-year

24   Government Bond will be 3.6 percent by 2020.[59] I adjust this value upward by 50 basis

25   points ("bps"), which is my estimate of the representative historical maturity premium

26   for the 20-year over the ten-year Government Bond. This gets me a basic risk-free rate

---

[58]   For clarity, the CAPM implementation says nothing about the risks associated with, for example,
        wildfires, which do not vary with market returns.

[59]   Blue Chip Economic Indicators, October 2018, p. 14.

1   of 4.10 percent for 2020. However, there is evidence that the risk-free rate is non-trivially

2   downward biased as the spread between, for example, A rated utility bond yields and the

3   20-year government bond yield is elevated by 49 basis points ("bps") relative to its

4   historical average. Consequently, publications such as Duff & Phelps "normalize" the

5   risk-free rate. I consider this case in Scenario 1, where I add a fraction of the increase in

6   yield spread to the risk-free rate to obtain a risk-free rate of 4.40 percent (the basic risk-

7   free rate for 2020 plus 30 basis points).

8   Alternatively the increase in yield spread can be viewed as an increase in the return

9   investors require to hold assets that are not risk-free; i.e., an increase in the Market Risk

10   Premium ("MRP"). I consider this possibility in a second scenario, where I (i) evaluate

11   what increase in the MRP the 49 bps increase in the yield spread indicates and (ii) look

12   to forecasted MRPs to assess the increase in MRP over its historical average.

13   Importantly, I do not allocate the increase in yield-spread to both the risk-free rate and

14   the MRP in the same scenario.

15 **Q52. What value did you use for the MRP?**

16 A52. Like the cost of capital itself, the MRP is a forward-looking concept. It is by definition

17   the premium above the risk-free interest rate that investors can expect to earn by investing

18   in a value-weighted portfolio of all risky investments in the market. The premium is not

19   directly observable. Rather, it must be inferred or forecasted based on known market

20   information. One commonly used method for estimating the MRP is to measure the

21   historical average premium of market returns over the income returns on government

22   bonds a long historical period.[60] The average market risk premium from 1926 to the

23   present (2017) is 7.07 percent.[61] I use this value of the MRP along with a risk-free rate

24   of 4.40% in one of my CAPM scenarios.

25   I also calculate a forward-looking MRP of 8.07 percent, which I use in combination with

26   a lower risk-free rate of 4.15%.

---

[60]   The longest period for which Duff & Phelps reports data is 1926 to current. Based on financial textbooks such as Ross, Westerfield and Jaffe, "*Corporate Finance,*" 10'th Edition, 2013, pp. 324-327, I use the longest period for which reliable estimates are available – in this case 1926 to 2017.

[61]   Duff & Phelps, *Ibbotson SBBI 2018 Valuation Yearbook* 10-21.

1   The 8.07 percent MRP was chosen by looking to forecasted MRP and the increase in

2   yield spread discussed above. Specifically, Bloomberg's forward-looking market-

3   implied MRP is currently estimated at approximately 7.7 percent (when expressed

4   relative to 20-year bond yields) and was above the 7.07 percent long-term historical

5   average value in most months of 2018.[62] At the same time, I recently estimated a MRP

6   of 9.67% using the methodology in FERC's NETO Briefing Order.[63]

7   Lastly, the increase in yield spread can be used to provide a quantitative benchmark for

8   the implied increase in MRP based on a paper by Edwin J. Elton, et al., which documents

9   that the yield spread on corporate bonds is normally a combination of a default premium,

10   a tax premium, and a systematic risk premium.[64] Of these components, it is the systematic

11   risk premium that likely explains the vast majority of the yield spread increase. In other

12   words, unless the risk-free rate is underestimated as described above, the market equity

13   risk premium has increased relative to its "normal" level.[65] For example, assuming a beta

14   of 0.25 for A rated debt[66] means that an increase in the MRP of one percentage point

15   translates into a ¼ percentage point increase in the risk premium on A rated debt (i.e.,

16   0.25 (beta) times 1 percentage point (increase in MRP) = ¼ percentage point increase in

17   yield spread). Thus, a 30 bps increase in the yield spread is therefore consistent with a

---

[62] As noted earlier, the reliance on a forecasted MRP based on the methodology used in the NETO Remand Order would result in a higher MRP of 9.67%, while the FERC Staff witness recommendation corresponds to an MRP of 7.9 to 8.15% over the 20-year Treasury Bond..

[63] Prefiled Direct Testimony of Bente Villadsen in Docket No. ER19-1553, April 2019, Exhibit SCE- 27.

[64] "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.

[65] In theory, some of the increase in yield spread for A rated debt may be due to an increase in default risk, but the increase in default risk for A 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 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.

[66] 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 & Demarzo* that I utilize for my Hamada adjustments are significantly lower: in the range of 0.0 – 0.1 percent and would result in a substantially higher MRP estimate.

1   1.0 percentage point increase in the MRP ($\frac{0.30\%}{0.25} = 1.2\%$). Thus, there is evidence that

2   the current MRP is elevated relative to the historical MRP of 7.07%.

3   The fact that recent forward-looking estimates of the MRP exceeded the historical

4   average level is consistent with the broader body of evidence that risk premiums have

5   remained elevated relative to their pre-financial crisis levels. (See Section IV above.)

6   Therefore, I believe the 7.07 percent long-term historical average MRP value I rely on is

7   a low-end estimate of what the market risk premium will be during the period at issue in

8   this proceeding. I similarly believe that the 8.07% I rely on for my Scenario 2 is a good

9   approximation for the forward-looking MRP.

10   **Q53. Please summarize the parameters of the scenarios and variations you considered in**

11   **your CAPM and ECAPM analyses.**

12   A53. The parameters are displayed in Figure 13 below. As discussed above, I consider two

13   scenarios; in each case, the risk-free interest rate represents Blue Chip Economic

14   Indicators projection for the ten-year Treasury Yield to prevail in 2020, adjusted to a 20-

15   year horizon. However, I consider that the elevated spread between the yield on A rated

16   utility bonds and 20-year Treasury bonds could either be reflected predominantly in the

17   risk-free rate (Scenario 1) on in the MRP (Scenario 1). The MRP is the long-term

18   historical arithmetic average of annual realized premiums of U.S. stock market returns

19   over long-term (approximately 20-year maturity) Treasury bond income returns from

20   1926 to 2017 as reported by Duff and Phelps in Scenario 1. In Scenario 2, I look to the

21   forecasted yield from Bloomberg, recent forecasts using FERC's recently suggested

22   methodology, and looking to reflecting the yield spread in the MRP rather than in the

23   risk-free rate.

Figure 13
Parameters in Risk Positioning Analyses

	Scenario 1	Scenario 2
Risk-Free Interest Rate	4.40%	4.15%
Market Risk Premium	7.07%	8.07%

1   **Q54. What betas did you use for the companies in your proxy groups?**

2   A54. I used *Value Line* betas, which are estimated using the most recent five years of weekly

3   historical returns data.[67] The *Value Line* levered equity betas are reported in Figure 11

4   and Figure 12 above. Importantly, as explained in Section III.B above, these betas—

5   which are measured (by *Value Line*) using the market stock return data of the proxy

6   companies—reflect the level of financial risk inherent in the proxy companies' market

7   value leverage ratios over the estimation period. Because SCE's regulatory capital

8   structure includes a substantially higher proportion of debt financing compared to the

9   proxy companies, the financial risk associated with an equity investment in SCE's rate

10   base is correspondingly greater than the financial risk borne by investors in the proxy

11   companies' publicly traded stock.[68]

12   Consequently, standard textbook techniques are applied to unlever the *Value Line* betas

13   reported in Figure 11 and Figure 12 above and relever the resulting asset betas at SCE's

14   regulatory capital structure.[69]

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[67]   See Value Line Glossary, accessible at http://www.valueline.com/Glossary/Glossary.aspx

[68]   A further detailed discussion is contained in Appendix BV-B, Section III.

[69]   See Appendix BV-C, Table Nos. BV-13 – BV-15. The Technical Appendix (Appendix BV-B) to this testimony provides a detailed description of the standard textbook formulas used to implement the "Hamada" technique for unlevering measured equity betas based on the proxy companies' capital structures to calculate "asset betas" that measure the proxy companies' business risk independent of the financial risk impact of differing capital structures. The proxy group average asset betas are then relevered at the target capital structure (i.e., SCE's regulatory capital structure), with the precise relevered beta depending on the specific version of the unlevering/relevering formula employed.

1   **2. The Empirical CAPM**

2 **Q55. What other equity risk premium model do you use?**

3 A55. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity

4   of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than

5   predicted by the CAPM and high-beta stocks tend to have lower risk premiums than

6   predicted.[70] A number of variations on the original CAPM theory have been proposed to

7   explain this finding, but the observation itself can also be used to estimate the cost of

8   capital directly, using beta to measure relative risk by making a direct empirical

9   adjustment to the CAPM.

10   The second variation on the CAPM that I employ makes use of these empirical findings.

11   It estimates the cost of capital with the equation,

12
$$r_S = r_f + \alpha + \beta_S \times (MRP - \alpha) \qquad (2)$$

13   where α is the "alpha" adjustment of the risk-return line, a constant, and the other

14   symbols are defined as for the CAPM (see equation (2) above).

15   I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha

16   adjustment has the effect of increasing the intercept but reducing the slope of the Security

17   Market Line in Figure 3, which results in a Security Market Line that more closely

18   matches the results of empirical tests. This adjustment is portrayed in Figure 14 below.

19   In other words, the ECAPM produces more accurate predictions of eventual realized risk

20   premiums than does the CAPM.

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[70]   *See* Figure A-2 in Appendix BV-B for references to relevant academic articles.

Figure 14
The Empirical Security Market Line
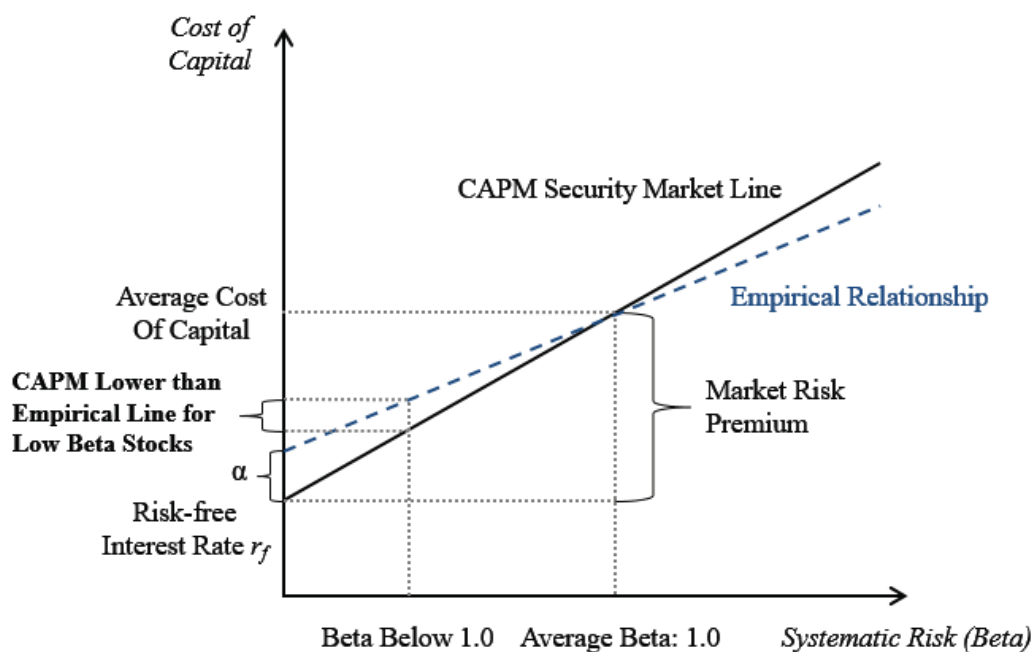
Q56. **Why do you use the ECAPM?**

A56. Academic research finds that the CAPM has not generally performed well as an empirical model. One of its short-comings 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. Appendix BV-B Section II.C discusses the empirical findings that have tested the CAPM and also provides documentation for the magnitude of the adjustment, α.

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

Q57. **Please summarize the results of the CAPM-based models.**

A57. The results of CAPM and ECAPM estimation for the two proxy groups are presented in Figure 15 below. The ranges of results for each model (CAPM and ECAPM) reflect the

1   application of different specific versions of the textbook formulas used to account for the

2   impact of different financial leverage on financial risk.

Figure 15
CAPM / ECAPM Summary at 52% Equity

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Electric Utility Sample		
Financial Risk Adjusted Method		
CAPM	9.1%	9.4%
ECAPM ($\alpha = 1.5\%$)	9.8%	10.1%
Hamada Adjustment Without Taxes		
CAPM	8.8%	9.2%
ECAPM ($\alpha = 1.5\%$)	9.4%	9.8%
Hamada Adjustment With Taxes		
CAPM	8.8%	9.1%
ECAPM ($\alpha = 1.5\%$)	9.3%	9.7%
Water and Gas Sample		
Financial Risk Adjusted Method		
CAPM	10.3%	10.8%
ECAPM ($\alpha = 1.5\%$)	10.9%	11.4%
Hamada Adjustment Without Taxes		
CAPM	9.9%	10.4%
ECAPM ($\alpha = 1.5\%$)	10.2%	10.7%
Hamada Adjustment With Taxes		
CAPM	9.7%	10.2%
ECAPM ($\alpha = 1.5\%$)	10.1%	10.6%

Sources and Notes:
[1]: Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%
[2]: Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Figure 16
CAPM / ECAPM Summary at 48% Equity

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Electric Utility Sample		
Financial Risk Adjusted Method		
CAPM	9.5%	9.9%
ECAPM (α = 1.5%)	10.3%	10.7%
Hamada Adjustment Without Taxes		
CAPM	9.1%	9.5%
ECAPM (α = 1.5%)	9.6%	10.0%
Hamada Adjustment With Taxes		
CAPM	9.0%	9.4%
ECAPM (α = 1.5%)	9.5%	9.9%
Water and Gas Sample		
Financial Risk Adjusted Method		
CAPM	10.8%	11.4%
ECAPM (α = 1.5%)	11.6%	12.1%
Hamada Adjustment Without Taxes		
CAPM	10.3%	10.8%
ECAPM (α = 1.5%)	10.5%	11.1%
Hamada Adjustment With Taxes		
CAPM	10.0%	10.5%
ECAPM (α = 1.5%)	10.3%	10.8%

Sources and Notes:

[1]: Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%.

[2]: Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%.

1   **Q58. How do you interpret the results of your CAPM and ECAPM Analyses?**

2   A58. Looking to Figure 15 above, the majority of the results are in the range of 9.5% to 10.6%

3   and I therefore consider that range the most reasonable to consider when determining the

4   ROE for SCE at its requested capital structure.[71] As discussed above, the established

---

[71]   I round to the nearest 0.25% when determining ranges of reasonable results. Clearly, there are numbers below 9.5% and numbers above 10.5% in the table, but if rounding to the nearest .25%, I have a small number of observations above and below the range.

1   academic evidence indicates that the traditional CAPM tends to understate the cost of

2   equity for lower-than-average risk companies such as those in the Electric Utility Proxy

3   Group and the OHRU, I therefore give somewhat greater weight to the ECAPM results

4   to inform my recommendation and consider the lowest estimate from the CAPM to be

5   too low.

6   In the event, SCE's request for a higher equity percentage is not approved, I look to

7   Figure 16 and compare the results here with those in Figure 15. At 48 percent equity the

8   CAPM / ECAPM figure increase by 0.2 to 0.7 percent but the majority of the results

9   increase by 0.3 to 0.4 percent, so based on the CAPM / ECAPM results an increase in

10   the ROE of 0.3 to 0.4 percent would be appropriate.

11   **D. DCF BASED ESTIMATES**

12   **Q59. Can you describe the DCF model's approach to estimating the cost of equity?**

13   A59. The DCF model attempts to estimate the cost of capital for a given company directly,

14   rather than based on its risk relative to the market as the CAPM does. The DCF method

15   assumes that the market price of a stock is equal to the present value of the dividends that

16   its owners expect to receive. The method also assumes that this present value can be

17   calculated by the standard formula for the present value of a cash flow—literally a stream

18   of expected "cash flows" discounted at a risk-appropriate discount rate. When the cash

19   flows are dividends, that discount rate is the cost of equity capital:

20
$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T} \tag{3}$$

21   Where,

22   P_0 is the current market price of the stock;

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

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

25   r is the cost of equity capital.

1   Importantly, this formula implies that if the current market price and the pattern of

2   expected dividends are known, it is possible to "solve for" the discount rate r that makes

3   the equation true. In this sense, a DCF analysis can be used to estimate the cost of equity

4   capital implied by the market price of a stock and market expectations for its future

5   dividends.

6   Many DCF applications assume that the growth rate lasts into perpetuity, so the formula

7   can be rearranged algebraically to directly estimate the cost of capital. Specifically, the

8   implied DCF cost of equity can then be calculated using the well-known "DCF formula"

9   for the cost of capital:

10

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

11   where D_0 is the current dividend, which investors expect to increase at rate g by the end

12   of the next period, and over all subsequent periods into perpetuity.

13   Equation (4) says that if equation (3) holds, the cost of capital equals the expected

14   dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to

15   this as the single-stage DCF model; it is also known as the Gordon Growth model, in

16   honor of its originator Professor Myron J Gordon.

17   **Q60. Are there other versions of the DCF model?**

18   A60. Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that

19   use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).[72] One

20   such alternative expands the Gordon Growth model to three stages. In the multistage

21   model, earnings and dividends can grow at different rates, but must grow at the same rate

22   in the final, constant growth rate period. [73]

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[72] 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.

[73] See Appendix BV-B, Section I for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

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

6   **1. DCF Inputs and Results**

7 **Q61. What growth rate information do you use?**

8 A61. The first step in my DCF analysis (either constant growth or multi-stage formulations) is
9   to examine a sample of investment analysts' forecasted earnings growth rates for
10   companies in my proxy group. For the single-stage DCF and for the first stage of the
11   multi-stage DCF, I use investment analyst forecasts of company-specific growth rates
12   sourced from *Value Line* and Thomson Reuters *IBES*.

13   For the long-term growth rate for the final, constant-growth stage of the multistage DCF
14   estimates, I use the long-term U.S. GDP growth forecast of 4.1 from Blue Chip Economic
15   Indicators.[74] Thus, the long-run (or terminal) growth rate in the multi-stage model is
16   nominal GDP growth.

17 **Q62. What are the pros and cons of the input data?**

18 A62. Both the Gordon Growth and single-stage DCF models require forecast growth rates that
19   reflect investor expectations about the pattern of dividend growth for the companies over
20   a sufficiently long horizon, but estimates are typically only available for three - five years.
21   In the multi-stage version, I taper these growth rates toward a stable growth rate
22   corresponding to a forecast of long-term GDP growth for all companies.

23   One issue with the data is that it includes solely dividend payments as cash distributions
24   to shareholders, while some companies also use share repurchases to distribute cash to
25   shareholders. To the extent that companies distribute cash to shareholders via share

---

[74] See Blue Chip Economic Indicators, October 2018, p. 14.

1   repurchases a DCF model that uses dividends as the payment to shareholders will under-

2   estimate the cost of equity capital.

3   **Q63. Please summarize the DCF based cost of equity estimates for the proxy groups.**

4   A63. The results of the DCF based estimation for the proxy groups are displayed below in

5   Figure 17 and Figure 18.

Figure 17
DCF Model Results at 52% Equity

	Simple	Multi-stage
	[1]	[2]
Electric Utility Sample	9.9%	8.3%
Water and Gas Sample	11.8%	8.0%

Figure 18
DCF Model Results at 48% Equity

	Simple	Multi-stage
	[1]	[2]
Electric Utility Sample	10.4%	8.7%
Water and Gas Sample	12.5%	8.4%

6   **Q64. How do you interpret the results of your DCF analyses?**

7   A64. The DCF models are estimated based on dividend yields that may be expected to increase

8   as interest rates continue to rise in the coming months and years. As Price / Earnings

9   ratios change with interest rates, so does the dividend yield (assuming a reasonable

10   constant payout ratio). As a consequence, the dividend yield is more likely to under

11   estimated than over estimated going forward. At the same time, the Blue Chip forecasted

12   GDP growth is well below the GDP growth the U.S. recently has experienced, so if the

13   2018 GDP growth pattern continues, the multi-stage model will incorporate a GDP

1   growth that is too low.[75] Therefore, I believe the multi-stage DCF model is downward

2   biased in that it suffers from both of these effects. As a result I acknowledge that the

3   single-stage DCF model makes the strong assumption that current three-to-five year

4   Earnings Per Share growth expectations will persist into perpetuity, I conclude that a

5   reasonable low-end estimate of the cost of equity falls somewhere between what is

6   estimated by the two versions of the model while a high-end estimate is better

7   approximated by the single-stage model. In considering the results from the two proxy

8   groups, I believe the DCF model at 52% equity supports a reasonable range of 9.5 to

9   10.75 percent for SCE's cost of equity.[76]

10   Looking to the difference between the results displayed in Figure 18 and the results in

11   Figure 17, I observe that the cost of equity at 48 percent equity is at least 40 to 70 basis

12   points higher than at 52 percent equity.

13   **E. RISK PREMIUM MODEL ESTIMATES**

14   **Q65. Did you estimate the cost of equity that results from an analysis of risk premiums**

15   **implied by allowed ROEs in past utility rate cases?**

16   A65. Yes. In this type of analysis, sometimes called the "risk premium model," the cost of

17   equity capital for utilities is estimated based on the historical relationship between

18   allowed ROEs in utility rate cases and the risk-free rate of interest at the time the ROEs

19   were granted. These estimates add a "risk premium" implied by this relationship to the

20   relevant (prevailing or forecast) risk-free interest rate:

21   $$Cost\ of\ Equity = r_f + Risk\ Premium$$

---

[75] Blue Chip's forecasted GDP growth was 4.10% at the time of estimation, while the realized nominal GDP growth for 2018 per the Bureau of Economic Analysis preliminary analysis is 5.6% (real GDP of 3.4% plus inflation of 2.2%).

Source: https://www.bea.gov/news/2019/initial-gross-domestic-product-4th-quarter-and-annual-2018

[76] I calculated 9.5% as the average of all four figures and the 10.75% as the average of the two simple DCF results (rounding to the nearest 1/4%)

1   **Q66. What are the merits of this approach?**

2   A66. First, it estimates the cost of equity from regulated entities as opposed to holding

3   companies, so that the relied-upon figure is directly applicable to a rate base. Second,

4   the allowed returns are readily observable to market participants, who will use this one

5   data input in making investment decisions, so that the information is at the very least a

6   good check on whether the return is comparable to that of other investments. Third, I

7   analyze the spread between the allowed ROE at a given time and the then-prevailing

8   interest rate to ensure that I properly consider the interest rate regime at the time the ROE

9   was awarded. This implementation ensures that I can compare allowed ROE granted at

10   different times and under different interest rate regimes.

11   **Q67. How did you use rate case data to estimate the risk premiums for your analysis?**

12   A67. The rate case data from 1990-2018 is derived from Regulatory Research Associates.[77]

13   Using this data I compared (statistically) the average allowed rate of return on equity

14   granted by U.S. state regulatory agencies in electric utility and electric distribution rate

15   cases to the average 20-year Treasury bond yield that prevailed in each quarter.[78] I

16   calculated the allowed utility "risk premium" in each quarter as the difference between

17   allowed returns and the Treasury bond yield, since this represents the compensation for

18   risk allowed by regulators. Then I used the statistical technique of ordinary least squares

19   ("OLS") regression to estimate the parameters of the linear equation:

20   $$Risk\ Premium\ =\ A_0\ +\ A_1 \times (Treasury\ Bond\ Yield) \tag{8}$$

21   I derived my estimates of A_0 and A_1 using standard statistical methods (OLS regression)

22   and found that the regression has a high degree of explanatory power in a statistical sense.

23   I report my results for the respective classifications of rate cases below in Figure 19.[79] I

24   note that the results displayed in Figure 19 below shows that the risk premium model fits

---

77   SNL Financial as of February 2019.

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

79   Appendix D contains my risk premium analysis.

1   the data well as the R-squared is above 80% and R-squared is a measure of how well the

2   data fits the model. An R-squared above 0.8 indicates a solid result.

Figure 19
Implied Risk Premium Model Estimates

		R Squared	Estimate of A_0	Estimate of A_1	Implied Cost of Equity Range	
		[1]	[2]	[3]	[4]	[5]
Electric Utility	[a]	0.828	8.46%	-0.540	10.5%	10.4%
Electric Vertically Integrated	[b]	0.846	8.69%	-0.567	10.6%	10.5%

Sources and Notes
[1]-[3]: Estimated using SNL Rate Case data as of 1/28/2019 and Bloomberg Treasury yield data as of 12/31/2018.
[4] Risk-free rate of 4.40%
[5] Risk-free rate of 4.15%

3   The negative slope coefficient reflects the empirical fact that regulators grant smaller risk

4   premiums when risk-free interest rates (as measured by Treasury bond yields) are higher.

5   This is consistent with past observations that the premium investors require to hold equity

6   over government bonds increases as government bond yields decline. In the regression

7   described above the risk premium declined by less than the increase in Treasury bond

8   yields. Therefore, the allowed ROE on average declined by less than 100 bps when the

9   government bond yield declined by 100 bps. Based on this analysis, I find that the current

10   market conditions are consistent with an ROE of 10.5 to 10.6 percent for vertically

11   integrated utilities.

12   **Q68. What conclusions did you draw from you risk premium analysis?**

13   A68. The results in Figure 19 indicate a ROE of 10.5 to 10.6 percent for SCE based on the risk

14   premium model, which overlaps with the upper half of the estimates from the reasonable

15   range from the DCF and CAPM models at 52 percent equity. While the risk premium

16   model based on historical allowed returns is not underpinned by fundamental finance

17   principles in the manner of the CAPM or DCF models, I believe that this analysis, when

18   properly designed and executed and placed in the proper context, is a valid and useful

19   approach to estimating utility ROE. Because the risk premium analysis as implemented

20   takes into account the interest rate prevailing during the quarter the decision that granted

21   an ROE used in the analysis was issued, it provides a useful benchmark for the cost of

1   equity in any interest environment. Because it relies on the returns for regulated utilities,

2   I believe this method provides a good way to directly assess whether the ROE is

3   commensurate with that available to alternative regulated investments of similar risk. The

4   average ROE used in the analysis has an equity percentage between the 52% SCE

5   requests and the current 48%. Consequently, I make use the same figures for the two

6   potential capital structures.

7   **Q69. Please summarize your results before considering where to place SCE.**

8   A69. Figure 20 below summarizes the ranges of results I obtained above with the risk premium

9   results focused on the vertically integrated utilities.

10   Looking to Figure 15 and Figure 16 above as well as the discussion in Q/A 58, I observed

11   that at 48 percent equity, the CAPM / ECAPM results were 30 to 40 basis points higher

12   than at 52 percent equity. I therefore use 35 basis points as a reasonable estimate of the

13   impact of the additional leverage in the CAPM / ECAPM.

14   Similarly, looking to Figure 17 and Figure 18 and the discussion in Q/A 64, I observed

15   that at 48 percent equity, the DCF models resulted in estimates that were 40 to 70 basis

16   points higher than at 52 percent equity. I conservatively use 40 basis points as a

17   reasonable estimate of the impact of the additional leverage in the DCF models.[80]

18   Thus, to determine the reasonable range at 48 percent equity, I added 35 basis points to

19   the CAPM / ECAPM and 40 basis points to the DCF results, while I left the risk premium

20   results untouched. This resulted in the range shown in Figure 21.

---

[80]   Ignoring the largest difference of 70 basis points, the average difference is slightly above 40 basis points.

Figure 20: Summary of Results at 52% Equity

	Low End	High End
CAPM / ECAPM	9.5%	10.5%
DCF	9.5%	10.75%
Risk Premium	10.5%	10.6%
Midpoint	10.0%	10.625%
Average	9.7%	10.6%

Figure 21: Summary of Results at 48% Equity

	Low End	High End
CAPM / ECAPM	9.85%	10.85%
DCF	9.9%	11.15%
Risk Premium	10.5%	10.6%
Midpoint	10.2%	10.9%
Average	10.1%	10.9%

1 **VI. SCE SPECIFIC CIRCUMSTANCES AND ROE RECOMMENDATION**

2   **A. BUSINESS RISK CHARACTERISTICS**

3 **Q70. Are there any differences in the regulatory environment in which the comparable**

4 **companies and SCE operates?**

5 A70. Yes. SCE is located in California, which has many regulatory and legislative risks that

6   are not common to other electric utilities. California has embarked on major electricity

7   related transformation on more than one occasion. These changes to the status quo

8   disrupt the electric utility business and have a proven track record of enhancing risk to

1   the utilities.[81] Two decades ago, this legal and regulatory environment triggered a crisis

2   that drove SCE's most comparable neighboring utility into bankruptcy and pushed SCE

3   to insolvency where it narrowly avoided bankruptcy. Today, as the state enters uncharted

4   legal and regulatory territory to address climate conditions and air pollution, this legal

5   and regulatory environment is once again increasingly under strain in California, and

6   presenting risks to the financial health of its utilities. And, most critically, California has

7   created a liability structure that has led to a second bankruptcy of SCE's neighboring

8   utility and, without reform, could also push SCE into financial distress or even

9   bankruptcy. The Commission should take those risks into account in setting SCE's ROE

10   to ensure consistency with the criteria outlined in *Hope* and *Bluefield*, including that the

11   ROE must be comparable to returns on *investments of similar risk*.

12   **Q71. What is the biggest risk that SCE faces?**

13   A71. Wildfire liabilities poses the most immediate and catastrophic risk for SCE and in recent

14   years, wildfires have become a year-round phenomenon with increasing severity.[82] The

15   intensity of California wildfires has gotten worse over time, as two-thirds of the state's

16   largest fires on record have occurred in the last 20 years.[83] Under the legal doctrine of

17   inverse condemnation, SCE faces strict liability for damages resulting from fires caused

18   by its utility equipment. SCE has significant cost-recovery uncertainty for those damages

19   due to a recent decision by the Commission.[84]

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[81] Such policies are currently implemented primarily for environmental reasons.

[82] See, for example,
http://calfire.ca.gov/communications/downloads/newsreleases/2018/WAWNewsRelease_2018_FINAL.pdf, downloaded, information accessed February 15, 2019 ("Already this year [May 7, 2018] CAL FIRE has responded to more than 950 wildfires that have burned over 5,800 acres. We need Californias to accept fire as part of our natural landscape, understand the potential fire risk, ... CAL FIRE's 'Ready for Wildfire' app is the perfect tool to use in year-round preparation.").

[83] http://www.fire.ca.gov/communications/downloads/fact_sheets/Top20_Acres.pdf,
downloaded, information accessed August 23, 2018

[84] CPUC Decision (D.)17-11-033, *Decision Denying Application* (issued December 6, 2017); reh'g denied, D.18-07-025 *Order Denying Rehearing of D.17-11-033* (July 12, 2018).

1   This liability and financial implications hereof, created by the Courts' application of

2   inverse condemnation combined with the Commission's recent decision, is unique to

3   California utilities and consequently not captured in the proxy groups discussed above.

4   **Q72. Are wildfire risks included in your ROE estimate?**

5   A72. No. The risks associated with the California wildfires are (i) not present among the

6   electric utilities in my proxy group and (ii) asymmetric, so that SCE faces a potential

7   liability or cost from the wildfires, but there is no offsetting upward return opportunity.

8   Such asymmetric risks are not included in the ROE that is estimated using common cost

9   of equity models.[85] As a result the return that investors require to bear such risks has to

10   be considered separately and I understand that SCE-03 discusses the magnitude of this

11   risk, while SCE-01 provides SCE's requested relief.

12   **Q73. What other risks are unique to SCE, if any?**

13   A73. The State of California is embarking on very aggressive carbon-reducing goals,

14   Community Choice Aggregation ("CCA"), Distributed Energy Resources ("DER")

15   among other initiatives. The programs and their impact on SCE is discussed in the

16   Company's testimony (SCE-01, Section III). While each of these policies have unique

17   pros and cons, they all adds risk to SCE's utility business.

18   **Q74. Please summarize the impact of California's carbon reducing goals on SCE's**

19   **business.**

20   A74. California has one of the most aggressive Renewables Portfolio Standards ("RPSs") in

21   the nation. [86] For example, SB 100 set a goal of 100 percent clean electricity by 2045,

22   while the 2015 goal through Senate Bill 350 was 50 percent from renewables by 2020.

23   Earlier versions had lower targets (albeit at a closer date). These standards are higher

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[85]   A detailed discussion of asymmetric risk is provided in Bente Villadsen, Michael J. Vilbert, Dan Harris, and A. Lawrence Kolbe, "*Risk and Return for Regulated Industries*," Academic Press, 2017, Chapter 10. See also Leonardo R. Giacchino and Jonathan A. Lesser, "*Principles of Utility Corporate Finance*," Public Utilities Reports, Inc., 2011, pp. 25-26.

[86]   Megan Cleveland, *States' Renewable Energy Ambitions* (February 4, 2019) available at: http://www.ncsl.org/research/energy/states-renewable-energy-ambitions.aspx

1   than that of most other states and the goals have been changes. The details of these

2   programs and their risks to SCE are discussed in the Company testimony (SCE-01).

3   However, I note that the changing targets pose uncertainty for SCE's planning process.

4   This adds to SCE's risk system-wide: generation as well as distribution and transmission.

5   **Q75. Are there other unique risks facing SCE?**

6   A75. Yes. There is a renewed policy shift towards deregulation and electric competition in

7   California, as reflected by California's now expanding Direct Access program, its CCA

8   and the growth of DERs. This creates business and regulatory risks for SCE that further

9   amplify the risks relating to changes in grid design and operation

10   **Q76. How do these programs create risk for SCE?**

11   A76. California's Direct Access program allows a limited selection of consumers living in the

12   state of California to purchase their electricity from an Electric Service Provider ("ESP"),

13   instead of their utility. Thus, SCE's is facing a declining demand that is outside its

14   control – yet SCE has to plan for the ability to serve all customers.

15   Similarly, the California utilities are seeing a numbers of customers departing to be

16   served by CCAs. CCA permits customer groups, including cities or counties, acting alone

17   or in purchasing groups, to procure electricity directly from wholesale non-utility

18   suppliers. The utility continues to provide distribution services, billing, and metering.

19   Much like the Direct Access programs, the potential for CCA affects SCE's ability to

20   predict the size of its customer base and the load for which it must procure or generate

21   electricity, adding to the risks of committing to longer-term resources.

22   Another factor to consider is the growth in DERs, where an increasing number of

23   customers install their own generation capacity. Through policies such as Net Energy

24   Metering ("NEM"), customers who install self-generation technologies avoid

25   transmission and distribution investment costs incurred by SCE on behalf of its

26   customers. Yet, SCE continues to incur such costs and when groups of customers avoid

27   paying for such costs, the fixed portion of the costs is re-allocated to remaining

28   customers. This in turn leads more customers to self-generate and SCE's ability to

29   recover its costs becomes more and more challenging.

1 **Q77. What are the implications of these unique risks?**

2 A77. These risks mean that SCE is riskier than the electric utility industry and the proxy group

3   I use. Consequently, it is necessary that the Commission grant SCE a return on equity

4   that will ensure comparability to the return on similar risk entities and one that allow

5   SCE to attract capital on reasonable terms.

6 **Q78. Has the commission in the past recognized SCE's higher than average business**

7   **risk?**

8 A78. Yes. In Decision 12-12-034, the Commission noted:

9   we conclude that the adopted ROE should be set at the upper end
10   of the adopted ROE range found just and reasonable.[87]
11
12   Consequently, it is not new to the Commission that SCE faces risks above and beyond

13   those of the proxy companies.

14 **VII. ALTERNATIVE PROXY GROUP WITH HIGHER RISK**

15 **Q79. What is the purpose of this section?**

16 A79. The purpose of this section is to illustrate the magnitude of the cost of equity that obtains

17   when I consider a group of companies that similar to SCE are based on a network and

18   capital intensive. However, unlike SCE they do not necessarily have regulated

19   operations and therefore face both downside risks and upside opportunities. The sample

20   simply illustrates that there is a very wide range of cost of equity estimates for companies

21   that have risk characteristics that differ from those of traditional utilities as those in my

22   proxy groups.

23   **A. SAMPLE SELECTION**

24 **Q80. How do you select an alternative sample?**

25 A80. I selected a group of Capital-Intensive Network Industry ("CINI") companies after

26   considering the characteristics of the electric utility industry.

---

[87] CPUC, Decision 12-12-034, issued December 26, 2012. p. 39.

1   Regulated electric utilities are capital intensive and operate networks of assets. Thus, the

2   sample captures two key characteristics of the electric utility industry's assets – namely

3   that each dollar invested generate relatively low revenue and that the assets are not readily

4   re-deployed to a different use (contrary to, for example, the liquid assets owned by a

5   bank). I measure capital intensity as the amount of capital (in dollars) that is needed to

6   generate a dollar of revenue. The higher that figure is the more capital intensive a

7   company is.[88] Financial analysts commonly calculate the so-called asset turnover ratio,

8   which is revenue per dollar of investment. The lower the revenue per dollar invested,

9   the more capital is needed to generate revenue and the higher the capital intensity. Across

10   industries, the capital intensity differs widely, with regulated industries commonly being

11   among the most capital intensive in the economy, and the regulated electric utility

12   industry is capital intensive.[89]

13   In addition to electric, water and gas utilities, the following industries are also network

14   industries: oil and natural gas pipelines, pipeline master limited partnerships ("MLPs"),

15   telecom services, telecom utility, cable TV, trucking, railroads, and air transport.

16   Consequently, the CINI sample includes companies from these industries that meet the

17   selection criteria and have sufficient data for estimation.

18   **Q81. How did you determine what companies to include in the Capital-Intensive Network**

19   **Industries ("CINI") Sample?**

20   A81. The CINI sample is derived from the universe of publicly-traded U.S. domiciled

21   companies from *Value Line* with industry classifications that are network based and that

22   empirically can be shown to be capital intensive. The initial group of companies for

23   which I examined capital intensity and other characteristics consisted of 296 companies

24   of which 41 are electric utilities, 15 are classified as gas distribution and 11 are classified

25   as water utilities. Removing these 67 companies leave me with 229 companies that I

26   consider for the CINI sample.

---

[88] Financial analysts commonly calculate the so-called asset turnover ratio, which is revenue per dollar investment thus capital intensity equals 1 divided by the asset turnover ratio. See, for example, Ross, Westerfield & Jaffe, "Corporate Finance," 10th edition, 2013, pp. 52-53.

[89] To be included in the CINI Sample, individual companies must have an asset turnover ratio of less than 1.60.

1 However, a very large number of the remaining companies do not pay dividends, do not

2 have a credit rating or have been engaged in merger and acquisition activity or simply

3 lack data, so I end up with a sample of 15 companies, whose characteristics are displayed

4 below.

Figure 22
Companies in the Capital Intensive Network Industries Sample

Company	Annual Revenue (Q3 2018) ($MM) (a)	Market Cap. (Q3 2018) ($MM) (c)	S&P Credit Rating	Long-Term Growth Estimate (e)
Delta Air Lines	$43,925	$39,686	BBB-	16.1%
Southwest Airlines	$21,519	$35,168	BBB+	14.5%
FedEx Corp.	$67,205	$65,007	BBB	8.7%
United Parcel Serv.	$70,988	$102,379	A+	11.0%
Enable Midstream Part.	$3,287	$7,004	BBB-	12.9%
Enterprise Products	$35,779	$63,318	BBB+	9.2%
Magellan Midstream	$2,634	$15,604	BBB+	5.6%
CSX Corp.	$11,970	$62,290	BBB+	21.1%
GATX Corp.	$1,357	$3,191	BBB	9.0%
Kansas City South'n	$2,680	$11,890	BBB-	13.6%
Union Pacific	$22,525	$118,559	A-	17.0%
Heartland Express	$630	$1,666	n/a	21.2%
Ryder System	$8,082	$4,009	BBB+	13.2%
MDU Resources	$4,487	$5,194	BBB+	15.2%
EOG Resources	$16,216	$69,860	A-	73.7%
National Fuel Gas	$1,593	$4,815	BBB	7.3%

5 As can be seen from the sample above, the resulting sample has regulated entities from

6 the pipeline industry, but mostly consists of non-regulated companies: airlines,

7 railroads, transportation, and diversified gas companies.[90] In addition to screening the

8 companies for credit ratings, sufficient data and size, I also screened the companies for

9 capital intensity.

---

[90] I note that pipelines are subject to FERC regulation and commonly are granted an ROE well above that used in state regulation. Railroads are subject to (some) regulation by the Surface Transportation Board (STB"). The STB most recently determined the railroad industry's ROE in 2017, where it found an ROE of 11.46% and a weighted average cost of capital of 10.04%. See, Surface Transportation Board, Decision in Docket No. EP 558 (Sub-No. 21) – Railroad Cost of Capital – 2017, December 6, 2018.

1   **1.**   **Capital Intensity Screen**

2 **Q82. Please explain how you measure capital intensity.**

3 A82. To ensure a company truly is capital intensive, I calculated the five-year average Asset-

4   Turnover for each company and included only those with a measure below 1.6.

5   Specifically, I calculated

6
$$Asset\ Turnover\ = \frac{Revenue}{Average\ Total\ Assets}$$

7   where revenue is net sales revenue and average total assets is the average of balance sheet

8   total assets from the prior year and the current year.

9   The five-year average asset turnover ratio is calculated as the average of asset turnover

10   from each of the last five years leading up to 2017, which is the most recent year for

11   which I have sufficient data for all companies.

12   **B.**   **CALCULATING THE ROE FOR THE CINI SAMPLE**

13 **Q83. How do you calculate the ROE for the CINI sample?**

14 A83. I rely on the same estimation methods as for the Electric Utility Proxy Group and the

15   OHRU group. First, I calculate the ROE using the CAPM / ECAPM and the DCF (single

16   and multi-stage). I then determine the appropriate ROE at SCE's capital structure using

17   the same methodology as above. The results shown below are the average of the CINI

18   group at SCE's requested 52% equity.

19 **Q84. What are your results for the CAPM / ECAPM?**

20 A84. The results from the CAPM based models are displayed in Figure 23 below. The range

21   is 14.2 percent to 17.7 percent.

Figure 23
CAPM / ECAPM Results for CINI Sample at 52% Equity

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Financial Risk Adjusted Method		
CAPM	16.4%	17.7%
ECAPM (α = 1.5%)	16.1%	17.4%
Hamada Adjustment Without Taxes		
CAPM	15.7%	17.1%
ECAPM (α = 1.5%)	14.8%	16.2%
Hamada Adjustment With Taxes		
CAPM	14.9%	16.2%
ECAPM (α = 1.5%)	14.2%	15.4%

Sources and Notes:
[1]: Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%.
[2]: Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%.

1   **Q85. What are the results from the DCF models?**

2   A85. The results are displayed in Figure 24 below, which shows a range of 12.1 to 19.8 percent

3   when I eliminate companies with growth rates above 20 percent. If I include all

4   companies but one with a growth rate above 70 percent, the results are higher at up to

5   21.9 percent.

Figure 24
DCF Results for CINI Sample at 52% Equity

	Simple	Multi-stage
CINI Sample Results	19.8%	12.1%

6   **VIII. COST OF CAPITAL RECOMMENDATION**

7   **Q86. Please summarize your conclusions regarding SCE's risk and the necessary return.**

8   A86. First, since the Commission last awarded an ROE for SCE, its business risks have

9   increased by a substantial amount and key macro-economic indicators such as interest

10   rates have increased moderately. Therefore, SCE's return for 2020-2022 ought to be

11   higher than the 10.3% allowed in 2017. Second, as discussed above, there is no question

1   that SCE's business risk and regulatory risk has increased in recent years. Third, the

2   Commission has in the past acknowledged that SCE merits placement in the upper end

3   of the reasonable range that I summarized in Figure 20 above. I therefore strongly

4   recommend that SCE be placed at or near the upper end of the reasonable range.

5   **Q87. What do you recommend for SCE's cost of equity in this proceeding?**

6   **A87.** I recommend that SCE be allowed to earn a 10.6 percent return on equity at its requested

7   52 percent equity. This estimate is at the upper end of the reasonable range of 9.5 - 10.75

8   percent I obtained from the DCF, CAPM and Risk Premium models and the average of

9   the high-end figures I calculated in Figure 20. I note that the upper bound on the electric

10   utility sample is 10.6%, so I have evidence from both the electric utility and the water

11   and gas sample that is consistent with the recommendation. In the event, SCE is not

12   granted an increase in its authorized common equity percentage, I recommend that it be

13   allowed an ROE of 10.9 percent on 48 percent equity. Again, this figure is the average

14   of the results shown at the upper end in Figure 21.

15   I find that allowing a return at or near the upper end of the range of reasonable estimates

16   will assist SCE as it has seen its credit rating downgraded three times since January 2018

17   and remains on credit watch negative.

18   **Q88. Does your recommendation include any return to investors for SCE's Wildfire**

19   **risks?**

20   A88. No.[91]

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[91] For clarity, my testimony does not address what liability may be imposed on SCE nor does it address
what return investors may require for accepting that specific risk. It simply recognizes that such risks
are **not** captured in the standard electric sample and consequently considers group of capital-intensive
network industry companies that may be more comparable albeit none of them are likely to capture the
full extent of this liability. I understand that the specifics of the wildfire risk and the appropriate
treatment of such risks is discussed in Exhibit SCE-01 and Mr. Frank Graves Exhibit SCE-03.

1   **SOUTHERN CALIFORNIA EDISON COMPANY**

2   **QUALIFICATIONS AND PREPARED TESTIMONY**

3   **OF DR. BENTE VILLADSEN**

4   **Q89. Please state your name and business address for the record.**

5   A89. My name is Bente Villadsen, and my business address is The Brattle Group, One Beacon

6   St., Suite 2600, Boston, MA 02108.

7   **Q90. Briefly describe your present responsibilities at The Brattle Group.**

8   A90. As a Principal it is my responsibility to research and direct research into the utility

9   industry as it pertains to cost of capital and related issues. It is also my responsibility to

10   consult on utility industry issues and testify, when appropriate. Among my other duties

11   is the supervision and training of staff and ensuring that work products are of high quality

12   and accurate.

13   **Q91. Briefly describe your educational and professional qualifications.**

14   A91. I have 20 years of experience working with regulated utilities on cost of capital and

15   related matters. My practice focuses on cost of capital, regulatory finance, and

16   accounting issues. I am the co-author of the text, "Risk and Return for Regulated

17   Industries"[92] and a frequent speaker on regulatory finance at conferences or webinars. I

18   have testified or filed expert reports on cost of capital in Alaska, Arizona, California,

19   Illinois, New Mexico, New York, Oregon, and Washington, as well as before the

20   Bonneville Power Administration, Federal Energy Regulatory Commission, the Surface

21   Transportation Board, the Alberta Utilities Commission, and the Ontario Energy Board.

22   I have provided white papers on cost of capital to the British Columbia Utilities

23   Commission, the Canadian Transportation Agency as well as to European and Australian

24   regulators on cost of capital. I have testified or filed testimony on regulatory accounting

25   issues before the Federal Energy Regulatory Commission ("FERC"), the Regulatory

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92   Bente Villadsen, Michael J. Vilbert, Dan Harris, A. Lawrence Kolbe, "Risk and Return for Regulated
     Industries," Academic Press, 2017.

1   Commission of Alaska, the Michigan Public Service Commission, the Texas Public

2   Utility Commission as well as in international and U.S. arbitrations and regularly provide

3   advice to utilities on regulatory matters as well as risk management.

4   I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus, Denmark.

5   Appendix A contains more information on my professional qualifications as well as a list

6   of my prior testimonies and publications.

7   **Q92. What is the purpose of your testimony in this proceeding?**

8   A92. I am sponsoring Exhibit SCE-02. Specifically, Southern California Edison Company

9   ("SCE" or the "Company") has asked me to estimate the cost of equity that the Public

10   Utilities Commission of the State of California ("Commission") should allow SCE an

11   opportunity to earn on the equity financed portion of its regulated utility rate base. The

12   cost of equity estimate I provide does not include any consideration of the return investors

13   need to provide capital to a company exposed to the wildfire risks that SCE is.

14   **Q93. Was this material prepared by you or under your supervision?**

15   A93. Yes. It was.

16   **Q94. Insofar as this material is factual in nature, do you believe it to be correct?**

17   A94. Yes, I do.

18   **Q95. Insofar as this material is in the nature of opinion or judgment, does it represent**

19   **your best judgment?**

20   A95. Yes, it does.

21   **Q96. Does this conclude your direct testimony?**

22   A96. Yes, it does.

Appendix BV-A

Resume of Dr. Bente Villadsen

BENTE VILLADSEN
Principal

Boston, MA   +1.617.864.7900   Bente.Villadsen@brattle.com

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 the review of regulatory practices regarding the return on equity, capital structure, recovery of costs and capital expenditures 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
    - 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, and water utilities in many jurisdictions including at the FERC, the Surface Transportation Board, the states of Alaska, Arizona, California, Illinois, 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.

- 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.

- 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.

- She has estimated the cost of equity on behalf of Anchorage Municipal Light and Power, Arizona Public Service, Portland General Electric, Anchorage Water and Wastewater, American Water, California Water, and EPCOR in state regulatory proceedings. She has also submitted testimony before the 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.

- 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

12 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.

Accounting and Corporate Finance

- 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.

- 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.

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"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.

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"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.

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"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.

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"Current Issues in Cost of Capital" presented to *EEI Members*, July 23, 2018.

"Introduction to Capital Structure & Liability Management", presented at *the American Gas Association (AGA)/Edison Electric Institute (EEI) "Introduction and Advanced Public Utility Accounting Courses",* August 21, 2018.

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

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Appendix BV-B

Technical Appendix

Technical Appendix to the Direct Testimony of Bente Villadsen

This technical appendix contains methodological details related to my implementations of the DCF and CAPM / ECAPM models. It also contains a discussion of both the basic finance principles and the specific standard formulations of the financial leverage adjustments employed to determine the cost of equity for a company with the level of financial risk inherent in Con Edison's requested regulatory capital structure.

Table of Contents

I. 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:

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

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 (1), 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. DETAILS OF THE 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 (1) 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

$$P_0 = \frac{D_1}{r - g} \tag{2}$$

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 (2) is a simplified version of Equation (1) that can be solved algebraically to yield the well-known "DCF formula" for the cost of equity capital,

$$r = \frac{D_1}{P_0} + g = \frac{D_0 \times (1 + g)}{P_0} + g \tag{3}$$

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 (1)).

1.   Dividends, Cash Flows, and Share Repurchases

In addition to the DCF model described above, there are many alternative formulations. Notable among these are versions of the model that use cash flows rather than dividends in the present value formula (Equation (1)).[1]

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 (1)). 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.

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[1]   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. Confirmed in EP-664 (Sub-No. 2), October 31, 2016.

Many utility companies such as those included in my proxy group have long histories of paying a dividend. In fact, as mentioned in Section I of this Appendix, one of my standard requirements for inclusion in my proxy group is that a company pays dividends for 5-years without a gap or a dividend cut (on per share basis). Additionally, although some utility companies have engaged in share repurchase programs, the companies in my proxy group do not distribute substantial cash flows by means other than dividends.[2]

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 proxy group 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.

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 defined as tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. Any optimism bias might be 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 more

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[2] While a number of companies in my proxy group 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 proxy group. However, it is clear that not including the cash distributions from such repurchases downwardly biases the estimated cost of equity.

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."[3] Thus, some recent research indicates that the analyst bias may be a problem of the past.

The findings of several academic studies[4] 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 the majority of utility companies with wide analyst coverage and information transparency. Consequently, optimism bias is not expected to be an issue for utilities.

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. Most companies in my proxy group 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. I supplement these consensus values with growth rates based on EPS estimates from *Value Line*.[5]

II.   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

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

[4]   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.

[5]   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.

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 3 in my Direct Testimony), 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:

$$r_s = r_f + \beta_s \times MRP \tag{4}$$

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

MRP 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 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,

$$\beta_s = \frac{covariance(r_s, R_m)}{variance(R_m)} \tag{5}$$

where 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 500 over a government bond rate.

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 the U.S., government debt is generally considered have no 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. I rely on the 20-year Treasury bond as a measure of the risk-free asset in this proceeding.[7] I use the term "risk-free rate" as describing the yield on the 20-year Treasury bond.

However, I do not believe the *current* yield on long-term Treasury bonds is a good estimate for the risk-free rate that will prevail over the time period relevant to this proceeding as currently

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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]   The use of a 20-year government bond is consistent with the measurement of the Ibbotson MRP and permits me to use a series that has been in consistent circulation since the 1990's (the 30-year government bond was not issued from 2002 to 2006).

prevailing bond yields are near historic lows for a variety of circumstances that should not be expected to persist for the reasons discussed in my direct testimony.

As shown in Figure A- 1 below, the current spread between utility bond yields and the 20-year treasury bond yield is elevated by almost 50 basis points.

Figure A- 1: Yield Spreads

Spreads between U.S. Utility Bond (20 year maturity) and U.S. Government Bond (20 year maturity) - bps		
Periods	A-Rated Utility and Treasury	BBB-Rated Utility and Treasury
Period 1 - Average Apr-1991 - 2007	93	123
Period 2 - Average Aug-2008 - Dec-2018	149	195
Period 3 - Average Dec-2018	134	180
Period 4 - Average 15-Day (Dec 10, 2018 to Dec 31, 2018)	143	188
Spread Increase between Period 2 and Period 1	56	72
Spread Increase between Period 3 and Period 1	41	57
Spread Increase between Period 4 and Period 1	49	66

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 December 31, 2018.

For this reason I rely on Blue Chip's forecast of 3.60% for the yield on a 10-year Treasury bond for 2020.[8] I adjust this value upward by 50 basis points, which is my estimate of the maturity premium for the 20-year over the 10-year Treasury Bond and add 25 basis points as a normalization to the forecasted risk-free rate.[9] Thus, I obtain a risk-free rate of 4.40% for 2020 in Scenario I. I also consider a scenario, where the increase in yield spread is allocated to the MRP and only a small fraction of the increase in yield spread is allocated to the risk-free rate. In Scenario II, which I discuss in more detail below, the risk-free rate for 2020 is 4.15%.

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[8]   Blue Chip Economic Indicators, October 10, 2018.

[9]   This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Treasury Bonds over the period January 1990 – September 2018, using data from Bloomberg. See Table No. BV-9.

2. The Market Equity Risk Premium

a. Historical Average Market Risk Premium

Like the cost of capital itself, the market 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. When such a calculation is performed using the traditional industry standard Ibbotson data, the result is an arithmetic average of 7.07% for annual observed premiums of U.S. stock market returns over income returns on long-term (approximate average maturity of 20-years) U.S. Treasury bonds from 1926 to the present is 7.07%.[10]

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; for the U.S. Bloomberg performs a multi-stage DCF using dividend-paying stocks in the S&P 500 to infer the expected market return.

When calculated relative to 20-year Treasury bond yields, Bloomberg's estimate of the forward-looking market-implied MRP over the month leading up to my analysis was approximately 7.65%.[11]

c. Yield Spreads and the Market Equity Risk Premium

As shown in Figure 7 of my testimony the yield spreads for 20-year A rated utility debt over 20-year Treasury bonds is elevated relative to its historical norm by about 40 bps relative to its long-term average leading up to the 2008 financial crisis. This means that investors require a higher

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[10]   Duff & Phelps, "2018 SBBI Yearbook," p. 10-21.

[11]   Bloomberg data.

return on investment grade utility debt relative to the return on T-bonds than they did before the crisis and ensuing economic turmoil.

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.[12] 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.[13] For example, assuming a beta of 0.25 for A rated debt[14] 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 (beta) times 1 percentage point (increase in MRP) = ¼ percentage point increase in yield spread). Thus, a 25 bps increase in the yield spread is therefore consistent with a 1.0 percentage point increase in the MRP ($\frac{0.25\%}{0.25} = 1.0\%$). Thus, there is evidence that the current MRP is elevated relative to the historical MRP of 7.07%. While the increase in yield spread as well as an implementation of the DCF model on the S&P 500 (as shown in Appendix BV-E could justify an MRP of upward 9 percent,[15] I conservatively use the historical average of 7.07% along with a scenario of 8.07%.

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

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[12] "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.

[13] In theory, some of the increase in yield spread for A rated debt may be due to an increase in default risk, but the increase in default risk for A 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 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.

[14] 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 & Demarzo* that I utilize for my Hamada adjustments are significantly lower: in the range of 0.0 – 0.1 percent and would result in a substantially higher MRP estimate.

[15] Using a debt beta of 0.25, the increased yield spread of 49 bps result in an increase in the MRP of 0.49/0.25 = 1.96%.

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,

$$r_S = r_f + \alpha + \beta_S \times (MRP - \alpha) \tag{6}$$

where α is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see Equation (4)). 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.

Figure A-2
The Empirical Security Market Line
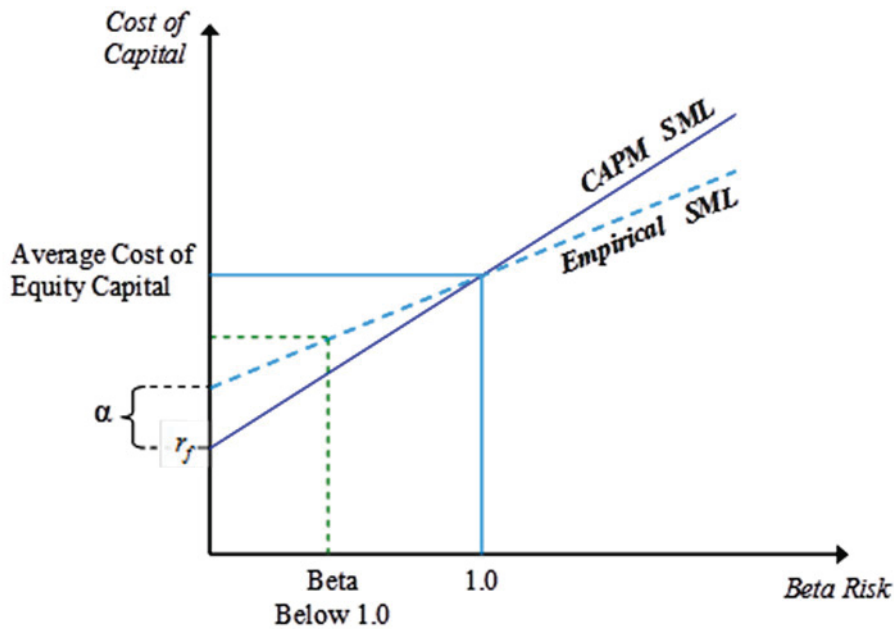
2.   Academic Evidence on the Alpha Term in the ECAPM

Figure A-2 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. 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.[16] It may be tempting to simply estimate the cost of equity capital for each of the proxy 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.[17]

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 and Figure A-5below 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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[16]   This is also a common valuation problem in general business contexts.

[17]   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

	Asset Cash Flow	Debt Service	Equity Dividend	ROE	
½ →	$15	$0	$15	15/100 =	15%
$100					
½ →	$5	$0	$5	5/100 =	5%
				E(ROE)=	10%
				σ(ROE)=	5%

Figure A-5: 50/50 Capital Structure

	Asset cash flow	Debt Service	Equity Dividend	ROE	
½ →	$15	$2.50	$12.50	12.50/50 =	25%
$100					
½ →	$5	$2.50	$2.50	2.50/50 =	5%
				E(ROE)=	15%
				σ(ROE)=	10%

In the figures, E(ROE) indicates the mean return and σ(ROE) represents the standard deviation. 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 proxy group 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.[18] The expected return to the underlying asset is therefore equal to the value weighted

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[18]   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 (7), 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.

average of the expected returns to equity and debt holders – which is the overall cost of capital (r^*), or the expected return on the assets of the firm as a whole.[19]

$$r^* = \frac{E}{V} \times r_E + \frac{D}{V} \times r_D (1 - \tau_c)$$
(7)

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.[20]

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.[21] 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

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[19]   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 assumptions and formulations. Equation (7) represents the overall weighted average cost of capital to the firm, which can be assumed to be constant across a relatively broad range of capital structures.

[20]   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.

[21]   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.

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,[22] showed that while taxes and costs to financial distress affect a firm's incentives when choosing its capital structure as well as its overall cost of capital,[23] the latter can still be shown to be constant across a broad range of capital structures.[24]

This reasoning suggests that one could compute the overall cost of capital for each of the proxy 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 on a book value basis.[25]

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.

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

[23] 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.

[24] This is a simplified treatment of what is generally a complex and on-going area of academic investigation. The roles of taxes, market imperfections and constraints, etc. are areas of on-going research and differing assumptions can yield subtly different formulations for how to formulate the weighted average cost of capital that is constant over all (or most) capital structures.

[25] Market value capital structures are used in estimating the overall cost of capital for the proxy companies.

Recognizing that under general conditions, the value of a firm can be decomposed into its value with and without a tax shield, I obtain:[26]

$$V = V_U + PV(ITS) \tag{8}$$

where $V = E + D$ is the total value of the firm as in Equation (7),

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:

$$r_E = r_U + \frac{D}{E}(1 - \tau_c)(r_U - r_D) \tag{9}$$

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 (7).

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:

$$\beta_L = \beta_U + \frac{D}{E}(1 - \tau_c)(\beta_U - \beta_D) \tag{10}$$

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

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[26] 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 form 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).

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:

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D) \qquad\qquad (11)$$

Unlike Equation (10), Equation (11) 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 (10) 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 (10), or Equation (11). Rather than estimating debt betas, I rely on the standard financial textbook of Professors Berk & DeMarzo, who report a debt beta of 0.05 for A rated debt and a beta of 0.10 for BBB rated debt.[27]

Once a decision on debt betas is made, the levered equity beta of each proxy company can be computed (in this case by Value Line) from market data and then translated to an unlevered beta at the company's market value capital structure. The unlevered betas for the proxy companies are comparable on an "apples to apples" basis, since they reflect the systematic risk inherent in the assets of the proxy 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

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[27]   Berk, J. & DeMarzo, P., *Corporate Finance, 2ⁿᵈ Edition.* 2011 Prentice Hall, p. 389.

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[28]—are ubiquitous among finance practitioners when using the CAPM to estimate discount rates.

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[28] 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.

Appendix BV-C

CAPM-based, DCF-based and Risk-Premium Results at 52% Equity

Schedule No. BV-1

Table of Contents

Schedule No. BV-2

Electric, Water, and Gas Sample

Classification of Companies by Assets

Company	Company Category
ALLETE	M
Alliant Energy	R
Amer. Elec. Power	R
Ameren Corp.	R
AVANGRID Inc.	M
CMS Energy Corp.	R
Consol. Edison	R
DTE Energy	M
Duke Energy	R
Edison Int'l	R
El Paso Electric	R
Entergy Corp.	R
Eversource Energy	R
FirstEnergy Corp.	R
IDACORP Inc.	R
MGE Energy	M
NextEra Energy	M
NorthWestern Corp.	R
OGE Energy	R
Otter Tail Corp.	R
Pinnacle West Capital	R
PNM Resources	R
Portland General	R
PPL Corp.	R
Public Serv. Enterprise	M
Southern Co.	R
Unitil Corp.	R

Schedule No. BV-2

Electric, Water, and Gas Sample

Classification of Companies by Assets

Company	Company Category
WEC Energy Group	R
Xcel Energy Inc.	R
Atmos Energy	R
Chesapeake Utilities	M
NiSource Inc.	R
Northwest Natural	R
ONE Gas Inc.	R
Southwest Gas	R
Spire Inc.	R
Amer. States Water	R
Amer. Water Works	R
Middlesex Water	R
York Water Co. (The)	R

Sources and Notes:

Calculations based on EEI definitions and Company 10K filings:

R = Regulated (greater than 80 percent of total assets are regulated).

M = Mostly Regulated (50 to 80 percent of total assets are regulated).

D = Diversified (less than 50 percent of total assets are regulated).

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel A: ALLETE

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,116	$2,116	$2,043	$1,873	$1,822	$1,529	$1,288	[a]
Shares Outstanding (in millions) - Common	51	51	51	50	49	45	41	[b]
Price per Share - Common	$78	$75	$78	$61	$49	$46	$48	[c]
Market Value of Common Equity	$4,000	$3,878	$3,963	$2,997	$2,393	$2,048	$1,941	[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	$4,000	$3,878	$3,963	$2,997	$2,393	$2,048	$1,941	[f] = [d] + [e]
Market to Book Value of Common Equity	1.89	1.83	1.94	1.60	1.31	1.34	1.51	[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	$439	$439	$388	$362	$403	$358	$369	[j]
Current Liabilities	$403	$403	$291	$404	$318	$287	$224	[k]
Current Portion of Long-Term Debt	$57	$57	$64	$187	$49	$85	$38	[l]
Net Working Capital	$93	$93	$162	$144	$135	$156	$183	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$3	$1	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,462	$1,462	$1,445	$1,359	$1,549	$1,289	$1,064	[p]
Book Value of Long-Term Debt	$1,518	$1,518	$1,509	$1,546	$1,598	$1,375	$1,102	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$114	$114	$85	$71	$111	$22	$126	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,633	$1,633	$1,593	$1,617	$1,709	$1,396	$1,228	[s] = [q] + [r].
Market Value of Debt	$1,633	$1,633	$1,593	$1,617	$1,709	$1,396	$1,228	[t] = [s].
MARKET VALUE OF FIRM	$5,633	$5,510	$5,556	$4,614	$4,102	$3,444	$3,169	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	71.02%	70.37%	71.32%	64.96%	58.33%	59.47%	61.26%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	28.98%	29.63%	28.68%	35.04%	41.67%	40.53%	38.74%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel B: Alliant Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,570	$4,570	$4,154	$3,859	$3,745	$3,436	$3,267	[a]
Shares Outstanding (in millions) - Common	236	236	231	228	227	222	222	[b]
Price per Share - Common	$44	$43	$42	$39	$28	$28	$25	[c]
Market Value of Common Equity	$10,346	$10,181	$9,787	$8,841	$6,434	$6,291	$5,494	[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	$10,346	$10,181	$9,787	$8,841	$6,434	$6,291	$5,494	[f]= [d] + [e]
Market to Book Value of Common Equity	2.26	2.23	2.36	2.29	1.72	1.83	1.68	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$400	$400	$200	$200	$200	$200	$200	[h]
Market Value of Preferred Equity	$400	$400	$200	$200	$200	$200	$200	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$1,125	$1,125	$752	$958	$1,088	$962	$880	[j]
Current Liabilities	$1,548	$1,548	$1,470	$1,370	$991	$1,742	$1,053	[k]
Current Portion of Long-Term Debt	$506	$506	$105	$314	$3	$493	$48	[l]
Net Working Capital	$83	$83	($613)	($98)	$100	($287)	($124)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$137	$137	$485	$238	$109	$354	$237	[n]
Adjusted Short-Term Debt	$0	$0	$485	$98	$0	$287	$124	[o] = See Sources and Notes.
Long-Term Debt	$5,248	$5,248	$4,255	$3,817	$3,856	$2,800	$3,105	[p]
Book Value of Long-Term Debt	$5,754	$5,754	$4,846	$4,229	$3,859	$3,579	$3,278	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$581	$581	$479	$501	$629	$376	$722	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$6,336	$6,336	$5,324	$4,729	$4,487	$3,955	$4,000	[s] = [q] + [r].
Market Value of Debt	$6,336	$6,336	$5,324	$4,729	$4,487	$3,955	$4,000	[t] = [s].
MARKET VALUE OF FIRM	$17,082	$16,917	$15,311	$13,770	$11,121	$10,446	$9,694	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	60.57%	60.18%	63.92%	64.21%	57.85%	60.22%	56.68%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	2.34%	2.36%	1.31%	1.45%	1.80%	1.91%	2.06%	[w] = [i] / [u].
Debt - Market Value Ratio	37.09%	37.45%	34.78%	34.34%	40.35%	37.86%	41.26%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel C: Amer. Elec. Power

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$19,047	$19,047	$18,078	$17,322	$17,699	$16,868	$15,762	[a]
Shares Outstanding (in millions) - Common	493	493	492	492	491	489	487	[b]
Price per Share - Common	$77	$72	$72	$65	$55	$53	$43	[c]
Market Value of Common Equity	$38,032	$35,280	$35,328	$32,042	$27,037	$25,812	$21,167	[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	$38,032	$35,280	$35,328	$32,042	$27,037	$25,812	$21,167	[f]= [d] + [e]
Market to Book Value of Common Equity	2.00	1.85	1.95	1.85	1.53	1.53	1.34	[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	$4,692	$4,692	$4,068	$5,949	$4,548	$4,111	$4,317	[j]
Current Liabilities	$8,426	$8,426	$7,322	$7,779	$7,058	$7,457	$5,692	[k]
Current Portion of Long-Term Debt	$1,904	$1,904	$2,359	$2,385	$1,826	$2,381	$1,366	[l]
Net Working Capital	($1,830)	($1,830)	($895)	$555	($684)	($965)	($9)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$2,243	$2,243	$1,059	$1,478	$782	$1,282	$1,218	[n]
Adjusted Short-Term Debt	$1,830	$1,830	$895	$0	$684	$965	$9	[o] = See Sources and Notes.
Long-Term Debt	$20,870	$20,870	$18,362	$17,320	$17,600	$15,677	$16,202	[p]
Book Value of Long-Term Debt	$24,604	$24,604	$21,617	$19,705	$20,110	$19,023	$17,577	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$2,476	$2,476	$1,821	$1,629	$2,391	$1,295	$3,150	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$27,080	$27,080	$23,437	$21,333	$22,501	$20,318	$20,727	[s] = [q] + [r].
Market Value of Debt	$27,080	$27,080	$23,437	$21,333	$22,501	$20,318	$20,727	[t] = [s].
MARKET VALUE OF FIRM	$65,112	$62,360	$58,765	$53,375	$49,538	$46,130	$41,894	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	58.41%	56.57%	60.12%	60.03%	54.58%	55.95%	50.53%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	41.59%	43.43%	39.88%	39.97%	45.42%	44.05%	49.47%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel D: Ameren Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$7,656	$7,656	$7,345	$7,193	$7,014	$6,774	$6,574	[a]
Shares Outstanding (in millions) - Common	244	244	243	243	243	243	243	[b]
Price per Share - Common	$67	$64	$59	$50	$40	$38	$34	[c]
Market Value of Common Equity	$16,443	$15,714	$14,327	$12,115	$9,802	$9,318	$8,311	[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	$16,443	$15,714	$14,327	$12,115	$9,802	$9,318	$8,311	[f]= [d] + [e]
Market to Book Value of Common Equity	2.15	2.05	1.95	1.68	1.40	1.38	1.26	[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	$1,640	$1,640	$1,581	$1,599	$1,983	$1,942	$3,273	[j]
Current Liabilities	$2,580	$2,580	$2,581	$2,291	$2,489	$2,119	$3,228	[k]
Current Portion of Long-Term Debt	$649	$649	$777	$431	$395	$119	$884	[l]
Net Working Capital	($291)	($291)	($223)	($261)	($111)	($58)	$929	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$521	$521	$446	$608	$783	$753	$25	[n]
Adjusted Short-Term Debt	$291	$291	$223	$261	$111	$58	$0	[o] = See Sources and Notes.
Long-Term Debt	$7,614	$7,614	$6,922	$6,607	$5,981	$5,825	$5,274	[p]
Book Value of Long-Term Debt	$8,554	$8,554	$7,922	$7,299	$6,487	$6,002	$6,158	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$596	$596	$496	$539	$895	$546	$953	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$9,150	$9,150	$8,418	$7,838	$7,382	$6,548	$7,111	[s] = [q] + [r].
Market Value of Debt	$9,150	$9,150	$8,418	$7,838	$7,382	$6,548	$7,111	[t] = [s].
MARKET VALUE OF FIRM								
	$25,593	$24,864	$22,745	$19,953	$17,184	$15,866	$15,422	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	64.25%	63.20%	62.99%	60.72%	57.04%	58.73%	53.89%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	35.75%	36.80%	37.01%	39.28%	42.96%	41.27%	46.11%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel E: AVANGRID Inc.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$15,128	$15,128	$15,202	$15,038	$3,999	$3,999	$3,999	[a]
Shares Outstanding (in millions) - Common	309	309	309	309	-	-	-	[b]
Price per Share - Common	$51	$49	$47	$42	N/A	N/A	N/A	[c]
Market Value of Common Equity	$15,786	$15,110	$14,573	$13,022	N/A	N/A	N/A	[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	$15,786	$15,110	$14,573	$13,022	N/A	N/A	N/A	[f]= [d] + [e]
Market to Book Value of Common Equity	1.04	1.00	0.96	0.87	N/A	N/A	N/A	[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	$1,963	$1,963	$2,021	$2,153	$915	$915	$915	[j]
Current Liabilities	$2,911	$2,911	$2,934	$2,153	$1,189	$1,189	$1,189	[k]
Current Portion of Long-Term Debt	$523	$523	$267	$187	$23	$23	$23	[l]
Net Working Capital	($425)	($425)	($646)	$187	($251)	($251)	($251)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$500	$500	$731	$3	$305	$305	$305	[n]
Adjusted Short-Term Debt	$425	$425	$646	$0	$251	$251	$251	[o] = See Sources and Notes.
Long-Term Debt	$5,096	$5,096	$4,767	$4,399	$2,889	$2,889	$2,889	[p]
Book Value of Long-Term Debt	$6,044	$6,044	$5,680	$4,586	$3,163	$3,163	$3,163	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$603	$603	$694	$455	$473	$0	$0	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$6,647	$6,647	$6,374	$5,041	$3,636	$3,163	$3,163	[s] = [q] + [r].
Market Value of Debt	$6,647	$6,647	$6,374	$5,041	$3,636	$3,163	$3,163	[t] = [s].
MARKET VALUE OF FIRM	$22,433	$21,757	$20,947	$18,063	N/A	N/A	N/A	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.37%	69.45%	69.57%	72.09%	N/A	N/A	N/A	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	N/A	N/A	N/A	[w] = [i] / [u].
Debt - Market Value Ratio	29.63%	30.55%	30.43%	27.91%	N/A	N/A	N/A	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel F: CMS Energy Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,749	$4,749	$4,535	$4,259	$3,902	$3,670	$3,396	[a]
Shares Outstanding (in millions) - Common	283	283	282	279	277	275	266	[b]
Price per Share - Common	$51	$50	$47	$43	$34	$30	$26	[c]
Market Value of Common Equity	$14,486	$14,027	$13,310	$11,917	$9,338	$8,161	$7,018	[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	$14,486	$14,027	$13,310	$11,917	$9,338	$8,161	$7,018	[f] = [d] + [e]
Market to Book Value of Common Equity	3.05	2.95	2.94	2.80	2.39	2.22	2.07	[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	$2,374	$2,374	$2,121	$2,198	$2,123	$2,734	$2,401	[j]
Current Liabilities	$3,442	$3,442	$2,261	$2,069	$1,788	$1,648	$1,464	[k]
Current Portion of Long-Term Debt	$1,971	$1,971	$980	$1,005	$741	$690	$532	[l]
Net Working Capital	$903	$903	$840	$1,134	$1,076	$1,776	$1,469	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$279	$279	$230	$75	$68	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$8,944	$8,944	$9,121	$8,832	$8,014	$8,171	$7,229	[p]
Book Value of Long-Term Debt	$10,915	$10,915	$10,101	$9,837	$8,755	$8,861	$7,761	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$511	$511	$449	$474	$750	$726	$1,118	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$11,426	$11,426	$10,550	$10,311	$9,505	$9,587	$8,879	[s] = [q] + [r].
Market Value of Debt	$11,426	$11,426	$10,550	$10,311	$9,505	$9,587	$8,879	[t] = [s].
MARKET VALUE OF FIRM	$25,912	$25,453	$23,860	$22,228	$18,843	$17,748	$15,897	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	55.90%	55.11%	55.78%	53.61%	49.56%	45.98%	44.15%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	44.10%	44.89%	44.22%	46.39%	50.44%	54.02%	55.85%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel G: Consol. Edison

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$15,887	$15,887	$15,102	$14,267	$13,040	$12,707	$12,166	[a]
Shares Outstanding (in millions) - Common	311	311	310	305	293	293	293	[b]
Price per Share - Common	$80	$78	$83	$76	$65	$57	$56	[c]
Market Value of Common Equity	$24,863	$24,364	$25,682	$23,296	$18,927	$16,614	$16,301	[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	$24,863	$24,364	$25,682	$23,296	$18,927	$16,614	$16,301	[f]= [d] + [e]
Market to Book Value of Common Equity	1.57	1.53	1.70	1.63	1.45	1.31	1.34	[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	$3,356	$3,356	$3,096	$3,154	$3,505	$3,519	$3,704	[j]
Current Liabilities	$5,401	$5,401	$3,915	$3,591	$4,429	$3,873	$4,373	[k]
Current Portion of Long-Term Debt	$1,128	$1,128	$687	$346	$761	$210	$483	[l]
Net Working Capital	($917)	($917)	($132)	($91)	($163)	($144)	($186)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,352	$1,352	$356	$601	$1,160	$1,425	$1,220	[n]
Adjusted Short-Term Debt	$917	$917	$132	$91	$163	$144	$186	[o] = See Sources and Notes.
Long-Term Debt	$15,480	$15,480	$14,651	$13,747	$11,521	$10,986	$10,495	[p]
Book Value of Long-Term Debt	$17,525	$17,525	$15,470	$14,184	$12,445	$11,340	$11,164	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$2,118	$2,118	$1,319	$1,111	$1,807	$1,108	$2,167	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$19,643	$19,643	$16,789	$15,295	$14,252	$12,448	$13,331	[s] = [q] + [r].
Market Value of Debt	$19,643	$19,643	$16,789	$15,295	$14,252	$12,448	$13,331	[t] = [s].
MARKET VALUE OF FIRM	$44,506	$44,007	$42,471	$38,591	$33,179	$29,062	$29,632	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	55.86%	55.36%	60.47%	60.37%	57.05%	57.17%	55.01%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	44.14%	44.64%	39.53%	39.63%	42.95%	42.83%	44.99%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel H: DTE Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$10,207	$10,207	$9,373	$9,130	$8,812	$8,169	$7,876	[a]
Shares Outstanding (in millions) - Common	182	182	179	179	179	177	177	[b]
Price per Share - Common	$114	$110	$110	$94	$78	$76	$67	[c]
Market Value of Common Equity	$20,804	$20,096	$19,692	$16,898	$13,951	$13,475	$11,792	[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	$20,804	$20,096	$19,692	$16,898	$13,951	$13,475	$11,792	[f]= [d] + [e]
Market to Book Value of Common Equity	2.04	1.97	2.10	1.85	1.58	1.65	1.50	[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	$3,103	$3,103	$2,815	$2,595	$2,700	$2,755	$2,549	[j]
Current Liabilities	$2,117	$2,117	$2,598	$1,969	$2,273	$2,805	$3,008	[k]
Current Portion of Long-Term Debt	$1	$1	$109	$15	$468	$274	$896	[l]
Net Working Capital	$987	$987	$326	$641	$895	$224	$437	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$77	$77	$659	$410	$185	$653	$271	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$13,620	$13,620	$11,795	$9,478	$8,856	$7,909	$6,846	[p]
Book Value of Long-Term Debt	$13,621	$13,621	$11,904	$9,493	$9,324	$8,183	$7,742	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$986	$986	$635	$550	$897	$381	$1,080	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$14,607	$14,607	$12,539	$10,043	$10,221	$8,564	$8,822	[s] = [q] + [r].
Market Value of Debt	$14,607	$14,607	$12,539	$10,043	$10,221	$8,564	$8,822	[t] = [s].
MARKET VALUE OF FIRM	$35,411	$34,703	$32,231	$26,941	$24,172	$22,039	$20,614	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	58.75%	57.91%	61.10%	62.72%	57.71%	61.14%	57.20%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	41.25%	42.09%	38.90%	37.28%	42.29%	38.86%	42.80%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel I: Duke Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity		$42,995	$41,631	$40,489	$39,832	$41,412	$41,165	[a]
Shares Outstanding (in millions) - Common		713	700	689	688	707	706	[b]
Price per Share - Common		$88	$86	$81	$70	$74	$67	[c]
Market Value of Common Equity		$62,691	$60,010	$55,487	$47,883	$52,276	$47,133	[d] = [b] x [c].
Market Value of GP Equity		$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity		$62,691	$60,010	$55,487	$47,883	$52,276	$47,133	[f]= [d] + [e]
Market to Book Value of Common Equity		1.46	1.44	1.37	1.20	1.26	1.14	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity		$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity		$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets		$9,520	$7,706	$13,534	$10,195	$11,575	$10,418	[j]
Current Liabilities		$13,922	$10,820	$12,076	$10,516	$8,251	$9,239	[k]
Current Portion of Long-Term Debt		$3,455	$2,485	$3,201	$2,536	$1,156	$2,307	[l]
Net Working Capital		($947)	($629)	$4,659	$2,215	$4,480	$3,486	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)		$2,891	$1,899	$3,011	$2,419	$1,787	$1,278	[n]
Adjusted Short-Term Debt		$947	$629	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt		$50,507	$48,929	$43,964	$37,667	$38,702	$37,402	[p]
Book Value of Long-Term Debt		$54,909	$52,043	$47,165	$40,203	$39,858	$39,709	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt		$3,052	$1,266	$2,899	$4,546	$2,336	$4,540	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$57,961	$53,309	$50,064	$44,749	$42,194	$44,249	[s] = [q] + [r].
Market Value of Debt		$57,961	$53,309	$50,064	$44,749	$42,194	$44,249	[t] = [s].
MARKET VALUE OF FIRM		$120,652	$113,319	$105,551	$92,632	$94,470	$91,382	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	51.96%	49.77%	52.96%	52.57%	51.69%	55.34%	51.58%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	48.04%	50.23%	47.04%	47.43%	48.31%	44.66%	48.42%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel J: Edison Int'l

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$12,096	$12,096	$12,416	$11,814	$11,600	$10,736	$9,689	[a]
Shares Outstanding (in millions) - Common	326	326	326	326	326	326	326	[b]
Price per Share - Common	$58	$68	$80	$74	$61	$57	$46	[c]
Market Value of Common Equity	$18,821	$22,051	$25,912	$23,951	$19,740	$18,584	$14,938	[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	$18,821	$22,051	$25,912	$23,951	$19,740	$18,584	$14,938	[f]= [d] + [e]
Market to Book Value of Common Equity	1.56	1.82	2.09	2.03	1.70	1.73	1.54	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$2,193	$2,193	$2,194	$2,191	$2,020	$2,022	$1,753	[h]
Market Value of Preferred Equity	$2,193	$2,193	$2,194	$2,191	$2,020	$2,022	$1,753	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$3,383	$3,383	$2,758	$2,605	$3,792	$4,498	$3,603	[j]
Current Liabilities	$4,719	$4,719	$5,409	$5,342	$5,239	$5,849	$5,389	[k]
Current Portion of Long-Term Debt	$79	$79	$583	$881	$295	$704	$401	[l]
Net Working Capital	($1,257)	($1,257)	($2,068)	($1,856)	($1,152)	($647)	($1,385)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$103	$103	$908	$757	$1,154	$1,349	$1,528	[n]
Adjusted Short-Term Debt	$103	$103	$908	$757	$1,152	$647	$1,385	[o] = See Sources and Notes.
Long-Term Debt	$14,629	$14,629	$11,638	$10,407	$10,957	$10,133	$9,232	[p]
Book Value of Long-Term Debt	$14,811	$14,811	$13,129	$12,045	$12,404	$11,484	$11,018	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$1,637	$1,637	$1,212	$993	$1,581	$658	$1,713	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$16,448	$16,448	$14,341	$13,038	$13,985	$12,142	$12,731	[s] = [q] + [r].
Market Value of Debt	$16,448	$16,448	$14,341	$13,038	$13,985	$12,142	$12,731	[t] = [s].
MARKET VALUE OF FIRM	$37,462	$40,692	$42,447	$39,180	$35,745	$32,748	$29,422	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	50.24%	54.19%	61.05%	61.13%	55.22%	56.75%	50.77%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	5.85%	5.39%	5.17%	5.59%	5.65%	6.17%	5.96%	[w] = [i] / [u].
Debt - Market Value Ratio	43.91%	40.42%	33.79%	33.28%	39.12%	37.08%	43.27%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel K: El Paso Electric

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,197	$1,197	$1,136	$1,075	$1,021	$1,016	$894	[a]
Shares Outstanding (in millions) - Common	41	41	40	40	40	40	40	[b]
Price per Share - Common	$53	$60	$55	$47	$36	$37	$33	[c]
Market Value of Common Equity	$2,133	$2,418	$2,230	$1,886	$1,432	$1,481	$1,328	[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	$2,133	$2,418	$2,230	$1,886	$1,432	$1,481	$1,328	[f] = [d] + [e]
Market to Book Value of Common Equity	1.78	2.02	1.96	1.75	1.40	1.46	1.49	[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	$201	$201	$199	$192	$202	$207	$237	[j]
Current Liabilities	$204	$204	$316	$294	$251	$242	$141	[k]
Current Portion of Long-Term Debt	$0	$0	$0	$83	$0	$15	$0	[l]
Net Working Capital	($3)	($3)	($117)	($19)	($48)	($19)	$96	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$19	$19	$168	$55	$119	$90	$15	[n]
Adjusted Short-Term Debt	$3	$3	$117	$19	$48	$19	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,385	$1,385	$1,196	$1,195	$1,134	$985	$1,000	[p]
Book Value of Long-Term Debt	$1,388	$1,388	$1,313	$1,297	$1,182	$1,019	$1,000	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$232	$232	$139	$9	$150	$45	$160	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,621	$1,621	$1,452	$1,306	$1,332	$1,064	$1,160	[s] = [q] + [r].
Market Value of Debt	$1,621	$1,621	$1,452	$1,306	$1,332	$1,064	$1,160	[t] = [s].
MARKET VALUE OF FIRM	$3,754	$4,039	$3,682	$3,192	$2,764	$2,544	$2,487	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	56.83%	59.87%	60.56%	59.09%	51.80%	58.19%	53.38%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	43.17%	40.13%	39.44%	40.91%	48.20%	41.81%	46.62%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel L: Entergy Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$8,413	$8,413	$8,690	$10,069	$9,157	$10,149	$9,408	[a]
Shares Outstanding (in millions) - Common	181	181	180	179	178	180	178	[b]
Price per Share - Common	$87	$83	$78	$79	$64	$76	$64	[c]
Market Value of Common Equity	$15,786	$14,961	$13,998	$14,147	$11,376	$13,736	$11,359	[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	$15,786	$14,961	$13,998	$14,147	$11,376	$13,736	$11,359	[f]= [d] + [e]
Market to Book Value of Common Equity	1.88	1.78	1.61	1.40	1.24	1.35	1.21	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$198	$198	$203	$233	$211	$305	$281	[h]
Market Value of Preferred Equity	$198	$198	$203	$233	$211	$305	$281	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$3,695	$3,695	$3,471	$4,340	$4,117	$4,265	$3,490	[j]
Current Liabilities	$5,751	$5,751	$4,461	$3,452	$3,454	$4,454	$3,439	[k]
Current Portion of Long-Term Debt	$736	$736	$871	$753	$281	$1,117	$209	[l]
Net Working Capital	($1,320)	($1,320)	($118)	$1,641	$945	$927	$260	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,947	$1,947	$1,353	$433	$782	$891	$1,106	[n]
Adjusted Short-Term Debt	$1,320	$1,320	$118	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$15,802	$15,802	$14,000	$13,887	$13,080	$11,665	$12,308	[p]
Book Value of Long-Term Debt	$17,858	$17,858	$14,990	$14,640	$13,362	$12,782	$12,517	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$292	$292	($17)	$253	$208	($156)	$210	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$18,150	$18,150	$14,973	$14,892	$13,569	$12,625	$12,728	[s] = [q] + [r].
Market Value of Debt	$18,150	$18,150	$14,973	$14,892	$13,569	$12,625	$12,728	[t] = [s].
MARKET VALUE OF FIRM								
	$34,134	$33,309	$29,174	$29,272	$25,156	$26,665	$24,367	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	46.25%	44.92%	47.98%	48.33%	45.22%	51.51%	46.62%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.58%	0.59%	0.70%	0.80%	0.84%	1.14%	1.15%	[w] = [i] / [u].
Debt - Market Value Ratio	53.17%	54.49%	51.32%	50.88%	53.94%	47.35%	52.23%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel M: Eversource Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$11,409	$11,409	$10,998	$10,637	$10,294	$9,891	$9,517	[a]
Shares Outstanding (in millions) - Common	317	317	317	317	317	317	315	[b]
Price per Share - Common	$67	$62	$62	$55	$48	$45	$41	[c]
Market Value of Common Equity	$21,265	$19,745	$19,570	$17,382	$15,117	$14,213	$12,939	[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	$21,265	$19,745	$19,570	$17,382	$15,117	$14,213	$12,939	[f]= [d] + [e]
Market to Book Value of Common Equity	1.86	1.73	1.78	1.63	1.47	1.44	1.36	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$156	$156	$156	$156	$156	$156	$156	[h]
Market Value of Preferred Equity	$156	$156	$156	$156	$156	$156	$156	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$2,153	$2,153	$2,403	$2,415	$2,368	$2,102	$2,018	[j]
Current Liabilities	$3,630	$3,630	$2,620	$2,642	$2,972	$2,930	$3,378	[k]
Current Portion of Long-Term Debt	$387	$387	$958	$374	$229	$246	$608	[l]
Net Working Capital	($1,090)	($1,090)	$741	$147	($375)	($583)	($752)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,067	$1,067	$18	$735	$1,016	$1,047	$1,343	[n]
Adjusted Short-Term Debt	$1,067	$1,067	$0	$0	$375	$583	$752	[o] = See Sources and Notes.
Long-Term Debt	$12,152	$12,152	$10,468	$9,235	$8,757	$8,167	$7,444	[p]
Book Value of Long-Term Debt	$13,606	$13,606	$11,426	$9,609	$9,362	$8,995	$8,804	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$552	$552	$377	$391	$637	$133	$677	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$14,158	$14,158	$11,803	$10,000	$9,999	$9,128	$9,482	[s] = [q] + [r].
Market Value of Debt	$14,158	$14,158	$11,803	$10,000	$9,999	$9,128	$9,482	[t] = [s].
MARKET VALUE OF FIRM	$35,579	$34,058	$31,529	$27,538	$25,272	$23,496	$22,576	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59.77%	57.97%	62.07%	63.12%	59.82%	60.49%	57.31%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.44%	0.46%	0.49%	0.56%	0.62%	0.66%	0.69%	[w] = [i] / [u].
Debt - Market Value Ratio	39.79%	41.57%	37.44%	36.32%	39.56%	38.85%	42.00%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel N: FirstEnergy Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$6,803	$6,803	$6,406	$11,503	$12,627	$12,702	$12,544	[a]
Shares Outstanding (in millions) - Common	511	511	445	426	423	421	418	[b]
Price per Share - Common	$38	$37	$31	$34	$31	$34	$37	[c]
Market Value of Common Equity	$19,384	$19,049	$13,872	$14,301	$13,120	$14,402	$15,599	[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	$19,384	$19,049	$13,872	$14,301	$13,120	$14,402	$15,599	[f] = [d] + [e]
Market to Book Value of Common Equity	2.85	2.80	2.17	1.24	1.04	1.13	1.24	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$70	$70	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$70	$70	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$2,596	$2,596	$2,931	$3,480	$3,833	$3,785	$3,559	[j]
Current Liabilities	$5,800	$5,800	$4,255	$7,043	$5,876	$5,979	$7,955	[k]
Current Portion of Long-Term Debt	$1,128	$1,128	$1,076	$1,216	$1,148	$1,386	$1,889	[l]
Net Working Capital	($2,076)	($2,076)	($248)	($2,347)	($895)	($808)	($2,507)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,700	$1,700	$500	$2,975	$1,933	$1,621	$3,404	[n]
Adjusted Short-Term Debt	$1,700	$1,700	$248	$2,347	$895	$808	$2,507	[o] = See Sources and Notes.
Long-Term Debt	$16,608	$16,608	$21,089	$18,532	$19,093	$18,531	$15,291	[p]
Book Value of Long-Term Debt	$19,436	$19,436	$22,413	$22,095	$21,136	$20,725	$19,687	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$777	$777	($56)	$1,275	$1,905	$908	$2,503	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$20,213	$20,213	$22,357	$23,370	$23,041	$21,633	$22,190	[s] = [q] + [r].
Market Value of Debt	$20,213	$20,213	$22,357	$23,370	$23,041	$21,633	$22,190	[t] = [s].
MARKET VALUE OF FIRM	$39,667	$39,332	$36,229	$37,671	$36,161	$36,035	$37,789	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	48.87%	48.43%	38.29%	37.96%	36.28%	39.97%	41.28%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.18%	0.18%	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	50.96%	51.39%	61.71%	62.04%	63.72%	60.03%	58.72%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel O: IDACORP Inc.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,368	$2,368	$2,248	$2,149	$2,050	$1,949	$1,860	[a]
Shares Outstanding (in millions) - Common	50	50	50	50	50	50	50	[b]
Price per Share - Common	$97	$99	$89	$79	$61	$55	$48	[c]
Market Value of Common Equity	$4,884	$5,003	$4,490	$3,961	$3,087	$2,753	$2,403	[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	$4,884	$5,003	$4,490	$3,961	$3,087	$2,753	$2,403	[f]= [d] + [e]
Market to Book Value of Common Equity	2.06	2.11	2.00	1.84	1.51	1.41	1.29	[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	$583	$583	$458	$460	$494	$475	$567	[j]
Current Liabilities	$250	$250	$226	$205	$205	$240	$335	[k]
Current Portion of Long-Term Debt	$0	$0	$0	$1	$1	$1	$71	[l]
Net Working Capital	$332	$332	$232	$256	$290	$237	$303	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$2	$5	$4	$32	$53	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,834	$1,834	$1,746	$1,746	$1,742	$1,614	$1,615	[p]
Book Value of Long-Term Debt	$1,834	$1,834	$1,746	$1,747	$1,743	$1,615	$1,686	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$169	$169	$113	$87	$173	($16)	$282	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,004	$2,004	$1,859	$1,833	$1,916	$1,599	$1,968	[s] = [q] + [r].
Market Value of Debt	$2,004	$2,004	$1,859	$1,833	$1,916	$1,599	$1,968	[t] = [s].
MARKET VALUE OF FIRM	$6,888	$7,007	$6,348	$5,795	$5,003	$4,353	$4,370	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.91%	71.40%	70.72%	68.36%	61.71%	63.26%	54.97%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	29.09%	28.60%	29.28%	31.64%	38.29%	36.74%	45.03%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel P: MGE Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$812	$812	$753	$720	$689	$654	$613	[a]
Shares Outstanding (in millions) - Common	35	35	35	35	35	35	35	[b]
Price per Share - Common	$65	$65	$65	$57	$40	$39	$36	[c]
Market Value of Common Equity	$2,242	$2,260	$2,265	$1,975	$1,396	$1,340	$1,244	[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	$2,242	$2,260	$2,265	$1,975	$1,396	$1,340	$1,244	[f] = [d] + [e]
Market to Book Value of Common Equity	2.76	2.78	3.01	2.74	2.03	2.05	2.03	[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	$281	$281	$255	$249	$242	$225	$214	[j]
Current Liabilities	$98	$98	$85	$86	$74	$82	$79	[k]
Current Portion of Long-Term Debt	$5	$5	$4	$4	$4	$4	$4	[l]
Net Working Capital	$187	$187	$175	$167	$172	$147	$139	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$7	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$494	$494	$389	$384	$392	$396	$400	[p]
Book Value of Long-Term Debt	$499	$499	$394	$388	$396	$400	$405	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$48	$48	$39	$40	$58	$28	$66	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$547	$547	$433	$428	$454	$429	$470	[s] = [q] + [r].
Market Value of Debt	$547	$547	$433	$428	$454	$429	$470	[t] = [s].
MARKET VALUE OF FIRM	$2,790	$2,808	$2,698	$2,404	$1,850	$1,769	$1,714	[u] = [f] + [o] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	80.38%	80.51%	83.96%	82.18%	75.46%	75.77%	72.56%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	19.62%	19.49%	16.04%	17.82%	24.54%	24.23%	27.44%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel Q: NextEra Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$34,252	$34,252	$26,398	$23,907	$22,318	$18,810	$17,409	[a]
Shares Outstanding (in millions) - Common	478	478	470	467	461	436	431	[b]
Price per Share - Common	$176	$170	$148	$125	$97	$95	$80	[c]
Market Value of Common Equity	$84,212	$81,411	$69,521	$58,248	$44,783	$41,205	$34,660	[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	$84,212	$81,411	$69,521	$58,248	$44,783	$41,205	$34,660	[f]= [d] + [e]
Market to Book Value of Common Equity	2.46	2.38	2.63	2.44	2.01	2.19	1.99	[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	$8,349	$8,349	$7,027	$6,747	$6,657	$5,633	$5,472	[j]
Current Liabilities	$12,807	$12,807	$11,604	$10,456	$10,371	$9,572	$9,213	[k]
Current Portion of Long-Term Debt	$2,649	$2,649	$2,285	$2,364	$2,497	$3,385	$3,933	[l]
Net Working Capital	($1,809)	($1,809)	($2,292)	($1,345)	($1,217)	($554)	$192	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$2,890	$2,890	$2,329	$1,118	$2,163	$1,185	$915	[n]
Adjusted Short-Term Debt	$1,809	$1,809	$2,292	$1,118	$1,217	$554	$0	[o] = See Sources and Notes.
Long-Term Debt	$27,048	$27,048	$30,345	$28,195	$25,604	$24,853	$23,862	[p]
Book Value of Long-Term Debt	$31,506	$31,506	$34,922	$31,677	$29,318	$28,792	$27,795	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$2,313	$2,313	$1,205	$1,515	$2,461	$884	$2,227	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$33,819	$33,819	$36,127	$33,192	$31,779	$29,676	$30,022	[s] = [q] + [r].
Market Value of Debt	$33,819	$33,819	$36,127	$33,192	$31,779	$29,676	$30,022	[t] = [s].
MARKET VALUE OF FIRM	$118,031	$115,230	$105,648	$91,440	$76,562	$70,881	$64,682	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	71.35%	70.65%	65.80%	63.70%	58.49%	58.13%	53.59%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	28.65%	29.35%	34.20%	36.30%	41.51%	41.87%	46.41%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel R: NorthWestern Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,900	$1,900	$1,726	$1,649	$1,519	$1,082	$1,004	[a]
Shares Outstanding (in millions) - Common	54	54	52	52	51	43	42	[b]
Price per Share - Common	$62	$59	$58	$58	$51	$47	$43	[c]
Market Value of Common Equity	$3,329	$3,184	$3,049	$3,036	$2,603	$1,998	$1,818	[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	$3,329	$3,184	$3,049	$3,036	$2,603	$1,998	$1,818	[f]= [d] + [e]
Market to Book Value of Common Equity	1.75	1.68	1.77	1.84	1.71	1.85	1.81	[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	$247	$247	$254	$238	$316	$320	$281	[j]
Current Liabilities	$350	$350	$602	$547	$575	$493	$418	[k]
Current Portion of Long-Term Debt	$2	$2	$2	$2	$2	$2	$2	[l]
Net Working Capital	($100)	($100)	($346)	($307)	($257)	($171)	($136)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$270	$222	$218	$170	$103	[n]
Adjusted Short-Term Debt	$0	$0	$270	$222	$218	$170	$103	[o] = See Sources and Notes.
Long-Term Debt	$2,037	$2,037	$1,817	$1,819	$1,809	$1,211	$1,085	[p]
Book Value of Long-Term Debt	$2,039	$2,039	$2,089	$2,044	$2,029	$1,382	$1,190	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$108	$108	$59	$63	$156	$82	$174	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,147	$2,147	$2,147	$2,106	$2,184	$1,464	$1,364	[s] = [q] + [r].
Market Value of Debt	$2,147	$2,147	$2,147	$2,106	$2,184	$1,464	$1,364	[t] = [s].
MARKET VALUE OF FIRM	$5,476	$5,331	$5,196	$5,142	$4,788	$3,463	$3,182	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	60.79%	59.72%	58.67%	59.03%	54.38%	57.71%	57.13%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	39.21%	40.28%	41.33%	40.97%	45.62%	42.29%	42.87%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel S: OGE Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,030	$4,030	$3,617	$3,445	$3,353	$3,243	$2,995	[a]
Shares Outstanding (in millions) - Common	200	200	200	200	200	199	198	[b]
Price per Share - Common	$40	$37	$36	$32	$27	$36	$36	[c]
Market Value of Common Equity	$8,004	$7,331	$7,219	$6,386	$5,399	$7,266	$7,104	[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	$8,004	$7,331	$7,219	$6,386	$5,399	$7,266	$7,104	[f]= [d] + [e]
Market to Book Value of Common Equity	1.99	1.82	2.00	1.85	1.61	2.24	2.37	[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	$642	$642	$600	$547	$753	$740	$758	[j]
Current Liabilities	$841	$841	$954	$795	$587	$869	$942	[k]
Current Portion of Long-Term Debt	$250	$250	$350	$125	$110	$0	$0	[l]
Net Working Capital	$51	$51	($4)	($123)	$276	($129)	($184)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$147	$213	$0	$411	$447	[n]
Adjusted Short-Term Debt	$0	$0	$4	$123	$0	$129	$184	[o] = See Sources and Notes.
Long-Term Debt	$2,897	$2,897	$2,750	$2,505	$2,646	$2,510	$2,400	[p]
Book Value of Long-Term Debt	$3,147	$3,147	$3,103	$2,753	$2,756	$2,639	$2,584	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$389	$389	$273	($244)	($206)	$253	$548	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$3,535	$3,535	$3,377	$2,510	$2,550	$2,891	$3,132	[s] = [q] + [r].
Market Value of Debt	$3,535	$3,535	$3,377	$2,510	$2,550	$2,891	$3,132	[t] = [s].
MARKET VALUE OF FIRM	$11,539	$10,866	$10,596	$8,896	$7,949	$10,157	$10,236	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.36%	67.46%	68.13%	71.79%	67.92%	71.54%	69.41%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	30.64%	32.54%	31.87%	28.21%	32.08%	28.46%	30.59%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel T: Otter Tail Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$725	$725	$693	$657	$598	$563	$530	[a]
Shares Outstanding (in millions) - Common	40	40	40	39	38	37	36	[b]
Price per Share - Common	$50	$48	$43	$35	$26	$27	$28	[c]
Market Value of Common Equity	$1,972	$1,907	$1,703	$1,380	$972	$1,007	$1,006	[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	$1,972	$1,907	$1,703	$1,380	$972	$1,007	$1,006	[f]= [d] + [e]
Market to Book Value of Common Equity	2.72	2.63	2.46	2.10	1.63	1.79	1.90	[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	$241	$241	$228	$204	$274	$298	$310	[j]
Current Liabilities	$163	$163	$246	$246	$237	$200	$220	[k]
Current Portion of Long-Term Debt	$0	$0	$0	$85	$0	$0	$0	[l]
Net Working Capital	$78	$78	($18)	$43	$37	$98	$91	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$15	$15	$104	$37	$87	$39	$40	[n]
Adjusted Short-Term Debt	$0	$0	$18	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$590	$590	$490	$461	$498	$499	$437	[p]
Book Value of Long-Term Debt	$590	$590	$508	$546	$499	$499	$437	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$52	$52	$45	$65	$102	$38	$69	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$642	$642	$554	$611	$601	$537	$507	[s] = [q] + [r].
Market Value of Debt	$642	$642	$554	$611	$601	$537	$507	[t] = [s].
MARKET VALUE OF FIRM	$2,615	$2,549	$2,257	$1,991	$1,573	$1,544	$1,513	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	75.44%	74.80%	75.47%	69.31%	61.81%	65.24%	66.49%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	24.56%	25.20%	24.53%	30.69%	38.19%	34.76%	33.51%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
  Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel U: Pinnacle West Capital

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$5,354	$5,354	$5,142	$4,853	$4,654	$4,492	$4,276	[a]
Shares Outstanding (in millions) - Common	112	112	112	111	111	110	110	[b]
Price per Share - Common	$89	$80	$87	$77	$62	$56	$55	[c]
Market Value of Common Equity	$9,916	$8,907	$9,757	$8,563	$6,850	$6,196	$6,003	[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	$9,916	$8,907	$9,757	$8,563	$6,850	$6,196	$6,003	[f]= [d] + [e]
Market to Book Value of Common Equity	1.85	1.66	1.90	1.76	1.47	1.38	1.40	[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	$1,207	$1,207	$1,174	$977	$1,062	$1,041	$1,350	[j]
Current Liabilities	$1,735	$1,735	$1,303	$1,110	$1,523	$1,449	$1,447	[k]
Current Portion of Long-Term Debt	$600	$600	$207	$17	$411	$369	$566	[l]
Net Working Capital	$72	$72	$78	($115)	($50)	($39)	$470	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$128	$128	$131	$117	$57	$19	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$115	$50	$19	$0	[o] = See Sources and Notes.
Long-Term Debt	$4,487	$4,487	$4,491	$4,145	$3,257	$3,038	$2,820	[p]
Book Value of Long-Term Debt	$5,087	$5,087	$4,698	$4,278	$3,719	$3,426	$3,387	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$433	$433	$279	$286	$424	$242	$553	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$5,521	$5,521	$4,977	$4,564	$4,143	$3,668	$3,940	[s] = [q] + [r].
Market Value of Debt	$5,521	$5,521	$4,977	$4,564	$4,143	$3,668	$3,940	[t] = [s].
MARKET VALUE OF FIRM	$15,437	$14,427	$14,734	$13,127	$10,993	$9,864	$9,943	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	64.24%	61.73%	66.22%	65.23%	62.31%	62.81%	60.38%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	35.76%	38.27%	33.78%	34.77%	37.69%	37.19%	39.62%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel V: PNM Resources

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,771	$1,771	$1,766	$1,688	$1,763	$1,723	$1,665	[a]
Shares Outstanding (in millions) - Common	80	80	80	80	80	80	80	[b]
Price per Share - Common	$43	$39	$42	$33	$26	$26	$22	[c]
Market Value of Common Equity	$3,392	$3,135	$3,317	$2,640	$2,094	$2,053	$1,766	[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	$3,392	$3,135	$3,317	$2,640	$2,094	$2,053	$1,766	[f] = [d] + [e]
Market to Book Value of Common Equity	1.91	1.77	1.88	1.56	1.19	1.19	1.06	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$12	$12	$12	$12	$12	$12	$12	[h]
Market Value of Preferred Equity	$12	$12	$12	$12	$12	$12	$12	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$364	$364	$375	$399	$408	$466	$401	[j]
Current Liabilities	$980	$980	$711	$702	$519	$700	$416	[k]
Current Portion of Long-Term Debt	$472	$472	$165	$101	$125	$333	$53	[l]
Net Working Capital	($145)	($145)	($171)	($202)	$14	$99	$37	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$263	$263	$267	$356	$103	$100	$112	[n]
Adjusted Short-Term Debt	$145	$145	$171	$202	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$2,143	$2,143	$2,282	$2,207	$1,980	$1,542	$1,696	[p]
Book Value of Long-Term Debt	$2,759	$2,759	$2,619	$2,510	$2,105	$1,875	$1,749	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$69	$69	$99	$123	$142	$92	$170	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,828	$2,828	$2,718	$2,632	$2,247	$1,967	$1,919	[s] = [q] + [r].
Market Value of Debt	$2,828	$2,828	$2,718	$2,632	$2,247	$1,967	$1,919	[t] = [s].
MARKET VALUE OF FIRM	$6,232	$5,975	$6,046	$5,284	$4,353	$4,032	$3,697	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	54.43%	52.47%	54.86%	49.97%	48.11%	50.91%	47.78%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.18%	0.19%	0.19%	0.22%	0.26%	0.29%	0.31%	[w] = [i] / [u].
Debt - Market Value Ratio	45.39%	47.34%	44.95%	49.82%	51.62%	48.80%	51.90%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel W: Portland General

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,486	$2,486	$2,402	$2,310	$2,232	$1,889	$1,792	[a]
Shares Outstanding (in millions) - Common	89	89	89	89	89	78	78	[b]
Price per Share - Common	$47	$46	$46	$43	$36	$33	$28	[c]
Market Value of Common Equity	$4,220	$4,113	$4,140	$3,833	$3,155	$2,567	$2,212	[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	$4,220	$4,113	$4,140	$3,833	$3,155	$2,567	$2,212	[f]= [d] + [e]
Market to Book Value of Common Equity	1.70	1.65	1.72	1.66	1.41	1.36	1.23	[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	$631	$631	$466	$476	$605	$542	$565	[j]
Current Liabilities	$703	$703	$491	$448	$465	$482	$380	[k]
Current Portion of Long-Term Debt	$300	$300	$100	$0	$0	$70	$50	[l]
Net Working Capital	$228	$228	$75	$28	$140	$130	$235	[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	$2,127	$2,127	$2,277	$2,325	$2,204	$2,251	$1,761	[p]
Book Value of Long-Term Debt	$2,427	$2,427	$2,377	$2,325	$2,204	$2,321	$1,811	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$403	$403	$343	$251	$400	$158	$313	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,830	$2,830	$2,720	$2,576	$2,604	$2,479	$2,124	[s] = [q] + [r].
Market Value of Debt	$2,830	$2,830	$2,720	$2,576	$2,604	$2,479	$2,124	[t] = [s].
MARKET VALUE OF FIRM	$7,050	$6,943	$6,860	$6,409	$5,759	$5,046	$4,336	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59.86%	59.24%	60.35%	59.81%	54.79%	50.87%	51.02%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	40.14%	40.76%	39.65%	40.19%	45.21%	49.13%	48.98%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
   Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel X: PPL Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$11,783	$11,783	$10,692	$9,975	$10,222	$13,974	$12,344	[a]
Shares Outstanding (in millions) - Common	720	720	688	679	672	665	630	[b]
Price per Share - Common	$29	$30	$39	$35	$31	$31	$28	[c]
Market Value of Common Equity	$20,995	$21,335	$26,705	$23,739	$20,835	$20,387	$17,754	[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	$20,995	$21,335	$26,705	$23,739	$20,835	$20,387	$17,754	[f]= [d] + [e]
Market to Book Value of Common Equity	1.78	1.81	2.50	2.38	2.04	1.46	1.44	[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	$2,545	$2,545	$2,331	$2,099	$2,990	$5,760	$4,971	[j]
Current Liabilities	$4,383	$4,383	$4,149	$3,412	$4,468	$5,412	$4,948	[k]
Current Portion of Long-Term Debt	$330	$330	$448	$443	$1,460	$235	$751	[l]
Net Working Capital	($1,508)	($1,508)	($1,370)	($870)	($18)	$583	$774	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,549	$1,549	$1,211	$636	$557	$1,099	$499	[n]
Adjusted Short-Term Debt	$1,508	$1,508	$1,211	$636	$18	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$19,924	$19,924	$19,110	$18,069	$17,745	$20,522	$19,092	[p]
Book Value of Long-Term Debt	$21,762	$21,762	$20,769	$19,148	$19,223	$20,757	$19,843	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$3,588	$3,588	$3,029	$2,929	$3,568	$1,761	$3,473	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$25,350	$25,350	$23,798	$22,077	$22,791	$22,518	$23,316	[s] = [q] + [r].
Market Value of Debt	$25,350	$25,350	$23,798	$22,077	$22,791	$22,518	$23,316	[t] = [s].
MARKET VALUE OF FIRM	$46,345	$46,685	$50,503	$45,816	$43,626	$42,905	$41,070	[u] = [f] + [o] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	45.30%	45.70%	52.88%	51.81%	47.76%	47.52%	43.23%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	54.70%	54.30%	47.12%	48.19%	52.24%	52.48%	56.77%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel Y: Public Serv. Enterprise

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$14,359	$14,359	$13,124	$13,476	$12,933	$12,083	$11,338	[a]
Shares Outstanding (in millions) - Common	504	504	505	505	505	506	506	[b]
Price per Share - Common	$53	$52	$46	$43	$40	$38	$33	[c]
Market Value of Common Equity	$26,823	$26,428	$23,230	$21,487	$20,317	$18,979	$16,702	[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	$26,823	$26,428	$23,230	$21,487	$20,317	$18,979	$16,702	[f]= [d] + [e]
Market to Book Value of Common Equity	1.87	1.84	1.77	1.59	1.57	1.57	1.47	[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	$3,215	$3,215	$3,081	$3,209	$3,204	$3,846	$3,741	[j]
Current Liabilities	$4,485	$4,485	$3,831	$2,804	$3,604	$3,136	$3,235	[k]
Current Portion of Long-Term Debt	$1,450	$1,450	$1,250	$662	$1,106	$574	$1,010	[l]
Net Working Capital	$180	$180	$500	$1,067	$706	$1,284	$1,516	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$419	$419	$202	$255	$20	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$12,909	$12,909	$11,274	$10,697	$8,132	$8,389	$7,476	[p]
Book Value of Long-Term Debt	$14,359	$14,359	$12,524	$11,359	$9,238	$8,963	$8,486	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$994	$994	$608	$688	$1,005	$418	$1,385	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$15,353	$15,353	$13,132	$12,047	$10,243	$9,381	$9,871	[s] = [q] + [r].
Market Value of Debt	$15,353	$15,353	$13,132	$12,047	$10,243	$9,381	$9,871	[t] = [s].
MARKET VALUE OF FIRM	$42,176	$41,781	$36,362	$33,534	$30,560	$28,360	$26,573	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	63.60%	63.25%	63.89%	64.08%	66.48%	66.92%	62.85%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	36.40%	36.75%	36.11%	35.92%	33.52%	33.08%	37.15%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel Z: Southern Co.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$24,877	$24,877	$24,082	$24,547	$20,664	$19,857	$18,778	[a]
Shares Outstanding (in millions) - Common	999	999	999	980	909	900	882	[b]
Price per Share - Common	$45	$44	$50	$52	$43	$44	$42	[c]
Market Value of Common Equity	$45,431	$43,762	$49,457	$51,295	$39,408	$39,217	$36,620	[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	$45,431	$43,762	$49,457	$51,295	$39,408	$39,217	$36,620	[f]= [d] + [e]
Market to Book Value of Common Equity	1.83	1.76	2.05	2.09	1.91	1.97	1.95	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$324	$324	$823	$727	$727	$1,131	$1,131	[h]
Market Value of Preferred Equity	$324	$324	$823	$727	$727	$1,131	$1,131	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$9,384	$9,384	$9,202	$9,658	$6,270	$6,258	$5,785	[j]
Current Liabilities	$12,965	$12,965	$12,603	$10,567	$9,689	$6,890	$5,704	[k]
Current Portion of Long-Term Debt	$3,013	$3,013	$3,505	$2,254	$3,313	$2,398	$1,307	[l]
Net Working Capital	($568)	($568)	$104	$1,345	($106)	$1,766	$1,388	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$2,564	$2,564	$2,579	$1,670	$1,490	$361	$750	[n]
Adjusted Short-Term Debt	$568	$568	$0	$0	$106	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$41,425	$41,425	$44,042	$41,550	$22,326	$21,699	$21,053	[p]
Book Value of Long-Term Debt	$45,006	$45,006	$47,547	$43,804	$25,745	$24,097	$22,360	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$3,197	$3,197	$1,206	$697	$2,002	$547	$1,950	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$48,203	$48,203	$48,753	$44,501	$27,747	$24,644	$24,310	[s] = [q] + [r].
Market Value of Debt	$48,203	$48,203	$48,753	$44,501	$27,747	$24,644	$24,310	[t] = [s].
MARKET VALUE OF FIRM	$93,958	$92,289	$99,033	$96,523	$67,882	$64,992	$62,061	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	48.35%	47.42%	49.94%	53.14%	58.05%	60.34%	59.01%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.34%	0.35%	0.83%	0.75%	1.07%	1.74%	1.82%	[w] = [i] / [u].
Debt - Market Value Ratio	51.30%	52.23%	49.23%	46.10%	40.88%	37.92%	39.17%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AA: Until Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$345	$345	$298	$287	$278	$268	$254	[a]
Shares Outstanding (in millions) - Common	15	15	14	14	14	14	14	[b]
Price per Share - Common	$51	$51	$50	$39	$36	$32	$29	[c]
Market Value of Common Equity	$757	$763	$699	$552	$499	$439	$400	[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	$757	$763	$699	$552	$499	$439	$400	[f]= [d] + [e]
Market to Book Value of Common Equity	2.20	2.21	2.35	1.92	1.80	1.64	1.58	[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	$121	$121	$122	$108	$107	$112	$112	[j]
Current Liabilities	$181	$181	$216	$126	$101	$76	$116	[k]
Current Portion of Long-Term Debt	$35	$35	$33	$20	$4	$3	$1	[l]
Net Working Capital	($25)	($25)	($61)	$1	$10	$39	($3)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$69	$69	$112	$37	$4	$1	$44	[n]
Adjusted Short-Term Debt	$25	$25	$61	$0	$0	$0	$3	[o] = See Sources and Notes.
Long-Term Debt	$365	$365	$310	$344	$338	$333	$287	[p]
Book Value of Long-Term Debt	$424	$424	$404	$364	$342	$336	$291	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$81	$81	$54	$40	$52	$43	$62	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$505	$505	$458	$404	$394	$378	$353	[s] = [q] + [r].
Market Value of Debt	$505	$505	$458	$404	$394	$378	$353	[t] = [s].
MARKET VALUE OF FIRM	$1,263	$1,269	$1,157	$956	$893	$817	$754	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59.98%	60.16%	60.42%	57.74%	55.88%	53.69%	53.11%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	[w] = [i] / [u].
Debt - Market Value Ratio	40.00%	39.82%	39.56%	42.24%	44.09%	46.28%	46.86%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AB: WEC Energy Group

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$9,775	$9,775	$9,195	$8,892	$8,630	$4,398	$4,198	[a]
Shares Outstanding (in millions) - Common	316	316	316	316	316	226	227	[b]
Price per Share - Common	$72	$68	$65	$61	$49	$44	$40	[c]
Market Value of Common Equity	$22,598	$21,308	$20,397	$19,308	$15,623	$9,898	$9,171	[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	$22,598	$21,308	$20,397	$19,308	$15,623	$9,898	$9,171	[f]= [d] + [e]
Market to Book Value of Common Equity	2.31	2.18	2.22	2.17	1.81	2.25	2.18	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$30	$30	$30	$30	$82	$30	$30	[h]
Market Value of Preferred Equity	$30	$30	$30	$30	$82	$30	$30	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$1,840	$1,840	$1,823	$1,818	$2,182	$1,275	$1,238	[j]
Current Liabilities	$3,603	$3,603	$3,026	$2,026	$2,667	$1,066	$1,291	[k]
Current Portion of Long-Term Debt	$369	$369	$709	$89	$606	$48	$371	[l]
Net Working Capital	($1,393)	($1,393)	($494)	($118)	$121	$257	$318	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,788	$1,788	$994	$789	$662	$476	$362	[n]
Adjusted Short-Term Debt	$1,393	$1,393	$494	$118	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$9,119	$9,119	$8,786	$9,088	$8,727	$4,570	$4,371	[p]
Book Value of Long-Term Debt	$10,882	$10,882	$9,989	$9,296	$9,333	$4,617	$4,742	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$780	$780	$532	$459	$616	$285	$674	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$11,662	$11,662	$10,521	$9,755	$9,949	$4,902	$5,416	[s] = [q] + [r].
Market Value of Debt	$11,662	$11,662	$10,521	$9,755	$9,949	$4,902	$5,416	[t] = [s].
MARKET VALUE OF FIRM	$34,291	$33,000	$30,949	$29,093	$25,653	$14,831	$14,617	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	65.90%	64.57%	65.91%	66.37%	60.90%	66.74%	62.74%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.09%	0.09%	0.10%	0.10%	0.32%	0.20%	0.21%	[w] = [i] / [u].
Debt - Market Value Ratio	34.01%	35.34%	33.99%	33.53%	38.78%	33.06%	37.05%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AC: Xcel Energy Inc.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$12,165	$12,165	$11,439	$10,988	$10,545	$10,155	$9,547	[a]
Shares Outstanding (in millions) - Common	513	513	508	508	507	505	498	[b]
Price per Share - Common	$51	$48	$48	$42	$34	$31	$28	[c]
Market Value of Common Equity	$26,330	$24,475	$24,546	$21,223	$17,219	$15,664	$13,799	[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	$26,330	$24,475	$24,546	$21,223	$17,219	$15,664	$13,799	[f]= [d] + [e]
Market to Book Value of Common Equity	2.16	2.01	2.15	1.93	1.63	1.54	1.45	[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	$3,003	$3,003	$2,899	$3,076	$3,344	$3,197	$3,121	[j]
Current Liabilities	$3,838	$3,838	$3,340	$3,454	$3,085	$3,471	$2,839	[k]
Current Portion of Long-Term Debt	$556	$556	$305	$710	$457	$258	$281	[l]
Net Working Capital	($279)	($279)	($136)	$332	$717	($17)	$562	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$437	$437	$514	$366	$64	$697	$302	[n]
Adjusted Short-Term Debt	$279	$279	$136	$0	$0	$17	$0	[o] = See Sources and Notes.
Long-Term Debt	$15,508	$15,508	$14,573	$13,403	$12,691	$11,502	$10,914	[p]
Book Value of Long-Term Debt	$16,343	$16,343	$15,014	$14,112	$13,148	$11,776	$11,195	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$1,555	$1,555	$1,063	$947	$1,603	$687	$1,806	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$17,898	$17,898	$16,077	$15,059	$14,751	$12,463	$13,001	[s] = [q] + [r].
Market Value of Debt	$17,898	$17,898	$16,077	$15,059	$14,751	$12,463	$13,001	[t] = [s].
MARKET VALUE OF FIRM	$44,228	$42,373	$40,624	$36,282	$31,970	$28,128	$26,800	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59.53%	57.76%	60.42%	58.49%	53.86%	55.69%	51.49%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	40.47%	42.24%	39.58%	41.51%	46.14%	44.31%	48.51%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AD: Atmos Energy

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,770	$4,770	$3,899	$3,463	$3,195	$3,086	$2,580	[a]
Shares Outstanding (in millions) - Common	111	111	106	104	104	100	91	[b]
Price per Share - Common	$95	$94	$86	$75	$56	$49	$42	[c]
Market Value of Common Equity	$10,557	$10,426	$9,078	$7,799	$5,817	$4,908	$3,764	[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	$10,557	$10,426	$9,078	$7,799	$5,817	$4,908	$3,764	[f]= [d] + [e]
Market to Book Value of Common Equity	2.21	2.19	2.33	2.25	1.82	1.59	1.46	[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	$479	$479	$540	$682	$626	$776	$683	[j]
Current Liabilities	$1,915	$1,915	$1,013	$1,788	$1,155	$911	$978	[k]
Current Portion of Long-Term Debt	$575	$575	$0	$250	$0	$500	$0	[l]
Net Working Capital	($861)	($861)	($474)	($857)	($529)	$365	($295)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$576	$576	$448	$830	$458	$197	$368	[n]
Adjusted Short-Term Debt	$576	$576	$448	$830	$458	$0	$295	[o] = See Sources and Notes.
Long-Term Debt	$2,494	$2,494	$3,067	$2,189	$2,438	$2,456	$2,456	[p]
Book Value of Long-Term Debt	$3,644	$3,644	$3,515	$3,269	$2,895	$2,956	$2,751	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$297	$297	$385	$209	$310	$216	$466	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$3,942	$3,942	$3,900	$3,478	$3,205	$3,172	$3,217	[s] = [q] + [r].
Market Value of Debt	$3,942	$3,942	$3,900	$3,478	$3,205	$3,172	$3,217	[t] = [s].
MARKET VALUE OF FIRM	$14,499	$14,368	$12,978	$11,277	$9,022	$8,081	$6,981	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	72.81%	72.57%	69.95%	69.16%	64.48%	60.74%	53.92%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	27.19%	27.43%	30.05%	30.84%	35.52%	39.26%	46.08%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AE: Chesapeake Utilities

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$508	$508	$464	$438	$353	$296	$270	[a]
Shares Outstanding (in millions) - Common	16	16	16	16	15	15	14	[b]
Price per Share - Common	$86	$87	$79	$62	$49	$43	$35	[c]
Market Value of Common Equity	$1,403	$1,423	$1,294	$1,007	$755	$622	$506	[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	$1,403	$1,423	$1,294	$1,007	$755	$622	$506	[f]= [d] + [e]
Market to Book Value of Common Equity	2.76	2.80	2.79	2.30	2.14	2.10	1.88	[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	$129	$129	$149	$102	$88	$88	$98	[j]
Current Liabilities	$427	$427	$339	$263	$237	$169	$195	[k]
Current Portion of Long-Term Debt	$10	$10	$12	$12	$9	$11	$8	[l]
Net Working Capital	($289)	($289)	($178)	($149)	($140)	($70)	($89)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$268	$268	$203	$154	$127	$71	$91	[n]
Adjusted Short-Term Debt	$268	$268	$178	$149	$127	$70	$89	[o] = See Sources and Notes.
Long-Term Debt	$242	$242	$201	$144	$156	$165	$107	[p]
Book Value of Long-Term Debt	$520	$520	$392	$304	$292	$246	$204	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$10	$10	$16	$11	$19	$15	$23	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$530	$530	$407	$316	$311	$261	$227	[s] = [q] + [r].
Market Value of Debt	$530	$530	$407	$316	$311	$261	$227	[t] = [s].
MARKET VALUE OF FIRM	$1,932	$1,953	$1,701	$1,323	$1,066	$882	$734	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	72.59%	72.87%	76.07%	76.12%	70.80%	70.47%	69.00%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	27.41%	27.13%	23.93%	23.88%	29.20%	29.53%	31.00%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
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Prices are reported in Workpaper #1 to Schedule No. BV-6.
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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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AF: NiSource Inc.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,680	$4,680	$4,363	$3,812	$3,800	$6,007	$5,701	[a]
Shares Outstanding (in millions) - Common	363	363	337	323	318	316	313	[b]
Price per Share - Common	$26	$26	$26	$24	$17	$16	$12	[c]
Market Value of Common Equity	$9,563	$9,407	$8,845	$7,863	$5,540	$4,899	$3,738	[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	$9,563	$9,407	$8,845	$7,863	$5,540	$4,899	$3,738	[f]= [d] + [e]
Market to Book Value of Common Equity	2.04	2.01	2.03	2.06	1.46	0.82	0.66	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$394	$394	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity	$394	$394	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$1,369	$1,369	$1,332	$1,379	$1,638	$2,012	$1,746	[j]
Current Liabilities	$3,411	$3,411	$2,567	$2,912	$2,073	$3,049	$3,006	[k]
Current Portion of Long-Term Debt	$49	$49	$290	$583	$443	$19	$541	[l]
Net Working Capital	($1,994)	($1,994)	($945)	($951)	$7	($1,018)	($719)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1,611	$1,611	$843	$1,059	$107	$1,311	$821	[n]
Adjusted Short-Term Debt	$1,611	$1,611	$843	$951	$0	$1,018	$719	[o] = See Sources and Notes.
Long-Term Debt	$7,095	$7,095	$7,519	$6,096	$6,134	$8,397	$7,089	[p]
Book Value of Long-Term Debt	$8,754	$8,754	$8,652	$7,629	$6,576	$9,434	$8,349	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$807	$807	$643	$594	$1,088	$562	$1,063	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$9,561	$9,561	$9,294	$8,223	$7,664	$9,996	$9,412	[s] = [q] + [r].
Market Value of Debt	$9,561	$9,561	$9,294	$8,223	$7,664	$9,996	$9,412	[t] = [s].
MARKET VALUE OF FIRM	$19,518	$19,361	$18,139	$16,086	$13,204	$14,895	$13,149	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	49.00%	48.58%	48.76%	48.88%	41.96%	32.89%	28.42%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	2.02%	2.03%	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	48.99%	49.38%	51.24%	51.12%	58.04%	67.11%	71.58%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
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Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AG: Northwest Natural

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$738	$738	$847	$779	$759	$752	$730	[a]
Shares Outstanding (in millions) - Common	29	29	29	28	27	27	27	[b]
Price per Share - Common	$63	$68	$66	$61	$44	$43	$41	[c]
Market Value of Common Equity	$1,830	$1,960	$1,891	$1,674	$1,212	$1,178	$1,115	[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	$1,830	$1,960	$1,891	$1,674	$1,212	$1,178	$1,115	[f]= [d] + [e]
Market to Book Value of Common Equity	2.48	2.66	2.23	2.15	1.60	1.57	1.53	[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	$218	$218	$200	$211	$277	$248	$196	[j]
Current Liabilities	$383	$383	$203	$403	$385	$386	$342	[k]
Current Portion of Long-Term Debt	$85	$85	$22	$65	$0	$40	$60	[l]
Net Working Capital	($80)	($80)	$19	($127)	($109)	($98)	($87)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$101	$101	$0	$195	$225	$190	$141	[n]
Adjusted Short-Term Debt	$80	$80	$0	$127	$109	$98	$87	[o] = See Sources and Notes.
Long-Term Debt	$725	$725	$757	$530	$614	$622	$682	[p]
Book Value of Long-Term Debt	$889	$889	$779	$722	$723	$759	$828	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$73	$73	$74	$65	$95	$65	$143	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$963	$963	$853	$788	$818	$824	$971	[s] = [q] + [r].
Market Value of Debt	$963	$963	$853	$788	$818	$824	$971	[t] = [s].
MARKET VALUE OF FIRM	$2,793	$2,923	$2,744	$2,461	$2,030	$2,002	$2,086	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	65.53%	67.06%	68.90%	67.99%	59.72%	58.85%	53.44%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	34.47%	32.94%	31.10%	32.01%	40.28%	41.15%	46.56%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AH: ONE Gas Inc.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,017	$2,017	$1,932	$1,862	$1,811	$1,771	$1,203	[a]
Shares Outstanding (in millions) - Common	53	53	52	52	52	52	-	[b]
Price per Share - Common	$83	$81	$75	$62	$44	$36	N/A	[c]
Market Value of Common Equity	$4,337	$4,277	$3,902	$3,251	$2,275	$1,866	N/A	[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	$4,337	$4,277	$3,902	$3,251	$2,275	$1,866	N/A	[f]= [d] + [e]
Market to Book Value of Common Equity	2.15	2.12	2.02	1.75	1.26	1.05	N/A	[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	$375	$375	$446	$377	$417	$505	$392	[j]
Current Liabilities	$1,358	$1,358	$392	$259	$233	$274	$572	[k]
Current Portion of Long-Term Debt	$300	$300	$0	$0	$0	$0	$0	[l]
Net Working Capital	($683)	($683)	$53	$118	$184	$231	($180)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$276	$276	$174	$41	$0	$0	$342	[n]
Adjusted Short-Term Debt	$276	$276	$0	$0	$0	$0	$180	[o] = See Sources and Notes.
Long-Term Debt	$894	$894	$1,193	$1,192	$1,201	$1,201	$1,029	[p]
Book Value of Long-Term Debt	$1,470	$1,470	$1,193	$1,192	$1,201	$1,201	$1,209	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$100	$100	$0	$0	$100	$200	$300	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$1,570	$1,570	$1,193	$1,192	$1,301	$1,401	$1,509	[s] = [q] + [r].
Market Value of Debt	$1,570	$1,570	$1,193	$1,192	$1,301	$1,401	$1,509	[t] = [s].
MARKET VALUE OF FIRM	$5,907	$5,847	$5,095	$4,444	$3,576	$3,268	N/A	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	73.42%	73.15%	76.58%	73.17%	63.61%	57.12%	N/A	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	N/A	[w] = [i] / [u].
Debt - Market Value Ratio	26.58%	26.85%	23.42%	26.83%	36.39%	42.88%	N/A	[x] = [t] / [u].

Sources and Notes:
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    Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel A1: Southwest Gas

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,946	$1,946	$1,716	$1,625	$1,550	$1,454	$1,363	[a]
Shares Outstanding (in millions) - Common	49	49	48	47	47	47	46	[b]
Price per Share - Common	$79	$80	$79	$71	$55	$50	$48	[c]
Market Value of Common Equity	$3,914	$3,967	$3,767	$3,360	$2,625	$2,344	$2,246	[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	$3,914	$3,967	$3,767	$3,360	$2,625	$2,344	$2,246	[f]= [d] + [e]
Market to Book Value of Common Equity	2.01	2.04	2.20	2.07	1.69	1.61	1.65	[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	$721	$721	$539	$544	$479	$451	$348	[j]
Current Liabilities	$713	$713	$656	$613	$495	$394	$406	[k]
Current Portion of Long-Term Debt	$33	$33	$28	$49	$20	$11	$11	[l]
Net Working Capital	$42	$42	($89)	($19)	$4	$68	($47)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$32	$32	$111	$0	$0	$0	$33	[n]
Adjusted Short-Term Debt	$0	$0	$89	$0	$0	$0	$33	[o] = See Sources and Notes.
Long-Term Debt	$2,124	$2,124	$1,732	$1,593	$1,540	$1,438	$1,280	[p]
Book Value of Long-Term Debt	$2,157	$2,157	$1,849	$1,642	$1,560	$1,449	$1,324	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$121	$121	$130	$94	$139	$71	$164	[r]= See Sources and Notes.
Market Value of Long-Term Debt	$2,278	$2,278	$1,979	$1,737	$1,699	$1,520	$1,488	[s] = [q] + [r].
Market Value of Debt	$2,278	$2,278	$1,979	$1,737	$1,699	$1,520	$1,488	[t] = [s].
MARKET VALUE OF FIRM	$6,192	$6,245	$5,747	$5,096	$4,325	$3,864	$3,734	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	63.21%	63.52%	65.56%	65.92%	60.71%	60.66%	60.15%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	36.79%	36.48%	34.44%	34.08%	39.29%	39.34%	39.85%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
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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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AJ: Spire Inc.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,255	$2,255	$1,991	$1,768	$1,574	$1,508	$1,046	[a]
Shares Outstanding (in millions) - Common	51	51	48	46	43	43	33	[b]
Price per Share - Common	$76	$75	$75	$64	$52	$47	$44	[c]
Market Value of Common Equity	$3,855	$3,779	$3,632	$2,936	$2,265	$2,043	$1,448	[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	$3,855	$3,779	$3,632	$2,936	$2,265	$2,043	$1,448	[f]= [d] + [e]
Market to Book Value of Common Equity	1.71	1.68	1.82	1.66	1.44	1.35	1.38	[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	$660	$660	$726	$570	$530	$628	$476	[j]
Current Liabilities	$1,322	$1,322	$1,098	$1,161	$854	$786	$353	[k]
Current Portion of Long-Term Debt	$176	$176	$100	$250	$80	$0	$0	[l]
Net Working Capital	($487)	($487)	($272)	($342)	($244)	($158)	$123	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$554	$554	$477	$399	$338	$287	$74	[n]
Adjusted Short-Term Debt	$487	$487	$272	$342	$244	$158	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,900	$1,900	$1,995	$1,821	$1,772	$1,851	$913	[p]
Book Value of Long-Term Debt	$2,562	$2,562	$2,367	$2,412	$2,095	$2,009	$913	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$115	$115	$173	$93	$86	$41	$88	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,678	$2,678	$2,541	$2,505	$2,182	$2,050	$1,001	[s] = [q] + [r].
Market Value of Debt	$2,678	$2,678	$2,541	$2,505	$2,182	$2,050	$1,001	[t] = [s].
MARKET VALUE OF FIRM	$6,532	$6,456	$6,173	$5,441	$4,446	$4,093	$2,449	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	59.01%	58.53%	58.84%	53.96%	50.94%	49.91%	59.13%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	40.99%	41.47%	41.16%	46.04%	49.06%	50.09%	40.87%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AK: Amer. States Water

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$554	$554	$526	$491	$470	$510	$487	[a]
Shares Outstanding (in millions) - Common	37	37	37	37	37	38	39	[b]
Price per Share - Common	$67	$60	$50	$40	$40	$31	$27	[c]
Market Value of Common Equity	$2,465	$2,205	$1,850	$1,446	$1,466	$1,190	$1,028	[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	$2,465	$2,205	$1,850	$1,446	$1,466	$1,190	$1,028	[f]= [d] + [e]
Market to Book Value of Common Equity	4.45	3.98	3.52	2.95	3.12	2.33	2.11	[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	$135	$135	$147	$137	$135	$187	$203	[j]
Current Liabilities	$143	$143	$152	$180	$124	$121	$116	[k]
Current Portion of Long-Term Debt	$40	$40	$0	$0	$0	$6	$3	[l]
Net Working Capital	$32	$32	($5)	($43)	$12	$72	$90	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$46	$77	$15	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$5	$43	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$351	$351	$321	$321	$326	$311	$332	[p]
Book Value of Long-Term Debt	$391	$391	$326	$364	$326	$317	$335	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$99	$99	$98	$78	$91	$80	$121	[r]= See Sources and Notes.
Market Value of Long-Term Debt	$490	$490	$424	$442	$417	$397	$456	[s] = [q] + [r].
Market Value of Debt	$490	$490	$424	$442	$417	$397	$456	[t] = [s].
MARKET VALUE OF FIRM	$2,955	$2,695	$2,274	$1,887	$1,883	$1,587	$1,485	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	83.41%	81.81%	81.35%	76.59%	77.87%	74.97%	69.26%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	16.59%	18.19%	18.65%	23.41%	22.13%	25.03%	30.74%	[x] = [t] / [u].

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AL: Amer. Water Works

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$5,860	$5,860	$5,518	$5,238	$5,165	$4,920	$4,633	[a]
Shares Outstanding (in millions) - Common	181	181	178	178	180	179	178	[b]
Price per Share - Common	$93	$88	$82	$75	$53	$49	$40	[c]
Market Value of Common Equity	$16,781	$15,928	$14,621	$13,381	$9,591	$8,756	$7,162	[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	$16,781	$15,928	$14,621	$13,381	$9,591	$8,756	$7,162	[f]= [d] + [e]
Market to Book Value of Common Equity	2.86	2.72	2.65	2.55	1.86	1.78	1.55	[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	$800	$800	$860	$801	$879	$757	$613	[j]
Current Liabilities	$1,748	$1,748	$1,747	$1,928	$1,165	$1,059	$1,141	[k]
Current Portion of Long-Term Debt	$263	$263	$687	$53	$22	$56	$114	[l]
Net Working Capital	($685)	($685)	($200)	($1,074)	($264)	($246)	($415)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$564	$564	$103	$951	$380	$314	$389	[n]
Adjusted Short-Term Debt	$564	$564	$103	$951	$264	$246	$389	[o] = See Sources and Notes.
Long-Term Debt	$7,577	$7,577	$6,681	$5,853	$5,955	$5,557	$5,192	[p]
Book Value of Long-Term Debt	$8,404	$8,404	$7,471	$6,857	$6,241	$5,859	$5,695	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$834	$834	$724	$843	$913	$559	$1,027	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$9,238	$9,238	$8,195	$7,700	$7,154	$6,417	$6,722	[s] = [q] + [r].
Market Value of Debt	$9,238	$9,238	$8,195	$7,700	$7,154	$6,417	$6,722	[t] = [s].
MARKET VALUE OF FIRM	$26,019	$25,166	$22,816	$21,081	$16,745	$15,173	$13,884	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	64.50%	63.29%	64.08%	63.47%	57.28%	57.71%	51.59%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	35.50%	36.71%	35.92%	36.53%	42.72%	42.29%	48.41%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AM: Middlesex Water

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$245	$245	$227	$218	$205	$196	$188	[a]
Shares Outstanding (in millions) - Common	16	16	16	16	16	16	16	[b]
Price per Share - Common	$53	$48	$39	$35	$23	$20	$21	[c]
Market Value of Common Equity	$876	$780	$643	$571	$380	$323	$331	[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	$876	$780	$643	$571	$380	$323	$331	[f]= [d] + [e]
Market to Book Value of Common Equity	3.57	3.18	2.83	2.62	1.86	1.64	1.76	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$3	[h]
Market Value of Preferred Equity	$2	$2	$2	$2	$2	$2	$3	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$35	$35	$30	$30	$31	$29	$27	[j]
Current Liabilities	$94	$94	$59	$44	$47	$57	$52	[k]
Current Portion of Long-Term Debt	$7	$7	$7	$6	$6	$6	$5	[l]
Net Working Capital	($52)	($52)	($22)	($8)	($10)	($22)	($20)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$49	$49	$25	$14	$18	$31	$30	[n]
Adjusted Short-Term Debt	$49	$49	$22	$8	$10	$22	$20	[o] = See Sources and Notes.
Long-Term Debt	$141	$141	$136	$131	$135	$129	$131	[p]
Book Value of Long-Term Debt	$197	$197	$165	$145	$151	$157	$156	[q] = [l]+ [o] + [p].
Adjustment to Book Value of Long-Term Debt	$3	$3	$2	$3	$1	($8)	$1	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$200	$200	$167	$148	$153	$149	$157	[s] = [q] + [r].
Market Value of Debt	$200	$200	$167	$148	$153	$149	$157	[t] = [s].
MARKET VALUE OF FIRM	$1,078	$982	$812	$721	$536	$474	$490	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	81.26%	79.43%	79.17%	79.19%	71.02%	68.01%	67.48%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.23%	0.25%	0.30%	0.34%	0.45%	0.51%	0.59%	[w] = [i] / [u].
Debt - Market Value Ratio	18.52%	20.32%	20.53%	20.47%	28.52%	31.48%	31.93%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
    Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-3

Market Value of the Electric, Water, and Gas Sample

Panel AN: York Water Co. (The)

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$124	$124	$118	$114	$107	$103	$102	[a]
Shares Outstanding (in millions) - Common	13	13	13	13	13	13	13	[b]
Price per Share - Common	$33	$30	$34	$30	$22	$20	$20	[c]
Market Value of Common Equity	$427	$390	$433	$380	$276	$259	$264	[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	$427	$390	$433	$380	$276	$259	$264	[f]= [d] + [e]
Market to Book Value of Common Equity	3.43	3.13	3.68	3.35	2.58	2.52	2.59	[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	$9	$9	$9	$15	$10	$12	$14	[j]
Current Liabilities	$21	$21	$10	$6	$6	$12	$7	[k]
Current Portion of Long-Term Debt	$11	$11	$0	$0	$0	$0	$0	[l]
Net Working Capital	($1)	($1)	($1)	$9	$4	$0	$7	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$1	$1	$1	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$1	$1	$1	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$79	$79	$89	$85	$87	$85	$85	[p]
Book Value of Long-Term Debt	$91	$91	$90	$85	$87	$85	$85	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$15	$15	$12	$14	$15	$9	$22	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$106	$106	$101	$99	$102	$94	$107	[s] = [q] + [r].
Market Value of Debt	$106	$106	$101	$99	$102	$94	$107	[t] = [s].
MARKET VALUE OF FIRM	$533	$496	$534	$479	$378	$353	$371	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	80.02%	78.53%	81.00%	79.33%	72.93%	73.36%	71.16%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	19.98%	21.47%	19.00%	20.67%	27.07%	26.64%	28.84%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
 Prices are reported in Workpaper #1 to Schedule No. BV-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 2013 to 2017 10-Ks.

Schedule No. BV-4

Electric, Water, and Gas Sample

Capital Structure Summary of the Electric, Water, and Gas Sample

Company	DCF Capital Structure			5-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]
ALLETE	0.71	0.00	0.29	0.64	0.00	0.36
Alliant Energy	0.61	0.02	0.37	0.61	0.02	0.37
Amer. Elec. Power	0.58	0.00	0.42	0.57	0.00	0.43
Ameren Corp.	0.64	0.00	0.36	0.60	0.00	0.40
AVANGRID Inc.	0.70	0.00	0.30	0.70	0.00	0.30
CMS Energy Corp.	0.56	0.00	0.44	0.51	0.00	0.49
Consol. Edison	0.56	0.00	0.44	0.58	0.00	0.42
DTE Energy	0.59	0.00	0.41	0.60	0.00	0.40
Duke Energy	0.52	0.00	0.48	0.53	0.00	0.47
Edison Int'l	0.50	0.06	0.44	0.57	0.06	0.37
El Paso Electric	0.57	0.00	0.43	0.57	0.00	0.43
Entergy Corp.	0.46	0.01	0.53	0.48	0.01	0.51
Eversource Energy	0.60	0.00	0.40	0.61	0.01	0.39
FirstEnergy Corp.	0.49	0.00	0.51	0.39	0.00	0.61
IDACORP Inc.	0.71	0.00	0.29	0.65	0.00	0.35
MGE Energy	0.80	0.00	0.20	0.79	0.00	0.21
NextEra Energy	0.71	0.00	0.29	0.62	0.00	0.38
NorthWestern Corp.	0.61	0.00	0.39	0.58	0.00	0.42
OGE Energy	0.69	0.00	0.31	0.70	0.00	0.30
Otter Tail Corp.	0.75	0.00	0.25	0.68	0.00	0.32
Pinnacle West Capital	0.64	0.00	0.36	0.64	0.00	0.36
PNM Resources	0.54	0.00	0.45	0.51	0.00	0.49
Portland General	0.60	0.00	0.40	0.56	0.00	0.44
PPL Corp.	0.45	0.00	0.55	0.49	0.00	0.51
Public Serv. Enterprise	0.64	0.00	0.36	0.65	0.00	0.35
Southern Co.	0.48	0.00	0.51	0.55	0.01	0.44
Unitil Corp.	0.60	0.00	0.40	0.57	0.00	0.43
WEC Energy Group	0.66	0.00	0.34	0.65	0.00	0.35
Xcel Energy Inc.	0.60	0.00	0.40	0.57	0.00	0.43

Schedule No. BV-4

Electric, Water, and Gas Sample

Capital Structure Summary of the Electric, Water, and Gas Sample

Company	DCF Capital Structure			5-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]
Atmos Energy	0.73	0.00	0.27	0.66	0.00	0.34
Chesapeake Utilities	0.73	0.00	0.27	0.73	0.00	0.27
NiSource Inc.	0.49	0.02	0.49	0.42	0.00	0.58
Northwest Natural	0.66	0.00	0.34	0.63	0.00	0.37
ONE Gas Inc.	0.73	0.00	0.27	0.70	0.00	0.30
Southwest Gas	0.63	0.00	0.37	0.63	0.00	0.37
Spire Inc.	0.59	0.00	0.41	0.54	0.00	0.46
Amer. States Water	0.83	0.00	0.17	0.77	0.00	0.23
Amer. Water Works	0.64	0.00	0.36	0.60	0.00	0.40
Middlesex Water	0.81	0.00	0.19	0.74	0.00	0.25
York Water Co. (The)	0.80	0.00	0.20	0.76	0.00	0.24
Full Sample Average	0.63	0.00	0.37	0.61	0.00	0.39
Electric Utility Sample Average	0.61	0.00	0.39	0.59	0.00	0.41
Water and Gas Sample Average	0.70	0.00	0.30	0.65	0.00	0.35

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.

Workpaper #1 to Schedule No. BV-4

Electric, Water, and Gas Sample

Calculation of the Average Common Equity – Market Value Ratio

Company	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ALLETE	0.71	0.70	0.71	0.65	0.58	0.59	0.61	0.64
Alliant Energy	0.61	0.60	0.64	0.64	0.58	0.60	0.57	0.61
Amer. Elec. Power	0.58	0.57	0.60	0.60	0.55	0.56	0.51	0.57
Ameren Corp.	0.64	0.63	0.63	0.61	0.57	0.59	0.54	0.60
AVANGRID Inc.	0.70	0.69	0.70	0.72	n/a	n/a	n/a	0.70
CMS Energy Corp.	0.56	0.55	0.56	0.54	0.50	0.46	0.44	0.51
Consol. Edison	0.56	0.55	0.60	0.60	0.57	0.57	0.55	0.58
DTE Energy	0.59	0.58	0.61	0.63	0.58	0.61	0.57	0.60
Duke Energy	0.52	0.50	0.53	0.53	0.52	0.55	0.52	0.53
Edison Int'l	0.50	0.54	0.61	0.61	0.55	0.57	0.51	0.57
El Paso Electric	0.57	0.60	0.61	0.59	0.52	0.58	0.53	0.57
Entergy Corp.	0.46	0.45	0.48	0.48	0.45	0.52	0.47	0.48
Eversource Energy	0.60	0.58	0.62	0.63	0.60	0.60	0.57	0.61
FirstEnergy Corp.	0.49	0.48	0.38	0.38	0.36	0.40	0.41	0.39
IDACORP Inc.	0.71	0.71	0.71	0.68	0.62	0.63	0.55	0.65
MGE Energy	0.80	0.81	0.84	0.82	0.75	0.76	0.73	0.79
NextEra Energy	0.71	0.71	0.66	0.64	0.58	0.58	0.54	0.62
NorthWestern Corp.	0.61	0.60	0.59	0.59	0.54	0.58	0.57	0.58
OGE Energy	0.69	0.67	0.68	0.72	0.68	0.72	0.69	0.70
Otter Tail Corp.	0.75	0.75	0.75	0.69	0.62	0.65	0.66	0.68
Pinnacle West Capital	0.64	0.62	0.66	0.65	0.62	0.63	0.60	0.64
PNM Resources	0.54	0.52	0.55	0.50	0.48	0.51	0.48	0.51
Portland General	0.60	0.59	0.60	0.60	0.55	0.51	0.51	0.56
PPL Corp.	0.45	0.46	0.53	0.52	0.48	0.48	0.43	0.49

Workpaper #1 to Schedule No. BV-4

Electric, Water, and Gas Sample

Calculation of the Average Common Equity – Market Value Ratio

Company	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Public Serv. Enterprise	0.64	0.63	0.64	0.64	0.66	0.67	0.63	0.65
Southern Co.	0.48	0.47	0.50	0.53	0.58	0.60	0.59	0.55
Unitil Corp.	0.60	0.60	0.60	0.58	0.56	0.54	0.53	0.57
WEC Energy Group	0.66	0.65	0.66	0.66	0.61	0.67	0.63	0.65
Xcel Energy Inc.	0.60	0.58	0.60	0.58	0.54	0.56	0.51	0.57
Atmos Energy	0.73	0.73	0.70	0.69	0.64	0.61	0.54	0.66
Chesapeake Utilities	0.73	0.73	0.76	0.76	0.71	0.70	0.69	0.73
NiSource Inc.	0.49	0.49	0.49	0.49	0.42	0.33	0.28	0.42
Northwest Natural	0.66	0.67	0.69	0.68	0.60	0.59	0.53	0.63
ONE Gas Inc.	0.73	0.73	0.77	0.73	0.64	0.57	n/a	0.70
Southwest Gas	0.63	0.64	0.66	0.66	0.61	0.61	0.60	0.63
Spire Inc.	0.59	0.59	0.59	0.54	0.51	0.50	0.59	0.54
Amer. States Water	0.83	0.82	0.81	0.77	0.78	0.75	0.69	0.77
Amer. Water Works	0.64	0.63	0.64	0.63	0.57	0.58	0.52	0.60
Middlesex Water	0.81	0.79	0.79	0.79	0.71	0.68	0.67	0.74
York Water Co. (The)	0.80	0.79	0.81	0.79	0.73	0.73	0.71	0.76

Sources and Notes:

[1] - [7]: Schedule No. BV-3; Panels A - AN, [v].

[1]: Reflects the current capital structure.

[8]: Average of [2] - [7] with 1/2 weighting to 3Q2018 and 3Q2013 for the purposes of calculating average capital structure during the period.

For companies without sufficient data history, Capital structure is calculated using available data.

Workpaper #2 to Schedule No. BV-4

Electric, Water, and Gas Sample

Calculation of the Average Preferred Equity – Market Value Ratio

Company	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ALLETE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alliant Energy	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02
Amer. Elec. Power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ameren Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVANGRID Inc.	0.00	0.00	0.00	0.00	n/a	n/a	n/a	0.00
CMS Energy Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consol. Edison	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DTE Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Duke Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Edison Int'l	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06
El Paso Electric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Entergy Corp.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Eversource Energy	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
FirstEnergy Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IDACORP Inc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MGE Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NextEra Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NorthWestern Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OGE Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otter Tail Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinnacle West Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PNM Resources	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Portland General	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PPL Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Workpaper #2 to Schedule No. BV-4

Electric, Water, and Gas Sample

Calculation of the Average Preferred Equity – Market Value Ratio

Company	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Public Serv. Enterprise	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Southern Co.	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.01
Unitil Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WEC Energy Group	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Xcel Energy Inc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atmos Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chesapeake Utilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NiSource Inc.	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Northwest Natural	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ONE Gas Inc.	0.00	0.00	0.00	0.00	0.00	0.00	n/a	0.00
Southwest Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Spire Inc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amer. States Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amer. Water Works	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Middlesex Water	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
York Water Co. (The)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

[1] - [7]: Schedule No. BV-3; Panels A - AN, [w].

[1]: Reflects the current capital structure.

[8]: Average of [2] - [7] with 1/2 weighting to 3Q2018 and 3Q2013 for the purposes of calculating average capital structure during the period. For companies without sufficient data history, Capital structure is calculated using available data.

Workpaper #3 to Schedule No. BV-4

Electric, Water, and Gas Sample

Calculation of the Average Debt – Market Value Ratio

Company	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ALLETE	0.29	0.30	0.29	0.35	0.42	0.41	0.39	0.36
Alliant Energy	0.37	0.37	0.35	0.34	0.40	0.38	0.41	0.37
Amer. Elec. Power	0.42	0.43	0.40	0.40	0.45	0.44	0.49	0.43
Ameren Corp.	0.36	0.37	0.37	0.39	0.43	0.41	0.46	0.40
AVANGRID Inc.	0.30	0.31	0.30	0.28	n/a	n/a	n/a	0.30
CMS Energy Corp.	0.44	0.45	0.44	0.46	0.50	0.54	0.56	0.49
Consol. Edison	0.44	0.45	0.40	0.40	0.43	0.43	0.45	0.42
DTE Energy	0.41	0.42	0.39	0.37	0.42	0.39	0.43	0.40
Duke Energy	0.48	0.50	0.47	0.47	0.48	0.45	0.48	0.47
Edison Int'l	0.44	0.40	0.34	0.33	0.39	0.37	0.43	0.37
El Paso Electric	0.43	0.40	0.39	0.41	0.48	0.42	0.47	0.43
Entergy Corp.	0.53	0.54	0.51	0.51	0.54	0.47	0.52	0.51
Eversource Energy	0.40	0.42	0.37	0.36	0.40	0.39	0.42	0.39
FirstEnergy Corp.	0.51	0.51	0.62	0.62	0.64	0.60	0.59	0.61
IDACORP Inc.	0.29	0.29	0.29	0.32	0.38	0.37	0.45	0.35
MGE Energy	0.20	0.19	0.16	0.18	0.25	0.24	0.27	0.21
NextEra Energy	0.29	0.29	0.34	0.36	0.42	0.42	0.46	0.38
NorthWestern Corp.	0.39	0.40	0.41	0.41	0.46	0.42	0.43	0.42
OGE Energy	0.31	0.33	0.32	0.28	0.32	0.28	0.31	0.30
Otter Tail Corp.	0.25	0.25	0.25	0.31	0.38	0.35	0.34	0.32
Pinnacle West Capital	0.36	0.38	0.34	0.35	0.38	0.37	0.40	0.36
PNM Resources	0.45	0.47	0.45	0.50	0.52	0.49	0.52	0.49
Portland General	0.40	0.41	0.40	0.40	0.45	0.49	0.49	0.44
PPL Corp.	0.55	0.54	0.47	0.48	0.52	0.52	0.57	0.51

Workpaper #3 to Schedule No. BV-4

Electric, Water, and Gas Sample

Calculation of the Average Debt – Market Value Ratio

Company	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Public Serv. Enterprise	0.36	0.37	0.36	0.36	0.34	0.33	0.37	0.35
Southern Co.	0.51	0.52	0.49	0.46	0.41	0.38	0.39	0.44
Unitil Corp.	0.40	0.40	0.40	0.42	0.44	0.46	0.47	0.43
WEC Energy Group	0.34	0.35	0.34	0.34	0.39	0.33	0.37	0.35
Xcel Energy Inc.	0.40	0.42	0.40	0.42	0.46	0.44	0.49	0.43
Atmos Energy	0.27	0.27	0.30	0.31	0.36	0.39	0.46	0.34
Chesapeake Utilities	0.27	0.27	0.24	0.24	0.29	0.30	0.31	0.27
NiSource Inc.	0.49	0.49	0.51	0.51	0.58	0.67	0.72	0.58
Northwest Natural	0.34	0.33	0.31	0.32	0.40	0.41	0.47	0.37
ONE Gas Inc.	0.27	0.27	0.23	0.27	0.36	0.43	n/a	0.30
Southwest Gas	0.37	0.36	0.34	0.34	0.39	0.39	0.40	0.37
Spire Inc.	0.41	0.41	0.41	0.46	0.49	0.50	0.41	0.46
Amer. States Water	0.17	0.18	0.19	0.23	0.22	0.25	0.31	0.23
Amer. Water Works	0.36	0.37	0.36	0.37	0.43	0.42	0.48	0.40
Middlesex Water	0.19	0.20	0.21	0.20	0.29	0.31	0.32	0.25
York Water Co. (The)	0.20	0.21	0.19	0.21	0.27	0.27	0.29	0.24

Sources and Notes:

[1] - [7]: Schedule No. BV-3; Panels A - AN, [x].

[1]: Reflects the current capital structure.

[8]: Average of [2] - [7] with 1/2 weighting to 3Q2018 and 3Q2013 for the purposes of calculating average capital structure during the period.

   For companies without sufficient data history, Capital structure is calculated using available data.

Schedule No. BV-5

Electric, Water, and Gas Sample

Estimated Growth Rates of the Electric, Water, and Gas Sample

| Company | Thomson Reuters IBES Estimate | | Value Line | | | Combined Growth Rate |
| | Long-Term Growth Rate | Number of Estimates | EPS Year 2018 Estimate | EPS Year 2021-2023 Estimate | Annualized Growth Rate | |
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	n/a	0	3.35	4.00	4.5%	4.5%
Alliant Energy	6.9%	1	2.15	2.60	4.9%	5.9%
Amer. Elec. Power	5.8%	2	3.90	5.00	6.4%	6.0%
Ameren Corp.	7.8%	2	3.35	4.00	4.5%	6.7%
AVANGRID Inc.	9.2%	1	2.20	3.25	10.2%	9.7%
CMS Energy Corp.	7.1%	4	2.35	3.00	6.3%	6.9%
Consol. Edison	2.9%	4	4.20	4.75	3.1%	2.9%
DTE Energy	5.5%	4	6.15	7.75	6.0%	5.6%
Duke Energy	4.4%	2	4.40	5.50	5.7%	4.9%
Edison Int'l	3.8%	4	4.35	5.50	6.0%	4.2%
El Paso Electric	5.1%	1	2.55	3.00	4.1%	4.6%
Entergy Corp.	-3.9%	2	5.00	6.25	5.7%	-0.7%
Eversource Energy	5.8%	4	3.25	4.00	5.3%	5.7%
FirstEnergy Corp.	-6.9%	2	1.15	2.75	24.4%	3.5%
IDACORP Inc.	2.6%	1	4.30	4.75	2.5%	2.6%
MGE Energy	n/a	0	2.45	3.35	8.1%	8.1%
NextEra Energy	8.6%	3	7.50	10.25	8.1%	8.5%
NorthWestern Corp.	2.4%	2	3.50	4.00	3.4%	2.7%
OGE Energy	-2.3%	2	2.10	2.50	4.5%	0.0%
Otter Tail Corp.	9.0%	1	2.15	2.80	6.8%	7.9%
Pinnacle West Capital	4.1%	3	4.40	5.50	5.7%	4.5%
PNM Resources	4.1%	1	1.90	2.50	7.1%	5.6%
Portland General	5.1%	2	2.30	2.75	4.6%	4.9%
PPL Corp.	4.3%	1	2.50	2.75	2.4%	3.4%

Schedule No. BV-5

Electric, Water, and Gas Sample

Estimated Growth Rates of the Electric, Water, and Gas Sample

	Thomson Reuters IBES Estimate		Value Line			
					Annualized	
	Long-Term	Number of	EPS Year	EPS Year 2021-	Growth	Combined Growth
Company	Growth Rate	Estimates	2018 Estimate	2023 Estimate	Rate	Rate
	[1]	[2]	[3]	[4]	[5]	[6]
Public Serv. Enterprise	7.3%	2	3.00	3.75	5.7%	6.7%
Southern Co.	1.4%	3	2.90	3.50	4.8%	2.2%
Unitil Corp.	3.7%	1	n/a	n/a	n/a	3.7%
WEC Energy Group	4.7%	3	3.35	4.25	6.1%	5.0%
Xcel Energy Inc.	6.6%	2	2.45	3.00	5.2%	6.2%
Atmos Energy	6.5%	2	4.25	5.15	4.9%	5.9%
Chesapeake Utilities	n/a	0	3.10	4.50	9.8%	9.8%
NiSource Inc.	5.9%	3	1.30	1.80	8.5%	6.6%
Northwest Natural	4.0%	1	2.20	3.50	12.3%	8.2%
ONE Gas Inc.	5.5%	2	3.33	4.75	9.3%	6.8%
Southwest Gas	6.2%	2	3.95	5.40	8.1%	6.8%
Spire Inc.	2.7%	2	4.00	5.00	5.7%	3.7%
Amer. States Water	6.0%	1	1.65	2.50	10.9%	8.5%
Amer. Water Works	8.2%	1	3.30	4.50	8.1%	8.1%
Middlesex Water	n/a	0	1.75	2.20	5.9%	5.9%
York Water Co. (The)	n/a	0	1.10	1.60	9.8%	9.8%

Sources and Notes:

[1] - [2]: Thomson Reuters as of December 31, 2018.

[3] - [4]: From Valueline Investment Analyzer as of 12/31/2018.

[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-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield (t+1)	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	$77.82	$0.56	0.73%	4.5%	1.1%	7.6%
Alliant Energy	$43.85	$0.34	0.77%	5.9%	1.4%	9.2%
Amer. Elec. Power	$77.13	$0.67	0.88%	6.0%	1.5%	9.8%
Ameren Corp.	$67.33	$0.48	0.72%	6.7%	1.6%	9.7%
AVANGRID Inc.	$51.09	$0.44	0.88%	9.7%	2.3%	13.6%
CMS Energy Corp.	$51.13	$0.36	0.71%	6.9%	1.7%	9.9%
Consol. Edison	$79.95	$0.72	0.90%	2.9%	0.7%	6.7%
DTE Energy	$114.35	$0.95	0.84%	5.6%	1.4%	9.1%
Duke Energy	$87.93	$0.93	1.07%	4.9%	1.2%	9.3%
Edison Int'l	$57.77	$0.61	1.07%	4.2%	1.0%	8.7%
El Paso Electric	$52.62	$0.36	0.69%	4.6%	1.1%	7.5%
Entergy Corp.	$87.15	$0.91	1.04%	-0.7%	-0.2%	3.5%
Eversource Energy	$67.11	$0.51	0.76%	5.7%	1.4%	8.9%
FirstEnergy Corp.	$37.90	$0.36	0.96%	3.5%	0.9%	7.5%
IDACORP Inc.	$96.92	$0.63	0.65%	2.6%	0.6%	5.3%
MGE Energy	$64.68	$0.34	0.53%	8.1%	2.0%	10.4%
NextEra Energy	$176.18	$1.11	0.64%	8.5%	2.1%	11.2%
NorthWestern Corp.	$61.77	$0.55	0.90%	2.7%	0.7%	6.5%
OGE Energy	$40.07	$0.37	0.91%	0.0%	0.0%	3.7%
Otter Tail Corp.	$49.73	$0.34	0.69%	7.9%	1.9%	10.9%
Pinnacle West Capital	$88.54	$0.74	0.84%	4.5%	1.1%	8.0%
PNM Resources	$42.58	$0.27	0.63%	5.6%	1.4%	8.3%
Portland General	$47.29	$0.36	0.78%	4.9%	1.2%	8.2%
PPL Corp.	$29.17	$0.41	1.42%	3.4%	0.8%	9.3%

Schedule No. BV-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield (t+1)	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Public Serv. Enterprise	$53.22	$0.45	0.86%	6.7%	1.6%	10.4%
Southern Co.	$45.48	$0.60	1.33%	2.2%	0.6%	7.7%
Unitil Corp.	$50.93	$0.37	0.72%	3.7%	0.9%	6.7%
WEC Energy Group	$71.62	$0.55	0.78%	5.0%	1.2%	8.3%
Xcel Energy Inc.	$51.30	$0.38	0.75%	6.2%	1.5%	9.3%
Atmos Energy	$94.87	$0.53	0.56%	5.9%	1.5%	8.3%
Chesapeake Utilities	$85.65	$0.37	0.44%	9.8%	2.4%	11.7%
NiSource Inc.	$26.33	$0.20	0.75%	6.6%	1.6%	9.8%
Northwest Natural	$63.45	$0.48	0.76%	8.2%	2.0%	11.4%
ONE Gas Inc.	$82.56	$0.46	0.57%	6.8%	1.6%	9.2%
Southwest Gas	$79.20	$0.52	0.67%	6.8%	1.7%	9.7%
Spire Inc.	$76.07	$0.59	0.79%	3.7%	0.9%	7.0%
Amer. States Water	$67.08	$0.28	0.42%	8.5%	2.1%	10.3%
Amer. Water Works	$92.92	$0.46	0.50%	8.1%	2.0%	10.3%
Middlesex Water	$53.42	$0.24	0.46%	5.9%	1.4%	7.8%
York Water Co. (The)	$33.00	$0.17	0.54%	9.8%	2.4%	12.1%

Sources and Notes:

[1]: Workpaper #1 to Schedule No. BV-6.
[2]: Workpaper #2 to Schedule No. BV-6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Schedule No. BV-5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Schedule No. BV-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Panel B: Multi-Stage DCF (Using Blue Chip 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]
ALLETE	$77.82	$0.56	4.5%	4.5%	4.4%	4.3%	4.2%	4.2%	4.1%	7.2%
Alliant Energy	$43.85	$0.34	5.9%	5.6%	5.3%	5.0%	4.7%	4.4%	4.1%	7.7%
Amer. Elec. Power	$77.13	$0.67	6.0%	5.7%	5.4%	5.1%	4.7%	4.4%	4.1%	8.2%
Ameren Corp.	$67.33	$0.48	6.7%	6.2%	5.8%	5.4%	5.0%	4.5%	4.1%	7.6%
AVANGRID Inc.	$51.09	$0.44	9.7%	8.8%	7.8%	6.9%	6.0%	5.0%	4.1%	9.2%
CMS Energy Corp.	$51.13	$0.36	6.9%	6.5%	6.0%	5.5%	5.0%	4.6%	4.1%	7.6%
Consol. Edison	$79.95	$0.72	2.9%	3.1%	3.3%	3.5%	3.7%	3.9%	4.1%	7.6%
DTE Energy	$114.35	$0.95	5.6%	5.3%	5.1%	4.8%	4.6%	4.3%	4.1%	7.9%
Duke Energy	$87.93	$0.93	4.9%	4.7%	4.6%	4.5%	4.4%	4.2%	4.1%	8.8%
Edison Int'l	$57.77	$0.61	4.2%	4.2%	4.2%	4.2%	4.1%	4.1%	4.1%	8.6%
El Paso Electric	$52.62	$0.36	4.6%	4.5%	4.4%	4.4%	4.3%	4.2%	4.1%	7.1%
Entergy Corp.	$87.15	$0.91	-0.7%	0.1%	0.9%	1.7%	2.5%	3.3%	4.1%	7.3%
Eversource Energy	$67.11	$0.51	5.7%	5.5%	5.2%	4.9%	4.6%	4.4%	4.1%	7.6%
FirstEnergy Corp.	$37.90	$0.36	3.5%	3.6%	3.7%	3.8%	3.9%	4.0%	4.1%	8.0%
IDACORP Inc.	$96.92	$0.63	2.6%	2.8%	3.1%	3.3%	3.6%	3.8%	4.1%	6.6%
MGE Energy	$64.68	$0.34	8.1%	7.5%	6.8%	6.1%	5.4%	4.8%	4.1%	6.9%
NextEra Energy	$176.18	$1.11	8.5%	7.7%	7.0%	6.3%	5.6%	4.8%	4.1%	7.6%
NorthWestern Corp.	$61.77	$0.55	2.7%	3.0%	3.2%	3.4%	3.6%	3.9%	4.1%	7.5%
OGE Energy	$40.07	$0.37	0.0%	0.7%	1.4%	2.0%	2.7%	3.4%	4.1%	7.0%
Otter Tail Corp.	$49.73	$0.34	7.9%	7.3%	6.6%	6.0%	5.4%	4.7%	4.1%	7.7%
Pinnacle West Capital	$88.54	$0.74	4.5%	4.4%	4.4%	4.3%	4.2%	4.2%	4.1%	7.7%
PNM Resources	$42.58	$0.27	5.6%	5.4%	5.1%	4.9%	4.6%	4.4%	4.1%	7.0%
Portland General	$47.29	$0.36	4.9%	4.8%	4.6%	4.5%	4.4%	4.2%	4.1%	7.5%
PPL Corp.	$29.17	$0.41	3.4%	3.5%	3.6%	3.7%	3.9%	4.0%	4.1%	9.8%

Schedule No. BV-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Panel B: Multi-Stage DCF (Using Blue Chip 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]
Public Serv. Enterprise	$53.22	$0.45	6.7%	6.3%	5.9%	5.4%	5.0%	4.5%	4.1%	8.3%
Southern Co.	$45.48	$0.60	2.2%	2.5%	2.8%	3.2%	3.5%	3.8%	4.1%	9.1%
Unitil Corp.	$50.93	$0.37	3.7%	3.8%	3.8%	3.9%	4.0%	4.0%	4.1%	7.0%
WEC Energy Group	$71.62	$0.55	5.0%	4.9%	4.7%	4.6%	4.4%	4.3%	4.1%	7.6%
Xcel Energy Inc.	$51.30	$0.38	6.2%	5.8%	5.5%	5.1%	4.8%	4.4%	4.1%	7.7%
Atmos Energy	$94.87	$0.53	5.9%	5.6%	5.3%	5.0%	4.7%	4.4%	4.1%	6.7%
Chesapeake Utilities	$85.65	$0.37	9.8%	8.8%	7.9%	6.9%	6.0%	5.0%	4.1%	6.7%
NiSource Inc.	$26.33	$0.20	6.6%	6.2%	5.7%	5.3%	4.9%	4.5%	4.1%	7.7%
Northwest Natural	$63.45	$0.48	8.2%	7.5%	6.8%	6.1%	5.5%	4.8%	4.1%	8.2%
ONE Gas Inc.	$82.56	$0.46	6.8%	6.3%	5.9%	5.4%	5.0%	4.5%	4.1%	6.9%
Southwest Gas	$79.20	$0.52	6.8%	6.4%	5.9%	5.5%	5.0%	4.6%	4.1%	7.4%
Spire Inc.	$76.07	$0.59	3.7%	3.8%	3.8%	3.9%	4.0%	4.0%	4.1%	7.3%
Amer. States Water	$67.08	$0.28	8.5%	7.7%	7.0%	6.3%	5.6%	4.8%	4.1%	6.4%
Amer. Water Works	$92.92	$0.46	8.1%	7.5%	6.8%	6.1%	5.4%	4.8%	4.1%	6.8%
Middlesex Water	$53.42	$0.24	5.9%	5.6%	5.3%	5.0%	4.7%	4.4%	4.1%	6.2%
York Water Co. (The)	$33.00	$0.17	9.8%	8.9%	7.9%	7.0%	6.0%	5.1%	4.1%	7.3%

Sources and Notes:

[1]: Workpaper #1 to Schedule No. BV-6.
[2]: Workpaper #2 to Schedule No. BV-6.
[3]: Schedule No. BV-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]: BlueChip Economic Indicators, October, 2018 This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Schedule No. BV-6.

Workpaper #1 to Schedule No. BV-6

Electric, Water, and Gas Sample

Common Stock Prices from December 10, 2018 to December 31, 2018

Company	12/31/2018 [1]	12/28/2018 [2]	12/27/2018 [3]	12/26/2018 [4]	12/24/2018 [5]	12/21/2018 [6]	12/20/2018 [7]	12/19/2018 [8]	12/18/2018 [9]	12/17/2018 [10]	12/14/2018 [11]	12/13/2018 [12]	12/12/2018 [13]	12/11/2018 [14]	12/10/2018 [15]	Average [16]
ALLETE	$76.22	$75.73	$75.39	$74.28	$73.69	$77.55	$78.14	$77.15	$77.10	$78.03	$80.78	$80.99	$80.68	$80.88	$80.76	$77.82
Alliant Energy	$42.25	$42.05	$41.99	$41.68	$41.21	$43.45	$43.82	$43.72	$43.92	$44.13	$45.32	$46.12	$45.89	$46.28	$45.94	$43.85
Amer. Elec. Power	$74.74	$74.73	$75.04	$74.36	$73.55	$76.43	$77.62	$76.86	$77.26	$77.33	$80.01	$80.36	$79.52	$79.76	$79.36	$77.13
Ameren Corp.	$65.23	$64.94	$65.30	$64.35	$63.24	$66.94	$67.03	$67.21	$67.38	$67.31	$69.81	$70.44	$69.84	$70.29	$70.71	$67.33
AVANGRID Inc.	$50.09	$49.83	$49.80	$49.42	$49.15	$51.07	$51.48	$50.93	$51.15	$51.28	$53.08	$52.92	$51.87	$52.24	$51.98	$51.09
CMS Energy Corp.	$49.65	$49.37	$49.44	$48.88	$48.25	$51.17	$51.12	$51.12	$51.19	$51.40	$52.89	$53.48	$52.73	$53.16	$53.14	$51.13
Consol. Edison	$76.46	$76.48	$76.83	$76.09	$75.32	$79.96	$80.73	$80.10	$80.21	$80.63	$83.83	$83.93	$82.47	$83.25	$82.91	$79.95
DTE Energy	$110.30	$110.11	$110.16	$109.65	$108.95	$114.05	$114.54	$113.81	$113.63	$114.14	$118.22	$119.82	$118.74	$119.87	$119.31	$114.35
Duke Energy	$86.30	$86.12	$85.96	$85.25	$83.91	$87.67	$88.14	$87.23	$87.66	$88.09	$90.75	$90.90	$89.60	$90.79	$90.51	$87.93
Edison Int'l	$56.77	$57.23	$57.00	$56.20	$54.33	$56.18	$58.26	$58.42	$57.49	$58.19	$59.64	$59.53	$59.54	$58.89	$58.84	$57.77
El Paso Electric	$50.13	$49.90	$49.97	$49.68	$48.96	$52.08	$53.35	$52.67	$53.02	$53.80	$55.03	$55.97	$55.61	$54.83	$54.36	$52.62
Entergy Corp.	$86.07	$85.49	$85.34	$84.44	$83.24	$86.76	$87.34	$86.84	$87.09	$86.78	$89.78	$90.46	$88.91	$89.59	$89.15	$87.15
Eversource Energy	$65.04	$64.67	$64.78	$64.24	$63.38	$66.47	$67.17	$67.29	$67.06	$67.25	$69.77	$70.23	$69.45	$70.17	$69.64	$67.11
FirstEnergy Corp.	$37.55	$37.26	$37.03	$36.60	$35.84	$37.19	$37.40	$37.36	$37.63	$37.72	$39.12	$39.44	$39.23	$39.61	$39.54	$37.90
IDACORP Inc.	$93.06	$92.54	$93.16	$92.51	$91.14	$96.26	$97.37	$97.10	$97.20	$98.04	$100.70	$101.40	$101.09	$101.78	$100.43	$96.92
MGE Energy	$59.96	$59.65	$57.74	$60.09	$62.10	$66.45	$66.82	$67.15	$67.47	$67.64	$66.66	$67.66	$67.69	$66.88	$66.31	$64.68
NextEra Energy	$173.82	$172.72	$172.16	$170.34	$168.08	$174.11	$174.91	$174.52	$176.00	$175.65	$181.24	$182.20	$181.31	$182.98	$182.61	$176.18
NorthWestern Corp.	$59.44	$59.41	$59.22	$58.54	$58.02	$61.42	$62.21	$62.14	$62.31	$62.34	$63.93	$64.45	$64.32	$64.46	$64.31	$61.77
OGE Energy	$39.19	$39.05	$39.21	$38.82	$38.22	$39.92	$40.03	$39.83	$40.14	$40.14	$41.60	$41.63	$41.25	$41.28	$40.79	$40.07
Otter Tail Corp.	$49.64	$49.53	$48.38	$48.39	$47.57	$49.80	$49.76	$49.02	$49.56	$49.78	$50.67	$51.21	$51.58	$51.02	$49.98	$49.73
Pinnacle West Capital	$85.20	$85.25	$85.85	$85.33	$84.61	$89.41	$89.55	$88.45	$88.37	$88.42	$91.44	$92.33	$91.12	$91.66	$91.07	$88.54
PNM Resources	$41.09	$40.83	$40.79	$40.64	$39.96	$42.48	$43.26	$42.53	$42.45	$43.00	$44.23	$44.70	$44.41	$44.36	$44.04	$42.58
Portland General	$45.85	$45.50	$45.34	$44.94	$44.19	$46.67	$47.27	$47.44	$47.16	$47.51	$48.96	$49.49	$49.43	$49.98	$49.60	$47.29
PPL Corp.	$28.33	$28.35	$28.34	$28.31	$27.59	$28.40	$28.70	$28.23	$27.97	$29.96	$30.59	$30.83	$30.69	$30.50	$30.79	$29.17
Public Serv. Enterprise	$52.05	$51.33	$51.43	$50.71	$49.89	$52.44	$52.70	$52.76	$53.20	$53.41	$55.69	$55.80	$55.72	$55.79	$55.39	$53.22
Southern Co.	$43.92	$43.95	$43.95	$43.64	$43.02	$45.09	$45.28	$45.28	$45.53	$46.00	$47.33	$47.55	$47.01	$47.56	$47.22	$45.48
Unitil Corp.	$50.64	$50.80	$50.55	$50.45	$49.89	$51.79	$50.60	$49.30	$49.84	$50.49	$51.72	$51.80	$52.03	$52.16	$51.92	$50.93
WEC Energy Group	$69.26	$69.01	$69.18	$68.45	$67.62	$71.44	$71.74	$71.31	$71.75	$72.05	$74.36	$74.96	$73.87	$74.89	$74.43	$71.62
Xcel Energy Inc.	$49.27	$49.25	$49.60	$49.56	$48.60	$50.90	$51.37	$50.92	$51.49	$51.73	$53.14	$53.68	$52.94	$53.52	$53.46	$51.30
Atmos Energy	$92.72	$91.66	$91.20	$90.12	$89.33	$94.46	$95.10	$94.93	$94.52	$95.56	$98.47	$99.50	$98.59	$98.50	$98.45	$94.87
Chesapeake Utilities	$81.30	$79.62	$79.75	$79.26	$78.95	$82.99	$84.23	$86.41	$87.08	$87.88	$93.12	$93.01	$91.73	$90.33	$89.05	$85.65
NiSource Inc.	$25.35	$25.48	$25.33	$25.06	$24.89	$26.05	$26.28	$26.37	$26.48	$26.64	$27.49	$27.62	$27.19	$27.50	$27.26	$26.33
Northwest Natural	$60.46	$60.15	$60.25	$59.54	$59.17	$63.09	$63.20	$62.98	$63.57	$63.98	$67.06	$67.38	$67.56	$66.97	$66.34	$63.45
ONE Gas Inc.	$79.60	$78.34	$78.27	$77.42	$77.41	$82.40	$82.89	$82.77	$83.00	$83.80	$86.73	$86.97	$87.03	$86.14	$85.70	$82.56
Southwest Gas	$76.50	$75.47	$75.45	$74.97	$74.09	$79.98	$79.89	$80.11	$80.35	$80.66	$82.69	$82.74	$83.03	$81.09	$81.00	$79.20
Spire Inc.	$74.08	$73.64	$73.24	$72.41	$71.15	$75.21	$75.84	$75.68	$75.86	$76.45	$79.32	$79.89	$79.55	$79.28	$79.45	$76.07
Amer. States Water	$67.04	$66.76	$66.51	$65.45	$63.65	$67.38	$68.19	$67.24	$66.73	$67.16	$69.19	$68.63	$68.01	$67.72	$66.58	$67.08
Amer. Water Works	$90.77	$90.02	$89.41	$88.53	$86.31	$91.19	$92.86	$92.68	$92.58	$93.58	$97.14	$97.66	$97.12	$96.48	$97.46	$92.92
Middlesex Water	$53.35	$52.59	$51.88	$51.40	$49.23	$52.05	$52.91	$53.02	$52.74	$54.48	$58.56	$54.70	$55.75	$54.73	$53.96	$53.42
York Water Co. (The)	$32.06	$32.32	$31.46	$31.32	$29.88	$30.74	$33.63	$33.56	$34.20	$34.36	$35.02	$34.32	$34.44	$34.08	$33.54	$33.00

Sources and Notes:

[1] - [15]: Bloomberg as of December 31, 2018.

[16]: Average of [1] through [15].

Workpaper #2 to Schedule No. BV-6

Electric, Water, and Gas Sample

Most Recent Paid Dividends

Company	Most Recent Dividend
ALLETE	0.56
Alliant Energy	0.34
Amer. Elec. Power	0.67
Ameren Corp.	0.48
AVANGRID Inc.	0.44
CMS Energy Corp.	0.36
Consol. Edison	0.72
DTE Energy	0.95
Duke Energy	0.93
Edison Int'l	0.61
El Paso Electric	0.36
Entergy Corp.	0.91
Eversource Energy	0.51
FirstEnergy Corp.	0.36
IDACORP Inc.	0.63
MGE Energy	0.34
NextEra Energy	1.11
NorthWestern Corp.	0.55
OGE Energy	0.37
Otter Tail Corp.	0.34
Pinnacle West Capital	0.74
PNM Resources	0.27
Portland General	0.36
PPL Corp.	0.41

Workpaper #2 to Schedule No. BV-6

Electric, Water, and Gas Sample

Most Recent Paid Dividends

Company	Most Recent Dividend
Public Serv. Enterprise	0.45
Southern Co.	0.60
Unitil Corp.	0.37
WEC Energy Group	0.55
Xcel Energy Inc.	0.38
Atmos Energy	0.53
Chesapeake Utilities	0.37
NiSource Inc.	0.20
Northwest Natural	0.48
ONE Gas Inc.	0.46
Southwest Gas	0.52
Spire Inc.	0.59
Amer. States Water	0.28
Amer. Water Works	0.46
Middlesex Water	0.24
York Water Co. (The)	0.17

Sources and Notes:
Bloomberg as of December 31, 2018.

Workpaper #3 to Schedule No. BV-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Multi-Stage DCF (using Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Growth Rate)

Company	ALLETE	Alliant Energy	Amer. Elec. Power	Ameren Corp.	AVANGRID Inc.	CMS Energy Corp.	Consol. Edison	DTE Energy	Duke Energy	Edison Int'l	El Paso Electric	Entergy Corp.	Eversource Energy	FirstEnergy Corp.	IDACORP Inc.
Current Dividend	$0.56	$0.34	$0.67	$0.48	$0.44	$0.36	$0.72	$0.95	$0.93	$0.61	$0.36	$0.91	$0.51	$0.36	$0.63
Current Stock Price	($77.82)	($43.85)	($77.13)	($67.33)	($51.09)	($51.13)	($79.95)	($114.35)	($87.93)	($57.77)	($52.62)	($87.15)	($67.11)	($37.90)	($96.92)
Dividend Q1 Estimate	$0.57	$0.34	$0.68	$0.48	$0.45	$0.36	$0.72	$0.96	$0.94	$0.62	$0.36	$0.91	$0.51	$0.36	$0.63
Dividend Q2 Estimate	$0.57	$0.34	$0.69	$0.48	$0.46	$0.37	$0.72	$0.97	$0.95	$0.63	$0.37	$0.91	$0.52	$0.37	$0.64
Dividend Q3 Estimate	$0.58	$0.35	$0.70	$0.50	$0.47	$0.38	$0.73	$0.98	$0.96	$0.63	$0.37	$0.91	$0.53	$0.37	$0.65
Dividend Q4 Estimate	$0.59	$0.36	$0.71	$0.51	$0.48	$0.38	$0.74	$1.00	$0.97	$0.64	$0.38	$0.90	$0.53	$0.37	$0.65
Dividend Q1 Estimate	$0.59	$0.36	$0.72	$0.51	$0.49	$0.39	$0.74	$1.01	$0.98	$0.64	$0.38	$0.90	$0.54	$0.38	$0.65
Dividend Q2 Estimate	$0.60	$0.36	$0.73	$0.52	$0.51	$0.40	$0.75	$1.01	$1.00	$0.65	$0.39	$0.90	$0.55	$0.38	$0.66
Dividend Q3 Estimate	$0.61	$0.37	$0.74	$0.53	$0.52	$0.40	$0.75	$1.03	$1.01	$0.66	$0.39	$0.90	$0.56	$0.38	$0.66
Dividend Q4 Estimate	$0.61	$0.38	$0.75	$0.54	$0.53	$0.41	$0.76	$1.05	$1.02	$0.67	$0.39	$0.90	$0.56	$0.39	$0.66
Dividend Q1 Estimate	$0.62	$0.38	$0.76	$0.55	$0.54	$0.42	$0.76	$1.07	$1.03	$0.67	$0.40	$0.90	$0.57	$0.39	$0.67
Dividend Q2 Estimate	$0.63	$0.39	$0.78	$0.56	$0.55	$0.42	$0.77	$1.08	$1.04	$0.68	$0.40	$0.89	$0.58	$0.39	$0.67
Dividend Q3 Estimate	$0.63	$0.39	$0.79	$0.57	$0.57	$0.43	$0.77	$1.10	$1.06	$0.69	$0.40	$0.89	$0.59	$0.40	$0.68
Dividend Q4 Estimate	$0.64	$0.40	$0.80	$0.58	$0.58	$0.44	$0.78	$1.11	$1.07	$0.69	$0.41	$0.89	$0.60	$0.40	$0.68
Dividend Q1 Estimate	$0.65	$0.40	$0.81	$0.59	$0.59	$0.44	$0.79	$1.13	$1.08	$0.70	$0.42	$0.89	$0.61	$0.40	$0.69
Dividend Q2 Estimate	$0.65	$0.41	$0.82	$0.60	$0.61	$0.45	$0.79	$1.14	$1.09	$0.71	$0.42	$0.89	$0.61	$0.41	$0.69
Dividend Q3 Estimate	$0.66	$0.42	$0.83	$0.61	$0.62	$0.46	$0.80	$1.16	$1.11	$0.71	$0.43	$0.89	$0.62	$0.41	$0.70
Dividend Q4 Estimate	$0.67	$0.42	$0.85	$0.62	$0.64	$0.47	$0.80	$1.17	$1.12	$0.72	$0.43	$0.88	$0.63	$0.41	$0.70
Dividend Q1 Estimate	$0.68	$0.43	$0.86	$0.63	$0.65	$0.48	$0.81	$1.19	$1.13	$0.73	$0.44	$0.88	$0.64	$0.42	$0.71
Dividend Q2 Estimate	$0.68	$0.43	$0.87	$0.64	$0.67	$0.48	$0.81	$1.21	$1.15	$0.74	$0.44	$0.88	$0.65	$0.42	$0.71
Dividend Q3 Estimate	$0.69	$0.44	$0.88	$0.65	$0.68	$0.49	$0.82	$1.21	$1.16	$0.74	$0.45	$0.88	$0.66	$0.42	$0.71
Dividend Q4 Estimate	$0.70	$0.45	$0.90	$0.66	$0.70	$0.50	$0.83	$1.24	$1.18	$0.75	$0.45	$0.88	$0.67	$0.43	$0.72
Dividend Q1 Estimate	$0.71	$0.45	$0.91	$0.67	$0.71	$0.51	$0.83	$1.26	$1.19	$0.76	$0.46	$0.88	$0.68	$0.43	$0.72
Dividend Q2 Estimate	$0.71	$0.46	$0.92	$0.68	$0.73	$0.52	$0.84	$1.27	$1.20	$0.77	$0.46	$0.88	$0.69	$0.44	$0.72
Dividend Q3 Estimate	$0.72	$0.46	$0.94	$0.69	$0.75	$0.52	$0.85	$1.29	$1.22	$0.78	$0.47	$0.88	$0.69	$0.44	$0.73
Dividend Q4 Estimate	$0.73	$0.47	$0.95	$0.70	$0.76	$0.53	$0.85	$1.31	$1.23	$0.78	$0.47	$0.88	$0.70	$0.45	$0.74
Dividend Q1 Estimate	$0.74	$0.48	$0.96	$0.71	$0.78	$0.54	$0.86	$1.32	$1.24	$0.79	$0.48	$0.88	$0.71	$0.45	$0.74
Dividend Q2 Estimate	$0.75	$0.48	$0.97	$0.72	$0.79	$0.55	$0.87	$1.34	$1.26	$0.80	$0.48	$0.88	$0.72	$0.46	$0.75
Dividend Q3 Estimate	$0.75	$0.49	$0.99	$0.73	$0.81	$0.56	$0.88	$1.36	$1.27	$0.81	$0.49	$0.89	$0.73	$0.46	$0.76
Dividend Q4 Estimate	$0.76	$0.50	$1.00	$0.74	$0.82	$0.56	$0.88	$1.37	$1.29	$0.82	$0.49	$0.89	$0.74	$0.46	$0.76
Dividend Q1 Estimate	$0.77	$0.50	$1.01	$0.75	$0.83	$0.57	$0.89	$1.39	$1.30	$0.83	$0.50	$0.89	$0.75	$0.47	$0.77
Dividend Q2 Estimate	$0.78	$0.51	$1.02	$0.76	$0.85	$0.58	$0.90	$1.41	$1.32	$0.84	$0.50	$0.90	$0.76	$0.47	$0.78
Dividend Q3 Estimate	$0.79	$0.51	$1.04	$0.77	$0.86	$0.59	$0.90	$1.42	$1.33	$0.85	$0.51	$0.90	$0.77	$0.47	$0.78
Dividend Q4 Estimate	$0.80	$0.52	$1.05	$0.78	$0.88	$0.59	$0.91	$1.44	$1.35	$0.85	$0.51	$0.90	$0.78	$0.48	$0.78
Dividend Q1 Estimate	$0.80	$0.53	$1.06	$0.79	$0.89	$0.60	$0.92	$1.46	$1.36	$0.86	$0.52	$0.91	$0.79	$0.48	$0.79
Dividend Q2 Estimate	$0.81	$0.53	$1.08	$0.80	$0.90	$0.61	$0.93	$1.47	$1.37	$0.87	$0.53	$0.91	$0.80	$0.49	$0.80
Dividend Q3 Estimate	$0.82	$0.54	$1.09	$0.81	$0.92	$0.62	$0.94	$1.49	$1.39	$0.88	$0.53	$0.92	$0.81	$0.49	$0.80
Dividend Q4 Estimate	$0.83	$0.54	$1.10	$0.82	$0.93	$0.62	$0.94	$1.51	$1.40	$0.89	$0.54	$0.92	$0.81	$0.50	$0.81
Dividend Q1 Estimate	$0.84	$0.55	$1.11	$0.83	$0.94	$0.63	$0.95	$1.52	$1.42	$0.90	$0.54	$0.93	$0.82	$0.50	$0.82
Dividend Q2 Estimate	$0.85	$0.56	$1.12	$0.83	$0.95	$0.64	$0.96	$1.54	$1.43	$0.90	$0.55	$0.94	$0.83	$0.51	$0.83
Dividend Q3 Estimate	$0.85	$0.56	$1.14	$0.84	$0.97	$0.65	$0.97	$1.55	$1.45	$0.91	$0.55	$0.95	$0.84	$0.51	$0.83
Dividend Q4 Estimate	$0.86	$0.57	$1.15	$0.85	$0.98	$0.65	$0.98	$1.57	$1.46	$0.92	$0.56	$0.96	$0.85	$0.52	$0.84
Year 10 Stock Price	$118.74	$67.75	$119.69	$104.60	$82.74	$79.59	$120.48	$176.48	$135.28	$88.24	$80.30	$127.16	$103.50	$57.42	$145.75
Trial COE: Quarterly Rate	1.8%	1.9%	2.0%	1.8%	2.2%	1.9%	1.8%	1.9%	2.1%	2.1%	1.7%	1.8%	1.9%	1.9%	1.6%
Trial COE: Annual Rate	7.2%	7.7%	8.2%	7.6%	9.2%	7.6%	7.6%	7.9%	8.8%	8.6%	7.1%	7.3%	7.6%	8.0%	6.6%
Cost of Equity	7.2%	7.7%	8.2%	7.6%	9.2%	7.6%	7.6%	7.9%	8.8%	8.6%	7.1%	7.3%	7.6%	8.0%	6.6%
(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Schedule No. BV-6; Panel B.

Stock Prices and Dividends are from Bloomberg as of December 31, 2018.

1. See Workpaper #1 to Schedule No. BV-6 for the average closing stock price obtained from Bloomberg.

2. See Workpaper #2 to Schedule No. BV-6 for the quarterly dividend obtained from Bloomberg.

3. The Blue Chip Economic Indicator Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.

Year 10 Stock Price = {(the Dividend Year 2028 Q4 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Quarterly Rate))} /

{(Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Workpaper #3 to Schedule No. BV-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Multi-Stage DCF (using Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Growth Rate)

Company	MGE Energy	NextEra Energy	NorthWestern Corp.	OGE Energy	Otter Tail Corp.	Pinnacle West Capital	PNM Resources	Portland General	PPL Corp.	Public Serv. Enterprise	Southern Co.	Unitil Corp.	WEC Energy Group	Xcel Energy Inc.	Atmos Energy
Current Dividend	$0.34	$1.11	$0.55	$0.37	$0.34	$0.74	$0.27	$0.36	$0.41	$0.45	$0.60	$0.37	$0.55	$0.38	$0.53
Current Stock Price	($64.68)	($176.18)	($61.77)	($40.07)	($49.73)	($88.54)	($42.58)	($47.29)	($29.17)	($53.22)	($45.48)	($50.93)	($71.62)	($51.30)	($94.87)
Dividend Q1 Estimate	$0.34	$1.13	$0.55	$0.36	$0.34	$0.75	$0.27	$0.37	$0.41	$0.46	$0.60	$0.37	$0.56	$0.39	$0.53
Dividend Q2 Estimate	$0.35	$1.16	$0.56	$0.36	$0.35	$0.76	$0.27	$0.37	$0.42	$0.46	$0.61	$0.37	$0.57	$0.39	$0.54
Dividend Q3 Estimate	$0.36	$1.18	$0.57	$0.36	$0.35	$0.77	$0.28	$0.38	$0.42	$0.47	$0.61	$0.38	$0.57	$0.40	$0.55
Dividend Q4 Estimate	$0.36	$1.20	$0.57	$0.36	$0.36	$0.78	$0.28	$0.38	$0.42	$0.48	$0.61	$0.38	$0.58	$0.40	$0.56
Dividend Q1 Estimate	$0.36	$1.23	$0.58	$0.36	$0.37	$0.79	$0.29	$0.39	$0.43	$0.49	$0.62	$0.39	$0.59	$0.41	$0.57
Dividend Q2 Estimate	$0.37	$1.25	$0.58	$0.36	$0.38	$0.80	$0.29	$0.40	$0.43	$0.50	$0.62	$0.39	$0.60	$0.42	$0.58
Dividend Q3 Estimate	$0.38	$1.28	$0.59	$0.36	$0.38	$0.81	$0.30	$0.40	$0.44	$0.51	$0.63	$0.40	$0.61	$0.43	$0.59
Dividend Q4 Estimate	$0.39	$1.31	$0.59	$0.36	$0.39	$0.82	$0.30	$0.41	$0.44	$0.52	$0.63	$0.40	$0.62	$0.43	$0.60
Dividend Q1 Estimate	$0.40	$1.33	$0.60	$0.36	$0.40	$0.83	$0.31	$0.41	$0.45	$0.53	$0.64	$0.41	$0.63	$0.44	$0.61
Dividend Q2 Estimate	$0.41	$1.36	$0.60	$0.36	$0.41	$0.84	$0.31	$0.42	$0.45	$0.55	$0.64	$0.41	$0.65	$0.45	$0.62
Dividend Q3 Estimate	$0.42	$1.39	$0.61	$0.36	$0.42	$0.85	$0.32	$0.42	$0.46	$0.56	$0.64	$0.41	$0.65	$0.46	$0.62
Dividend Q4 Estimate	$0.43	$1.42	$0.62	$0.36	$0.43	$0.86	$0.32	$0.43	$0.46	$0.57	$0.65	$0.41	$0.66	$0.47	$0.63
Dividend Q1 Estimate	$0.44	$1.45	$0.62	$0.36	$0.44	$0.87	$0.33	$0.43	$0.47	$0.58	$0.65	$0.42	$0.67	$0.48	$0.64
Dividend Q2 Estimate	$0.44	$1.47	$0.63	$0.36	$0.45	$0.89	$0.33	$0.44	$0.47	$0.59	$0.66	$0.42	$0.68	$0.48	$0.65
Dividend Q3 Estimate	$0.45	$1.50	$0.63	$0.37	$0.46	$0.90	$0.34	$0.45	$0.48	$0.60	$0.66	$0.43	$0.69	$0.50	$0.66
Dividend Q4 Estimate	$0.46	$1.54	$0.64	$0.37	$0.47	$0.91	$0.34	$0.46	$0.48	$0.61	$0.67	$0.43	$0.70	$0.50	$0.67
Dividend Q1 Estimate	$0.47	$1.57	$0.64	$0.37	$0.48	$0.92	$0.35	$0.46	$0.48	$0.62	$0.67	$0.44	$0.71	$0.51	$0.68
Dividend Q2 Estimate	$0.48	$1.60	$0.65	$0.37	$0.49	$0.93	$0.35	$0.47	$0.49	$0.63	$0.68	$0.45	$0.71	$0.52	$0.69
Dividend Q3 Estimate	$0.49	$1.63	$0.66	$0.38	$0.50	$0.95	$0.36	$0.48	$0.49	$0.64	$0.68	$0.45	$0.72	$0.53	$0.70
Dividend Q4 Estimate	$0.50	$1.67	$0.67	$0.38	$0.51	$0.96	$0.36	$0.48	$0.50	$0.65	$0.69	$0.46	$0.73	$0.54	$0.71
Dividend Q1 Estimate	$0.51	$1.70	$0.67	$0.38	$0.52	$0.97	$0.37	$0.49	$0.50	$0.66	$0.69	$0.46	$0.74	$0.55	$0.72
Dividend Q2 Estimate	$0.52	$1.73	$0.68	$0.39	$0.53	$0.98	$0.37	$0.50	$0.51	$0.67	$0.70	$0.46	$0.75	$0.55	$0.73
Dividend Q3 Estimate	$0.53	$1.76	$0.69	$0.39	$0.54	$0.99	$0.38	$0.50	$0.51	$0.68	$0.70	$0.47	$0.76	$0.56	$0.74
Dividend Q4 Estimate	$0.54	$1.79	$0.69	$0.40	$0.55	$1.00	$0.38	$0.51	$0.52	$0.69	$0.71	$0.47	$0.77	$0.57	$0.75
Dividend Q1 Estimate	$0.55	$1.83	$0.70	$0.40	$0.56	$1.01	$0.39	$0.51	$0.52	$0.70	$0.71	$0.47	$0.78	$0.58	$0.76
Dividend Q2 Estimate	$0.55	$1.86	$0.70	$0.41	$0.57	$1.02	$0.39	$0.52	$0.52	$0.71	$0.72	$0.48	$0.79	$0.59	$0.77
Dividend Q3 Estimate	$0.56	$1.89	$0.71	$0.42	$0.58	$1.04	$0.40	$0.53	$0.53	$0.72	$0.72	$0.49	$0.80	$0.59	$0.78
Dividend Q4 Estimate	$0.57	$1.92	$0.72	$0.42	$0.59	$1.05	$0.40	$0.53	$0.53	$0.73	$0.73	$0.49	$0.81	$0.60	$0.79
Dividend Q1 Estimate	$0.58	$1.95	$0.73	$0.43	$0.60	$1.06	$0.41	$0.54	$0.54	$0.74	$0.73	$0.49	$0.82	$0.61	$0.80
Dividend Q2 Estimate	$0.59	$1.98	$0.74	$0.43	$0.61	$1.07	$0.41	$0.55	$0.54	$0.75	$0.74	$0.50	$0.83	$0.62	$0.81
Dividend Q3 Estimate	$0.60	$2.01	$0.74	$0.44	$0.62	$1.08	$0.42	$0.55	$0.55	$0.76	$0.74	$0.50	$0.84	$0.62	$0.82
Dividend Q4 Estimate	$0.61	$2.04	$0.75	$0.44	$0.63	$1.09	$0.42	$0.56	$0.56	$0.77	$0.75	$0.50	$0.85	$0.63	$0.83
Dividend Q1 Estimate	$0.62	$2.07	$0.75	$0.45	$0.64	$1.10	$0.43	$0.56	$0.56	$0.79	$0.76	$0.51	$0.86	$0.64	$0.84
Dividend Q2 Estimate	$0.63	$2.10	$0.76	$0.45	$0.65	$1.11	$0.43	$0.57	$0.57	$0.79	$0.77	$0.51	$0.86	$0.64	$0.85
Dividend Q3 Estimate	$0.64	$2.13	$0.77	$0.46	$0.66	$1.12	$0.44	$0.57	$0.57	$0.80	$0.78	$0.52	$0.87	$0.65	$0.86
Dividend Q4 Estimate	$0.65	$2.15	$0.78	$0.46	—	$1.14	$0.44	—	$0.58	$0.81	$0.78	$0.52	$0.88	$0.66	$0.87
Dividend Q1 Estimate	$0.66	$2.18	—	—	—	—	—	—	—	—	—	$0.53	—	—	$0.88
Dividend Q2 Estimate	$0.67	$2.21	—	—	—	—	—	—	—	—	—	—	—	—	$0.89
Dividend Q3 Estimate	—	$2.23	—	—	—	—	—	—	—	—	—	—	—	—	—
Dividend Q4 Estimate	—	$2.26	—	—	—	—	—	—	—	—	—	—	—	—	—
Year 10 Stock Price	$100.85	$277.16	$92.93	$58.99	$78.02	$135.28	$65.39	$72.44	$44.21	$83.16	$67.93	$77.20	$109.83	$79.40	$145.76
Trial COE: Quarterly Rate	1.7%	1.8%	1.8%	1.7%	1.9%	1.9%	1.7%	1.8%	2.4%	2.0%	2.2%	1.7%	1.8%	1.9%	1.6%
Trial COE: Annual Rate	6.9%	7.6%	7.5%	7.0%	7.7%	7.7%	7.0%	7.5%	9.8%	8.3%	9.1%	7.0%	7.6%	7.7%	6.7%
Cost of Equity	6.9%	7.6%	7.5%	7.0%	7.7%	7.7%	7.0%	7.5%	9.8%	8.3%	9.1%	7.0%	7.6%	7.7%	6.7%
(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Schedule No. BV-6, Panel B.

Stock Prices and Dividends are from Bloomberg as of December 31, 2018.

1. See Workpaper #1 to Schedule No. BV-6 for the average closing stock price obtained from Bloomberg.
2. See Workpaper #2 to Schedule No. BV-6 for the quarterly dividend obtained from Bloomberg.
3. The Blue Chip Economic Indicator Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.

Year 10 Stock Price = {(the Dividend Year 2028 Q4 Estimate) x (1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Quarterly Rate)) / {(Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Workpaper #3 to Schedule No. BV-6

DCF Cost of Equity of the Electric, Water, and Gas Sample

Multi-Stage DCF (using Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Growth Rate)

Company	Chesapeake Utilities	NiSource Inc.	Northwest Natural	ONE Gas Inc.	Southwest Gas	Spire Inc.	Amer. States Water	Amer. Water Works	Middlesex Water	York Water Co. (The)
Current Dividend	$0.37	$0.20	$0.48	$0.46	$0.52	$0.59	$0.28	$0.46	$0.24	$0.17
Current Stock Price	($85.65)	($26.33)	($63.45)	($82.56)	($79.20)	($76.07)	($67.08)	($92.92)	($53.42)	($33.00)
Dividend Q1 Estimate	$0.38	$0.20	$0.48	$0.47	$0.53	$0.60	$0.28	$0.46	$0.24	$0.18
Dividend Q2 Estimate	$0.39	$0.20	$0.48	$0.48	$0.54	$0.60	$0.28	$0.47	$0.25	$0.18
Dividend Q3 Estimate	$0.40	$0.20	$0.49	$0.48	$0.55	$0.61	$0.29	$0.48	$0.25	$0.19
Dividend Q4 Estimate	$0.41	$0.21	$0.50	$0.49	$0.56	$0.61	$0.29	$0.49	$0.26	$0.19
Dividend Q1 Estimate	$0.42	$0.21	$0.51	$0.50	$0.56	$0.62	$0.30	$0.50	$0.26	$0.20
Dividend Q2 Estimate	$0.42	$0.21	$0.52	$0.51	$0.57	$0.63	$0.30	$0.51	$0.27	$0.20
Dividend Q3 Estimate	$0.43	$0.22	$0.53	$0.52	$0.58	$0.63	$0.31	$0.52	$0.27	$0.21
Dividend Q4 Estimate	$0.44	$0.22	$0.54	$0.52	$0.59	$0.64	$0.32	$0.53	$0.28	$0.21
Dividend Q1 Estimate	$0.45	$0.22	$0.56	$0.53	$0.60	$0.64	$0.33	$0.54	$0.28	$0.22
Dividend Q2 Estimate	$0.46	$0.23	$0.57	$0.54	$0.61	$0.65	$0.34	$0.55	$0.28	$0.22
Dividend Q3 Estimate	$0.47	$0.23	$0.58	$0.55	$0.62	$0.66	$0.34	$0.56	$0.29	$0.23
Dividend Q4 Estimate	$0.48	$0.24	$0.59	$0.56	$0.63	$0.67	$0.35	$0.58	$0.29	$0.23
Dividend Q1 Estimate	$0.49	$0.24	$0.60	$0.57	$0.64	$0.67	$0.36	$0.59	$0.30	$0.24
Dividend Q2 Estimate	$0.50	$0.24	$0.61	$0.58	$0.66	$0.68	$0.37	$0.60	$0.30	$0.25
Dividend Q3 Estimate	$0.51	$0.25	$0.62	$0.59	$0.67	$0.68	$0.37	$0.61	$0.31	$0.25
Dividend Q4 Estimate	$0.52	$0.25	$0.64	$0.60	$0.68	$0.69	$0.38	$0.62	$0.31	$0.26
Dividend Q1 Estimate	$0.54	$0.26	$0.65	$0.61	$0.69	$0.70	$0.39	$0.63	$0.32	$0.26
Dividend Q2 Estimate	$0.55	$0.26	$0.66	$0.62	$0.70	$0.70	$0.40	$0.65	$0.32	$0.27
Dividend Q3 Estimate	$0.56	$0.27	$0.68	$0.63	$0.71	$0.71	$0.40	$0.66	$0.33	$0.28
Dividend Q4 Estimate	$0.58	$0.27	$0.69	$0.64	$0.72	$0.72	$0.41	$0.67	$0.33	$0.28
Dividend Q1 Estimate	$0.59	$0.28	$0.70	$0.65	$0.74	$0.72	$0.42	$0.68	$0.34	$0.29
Dividend Q2 Estimate	$0.60	$0.28	$0.72	$0.66	$0.75	$0.72	$0.43	$0.70	$0.34	$0.30
Dividend Q3 Estimate	$0.61	$0.28	$0.73	$0.67	$0.76	$0.73	$0.43	$0.71	$0.35	$0.30
Dividend Q4 Estimate	$0.63	$0.29	$0.74	$0.68	$0.77	$0.74	$0.44	$0.72	$0.35	$0.31
Dividend Q1 Estimate	$0.64	$0.29	$0.76	$0.69	$0.78	$0.74	$0.45	$0.73	$0.35	$0.31
Dividend Q2 Estimate	$0.65	$0.30	$0.77	$0.70	$0.79	$0.75	$0.46	$0.75	$0.36	$0.32
Dividend Q3 Estimate	$0.67	$0.30	$0.78	$0.71	$0.80	$0.76	$0.47	$0.76	$0.36	$0.33
Dividend Q4 Estimate	$0.68	$0.31	$0.79	$0.72	$0.82	$0.77	$0.48	$0.77	$0.37	$0.33
Dividend Q1 Estimate	$0.69	$0.32	$0.81	$0.73	$0.83	$0.77	$0.48	$0.78	$0.37	$0.34
Dividend Q2 Estimate	$0.70	$0.32	$0.82	$0.74	$0.84	$0.78	$0.49	$0.80	$0.38	$0.34
Dividend Q3 Estimate	$0.72	$0.32	$0.83	$0.75	$0.85	$0.79	$0.50	$0.81	$0.38	$0.35
Dividend Q4 Estimate	$0.73	$0.33	$0.84	$0.76	$0.86	$0.80	$0.51	$0.82	$0.38	$0.35
Dividend Q1 Estimate	$0.74	$0.33	$0.86	$0.77	$0.87	$0.80	$0.51	$0.83	$0.39	$0.36
Dividend Q2 Estimate	$0.75	$0.34	$0.87	$0.78	$0.88	$0.81	$0.52	$0.84	$0.39	$0.36
Dividend Q3 Estimate	$0.76	$0.34	$0.88	$0.79	$0.89	$0.82	$0.53	$0.85	$0.39	$0.36
Dividend Q4 Estimate	$0.77	$0.34	$0.89	$0.79	$0.90	$0.83	$0.53	$0.86	$0.39	$0.37
Dividend Q1 Estimate	$0.78	$0.34	$0.90	$0.80	$0.91	$0.84	$0.54	$0.87	$0.39	$0.37
Dividend Q2 Estimate	$0.79	$0.34	$0.91	$0.81	$0.92	$0.84	$0.55	$0.88	$0.40	$0.38
Dividend Q3 Estimate	$0.80	$0.34	$0.92	$0.82	$0.93	$0.85	$0.55	$0.89	$0.40	$0.38
Dividend Q4 Estimate	$0.81	$0.35	$0.94	$0.82	$0.94	$0.86	$0.56	$0.90	$0.41	$0.39
Year 10 Stock Price	$134.32	$40.91	$100.19	$127.61	$122.98	$115.36	$104.12	$144.59	$81.80	$52.16
Trial COE: Quarterly Rate	1.6%	1.9%	2.0%	1.7%	1.8%	1.8%	1.6%	1.7%	1.5%	1.8%
Trial COE: Annual Rate	6.7%	7.7%	8.2%	6.9%	7.4%	7.3%	6.4%	6.8%	6.2%	7.3%
Cost of Equity	6.7%	7.7%	8.2%	6.9%	7.4%	7.3%	6.4%	6.8%	6.2%	7.3%
(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Schedule No. BV-6; Panel B.

Stock Prices and Dividends are from Bloomberg as of December 31, 2018.

1. See Workpaper #1 to Schedule No. BV-6 for the average closing stock price obtained from Bloomberg.
2. See Workpaper #2 to Schedule No. BV-6 for the for the quarterly dividend obtained from Bloomberg.
3. The Blue Chip Economic Indicator Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.

Year 10 Stock Price = {(the Dividend Year 2028 Q4 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Quarterly Rate)} /
   {(Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Schedule No. BV-7

Overall After-Tax DCF Cost of Capital of the Electric, Water, and Gas Sample

Panel A: Simple DCF Method (Quarterly)

Company	3rd Quarter, 2018 S&P Bond Rating	3rd Quarter, 2018 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	SCE's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
ALLETE	BBB	-	7.6%	0.71	-	0.00	4.8%	0.29	28.0%	6.4%
Alliant Energy	A	A	9.2%	0.61	4.4%	0.02	4.4%	0.37	28.0%	6.8%
Amer. Elec. Power	A	-	9.8%	0.58	-	0.00	4.4%	0.42	28.0%	7.0%
Ameren Corp.	BBB	-	9.7%	0.64	-	0.00	4.8%	0.36	28.0%	7.5%
AVANGRID Inc.	BBB	-	13.6%	0.70	-	0.00	4.8%	0.30	28.0%	10.6%
CMS Energy Corp.	BBB	-	9.9%	0.56	-	0.00	4.8%	0.44	28.0%	7.1%
Consol. Edison	A	-	6.7%	0.56	-	0.00	4.4%	0.44	28.0%	5.1%
DTE Energy	BBB	-	9.1%	0.59	-	0.00	4.8%	0.41	28.0%	6.8%
Duke Energy	A	-	9.3%	0.52	-	0.00	4.4%	0.48	28.0%	6.4%
Edison Intl	BBB	BBB	8.7%	0.50	4.8%	0.06	4.8%	0.44	28.0%	6.2%
El Paso Electric	BBB	-	7.5%	0.57	-	0.00	4.8%	0.43	28.0%	5.8%
Entergy Corp.	BBB	BBB	3.5%	0.46	4.8%	0.01	4.8%	0.53	28.0%	3.5%
Eversource Energy	A	A	8.9%	0.60	4.4%	0.00	4.4%	0.40	28.0%	6.6%
FirstEnergy Corp.	BBB	BBB	7.5%	0.49	4.8%	0.00	4.8%	0.51	28.0%	5.4%
IDACORP Inc.	BBB	-	5.3%	0.71	-	0.00	4.8%	0.29	28.0%	4.7%
MGE Energy	AA	-	10.4%	0.80	-	0.00	4.2%	0.20	28.0%	9.0%
NextEra Energy	A	-	11.2%	0.71	-	0.00	4.4%	0.29	28.0%	8.9%
NorthWestern Corp.	BBB	-	6.5%	0.61	-	0.00	4.8%	0.39	28.0%	5.3%
OGE Energy	BBB	-	3.7%	0.69	-	0.00	4.8%	0.31	28.0%	3.6%
Otter Tail Corp.	BBB	-	10.9%	0.75	-	0.00	4.8%	0.25	28.0%	9.0%
Pinnacle West Capital	A	-	8.0%	0.64	-	0.00	4.4%	0.36	28.0%	6.3%
PNM Resources	BBB	BBB	8.3%	0.54	4.8%	0.00	4.8%	0.45	28.0%	6.1%
Portland General	BBB	-	8.2%	0.60	-	0.00	4.8%	0.40	28.0%	6.3%
PPL Corp.	A	-	9.3%	0.45	-	0.00	4.4%	0.55	28.0%	5.9%
Public Serv. Enterprise	BBB	-	10.4%	0.64	-	0.00	4.8%	0.36	28.0%	7.9%
Southern Co.	A	A	7.7%	0.48	4.4%	0.00	4.4%	0.51	28.0%	5.4%
Unitil Corp.	BBB	BBB	6.7%	0.60	4.8%	0.00	4.8%	0.40	28.0%	5.4%
WEC Energy Group	A	A	8.3%	0.66	4.4%	0.00	4.4%	0.34	28.0%	6.6%
Xcel Energy Inc.	A	-	9.3%	0.60	-	0.00	4.4%	0.40	28.0%	6.8%
Atmos Energy	A	-	8.3%	0.73	-	0.00	4.4%	0.27	28.0%	6.9%
Chesapeake Utilities	A	-	11.7%	0.73	-	0.00	4.4%	0.27	28.0%	9.3%
NiSource Inc.	BBB	BBB	9.8%	0.49	4.8%	0.02	4.8%	0.49	28.0%	6.6%
Northwest Natural	A	-	11.4%	0.66	-	0.00	4.4%	0.34	28.0%	8.6%
ONE Gas Inc.	A	-	9.2%	0.73	-	0.00	4.4%	0.27	28.0%	7.6%
Southwest Gas	BBB	-	9.7%	0.63	-	0.00	4.8%	0.37	28.0%	7.4%
Spire Inc.	A	-	7.0%	0.59	-	0.00	4.4%	0.41	28.0%	5.4%
Amer. States Water	A	-	10.3%	0.83	-	0.00	4.4%	0.17	28.0%	9.1%
Amer. Water Works	A	-	10.3%	0.64	-	0.00	4.4%	0.36	28.0%	7.7%
Middlesex Water	A	A	7.8%	0.81	4.4%	0.00	4.4%	0.19	28.0%	6.9%
York Water Co. (The)	A	-	12.1%	0.80	-	0.00	4.4%	0.20	28.0%	10.3%
Simple Full Sample Average			9.2%	0.63	4.6%	0.00	4.6%	0.37	28.0%	7.1%
Simple Electric Utility Sample Average			9.0%	0.61	4.6%	0.00	4.6%	0.39	28.0%	6.8%
Simple Water and Gas Sample Average			9.8%	0.70	4.6%	0.00	4.5%	0.30	28.0%	7.8%

Sources and Notes:

[1]: Bloomberg as of December 31, 2018.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. BV-6; Panel A, [6].
[4]: Schedule No. BV-4, [1].
[5]: Workpaper #2 to Schedule No. BV-11, Panel C.
[6]: Schedule No. BV-4, [2].
[7]: Workpaper #2 to Schedule No. BV-11, Panel B.
[8]: Schedule No. BV-4, [3].
[9]: Provided by SCE.
[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-7

Overall After-Tax DCF Cost of Capital of the Electric, Water, and Gas Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	3rd Quarter, 2018 S&P Bond Rating	3rd Quarter, 2018 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	SCE's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
ALLETE	BBB	-	7.2%	0.71	-	0.00	4.8%	0.29	28.0%	6.1%
Alliant Energy	A	A	7.7%	0.61	4.4%	0.02	4.4%	0.37	28.0%	5.9%
Amer. Elec. Power	A	-	8.2%	0.58	-	0.00	4.4%	0.42	28.0%	6.1%
Ameren Corp.	BBB	-	7.6%	0.64	-	0.00	4.8%	0.36	28.0%	6.1%
AVANGRID Inc.	BBB	-	9.2%	0.70	-	0.00	4.8%	0.30	28.0%	7.5%
CMS Energy Corp.	BBB	-	7.6%	0.56	-	0.00	4.8%	0.44	28.0%	5.8%
Consol. Edison	A	-	7.6%	0.56	-	0.00	4.4%	0.44	28.0%	5.6%
DTE Energy	BBB	-	7.9%	0.59	-	0.00	4.8%	0.41	28.0%	6.1%
Duke Energy	A	-	8.8%	0.52	-	0.00	4.4%	0.48	28.0%	6.1%
Edison Intl	BBB	BBB	8.6%	0.50	4.8%	0.06	4.8%	0.44	28.0%	6.1%
El Paso Electric	BBB	-	7.1%	0.57	-	0.00	4.8%	0.43	28.0%	5.5%
Entergy Corp.	BBB	BBB	7.3%	0.46	4.8%	0.01	4.8%	0.53	28.0%	5.3%
Eversource Energy	A	A	7.6%	0.60	4.4%	0.00	4.4%	0.40	28.0%	5.8%
FirstEnergy Corp.	BBB	BBB	8.0%	0.49	4.8%	0.00	4.8%	0.51	28.0%	5.7%
IDACORP Inc.	BBB	-	6.6%	0.71	-	0.00	4.8%	0.29	28.0%	5.7%
MGE Energy	AA	-	6.9%	0.80	-	0.00	4.2%	0.20	28.0%	6.2%
NextEra Energy	A	-	7.6%	0.71	-	0.00	4.4%	0.29	28.0%	6.3%
NorthWestern Corp.	BBB	-	7.5%	0.61	-	0.00	4.8%	0.39	28.0%	6.0%
OGE Energy	BBB	-	7.0%	0.69	-	0.00	4.8%	0.31	28.0%	5.9%
Otter Tail Corp.	BBB	-	7.7%	0.75	-	0.00	4.8%	0.25	28.0%	6.7%
Pinnacle West Capital	A	-	7.7%	0.64	-	0.00	4.4%	0.36	28.0%	6.1%
PNM Resources	BBB	BBB	7.0%	0.54	4.8%	0.00	4.8%	0.45	28.0%	5.4%
Portland General	BBB	-	7.5%	0.60	-	0.00	4.8%	0.40	28.0%	5.9%
PPL Corp.	A	-	9.8%	0.45	-	0.00	4.4%	0.55	28.0%	6.2%
Public Serv. Enterprise	BBB	-	8.3%	0.64	-	0.00	4.8%	0.36	28.0%	6.6%
Southern Co.	A	A	9.1%	0.48	4.4%	0.00	4.4%	0.51	28.0%	6.0%
Untill Corp.	BBB	BBB	7.0%	0.60	4.8%	0.00	4.8%	0.40	28.0%	5.6%
WEC Energy Group	A	A	7.6%	0.66	4.4%	0.00	4.4%	0.34	28.0%	6.1%
Xcel Energy Inc.	A	-	7.7%	0.60	-	0.00	4.4%	0.40	28.0%	5.8%
Atmos Energy	A	-	6.7%	0.73	-	0.00	4.4%	0.27	28.0%	5.8%
Chesapeake Utilities	A	-	6.7%	0.73	-	0.00	4.4%	0.27	28.0%	5.7%
NiSource Inc.	BBB	BBB	7.7%	0.49	4.8%	0.02	4.8%	0.49	28.0%	5.6%
Northwest Natural	A	-	8.2%	0.66	-	0.00	4.4%	0.34	28.0%	6.4%
ONE Gas Inc.	A	-	6.9%	0.73	-	0.00	4.4%	0.27	28.0%	5.9%
Southwest Gas	BBB	-	7.4%	0.63	-	0.00	4.8%	0.37	28.0%	6.0%
Spire Inc.	A	-	7.3%	0.59	-	0.00	4.4%	0.41	28.0%	5.6%
Amer. States Water	A	-	6.4%	0.83	-	0.00	4.4%	0.17	28.0%	5.9%
Amer. Water Works	A	-	6.8%	0.64	-	0.00	4.4%	0.36	28.0%	5.5%
Middlesex Water	A	A	6.2%	0.81	4.4%	0.00	4.4%	0.19	28.0%	5.7%
York Water Co. (The)	A	-	7.3%	0.80	-	0.00	4.4%	0.20	28.0%	6.5%
Multi-Stage Full Sample Average			7.6%	0.63	4.6%	0.00	4.6%	0.37	28.0%	6.0%
Multi-Stage Electric Utility Sample Average			7.7%	0.61	4.6%	0.00	4.6%	0.39	28.0%	6.0%
Multi-Stage Water and Gas Sample Average			7.1%	0.70	4.6%	0.00	4.5%	0.30	28.0%	5.9%

Sources and Notes:

[1]: Bloomberg as of December 31, 2018.
[2]: Preferred ratings were assumed equal to debt rating
[3]: Schedule No. BV-6, Panel B, [10].
[4]: Schedule No. BV-4, [1].
[5]: Workpaper #2 to Schedule No. BV-11, Panel C.

[6]: Schedule No. BV-4, [2].
[7]: Workpaper #2 to Schedule No. BV-11, Panel B.
[8]: Schedule No. BV-4, [3].
[9]: Provided by SCE.
[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-8

DCF Cost of Equity at SCE's Proposed Capital Structure

Electric, Water, and Gas Sample

	Overall After - Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Return on Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Simple DCF Quarterly	7.1%	48.0%	4.8%	28.0%	52.0%	10.4%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	6.0%	48.0%	4.8%	28.0%	52.0%	8.3%
Electric Utility Sample						
Simple DCF Quarterly	6.8%	48.0%	4.8%	28.0%	52.0%	9.9%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	6.0%	48.0%	4.8%	28.0%	52.0%	8.3%
Water and Gas Sample						
Simple DCF Quarterly	7.8%	48.0%	4.8%	28.0%	52.0%	11.8%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.9%	48.0%	4.8%	28.0%	52.0%	8.0%

Sources and Notes:
[1]: Schedule No. BV-7; Panels A-B, [10].
[2]: Provided by SCE.
[3]: Based on a BBB rating. Yield from Bloomberg as of December 31, 2018.
[4]: Provided by SCE.
[5]: Provided by SCE.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. BV-9 Risk-Free Rates

BCEI Forecast of 10 year U.S. Treasury Yield	[a]	**3.60%**
Long-run Average of 20 year U.S. Treasury Yield	[b]	5.08%
Long-run Average of 10 year U.S. Treasury Yield	[c]	4.59%
Maturity Premium	**[d] = [b] - [c]**	**0.50%**
Base Projection of 20 year U.S. Treasury Yield	**[e] = [a] + [d]**	**4.10%**

Sources and Notes:

[a]: Blue Chip Economic Indicators, October 2018. Projection of 2020 Yield.

[b], [c]: Bloomberg as of 12/31/2018, see Workpaper #1 to Schedule No. BV-9.

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
1/31/1990	8.210	8.240
2/28/1990	8.470	8.490
3/31/1990	8.590	8.580
4/30/1990	8.790	8.770
5/31/1990	8.760	8.740
6/30/1990	8.480	8.470
7/31/1990	8.470	8.480
8/31/1990	8.750	8.810
9/30/1990	8.890	8.960
10/31/1990	8.720	8.790
11/30/1990	8.390	8.470
12/31/1990	8.080	8.160
1/31/1991	8.090	8.190
2/28/1991	7.850	7.950
3/31/1991	8.110	8.200
4/30/1991	8.040	8.130
5/31/1991	8.070	8.170
6/30/1991	8.280	8.380
7/31/1991	8.270	8.370
8/31/1991	7.900	8.030
9/30/1991	7.650	7.800
10/31/1991	7.530	7.730
11/30/1991	7.420	7.670
12/31/1991	7.090	7.390
1/31/1992	7.030	7.300
2/29/1992	7.340	7.590
3/31/1992	7.540	7.760
4/30/1992	7.480	7.720
5/31/1992	7.390	7.650
6/30/1992	7.260	7.560
7/31/1992	6.840	7.240
8/31/1992	6.590	7.000
9/30/1992	6.420	6.880

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
10/31/1992	6.590	7.070
11/30/1992	6.870	7.240
12/31/1992	6.770	7.100
1/31/1993	6.600	6.980
2/28/1993	6.260	6.670
3/31/1993	5.980	6.400
4/30/1993	5.970	6.410
5/31/1993	6.040	6.480
6/30/1993	5.960	6.390
7/31/1993	5.810	6.230
8/31/1993	5.680	6.000
9/30/1993	5.360	5.680
10/31/1993	5.330	6.070
11/30/1993	5.720	6.380
12/31/1993	5.770	6.400
1/31/1994	5.750	6.390
2/28/1994	5.970	6.570
3/31/1994	6.480	7.000
4/30/1994	6.970	7.400
5/31/1994	7.180	7.540
6/30/1994	7.100	7.510
7/31/1994	7.300	7.670
8/31/1994	7.240	7.620
9/30/1994	7.460	7.870
10/31/1994	7.740	8.080
11/30/1994	7.960	8.200
12/31/1994	7.810	7.990
1/31/1995	7.780	7.970
2/28/1995	7.470	7.730
3/31/1995	7.200	7.570
4/30/1995	7.060	7.450
5/31/1995	6.630	7.010
6/30/1995	6.170	6.590

Workpaper #1 to Schedule No. BV-9
Historical U.S.Treasury Bond Yields

Date	10 year	20 year
7/31/1995	6.280	6.740
8/31/1995	6.490	6.920
9/30/1995	6.200	6.650
10/31/1995	6.040	6.450
11/30/1995	5.930	6.330
12/31/1995	5.710	6.120
1/31/1996	5.650	6.110
2/29/1996	5.810	6.300
3/31/1996	6.270	6.740
4/30/1996	6.510	6.980
5/31/1996	6.740	7.110
6/30/1996	6.910	7.220
7/31/1996	6.870	7.140
8/31/1996	6.640	6.970
9/30/1996	6.830	7.170
10/31/1996	6.530	6.900
11/30/1996	6.200	6.580
12/31/1996	6.300	6.650
1/31/1997	6.580	6.910
2/28/1997	6.420	6.770
3/31/1997	6.690	7.050
4/30/1997	6.890	7.200
5/31/1997	6.710	7.020
6/30/1997	6.490	6.840
7/31/1997	6.220	6.560
8/31/1997	6.300	6.650
9/30/1997	6.210	6.560
10/31/1997	6.030	6.380
11/30/1997	5.880	6.200
12/31/1997	5.810	6.070
1/31/1998	5.540	5.880
2/28/1998	5.570	5.960
3/31/1998	5.650	6.010

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
4/30/1998	5.640	6.000
5/31/1998	5.650	6.010
6/30/1998	5.500	5.800
7/31/1998	5.460	5.780
8/31/1998	5.340	5.660
9/30/1998	4.810	5.380
10/31/1998	4.530	5.300
11/30/1998	4.830	5.480
12/31/1998	4.650	5.360
1/31/1999	4.720	5.450
2/28/1999	5.000	5.660
3/31/1999	5.230	5.870
4/30/1999	5.180	5.820
5/31/1999	5.540	6.080
6/30/1999	5.900	6.360
7/31/1999	5.790	6.280
8/31/1999	5.940	6.430
9/30/1999	5.920	6.500
10/31/1999	6.110	6.660
11/30/1999	6.030	6.480
12/31/1999	6.280	6.690
1/31/2000	6.660	6.860
2/29/2000	6.520	6.540
3/31/2000	6.260	6.380
4/30/2000	5.990	6.180
5/31/2000	6.440	6.550
6/30/2000	6.100	6.280
7/31/2000	6.050	6.200
8/31/2000	5.830	6.020
9/30/2000	5.800	6.090
10/31/2000	5.740	6.040
11/30/2000	5.720	5.980
12/31/2000	5.240	5.640

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
1/31/2001	5.160	5.650
2/28/2001	5.100	5.620
3/31/2001	4.890	5.490
4/30/2001	5.140	5.780
5/31/2001	5.390	5.920
6/30/2001	5.280	5.820
7/31/2001	5.240	5.750
8/31/2001	4.970	5.580
9/30/2001	4.730	5.530
10/31/2001	4.570	5.340
11/30/2001	4.650	5.330
12/31/2001	5.090	5.760
1/31/2002	5.040	5.690
2/28/2002	4.910	5.610
3/31/2002	5.280	5.930
4/30/2002	5.210	5.850
5/31/2002	5.160	5.810
6/30/2002	4.930	5.650
7/31/2002	4.650	5.510
8/31/2002	4.260	5.190
9/30/2002	3.870	4.870
10/31/2002	3.940	5.000
11/30/2002	4.050	5.040
12/31/2002	4.030	5.010
1/31/2003	4.050	5.020
2/28/2003	3.900	4.870
3/31/2003	3.810	4.820
4/30/2003	3.960	4.910
5/31/2003	3.570	4.520
6/30/2003	3.330	4.340
7/31/2003	3.980	4.920
8/31/2003	4.450	5.390
9/30/2003	4.270	5.210

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
10/31/2003	4.290	5.210
11/30/2003	4.300	5.170
12/31/2003	4.270	5.110
1/31/2004	4.150	5.010
2/29/2004	4.080	4.940
3/31/2004	3.830	4.720
4/30/2004	4.350	5.160
5/31/2004	4.720	5.460
6/30/2004	4.730	5.450
7/31/2004	4.500	5.240
8/31/2004	4.280	5.070
9/30/2004	4.130	4.890
10/31/2004	4.100	4.850
11/30/2004	4.190	4.890
12/31/2004	4.230	4.880
1/31/2005	4.220	4.770
2/28/2005	4.170	4.610
3/31/2005	4.500	4.890
4/30/2005	4.340	4.750
5/31/2005	4.140	4.560
6/30/2005	4.000	4.350
7/31/2005	4.180	4.480
8/31/2005	4.260	4.530
9/30/2005	4.200	4.510
10/31/2005	4.460	4.740
11/30/2005	4.540	4.830
12/31/2005	4.470	4.730
1/31/2006	4.420	4.650
2/28/2006	4.570	4.730
3/31/2006	4.720	4.910
4/30/2006	4.990	5.220
5/31/2006	5.110	5.350
6/30/2006	5.110	5.290

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
7/31/2006	5.090	5.250
8/31/2006	4.880	5.080
9/30/2006	4.720	4.930
10/31/2006	4.730	4.940
11/30/2006	4.600	4.780
12/31/2006	4.560	4.780
1/31/2007	4.760	4.950
2/28/2007	4.720	4.930
3/31/2007	4.560	4.810
4/30/2007	4.690	4.950
5/31/2007	4.750	4.980
6/30/2007	5.100	5.290
7/31/2007	5.000	5.190
8/31/2007	4.670	5.000
9/30/2007	4.520	4.840
10/31/2007	4.530	4.830
11/30/2007	4.150	4.560
12/31/2007	4.100	4.570
1/31/2008	3.740	4.350
2/29/2008	3.740	4.490
3/31/2008	3.510	4.360
4/30/2008	3.670	4.440
5/31/2008	3.880	4.600
6/30/2008	4.100	4.740
7/31/2008	4.010	4.620
8/31/2008	3.890	4.530
9/30/2008	3.690	4.320
10/31/2008	3.810	4.450
11/30/2008	3.530	4.270
12/31/2008	2.420	3.180
1/31/2009	2.520	3.460
2/28/2009	2.870	3.830
3/31/2009	2.820	3.780

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
4/30/2009	2.930	3.840
5/31/2009	3.290	4.220
6/30/2009	3.720	4.510
7/31/2009	3.560	4.380
8/31/2009	3.590	4.330
9/30/2009	3.400	4.140
10/31/2009	3.390	4.160
11/30/2009	3.400	4.240
12/31/2009	3.590	4.400
1/31/2010	3.730	4.500
2/28/2010	3.690	4.480
3/31/2010	3.730	4.490
4/30/2010	3.850	4.530
5/31/2010	3.420	4.110
6/30/2010	3.200	3.950
7/31/2010	3.010	3.800
8/31/2010	2.700	3.520
9/30/2010	2.650	3.470
10/31/2010	2.540	3.520
11/30/2010	2.760	3.820
12/31/2010	3.290	4.170
1/31/2011	3.390	4.280
2/28/2011	3.580	4.420
3/31/2011	3.410	4.270
4/30/2011	3.450	4.280
5/31/2011	3.170	4.010
6/30/2011	3.000	3.910
7/31/2011	3.000	3.950
8/31/2011	2.300	3.240
9/30/2011	1.980	2.830
10/31/2011	2.150	2.870
11/30/2011	2.010	2.720
12/31/2011	1.980	2.670

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Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
1/31/2012	1.970	2.700
2/29/2012	1.970	2.750
3/31/2012	2.170	2.940
4/30/2012	2.050	2.820
5/31/2012	1.800	2.530
6/30/2012	1.620	2.310
7/31/2012	1.530	2.220
8/31/2012	1.680	2.400
9/30/2012	1.720	2.490
10/31/2012	1.750	2.510
11/30/2012	1.650	2.390
12/31/2012	1.720	2.470
1/31/2013	1.910	2.680
2/28/2013	1.980	2.780
3/31/2013	1.960	2.780
4/30/2013	1.760	2.550
5/31/2013	1.930	2.730
6/30/2013	2.300	3.070
7/31/2013	2.580	3.310
8/31/2013	2.740	3.490
9/30/2013	2.810	3.530
10/31/2013	2.620	3.380
11/30/2013	2.720	3.500
12/31/2013	2.900	3.630
1/31/2014	2.860	3.520
2/28/2014	2.710	3.380
3/31/2014	2.720	3.350
4/30/2014	2.710	3.270
5/31/2014	2.560	3.120
6/30/2014	2.600	3.150
7/31/2014	2.540	3.070
8/31/2014	2.420	2.940
9/30/2014	2.530	3.010

Workpaper #1 to Schedule No. BV-9

Historical U.S.Treasury Bond Yields

Date	10 year	20 year
10/31/2014	2.300	2.770
11/30/2014	2.330	2.760
12/31/2014	2.210	2.550
1/31/2015	1.880	2.200
2/28/2015	1.980	2.340
3/31/2015	2.040	2.410
4/30/2015	1.940	2.330
5/31/2015	2.200	2.690
6/30/2015	2.360	2.850
7/31/2015	2.320	2.770
8/31/2015	2.170	2.550
9/30/2015	2.170	2.620
10/31/2015	2.070	2.500
11/30/2015	2.260	2.690
12/31/2015	2.240	2.610
1/31/2016	2.090	2.490
2/29/2016	1.780	2.200
3/31/2016	1.890	2.280
4/30/2016	1.810	2.210
5/31/2016	1.810	2.220
6/30/2016	1.640	2.020
7/31/2016	1.500	1.820
8/31/2016	1.560	1.890
9/30/2016	1.630	2.020
10/31/2016	1.760	2.170
11/30/2016	2.140	2.540
12/31/2016	2.490	2.840
1/31/2017	2.430	2.750
2/28/2017	2.420	2.760
3/31/2017	2.480	2.830
4/30/2017	2.300	2.670
5/31/2017	2.300	2.700
6/30/2017	2.190	2.540

Workpaper #1 to Schedule No. BV-9
Historical U.S.Treasury Bond Yields

Date	10 year	20 year
7/31/2017	2.320	2.650
8/31/2017	2.210	2.550
9/30/2017	2.200	2.530
10/31/2017	2.360	2.650
11/30/2017	2.350	2.600
12/31/2017	2.400	2.600
1/31/2018	2.580	2.730
2/28/2018	2.860	3.020
3/31/2018	2.840	2.970
4/30/2018	2.870	2.960
5/31/2018	2.980	3.050
6/30/2018	2.910	2.980
7/31/2018	2.890	2.940
8/31/2018	2.890	2.970
9/30/2018	3.000	3.080
10/31/2018	3.150	3.270
11/30/2018	3.120	3.270
12/31/2018	2.830	2.980

Source: Bloomberg LP as of 12/31/2018.

Schedule No. BV-10

Risk Positioning Cost of Equity of the Electric, Water, and Gas Sample (Using Value Line Betas)

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
ALLETE	4.40%	0.65	7.07%	9.0%	9.5%
Alliant Energy	4.40%	0.60	7.07%	8.6%	9.2%
Amer. Elec. Power	4.40%	0.55	7.07%	8.3%	9.0%
Ameren Corp.	4.40%	0.55	7.07%	8.3%	9.0%
AVANGRID Inc.	4.40%	0.30	7.07%	6.5%	7.6%
CMS Energy Corp.	4.40%	0.55	7.07%	8.3%	9.0%
Consol. Edison	4.40%	0.40	7.07%	7.2%	8.1%
DTE Energy	4.40%	0.55	7.07%	8.3%	9.0%
Duke Energy	4.40%	0.50	7.07%	7.9%	8.7%
Edison Int'l	4.40%	0.55	7.07%	8.3%	9.0%
El Paso Electric	4.40%	0.65	7.07%	9.0%	9.5%
Entergy Corp.	4.40%	0.60	7.07%	8.6%	9.2%
Eversource Energy	4.40%	0.60	7.07%	8.6%	9.2%
FirstEnergy Corp.	4.40%	0.60	7.07%	8.6%	9.2%
IDACORP Inc.	4.40%	0.55	7.07%	8.3%	9.0%
MGE Energy	4.40%	0.60	7.07%	8.6%	9.2%
NextEra Energy	4.40%	0.55	7.07%	8.3%	9.0%
NorthWestern Corp.	4.40%	0.55	7.07%	8.3%	9.0%
OGE Energy	4.40%	0.85	7.07%	10.4%	10.6%
Otter Tail Corp.	4.40%	0.75	7.07%	9.7%	10.1%
Pinnacle West Capital	4.40%	0.55	7.07%	8.3%	9.0%
PNM Resources	4.40%	0.65	7.07%	9.0%	9.5%
Portland General	4.40%	0.60	7.07%	8.6%	9.2%
PPL Corp.	4.40%	0.70	7.07%	9.3%	9.8%
Public Serv. Enterprise	4.40%	0.60	7.07%	8.6%	9.2%
Southern Co.	4.40%	0.50	7.07%	7.9%	8.7%
Unitil Corp.	4.40%	0.55	7.07%	8.3%	9.0%
WEC Energy Group	4.40%	0.50	7.07%	7.9%	8.7%
Xcel Energy Inc.	4.40%	0.50	7.07%	7.9%	8.7%
Atmos Energy	4.40%	0.60	7.07%	8.6%	9.2%
Chesapeake Utilities	4.40%	0.65	7.07%	9.0%	9.5%
NiSource Inc.	4.40%	0.50	7.07%	7.9%	8.7%
Northwest Natural	4.40%	0.60	7.07%	8.6%	9.2%
ONE Gas Inc.	4.40%	0.65	7.07%	9.0%	9.5%
Southwest Gas	4.40%	0.70	7.07%	9.3%	9.8%
Spire Inc.	4.40%	0.65	7.07%	9.0%	9.5%
Amer. States Water	4.40%	0.70	7.07%	9.3%	9.8%
Amer. Water Works	4.40%	0.55	7.07%	8.3%	9.0%
Middlesex Water	4.40%	0.75	7.07%	9.7%	10.1%
York Water Co. (The)	4.40%	0.75	7.07%	9.7%	10.1%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: From Valueline Investment Analyzer as of 12/31/2018.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-10

Risk Positioning Cost of Equity of the Electric, Water, and Gas Sample (Using Value Line Betas)

Panel B: Scenario 2 – Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
ALLETE	4.15%	0.65	8.07%	9.4%	9.9%
Alliant Energy	4.15%	0.60	8.07%	9.0%	9.6%
Amer. Elec. Power	4.15%	0.55	8.07%	8.6%	9.3%
Ameren Corp.	4.15%	0.55	8.07%	8.6%	9.3%
AVANGRID Inc.	4.15%	0.30	8.07%	6.6%	7.6%
CMS Energy Corp.	4.15%	0.55	8.07%	8.6%	9.3%
Consol. Edison	4.15%	0.40	8.07%	7.4%	8.3%
DTE Energy	4.15%	0.55	8.07%	8.6%	9.3%
Duke Energy	4.15%	0.50	8.07%	8.2%	8.9%
Edison Int'l	4.15%	0.55	8.07%	8.6%	9.3%
El Paso Electric	4.15%	0.65	8.07%	9.4%	9.9%
Entergy Corp.	4.15%	0.60	8.07%	9.0%	9.6%
Eversource Energy	4.15%	0.60	8.07%	9.0%	9.6%
FirstEnergy Corp.	4.15%	0.60	8.07%	9.0%	9.6%
IDACORP Inc.	4.15%	0.55	8.07%	8.6%	9.3%
MGE Energy	4.15%	0.60	8.07%	9.0%	9.6%
NextEra Energy	4.15%	0.55	8.07%	8.6%	9.3%
NorthWestern Corp.	4.15%	0.55	8.07%	8.6%	9.3%
OGE Energy	4.15%	0.85	8.07%	11.0%	11.2%
Otter Tail Corp.	4.15%	0.75	8.07%	10.2%	10.6%
Pinnacle West Capital	4.15%	0.55	8.07%	8.6%	9.3%
PNM Resources	4.15%	0.65	8.07%	9.4%	9.9%
Portland General	4.15%	0.60	8.07%	9.0%	9.6%
PPL Corp.	4.15%	0.70	8.07%	9.8%	10.2%
Public Serv. Enterprise	4.15%	0.60	8.07%	9.0%	9.6%
Southern Co.	4.15%	0.50	8.07%	8.2%	8.9%
Unitil Corp.	4.15%	0.55	8.07%	8.6%	9.3%
WEC Energy Group	4.15%	0.50	8.07%	8.2%	8.9%
Xcel Energy Inc.	4.15%	0.50	8.07%	8.2%	8.9%
Atmos Energy	4.15%	0.60	8.07%	9.0%	9.6%
Chesapeake Utilities	4.15%	0.65	8.07%	9.4%	9.9%
NiSource Inc.	4.15%	0.50	8.07%	8.2%	8.9%
Northwest Natural	4.15%	0.60	8.07%	9.0%	9.6%
ONE Gas Inc.	4.15%	0.65	8.07%	9.4%	9.9%
Southwest Gas	4.15%	0.70	8.07%	9.8%	10.2%
Spire Inc.	4.15%	0.65	8.07%	9.4%	9.9%
Amer. States Water	4.15%	0.70	8.07%	9.8%	10.2%
Amer. Water Works	4.15%	0.55	8.07%	8.6%	9.3%
Middlesex Water	4.15%	0.75	8.07%	10.2%	10.6%
York Water Co. (The)	4.15%	0.75	8.07%	10.2%	10.6%

Sources and Notes:
[1], [3]: Villadsen Direct Testimony.
[2]: From Valueline Investment Analyzer as of 12/31/2018.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Workpaper # 1 to Schedule No. BV-10

Full Sample

Value Line Betas

Company	Value Line Betas
	[1]
ALLETE	0.65
Alliant Energy	0.60
Amer. Elec. Power	0.55
Ameren Corp.	0.55
AVANGRID Inc.	0.30
CMS Energy Corp.	0.55
Consol. Edison	0.40
DTE Energy	0.55
Duke Energy	0.50
Edison Int'l	0.55
El Paso Electric	0.65
Entergy Corp.	0.60
Eversource Energy	0.60
FirstEnergy Corp.	0.60
IDACORP Inc.	0.55
MGE Energy	0.60
NextEra Energy	0.55
NorthWestern Corp.	0.55
OGE Energy	0.85
Otter Tail Corp.	0.75
Pinnacle West Capital	0.55
PNM Resources	0.65
Portland General	0.60
PPL Corp.	0.70

Workpaper # 1 to Schedule No. BV-10

Full Sample

Value Line Betas

Company	Value Line Betas
	[1]
Public Serv. Enterprise	0.60
Southern Co.	0.50
Unitil Corp.	0.55
WEC Energy Group	0.50
Xcel Energy Inc.	0.50
Atmos Energy	0.60
Chesapeake Utilities	0.65
NiSource Inc.	0.50
Northwest Natural	0.60
ONE Gas Inc.	0.65
Southwest Gas	0.70
Spire Inc.	0.65
Amer. States Water	0.70
Amer. Water Works	0.55
Middlesex Water	0.75
York Water Co. (The)	0.75
Full Sample Average	0.59
Electric Utility Sample Average	0.58
Water and Gas Sample Average	0.65

Sources and Notes:
[1]: From Valueline Investment Analyzer as of 12/31/2018.

Schedule No. BV-11

Overall After-Tax Risk Positioning Cost of Capital of the Electric, Water, and Gas Sample (Using Value Line Betas)

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted-Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	SCE'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]
ALLETE	9.0%	9.5%	0.64	-	0.00	4.8%	0.36	28.0%	7.0%	7.3%
Alliant Energy	8.6%	9.2%	0.61	4.4%	0.02	4.4%	0.37	28.0%	6.5%	6.9%
Amer. Elec. Power	8.3%	9.0%	0.57	-	0.00	4.7%	0.43	28.0%	6.2%	6.5%
Ameren Corp.	8.3%	9.0%	0.60	-	0.00	4.8%	0.40	28.0%	6.3%	6.8%
AVANGRID Inc.	6.5%	7.6%	0.70	4.8%	0.00	4.8%	0.30	28.0%	5.6%	6.4%
CMS Energy Corp.	8.3%	9.0%	0.51	-	0.00	4.8%	0.49	28.0%	5.9%	6.3%
Consol. Edison	7.2%	8.1%	0.58	-	0.00	4.4%	0.42	28.0%	5.5%	6.0%
DTE Energy	8.3%	9.0%	0.60	-	0.00	4.8%	0.40	28.0%	6.4%	6.8%
Duke Energy	7.9%	8.7%	0.53	-	0.00	4.5%	0.47	28.0%	5.7%	6.1%
Edison Int'l	8.3%	9.0%	0.57	4.8%	0.06	4.8%	0.37	28.0%	6.3%	6.7%
El Paso Electric	9.0%	9.5%	0.57	-	0.00	4.8%	0.43	28.0%	6.6%	6.9%
Entergy Corp.	8.6%	9.2%	0.48	4.8%	0.00	4.8%	0.51	28.0%	6.0%	6.2%
Eversource Energy	8.6%	9.2%	0.61	4.4%	0.01	4.4%	0.39	28.0%	6.5%	6.9%
FirstEnergy Corp.	8.6%	9.2%	0.39	4.8%	0.00	4.8%	0.61	28.0%	5.5%	5.8%
IDACORP Inc.	8.3%	9.0%	0.65	-	0.00	4.8%	0.35	28.0%	6.6%	7.1%
MGE Energy	8.6%	9.2%	0.79	-	0.00	4.2%	0.21	28.0%	7.4%	7.9%
NextEra Energy	8.3%	9.0%	0.62	-	0.00	4.4%	0.38	28.0%	6.3%	6.7%
NorthWestern Corp.	8.3%	9.0%	0.58	-	0.00	4.8%	0.42	28.0%	6.3%	6.6%
OGE Energy	10.4%	10.6%	0.70	-	0.00	4.5%	0.30	28.0%	8.2%	8.4%
Otter Tail Corp.	9.7%	10.1%	0.68	-	0.00	4.8%	0.32	28.0%	7.7%	8.0%
Pinnacle West Capital	8.3%	9.0%	0.64	-	0.00	4.4%	0.36	28.0%	6.4%	6.8%
PNM Resources	9.0%	9.5%	0.51	4.8%	0.00	4.8%	0.49	28.0%	6.3%	6.6%
Portland General	8.6%	9.2%	0.56	-	0.00	4.8%	0.44	28.0%	6.4%	6.7%
PPL Corp.	9.3%	9.8%	0.49	-	0.00	4.4%	0.51	28.0%	6.2%	6.4%
Public Serv. Enterprise	8.6%	9.2%	0.65	-	0.00	4.8%	0.35	28.0%	6.8%	7.2%
Southern Co.	7.9%	8.7%	0.55	4.4%	0.01	4.4%	0.44	28.0%	5.8%	6.2%
Unitil Corp.	8.3%	9.0%	0.57	4.8%	0.00	4.8%	0.43	28.0%	6.2%	6.6%
WEC Energy Group	7.9%	8.7%	0.65	4.4%	0.00	4.4%	0.35	28.0%	6.3%	6.7%
Xcel Energy Inc.	7.9%	8.7%	0.57	-	0.00	4.4%	0.43	28.0%	5.9%	6.3%
Atmos Energy	8.6%	9.2%	0.66	-	0.00	4.4%	0.34	28.0%	6.7%	7.1%
Chesapeake Utilities	9.0%	9.5%	0.73	-	0.00	4.8%	0.27	28.0%	7.4%	7.8%
NiSource Inc.	7.9%	8.7%	0.42	4.8%	0.00	4.8%	0.58	28.0%	5.4%	5.7%
Northwest Natural	8.6%	9.2%	0.63	-	0.00	4.4%	0.37	28.0%	6.6%	7.0%
ONE Gas Inc.	9.0%	9.5%	0.70	-	0.00	4.4%	0.30	28.0%	7.2%	7.6%
Southwest Gas	9.3%	9.8%	0.63	-	0.00	4.8%	0.37	28.0%	7.2%	7.5%
Spire Inc.	9.0%	9.5%	0.54	-	0.00	4.4%	0.46	28.0%	6.3%	6.6%
Amer. States Water	9.3%	9.8%	0.77	-	0.00	4.4%	0.23	28.0%	7.9%	8.3%
Amer. Water Works	8.3%	9.0%	0.60	-	0.00	4.4%	0.40	28.0%	6.2%	6.6%
Middlesex Water	9.7%	10.1%	0.74	4.4%	0.00	4.4%	0.25	28.0%	8.0%	8.3%
York Water Co. (The)	9.7%	10.1%	0.76	-	0.00	4.4%	0.24	28.0%	8.2%	8.4%
Full Sample Average	8.6%	9.2%	0.61	4.6%	0.00	4.6%	0.39	28.0%	6.6%	6.9%
Electric Utility Sample Average	8.5%	9.1%	0.59	4.6%	0.00	4.6%	0.41	28.0%	6.4%	6.8%
Water and Gas Sample Average	9.0%	9.5%	0.65	4.6%	0.00	4.5%	0.35	28.0%	7.0%	7.4%

Sources and Notes:
[1]: Schedule No. BV-10; Panel A, [4].   [7]: Schedule No. BV-4, [6].
[2]: Schedule No. BV-10; Panel A, [5].   [8]: Provided by SCE.
[3]: Schedule No. BV-4, [4].   [9] = [1] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[4]: Workpaper #2 to Schedule No. BV-11, Panel C.   [10] = [2] x [3] + [4] x [5] + [6] x [7] x (1 - [8])
[5]: Schedule No. BV-4, [5].
[6]: Workpaper #2 to Schedule No. BV-11, Panel B.

Schedule No. BV-11

Overall After-Tax Risk Positioning Cost of Capital of the Electric, Water, and Gas Sample (Using Value Line Betas)

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted - Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted- Average Cost of Debt	5-Year Average Debt to Market Value Ratio	SCE'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]
ALLETE	9.4%	9.9%	0.64	-	0.00	4.8%	0.36	28.0%	7.3%	7.6%
Alliant Energy	9.0%	9.6%	0.61	4.4%	0.02	4.4%	0.37	28.0%	6.7%	7.1%
Amer. Elec. Power	8.6%	9.3%	0.57	-	0.00	4.7%	0.43	28.0%	6.3%	6.7%
Ameren Corp.	8.6%	9.3%	0.60	-	0.00	4.8%	0.40	28.0%	6.5%	6.9%
AVANGRID Inc.	6.6%	7.6%	0.70	4.8%	0.00	4.8%	0.30	28.0%	5.7%	6.4%
CMS Energy Corp.	8.6%	9.3%	0.51	-	0.00	4.8%	0.49	28.0%	6.1%	6.4%
Consol. Edison	7.4%	8.3%	0.58	-	0.00	4.4%	0.42	28.0%	5.6%	6.1%
DTE Energy	8.6%	9.3%	0.60	-	0.00	4.8%	0.40	28.0%	6.5%	7.0%
Duke Energy	8.2%	8.9%	0.53	-	0.00	4.5%	0.47	28.0%	5.8%	6.2%
Edison Int'l	8.6%	9.3%	0.57	4.8%	0.06	4.8%	0.37	28.0%	6.5%	6.9%
El Paso Electric	9.4%	9.9%	0.57	-	0.00	4.8%	0.43	28.0%	6.9%	7.2%
Entergy Corp.	9.0%	9.6%	0.48	4.8%	0.01	4.8%	0.51	28.0%	6.1%	6.4%
Eversource Energy	9.0%	9.6%	0.61	4.4%	0.01	4.4%	0.39	28.0%	6.7%	7.1%
FirstEnergy Corp.	9.0%	9.6%	0.39	4.8%	0.00	4.8%	0.61	28.0%	5.7%	5.9%
IDACORP Inc.	8.6%	9.3%	0.65	-	0.00	4.8%	0.35	28.0%	6.8%	7.3%
MGE Energy	9.0%	9.6%	0.79	-	0.00	4.2%	0.21	28.0%	7.7%	8.2%
NextEra Energy	8.6%	9.3%	0.62	-	0.00	4.4%	0.38	28.0%	6.5%	6.9%
NorthWestern Corp.	8.6%	9.3%	0.58	-	0.00	4.8%	0.42	28.0%	6.4%	6.8%
OGE Energy	11.0%	11.2%	0.70	-	0.00	4.5%	0.30	28.0%	8.6%	8.8%
Otter Tail Corp.	10.2%	10.6%	0.68	-	0.00	4.8%	0.32	28.0%	8.1%	8.3%
Pinnacle West Capital	8.6%	9.3%	0.64	-	0.00	4.4%	0.36	28.0%	6.6%	7.0%
PNM Resources	9.4%	9.9%	0.51	4.8%	0.00	4.8%	0.49	28.0%	6.5%	6.8%
Portland General	9.0%	9.6%	0.56	-	0.00	4.8%	0.44	28.0%	6.6%	6.9%
PPL Corp.	9.8%	10.2%	0.49	-	0.00	4.4%	0.51	28.0%	6.4%	6.6%
Public Serv. Enterprise	9.0%	9.6%	0.65	-	0.00	4.8%	0.35	28.0%	7.1%	7.4%
Southern Co.	8.2%	8.9%	0.55	4.4%	0.01	4.4%	0.44	28.0%	5.9%	6.3%
Unitil Corp.	8.6%	9.3%	0.57	4.8%	0.00	4.8%	0.43	28.0%	6.4%	6.8%
WEC Energy Group	8.2%	8.9%	0.65	4.4%	0.00	4.4%	0.35	28.0%	6.4%	6.9%
Xcel Energy Inc.	8.2%	8.9%	0.57	-	0.00	4.4%	0.43	28.0%	6.0%	6.4%
Atmos Energy	9.0%	9.6%	0.66	-	0.00	4.4%	0.34	28.0%	7.0%	7.4%
Chesapeake Utilities	9.4%	9.9%	0.73	-	0.00	4.4%	0.27	28.0%	7.7%	8.1%
NiSource Inc.	8.2%	8.9%	0.42	4.8%	0.00	4.8%	0.58	28.0%	5.5%	5.8%
Northwest Natural	9.0%	9.6%	0.63	-	0.00	4.4%	0.37	28.0%	6.8%	7.2%
ONE Gas Inc.	9.4%	9.9%	0.70	-	0.00	4.4%	0.30	28.0%	7.5%	7.9%
Southwest Gas	9.8%	10.2%	0.63	-	0.00	4.8%	0.37	28.0%	7.5%	7.7%
Spire Inc.	9.4%	9.9%	0.54	-	0.00	4.4%	0.46	28.0%	6.6%	6.8%
Amer. States Water	9.8%	10.2%	0.77	-	0.00	4.4%	0.23	28.0%	8.3%	8.6%
Amer. Water Works	8.6%	9.3%	0.60	-	0.00	4.4%	0.40	28.0%	6.4%	6.8%
Middlesex Water	10.2%	10.6%	0.74	4.4%	0.00	4.4%	0.25	28.0%	8.4%	8.7%
York Water Co. (The)	10.2%	10.6%	0.76	-	0.00	4.4%	0.24	28.0%	8.5%	8.8%
Full Sample Average	8.9%	9.6%	0.61	4.6%	0.00	4.6%	0.39	28.0%	6.8%	7.1%
Electric Utility Sample Average	8.8%	9.4%	0.59	4.6%	0.00	4.6%	0.41	28.0%	6.6%	6.9%
Water and Gas Sample Average	9.4%	9.9%	0.65	4.6%	0.00	4.5%	0.35	28.0%	7.3%	7.6%

Sources and Notes:
[1]: Schedule No. BV-10; Panel B, [4].
[2]: Schedule No. BV-10; Panel B, [5].
[3]: Schedule No. BV-4, [4].
[4]: Workpaper #2 to Schedule No. BV-11, Panel C.
[5]: Schedule No. BV-4, [5].
[6]: Workpaper #2 to Schedule No. BV-11, Panel B.

[7]: Schedule No. BV-4, [6].
[8]: Provided by SCE.
[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])

Workpaper #1 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel A: Rating to Yield Conversion

Rating	Bond Yield	Preferred Yield
AA	4.2%	4.2%
A	4.4%	4.4%
BBB	4.8%	4.8%

Sources and Notes:

AA estimated as A - 0.5 *(BBB-A).

Bond Yields from Bloomberg as of December 31, 2018.

Preferred Yields from matching Bloomberg bond

yields as of Dec 31, 2018.

Workpaper #1 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel B: Bond Rating Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
Alliant Energy	A-	A-	A-	A-	A-	A-
Amer. Elec. Power	A-	A-	A-	BBB+	BBB	BBB
Ameren Corp.	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
AVANGRID Inc.	BBB+	BBB+	BBB+	BBB+	BBB	BBB
CMS Energy Corp.	BBB+	BBB+	BBB+	BBB+	BBB+	BBB
Consol. Edison	A-	A-	A-	A-	A-	A-
DTE Energy	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
Duke Energy	A-	A-	A-	A-	A-	BBB+
Edison Int'l	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
El Paso Electric	BBB	BBB	BBB	BBB	BBB	BBB
Entergy Corp.	BBB+	BBB+	BBB+	BBB+	BBB	BBB
Eversource Energy	A+	A+	A	A	A	A-
FirstEnergy Corp.	BBB	BBB	BBB-	BBB-	BBB-	BBB-
IDACORP Inc.	BBB	BBB	BBB	BBB	BBB	BBB
MGE Energy	AA-	AA-	AA-	AA-	AA-	AA-
NextEra Energy	A-	A-	A-	A-	A-	A-
NorthWestern Corp.	BBB	BBB	BBB	BBB	BBB	BBB
OGE Energy	BBB+	BBB+	A-	A-	A-	A-
Otter Tail Corp.	BBB	BBB	BBB	BBB	BBB	BBB
Pinnacle West Capital	A-	A-	A-	A-	A-	A-
PNM Resources	BBB+	BBB+	BBB+	BBB+	BBB	BBB
Portland General	BBB+	BBB+	BBB	BBB	BBB	BBB
PPL Corp.	A-	A-	A-	A-	A-	BBB
Public Serv. Enterprise	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
Southern Co.	A-	A-	A-	A-	A-	A
Unitil Corp.	BBB+	BBB+	BBB+	BBB+	BBB+	n/a
WEC Energy Group	A-	A-	A-	A-	A-	A-
Xcel Energy Inc.	A-	A-	A-	A-	A-	A-
Atmos Energy	A	A	A	A	A-	A-

Workpaper #1 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel B: Bond Rating Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014
	[1]	[2]	[3]	[4]	[5]	[6]
Chesapeake Utilities	A-	A-	A-	A-	A-	A-
NiSource Inc.	BBB+	BBB+	BBB+	BBB+	BBB+	BBB-
Northwest Natural	A	A	A	A	A	A
ONE Gas Inc.	A	A	A	A-	A-	A-
Southwest Gas	BBB+	BBB+	BBB+	n/a	n/a	n/a
Spire Inc.	A-	A-	A-	A-	A-	A-
Amer. States Water	A+	A+	A+	A+	A+	A+
Amer. Water Works	A	A	A	A	A	A-
Middlesex Water	A	A	A	A	A	A-
York Water Co. (The)	A-	A-	A-	A-	A-	A-

Sources and Notes:

[1] - [6]: Bloomberg as of December 31, 2018.

Workpaper #1 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel C: Preferred Equity Rating Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	-	-	-	-	-	-
Alliant Energy	A-	A-	A-	A-	A-	A-
Amer. Elec. Power	-	-	-	-	-	-
Ameren Corp.	-	-	-	-	-	-
AVANGRID Inc.	-	-	-	-	BBB	BBB
CMS Energy Corp.	-	-	-	-	-	-
Consol. Edison	-	-	-	-	-	-
DTE Energy	-	-	-	-	-	-
Duke Energy	-	-	-	-	-	-
Edison Int'l	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+
El Paso Electric	-	-	-	-	-	-
Entergy Corp.	BBB+	BBB+	BBB+	BBB+	BBB	BBB
Eversource Energy	A+	A+	A	A	A	A-
FirstEnergy Corp.	BBB	BBB	-	-	-	-
IDACORP Inc.	-	-	-	-	-	-
MGE Energy	-	-	-	-	-	-
NextEra Energy	-	-	-	-	-	-
NorthWestern Corp.	-	-	-	-	-	-
OGE Energy	-	-	-	-	-	-
Otter Tail Corp.	-	-	-	-	-	-
Pinnacle West Capital	-	-	-	-	-	-
PNM Resources	BBB+	BBB+	BBB+	BBB+	BBB	BBB
Portland General	-	-	-	-	-	-
PPL Corp.	-	-	-	-	-	-

Workpaper #1 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel C: Preferred Equity Rating Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014
	[1]	[2]	[3]	[4]	[5]	[6]
Public Serv. Enterprise	-	-	-	-	-	-
Southern Co.	A-	A-	A-	A-	A-	A
Unitil Corp.	BBB+	BBB+	BBB+	BBB+	BBB+	n/a
WEC Energy Group	A-	A-	A-	A-	A-	A-
Xcel Energy Inc.	-	-	-	-	-	-
Atmos Energy	-	-	-	-	-	-
Chesapeake Utilities	-	-	-	-	-	-
NiSource Inc.	BBB+	BBB+	-	-	-	-
Northwest Natural	-	-	-	-	-	-
ONE Gas Inc.	-	-	-	-	-	-
Southwest Gas	-	-	-	-	-	-
Spire Inc.	-	-	-	-	-	-
Amer. States Water	-	-	-	-	-	-
Amer. Water Works	-	-	-	-	-	-
Middlesex Water	A	A	A	A	A	A-
York Water Co. (The)	-	-	-	-	-	-

Sources and Notes:

[1] - [6]: Preferred equity ratings are assumed equal to the company's bond ratings reported in Workpaper #1 to Schedule No. BV-11, Panel B.

Workpaper #2 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel A: 15-Day Average Utility Bond Yields and Preferred Yields

Date	AA Rated Utility	A Rated Utility	BBB Rated Utility	AA Preferred	A Preferred	BBB Preferred
	[1]	[2]	[3]	[4]	[5]	[6]
12/31/2018	4.10	4.32	4.78	4.10	4.32	4.78
12/28/2018	4.11	4.34	4.80	4.11	4.34	4.80
12/27/2018	4.15	4.38	4.84	4.15	4.38	4.84
12/26/2018	4.14	4.37	4.84	4.14	4.37	4.84
12/24/2018	4.07	4.31	4.78	4.07	4.31	4.78
12/21/2018	4.10	4.34	4.82	4.10	4.34	4.82
12/20/2018	4.09	4.33	4.82	4.09	4.33	4.82
12/19/2018	4.08	4.31	4.78	4.08	4.31	4.78
12/18/2018	4.14	4.37	4.83	4.14	4.37	4.83
12/17/2018	4.18	4.41	4.86	4.18	4.41	4.86
12/14/2018	4.22	4.44	4.89	4.22	4.44	4.89
12/13/2018	4.24	4.46	4.91	4.24	4.46	4.91
12/12/2018	4.23	4.45	4.91	4.23	4.45	4.91
12/11/2018	4.21	4.44	4.89	4.21	4.44	4.89
12/10/2018	4.22	4.44	4.87	4.22	4.44	4.87
Average	4.15	4.38	4.84	4.15	4.38	4.84

Sources and Notes:

[1]: AA estimated as A - 0.5 * (BBB - A).

[2], [3]: Bloomberg as of December 31, 2018.

[4] - [6]: matching Bloomberg bond yields as of Dec 31, 2018.

Workpaper #2 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel B: Bond Yield Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
ALLETE	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Alliant Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Amer. Elec. Power	4.4%	4.4%	4.4%	4.8%	4.8%	4.8%	4.7%
Ameren Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
AVANGRID Inc.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
CMS Energy Corp.	4.8%	4.8%	4.4%	4.4%	4.8%	4.8%	4.8%
Consol. Edison	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
DTE Energy	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Duke Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.8%	4.5%
Edison Int'l	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
El Paso Electric	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Entergy Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Eversource Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
FirstEnergy Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
IDACORP Inc.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
MGE Energy	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
NextEra Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
NorthWestern Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
OGE Energy	4.8%	4.8%	4.4%	4.4%	4.4%	4.4%	4.5%
Otter Tail Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Pinnacle West Capital	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
PNM Resources	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Portland General	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
PPL Corp.	4.4%	4.4%	4.4%	4.4%	4.4%	n/a	4.4%
Public Serv. Enterprise	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Southern Co.	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Unitil Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	n/a	4.8%
WEC Energy Group	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Xcel Energy Inc.	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Atmos Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%

Workpaper #2 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel B: Bond Yield Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Chesapeake Utilities	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
NiSource Inc.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Northwest Natural	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
ONE Gas Inc.	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Southwest Gas	4.8%	4.8%	4.8%	n/a	n/a	n/a	4.8%
Spire Inc.	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Amer. States Water	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Amer. Water Works	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Middlesex Water	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
York Water Co. (The)	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%

Sources and Notes:

[1] - [6]: Ratings based on Workpaper #1 to Schedule No. BV-11, Panel B. Bond yields from Bloomberg as of December 31, 2018.

[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Workpaper #2 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel C: Preferred Equity Yield Summary

Company	December 31, 2018 [1]	3rd Quarter, 2018 [2]	3rd Quarter, 2017 [3]	3rd Quarter, 2016 [4]	3rd Quarter, 2015 [5]	3rd Quarter, 2014 [6]	5-Year Average [7]
ALLETE	-	-	-	-	-	-	-
Alliant Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Amer. Elec. Power	-	-	-	-	-	-	-
Ameren Corp.	-	-	-	-	-	-	-
AVANGRID Inc.	-	-	-	-	4.8%	4.8%	4.8%
CMS Energy Corp.	-	-	-	-	-	-	-
Consol. Edison	-	-	-	-	-	-	-
DTE Energy	-	-	-	-	-	-	-
Duke Energy	-	-	-	-	-	-	-
Edison Int'l	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
El Paso Electric	-	-	-	-	-	-	-
Entergy Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Eversource Energy	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
FirstEnergy Corp.	4.8%	4.8%	-	-	-	-	4.8%
IDACORP Inc.	-	-	-	-	-	-	-
MGE Energy	-	-	-	-	-	-	-
NextEra Energy	-	-	-	-	-	-	-
NorthWestern Corp.	-	-	-	-	-	-	-
OGE Energy	-	-	-	-	-	-	-
Otter Tail Corp.	-	-	-	-	-	-	-
Pinnacle West Capital	-	-	-	-	-	-	-
PNM Resources	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Portland General	-	-	-	-	-	-	-
PPL Corp.	-	-	-	-	-	-	-
Public Serv. Enterprise	-	-	-	-	-	-	-
Southern Co.	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Unitil Corp.	4.8%	4.8%	4.8%	4.8%	4.8%	-	4.8%
WEC Energy Group	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Xcel Energy Inc.	-	-	-	-	-	-	-
Atmos Energy	-	-	-	-	-	-	-

Workpaper #2 to Schedule No. BV-11

Electric, Water, and Gas Sample

Panel C: Preferred Equity Yield Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Chesapeake Utilities	-	-	-	-	-	-	-
NiSource Inc.	4.8%	4.8%	-	-	-	-	4.8%
Northwest Natural	-	-	-	-	-	-	-
ONE Gas Inc.	-	-	-	-	-	-	-
Southwest Gas	-	-	-	-	-	-	-
Spire Inc.	-	-	-	-	-	-	-
Amer. States Water	-	-	-	-	-	-	-
Amer. Water Works	-	-	-	-	-	-	-
Middlesex Water	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
York Water Co. (The)	-	-	-	-	-	-	-

Sources and Notes:

[1] - [6]: See Workpaper #1 to Schedule No. BV-11, Panels C. Preferred equity yields are from matching Bloomberg bond yields as of Dec 31, 2018.

[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Schedule No. BV-12

Risk Positioning Cost of Equity at SCE's Proposed Capital Structure

Electric, Water, and Gas Sample

Using Value Line Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	SCE's Representative Regulatory % Debt	Representative Cost of BBB-Rated Utility Debt	SCE's Representative Income Tax Rate	SCE'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 Value Line Betas	6.6%	6.8%	48.0%	4.8%	28.0%	52.0%	9.4%	9.8%
ECAPM (1.50%) using Value Line Betas	6.9%	7.1%	48.0%	4.8%	28.0%	52.0%	10.1%	10.5%
Electric Utility Sample								
CAPM using Value Line Betas	6.4%	6.6%	48.0%	4.8%	28.0%	52.0%	9.1%	9.4%
ECAPM (1.50%) using Value Line Betas	6.8%	6.9%	48.0%	4.8%	28.0%	52.0%	9.8%	10.1%
Water and Gas Sample								
CAPM using Value Line Betas	7.0%	7.3%	48.0%	4.8%	28.0%	52.0%	10.3%	10.8%
ECAPM (1.50%) using Value Line Betas	7.4%	7.6%	48.0%	4.8%	28.0%	52.0%	10.9%	11.4%

Scenario 1: Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%.
Scenario 2: Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%.

Sources and Notes:
[1]: Schedule No. BV-11; Panel A, [9] - [10].
[2]: Schedule No. BV-11; Panel B, [9] - [10].
[3]: Provided by SCE.
[4]: Based on a BBB rating. Yield from Bloomberg as of December 31, 2018.
[5]: Provided by SCE.
[6]: Provided by SCE.
[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6]
[8]: {[2] - ([3] x [4] x (1 - [5])}/ [6]

Schedule No. BV-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Value Line Betas	Debt Beta	5-Year Average Common Equity to Market Value Ratio	5-Year Average Preferred Equity to Market Value Ratio	5-Year Average Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ALLETE	0.65	0.10	0.64	0.00	0.36	28.0%	0.45	0.49
Alliant Energy	0.60	0.05	0.61	0.02	0.37	28.0%	0.39	0.42
Amer. Elec. Power	0.55	0.08	0.57	0.00	0.43	28.0%	0.35	0.38
Ameren Corp.	0.55	0.10	0.60	0.00	0.40	28.0%	0.37	0.40
AVANGRID Inc.	0.30	0.10	0.70	0.00	0.30	28.0%	0.24	0.25
CMS Energy Corp.	0.55	0.10	0.51	0.00	0.49	28.0%	0.33	0.37
Consol. Edison	0.40	0.05	0.58	0.00	0.42	28.0%	0.25	0.28
DTE Energy	0.55	0.10	0.60	0.00	0.40	28.0%	0.37	0.40
Duke Energy	0.50	0.06	0.53	0.00	0.47	28.0%	0.29	0.33
Edison Int'l	0.55	0.10	0.57	0.06	0.37	28.0%	0.36	0.39
El Paso Electric	0.65	0.10	0.57	0.00	0.43	28.0%	0.41	0.46
Entergy Corp.	0.60	0.10	0.48	0.01	0.51	28.0%	0.34	0.38
Eversource Energy	0.60	0.05	0.61	0.01	0.39	28.0%	0.38	0.42
FirstEnergy Corp.	0.60	0.10	0.39	0.00	0.61	28.0%	0.30	0.34
IDACORP Inc.	0.55	0.10	0.65	0.00	0.35	28.0%	0.39	0.43
MGE Energy	0.60	0.05	0.79	0.00	0.21	28.0%	0.48	0.51
NextEra Energy	0.55	0.05	0.62	0.00	0.38	28.0%	0.36	0.40
NorthWestern Corp.	0.55	0.10	0.58	0.00	0.42	28.0%	0.36	0.39
OGE Energy	0.85	0.06	0.70	0.00	0.30	28.0%	0.61	0.66
Otter Tail Corp.	0.75	0.10	0.68	0.00	0.32	28.0%	0.55	0.59
Pinnacle West Capital	0.55	0.05	0.64	0.00	0.36	28.0%	0.37	0.40
PNM Resources	0.65	0.10	0.51	0.00	0.49	28.0%	0.38	0.42
Portland General	0.60	0.10	0.56	0.00	0.44	28.0%	0.38	0.42
PPL Corp.	0.70	0.05	0.49	0.00	0.51	28.0%	0.37	0.42
Public Serv. Enterprise	0.60	0.10	0.65	0.00	0.35	28.0%	0.42	0.46
Southern Co.	0.50	0.05	0.55	0.01	0.44	28.0%	0.30	0.33
Unitil Corp.	0.55	0.10	0.57	0.00	0.43	28.0%	0.36	0.39
WEC Energy Group	0.50	0.05	0.65	0.00	0.35	28.0%	0.34	0.37
Xcel Energy Inc.	0.50	0.05	0.57	0.00	0.43	28.0%	0.30	0.34
Atmos Energy	0.60	0.05	0.66	0.00	0.34	28.0%	0.41	0.45

Schedule No. BV-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Value Line Betas	Debt Beta	5-Year Average Common Equity to Market Value Ratio	5-Year Average Preferred Equity to Market Value Ratio	5-Year Average Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Chesapeake Utilities	0.65	0.05	0.73	0.00	0.27	28.0%	0.49	0.52
NiSource Inc.	0.50	0.10	0.42	0.00	0.58	28.0%	0.27	0.30
Northwest Natural	0.60	0.05	0.63	0.00	0.37	28.0%	0.40	0.44
ONE Gas Inc.	0.65	0.05	0.70	0.00	0.30	28.0%	0.47	0.51
Southwest Gas	0.70	0.10	0.63	0.00	0.37	28.0%	0.48	0.52
Spire Inc.	0.65	0.05	0.54	0.00	0.46	28.0%	0.38	0.42
Amer. States Water	0.70	0.05	0.77	0.00	0.23	28.0%	0.55	0.59
Amer. Water Works	0.55	0.05	0.60	0.00	0.40	28.0%	0.35	0.39
Middlesex Water	0.75	0.05	0.74	0.00	0.25	28.0%	0.57	0.61
York Water Co. (The)	0.75	0.05	0.76	0.00	0.24	28.0%	0.58	0.62
Full Sample Average	0.59	0.07	0.61	0.00	0.39	28%	0.39	0.43
Electric Utility Sample Average	0.58	0.08	0.59	0.00	0.41	28%	0.37	0.41
Water and Gas Sample Average	0.65	0.06	0.65	0.00	0.35	28%	0.45	0.49

Sources and Notes:
[1]: Workpaper # 1 to Schedule No. BV-10, [1].
[2]: Workpaper #1 to Schedule No. BV-13, [7].
[3]: Schedule No. BV-4, [4].
[4]: Schedule No. BV-4, [5].

[5]: Schedule No. BV-4, [6].
[6]: SCE's Representative Tax Rate.
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Workpaper #1 to Schedule No. BV-13

Debt Beta Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
ALLETE	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Alliant Energy	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Amer. Elec. Power	0.05	0.05	0.05	0.10	0.10	0.10	0.08
Ameren Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
AVANGRID Inc.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
CMS Energy Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Consol. Edison	0.05	0.05	0.05	0.05	0.05	0.05	0.05
DTE Energy	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Duke Energy	0.05	0.05	0.05	0.05	0.05	0.10	0.06
Edison Int'l	0.10	0.10	0.10	0.10	0.10	0.10	0.10
El Paso Electric	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Entergy Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Eversource Energy	0.05	0.05	0.05	0.05	0.05	0.05	0.05
FirstEnergy Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
IDACORP Inc.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
MGE Energy	0.05	0.05	0.05	0.05	0.05	0.05	0.05
NextEra Energy	0.05	0.05	0.05	0.05	0.05	0.05	0.05
NorthWestern Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
OGE Energy	0.10	0.10	0.05	0.05	0.05	0.05	0.06
Otter Tail Corp.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Pinnacle West Capital	0.05	0.05	0.05	0.05	0.05	0.05	0.05
PNM Resources	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Portland General	0.10	0.10	0.10	0.10	0.10	0.10	0.10
PPL Corp.	0.05	0.05	0.05	0.05	0.05	n/a	0.05
Public Serv. Enterprise	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Southern Co.	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Unitil Corp.	0.10	0.10	0.10	0.10	0.10	n/a	0.10
WEC Energy Group	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Xcel Energy Inc.	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Atmos Energy	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Workpaper #1 to Schedule No. BV-13

Debt Beta Summary

Company	December 31, 2018	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	5-Year Average
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Chesapeake Utilities	0.05	0.05	0.05	0.05	0.05	0.05	0.05
NiSource Inc.	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Northwest Natural	0.05	0.05	0.05	0.05	0.05	0.05	0.05
ONE Gas Inc.	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Southwest Gas	0.10	0.10	0.10	n/a	n/a	n/a	0.10
Spire Inc.	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Amer. States Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Amer. Water Works	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Middlesex Water	0.05	0.05	0.05	0.05	0.05	0.05	0.05
York Water Co. (The)	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Sources and Notes:

[1] - [6]: Ratings based on Workpaper #2 to Schedule No. BV-11, Panel B. See Villadsen testimony for Debt betas.

[7]: Average of [2] through [6].

Schedule No. BV-14

Electric, Water, and Gas Sample Average Asset Beta Relevered at SCE's Proposed Capital Structure

	Asset Beta	Assumed Debt Beta	SCE's Representative Regulatory % Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Asset Beta Without Taxes	0.39	0.10	48.0%	28.0%	52.0%	0.66
Asset Beta With Taxes	0.43	0.10	48.0%	28.0%	52.0%	0.65
Electric Utility Sample						
Asset Beta Without Taxes	0.37	0.10	48.0%	28.0%	52.0%	0.62
Asset Beta With Taxes	0.41	0.10	48.0%	28.0%	52.0%	0.62
Water and Gas Sample						
Asset Beta Without Taxes	0.45	0.10	48.0%	28.0%	52.0%	0.77
Asset Beta With Taxes	0.49	0.10	48.0%	28.0%	52.0%	0.75

Sources and Notes:

[1]: Schedule No. BV-13, [7] - [8].
[2]: Villadsen Testimony.
[3]: Provided by SCE.
[4]: SCE's Representative Tax Rate.
[5]: Provided by SCE.
[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Schedule No. BV-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	4.40%	0.66	7.07%	9.1%	9.6%
Asset Beta With Taxes	4.40%	0.65	7.07%	9.0%	9.5%
Electric Utility Sample					
Asset Beta Without Taxes	4.40%	0.62	7.07%	8.8%	9.4%
Asset Beta With Taxes	4.40%	0.62	7.07%	8.8%	9.3%
Water and Gas Sample					
Asset Beta Without Taxes	4.40%	0.77	7.07%	9.9%	10.2%
Asset Beta With Taxes	4.40%	0.75	7.07%	9.7%	10.1%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	4.15%	0.66	8.07%	9.5%	10.0%
Asset Beta With Taxes	4.15%	0.65	8.07%	9.4%	9.9%
Electric Utility Sample					
Asset Beta Without Taxes	4.15%	0.62	8.07%	9.2%	9.8%
Asset Beta With Taxes	4.15%	0.62	8.07%	9.1%	9.7%
Water and Gas Sample					
Asset Beta Without Taxes	4.15%	0.77	8.07%	10.4%	10.7%
Asset Beta With Taxes	4.15%	0.75	8.07%	10.2%	10.6%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-16

Risk Premiums Determined by Relationship Between Authorized ROEs and Long-term Treasury Bond Rate

Risk Premiums Determined by Relationship Between
Authorized ROEs[1] and Long-term Treasury Bond Rates
During the Period 1990 - 2018
Electric Utilities

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.828
Estimate of Intercept (A_0)	8.46%
Estimate of Slope (A_1)	-0.540

Predicted Risk Premium	+	**Exp. Treasury Bond Rate[2]**	=	**Est. Cost of Equity for All Electric Utilities**
6.09%		4.40%		10.49%

Sources and Notes:

[1]: Authorized ROE Data from SNL financial as of 01/28/2019.

[2]: Blue Chip consensus forecast 2020 10 year T-bill yield + maturity premium between 10 year and 20 year U.S. Government bonds + utility yield spread adjustment.

See SS1-Regression Results for derivation of regression coefficients A_0 and A_1

Risk Premiums Determined by Relationship Between
Authorized ROEs[1] and Long-term Treasury Bond Rates
During the Period 1990 - 2018
Electric Utilities

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.828
Estimate of Intercept (A_0)	8.46%
Estimate of Slope (A_1)	-0.540

Predicted Risk Premium	+	Exp. Treasury Bond Rate[2]	=	Est. Cost of Equity for All Electric Utilities
6.22%		4.15%		10.37%

Sources and Notes:

[1]: Authorized ROE Data from SNL financial as of 01/28/2019.

[2]: Blue Chip consensus forecast 2020 10 year T-bill yield + maturity premium between 10 year and 20 year U.S. Government bonds + utility yield spread adjustment.
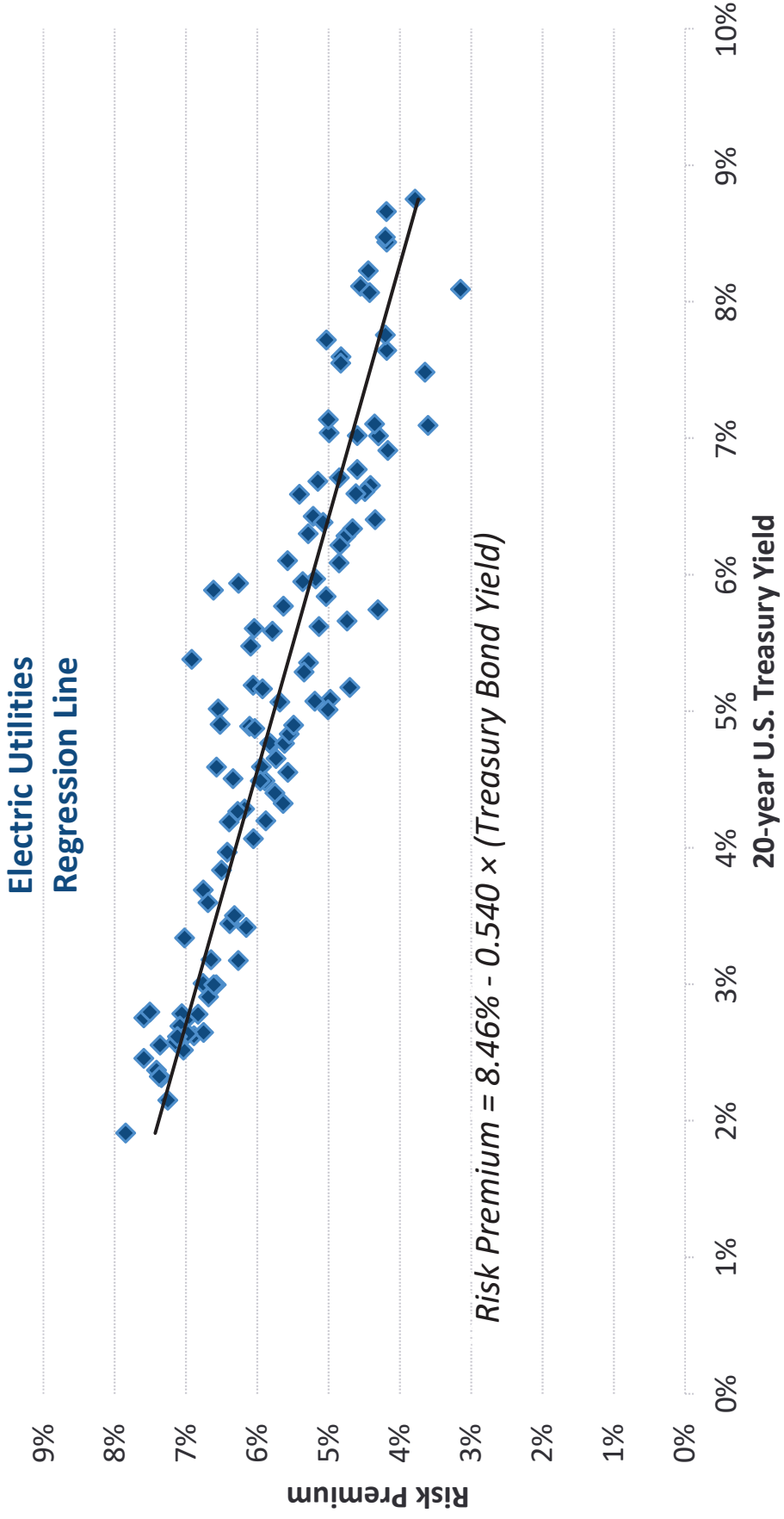
See SS1-Regression Results for derivation of regression coefficients A_0 and A_1

Regression Results

Electric Utilities

	Slope	Intercept
Coefficient	-0.540	0.085
Standard Error	0.023	0.001
R Squared	0.828	-

Note: Estimated by regressing Risk Premium on 20 year Treasury Bond Yield.

Electric Utilities
Regression Line

Risk Premium = 8.46% - 0.540 × (Treasury Bond Yield)

20-year U.S. Treasury Yield

Risk Premium

Source: Bloomberg for Treasury Bond Yields, SNL Financial for authorized RoE data.

Quarterly Risk Premiums for Electric Utilities

1990 - 2018

Quarter	Average Authorized Return on Equity [1]	20 year Treasury Bond Yield [2]	Risk Premium [3] = [1] - [2]
1990 Q1	12.62%	8.44%	4.19%
1990 Q2	12.85%	8.66%	4.19%
1990 Q3	12.54%	8.75%	3.79%
1990 Q4	12.68%	8.47%	4.21%
1991 Q1	12.66%	8.11%	4.55%
1991 Q2	12.67%	8.23%	4.44%
1991 Q3	12.49%	8.07%	4.43%
1991 Q4	12.42%	7.60%	4.83%
1992 Q1	12.38%	7.55%	4.83%
1992 Q2	11.83%	7.64%	4.18%
1992 Q3	12.03%	7.04%	4.99%
1992 Q4	12.14%	7.14%	5.00%
1993 Q1	11.84%	6.68%	5.15%
1993 Q2	11.64%	6.43%	5.21%
1993 Q3	11.15%	5.97%	5.18%
1993 Q4	11.04%	6.28%	4.76%
1994 Q1	11.07%	6.65%	4.41%
1994 Q2	11.13%	7.48%	3.65%
1994 Q3	12.75%	7.72%	5.03%
1994 Q4	11.24%	8.09%	3.15%
1995 Q1	11.96%	7.76%	4.20%
1995 Q2	11.32%	7.02%	4.30%
1995 Q3	11.37%	6.77%	4.60%
1995 Q4	11.58%	6.30%	5.28%
1996 Q1	11.46%	6.38%	5.08%
1996 Q2	11.46%	7.10%	4.36%
1996 Q3	10.70%	7.09%	3.61%
1996 Q4	11.56%	6.71%	4.85%
1997 Q1	11.08%	6.91%	4.17%
1997 Q2	11.62%	7.02%	4.60%
1997 Q3	12.00%	6.59%	5.41%
1997 Q4	11.06%	6.22%	4.84%
1998 Q1	11.31%	5.95%	5.36%
1998 Q2	12.20%	5.94%	6.26%
1998 Q3	11.65%	5.61%	6.04%
1998 Q4	12.30%	5.38%	6.92%
1999 Q1	10.40%	5.66%	4.74%
1999 Q2	10.94%	6.09%	4.85%
1999 Q3	10.75%	6.40%	4.35%
1999 Q4	11.10%	6.61%	4.49%

Quarterly Risk Premiums for Electric Utilities
1990 - 2018

Quarter	Average Authorized Return on Equity [1]	20 year Treasury Bond Yield [2]	Risk Premium [3] = [1] - [2]
2000 Q1	11.21%	6.59%	4.62%
2000 Q2	11.00%	6.34%	4.66%
2000 Q3	11.68%	6.10%	5.58%
2000 Q4	12.50%	5.89%	6.61%
2001 Q1	11.38%	5.59%	5.79%
2001 Q2	10.88%	5.84%	5.04%
2001 Q3	10.76%	5.62%	5.14%
2001 Q4	11.57%	5.48%	6.09%
2002 Q1	10.05%	5.74%	4.31%
2002 Q2	11.41%	5.77%	5.64%
2002 Q3	11.25%	5.19%	6.06%
2002 Q4	11.57%	5.02%	6.55%
2003 Q1	11.43%	4.90%	6.52%
2003 Q2	11.16%	4.59%	6.57%
2003 Q3	9.88%	5.17%	4.70%
2003 Q4	11.09%	5.16%	5.93%
2004 Q1	11.00%	4.89%	6.11%
2004 Q2	10.64%	5.36%	5.28%
2004 Q3	10.75%	5.07%	5.68%
2004 Q4	10.91%	4.87%	6.04%
2005 Q1	10.56%	4.76%	5.80%
2005 Q2	10.13%	4.55%	5.57%
2005 Q3	10.85%	4.51%	6.34%
2005 Q4	10.59%	4.77%	5.83%
2006 Q1	10.38%	4.76%	5.62%
2006 Q2	10.63%	5.29%	5.34%
2006 Q3	10.06%	5.09%	4.98%
2006 Q4	10.39%	4.83%	5.55%
2007 Q1	10.39%	4.90%	5.49%
2007 Q2	10.27%	5.07%	5.19%
2007 Q3	10.02%	5.01%	5.01%
2007 Q4	10.39%	4.65%	5.74%
2008 Q1	10.15%	4.40%	5.75%
2008 Q2	10.54%	4.59%	5.94%
2008 Q3	10.38%	4.49%	5.89%
2008 Q4	10.39%	3.97%	6.42%
2009 Q1	10.45%	3.69%	6.76%
2009 Q2	10.58%	4.19%	6.39%
2009 Q3	10.46%	4.28%	6.18%
2009 Q4	10.54%	4.27%	6.28%
2010 Q1	10.45%	4.49%	5.96%
2010 Q2	10.08%	4.20%	5.88%
2010 Q3	10.29%	3.60%	6.69%
2010 Q4	10.34%	3.84%	6.50%
2011 Q1	9.96%	4.32%	5.64%
2011 Q2	10.12%	4.07%	6.05%
2011 Q3	10.36%	3.34%	7.02%
2011 Q4	10.34%	2.75%	7.59%

Quarterly Risk Premiums for Electric Utilities
1990 - 2018

Quarter	Average Authorized Return on Equity [1]	20 year Treasury Bond Yield [2]	Risk Premium [3] = [1] - [2]
2012 Q1	10.30%	2.80%	7.51%
2012 Q2	9.92%	2.55%	7.36%
2012 Q3	9.78%	2.37%	7.41%
2012 Q4	10.05%	2.46%	7.59%
2013 Q1	9.74%	2.75%	6.99%
2013 Q2	9.84%	2.78%	7.06%
2013 Q3	9.83%	3.44%	6.39%
2013 Q4	9.82%	3.50%	6.32%
2014 Q1	9.57%	3.42%	6.16%
2014 Q2	9.83%	3.18%	6.65%
2014 Q3	9.77%	3.01%	6.76%
2014 Q4	9.78%	2.69%	7.08%
2015 Q1	9.66%	2.32%	7.34%
2015 Q2	9.51%	2.62%	6.89%
2015 Q3	9.40%	2.65%	6.75%
2015 Q4	9.65%	2.60%	7.05%
2016 Q1	9.70%	2.32%	7.38%
2016 Q2	9.41%	2.15%	7.26%
2016 Q3	9.76%	1.91%	7.85%
2016 Q4	9.55%	2.52%	7.04%
2017 Q1	9.61%	2.78%	6.83%
2017 Q2	9.61%	2.64%	6.97%
2017 Q3	9.73%	2.58%	7.15%
2017 Q4	9.74%	2.62%	7.12%
2018 Q1	9.59%	2.91%	6.68%
2018 Q2	9.57%	3.00%	6.58%
2018 Q3	9.61%	3.00%	6.61%
2018 Q4	9.44%	3.17%	6.27%

Sources:
[1]: SNL Financial as of 01/28/2019.
[2]: Bloomberg as of 12/31/2018.

Risk Premiums Determined by Relationship Between
Authorized ROEs[1] and Long-term Treasury Bond Rates
During the Period 1990 - 2018
Electric Vertically Integrated Utilities

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.846
Estimate of Intercept (A_0)	8.69%
Estimate of Slope (A_1)	-0.567

Predicted Risk Premium	+	**Exp. Treasury Bond Rate[2]**	=	**Est. Cost of Equity for Vertically Integrated Electric Utilities**
6.20%		4.40%		10.60%

Sources and Notes:

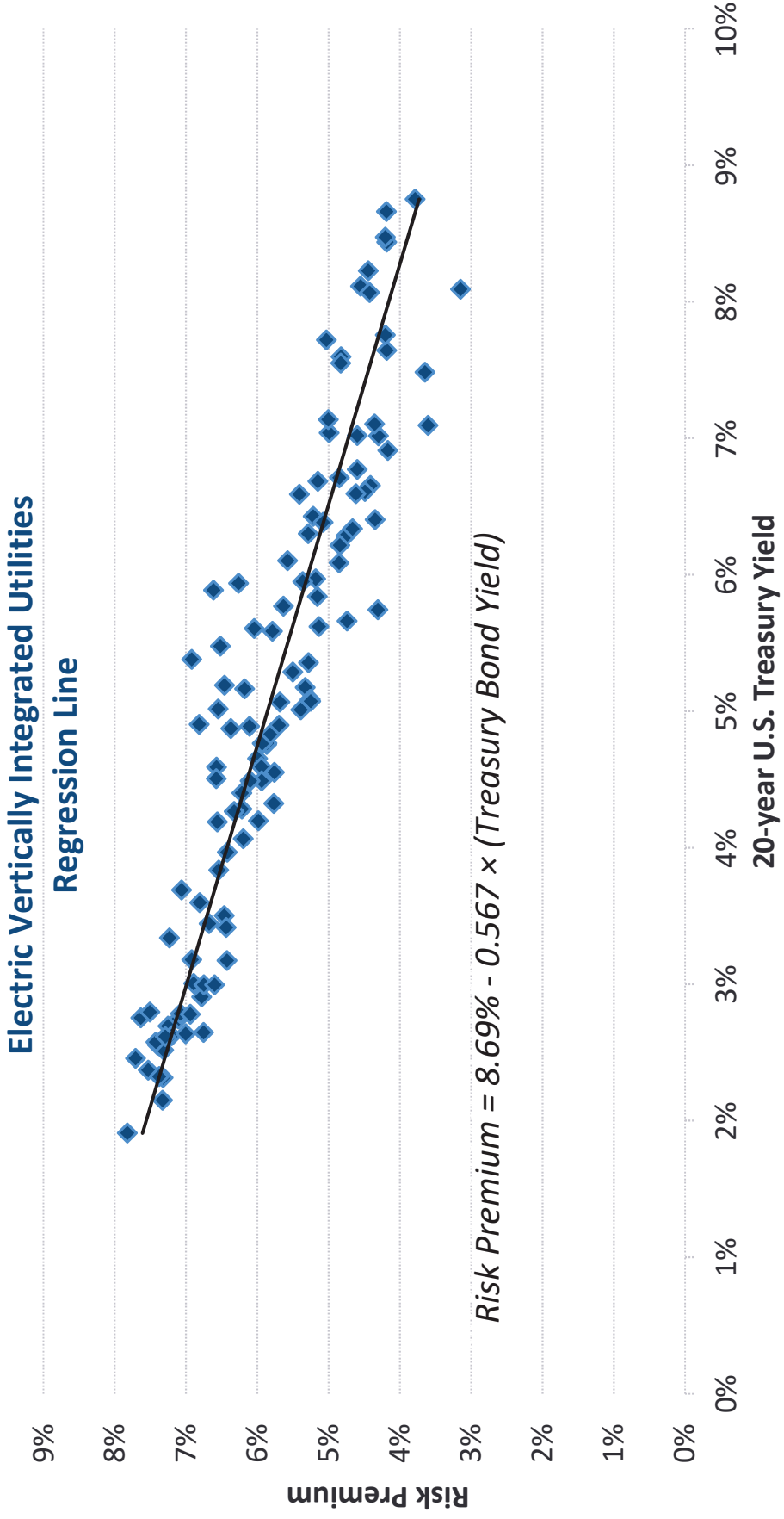[1]: Authorized ROE Data from SNL financial as of 01/28/2019.

[2]: Blue Chip consensus forecast 2020 10 year T-bill yield + maturity premium between 10 year and 20 year U.S. Government bonds + utility yield spread adjustment.

See SS1-Regression Results for derivation of regression coefficients A_0 and A_1

Risk Premiums Determined by Relationship Between
Authorized ROEs[1] and Long-term Treasury Bond Rates
During the Period 1990 - 2018
Electric Vertically Integrated Utilities

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.846
Estimate of Intercept (A_0)	8.69%
Estimate of Slope (A_1)	-0.567

Predicted Risk Premium	+	Exp. Treasury Bond Rate[2]	=	Est. Cost of Equity for Vertically Integrated Electric Utilities
6.34%		4.15%		10.49%

Sources and Notes:

[1]: Authorized ROE Data from SNL financial as of 01/28/2019.

[2]: Blue Chip consensus forecast 2020 10 year T-bill yield + maturity premium between 10 year and 20 year U.S. Government bonds + utility yield spread adjustment.

See SS1-Regression Results for derivation of regression coefficients A_0 and A_1

Regression Results

Electric Vertically Integrated Utilities

	Slope	Intercept
Coefficient	-0.567	0.087
Standard Error	0.023	0.001
R Squared	0.846	-

Note: Estimated by regressing Risk Premium on 20 year
Treasury Bond Yield.

Electric Vertically Integrated Utilities
Regression Line

Risk Premium = 8.69% - 0.567 × (Treasury Bond Yield)

20-year U.S. Treasury Yield

Risk Premium

Source: Bloomberg for Treasury Bond Yields, SNL Financial for authorized RoE data.

Quarterly Risk Premiums for Electric Vertically Integrated Utilities

1990 - 2018

Quarter	Average Authorized Return on Equity	20 year Treasury Bond Yield	Risk Premium
	[1]	[2]	[3] = [1] - [2]
1990 Q1	12.62%	8.44%	4.19%
1990 Q2	12.85%	8.66%	4.19%
1990 Q3	12.54%	8.75%	3.79%
1990 Q4	12.68%	8.47%	4.21%
1991 Q1	12.66%	8.11%	4.55%
1991 Q2	12.67%	8.23%	4.44%
1991 Q3	12.49%	8.07%	4.43%
1991 Q4	12.42%	7.60%	4.83%
1992 Q1	12.38%	7.55%	4.83%
1992 Q2	11.83%	7.64%	4.18%
1992 Q3	12.03%	7.04%	4.99%
1992 Q4	12.14%	7.14%	5.00%
1993 Q1	11.84%	6.68%	5.15%
1993 Q2	11.64%	6.43%	5.21%
1993 Q3	11.15%	5.97%	5.18%
1993 Q4	11.04%	6.28%	4.76%
1994 Q1	11.07%	6.65%	4.41%
1994 Q2	11.13%	7.48%	3.65%
1994 Q3	12.75%	7.72%	5.03%
1994 Q4	11.24%	8.09%	3.15%
1995 Q1	11.96%	7.76%	4.20%
1995 Q2	11.32%	7.02%	4.30%
1995 Q3	11.37%	6.77%	4.60%
1995 Q4	11.58%	6.30%	5.28%
1996 Q1	11.46%	6.38%	5.08%
1996 Q2	11.46%	7.10%	4.36%
1996 Q3	10.70%	7.09%	3.61%
1996 Q4	11.56%	6.71%	4.85%
1997 Q1	11.08%	6.91%	4.17%
1997 Q2	11.62%	7.02%	4.60%
1997 Q3	12.00%	6.59%	5.41%
1997 Q4	11.06%	6.22%	4.84%
1998 Q1	11.31%	5.95%	5.36%
1998 Q2	12.20%	5.94%	6.26%
1998 Q3	11.65%	5.61%	6.04%
1998 Q4	12.30%	5.38%	6.92%
1999 Q1	10.40%	5.66%	4.74%
1999 Q2	10.94%	6.09%	4.85%
1999 Q3	10.75%	6.40%	4.35%
1999 Q4	11.10%	6.61%	4.49%

Quarterly Risk Premiums for Electric Vertically Integrated Utilities

1990 - 2018

Quarter	Average Authorized Return on Equity	20 year Treasury Bond Yield	Risk Premium
	[1]	[2]	[3] = [1] - [2]
2000 Q1	11.21%	6.59%	4.62%
2000 Q2	11.00%	6.34%	4.66%
2000 Q3	11.68%	6.10%	5.58%
2000 Q4	12.50%	5.89%	6.61%
2001 Q1	11.38%	5.59%	5.79%
2001 Q2	11.00%	5.84%	5.16%
2001 Q3	10.76%	5.62%	5.14%
2001 Q4	11.99%	5.48%	6.52%
2002 Q1	10.05%	5.74%	4.31%
2002 Q2	11.41%	5.77%	5.64%
2002 Q3	11.65%	5.19%	6.46%
2002 Q4	11.57%	5.02%	6.55%
2003 Q1	11.72%	4.90%	6.82%
2003 Q2	11.16%	4.59%	6.57%
2003 Q3	10.50%	5.17%	5.33%
2003 Q4	11.34%	5.16%	6.18%
2004 Q1	11.00%	4.89%	6.11%
2004 Q2	10.64%	5.36%	5.28%
2004 Q3	10.75%	5.07%	5.68%
2004 Q4	11.24%	4.87%	6.37%
2005 Q1	10.63%	4.76%	5.87%
2005 Q2	10.31%	4.55%	5.76%
2005 Q3	11.08%	4.51%	6.58%
2005 Q4	10.63%	4.77%	5.86%
2006 Q1	10.70%	4.76%	5.93%
2006 Q2	10.79%	5.29%	5.50%
2006 Q3	10.35%	5.09%	5.26%
2006 Q4	10.65%	4.83%	5.82%
2007 Q1	10.59%	4.90%	5.70%
2007 Q2	10.33%	5.07%	5.25%
2007 Q3	10.40%	5.01%	5.39%
2007 Q4	10.65%	4.65%	6.00%
2008 Q1	10.62%	4.40%	6.22%
2008 Q2	10.54%	4.59%	5.94%
2008 Q3	10.43%	4.49%	5.94%
2008 Q4	10.39%	3.97%	6.42%
2009 Q1	10.75%	3.69%	7.06%
2009 Q2	10.75%	4.19%	6.56%
2009 Q3	10.50%	4.28%	6.22%
2009 Q4	10.59%	4.27%	6.33%
2010 Q1	10.59%	4.49%	6.10%
2010 Q2	10.18%	4.20%	5.98%
2010 Q3	10.40%	3.60%	6.81%
2010 Q4	10.38%	3.84%	6.54%
2011 Q1	10.09%	4.32%	5.77%
2011 Q2	10.26%	4.07%	6.20%
2011 Q3	10.57%	3.34%	7.23%
2011 Q4	10.39%	2.75%	7.63%

Quarterly Risk Premiums for Electric Vertically Integrated Utilities

1990 - 2018

Quarter	Average Authorized Return on Equity	20 year Treasury Bond Yield	Risk Premium
	[1]	[2]	[3] = [1] - [2]
2012 Q1	10.30%	2.80%	7.51%
2012 Q2	9.95%	2.55%	7.40%
2012 Q3	9.90%	2.37%	7.53%
2012 Q4	10.16%	2.46%	7.71%
2013 Q1	9.85%	2.75%	7.10%
2013 Q2	9.86%	2.78%	7.08%
2013 Q3	10.12%	3.44%	6.68%
2013 Q4	9.97%	3.50%	6.46%
2014 Q1	9.86%	3.42%	6.44%
2014 Q2	10.10%	3.18%	6.92%
2014 Q3	9.90%	3.01%	6.89%
2014 Q4	9.94%	2.69%	7.25%
2015 Q1	9.64%	2.32%	7.32%
2015 Q2	9.83%	2.62%	7.20%
2015 Q3	9.40%	2.65%	6.75%
2015 Q4	9.86%	2.60%	7.26%
2016 Q1	9.70%	2.32%	7.38%
2016 Q2	9.48%	2.15%	7.33%
2016 Q3	9.74%	1.91%	7.83%
2016 Q4	9.83%	2.52%	7.32%
2017 Q1	9.72%	2.78%	6.94%
2017 Q2	9.64%	2.64%	7.01%
2017 Q3	10.00%	2.58%	7.42%
2017 Q4	9.91%	2.62%	7.29%
2018 Q1	9.69%	2.91%	6.78%
2018 Q2	9.75%	3.00%	6.75%
2018 Q3	9.59%	3.00%	6.60%
2018 Q4	9.60%	3.17%	6.42%

Sources:
[1]: SNL Financial as of 01/28/2019.
[2]: Bloomberg as of 12/31/2018.

Appendix BV-D

CAPM and DCF Results at 48% Equity

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Note: All other Schedules are identical to those in Appendix BV-C

Schedule No. BV-8 (at 48% Equity)

DCF Cost of Equity at SCE's Proposed Capital Structure

Electric, Water, and Gas Sample

	Overall After-Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Return on Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Simple DCF Quarterly	7.1%	52.0%	4.8%	28.0%	48.0%	11.0%
Multi-Stage DCF – Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	6.0%	52.0%	4.8%	28.0%	48.0%	8.7%
Electric Utility Sample						
Simple DCF Quarterly	6.8%	52.0%	4.8%	28.0%	48.0%	10.4%
Multi-Stage DCF – Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	6.0%	52.0%	4.8%	28.0%	48.0%	8.7%
Water and Gas Sample						
Simple DCF Quarterly	7.8%	52.0%	4.8%	28.0%	48.0%	12.5%
Multi-Stage DCF – Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	5.9%	52.0%	4.8%	28.0%	48.0%	8.4%

Sources and Notes:
[1]: Schedule No. BV-7; Panels A-B, [10].
[2]: Provided by SCE.
[3]: Based on a BBB rating. Yield from Bloomberg as of December 31, 2018.
[4]: Provided by SCE.
[5]: Provided by SCE.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. BV-12 (at 48% Equity)

Risk Positioning Cost of Equity at SCE's Proposed Capital Structure

Electric, Water, and Gas Sample

Using Value Line Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	SCE's Representative Regulatory % Debt	Representative Cost of BBB-Rated Utility Debt	SCE's Representative Income Tax Rate	SCE'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 Value Line Betas	6.6%	6.8%	52.0%	4.8%	28.0%	48.0%	9.9%	10.3%
ECAPM (1.50%) using Value Line Betas	6.9%	7.1%	52.0%	4.8%	28.0%	48.0%	10.6%	11.1%
Electric Utility Sample								
CAPM using Value Line Betas	6.4%	6.6%	52.0%	4.8%	28.0%	48.0%	9.5%	9.9%
ECAPM (1.50%) using Value Line Betas	6.8%	6.9%	52.0%	4.8%	28.0%	48.0%	10.3%	10.7%
Water and Gas Sample								
CAPM using Value Line Betas	7.0%	7.3%	52.0%	4.8%	28.0%	48.0%	10.8%	11.4%
ECAPM (1.50%) using Value Line Betas	7.4%	7.6%	52.0%	4.8%	28.0%	48.0%	11.6%	12.1%

Sources and Notes:

[1]: Schedule No. BV-11; Panel A, [9] - [10].

[2]: Schedule No. BV-11; Panel B, [9] - [10].

[3]: Provided by SCE.

[4]: Based on a BBB rating. Yield from Bloomberg as of December 31, 2018.

[5]: Provided by SCE.

[6]: Provided by SCE.

[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 4.40%, Long-Term Market Risk Premium of 7.07%.

Scenario 2: Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%.

Schedule No. BV-14 (at 48% Equity)

Electric, Water, and Gas Sample Average Asset Beta Relevered at SCE's Proposed Capital Structure

	Asset Beta	Assumed Debt Beta	SCE's Representative Regulatory % Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
Full Sample						
Asset Beta Without Taxes	0.39	0.10	52.0%	28.0%	48.0%	0.71
Asset Beta With Taxes	0.43	0.10	52.0%	28.0%	48.0%	0.69
Electric Utility Sample						
Asset Beta Without Taxes	0.37	0.10	52.0%	28.0%	48.0%	0.67
Asset Beta With Taxes	0.41	0.10	52.0%	28.0%	48.0%	0.65
Water and Gas Sample						
Asset Beta Without Taxes	0.45	0.10	52.0%	28.0%	48.0%	0.83
Asset Beta With Taxes	0.49	0.10	52.0%	28.0%	48.0%	0.79

Sources and Notes:

[1]: Schedule No. BV-13, [7] - [8].

[2]: Villadsen Testimony.

[3]: Provided by SCE.

[4]: SCE's Representative Tax Rate.

[5]: Provided by SCE.

[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Schedule No. BV-15 (at 48% Equity)

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	4.40%	0.71	7.07%	9.4%	9.9%
Asset Beta With Taxes	4.40%	0.69	7.07%	9.3%	9.7%
Electric Utility Sample					
Asset Beta Without Taxes	4.40%	0.67	7.07%	9.1%	9.6%
Asset Beta With Taxes	4.40%	0.65	7.07%	9.0%	9.5%
Water and Gas Sample					
Asset Beta Without Taxes	4.40%	0.83	7.07%	10.3%	10.5%
Asset Beta With Taxes	4.40%	0.79	7.07%	10.0%	10.3%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-14 (at 48% Equity), [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-15 (at 48% Equity)

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Full Sample					
Asset Beta Without Taxes	4.15%	0.71	8.07%	9.9%	10.3%
Asset Beta With Taxes	4.15%	0.69	8.07%	9.7%	10.2%
Electric Utility Sample					
Asset Beta Without Taxes	4.15%	0.67	8.07%	9.5%	10.0%
Asset Beta With Taxes	4.15%	0.65	8.07%	9.4%	9.9%
Water and Gas Sample					
Asset Beta Without Taxes	4.15%	0.83	8.07%	10.8%	11.1%
Asset Beta With Taxes	4.15%	0.79	8.07%	10.5%	10.8%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-14 (at 48% Equity), [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Appendix BV-E

Results from the CINI Sample

Schedule No. BV- CINI-1

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Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel A: Delta Air Lines

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$13,704	$13,704	$14,001	$12,510	$10,345	$12,296	$137	[a]
Shares Outstanding (in millions) - Common	686	686	713	736	786	837	857	[b]
Price per Share - Common	$52	$58	$48	$38	$46	$38	$23	[c]
Market Value of Common Equity	$35,749	$39,686	$34,458	$28,108	$36,401	$31,981	$19,900	[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	$35,749	$39,686	$34,458	$28,108	$36,401	$31,981	$19,900	[f]= [d] + [e]
Market to Book Value of Common Equity	2.61	2.90	2.46	2.25	3.52	2.60	145.25	[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	$6,726	$6,726	$7,083	$7,329	$11,973	$10,995	$8,951	[j]
Current Liabilities	$18,158	$18,158	$16,496	$15,147	$17,608	$14,813	$14,134	[k]
Current Portion of Long-Term Debt	$1,176	$1,176	$1,224	$1,092	$1,705	$1,169	$1,823	[l]
Net Working Capital	($10,256)	($10,256)	($8,189)	($6,726)	($3,930)	($2,649)	($3,360)	[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	$8,115	$8,115	$7,584	$6,473	$7,096	$8,970	$10,077	[p]
Book Value of Long-Term Debt	$9,291	$9,291	$8,808	$7,565	$8,801	$10,139	$11,900	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$260	$260	$292	$454	$537	$755	$894	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$9,551	$9,551	$9,100	$8,019	$9,338	$10,894	$12,794	[s] = [q] +[r].
Market Value of Debt	$9,551	$9,551	$9,100	$8,019	$9,338	$10,894	$12,794	[t] = [s].
MARKET VALUE OF FIRM	$45,300	$49,237	$43,558	$36,127	$45,739	$42,875	$32,694	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	78.92%	80.60%	79.11%	77.80%	79.58%	74.59%	60.87%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	21.08%	19.40%	20.89%	22.20%	20.42%	25.41%	39.13%	[x] = [t] / [u].

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel B: Southwest Airlines

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$10,153	$10,153	$8,800	$8,047	$6,968	$7,429	$7,013	[a]
Shares Outstanding (in millions) - Common	562	562	593	616	650	679	697	[b]
Price per Share - Common	$48	$63	$55	$37	$39	$34	$14	[c]
Market Value of Common Equity	$27,197	$35,168	$32,501	$23,019	$25,078	$23,099	$9,965	[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	$27,197	$35,168	$32,501	$23,019	$25,078	$23,099	$9,965	[f]= [d] + [e]
Market to Book Value of Common Equity	2.68	3.46	3.69	2.86	3.60	3.11	1.42	[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	$5,601	$5,601	$4,280	$4,839	$4,573	$4,985	$4,773	[j]
Current Liabilities	$7,843	$7,843	$6,965	$7,816	$7,084	$6,446	$5,546	[k]
Current Portion of Long-Term Debt	$346	$346	$316	$972	$287	$607	$259	[l]
Net Working Capital	($1,896)	($1,896)	($2,369)	($2,005)	($2,224)	($854)	($514)	[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	$3,156	$3,156	$2,763	$2,323	$2,381	$2,125	$2,616	[p]
Book Value of Long-Term Debt	$3,502	$3,502	$3,079	$3,295	$2,668	$2,732	$2,875	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$51	$51	$58	$299	$329	$160	$112	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$3,553	$3,553	$3,137	$3,594	$2,997	$2,892	$2,987	[s] = [q] + [r].
Market Value of Debt	$3,553	$3,553	$3,137	$3,594	$2,997	$2,892	$2,987	[t] = [s].
MARKET VALUE OF FIRM	$30,750	$38,721	$35,638	$26,613	$28,075	$25,991	$12,952	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	88.45%	90.82%	91.20%	86.50%	89.32%	88.87%	76.94%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	11.55%	9.18%	8.80%	13.50%	10.68%	11.13%	23.06%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel C: FedEx Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$19,173	$19,173	$16,618	$14,142	$15,283	$15,121	$17,655	[a]
Shares Outstanding (in millions) - Common	264	264	268	266	282	283	317	[b]
Price per Share - Common	$172	$247	$218	$168	$146	$157	$113	[c]
Market Value of Common Equity	$45,391	$65,007	$58,484	$44,713	$41,348	$44,530	$35,702	[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	$45,391	$65,007	$58,484	$44,713	$41,348	$44,530	$35,702	[f]= [d] + [e]
Market to Book Value of Common Equity	2.37	3.39	3.52	3.16	2.71	2.94	2.02	[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	$12,641	$12,641	$12,722	$11,401	$10,703	$9,250	$11,493	[j]
Current Liabilities	$9,606	$9,606	$7,790	$7,474	$5,844	$5,153	$5,523	[k]
Current Portion of Long-Term Debt	$1,404	$1,404	$19	$47	$14	$1	$254	[l]
Net Working Capital	$4,439	$4,439	$4,951	$3,974	$4,873	$4,098	$6,224	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$299	$299	$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	$15,241	$15,241	$15,137	$13,735	$7,244	$4,735	$2,739	[p]
Book Value of Long-Term Debt	$16,645	$16,645	$15,156	$13,782	$7,258	$4,736	$2,993	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$591	$591	$462	$151	$264	$461	$500	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$17,236	$17,236	$15,618	$13,933	$7,522	$5,197	$3,493	[s] = [q] + [r].
Market Value of Debt	$17,236	$17,236	$15,618	$13,933	$7,522	$5,197	$3,493	[t] = [s].
MARKET VALUE OF FIRM	$62,627	$82,243	$74,102	$58,646	$48,870	$49,727	$39,195	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	72.48%	79.04%	78.92%	76.24%	84.61%	89.55%	91.09%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	27.52%	20.96%	21.08%	23.76%	15.39%	10.45%	8.91%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
 Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

BV-E-4

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel D: United Parcel Serv.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$3,098	$3,098	$1,509	$2,743	$1,929	$5,627	$3,642	[a]
Shares Outstanding (in millions) - Common	859	859	862	873	891	908	929	[b]
Price per Share - Common	$98	$119	$118	$108	$98	$98	$90	[c]
Market Value of Common Equity	$83,774	$102,379	$101,628	$94,627	$87,712	$89,034	$83,965	[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	$83,774	$102,379	$101,628	$94,627	$87,712	$89,034	$83,965	[f]= [d] + [e]
Market to Book Value of Common Equity	27.04	33.05	67.35	34.50	45.47	15.82	23.05	[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	$13,991	$13,991	$12,910	$12,853	$13,581	$13,318	$13,758	[j]
Current Liabilities	$12,222	$12,222	$12,167	$10,889	$11,869	$9,096	$7,821	[k]
Current Portion of Long-Term Debt	$3,200	$3,200	$4,555	$3,820	$4,557	$2,393	$1,703	[l]
Net Working Capital	$4,969	$4,969	$5,298	$5,784	$6,269	$6,615	$7,640	[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	$20,101	$20,101	$14,355	$11,506	$10,044	$9,858	$10,897	[p]
Book Value of Long-Term Debt	$23,301	$23,301	$18,910	$15,326	$14,601	$12,251	$12,600	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$4,928	$4,928	$4,740	$4,208	($2,393)	($932)	($3,569)	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$28,229	$28,229	$23,650	$19,534	$12,208	$11,319	$9,031	[s] = [q] + [r].
Market Value of Debt	$28,229	$28,229	$23,650	$19,534	$12,208	$11,319	$9,031	[t] = [s].
MARKET VALUE OF FIRM	$112,003	$130,608	$125,278	$114,161	$99,920	$100,353	$92,996	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	74.80%	78.39%	81.12%	82.89%	87.78%	88.72%	90.29%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	25.20%	21.61%	18.88%	17.11%	12.22%	11.28%	9.71%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
   Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel E: Enable Midstream Part.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$7,187	$7,187	$7,309	$7,348	$7,586	$8,794	$8,152	[a]
Shares Outstanding (in millions) - Common	433	433	433	422	422	422	214	[b]
Price per Share - Common	$14	$16	$15	$15	$14	$25	N/A	[c]
Market Value of Common Equity	$6,008	$7,004	$6,494	$6,344	$5,713	$10,739	N/A	[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	$6,008	$7,004	$6,494	$6,344	$5,713	$10,739	N/A	[f]= [d] + [e]
Market to Book Value of Common Equity	0.84	0.97	0.89	0.86	0.75	1.22	N/A	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$370	$370	$370	$370	$0	$0	$0	[h]
Market Value of Preferred Equity	$370	$370	$370	$370	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$481	$481	$446	$408	$427	$520	$425	[j]
Current Liabilities	$1,403	$1,403	$831	$338	$804	$519	$622	[k]
Current Portion of Long-Term Debt	$413	$413	$450	$0	$432	$0	$205	[l]
Net Working Capital	($509)	($509)	($136)	$70	$55	$1	$8	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$500	$500	$0	$0	$0	$95	$0	[n]
Adjusted Short-Term Debt	$500	$500	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$2,880	$2,880	$2,669	$3,113	$2,737	$2,292	$2,090	[p]
Book Value of Long-Term Debt	$3,793	$3,793	$3,119	$3,113	$3,169	$2,292	$2,295	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$16	$16	($136)	($401)	($55)	($10)	$0	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$3,809	$3,809	$2,983	$2,712	$3,114	$2,282	$2,295	[s] = [q] + [r].
Market Value of Debt	$3,809	$3,809	$2,983	$2,712	$3,114	$2,282	$2,295	[t] = [s].
MARKET VALUE OF FIRM	$10,187	$11,184	$9,847	$9,426	$8,827	$13,021	N/A	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	58.98%	62.63%	65.95%	67.30%	64.72%	82.47%	N/A	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	3.63%	3.31%	3.76%	3.93%	-	-	N/A	[w] = [i] / [u].
Debt - Market Value Ratio	37.39%	34.06%	30.29%	28.77%	35.28%	17.53%	N/A	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel F: Enterprise Products

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$23,073	$23,073	$22,331	$21,819	$20,162	$15,758	$14,472	[a]
Shares Outstanding (in millions) - Common	2,183	2,183	2,153	2,103	2,006	1,880	1,859	[b]
Price per Share - Common	$25	$29	$26	$27	$26	$40	$30	[c]
Market Value of Common Equity	$54,514	$63,318	$56,246	$56,618	$51,756	$75,580	$55,803	[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	$54,514	$63,318	$56,246	$56,618	$51,756	$75,580	$55,803	[f]= [d] + [e]
Market to Book Value of Common Equity	2.36	2.74	2.52	2.59	2.57	4.80	3.86	[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	$7,686	$7,686	$6,031	$5,742	$4,660	$8,366	$7,771	[j]
Current Liabilities	$10,922	$10,922	$8,439	$7,568	$6,879	$8,972	$8,724	[k]
Current Portion of Long-Term Debt	$3,406	$3,406	$3,009	$2,838	$1,619	$1,940	$1,050	[l]
Net Working Capital	$169	$169	$601	$1,011	($600)	$1,334	$97	[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	$22,509	$22,509	$21,711	$21,121	$20,841	$17,707	$16,482	[p]
Book Value of Long-Term Debt	$25,914	$25,914	$24,720	$23,959	$22,460	$19,646	$17,532	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$1,990	$1,990	$1,100	($1,360)	$1,680	$1,040	$2,240	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$27,904	$27,904	$25,820	$22,599	$24,140	$20,686	$19,772	[s] = [q] + [r].
Market Value of Debt	$27,904	$27,904	$25,820	$22,599	$24,140	$20,686	$19,772	[t] = [s].
MARKET VALUE OF FIRM	$82,418	$91,222	$82,066	$79,218	$75,896	$96,266	$75,574	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	66.14%	69.41%	68.54%	71.47%	68.19%	78.51%	73.84%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	33.86%	30.59%	31.46%	28.53%	31.81%	21.49%	26.16%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel G: Magellan Midstream

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,547	$2,547	$2,135	$2,049	$1,982	$1,818	$1,563	[a]
Shares Outstanding (in millions) - Common	228	228	228	228	227	227	227	[b]
Price per Share - Common	$57	$68	$71	$69	$63	$84	$55	[c]
Market Value of Common Equity	$13,060	$15,604	$16,105	$15,806	$14,220	$18,937	$12,534	[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	$13,060	$15,604	$16,105	$15,806	$14,220	$18,937	$12,534	[f]= [d] + [e]
Market to Book Value of Common Equity	5.13	6.13	7.54	7.72	7.17	10.41	8.02	[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	$672	$672	$407	$648	$358	$402	$387	[j]
Current Liabilities	$1,127	$1,127	$810	$684	$469	$394	$642	[k]
Current Portion of Long-Term Debt	$553	$553	$251	$250	$0	$0	$250	[l]
Net Working Capital	$98	$98	($151)	$214	($110)	$8	($5)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$197	$0	$0	$0	$0	[n]
Adjusted Short-Term Debt	$0	$0	$151	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$3,719	$3,719	$4,051	$4,074	$3,407	$3,004	$2,237	[p]
Book Value of Long-Term Debt	$4,272	$4,272	$4,454	$4,324	$3,407	$3,004	$2,487	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$302	$302	$175	($155)	$230	$130	$329	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$4,573	$4,573	$4,629	$4,169	$3,637	$3,134	$2,815	[s] = [q] + [r].
Market Value of Debt	$4,573	$4,573	$4,629	$4,169	$3,637	$3,134	$2,815	[t] = [s].
MARKET VALUE OF FIRM	$17,634	$20,178	$20,734	$19,974	$17,857	$22,071	$15,349	[u] = [f] + [o] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	74.06%	77.33%	77.67%	79.13%	79.63%	85.80%	81.66%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	25.94%	22.67%	22.33%	20.87%	20.37%	14.20%	18.34%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel H: CSX Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$13,719	$13,719	$10,887	$11,656	$11,645	$11,119	$9,848	[a]
Shares Outstanding (in millions) - Common	844	844	894	937	975	995	1,013	[b]
Price per Share - Common	$64	$74	$53	$29	$28	$32	$26	[c]
Market Value of Common Equity	$54,022	$62,290	$47,171	$27,593	$26,914	$31,737	$26,483	[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	$54,022	$62,290	$47,171	$27,593	$26,914	$31,737	$26,483	[f]= [d] + [e]
Market to Book Value of Common Equity	3.94	4.54	4.33	2.37	2.31	2.85	2.69	[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	$2,784	$2,784	$2,172	$2,163	$2,502	$2,676	$2,200	[j]
Current Liabilities	$1,944	$1,944	$2,075	$2,263	$1,922	$2,231	$2,251	[k]
Current Portion of Long-Term Debt	$18	$18	$19	$631	$18	$230	$264	[l]
Net Working Capital	$858	$858	$116	$531	$598	$675	$213	[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	$13,754	$13,754	$11,788	$9,888	$10,088	$9,387	$8,787	[p]
Book Value of Long-Term Debt	$13,772	$13,772	$11,807	$10,519	$10,106	$9,617	$9,051	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$1,411	$1,411	$803	$657	$1,300	$799	$1,730	[r]= See Sources and Notes.
Market Value of Long-Term Debt	$15,183	$15,183	$12,610	$11,176	$11,406	$10,416	$10,781	[s] = [q] + [r].
Market Value of Debt	$15,183	$15,183	$12,610	$11,176	$11,406	$10,416	$10,781	[t] = [s].
MARKET VALUE OF FIRM	$69,205	$77,473	$59,781	$38,769	$38,320	$42,153	$37,264	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	78.06%	80.40%	78.91%	71.17%	70.23%	75.29%	71.07%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	21.94%	19.60%	21.09%	28.83%	29.77%	24.71%	28.93%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel I: GATX Corp.

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity		$1,838	$1,470	$1,372	$1,269	$1,331	$1,312	[a]
Shares Outstanding (in millions) - Common		38	38	40	42	44	46	[b]
Price per Share - Common		$73	$61	$42	$46	$62	$48	[c]
Market Value of Common Equity		$2,732	$2,321	$1,682	$1,961	$2,759	$2,214	[d] = [b] x [c].
Market Value of GP Equity		$0	$0	$0	$0	$0	$0	[e] = See Sources and Notes.
Total Market Value of Equity		$2,732	$2,321	$1,682	$1,961	$2,759	$2,214	[f]= [d] + [e]
Market to Book Value of Common Equity		1.49	1.58	1.23	1.55	2.07	1.69	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity		$0	$0	$0	$0	$0	$0	[h]
Market Value of Preferred Equity		$0	$0	$0	$0	$0	$0	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets		$466	$419	$453	$396	$438	$583	[j]
Current Liabilities		$153	$150	$152	$167	$232	$245	[k]
Current Portion of Long-Term Debt		$0	$0	$0	$0	$0	$0	[l]
Net Working Capital		$314	$269	$301	$229	$206	$338	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)		$0	$16	$5	$18	$59	$48	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt		$4,397	$4,267	$4,204	$4,280	$4,100	$3,697	[p]
Book Value of Long-Term Debt		$4,397	$4,267	$4,204	$4,280	$4,100	$3,697	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt		$121	($12)	($43)	$136	$136	$177	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$4,518	$4,255	$4,162	$4,416	$4,236	$3,874	[s] = [q] + [r].
Market Value of Debt		$4,518	$4,255	$4,162	$4,416	$4,236	$3,874	[t] = [s].
MARKET VALUE OF FIRM								
		$7,250	$6,576	$5,844	$6,377	$6,995	$6,087	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	37.68%	41.39%	35.30%	28.79%	30.75%	39.44%	36.37%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	62.32%	58.61%	64.70%	71.21%	69.25%	60.56%	63.63%	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

The DCF Capital structure is calculated using respective balance sheet information and 15-day average prices ending at period end.

Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

BV-E-10

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel J: Kansas City South'n

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$4,766	$4,766	$4,085	$4,066	$3,869	$3,640	$3,271	[a]
Shares Outstanding (in millions) - Common	102	102	104	108	109	110	110	[b]
Price per Share - Common	$95	$117	$107	$91	$92	$119	$111	[c]
Market Value of Common Equity	$9,707	$11,890	$11,112	$9,831	$10,087	$13,142	$12,220	[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	$9,707	$11,890	$11,112	$9,831	$10,087	$13,142	$12,220	[f] = [d] + [e]
Market to Book Value of Common Equity	2.04	2.49	2.72	2.42	2.61	3.61	3.74	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$6	$6	$6	$6	$6	$6	$6	[h]
Market Value of Preferred Equity	$6	$6	$6	$6	$6	$6	$6	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$616	$616	$641	$769	$582	$780	$618	[j]
Current Liabilities	$466	$466	$925	$752	$465	$761	$455	[k]
Current Portion of Long-Term Debt	$11	$11	$41	$275	$25	$25	$52	[l]
Net Working Capital	$161	$161	($244)	$292	$141	$44	$215	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$356	$0	$0	$312	$0	[n]
Adjusted Short-Term Debt	$0	$0	$244	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$2,681	$2,681	$2,238	$2,276	$2,320	$1,846	$1,729	[p]
Book Value of Long-Term Debt	$2,691	$2,691	$2,523	$2,551	$2,345	$1,871	$1,780	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$104	$104	$7	($34)	$33	($106)	$112	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,795	$2,795	$2,530	$2,517	$2,378	$1,765	$1,893	[s] = [q] + [r].
Market Value of Debt	$2,795	$2,795	$2,530	$2,517	$2,378	$1,765	$1,893	[t] = [s].
MARKET VALUE OF FIRM	$12,507	$14,690	$13,648	$12,355	$12,471	$14,913	$14,118	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	77.61%	80.94%	81.42%	79.58%	80.89%	88.12%	86.55%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	0.05%	0.04%	0.04%	0.05%	0.05%	0.04%	0.04%	[w] = [i] / [u].
Debt - Market Value Ratio	22.34%	19.02%	18.53%	20.37%	19.07%	11.83%	13.40%	[x] = [t] / [u].

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel K: Union Pacific

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$20,645	$20,645	$19,151	$20,284	$20,599	$21,553	$20,774	[a]
Shares Outstanding (in millions) - Common	738	738	790	825	856	891	922	[b]
Price per Share - Common	$139	$161	$113	$94	$87	$108	$79	[c]
Market Value of Common Equity	$102,835	$118,559	$89,520	$77,769	$74,514	$96,400	$72,614	[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	$102,835	$118,559	$89,520	$77,769	$74,514	$96,400	$72,614	[f]= [d] + [e]
Market to Book Value of Common Equity	4.98	5.74	4.67	3.83	3.62	4.47	3.50	[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	$4,816	$4,816	$4,449	$4,602	$3,942	$4,780	$4,064	[j]
Current Liabilities	$4,529	$4,529	$3,831	$3,257	$3,508	$3,833	$3,655	[k]
Current Portion of Long-Term Debt	$1,468	$1,468	$903	$407	$521	$460	$691	[l]
Net Working Capital	$1,755	$1,755	$1,521	$1,752	$955	$1,407	$1,100	[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	$20,943	$20,943	$15,930	$15,205	$12,798	$11,045	$8,764	[p]
Book Value of Long-Term Debt	$22,411	$22,411	$16,833	$15,612	$13,319	$11,505	$9,455	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$1,300	$1,300	$900	$1,000	$1,500	$600	$2,100	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$23,711	$23,711	$17,733	$16,612	$14,819	$12,105	$11,555	[s] = [q] + [r].
Market Value of Debt	$23,711	$23,711	$17,733	$16,612	$14,819	$12,105	$11,555	[t] = [s].
MARKET VALUE OF FIRM	$126,546	$142,270	$107,253	$94,381	$89,333	$108,505	$84,169	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	81.26%	83.33%	83.47%	82.40%	83.41%	88.84%	86.27%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	18.74%	16.67%	16.53%	17.60%	16.59%	11.16%	13.73%	[x] = [t] / [u].

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel L: Heartland Express

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity		$595	$538	$494	$493	$456	$342	[a]
Shares Outstanding (in millions) - Common		82	83	83	86	88	85	[b]
Price per Share - Common		$18	$20	$23	$19	$21	$24	$14	[c]
Market Value of Common Equity	$1,485	$1,666	$1,914	$1,577	$1,772	$2,122	$1,198	[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	$1,485	$1,666	$1,914	$1,577	$1,772	$2,122	$1,198	[f] = [d] + [e]
Market to Book Value of Common Equity	2.49	2.80	3.56	3.19	3.60	4.65	3.50	[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	$216	$216	$172	$177	$185	$152	$246	[j]
Current Liabilities	$81	$81	$92	$77	$86	$100	$67	[k]
Current Portion of Long-Term Debt	$0	$0	$0	$0	$0	$0	$0	[l]
Net Working Capital	$135	$135	$79	$100	$100	$51	$180	[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	$0	$0	$0	$0	$0	$21	$0	[p]
Book Value of Long-Term Debt	$0	$0	$0	$0	$0	$21	$0	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$0	$0	$0	$0	$0	$0	$0	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$0	$0	$0	$0	$0	$21	$0	[s] = [q] + [r].
Market Value of Debt	$0	$0	$0	$0	$0	$21	$0	[t] = [s].
MARKET VALUE OF FIRM	$1,485	$1,666	$1,914	$1,577	$1,772	$2,143	$1,198	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	100.00%	100.00%	100.00%	100.00%	100.00%	99.02%	100.00%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	-	-	-	-	-	0.98%	-	[x] = [t] / [u].

Sources and Notes:

Bloomberg as of December 31, 2018

Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.

    Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel M: Ryder System

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,918	$2,918	$2,175	$2,097	$1,952	$1,982	$1,655	[a]
Shares Outstanding (in millions) - Common	53	53	53	53	53	53	53	[b]
Price per Share - Common	$48	$76	$81	$65	$79	$92	$60	[c]
Market Value of Common Equity	$2,573	$4,009	$4,306	$3,464	$4,220	$4,856	$3,153	[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	$2,573	$4,009	$4,306	$3,464	$4,220	$4,856	$3,153	[f]= [d] + [e]
Market to Book Value of Common Equity	0.88	1.37	1.98	1.65	2.16	2.45	1.90	[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	$1,465	$1,465	$1,253	$1,138	$1,118	$1,122	$1,099	[j]
Current Liabilities	$2,183	$2,183	$1,230	$2,030	$1,367	$1,476	$1,274	[k]
Current Portion of Long-Term Debt	$860	$860	$85	$1,055	$306	$460	$347	[l]
Net Working Capital	$141	$141	$107	$163	$56	$106	$172	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$59	$0	$0	$3	$4	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$5,424	$5,424	$5,205	$4,464	$5,145	$4,045	$3,686	[p]
Book Value of Long-Term Debt	$6,283	$6,283	$5,290	$5,520	$5,451	$4,505	$4,033	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$68	$68	$227	$69	$124	$139	$238	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$6,351	$6,351	$5,517	$5,589	$5,574	$4,644	$4,271	[s] = [q] + [r].
Market Value of Debt	$6,351	$6,351	$5,517	$5,589	$5,574	$4,644	$4,271	[t] = [s].
MARKET VALUE OF FIRM	$8,924	$10,360	$9,823	$9,053	$9,794	$9,500	$7,424	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	28.83%	38.70%	43.83%	38.26%	43.08%	51.12%	42.47%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	71.17%	61.30%	56.17%	61.74%	56.92%	48.88%	57.53%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
   Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

BV-E-14

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel N: MDU Resources

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$2,521	$2,521	$2,354	$2,270	$2,362	$3,068	$2,717	[a]
Shares Outstanding (in millions) - Common	196	196	195	195	195	194	189	[b]
Price per Share - Common	$25	$26	$27	$25	$17	$29	$27	[c]
Market Value of Common Equity	$4,857	$5,194	$5,181	$4,811	$3,285	$5,586	$5,173	[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	$4,857	$5,194	$5,181	$4,811	$3,285	$5,586	$5,173	[f]= [d] + [e]
Market to Book Value of Common Equity	1.93	2.06	2.20	2.12	1.39	1.82	1.90	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$15	$15	$15	$15	[h]
Market Value of Preferred Equity	$0	$0	$0	$15	$15	$15	$15	[i] = [h].
MARKET VALUE OF DEBT								
Current Assets	$1,214	$1,214	$1,099	$1,145	$1,204	$1,450	$1,255	[j]
Current Liabilities	$725	$725	$857	$744	$949	$971	$846	[k]
Current Portion of Long-Term Debt	$4	$4	$148	$94	$259	$149	$44	[l]
Net Working Capital	$493	$493	$391	$494	$513	$628	$453	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$7	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	$1,912	$1,912	$1,592	$1,808	$1,942	$2,061	$1,968	[p]
Book Value of Long-Term Debt	$1,915	$1,915	$1,741	$1,902	$2,201	$2,210	$2,012	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$111	$111	$52	$22	$145	$58	$143	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,027	$2,027	$1,792	$1,924	$2,345	$2,268	$2,155	[s] = [q] + [r].
Market Value of Debt	$2,027	$2,027	$1,792	$1,924	$2,345	$2,268	$2,155	[t] = [s].
MARKET VALUE OF FIRM								
	$6,883	$7,221	$6,974	$6,751	$5,645	$7,869	$7,343	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.55%	71.93%	74.30%	71.27%	58.19%	70.99%	70.45%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	0.22%	0.27%	0.19%	0.20%	[w] = [i] / [u].
Debt - Market Value Ratio	29.45%	28.07%	25.70%	28.50%	41.55%	28.82%	29.35%	[x] = [t] / [u].

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel O: EOG Resources

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$18,538	$18,538	$13,922	$11,798	$13,284	$17,720	$14,862	[a]
Shares Outstanding (in millions) - Common	580	580	578	551	550	548	546	[b]
Price per Share - Common	$94	$120	$94	$92	$75	$102	$84	[c]
Market Value of Common Equity	$54,357	$69,860	$54,166	$50,479	$41,333	$56,102	$46,114	[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	$54,357	$69,860	$54,166	$50,479	$41,333	$56,102	$46,114	[f]= [d] + [e]
Market to Book Value of Common Equity	2.93	3.77	3.89	4.28	3.11	3.17	3.10	[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	$4,817	$4,817	$2,764	$2,738	$2,825	$4,885	$4,192	[j]
Current Liabilities	$4,425	$4,425	$2,180	$1,733	$2,047	$3,379	$3,347	[k]
Current Portion of Long-Term Debt	$1,263	$1,263	$7	$7	$36	$7	$407	[l]
Net Working Capital	$1,655	$1,655	$591	$1,011	$814	$1,513	$1,251	[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	$5,172	$5,172	$6,380	$6,980	$6,394	$5,903	$5,906	[p]
Book Value of Long-Term Debt	$6,435	$6,435	$6,387	$6,986	$6,430	$5,910	$6,313	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$212	$212	$200	$134	$352	$332	$742	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$6,647	$6,647	$6,587	$7,120	$6,782	$6,242	$7,055	[s] = [q] + [r].
Market Value of Debt	$6,647	$6,647	$6,587	$7,120	$6,782	$6,242	$7,055	[t] = [s].
MARKET VALUE OF FIRM								
	$61,004	$76,507	$60,753	$57,599	$48,115	$62,343	$53,169	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	89.10%	91.31%	89.16%	87.64%	85.90%	89.99%	86.73%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	10.90%	8.69%	10.84%	12.36%	14.10%	10.01%	13.27%	[x] = [t] / [u].

Schedule No. BV-CINI-3

Market Value of the CINI Sample

Panel P: National Fuel Gas

($MM)

	DCF Capital Structure	3rd Quarter, 2018	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$1,937	$1,937	$1,704	$1,527	$2,025	$2,411	$2,195	[a]
Shares Outstanding (in millions) - Common	86	86	86	85	85	84	84	[b]
Price per Share - Common	$54	$56	$58	$56	$51	$72	$67	[c]
Market Value of Common Equity	$4,608	$4,815	$4,942	$4,726	$4,326	$6,087	$5,623	[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	$4,608	$4,815	$4,942	$4,726	$4,326	$6,087	$5,623	[f]= [d] + [e]
Market to Book Value of Common Equity	2.38	2.49	2.90	3.09	2.14	2.53	2.56	[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	$545	$545	$818	$413	$376	$377	$449	[j]
Current Liabilities	$440	$440	$646	$304	$446	$491	$302	[k]
Current Portion of Long-Term Debt	$0	$0	$300	$0	$0	$0	$0	[l]
Net Working Capital	$105	$105	$472	$109	($70)	($113)	$147	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$86	$0	[n]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$86	$0	[o] = See Sources and Notes.
Long-Term Debt	$2,131	$2,131	$2,084	$2,086	$2,084	$1,637	$1,649	[p]
Book Value of Long-Term Debt	$2,131	$2,131	$2,384	$2,086	$2,084	$1,723	$1,649	[q] = [l] + [o] + [p].
Adjustment to Book Value of Long-Term Debt	$140	$140	$169	$46	$138	$119	$225	[r] = See Sources and Notes.
Market Value of Long-Term Debt	$2,271	$2,271	$2,553	$2,132	$2,222	$1,842	$1,874	[s] = [q] + [r].
Market Value of Debt	$2,271	$2,271	$2,553	$2,132	$2,222	$1,842	$1,874	[t] = [s].
MARKET VALUE OF FIRM								
	$6,879	$7,087	$7,495	$6,857	$6,549	$7,929	$7,497	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	66.98%	67.95%	65.94%	68.91%	66.07%	76.77%	75.00%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio	33.02%	32.05%	34.06%	31.09%	33.93%	23.23%	25.00%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of December 31, 2018
Capital structure from 3rd Quarter, 2018 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2018 balance sheet information and a 15-trading day average closing price ending on 12/31/2018.
    Prices are reported in Workpaper #1 to Schedule No. BV-CINI-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 2013 to 2017 10-Ks.

BV-E-17

Schedule No. BV-CINI-4

CINI Sample

Capital Structure Summary of the CINI Sample

	DCF Capital Structure			5-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
Company	[1]	[2]	[3]	[4]	[5]	[6]
Delta Air Lines	0.79	0.00	0.21	0.76	0.00	0.24
Southwest Airlines	0.88	0.00	0.12	0.88	0.00	0.12
FedEx Corp.	0.72	0.00	0.28	0.83	0.00	0.17
United Parcel Serv.	0.75	0.00	0.25	0.85	0.00	0.15
Enable Midstream Part.	0.59	0.04	0.37	0.68	0.02	0.30
Enterprise Products	0.66	0.00	0.34	0.72	0.00	0.28
Magellan Midstream	0.74	0.00	0.26	0.80	0.00	0.20
CSX Corp.	0.78	0.00	0.22	0.74	0.00	0.26
GATX Corp.	0.38	0.00	0.62	0.35	0.00	0.65
Kansas City South'n	0.78	0.00	0.22	0.83	0.00	0.17
Union Pacific	0.81	0.00	0.19	0.85	0.00	0.15
Heartland Express	1.00	0.00	0.00	1.00	0.00	0.00
Ryder System	0.29	0.00	0.71	0.43	0.00	0.57
MDU Resources	0.71	0.00	0.29	0.69	0.00	0.31
EOG Resources	0.89	0.00	0.11	0.88	0.00	0.12
National Fuel Gas	0.67	0.00	0.33	0.70	0.00	0.30
CINI Sample Average	0.71	0.00	0.28	0.75	0.00	0.25

Sources and Notes:

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

Schedule No. BV-CINI-5

CINI Sample

Estimated Growth Rates of the CINI Sample

Company	Thomson Reuters IBES Estimate		Value Line			Combined Growth Rate
	Long-Term Growth Rate	Number of Estimates	EPS Year 2018 Estimate	EPS Year 2021-2023 Estimate	Annualized Growth Rate	
	[1]	[2]	[3]	[4]	[5]	[6]
Delta Air Lines	16.82%	5	5.60	8.90	12.28%	16.07%
Southwest Airlines	15.90%	4	4.20	5.95	9.10%	14.54%
FedEx Corp.	9.71%	5	17.50	20.00	3.39%	8.65%
United Parcel Serv.	11.59%	7	7.20	9.30	6.61%	10.97%
Enable Midstream Part.	8.10%	2	1.00	2.25	22.47%	12.89%
Enterprise Products	9.39%	3	1.80	2.50	8.56%	9.18%
Magellan Midstream	8.02%	2	5.55	5.70	0.67%	5.57%
CSX Corp.	23.21%	5	3.80	5.65	10.42%	21.08%
GATX Corp.	12.00%	1	5.15	6.50	5.99%	9.00%
Kansas City South'n	14.70%	2	6.15	9.50	11.48%	13.62%
Union Pacific	18.27%	5	7.85	11.65	10.37%	16.95%
Heartland Express	27.11%	1	0.85	1.50	15.26%	21.18%
Ryder System	14.61%	1	5.75	9.00	11.85%	13.23%
MDU Resources	n/a	0	1.45	2.55	15.16%	15.16%
EOG Resources	102.56%	2	5.95	10.80	16.07%	73.73%
National Fuel Gas	n/a	0	4.90	6.50	7.32%	7.32%

Sources and Notes:

[1] - [2]: Thomson Reuters as of December 31, 2018.

[3] - [4]: Valueline Investment Analyzer as of 12/31/2018.

[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-CINI-6

DCF Cost of Equity of the CINI Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price	Most Recent Dividend	Quarterly Dividend Yield (t+1)	Combined Long-Term Growth Rate	Quarterly Growth Rate	DCF Cost of Equity
	[1]	[2]	[3]	[4]	[5]	[6]
Delta Air Lines	$52.14	$0.35	0.70%	16.1%	3.8%	19.2%
Southwest Airlines	$48.37	$0.16	0.34%	14.5%	3.5%	16.1%
FedEx Corp.	$172.25	$0.65	0.39%	8.7%	2.1%	10.3%
United Parcel Serv.	$97.53	$0.91	0.96%	11.0%	2.6%	15.2%
Enable Midstream Part.	$13.88	$0.32	2.36%	12.9%	3.1%	23.6%
Enterprise Products	$24.98	$0.43	1.77%	9.2%	2.2%	16.9%
Magellan Midstream	$57.23	$0.98	1.73%	5.6%	1.4%	13.0%
CSX Corp.	$63.97	$0.22	0.36%	21.1%	4.9%	22.8%
GATX Corp.	$72.59	$0.44	0.62%	9.0%	2.2%	11.7%
Kansas City South'n	$95.45	$0.36	0.39%	13.6%	3.2%	15.3%
Union Pacific	$139.43	$0.80	0.60%	17.0%	4.0%	19.7%
Heartland Express	$18.12	$0.02	0.12%	21.2%	4.9%	21.7%
Ryder System	$48.47	$0.54	1.15%	13.2%	3.2%	18.4%
MDU Resources	$24.78	$0.20	0.85%	15.2%	3.6%	19.0%
EOG Resources	$93.75	$0.22	0.27%	73.7%	14.8%	75.4%
National Fuel Gas	$53.60	$0.43	0.81%	7.3%	1.8%	10.8%

Sources and Notes:

[1]: Workpaper #1 to Schedule No. BV-CINI-6.
[2]: Workpaper #2 to Schedule No. BV-CINI-6.
[3]: [2] / [1]) x (1 + [5]).
[4]: Schedule No. BV-CINI-5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Schedule No. BV-CINI-6

DCF Cost of Equity of the CINI Sample

Panel B: Multi-Stage DCF (Using Blue Chip 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]
Delta Air Lines	$52.14	$0.35	16.1%	14.1%	12.1%	10.1%	8.1%	6.1%	4.1%	9.8%
Southwest Airlines	$48.37	$0.16	14.5%	12.8%	11.1%	9.3%	7.6%	5.8%	4.1%	6.8%
FedEx Corp.	$172.25	$0.65	8.7%	7.9%	7.1%	6.4%	5.6%	4.9%	4.1%	6.2%
United Parcel Serv.	$97.53	$0.91	11.0%	9.8%	8.7%	7.5%	6.4%	5.2%	4.1%	10.0%
Enable Midstream Part.	$13.88	$0.32	12.9%	11.4%	10.0%	8.5%	7.0%	5.6%	4.1%	19.2%
Enterprise Products	$24.98	$0.43	9.2%	8.3%	7.5%	6.6%	5.8%	4.9%	4.1%	13.8%
Magellan Midstream	$57.23	$0.98	5.6%	5.3%	5.1%	4.8%	4.6%	4.3%	4.1%	12.0%
CSX Corp.	$63.97	$0.22	21.1%	18.3%	15.4%	12.6%	9.8%	6.9%	4.1%	8.2%
GATX Corp.	$72.59	$0.44	9.0%	8.2%	7.4%	6.5%	5.7%	4.9%	4.1%	7.6%
Kansas City South'n	$95.45	$0.36	13.6%	12.0%	10.4%	8.9%	7.3%	5.7%	4.1%	7.0%
Union Pacific	$139.43	$0.80	17.0%	14.8%	12.7%	10.5%	8.4%	6.2%	4.1%	9.3%
Heartland Express	$18.12	$0.02	21.2%	18.3%	15.5%	12.6%	9.8%	6.9%	4.1%	5.5%
Ryder System	$48.47	$0.54	13.2%	11.7%	10.2%	8.7%	7.1%	5.6%	4.1%	12.0%
MDU Resources	$24.78	$0.20	15.2%	13.3%	11.5%	9.6%	7.8%	5.9%	4.1%	10.7%
EOG Resources	$93.75	$0.22	73.7%	62.1%	50.5%	38.9%	27.3%	15.7%	4.1%	24.1%
National Fuel Gas	$53.60	$0.43	7.3%	6.8%	6.2%	5.7%	5.2%	4.6%	4.1%	8.2%

Sources and Notes:

[1]: Workpaper #1 to Schedule No. BV-CINI-6.
[2]: Workpaper #2 to Schedule No. BV-CINI-6.
[3]: Schedule No. BV-CINI-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]: BlueChip Economic Indicators, October, 2018 This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Schedule No. BV-CINI-6.

Schedule No. BV-CINI-7

Overall After-Tax DCF Cost of Capital of the CINI Sample

Panel A: Simple DCF Method (Quarterly)

Company	3rd Quarter, 2018 S&P Bond Rating	3rd Quarter, 2018 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	SCE's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Delta Air Lines	BBB	-	19.2%	0.79	-	0.00	4.8%	0.21	28.0%	15.9%
Southwest Airlines	BBB	-	16.1%	0.88	-	0.00	4.8%	0.12	28.0%	14.6%
FedEx Corp.	BBB	-	10.3%	0.72	-	0.00	4.8%	0.28	28.0%	8.4%
United Parcel Serv.	A	-	15.2%	0.75	-	0.00	4.4%	0.25	28.0%	12.1%
Enable Midstream Part.	BBB	BBB	23.6%	0.59	4.8%	0.04	4.8%	0.37	28.0%	15.4%
Enterprise Products	BBB	-	16.9%	0.66	-	0.00	4.8%	0.34	28.0%	12.4%
Magellan Midstream	BBB	-	13.0%	0.74	-	0.00	4.8%	0.26	28.0%	10.5%
CSX Corp.	BBB	-	~~22.8%~~	0.78	-	0.00	4.8%	0.22	28.0%	~~18.5%~~
GATX Corp.	BBB	-	11.7%	0.38	-	0.00	4.8%	0.62	28.0%	6.6%
Kansas City South'n	BBB	BBB	15.3%	0.78	4.8%	0.00	4.8%	0.22	28.0%	12.7%
Union Pacific	A	-	19.7%	0.81	-	0.00	4.4%	0.19	28.0%	16.6%
Heartland Express	n/a	-	~~21.7%~~	1.00	-	0.00	n/a	0.00	28.0%	~~21.7%~~
Ryder System	BBB	-	18.4%	0.29	-	0.00	4.8%	0.71	28.0%	7.8%
MDU Resources	BBB	-	19.0%	0.71	-	0.00	4.8%	0.29	28.0%	14.4%
EOG Resources	A	-	~~75.4%~~	0.89	-	0.00	4.4%	0.11	28.0%	~~67.5%~~
National Fuel Gas	BBB	-	10.8%	0.67	-	0.00	4.8%	0.33	28.0%	8.4%
Simple CINI Sample Average			16.1%	0.67	4.8%	0.00	4.8%	0.32	28.0%	12.0%

Sources and Notes:
[1]: Bloomberg as of 12/31/2018.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Schedule No. BV-CINI-6; Panel A, [6].
[4]: Schedule No. BV-CINI-4, [1].
[5]: Workpaper #2 to Schedule No. BV-CINI-11, Panel C.
[6]: Schedule No. BV-CINI-4, [2].

[7]: Workpaper #2 to Schedule No. BV-CINI-11, Panel B.
[8]: Schedule No. BV-CINI-4, [3].
[9]: Provided by SCE.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the company 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 or was excluded due to its growth rate either being less than zero or greater than 20%.

Schedule No. BV-CINI-7

Overall After-Tax DCF Cost of Capital of the CINI Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	3rd Quarter, 2018 S&P Bond Rating	3rd Quarter, 2018 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	SCE's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Delta Air Lines	BBB	-	9.8%	0.79	-	0.00	4.8%	0.21	28.0%	8.5%
Southwest Airlines	BBB	-	6.8%	0.88	-	0.00	4.8%	0.12	28.0%	6.4%
FedEx Corp.	BBB	-	6.2%	0.72	-	0.00	4.8%	0.28	28.0%	5.5%
United Parcel Serv.	A	-	10.0%	0.75	-	0.00	4.4%	0.25	28.0%	8.3%
Enable Midstream Part.	BBB	BBB	19.2%	0.59	4.8%	0.04	4.8%	0.37	28.0%	12.8%
Enterprise Products	BBB	-	13.8%	0.66	-	0.00	4.8%	0.34	28.0%	10.3%
Magellan Midstream	BBB	-	12.0%	0.74	-	0.00	4.8%	0.26	28.0%	9.8%
CSX Corp.	BBB	-	8.2%	0.78	-	0.00	4.8%	0.22	28.0%	7.1%
GATX Corp.	BBB	-	7.6%	0.38	-	0.00	4.8%	0.62	28.0%	5.0%
Kansas City South'n	BBB	BBB	7.0%	0.78	4.8%	0.00	4.8%	0.22	28.0%	6.2%
Union Pacific	A	-	9.3%	0.81	-	0.00	4.4%	0.19	28.0%	8.2%
Heartland Express	n/a	-	5.5%	1.00	-	0.00	n/a	0.00	28.0%	5.5%
Ryder System	BBB	-	12.0%	0.29	-	0.00	4.8%	0.71	28.0%	5.9%
MDU Resources	BBB	-	10.7%	0.71	-	0.00	4.8%	0.29	28.0%	8.5%
EOG Resources	A	-	24.1%	0.89	-	0.00	4.4%	0.11	28.0%	21.8%
National Fuel Gas	BBB	-	8.2%	0.67	-	0.00	4.8%	0.33	28.0%	6.6%
Multi-Stage CINI Sample Average			10.4%	0.68	4.8%	0.00	4.8%	0.32	28.0%	8.0%

Sources and Notes:

[1]: Bloomberg as of 12/31/2018.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Schedule No. BV-CINI-6; Panel B, [10].
[4]: Schedule No. BV-CINI-4, [1].
[5]: Workpaper #2 to Schedule No. BV-CINI-11, Panel C.
[6]: Schedule No. BV-CINI-4, [2].

[7]: Workpaper #2 to Schedule No. BV-CINI-11, Panel B.
[8]: Schedule No. BV-CINI-4, [3].
[9]: Provided by SCE.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the company 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-CINI-8

DCF Cost of Equity at SCE's Proposed Capital Structure

CINI Sample

	Overall After - Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Return on Equity
	[1]	[2]	[3]	[4]	[5]	[6]
CINI Sample						
Simple DCF Quarterly	12.0%	48.0%	4.8%	28.0%	52.0%	19.8%
Multi-Stage DCF - Using the Blue Chip Economic Indicator Long-Term GDP Growth Forecast as the Perpetual Rate	8.0%	48.0%	4.8%	28.0%	52.0%	12.1%

Sources and Notes:
[1]: Schedule No. BV-CINI-7; Panels A-B, [10].
[2]: Provided by SCE.
[3]: Based on a BBB rating. Yield from Bloomberg as of December 31, 2018.
[4]: Provided by SCE.
[5]: Provided by SCE.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

Schedule No. BV-CINI-10

Risk Positioning Cost of Equity of the CINI Sample (Using Value Line Betas)

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Delta Air Lines	4.40%	1.20	7.07%	12.9%	12.6%
Southwest Airlines	4.40%	1.15	7.07%	12.5%	12.3%
FedEx Corp.	4.40%	1.15	7.07%	12.5%	12.3%
United Parcel Serv.	4.40%	0.90	7.07%	10.8%	10.9%
Enable Midstream Part.	4.40%	1.25	7.07%	13.2%	12.9%
Enterprise Products	4.40%	1.30	7.07%	13.6%	13.1%
Magellan Midstream	4.40%	1.20	7.07%	12.9%	12.6%
CSX Corp.	4.40%	1.20	7.07%	12.9%	12.6%
GATX Corp.	4.40%	1.30	7.07%	13.6%	13.1%
Kansas City South'n	4.40%	1.10	7.07%	12.2%	12.0%
Union Pacific	4.40%	1.10	7.07%	12.2%	12.0%
Heartland Express	4.40%	0.90	7.07%	10.8%	10.9%
Ryder System	4.40%	1.30	7.07%	13.6%	13.1%
MDU Resources	4.40%	1.00	7.07%	11.5%	11.5%
EOG Resources	4.40%	1.45	7.07%	14.7%	14.0%
National Fuel Gas	4.40%	1.00	7.07%	11.5%	11.5%

Sources and Notes:

[1], [3]: Villadsen Direct Testimony.

[2]: Valueline Investment Analyzer as of 12/31/2018.

[4]: [1] + ([2] x [3]).

[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-CINI-10

Risk Positioning Cost of Equity of the CINI Sample (Using Value Line Betas)

Panel B: Scenario 2 - Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	Long-Term Risk-Free Rate	Value Line Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
Delta Air Lines	4.15%	1.20	8.07%	13.8%	13.5%
Southwest Airlines	4.15%	1.15	8.07%	13.4%	13.2%
FedEx Corp.	4.15%	1.15	8.07%	13.4%	13.2%
United Parcel Serv.	4.15%	0.90	8.07%	11.4%	11.6%
Enable Midstream Part.	4.15%	1.25	8.07%	14.2%	13.9%
Enterprise Products	4.15%	1.30	8.07%	14.6%	14.2%
Magellan Midstream	4.15%	1.20	8.07%	13.8%	13.5%
CSX Corp.	4.15%	1.20	8.07%	13.8%	13.5%
GATX Corp.	4.15%	1.30	8.07%	14.6%	14.2%
Kansas City South'n	4.15%	1.10	8.07%	13.0%	12.9%
Union Pacific	4.15%	1.10	8.07%	13.0%	12.9%
Heartland Express	4.15%	0.90	8.07%	11.4%	11.6%
Ryder System	4.15%	1.30	8.07%	14.6%	14.2%
MDU Resources	4.15%	1.00	8.07%	12.2%	12.2%
EOG Resources	4.15%	1.45	8.07%	15.9%	15.2%
National Fuel Gas	4.15%	1.00	8.07%	12.2%	12.2%

Sources and Notes:

[1], [3]: Villadsen Direct Testimony.

[2]: Valueline Investment Analyzer as of 12/31/2018.

[4]: [1] + ([2] x [3]).

[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-CINI-11

Overall After-Tax Risk Positioning Cost of Capital of the CINI Sample (Using Value Line Betas)

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted -Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	SCE'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]
Delta Air Lines	12.9%	12.6%	0.76	-	0.00	4.8%	0.24	28.0%	10.7%	10.4%
Southwest Airlines	12.5%	12.3%	0.88	-	0.00	4.8%	0.12	28.0%	11.4%	11.2%
FedEx Corp.	12.5%	12.3%	0.83	-	0.00	4.8%	0.17	28.0%	11.0%	10.8%
United Parcel Serv.	10.8%	10.9%	0.85	-	0.00	4.4%	0.15	28.0%	9.6%	9.7%
Enable Midstream Part.	13.2%	12.9%	0.68	4.8%	0.02	4.8%	0.30	28.0%	10.1%	9.9%
Enterprise Products	13.6%	13.1%	0.72	-	0.00	4.8%	0.28	28.0%	10.7%	10.4%
Magellan Midstream	12.9%	12.6%	0.80	-	0.00	4.8%	0.20	28.0%	11.0%	10.8%
CSX Corp.	12.9%	12.6%	0.74	-	0.00	4.8%	0.26	28.0%	10.5%	10.2%
GATX Corp.	13.6%	13.1%	0.35	-	0.00	4.8%	0.65	28.0%	7.0%	6.8%
Kansas City South'n	12.2%	12.0%	0.83	4.8%	0.00	4.8%	0.17	28.0%	10.7%	10.6%
Union Pacific	12.2%	12.0%	0.85	-	0.00	4.4%	0.15	28.0%	10.8%	10.7%
Heartland Express	10.8%	10.9%	1.00	-	0.00	-	0.00	28.0%	10.8%	10.9%
Ryder System	13.6%	13.1%	0.43	-	0.00	4.8%	0.57	28.0%	7.9%	7.7%
MDU Resources	11.5%	11.5%	0.69	4.8%	0.00	4.8%	0.31	28.0%	9.0%	9.0%
EOG Resources	14.7%	14.0%	0.88	-	0.00	4.6%	0.12	28.0%	13.3%	12.7%
National Fuel Gas	11.5%	11.5%	0.70	-	0.00	4.8%	0.30	28.0%	9.1%	9.1%
CINI Sample Average	12.6%	12.3%	0.75	4.8%	0.00	4.8%	0.25	28.0%	10.2%	10.1%

Sources and Notes:
[1]: Schedule No. BV-CINI-10; Panel A, [4].
[2]: Schedule No. BV-CINI-10; Panel A, [5].
[3]: Schedule No. BV-CINI-4, [4].
[4]: Workpaper #2 to Schedule No. BV-CINI-11, Panel C.
[5]: Schedule No. BV-CINI-4, [5].
[6]: Workpaper #2 to Schedule No. BV-CINI-11, Panel B.
[7]: Schedule No. BV-CINI-4, [6].
[8]: Provided by SCE.
[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-CINI-11

Overall After-Tax Risk Positioning Cost of Capital of the CINI Sample (Using Value Line Betas)

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity	5-Year Average Common Equity to Market Value Ratio	Weighted-Average Cost of Preferred Equity	5-Year Average Preferred Equity to Market Value Ratio	Weighted-Average Cost of Debt	5-Year Average Debt to Market Value Ratio	SCE'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]
Delta Air Lines	13.8%	13.5%	0.76	-	0.00	4.8%	0.24	28.0%	11.4%	11.2%
Southwest Airlines	13.4%	13.2%	0.88	-	0.00	4.8%	0.12	28.0%	12.2%	12.0%
FedEx Corp.	13.4%	13.2%	0.83	-	0.00	4.8%	0.17	28.0%	11.7%	11.5%
United Parcel Serv.	11.4%	11.6%	0.85	-	0.00	4.4%	0.15	28.0%	10.2%	10.3%
Enable Midstream Part.	14.2%	13.9%	0.68	4.8%	0.02	4.8%	0.30	28.0%	10.8%	10.5%
Enterprise Products	14.6%	14.2%	0.72	-	0.00	4.8%	0.28	28.0%	11.5%	11.2%
Magellan Midstream	13.8%	13.5%	0.80	-	0.00	4.8%	0.20	28.0%	11.8%	11.6%
CSX Corp.	13.8%	13.5%	0.74	-	0.00	4.8%	0.26	28.0%	11.2%	10.9%
GATX Corp.	14.6%	14.2%	0.35	-	0.00	4.8%	0.65	28.0%	7.3%	7.2%
Kansas City South'n	13.0%	12.9%	0.83	4.8%	0.00	4.8%	0.17	28.0%	11.4%	11.3%
Union Pacific	13.0%	12.9%	0.85	-	0.00	4.4%	0.15	28.0%	11.5%	11.4%
Heartland Express	11.4%	11.6%	1.00	-	0.00	-	0.00	28.0%	11.4%	11.6%
Ryder System	14.6%	14.2%	0.43	-	0.00	4.8%	0.57	28.0%	8.3%	8.1%
MDU Resources	12.2%	12.2%	0.69	4.8%	0.00	4.8%	0.31	28.0%	9.5%	9.5%
EOG Resources	15.9%	15.2%	0.88	-	0.00	4.6%	0.12	28.0%	14.4%	13.8%
National Fuel Gas	12.2%	12.2%	0.70	-	0.00	4.8%	0.30	28.0%	9.6%	9.6%
CINI Sample Average	13.5%	13.2%	0.75	4.8%	0.00	4.8%	0.25	28.0%	10.9%	10.7%

Sources and Notes:

[1]: Schedule No. BV-CINI-10; Panel B, [4].
[2]: Schedule No. BV-CINI-10; Panel B, [5].
[3]: Schedule No. BV-CINI-4, [4].
[4]: Workpaper #2 to Schedule No. BV-CINI-11, Panel C.
[5]: Schedule No. BV-CINI-4, [5].
[6]: Workpaper #2 to Schedule No. BV-CINI-11, Panel B.

[7]: Schedule No. BV-CINI-4, [6].
[8]: Provided by SCE.
[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-CINI-12

Risk Positioning Cost of Equity at SCE's Proposed Capital Structure

CINI Sample

Using Value Line Betas

	Overall After-Tax Cost of Capital (Scenario 1)	Overall After-Tax Cost of Capital (Scenario 2)	SCE's Representative Regulatory % Debt	Representative Cost of BBB-Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Return on Equity (Scenario 1)	Estimated Return on Equity (Scenario 2)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
CINI Sample								
CAPM using Value Line Betas	10.2%	10.9%	48.0%	4.8%	28.0%	52.0%	16.4%	17.7%
ECAPM (1.50%) using Value Line Betas	10.1%	10.7%	48.0%	4.8%	28.0%	52.0%	16.1%	17.4%

Scenario 1: Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%.
Scenario 2: Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%.

Sources and Notes:

[1]: Schedule No. BV-CINI-11; Panel A, [9] - [10].
[2]: Schedule No. BV-CINI-11; Panel B, [9] - [10].
[3]: Provided by SCE.
[4]: Based on a BBB rating. Yield from Bloomberg as of December 31, 2018.
[5]: Provided by SCE.
[6]: Provided by SCE.
[7]: {[1] -([3] x [4] x (1 - [5])}/ [6]
[8]: {[2] -([3] x [4] x (1 - [5]))}/ [6]

Schedule No. BV-CINI-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Value Line Betas	Debt Beta	5-Year Average Common Equity to Market Value Ratio	5-Year Average Preferred Equity to Market Value Ratio	5-Year Average Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Asset Beta: Without Taxes	Asset Beta: With Taxes
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Delta Air Lines	1.20	0.10	0.76	0.00	0.24	28.0%	0.94	1.00
Southwest Airlines	1.15	0.10	0.88	0.00	0.12	28.0%	1.02	1.06
FedEx Corp.	1.15	0.10	0.83	0.00	0.17	28.0%	0.97	1.01
United Parcel Serv.	0.90	0.05	0.85	0.00	0.15	28.0%	0.77	0.80
Enable Midstream Part.	1.25	0.10	0.68	0.02	0.30	28.0%	0.88	0.95
Enterprise Products	1.30	0.10	0.72	0.00	0.28	28.0%	0.96	1.03
Magellan Midstream	1.20	0.10	0.80	0.00	0.20	28.0%	0.98	1.04
CSX Corp.	1.20	0.10	0.74	0.00	0.26	28.0%	0.92	0.98
GATX Corp.	1.30	0.10	0.35	0.00	0.65	28.0%	0.52	0.61
Kansas City South'n	1.10	0.10	0.83	0.00	0.17	28.0%	0.93	0.97
Union Pacific	1.10	0.05	0.85	0.00	0.15	28.0%	0.94	0.98
Heartland Express	0.90	n/a	1.00	0.00	0.00	28.0%	0.90	0.90
Ryder System	1.30	0.10	0.43	0.00	0.57	28.0%	0.62	0.72
MDU Resources	1.00	0.10	0.69	0.00	0.31	28.0%	0.72	0.78
EOG Resources	1.45	0.07	0.88	0.00	0.12	28.0%	1.29	1.33
National Fuel Gas	1.00	0.10	0.70	0.00	0.30	28.0%	0.73	0.79
CINI Sample Average	1.16	0.09	0.75	0.00	0.25	28.0%	0.88	0.93

Sources and Notes:
[1]: Workpaper # 1 to Schedule No. BV-CINI-10, [1].
[2]: Workpaper #1 to Schedule No. BV-CINI-13, [7].
[3]: Schedule No. BV-CINI-4, [4].
[4]: Schedule No. BV-CINI-4, [5].

[5]: Schedule No. BV-CINI-4, [6].
[6]: SCE'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-CINI-14

CINI Sample Average Asset Beta Relevered at SCE's Proposed Capital Structure

	Asset Beta	Assumed Debt Beta	SCE's Representative Regulatory % Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Equity Beta
	[1]	[2]	[3]	[4]	[5]	[6]
CINI Sample						
Asset Beta Without Taxes	0.88	0.10	48.0%	28.0%	52.0%	1.60
Asset Beta With Taxes	0.93	0.10	48.0%	28.0%	52.0%	1.49

Sources and Notes:

[1]: Schedule No. BV-CINI-13, [7] - [8].
[2]: Villadsen Direct Testimony.
[3]: Provided by SCE.
[4]: SCE's Representative Tax Rate.
[5]: Provided by SCE.
[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Schedule No. BV-CINI-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.40%, Long-Term Market Risk Premium of 7.07%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
CINI Sample					
Asset Beta Without Taxes	4.40%	1.60	7.07%	15.7%	14.8%
Asset Beta With Taxes	4.40%	1.49	7.07%	14.9%	14.2%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-CINI-14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Schedule No. BV-CINI-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 4.15%, Long-Term Market Risk Premium of 8.07%

Company	Long-Term Risk-Free Rate	Hamada Adjusted Equity Betas	Long-Term Market Risk Premium	CAPM Cost of Equity	ECAPM (1.5%) Cost of Equity
	[1]	[2]	[3]	[4]	[5]
CINI Sample					
Asset Beta Without Taxes	4.15%	1.60	8.07%	17.1%	16.2%
Asset Beta With Taxes	4.15%	1.49	8.07%	16.2%	15.4%

Sources and Notes:
[1]: Villadsen Direct Testimony.
[2]: Schedule No. BV-CINI-14, [6].
[3]: Villadsen Direct Testimony.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).