BEFORE THE PUBLIC UTILITY COMMISSION

OF THE STATE OF OREGON

UE 335

Cost of Capital

PORTLAND GENERAL ELECTRIC COMPANY

Direct Testimony and Exhibits of

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February 15, 2018

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I. Introduction

Q. Please state your names and positions.

A. My name is Patrick G. Hager. I am the Manager of Regulatory Affairs at PGE. I am responsible for analyzing Portland General Electric Company's (PGE) cost of capital.

My name is Christopher Liddle. I am the Assistant Treasurer and Manager of Treasury and Investor Relations for PGE. I am responsible for managing the company's treasury function including financing.

My name is Dr. Bente Villadsen and I am a principal at The Brattle Group (Brattle). My business address is The Brattle Group, 44 Brattle Street, Cambridge, MA 02138. I have been asked by PGE to estimate the cost of equity that PGE should be allowed an opportunity to earn on the equity portion of its rate base for the period beginning January 1, 2019.

Our qualifications are included at the end of this testimony.

Q. What is the purpose of your testimony?

A. The purpose of our testimony is to recommend PGE's cost of capital and capital structure for the 2019 test year. PGE recently concluded a general rate case, Docket No. UE 319, where parties initially challenged PGE's recommended cost of capital and capital structure, and ultimately settled these issues. This settlement was approved in Order No. 17-511 in December 2017. PGE is not recommending changing the return on equity (ROE) or capital structure authorized in that order, and proposes only to update its cost of debt to reflect slightly lower costs.

Maintaining PGE's current cost of capital and capital structure is necessary to support its credit profile for access to the debt and equity markets, to fund its capital investments planned for 2019, and to provide PGE the opportunity to earn a fair return for equity

shareholders while keeping its costs reasonable. Guidance regarding the appropriate authorized cost of capital is provided by the Bluefield[1] and Hope[2] United States Supreme Court decisions, as well as ORS 756.040.

Q. What is PGE's requested overall cost of capital for this filing?

A. We request and support a 7.312% cost of capital for the 2019 test year. This cost of capital reflects PGE's currently authorized ROE of 9.50%, its currently authorized capital structure of 50% debt and 50% equity, and an updated long-term cost of debt of 5.123%. To demonstrate the reasonableness of maintaining PGE's current ROE, we have produced a recommended range for PGE's authorized ROE and 9.50% is at the lower end of that range.

Table 1 below, shows the recommended cost of the two components of PGE's capital, common equity and long-term debt. Table 1 also shows PGE's forecasted 2019 capital structure.

Table 1
PGE's Weighted Cost of Capital
Test Year 2019

Component	Average Outstanding ($000) [1]	Percent of Capital [2]	Component Cost	Weighted Cost
Long-term Debt	$2,481,956	50%	5.123%	2.562%
Common Equity	$2,553,639	50%	9.500%	4.750%
Total	**$5,035,595**	**100%**		**7.312%**

[1] "Average Outstanding" reflects PGE's projected average values of long-term debt and common equity for 2019.
[2] "Percent of Capital" reflects PGE's long-term targeted capital structure of 50% debt, 50% equity, and is used to calculate PGE's weighted average cost of capital ("Weighted Cost").

Q. How is the remainder of your testimony organized?

A. In the following section, we describe PGE's financial goals and how PGE manages counterparty risks and liquidity. Section III provides a review of financial and market regulation changes as well as the recent and near-future financial market and economic

[1] Bluefield Water Works v. Public Service Comm'n - 262 U.S. 679 (1923).
[2] FPC v. Hope Nat. Gas Co. - 320 U.S. 591 (1944).

conditions. We also briefly discuss the recent Tax Cuts and Jobs Act of 2017 Reform Act (tax reform) and its expected impact on PGE's cost of capital. We discuss PGE's cost of long-term debt, including new and redeemed issuances, in Section IV. In Section V, we provide the updated analysis that supports maintaining PGE's ROE at its current level of 9.50%. In Section VI, we discuss PGE's capital structure. Section VII provides our qualifications.

II. PGE's Financial Goals

Q. What is PGE's overall financial goal?

A. PGE's overall goal is to provide adequate capital and liquidity to fund PGE operations at the least cost and least risk to customers. Aligned with this goal is protection against unforeseen negative changes in cash flows and managing daily cash and liquidity needs. For these goals, PGE relies on its revolving lines of credit, long-term debt, and common equity.

Q. Does PGE have additional financial goals?

A. Yes. PGE's overall financial goals include financial performance, counterparty credit risk management, and liquidity management:

- Solid financial performance including:
  - Maintaining investment grade credit ratings;
  - Accessing financial markets at reasonable terms to provide liquidity for operations and capital expenditures;
  - Achieving an actual ROE that is commensurate with the return on equity achieved by a group of utilities with similar characteristics, service territory, and business risks;
  - Maintaining a capital structure of approximately 50% debt and 50% equity over time; and
  - Setting retail prices at a level sufficient to recover prudently incurred costs, including an overall return on utility investment, while taking into account the economic conditions facing PGE's customers.
- Managing wholesale and retail counterparty credit risks to protect our customers and PGE.

- Liquidity Management to meet our obligations and support PGE's operations.

A. Solid Financial Performance

Q. Why is it important for PGE to maintain an investment grade rating?

A. It is important for PGE to maintain an investment grade rating in order to secure financing for both debt and equity at reasonable rates, especially in today's changing financial environment, and to maintain access to wholesale energy markets with the best prices for customers. Without an investment grade rating, PGE's access to financing would be limited, at higher rates, and PGE would have to provide significantly more collateral to its counterparties (and may lose the ability to trade with some counterparties) in the wholesale power and gas markets. This would result in higher costs to PGE's customers.

Q. What does PGE do to maintain its investment grade credit rating?

A. Fundamentally, PGE's credit rating is a function of its financial performance, which is driven by PGE's retail prices and its ability to manage costs. The rating agencies, as well as equity investors, expect companies to meet certain financial performance standards to achieve an investment grade credit rating, as demonstrated in the financial and liquidity ratios that the rating agencies publish. PGE takes various steps to ensure that its financial performance continues to place it within the range of the appropriate financial ratios. PGE accomplishes this through continuous financial management that includes: closely monitoring budgets, minimizing costs to finance operations through the optimal use of revolving credit line, long-term debt, and equity, closely monitoring capital structure; and analyzing counterparty risks and taking appropriate mitigation measures. Using all of these measures helps PGE maintain financial performance levels necessary for investment grade credit ratings.

Q. Financial performance is an important element for the rating agencies. Do rating agencies also consider other factors?

A. Yes. Other factors that rating agencies consider include regulatory and recovery risk, corporate operations and growth, customer and portfolio diversification, and liquidity and other financial measures. We note that in prior years, the rating agencies have been concerned with PGE's earnings volatility due to one-time but significant write-offs, the asymmetric deadband on the Power Cost Adjustment Mechanism (PCAM), and Oregon's regulatory policies, in general. The rating agencies also continue to consider the liabilities associated with long-term Power Purchase Agreements (PPAs), including Qualifying Facility (QF) contracts, as imputed debt on the balance sheet, which increases the company's debt-to-equity ratios. PGE closely monitors the evolving rating agencies' methodologies and annually visits the major rating agencies for presentations and discussions.

Q. Have PGE's bond ratings changed recently?

A. No. PGE's bond ratings have not changed since its last general rate case filing in February 2017 (UE 319). However, PGE did receive two upgrades on its long-term debt from Moody's in the past few years. PGE's long-term debt ratings from Moody's are two notches higher than Standard & Poor's (S&P). We also note that S&P did change the outlook for PGE from Stable to Positive and PGE continues to take steps to meet S&P's ratings criteria for an upgrade. An upgrade from S&P would help lower financing costs for customers through lower pricing on revolving lines of credit and new debt issuance.

Q. How does PGE ensure an optimal long-term cost of capital?

A. PGE aims to issue long-term debt so that debt maturity schedules closely match investment schedules of its capital projects. PGE prefers First Mortgage Bonds (FMBs) as the primary form of debt because they have a lower cost than unsecured alternatives. PGE evaluates private placement market rates, bank term loans, and a delayed draw/forward structure to arrive at the lowest possible financing costs available at the time of PGE's financing need.

Q. How does PGE determine the timing of its financing?

A. PGE forecasts its cash needs, which include capital expenditures, debt maturities, dividends and changes in working capital, and attempts to match its long-term financing proceeds to meet those requirements. In the past, PGE has used a delayed draw for its long-term bonds that allows us to fix the interest rate on the upcoming bond issue, removing interest rate and funding risk**.**

Q. Does PGE's financial performance help PGE to maintain its desired long-term capital structure?

A. Yes. As we stated earlier, PGE's desired long-term capital structure is 50% equity and 50% long-term debt, although it may fluctuate somewhat from year to year. We believe that the 50% equity in PGE's capital structure helps it better withstand difficult situations, such as under-earning due to events outside of PGE's control and continued pressure on equity capitalization ratios due to imputed debt. To maintain this capital structure, PGE uses several techniques and tools as we discussed above. In addition, we require sufficient retail revenues to maintain the required financial ratios and investor expectations for its long-term capital structure. In the future, PGE plans to continue to use equity issuances, stock

repurchases, capital expenditure programs, the debt markets, and cash from operations to help maintain PGE's desired capital structure.

B. Manage Customer and Counterparty Credit Risks

Q. Why is it important for PGE to manage customer credit risks?

A. It is important to manage credit risks to limit losses associated with non-payment of customers' bills.

Q. What customer credit risks does PGE face?

A. PGE's energy deliveries and revenues are subject to industry and customer-specific risks and uncertainty, including potential shut down of customer facilities, curtailment of customers' operations, or changes in capacity as a result of economic or specific circumstances. In fact, since the Great Recession in 2008, a number of PGE's large customers have filed for bankruptcy, liquidated businesses, changed ownership or permanently shut down operations, substantially affecting PGE's actual and anticipated energy deliveries. In 2016, operational changes in PGE's solar and metals manufacturing customers caused a further decline in deliveries. In 2017, the paper and solar industries continued to lay off workers and close facilities in PGE's service area. Currently, solar manufacturing customers face uncertainty reflecting changes in US trade policy with regard to solar tariffs. Large retailers are facing mounting competition from online retailers. Large customer-related energy deliveries and revenue risk is asymmetric: through discussions with large customers, PGE is often aware of large expansions and increases to loads in advance to plan for adequate service, but the same notice is not necessarily known or given when a customer's energy deliveries significantly decline.

Q. How does PGE manage its customer credit risk exposure?

A. PGE attempts to minimize the impact of customer defaults and manage customer credit risk by proactively monitoring customer payment habits with PGE and other creditors, as well as reviewing commercial credit reports such as Dun and Bradstreet. If warranted, PGE may collect deposits from high risk customers to minimize loss in the event of a default.

PGE performs credit reviews of its customers, particularly large customers and associated industries. PGE's load forecasters work closely with its Key Customer Managers to gain a better understanding of the business forecasts provided by large customers and their potential consequences on PGE's retail load. After review, PGE determines the appropriate deposit required from a large customer. This deposit typically is up to one-sixth of the annual bill.

Q. How does PGE manage counterparty risk?

A. PGE manages its counterparty risk in wholesale power transactions using the same methods as for large customers. PGE performs credit reviews of wholesale power counterparties, both purchasers and sellers, and then determines the appropriate amount of collateral required from a counterparty based on their credit risk profile. PGE also sets a minimum credit ratings threshold below which it will not trade with a counterparty.

C. Liquidity Management

Q. What is PGE's strategy for liquidity management and related revolving credit facility sizing?

A. PGE's strategy is four-fold:

1. Carry sufficient credit levels to support both operational and power supply needs over a five year, forward-looking time horizon.

2. Achieve a designation of adequate or better from rating agencies (based on Moody's and S&P's interpretation of PGE's liquidity).
3. Fund short-term debt requirements using commercial paper or revolving credit facility loans as appropriate. Issue letters of credit in lieu of cash collateral, if the pricing is advantageous.
4. Manage market exposure related to maturing lines of credit by replacing them one year prior to maturity.

Q. Has PGE separately analyzed its revolving lines of credit requirements?

A. Yes. PGE periodically analyzes its revolver requirements separately for power supply and other operational needs, the sum of which yields the total liquidity requirement for PGE's needs. This approach enables PGE to ensure that its power and gas procurement efforts have enough liquidity to meet collateral requirements, while also maintaining sufficient liquidity for other operations.

Q. When did PGE last perform such an analysis?

A. PGE last analyzed its revolving lines of credit requirements in the fall of 2017.

Q. What were the results of that analysis?

A. Based on the 2017 analysis, PGE determined that its current revolver of $500 million is sufficient to meet its liquidity needs in support of power supply and other operations. PGE will monitor the need to increase the revolver in 2018-2019 based on the outcome of the Integrated Resource Planning (IRP) process and subsequent competitive bidding process.

Q. Did you determine how the results of this analysis would affect PGE's ratings by Moody's and/or S&P?

A. Yes. For Moody's criteria, PGE's liquidity profile would be rated "adequate" in 2018 and 2019. For S&P, PGE would be rated "adequate" in 2018 and 2019 based on their rating criteria. Based on this analysis, PGE determined that its current revolver capacity of $500 million is sufficient at this time to service the company's short term financing needs.

III. Uncertainty in Regulation, Accounting, and Financial Markets

A. Regulation and Financial Markets

Q. What are PGE's current bond ratings?

A. PGE's current bond ratings for secured (first mortgage) long-term debt are A1 from Moody's and A- from S&P. Ratings for unsecured debts are A3 and BBB. PGE's credit ratings, which were recently affirmed, are provided in PGE Exhibit 1001.

Q. You noted above that rating agencies consider a utility commission's regulatory policy when determining a company's rating. Can you provide some additional detail?

A. Yes. Regulatory policy that supports timely recovery of prudent costs is essential to maintaining a stable, investment grade credit rating. Both Moody's and S&P consider regulatory policy a key factor in their determination of a utility's creditworthiness. Moody's places 25% weight on the factor "Regulatory Framework."[3] S&P indicates that "[r]egulation is the most critical aspect that underlies regulated integrated utilities' creditworthiness."[4] Key characteristics in the assessment of regulatory environment for both credit rating firms include the consistency and predictability of Commission decisions, as well as the timely recovery of prudently incurred costs.

[3] With the other three factors and their weights being "Ability to Recover Costs and Earn Returns," 25%, "Diversification," 10%, and "Financial Strength and Liquidity," 40%. "Rating Methodology – Regulated Electric and Gas Utilities." Moody's Investor Service- December 23, 2013.
[4] "Key Credit Factors for the Regulated Utilities Industry." Standard & Poor's- November 19, 2013.

Q. Have financial analysts or rating agencies noted any concerns regarding regulatory outcomes for PGE?

A. Yes. Both Moody's and S&P have expressed some concerns regarding the recovery of PGE's capital costs for the Carty generation plant.[5] They expect that the increased costs for Carty will be recovered either through pending litigation (PGE versus the Carty construction contractor and PGE versus the two sureties who provided a performance bond on the project), or through retail rates.

Q. Do financial analysts have additional concerns regarding regulatory outcomes for PGE?

A. Yes. Sell side analysts have noted that the Public Utility Commission of Oregon (OPUC) has historically allowed ROEs that are slightly below the national average, but they also note that recent settlements have included constructive outcomes such as timely rate recognition of investment, forward-looking test years, revenue decoupling, and a renewable adjustment clause.[6] In the past, ratings agencies have stated concerns regarding the asymmetric nature and size of the deadbands in the PCAM, and it has been an ongoing concern expressed by financial analysts. Sell side analysts have also pointed out PGE's flattening rate base and opposition from intervenors and OPUC Staff during the IRP process regarding PGE's efforts to either buy or build upwards of 175 MW of renewable capacity.[7]

[5] "Portland General Electric", Credit Opinion, Moody's Investment Service, July 11, 2017.and "Portland General Electric", RatingsDirect, S&P Global Ratings, July 20, 2017.
[6] "POR Maintained Guidance, IRP Pending – Hold" Gabelli & Company- October 31, 2016.
[7] "Consensus estimates remain too high, guidance for 2018 a possible headwind" Goldman Sachs Equity Research, October 15, 2017.

Q. What concerns have financial analysts expressed regarding the PCAM?

A. PGE's asymmetrical deadband is unique. Most electric utilities tend to have a 'pass through' of their power costs if a PCAM is in place, with no deadbands. Thus, it is not unexpected that analysts have expressed concerns about PGE's wide deadband and the asymmetry of benefits allocation, which could result in "meaningful" impacts on PGE's earnings, increasing volatility. Wells Fargo mentions the following risks for PGE: negative regulatory developments; Request for Proposal outcome uncertainty; and risks related to the asymmetrical PCAM (e.g., hydro, plant outages).[8] JPMorgan lists PGE fuel and purchased power recovery mechanism as a source of risk: "any combination of a reduction in hydro conditions or an increase in the price of coal or natural gas could adversely impact POR's near-term earnings."[9] Key Banc views the PCAM as a source of "earnings variability related to fuel price volatility" and has stated that "[a]ny opportunity to make changes to this mechanism to reduce earnings risk around fuel would be viewed positively."[10]

Q. How does increased earnings volatility impact PGE's cost of capital?

A. Financial theory states that, all else equal, increased earnings volatility results in increased uncertainty or risk and thus, a higher return to investors. This is because investors and creditors require greater compensation for owning an investment with more risk. All else equal, a firm with greater earnings volatility will have a higher cost of capital than a firm with more stable earnings. If the current PCAM structure results in a higher level of earnings volatility relative to that faced by comparable firms, then investors' required rate of

[8] "POR CapEX Comes Through on the Q3 Update" – Wells Fargo Equity Research – 28 October 2016.
[9] "U.S. Utilities & Power Outlook" – J.P. Morgan – 16 December 2016.
[10] "Utilities – ALERT: Edison Electric Institute" – Key Banc Capital Markets, Inc. 8 November, 2016.

return for PGE will be higher as well. As a result, investors will demand a higher return to hold PGE's debt or common stock, which will increase the cost to finance PGE activities.

B. Update of Financial and Accounting Regulation Changes

Q. How have financial sector regulations changed?

A. Following the financial crisis, policymakers and regulators have sought to impose tougher rules and standards on banks in hopes of preventing future systemic crises. Regulatory efforts have been primarily focused in the following four areas: higher capital requirements (including higher minimum ratios and higher quality capital); new liquidity standards (new ratios and requirement for higher quality liquid assets); assigning higher capital requirements and increasing supervision for the largest, Systemically Important Banks; and adopting national initiatives (Dodd-Frank and Volker rules).

Q. How did commercial banks meet these new requirements?

A. First, the banks began tightening lending standards during 2012, making it more difficult for firms to access credit, potentially increasing firms' costs to obtain credit. Second, banks were forced to participate in the liquidity scenarios outlined by central banks around the world, encouraging many to keep more reserves on hand than they had historically. One additional result is that U.S. banks have significant excess reserves at the Federal Reserve Bank (Fed),[11] leaving less available for lending.

Q. Will these new requirements affect PGE's ability to access funds?

A. PGE has yet to see a significant impact on borrowing costs due to these requirements. In 2015, there was some financial stress passed through to PGE and other utilities as banks complied with the Basel III/Basel IV regulation (full compliance is required by 2019).

[11] http://research.stlouisfed.org/fred2/series/EXCSRESNS.

Even though most large US banks have now passed the Federal stress tests for capital requirements, many banks have chosen to be more particular when lending funds, and therefore, the availability of credit has tightened for certain entities.

Q. What challenges does PGE face in connection to imputed debt?

A. As previously discussed, PGE faces significant risks and uncertainties connected with imputed debt from purchased power contracts: S&P "imputes" additional debt to PGE's capital structure based on the payments under long-term PPAs. S&P believes that because of these quasi-debt instruments, an adjustment must be made to the capital structure to reflect the additional leverage of PPAs. As PGE acquires additional long-term capacity contracts and QF contracts, this imputed debt adjustment could result in increases in the debt ratio large enough to create a quantitative trigger for potential ratings downgrades. A ratings downgrade by S&P from PGE's current rating level could result in higher interest rates on debt issuances, an inability to attract equity capital at a reasonable price, and additional collateral postings for power supply operations.

Q. What challenges does PGE face in connection to FASB[12] pronouncements?

A. Accounting Standards Codification (ASC) 810 Consolidation of Variable Interest Entities (VIE), provides guidance for determining the financial reporting for entities over which control is attained by means other than through voting rights. Under ASC 810, consolidation is based on the power to direct significant activities of the VIE and the obligation to absorb losses that are significant to the VIE. The entity with the power to direct significant activities and the obligation to absorb significant losses becomes the "primary beneficiary" of the VIE and, in turn, is required to consolidate the financial

[12] Financial Accounting Standards Board (FASB).

statement of the VIE for financial reporting to the Securities and Exchange Commission (SEC). ASC 810 requires consolidated financial statements to reflect total assets under control and total liabilities for which an entity is responsible.

Under ASC 810, although it is not involved in the creation of these entities and has no equity or debt invested, PGE may be required to reflect the total assets, liabilities, and non-controlling interests of its PPA counterparties on PGE's balance sheet on an ongoing basis when reporting its financial position on a consolidated basis. The counter-party entities are expected to be highly debt leveraged and consolidating their capital structure will likely increase PGE's debt-to-equity capital structure. This high debt leverage will impact PGE's creditworthiness, as the increase to PGE's debt-to-equity percentage increases financial risk. To support PGE's creditworthiness and realign its capital structure, an increase to PGE's common equity could be necessary to offset the impact of the additional debt, consolidated under ASC 810.

Q. Has the FASB revised or added Accounting Standards that could impact PGE?

A. Yes. In February 2016, ASC 842 Leases was updated by the FASB. The new standard requires operating leases to be recorded on a company's balance sheet as a right of use asset with a corresponding lease liability. On the income statement, capital lease assets will be amortized and recorded within applicable depreciation and amortization periods, and the minimum lease payments will be split between principal and implied interest, which will be recorded as interest expense. Operating leases will record amortization and interest expense as one straight line value within operating expense on the income statement. PGE is in the process of quantifying the impacts of the new lease standard and plans to adopt the standard no later than its effective date of January 1, 2019. In light of our earlier discussion on

imputed debt, PGE continues to discuss with S&P and Moody's their expected treatment of these changes for ratings purposes, but nothing definitive is available yet.

C. Macroeconomic Uncertainty

Q. One factor that can certainly affect bond ratings is the economy, as earnings are partially driven by economic growth. Can you provide a brief overview of recent and expected market conditions?

A. Yes. The US economy has been growing at an accelerated rate, 3.2% in the third quarter of 2017,[13] and the Fed raised the federal-funds interest rates by a quarter-point three times in 2017. At the December 13, 2017 meeting of the Fed, the Federal Open Market Committee (FOMC) said it would increase its benchmark federal-funds rate by a quarter percentage point to a range between 1.25% and 1.5%, the fifth such increase in the past two years. Officials forecasted three more quarter-point rate increases for 2018, and two more quarter-point increases each in 2019 and 2020.[14] The recent tax reform legislation will likely provide more economic stimulus, which may cause the FOMC to accelerate the 2018 increases in federal-funds rates.

The U.S. economy has become more integrated with the rest of the world's economies as well. Because of this, major developments in other parts of the world can affect the U.S. economy and its interest rates. There are numerous areas of concern and risk in the world economy today such as Greece, Italy, the United Kingdom (UK), Venezuela, and Puerto Rico.

Greece's national credit rating remains at junk status (CCC) as they struggled to complete the third restructuring of their sovereign debt in November of 2017. They are faced with

[13] US Bureau of Economic Analysis: https://www.bea.gov/newsreleases/glance.htm.
[14] Fed Raises Rates, Sticks to Forecast for 2018 Increases, Wall Street Journal, 12/14/2017.

additional austerity covenants, which do not sit well with the populace. The Greek economy is growing at a slow 1.0% and could return to deficit in 2018, Greek unemployment at 20.6% is the highest in Europe, and the country's Debt/Gross Domestic Product (GDP) ratio remains the highest in the world at 180%. The Greek government faces political difficulties in implementing debt refinance covenants and popular sentiment is divided on submitting to the austerity measures and remaining within the Eurozone.[15]

The Italian government faces elevated social tensions that have led to widespread political unrest. Like Greece, they are highly leveraged with Debt/GDP at 133% - the fourth highest globally.[16] They have a stagnant economy, and a very fragile banking system, which continues to have to deal with legacy toxic debt holdings and insufficient capital reserve accounts. Failure of Italy's banks could result in negative financial consequences across Europe with potential effects on global markets as well.

Britain's economy has been hit hard by increasing inflation in the wake of the Brexit vote in 2016, curtailing consumer spending and driving up prices. The UK growth outlook is also souring with post-Brexit economic forecasts to slump to 1.1% in 2019, making it one of the slowest growing economies after Italy's forecasted 1% expansion.[17]

Venezuela is racked by political, social, and economic crises. The International Monetary Fund estimated that Venezuela's GDP will fall 12% in 2017 after contracting 16.5% in 2016, while inflation in 2018 could be 2,000%.[18]

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[15] The Economist Intelligence unit, Greece, September 2017.
[16] DEUTSCHE BANK "Italy's 3 big problems could trigger the next financial crisis – and bring the euro down with it" September 20, 2017. http://www.businessinsider.com/italy-financial-crisis-deutsche-bank-2017-9.
[17] "Eurozone Growth Set to Accelerate as Threats Subside; Bloc still faces labor, wage and inflationary pressures compounded by Brexit risks:" Wall Street Journal, November 9, 2017.
[18] Venezuelan Debt Crisis will be Huge and Devilishly complex; with the country racked by crises, any restructuring of Venezuela's debt will be a colossal undertaking, WSJ, November 3, 2017.

Puerto Rico has struggled with a decade of economic stagnation and owes investors over $70 billion. In the summer of 2017, Congress approved a bankruptcy-like framework for the island to restructure its debts. A federally appointed control board in March approved a plan under which bondholders would be paid about a quarter of what they are owed over the next 10 years. Under the plan, the Commonwealth also had to cut government spending. Hurricane Maria in October 2017 devastated the island and increased uncertainty that the bonds would be repaid.

There is also uncertainty surrounding long-term economic effects of the recent federal tax reform and the related $1.4 trillion increase in the federal deficit. U.S. government bonds weakened recently as investors were analyzing the potential effect of the passage of the tax bill. After the bill passed the Senate in early December 2017, the yield on the benchmark 10-year U.S. Treasury note rose for the fourth time in five days to 2.379% from 2.363%.[19] Bond prices slipped after the Senate passed revisions to the bill and moved closer to pushing through $1.4 trillion in tax cuts. Some analysts and investors believe that lower corporate tax rates could lift company earnings and boost growth, adding to the appeal of riskier assets. Investors also said that the tax overhaul could help push wages higher, fueling inflation, and eroding the purchasing power of bonds' fixed payments. The new legislation may require additional government borrowing, which could push yields higher as the supply of bonds increases. Many investors have said that the tax cut plan could make the Fed more likely to increase the pace of its projected interest rate increases in 2018 and 2019.

[19] "US Government Bond Yields Rise on Tax Plan Progress- The tax overhaul plan is adding to the appetite for riskier investments" Wall Street Journal, December 4, 2017.

IV. Cost of Long-Term Debt

Q. What is PGE's cost of long-term debt?

A. PGE's cost of long-term debt in 2019 is expected to be 5.123%. PGE Exhibit 1002 presents the amount and the effective cost of PGE's outstanding long-term debt for the test year. This includes existing bond issuances as of January 15, 2018, as well as bond issuances and retirements expected in 2018 and 2019.

Q. How did you calculate the cost of long-term debt for 2017?

A. We started with the debt costs approved in OPUC Order No. 17-511 and made applicable adjustments. When calculating the amount of debt outstanding, the full amount and cost for each issuance of outstanding debt at year end is included. We then multiply the amount outstanding by the effective interest rate for each bond issuance. The effective interest rate represents the internal rate of return for each of the cash flows associated with each debt issuance, including all unamortized call premiums and issuance expenses for debt issuances replaced before maturity with less expensive financings. Table 2 below summarizes PGE's cost of long-term debt for the 2019 test year.

Table 2

PGE's Cost of Long-Term Debt ($000)

	2019 Forecast	UE 319 Order No. 17-511	Difference
Principal Amount	$2,378,067	$ 2,436,400	$ (58,333)
Annual Interest Cost	$121,828	$ 126,766	$ (4,937)
Effective Interest Rate	**5.123%**	**5.203%**	**(0.08)%**

Note: UE 319 Principal Amount reflects downward principal revisions as of October 27, 2017.

Q. What future debt issuances did you include in your analysis?

A. At this time, PGE does not anticipate the need to issue long-term debt in 2018. However, PGE does expect to issue two, 30-year tranches of FMB's totaling $300 million in 2019, which we included in our analysis.

Q. What is the expected term, coupon rate, and issuance cost for the bonds to be issued in 2019?

A. The two 30-year tranches of FMBs have an estimated combined coupon rate of 5.005% which will replace $300 million of maturing notes in April of 2019. The first tranche is expected to be issued in April 2019 and the second tranche is expected to be issued late in 2019. We will provide an update to PGE's cost of long-term debt in our rebuttal testimony, which will include any changes in long-term debt.

Q. How are the estimated coupon rates and issuance costs derived by PGE?

A. The rates are based on an indicative new issuance pricing analysis, which includes a current estimated credit spread provided by a subset of PGE's investment banks and a forecast of treasury rates from *Global Insight*.

Q. Is there any long-term PGE debt maturing in 2018 or 2019?

A. Yes. As noted above, PGE has $300 million of term loans maturing in April 2019. There are no scheduled maturities in 2018.

V. Cost of Equity

Q. Please summarize your approach to estimating PGE's ROE.

A. In December 2017, the OPUC authorized a 9.5% ROE for PGE through Order No. 17-511 in UE 319. Our analysis in this case verifies the reasonableness of maintaining this ROE. We estimated the cost of equity for PGE using the OPUC preferred Discounted Cash Flow (DCF) method. We also used the Capital Asset Pricing Model (CAPM) as well as a Risk Premium model. In determining the cost of equity, we relied on the same methods and inputs as in UE 319 to the degree possible.[20] The cost of equity estimates are derived as of November 30, 2017, using 2019 forecasted interest rates and new income tax rates from recent tax reform legislation. We summarize the results in Table 3 below.[21]

Table 3:
Summary of ROE Estimates for PGE[22]

	Range of Estimates	Midpoint
DCF Models	8.6% - 11.1%%	9.8%
Risk Premium Model	10.2% - 10.3%	10.2%
Other Tests	9.2% - 10.4%	9.8%
Range	8.6% - 11.1%	9.8%
Midpoint* / Average*	9.8%	9.9%

**Ignores the ROEs based on historical GDP growth.*

Q. How do these results support your recommendation for maintaining PGE's current 9.5% ROE?

A. The results range from 8.6% to 11.14% with a midpoint of 9.8%. At the same time, recently allowed ROEs average 9.7%, so the requested 9.5% is not only lower than the midpoint, but

[20] Because companies enter into merger or acquisition arrangements and because PG&E recently cut dividends, the samples differ.
[21] The OPUC has, in the past, given no weight to the CAPM (Order No. 01-777, p. 32). Therefore, the CAPM is used as a check on the other estimates rather than a primary method in this matter.
[22] Data cited in Table 3 use all sample companies.

also lower than recently allowed ROEs for integrated electric utilities.[23] Therefore, a 9.5% ROE is conservative and near the low end of the estimation results.

We understand that the Commission in the past has relied primarily on the DCF model and, in particular, the multi-stage DCF model, where the low end is estimated at 8.6%. However, this figure is downward biased as: (1) it relies on a very low GDP growth rate that is well below what has been experienced historically or during the first three quarters of 2017; and (2) the estimate is well below the results from other estimation methods. To assess the reasonableness of the multi-stage DCF and the forecasted GDP growth rate, we also estimated the multi-stage DCF model using the average GDP growth rate from 1990 to today (ROE of 9.0%) and from 1947 to today (ROE of 11.1%).[24]

Q. What economic factors currently impact the ROE?

A. As we explained above, interest rates and especially government bond yields have been low, but have started to increase. The Federal Reserve raised the target for the federal-funds rate on December 14, 2017 and signaled that further increases are likely.[25] All else equal, increasing interest rates makes it likely that investors' expected ROE will increase going forward. In addition, the tax reform legislation, as well as international events such as those discussed above, creates uncertainty for investors, which may impact the ROE.[26]

[23] We note that the average allowed ROE for 2017 was approximately 9.7%. Source: Authorized ROE data from SNL Financial as of 11/30/2017.
[24] Growth data from Federal Reserve of St. Louse, "Gross Domestic Product" Downloaded January 5, 2018 and Bureau of Economic Analysis, "U.S. Economy at a Glance," January 2018.
[25] The Federal Reserve increased the target for the federal funds rate from 1 to 1¼ to 1 ¼ to 1½% on December 13, 2017. Source: https://www.forbes.com/sites/laurengensler/2017/12/13/federal-reserve-raises-interest-rates-for-third-time-in-2017/#695020107a53.
[26] For example, Moody's changed the outlook on 25 utilities on negative outlook on January 19, 2018. Source: "Moody's changes outlook on 25 US regulated utilities primarily impacted by tax reform."

Q. How did you estimate PGE's ROE?

A. To assess the cost of equity for PGE, a sample of integrated electric utilities is selected from Value Line's universe of electric utilities. The sample companies are selected to be comparable to PGE, so it includes electric utilities that (i) have more than 50% regulated assets and (ii) own generation. In addition, the companies are screened based on financial criteria such as credit ratings and on data availability. For each company, we then estimated the cost of equity using standard methods including two versions of the DCF model, the risk premium model, a review of recently allowed ROE, and as a test, two versions of CAPM. The characteristics of the 22 sample companies are displayed below in Table 4.[27]

[27] Compared to the sample in UE 319, Sempra was eliminated due to its planned acquisition of Oncor and Vectren was eliminated due to the announcement that it is considering the takeover interests in the company. Dominion and Scana were eliminated due to their announced merger. PG&E was eliminated as it has announced a dividend cut. Duke Energy was added as its acquisition is well in the past and PNM's was added as its lower credit rating is more than five years old.

Table 4:
Characteristics of Sample Companies

Company	CAPM Subsample	DCF Subsample	Annual Revenues (USD million)	Regulated Assets	Market Cap. 2017 Q3 (USD million)	Betas	S&P Credit Rating (2017)	Long Term Growth Est.
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ALLETE			$1,423	M	$3,963	0.75	BBB−	4.9%
Alliant Energy	*	*	$3,323	R	$9,787	0.70	A-	6.6%
Amer. Elec. Power	*	*	$15,405	R	$35,328	0.65	A-	3.9%
Ameren Corp.	*	*	$6,131	R	$14,327	0.65	BBB−	6.6%
CenterPoint Energy			$9,057	M	$12,812	0.90	A-	6.9%
CMS Energy Corp.	*	*	$6,445	R	$13,310	0.65	BBB−	7.2%
Consol. Edison	*	*	$11,779	R	$25,682	0.50	A-	3.1%
DTE Energy	*	*	$12,210	R	$19,692	0.00	BBB−	4.7%
Duke Energy	*	*	$22,582	R	$60,010	0.60	A-	3.3%
Edison Int'l	*	*	$11,984	R	$25,912	0.65	BBB−	5.7%
El Paso Electric	*	*	$909	R	$2,230	0.80	BBB	5.2%
Entergy Corp.	*	*	$11,099	R	$13,998	0.65	BBB−	-3.2%
IDACORP Inc.	*	*	$1,337	R	$4,490	0.70	BBB	4.1%
MGE Energy			$562	M	$2,265	0.75	AA-	7.9%
OGE Energy	*	*	$2,290	R	$7,219	0.95	A-	5.2%
Otter Tail Corp.	*	*	$839	R	$1,703	0.90	BBB	7.5%
Pinnacle West Capital	*	*	$3,545	R	$9,757	0.70	A-	5.5%
PNM Resources	*	*	$1,449	R	$3,317	0.00	BBB−	6.6%
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Average			$6,919		$15,656	0.65	BBB−	4.8%
Subsample Average			$7,339		$16,786	0.62	BBB−	4.7%

Companies marked with a * have more than 80% of their assets subject to regulation.

Q. What steps do you take to ensure that the ROEs for the sample are representative?

A. As the cost of equity capital for a company depends on its financial leverage, the estimated cost of equity figures for the sample were converted to an estimate for PGE using its 50-50 capital structure. We do this to ensure consistency between the capital structure used to derive the cost of equity estimates and PGE's regulatory capital structure, and also evaluate critical risk factors that may differ between PGE and the sample. We also looked to PGE's level of risk relative to the sample to assess where in the estimated range PGE reasonably falls. Two risk factors are somewhat unique to PGE: (i) PGE is a smaller size utility than the average sample companies and (ii) Oregon and the City of Portland have climate policy initiatives to reduce the emission of carbon dioxide (CO_2), These factors may impact PGE's

generation fleet and consequently PGE's risk due to (i) a combination of a reduction in sales volumes and the asymmetric PCAM or (ii) in a worst case scenario, inability to fully recover cost of investments.

Q. Having selected a comparable sample, what steps do you take to estimate the cost of equity capital?

A. As noted above, the cost of capital estimation process employs three general methodologies: DCF, CAPM, and risk premium models. All methods are commonly used in US state regulatory proceedings and have been presented to the Commission previously by PGE. For the DCF estimates, we present two models: the standard Gordon growth model (or the single-stage DCF) and a three-stage DCF model. We implement the three-stage DCF model using three different long-term growth rates: the consensus Blue Chip forecast; an average of the estimate from Office of Management and Budget (OMB) and Blue Chip (which is no different from the Blue Chip); and two historical growth rates, which are used as checks. Further, a version of the risk premium method (i.e., a regression analysis of allowed return on bond rates) is used to estimate the ROE. Finally, two versions of the CAPM were implemented as a check on the results: the traditional CAPM and a version of the Empirical CAPM.[28] Because the cost of equity cannot be measured precisely, it is important to consider more than one method. Further, each method has its strengths and weaknesses, which may be more or less prevalent at any given time. It is, therefore, necessary to evaluate the estimated cost of equity in light of the prevalent market conditions and the relative strengths and weaknesses of the model to take these factors into account.

[28] The CAPM is a commonly used cost of capital estimation model in corporate finance and Dr. Villadsen usually includes it among her methods. As noted above, however, the OPUC has historically not relied upon the CAPM, so it is used as a check on other capital estimation model results in this proceeding.

A. The DCF Based Estimates

Q. Please describe the DCF approach to estimating the cost of equity.

A. The DCF method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The standard DCF application goes on to make the assumption that the growth rate remains constant forever, which simplifies the standard formula, so that it can be rearranged to estimate the cost of capital. 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 the formula:

$$P = \frac{D_1}{(r - g)}$$

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "r" are the market price and the cost of capital, as before.

Q. Are there other DCF models?

A. Yes. There are many alternatives, notably, (i) multi-stage models and (ii) models that use cash flow rather than dividends or combinations of (i) and (ii).[29] One such alternative expands the model to three stages.[30] In the multi-stage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period.

[29] The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board, "Ex Parte No. 664 (Sub-No. 1)," Issued January 23, 2009. Confirmed in EP 664 (Sub-No. 2), issued October 31, 2016.

[30] Note that because investors are interested in cash flow, it is technically important to include all cash flow that is distributed to shareholders. Notably, many companies distribute cash through share buybacks in addition to dividends and therefore, we would include this type of distribution. However, among the comparable companies only El Paso Electric has non-trivial share buybacks and including the amount would not affect the results. Therefore, we ignore this aspect for this proceeding.

Q. What inputs do you use for your DCF model?

A. Investment analysts' forecasted earnings growth rates from Bloomberg and from Value Line for the companies in the electric sample are used as the growth forecast. For the long-term growth rate for the final, constant-growth stage of the multi-stage DCF estimates, we use several estimates: (i) the most recent long-run GDP growth forecast from Blue Chip Economic Indicators (ii) the average of the OMB and Blue Chip long-term estimate, and (iii) two historical GDP growth rates are used as checks.[31]

Q. What are your DCF estimates?

A. Looking at the full sample, the ROE estimate is 10.2% for the Gordon (single-stage) DCF model and 8.6 to 11.1% for the multi-stage model. Table 5 below summarizes the results from the DCF models.[32]

Table 5: DCF Estimates on the Cost of Equity

	GDP growth from Blue chip	1990-2016 historical GDP	1947-2016 historical GDP
Full Sample			
Simple	10.2%	10.2%	10.2%
Multi-Stage	8.6%	9.0%	11.1%
Regulated Subsample			
Simple	9.7%	9.7%	9.7%
Multi-Stage	8.5%	8.8%	10.9%

Q. Do you have any comments on the DCF estimates?

A. Yes. The multi-stage DCF estimates relying on the Blue Chip Growth Forecast may well be downward biased as they rely on a historically low GDP growth rate. This is shown by

[31] *Blue Chip Economic Indicators*, October 10, 2017.
[32] For details, see PGE Exhibit 1003.

using two historical periods of GDP growth, and it is worth noting that recent GDP growth in the US has exceeded the Blue Chip forecast.

B. Risk Premium and CAPM

Q. Do you estimate the cost of equity that results from a risk premium analysis?

A. Yes, the risk premium is estimated using a statistical regression approach. Specifically, the statistical relationship between the allowed ROE for electric utilities and the 20-year government bond rate is calculated using quarterly data. This results in an estimated ROE of 10.4% to 10.5% for 2019.

Q. Please explain the implementation and data underlying your risk premium analysis.

A. Using quarterly data from Regulatory Research Associates from Q1 1990 to Q3 2017,[33] the following is estimated:

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

The equation is estimated using ordinary least squares and the parameters are statistically significant at the 5% level (details are in PGE Exhibit 1004). Using this approach, the risk premium coefficient (A_1 = -0.56%) and a constant (A_0 = 8.48) is determined. The risk premium then determines the cost of equity as:

$$\text{Cost of Equity} = \text{Forecasted Bond Yield} + \text{Risk Premium}$$

The forecasted 20-year yield for 2019 is 3.90% if the currently elevated yield spread is not taken into account and 4.10% if the elevated yield spread is assumed to remain.[34] Using

[33] SNL Financial as of October 31, 2017.
[34] *Blue Chip Economic Indicators Forecast*, October 2017.

these two forecasts for the risk-free rate, we obtain cost of equity estimates of 10.2% and 10.3%, respectively.

Q. Please summarize your CAPM model.

A. The CAPM determines the cost of equity as follows:

$$r_S = r_f + \beta_S \times MRP$$

where r_s is the cost of capital for investment S; r_f is the risk-free rate; β_S is the beta risk measure for investment S; and MRP is the market risk premium. The CAPM relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities. The model is estimated using Value Line betas, the risk-free rate that Blue Chip forecasts for 2019 plus 20 basis points to account for an elevation in yield spread (as in the risk-premium analyses above), and the historical MRP for the period 1926-2016 as reported by the 2017 Duff & Phelps Valuation Handbook.[35] The model was also implemented using the forecasted yield for 2019 and an elevated MRP of 7.4%, which is consistent with recent Bloomberg forecasts for the MRP. Finally, we implemented two variations of the model that relies on the empirical observation that the intercept, α, in the model is higher than in the theoretical CAPM, but the slope, β, is lower. The CAPM and the empirical CAPM results in cost of equity estimates in the range of 9.5% to 10.4% for the full sample and 9.3% to 10.2% for the subsample, which confirms that PGE's requested ROE of 9.5% is conservative. The details of this model are in PGE Exhibit 1005.

[35] *Blue Chip Economic Indicators*, October 2017; Duff & Phelps, 2017 Valuation Handbook, Guide to Cost of Capital, page 3-24.

Q. Based on the analysis above, please summarize the evidence regarding PGE's recommended ROE.

A. The evidence demonstrates that a 9.5% ROE remains a conservative, but reasonable ROE for PGE. Interest rates are increasing and, combined with the other factors we discuss above, PGE's cost of equity can be expected to rise in the 2019 test period. In this environment, maintaining PGE's authorized ROE and capital structure should be a non-controversial resolution to cost of capital issues in this case.

VI. Capital Structure

Q. How did you determine the appropriate capital structure for 2019?

A. We evaluated PGE's capital structure using the forecasted income statement and balance sheet for 2018. Additionally, we considered several factors, including: 1) PGE's need to maintain its financial strength; 2) flexibility and adequate liquidity; 3) its ability to maintain reliable and economical access to the capital markets; 4) minimizing the cost of capital to customers and shareholders; and 5) Commission Order No. 17-511 in Docket UE 319. We also considered PGE's desire to maintain a capital structure consisting of 50% long-term debt and 50% equity.

Q. Does PGE expect to issue common equity in 2019?

A. No. At this time PGE does not anticipate additional equity issuances, but we will provide an update if financing plans change.

Q. Are you seeking a different capital structure than in docket UE 319?

A. No. In UE 319, the OPUC adopted a settlement among the parties that reaffirmed PGE's regulated capital structure at 50% equity and 50% debt even though PGE's expected regulated capital structure contained more equity. PGE's long-term goal continues to be to maintain its capital structure at 50% equity and 50% debt; however, the equity ratio fluctuates around the 50% target level, due to the timing and size of debt and equity issuances.

Q. Why does PGE intend to maintain 50% equity in its capital structure?

A. It is the optimal debt-to-equity ratio for PGE because it offers a balance between the ideal debt-to-equity range and reduces PGE's cost of capital. The equity portion of PGE's capital structure is important because it represents how PGE finances its cash needs, which directly

impacts customer prices. We believe that the 50% equity in PGE's capital structure helps it better withstand difficult situations, such as under-earning due to events outside of PGE's control. In addition, the equity portion helps offset the leverage and risk that PGE encounters, in part, as it has finished its large capital expenditure program. It is also required to help offset the leverage imputed by the rating agencies due to purchased power. Additionally, PGE faces risks in today's banking environment because of its relatively small size, and it must maintain a solid capital structure and financial flexibility to help manage customer costs and provide shareholder value.

Q. Aside from the risks discussed above, what other types of significant risks does PGE encounter today?

A. PGE encounters a variety of risks including:

- Hydro and wind availability and weather changes create risk for PGE in several ways, including: lower than average stream flows; lower than average wind flows and the timing of it; and volatility in electricity usage because of sudden, unexpected weather changes and severe storms. This weather risk is not mitigated by PGE's decoupling mechanism. These risks can potentially force PGE to purchase more spot energy, when the markets may be tight. The costs resulting from these purchases could be greater than what is included in customer prices.
- Regional economic weakness can adversely affect PGE's revenues. Weakness in Oregon's economy can lead to a decline in electricity usage as customers become more conservative. This can negatively impact PGE's revenues, thereby reducing PGE's profits, which negatively affect PGE's retained earnings and returns to

investors. Lower retained earnings affect our ability to reinvest in the business. Oregon's economy was especially hard-hit during the recession and financial crisis of 2008 and was slow to recover compared to other regions of the nation. The state's new minimum wage law, passed during the 2016 legislative session, will also have a negative impact on job growth. While the impact may be small when compared to the size of the Oregon economy, it is estimated that there will be approximately 40,000 fewer jobs in the state in 2025 than would have been the case if the legislation did not pass.[36]

- Uncertainty regarding financial and business operations contingencies, as noted in PGE's SEC annual 10-K and quarterly 10-Q filings.[37] PGE could be vulnerable to cyber security and physical assets attacks. The electric industry is going through accelerated technological changes, which can make a basic premise of the current business model (economies of scales gained from central generation facilities) obsolete.
- Uncertain federal and state energy policy from legislative or regulatory efforts to reduce greenhouse gas emissions and water discharges from thermal plants could lead to increased capital and operating costs. Operating changes required of PGE in order to comply with existing and new laws related to fish and wildlife also could materially increase PGE costs.

[36] Oregon Economic and Revenue Forecast, December, 2017, page 13; http://www.oregon.gov/das/OEA/Documents/forecast1217.pdf.
[37] http://investors.portlandgeneral.com/sec.cfm Starting with page 114,Note 17- 2016 SEC Form 10-K. http://investors.portlandgeneral.com/secfiling.cfm?filingID=784977-17-53&CIK=784977. Starting with page 23, Note 7- the most recent 10/27/17 PGE SEC Form 10-Q.

Q. Do the financial markets agree that these are risks for PGE?

A. Yes. Recent reports from various equity analysts include at least one of the risks listed above. We have included the most recent reports from Wells Fargo and Ladenburg in our work papers.

Q. Can PGE mitigate these risks?

A. PGE can manage some of these risks, but not others. For risks that PGE can manage, PGE develops management capabilities and core competencies, as well as establishes strong processes and procedures to mitigate those risks. PGE is proactively implementing programs that will better prepare it for the operational impacts of adverse events. For example, improving the ability to recover from catastrophic events remains a key strategic focus of PGE. PGE's Department of Business Continuity and Emergency Management has developed formal recovery plans to address disasters and implement emergency management procedures. PGE is also taking measures to address cyber security risks by increasing Information Technology security staff and evaluating process improvements for detection and prevention of cyber-attacks. Another risk category is PGE's fuel supply. PGE continues to develop backup plans for fueling its power plants in the event of extended outages of natural gas pipelines or coal supply. PGE is looking at gas dispatch modeling and performing cost-benefit analysis of re-establishing the ability of gas plants to run on oil if pipeline interruptions occur. PGE is also moving forward with storage solutions and has an estimated online date of January 1, 2019 for the North Mist expansion storage facility[38] to provide long-term no-notice underground natural gas storage to serve the Beaver and Port Westward natural gas-fired generating plants.

[38] See PGE Exhibit 300, Section III, part C.

We note, however, that there are risks that PGE cannot manage including those associated with the government or regulatory framework. For these types of risk, PGE ensures that it is prepared and capable of responding to them to the best of its ability and PGE continues to actively participate in the legislative and regulatory arenas.

Q. Could the risks addressed above alter the cost of capital you request?

A. Yes. If these risks result in financial distress to PGE and/or its peers, the cost of long-term debt and the cost of equity will increase, with a resulting long-term cost impact on customers through increased borrowing costs and possibly a ratings downgrade.

VII. Qualifications

Q. Mr. Hager, please state your educational background and experience.

A. I received a Bachelor of Science degree in Economics from the University of Santa Clara in 1975 and a Master of Arts degree in Economics from the University of California at Davis in 1978. In 1995, I passed the examination for the Certified Rate of Return Analyst (CRRA). In 2000, I obtained the Chartered Financial Analyst (CFA) designation. I have taught several introductory and intermediate classes in economics at the University of California at Davis and at California State University Sacramento. In addition, I taught intermediate finance classes at Portland State University. Between 1996 and 2004 and 2010-2018, I served on the Board of Directors for the Society of Utility and Regulatory Financial Analysts.

Locally, I have been on the Board of Directors for Advantis Credit Union since 2007, serving previously on the Audit Committee. I also serve on the board and as treasurer for the Portland Chapter of the American Association of Individual Investors (AAII). I have been employed at PGE since 1984, beginning as a business analyst. I have worked in a variety of positions at PGE since 1984, including power supply. My current position is Manager, Regulatory Affairs.

Q. Mr. Liddle, please state your educational background and experience.

A. I received a Bachelor of Science degree in Business Administration with a finance emphasis from the University of Oregon in 2004 and a Master of Business Administration degree from Portland State University in 2009. I have been employed at PGE since 2005, beginning as an analyst in PGE's Corporate Finance Department. I have worked in PGE's Investor Relations Department and spent approximately seven years working in

PGE's Rates and Regulatory Affairs Department. I then managed PGE's forecasting team including financial and load forecasting, and economic analysis. My current position is Assistant Treasurer and Manager of Corporate Finance & Investor Relations.

Q. Dr. Villadsen, please state your educational background and experience.

A. I hold a Ph.D. from Yale University's School of Management with a concentration in accounting. I have a joint degree in mathematics and economics (BS and MS) from University of Aarhus in Denmark. Prior to joining The Brattle Group, I was a Professor of Accounting at the University of Iowa, University of Michigan, and at Washington University in St. Louis where I taught financial and cost accounting. I have also taught graduate classes in econometrics and quantitative methods. I have worked as a consultant for Risoe National Laboratories in Denmark.

My work concentrates in the areas of regulatory finance and accounting. My recent work has focused on accounting issues, damages, cost of capital and regulatory finance. In the regulatory finance area, I have 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 decoupling on cost of capital and earnings. I have been involved in accounting 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. I have estimated damages in the U.S. as well as internationally for companies in the construction, telecommunications, energy, cement, and rail road industry. I have filed testimony and testified in federal and state court, in international and U.S. arbitrations and before state and federal regulatory commissions. My testimonies and expert reports pertain to accounting issues, damages,

discount rates and cost of capital for regulated entities. A detailed vita of my qualifications is included in Exhibit 1006.

Q. Does this conclude your testimony?

A. Yes.

List of Exhibits

PGE Exhibit	Description
1001C	Standard & Poor's and Moody's Investors Service Credit Ratings
1002	Cost of Long-Term Debt
1003	Discounted Cash Flow Model
1004	Risk Premium Model
1005	Capital Asset Pricing Model
1006	Villadsen Vita

Exhibit 1001C

Protected Information Subject to Protective Order 18-047

Standard & Poor's and Moody's Investors Service Credit Ratings

	S&P	Rating Date	Moody's	Rating Date
Senior Secured Debt	A-	7/20/2017	A1	7/11/2017
Senior Unsecured	BBB	7/20/2017	A3	7/11/2017
Short-term/ Commercial Paper	A-2	7/20/2017	P-2	7/11/2017

"Credit Opinion: Portland General Electric Company" July 20, 2017. Standard & Poor's
"Credit Opinion: Portland General Electric Company" July 11, 2017. Moody's Investors Service

SAMPLE CAPITAL STRUCTURE AND DCF MODEL

Table No. BV-ELEC-2

Classification of Companies by Assets

Company	Company Category
ALLETE	M
Alliant Energy	R
Amer. Elec. Power	R
Ameren Corp.	R
CenterPoint Energy	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
IDACORP Inc.	R
MGE Energy	M
OGE Energy	R
Otter Tail Corp.	R
Pinnacle West Capital	R
PNM Resources	R
Portland General	R
PPL Corp.	R
Public Serv. Enterprise	M
Xcel Energy Inc.	R

Sources and Notes:
Percent regulated categories and company data are based on Edison Electric Institute: "Q1 2017 - Stock Performance".
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).

U.S. Electric Sample

Company	CAPM Subsample	DCF Subsample	Annual Revenues (USD million)	Regulated Assets	Market Cap. 2017 Q3 (USD million)	Betas	S&P Credit Rating (2017)	Long Term Growth Est.
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
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Average			$6,919		$15,656	0.65	BBB+	4.8%
Subsample Average			$7,339		$16,786	0.62	BBB+	4.7%

Sources and Notes:
[1]-[2]: Denotes companies used in the CAPM and DCF subsamples.
[3]: Bloomberg as of November 30, 2017. Most recent four quarters.
[4]: See Table No. BV-ELEC-2. Key:
R - Regulated (More than 80% of assets regulated).
M - Mostly Regulated (50%-80% of assets regulated).
[5]: See Table No. BV-ELEC-3 Panels A through V.
[6]: See Supporting Schedule # 1 to Table No. BV-ELEC-10.
[7]: S&P Credit Ratings from Research Insight as of 2017 Q3.
[8]: See Table No. BV-ELEC-5.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel A: ALLETE

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$2,043	$2,043	$1,873	$1,822	$1,529	$1,288	$1,158	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	51	51	50	49	45	41	39	[b]
Price per Share - Common	15_day_Average	$78	$78	$61	$49	$46	$48	$42	[c]
Market Value of Common Equity		$3,990	$3,963	$2,997	$2,393	$2,048	$1,941	$1,616	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$3,990	$3,963	$2,997	$2,393	$2,048	$1,941	$1,616	[f]= [d]
Market to Book Value of Common Equity		1.95	1.94	1.60	1.31	1.34	1.51	1.40	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$388	$388	$362	$403	$358	$369	$278	[j]
Current Liabilities	BS_CUR_LIAB	$291	$291	$404	$318	$287	$224	$215	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$64	$64	$187	$49	$85	$38	$67	[l]
Net Working Capital		$162	$162	$144	$135	$156	$183	$131	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$0	$0	$0	$0	$3	$1	$0	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$1,445	$1,445	$1,359	$1,549	$1,289	$1,064	$948	[p]
Book Value of Long-Term Debt		$1,509	$1,509	$1,546	$1,598	$1,375	$1,102	$1,015	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$1,654	$1,654	$1,676	$1,485	$1,132	$1,144	$966	
Carrying Amount		$1,569	$1,569	$1,605	$1,374	$1,110	$1,018	$863	
Adjustment to Book Value of Long-Term Debt		$85	$85	$71	$111	$22	$126	$103	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$1,593	$1,593	$1,617	$1,709	$1,396	$1,228	$1,118	[s] = [q] + [r].
Market Value of Debt		$1,593	$1,593	$1,617	$1,709	$1,396	$1,228	$1,118	[t] = [s].
MARKET VALUE OF FIRM		$5,583	$5,556	$4,614	$4,102	$3,444	$3,169	$2,734	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		71.46%	71.32%	64.96%	58.33%	59.47%	61.26%	59.11%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		28.54%	28.68%	35.04%	41.67%	40.53%	38.74%	40.89%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel B: Alliant Energy

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$4,154	$4,154	$3,859	$3,745	$3,436	$3,267	$3,116	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	231	231	228	227	222	222	222	[b]
Price per Share - Common	15_day_Average	$44	$42	$39	$28	$28	$25	$22	[c]
Market Value of Common Equity		$10,284	$9,787	$8,841	$6,434	$6,291	$5,494	$4,871	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$10,284	$9,787	$8,841	$6,434	$6,291	$5,494	$4,871	[f]= [d]
Market to Book Value of Common Equity		2.48	2.36	2.29	1.72	1.83	1.68	1.56	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$200	$200	$200	$200	$200	$200	$205	[h]
Market Value of Preferred Equity		$200	$200	$200	$200	$200	$200	$205	[i] = [h].
MARKET VALUE OF DEBT									
Current Assets	BS_CUR_ASSET_REPORT	$752	$752	$958	$1,088	$962	$880	$1,029	[j]
Current Liabilities	BS_CUR_LIAB	$1,470	$1,470	$1,370	$991	$1,742	$1,053	$946	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$105	$105	$314	$3	$493	$48	$1	[l]
Net Working Capital		($613)	($613)	($98)	$100	($287)	($124)	$84	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$485	$485	$238	$109	$354	$237	$70	[n]
Adjusted Short-Term Debt		$485	$485	$98	$0	$287	$124	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$4,255	$4,255	$3,817	$3,856	$2,800	$3,105	$2,828	[p]
Book Value of Long-Term Debt		$4,846	$4,846	$4,229	$3,859	$3,579	$3,278	$2,830	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$4,799	$4,799	$4,336	$4,418	$3,712	$3,861	$3,325	
Carrying Amount		$4,320	$4,320	$3,836	$3,790	$3,336	$3,138	$2,705	
Adjustment to Book Value of Long-Term Debt		$479	$479	$501	$629	$376	$722	$621	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$5,324	$5,324	$4,729	$4,487	$3,955	$4,000	$3,450	[s] = [q] + [r].
Market Value of Debt		$5,324	$5,324	$4,729	$4,487	$3,955	$4,000	$3,450	[t] = [s].
MARKET VALUE OF FIRM		$15,809	$15,311	$13,770	$11,121	$10,446	$9,694	$8,526	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		65.05%	63.92%	64.21%	57.85%	60.22%	56.68%	57.13%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		1.27%	1.31%	1.45%	1.80%	1.91%	2.06%	2.41%	[w] = [i] / [u].
Debt - Market Value Ratio		33.68%	34.78%	34.34%	40.35%	37.86%	41.26%	40.47%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel C: Amer. Elec. Power

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$18,078	$18,078	$17,322	$17,699	$16,868	$15,762	$15,306	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	492	492	492	491	489	487	485	[b]
Price per Share - Common	15_day_Average	$77	$72	$65	$55	$53	$43	$44	[c]
Market Value of Common Equity		$37,653	$35,328	$32,042	$27,037	$25,812	$21,167	$21,277	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$37,653	$35,328	$32,042	$27,037	$25,812	$21,167	$21,277	[f]= [d]
Market to Book Value of Common Equity		2.08	1.95	1.85	1.53	1.53	1.34	1.39	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$4,068	$4,068	$5,949	$4,548	$4,111	$4,317	$4,648	[j]
Current Liabilities	BS_CUR_LIAB	$7,322	$7,322	$7,779	$7,058	$7,457	$5,692	$6,795	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$2,359	$2,359	$2,385	$1,826	$2,381	$1,366	$2,272	[l]
Net Working Capital		($895)	($895)	$555	($684)	($965)	($9)	$125	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$1,059	$1,059	$1,478	$782	$1,282	$1,218	$1,216	[n]
Adjusted Short-Term Debt		$895	$895	$0	$684	$965	$9	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$18,362	$18,362	$17,320	$17,600	$15,677	$16,202	$14,955	[p]
Book Value of Long-Term Debt		$21,617	$21,617	$19,705	$20,110	$19,023	$17,577	$17,227	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$22,212	$22,212	$21,201	$21,075	$19,672	$20,907	$19,259	
Carrying Amount		$20,391	$20,391	$19,573	$18,684	$18,377	$17,757	$16,516	
Adjustment to Book Value of Long-Term Debt		$1,821	$1,821	$1,629	$2,391	$1,295	$3,150	$2,743	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$23,437	$23,437	$21,333	$22,501	$20,318	$20,727	$19,970	[s] = [q] + [r].
Market Value of Debt		$23,437	$23,437	$21,333	$22,501	$20,318	$20,727	$19,970	[t] = [s].
MARKET VALUE OF FIRM		$61,090	$58,765	$53,375	$49,538	$46,130	$41,894	$41,247	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		61.63%	60.12%	60.03%	54.58%	55.95%	50.53%	51.58%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		38.37%	39.88%	39.97%	45.42%	44.05%	49.47%	48.42%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel D: Ameren Corp.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$7,345	$7,345	$7,193	$7,014	$6,774	$6,574	$7,874	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	243	243	243	243	243	243	243	[b]
Price per Share - Common	15_day_Average	$63	$59	$50	$40	$38	$34	$33	[c]
Market Value of Common Equity		$15,386	$14,327	$12,115	$9,802	$9,318	$8,311	$7,920	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$15,386	$14,327	$12,115	$9,802	$9,318	$8,311	$7,920	[f]= [d]
Market to Book Value of Common Equity		2.09	1.95	1.68	1.40	1.38	1.26	1.01	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$1,581	$1,581	$1,599	$1,983	$1,942	$3,273	$2,406	[j]
Current Liabilities	BS_CUR_LIAB	$2,581	$2,581	$2,291	$2,489	$2,119	$3,228	$1,546	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$777	$777	$431	$395	$119	$884	$206	[l]
Net Working Capital		($223)	($223)	($261)	($111)	($58)	$929	$1,066	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$446	$446	$608	$783	$753	$0	$5	[n]
Adjusted Short-Term Debt		$223	$223	$261	$111	$58	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$6,922	$6,922	$6,607	$5,981	$5,825	$5,274	$6,781	[p]
Book Value of Long-Term Debt		$7,922	$7,922	$7,299	$6,487	$6,002	$6,158	$6,987	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$7,772	$7,772	$7,814	$7,135	$6,584	$7,110	$7,800	
Carrying Amount		$7,276	$7,276	$7,275	$6,240	$6,038	$6,157	$6,856	
Adjustment to Book Value of Long-Term Debt		$496	$496	$539	$895	$546	$953	$944	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$8,418	$8,418	$7,838	$7,382	$6,548	$7,111	$7,931	[s] = [q] + [r].
Market Value of Debt		$8,418	$8,418	$7,838	$7,382	$6,548	$7,111	$7,931	[t] = [s].
MARKET VALUE OF FIRM		$23,804	$22,745	$19,953	$17,184	$15,866	$15,422	$15,851	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		64.64%	62.99%	60.72%	57.04%	58.73%	53.89%	49.97%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		35.36%	37.01%	39.28%	42.96%	41.27%	46.11%	50.03%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel E: CenterPoint Energy

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$3,618	$3,618	$3,472	$4,058	$4,473	$4,261	$4,257	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	431	431	431	430	430	429	427	[b]
Price per Share - Common	15_day_Average	$29	$30	$23	$18	$24	$24	$21	[c]
Market Value of Common Equity		$12,683	$12,812	$10,097	$7,692	$10,424	$10,139	$8,997	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$12,683	$12,812	$10,097	$7,692	$10,424	$10,139	$8,997	[f]= [d]
Market to Book Value of Common Equity		3.51	3.54	2.91	1.90	2.33	2.38	2.11	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$2,935	$2,935	$2,529	$2,400	$2,576	$2,319	$2,752	[j]
Current Liabilities	BS_CUR_LIAB	$3,221	$3,221	$2,398	$3,191	$3,008	$2,595	$3,364	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$1,102	$1,102	$772	$938	$722	$553	$1,402	[l]
Net Working Capital		$816	$816	$903	$147	$290	$277	$790	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$48	$48	$43	$49	$80	$70	$53	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$7,531	$7,531	$7,736	$7,662	$7,797	$7,758	$8,415	[p]
Book Value of Long-Term Debt		$8,633	$8,633	$8,508	$8,600	$8,519	$8,311	$9,817	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$8,846	$8,846	$9,067	$9,427	$8,670	$10,807	$10,049	
Carrying Amount		$8,443	$8,443	$8,585	$8,652	$8,171	$9,619	$8,994	
Adjustment to Book Value of Long-Term Debt		$403	$403	$482	$775	$499	$1,188	$1,055	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$9,036	$9,036	$8,990	$9,375	$9,018	$9,499	$10,872	[s] = [q] + [r].
Market Value of Debt		$9,036	$9,036	$8,990	$9,375	$9,018	$9,499	$10,872	[t] = [s].
MARKET VALUE OF FIRM		$21,719	$21,848	$19,087	$17,067	$19,442	$19,638	$19,869	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		58.40%	58.64%	52.90%	45.07%	53.62%	51.63%	45.28%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		41.60%	41.36%	47.10%	54.93%	46.38%	48.37%	54.72%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel F: CMS Energy Corp.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$4,535	$4,535	$4,259	$3,902	$3,670	$3,396	$3,196	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	282	282	279	277	275	266	264	[b]
Price per Share - Common	15_day_Average	$50	$47	$43	$34	$30	$26	$23	[c]
Market Value of Common Equity		$13,994	$13,310	$11,917	$9,338	$8,161	$7,018	$6,141	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$13,994	$13,310	$11,917	$9,338	$8,161	$7,018	$6,141	[f]= [d]
Market to Book Value of Common Equity		3.09	2.94	2.80	2.39	2.22	2.07	1.92	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$2,121	$2,121	$2,198	$2,123	$2,734	$2,401	$2,360	[j]
Current Liabilities	BS_CUR_LIAB	$2,261	$2,261	$2,069	$1,788	$1,648	$1,464	$1,485	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$980	$980	$1,005	$741	$690	$532	$510	[l]
Net Working Capital		$840	$840	$1,134	$1,076	$1,776	$1,469	$1,385	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$230	$230	$75	$68	$0	$0	$0	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$9,121	$9,121	$8,832	$8,014	$8,171	$7,229	$6,866	[p]
Book Value of Long-Term Debt		$10,101	$10,101	$9,837	$8,755	$8,861	$7,761	$7,376	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$9,953	$9,953	$9,599	$9,285	$8,368	$8,347	$8,025	
Carrying Amount		$9,504	$9,504	$9,084	$8,535	$7,642	$7,229	$7,073	
Adjustment to Book Value of Long-Term Debt		$449	$449	$515	$750	$726	$1,118	$952	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$10,550	$10,550	$10,352	$9,505	$9,587	$8,879	$8,328	[s] = [q] + [r].
Market Value of Debt		$10,550	$10,550	$10,352	$9,505	$9,587	$8,879	$8,328	[t] = [s].
MARKET VALUE OF FIRM		$24,544	$23,860	$22,269	$18,843	$17,748	$15,897	$14,469	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		57.02%	55.78%	53.51%	49.56%	45.98%	44.15%	42.44%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		42.98%	44.22%	46.49%	50.44%	54.02%	55.85%	57.56%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel G: Consol. Edison

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$15,102	$15,102	$14,267	$13,040	$12,707	$12,166	$11,842	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	310	310	305	293	293	293	293	[b]
Price per Share - Common	15_day_Average	$88	$83	$76	$65	$57	$56	$60	[c]
Market Value of Common Equity		$27,135	$25,682	$23,296	$18,927	$16,614	$16,301	$17,522	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$27,135	$25,682	$23,296	$18,927	$16,614	$16,301	$17,522	[f]= [d]
Market to Book Value of Common Equity		1.80	1.70	1.63	1.45	1.31	1.34	1.48	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$3,096	$3,096	$3,154	$3,505	$3,519	$3,704	$3,240	[j]
Current Liabilities	BS_CUR_LIAB	$3,915	$3,915	$3,591	$4,429	$3,873	$4,373	$3,724	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$687	$687	$346	$761	$210	$483	$930	[l]
Net Working Capital		($132)	($132)	($91)	($163)	($144)	($186)	$446	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$356	$356	$601	$1,160	$1,425	$1,220	$340	[n]
Adjusted Short-Term Debt		$132	$132	$91	$163	$144	$186	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$14,651	$14,651	$13,747	$11,521	$10,986	$10,495	$9,841	[p]
Book Value of Long-Term Debt		$15,470	$15,470	$14,184	$12,445	$11,340	$11,164	$10,771	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$16,093	$16,093	$13,856	$13,998	$12,082	$12,935	$12,744	
Carrying Amount		$14,774	$14,774	$12,745	$12,191	$10,974	$10,768	$10,673	
Adjustment to Book Value of Long-Term Debt		$1,319	$1,319	$1,111	$1,807	$1,108	$2,167	$2,071	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$16,789	$16,789	$15,295	$14,252	$12,448	$13,331	$12,842	[s] = [q] + [r].
Market Value of Debt		$16,789	$16,789	$15,295	$14,252	$12,448	$13,331	$12,842	[t] = [s].
MARKET VALUE OF FIRM		$43,924	$42,471	$38,591	$33,179	$29,062	$29,632	$30,364	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		61.78%	60.47%	60.37%	57.05%	57.17%	55.01%	57.71%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		38.22%	39.53%	39.63%	42.95%	42.83%	44.99%	42.29%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel H: DTE Energy

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$9,373	$9,373	$9,130	$8,812	$8,169	$7,876	$7,389	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	179	179	179	179	177	177	172	[b]
Price per Share - Common	15_day_Average	$114	$110	$94	$78	$76	$67	$59	[c]
Market Value of Common Equity		$20,392	$19,692	$16,898	$13,951	$13,475	$11,792	$10,192	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$20,392	$19,692	$16,898	$13,951	$13,475	$11,792	$10,192	[f]= [d]
Market to Book Value of Common Equity		2.18	2.10	1.85	1.58	1.65	1.50	1.38	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$2,815	$2,815	$2,595	$2,700	$2,755	$2,549	$2,730	[j]
Current Liabilities	BS_CUR_LIAB	$2,598	$2,598	$1,969	$2,273	$2,805	$3,008	$2,309	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$109	$109	$15	$468	$274	$896	$633	[l]
Net Working Capital		$326	$326	$641	$895	$224	$437	$1,054	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$659	$659	$410	$185	$653	$271	$98	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$11,795	$11,795	$9,478	$8,856	$7,909	$6,846	$7,120	[p]
Book Value of Long-Term Debt		$11,904	$11,904	$9,493	$9,324	$8,183	$7,742	$7,753	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$11,905	$11,905	$9,835	$9,503	$8,475	$8,893	$8,757	
Carrying Amount		$11,270	$11,270	$9,210	$8,606	$8,094	$7,813	$7,682	
Adjustment to Book Value of Long-Term Debt		$635	$635	$625	$897	$381	$1,080	$1,075	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$12,539	$12,539	$10,118	$10,221	$8,564	$8,822	$8,828	[s] = [q] + [r].
Market Value of Debt		$12,539	$12,539	$10,118	$10,221	$8,564	$8,822	$8,828	[t] = [s].
MARKET VALUE OF FIRM		$32,931	$32,231	$27,016	$24,172	$22,039	$20,614	$19,020	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		61.92%	61.10%	62.55%	57.71%	61.14%	57.20%	53.59%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		38.08%	38.90%	37.45%	42.29%	38.86%	42.80%	46.41%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
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Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel I: Duke Energy

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$41,631	$41,631	$40,489	$39,832	$41,412	$41,165	$40,905	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	700	700	689	688	707	706	704	[b]
Price per Share - Common	15_day_Average	$89	$86	$81	$70	$74	$67	$64	[c]
Market Value of Common Equity		$62,474	$60,010	$55,487	$47,883	$52,276	$47,133	$45,201	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$62,474	$60,010	$55,487	$47,883	$52,276	$47,133	$45,201	[f]= [d]
Market to Book Value of Common Equity		1.50	1.44	1.37	1.20	1.26	1.14	1.11	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$0	$0	$0	$0	$0	$0	$93	[h]
Market Value of Preferred Equity		$0	$0	$0	$0	$0	$0	$93	[i] = [h].
MARKET VALUE OF DEBT									
Current Assets	BS_CUR_ASSET_REPORT	$7,706	$7,706	$13,534	$10,195	$11,575	$10,418	$10,106	[j]
Current Liabilities	BS_CUR_LIAB	$10,820	$10,820	$12,076	$10,516	$8,251	$9,239	$8,556	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$2,485	$2,485	$3,201	$2,536	$1,156	$2,307	$2,488	[l]
Net Working Capital		($629)	($629)	$4,659	$2,215	$4,480	$3,486	$4,038	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$1,899	$1,899	$3,011	$2,419	$1,787	$1,278	$875	[n]
Adjusted Short-Term Debt		$629	$629	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$48,929	$48,929	$43,964	$37,667	$38,702	$37,402	$36,109	[p]
Book Value of Long-Term Debt		$52,043	$52,043	$47,165	$40,203	$39,858	$39,709	$38,597	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$49,161	$49,161	$41,767	$44,566	$42,592	$44,001	$23,053	
Carrying Amount		$47,895	$47,895	$38,868	$40,020	$40,256	$39,461	$20,573	
Adjustment to Book Value of Long-Term Debt		$1,266	$1,266	$2,899	$4,546	$2,336	$4,540	$2,480	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$53,309	$53,309	$50,064	$44,749	$42,194	$44,249	$41,077	[s] = [q] + [r].
Market Value of Debt		$53,309	$53,309	$50,064	$44,749	$42,194	$44,249	$41,077	[t] = [s].
MARKET VALUE OF FIRM		$115,783	$113,319	$105,551	$92,632	$94,470	$91,382	$86,371	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		53.96%	52.96%	52.57%	51.69%	55.34%	51.58%	52.33%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	0.11%	[w] = [i] / [u].
Debt - Market Value Ratio		46.04%	47.04%	47.43%	48.31%	44.66%	48.42%	47.56%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
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The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
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[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel J: Edison Int'l

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$12,416	$12,416	$11,814	$11,600	$10,736	$9,689	$10,023	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	326	326	326	326	326	326	326	[b]
Price per Share - Common	15_day_Average	$81	$80	$74	$61	$57	$46	$45	[c]
Market Value of Common Equity		$26,382	$25,912	$23,951	$19,740	$18,584	$14,938	$14,719	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$26,382	$25,912	$23,951	$19,740	$18,584	$14,938	$14,719	[f]= [d]
Market to Book Value of Common Equity		2.12	2.09	2.03	1.70	1.73	1.54	1.47	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$2,194	$2,194	$2,191	$2,020	$2,022	$1,753	$1,759	[h]
Market Value of Preferred Equity		$2,194	$2,194	$2,191	$2,020	$2,022	$1,753	$1,759	[i] = [h].
MARKET VALUE OF DEBT									
Current Assets	BS_CUR_ASSET_REPORT	$2,758	$2,758	$2,605	$3,792	$4,498	$3,603	$4,494	[j]
Current Liabilities	BS_CUR_LIAB	$5,409	$5,409	$5,342	$5,239	$5,849	$5,389	$4,274	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$583	$583	$881	$295	$704	$401	$565	[l]
Net Working Capital		($2,068)	($2,068)	($1,856)	($1,152)	($647)	($1,385)	$785	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$908	$908	$757	$1,154	$1,349	$1,528	$429	[n]
Adjusted Short-Term Debt		$908	$908	$757	$1,152	$647	$1,385	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$11,638	$11,638	$10,407	$10,957	$10,133	$9,232	$13,708	[p]
Book Value of Long-Term Debt		$13,129	$13,129	$12,045	$12,404	$11,484	$11,018	$14,273	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$12,368	$12,368	$12,252	$12,319	$11,084	$10,944	$10,548	
Carrying Amount		$11,156	$11,156	$11,178	$10,738	$10,426	$9,231	$8,834	
Adjustment to Book Value of Long-Term Debt		$1,212	$1,212	$1,074	$1,581	$658	$1,713	$1,714	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$14,341	$14,341	$13,119	$13,985	$12,142	$12,731	$15,987	[s] = [q] + [r].
Market Value of Debt		$14,341	$14,341	$13,119	$13,985	$12,142	$12,731	$15,987	[t] = [s].
MARKET VALUE OF FIRM		$42,917	$42,447	$39,261	$35,745	$32,748	$29,422	$32,465	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		61.47%	61.05%	61.00%	55.22%	56.75%	50.77%	45.34%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		5.11%	5.17%	5.58%	5.65%	6.17%	5.96%	5.42%	[w] = [i] / [u].
Debt - Market Value Ratio		33.42%	33.79%	33.41%	39.12%	37.08%	43.27%	49.24%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel K: El Paso Electric

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$1,136	$1,136	$1,075	$1,021	$1,016	$894	$830	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	40	40	40	40	40	40	40	[b]
Price per Share - Common	15_day_Average	$60	$55	$47	$36	$37	$33	$34	[c]
Market Value of Common Equity		$2,413	$2,230	$1,886	$1,432	$1,481	$1,328	$1,356	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$2,413	$2,230	$1,886	$1,432	$1,481	$1,328	$1,356	[f]= [d]
Market to Book Value of Common Equity		2.12	1.96	1.75	1.40	1.46	1.49	1.63	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$199	$199	$192	$202	$207	$237	$176	[j]
Current Liabilities	BS_CUR_LIAB	$316	$316	$294	$251	$242	$141	$174	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$83	$83	$83	$0	$15	$0	$33	[l]
Net Working Capital		($34)	($34)	($19)	($48)	($19)	$96	$35	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$168	$168	$55	$119	$90	$15	$62	[n]
Adjusted Short-Term Debt		$34	$34	$19	$48	$19	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$1,196	$1,196	$1,195	$1,134	$985	$1,000	$850	[p]
Book Value of Long-Term Debt		$1,313	$1,313	$1,297	$1,182	$1,019	$1,000	$883	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$1,500	$1,500	$1,285	$1,314	$1,059	$1,182	$1,057	
Carrying Amount		$1,360	$1,360	$1,264	$1,164	$1,014	$1,022	$883	
Adjustment to Book Value of Long-Term Debt		$139	$139	$20	$150	$45	$160	$174	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$1,452	$1,452	$1,318	$1,332	$1,064	$1,160	$1,057	[s] = [q] + [r].
Market Value of Debt		$1,452	$1,452	$1,318	$1,332	$1,064	$1,160	$1,057	[t] = [s].
MARKET VALUE OF FIRM		$3,865	$3,682	$3,204	$2,764	$2,544	$2,487	$2,414	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		62.43%	60.56%	58.88%	51.80%	58.19%	53.38%	56.19%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		37.57%	39.44%	41.12%	48.20%	41.81%	46.62%	43.81%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel L: Entergy Corp.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$8,690	$8,690	$10,069	$9,157	$10,149	$9,408	$9,191	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	180	180	179	178	180	178	178	[b]
Price per Share - Common	15_day_Average	$86	$78	$79	$64	$76	$64	$69	[c]
Market Value of Common Equity		$15,467	$13,998	$14,147	$11,376	$13,736	$11,359	$12,194	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$15,467	$13,998	$14,147	$11,376	$13,736	$11,359	$12,194	[f]= [d]
Market to Book Value of Common Equity		1.78	1.61	1.40	1.24	1.35	1.21	1.33	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$203	$203	$233	$211	$305	$281	$281	[h]
Market Value of Preferred Equity		$203	$203	$233	$211	$305	$281	$281	[i] = [h].
MARKET VALUE OF DEBT									
Current Assets	BS_CUR_ASSET_REPORT	$3,471	$3,471	$4,340	$4,117	$4,265	$3,490	$3,808	[j]
Current Liabilities	BS_CUR_LIAB	$4,461	$4,461	$3,452	$3,454	$4,454	$3,439	$3,924	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$871	$871	$753	$281	$1,117	$209	$792	[l]
Net Working Capital		($118)	($118)	$1,641	$945	$927	$260	$675	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$1,353	$1,353	$433	$782	$891	$1,106	$356	[n]
Adjusted Short-Term Debt		$118	$118	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$14,000	$14,000	$13,887	$13,080	$11,665	$12,308	$11,784	[p]
Book Value of Long-Term Debt		$14,990	$14,990	$14,640	$13,362	$12,782	$12,517	$12,575	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$14,816	$14,816	$13,579	$13,607	$12,440	$12,849	$12,176	
Carrying Amount		$14,833	$14,833	$13,326	$13,399	$12,596	$12,639	$12,236	
Adjustment to Book Value of Long-Term Debt		($17)	($17)	$253	$208	($156)	$210	($60)	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$14,973	$14,973	$14,892	$13,569	$12,625	$12,728	$12,515	[s] = [q] + [r].
Market Value of Debt		$14,973	$14,973	$14,892	$13,569	$12,625	$12,728	$12,515	[t] = [s].
MARKET VALUE OF FIRM		$30,644	$29,174	$29,272	$25,156	$26,665	$24,367	$24,989	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		50.48%	47.98%	48.33%	45.22%	51.51%	46.62%	48.80%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		0.66%	0.70%	0.80%	0.84%	1.14%	1.15%	1.12%	[w] = [i] / [u].
Debt - Market Value Ratio		48.86%	51.32%	50.88%	53.94%	47.35%	52.23%	50.08%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel M: IDACORP Inc.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$2,248	$2,248	$2,149	$2,050	$1,949	$1,860	$1,770	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	50	50	50	50	50	50	50	[b]
Price per Share - Common	15_day_Average	$97	$89	$79	$61	$55	$48	$43	[c]
Market Value of Common Equity		$4,888	$4,490	$3,961	$3,087	$2,753	$2,403	$2,151	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$4,888	$4,490	$3,961	$3,087	$2,753	$2,403	$2,151	[f]= [d]
Market to Book Value of Common Equity		2.17	2.00	1.84	1.51	1.41	1.29	1.21	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$458	$458	$460	$494	$475	$567	$366	[j]
Current Liabilities	BS_CUR_LIAB	$226	$226	$205	$205	$240	$335	$268	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$0	$0	$1	$1	$1	$71	$1	[l]
Net Working Capital		$232	$232	$256	$290	$237	$303	$99	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$2	$2	$5	$4	$32	$53	$51	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$1,746	$1,746	$1,746	$1,742	$1,614	$1,615	$1,537	[p]
Book Value of Long-Term Debt		$1,746	$1,746	$1,747	$1,743	$1,615	$1,686	$1,538	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$1,859	$1,859	$1,813	$1,788	$1,600	$1,819	$1,738	
Carrying Amount		$1,746	$1,746	$1,726	$1,616	$1,616	$1,538	$1,492	
Adjustment to Book Value of Long-Term Debt		$113	$113	$87	$173	($16)	$282	$246	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$1,859	$1,859	$1,833	$1,916	$1,599	$1,968	$1,784	[s] = [q] + [r].
Market Value of Debt		$1,859	$1,859	$1,833	$1,916	$1,599	$1,968	$1,784	[t] = [s].
MARKET VALUE OF FIRM		$6,747	$6,348	$5,795	$5,003	$4,353	$4,370	$3,934	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		72.45%	70.72%	68.36%	61.71%	63.26%	54.97%	54.66%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		27.55%	29.28%	31.64%	38.29%	36.74%	45.03%	45.34%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel N: MGE Energy

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$753	$753	$720	$689	$654	$613	$578	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	35	35	35	35	35	35	35	[b]
Price per Share - Common	15_day_Average	$65	$65	$57	$40	$39	$36	$35	[c]
Market Value of Common Equity		$2,264	$2,265	$1,975	$1,396	$1,340	$1,244	$1,223	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$2,264	$2,265	$1,975	$1,396	$1,340	$1,244	$1,223	[f]= [d]
Market to Book Value of Common Equity		3.01	3.01	2.74	2.03	2.05	2.03	2.11	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$255	$255	$249	$242	$225	$214	$220	[j]
Current Liabilities	BS_CUR_LIAB	$85	$85	$86	$74	$82	$79	$60	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$4	$4	$4	$4	$4	$4	$3	[l]
Net Working Capital		$175	$175	$167	$172	$147	$139	$162	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$7	$7	$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	BS_LT_BORROW	$389	$389	$384	$392	$396	$400	$359	[p]
Book Value of Long-Term Debt		$394	$394	$388	$396	$400	$405	$362	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$430	$430	$436	$457	$432	$427	$433	
Carrying Amount		$391	$391	$396	$400	$404	$362	$364	
Adjustment to Book Value of Long-Term Debt		$39	$39	$40	$58	$28	$66	$68	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$433	$433	$428	$454	$429	$470	$430	[s] = [q] + [r].
Market Value of Debt		$433	$433	$428	$454	$429	$470	$430	[t] = [s].
MARKET VALUE OF FIRM		$2,696	$2,698	$2,404	$1,850	$1,769	$1,714	$1,653	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		83.95%	83.96%	82.18%	75.46%	75.77%	72.56%	73.97%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		16.05%	16.04%	17.82%	24.54%	24.23%	27.44%	26.03%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel O: OGE Energy

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$3,617	$3,617	$3,445	$3,353	$3,243	$2,995	$2,769	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	200	200	200	200	199	198	197	[b]
Price per Share - Common	15_day_Average	$35	$36	$32	$27	$36	$36	$28	[c]
Market Value of Common Equity		$7,041	$7,219	$6,386	$5,399	$7,266	$7,104	$5,440	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$7,041	$7,219	$6,386	$5,399	$7,266	$7,104	$5,440	[f]= [d]
Market to Book Value of Common Equity		1.95	2.00	1.85	1.61	2.24	2.37	1.96	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$600	$600	$547	$753	$740	$758	$857	[j]
Current Liabilities	BS_CUR_LIAB	$954	$954	$795	$587	$869	$942	$1,196	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$350	$350	$125	$110	$0	$0	$0	[l]
Net Working Capital		($4)	($4)	($123)	$276	($129)	($184)	($339)	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$147	$147	$213	$0	$411	$447	$456	[n]
Adjusted Short-Term Debt		$4	$4	$123	$0	$129	$184	$339	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$2,750	$2,750	$2,505	$2,646	$2,510	$2,400	$2,848	[p]
Book Value of Long-Term Debt		$3,103	$3,103	$2,753	$2,756	$2,639	$2,584	$3,188	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$2,904	$2,904	$2,999	$2,550	$2,653	$3,397	$3,276	
Carrying Amount		$2,631	$2,631	$2,739	$2,755	$2,400	$2,849	$2,737	
Adjustment to Book Value of Long-Term Debt		$273	$273	$260	($206)	$253	$548	$539	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$3,377	$3,377	$3,014	$2,550	$2,891	$3,132	$3,726	[s] = [q] + [r].
Market Value of Debt		$3,377	$3,377	$3,014	$2,550	$2,891	$3,132	$3,726	[t] = [s].
MARKET VALUE OF FIRM		$10,417	$10,596	$9,400	$7,949	$10,157	$10,236	$9,166	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		67.59%	68.13%	67.94%	67.92%	71.54%	69.41%	59.35%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		32.41%	31.87%	32.06%	32.08%	28.46%	30.59%	40.65%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel P: Otter Tail Corp.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$693	$693	$657	$598	$563	$530	$531	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	40	40	39	38	37	36	36	[b]
Price per Share - Common	15_day_Average	$47	$43	$35	$26	$27	$28	$24	[c]
Market Value of Common Equity		$1,843	$1,703	$1,380	$972	$1,007	$1,006	$859	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$1,843	$1,703	$1,380	$972	$1,007	$1,006	$859	[f]= [d]
Market to Book Value of Common Equity		2.66	2.46	2.10	1.63	1.79	1.90	1.62	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$0	$0	$0	$0	$0	$0	$16	[h]
Market Value of Preferred Equity		$0	$0	$0	$0	$0	$0	$16	[i] = [h].
MARKET VALUE OF DEBT									
Current Assets	BS_CUR_ASSET_REPORT	$228	$228	$204	$274	$298	$310	$299	[j]
Current Liabilities	BS_CUR_LIAB	$246	$246	$246	$237	$200	$220	$176	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$0	$0	$85	$0	$0	$0	$0	[l]
Net Working Capital		($18)	($18)	$43	$37	$98	$91	$123	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$104	$104	$37	$87	$39	$40	$12	[n]
Adjusted Short-Term Debt		$18	$18	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$490	$490	$461	$498	$499	$437	$422	[p]
Book Value of Long-Term Debt		$508	$508	$546	$499	$499	$437	$422	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$584	$584	$561	$601	$428	$491	$525	
Carrying Amount		$539	$539	$496	$499	$390	$422	$472	
Adjustment to Book Value of Long-Term Debt		$45	$45	$65	$102	$38	$69	$53	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$554	$554	$611	$601	$537	$507	$475	[s] = [q] + [r].
Market Value of Debt		$554	$554	$611	$601	$537	$507	$475	[t] = [s].
MARKET VALUE OF FIRM									
		$2,397	$2,257	$1,991	$1,573	$1,544	$1,513	$1,350	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		76.90%	75.47%	69.31%	61.81%	65.24%	66.49%	63.66%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	1.15%	[w] = [i] / [u].
Debt - Market Value Ratio		23.10%	24.53%	30.69%	38.19%	34.76%	33.51%	35.19%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel Q: Pinnacle West Capital

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$5,142	$5,142	$4,853	$4,654	$4,492	$4,276	$4,056	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	112	112	111	111	110	110	110	[b]
Price per Share - Common	15_day_Average	$90	$87	$77	$62	$56	$55	$53	[c]
Market Value of Common Equity		$10,064	$9,757	$8,563	$6,850	$6,196	$6,003	$5,792	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$10,064	$9,757	$8,563	$6,850	$6,196	$6,003	$5,792	[f]= [d]
Market to Book Value of Common Equity		1.96	1.90	1.76	1.47	1.38	1.40	1.43	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$1,174	$1,174	$977	$1,062	$1,041	$1,350	$1,099	[j]
Current Liabilities	BS_CUR_LIAB	$1,303	$1,303	$1,110	$1,523	$1,449	$1,447	$949	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$207	$207	$17	$411	$369	$566	$90	[l]
Net Working Capital		$78	$78	($115)	($50)	($39)	$470	$240	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$131	$131	$117	$57	$19	$0	$0	[n]
Adjusted Short-Term Debt		$0	$0	$115	$50	$19	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$4,491	$4,491	$4,145	$3,257	$3,038	$2,820	$3,339	[p]
Book Value of Long-Term Debt		$4,698	$4,698	$4,278	$3,719	$3,426	$3,387	$3,429	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$4,426	$4,426	$4,106	$3,839	$3,579	$3,875	$3,926	
Carrying Amount		$4,147	$4,147	$3,820	$3,415	$3,337	$3,322	$3,496	
Adjustment to Book Value of Long-Term Debt		$279	$279	$286	$424	$242	$553	$430	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$4,977	$4,977	$4,564	$4,143	$3,668	$3,940	$3,859	[s] = [q] + [r].
Market Value of Debt		$4,977	$4,977	$4,564	$4,143	$3,668	$3,940	$3,859	[t] = [s].
MARKET VALUE OF FIRM		$15,041	$14,734	$13,127	$10,993	$9,864	$9,943	$9,651	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		66.91%	66.22%	65.23%	62.31%	62.81%	60.38%	60.01%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		33.09%	33.78%	34.77%	37.69%	37.19%	39.62%	39.99%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel R: PNM Resources

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$1,766	$1,766	$1,688	$1,763	$1,723	$1,665	$1,632	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	80	80	80	80	80	80	80	[b]
Price per Share - Common	15_day_Average	$45	$42	$33	$26	$26	$22	$21	[c]
Market Value of Common Equity		$3,555	$3,317	$2,640	$2,094	$2,053	$1,766	$1,655	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$3,555	$3,317	$2,640	$2,094	$2,053	$1,766	$1,655	[f]= [d]
Market to Book Value of Common Equity		2.01	1.88	1.56	1.19	1.19	1.06	1.01	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$375	$375	$399	$408	$466	$401	$472	[j]
Current Liabilities	BS_CUR_LIAB	$711	$711	$702	$519	$700	$416	$393	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$165	$165	$101	$125	$333	$53	$2	[l]
Net Working Capital		($171)	($171)	($202)	$14	$99	$37	$82	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$267	$267	$356	$103	$100	$112	$113	[n]
Adjusted Short-Term Debt		$171	$171	$202	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$2,282	$2,282	$2,207	$1,980	$1,542	$1,696	$1,672	[p]
Book Value of Long-Term Debt		$2,619	$2,619	$2,510	$2,105	$1,875	$1,749	$1,675	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$1,730	$1,730	$1,703	$1,624	$1,383	$1,385	$1,295	
Carrying Amount		$1,631	$1,631	$1,581	$1,483	$1,291	$1,216	$1,216	
Adjustment to Book Value of Long-Term Debt		$99	$99	$123	$142	$92	$170	$79	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$2,718	$2,718	$2,632	$2,247	$1,967	$1,919	$1,754	[s] = [q] + [r].
Market Value of Debt		$2,718	$2,718	$2,632	$2,247	$1,967	$1,919	$1,754	[t] = [s].
MARKET VALUE OF FIRM		$6,284	$6,046	$5,284	$4,353	$4,032	$3,697	$3,420	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		56.57%	54.86%	49.97%	48.11%	50.91%	47.78%	48.38%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		0.18%	0.19%	0.22%	0.26%	0.29%	0.31%	0.34%	[w] = [i] / [u].
Debt - Market Value Ratio		43.25%	44.95%	49.82%	51.62%	48.80%	51.90%	51.28%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
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The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel S: Portland General

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$2,402	$2,402	$2,310	$2,232	$1,889	$1,792	$1,717	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	89	89	89	89	78	78	76	[b]
Price per Share - Common	15_day_Average	$49	$46	$43	$36	$33	$28	$27	[c]
Market Value of Common Equity		$4,365	$4,140	$3,833	$3,155	$2,567	$2,212	$2,059	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$4,365	$4,140	$3,833	$3,155	$2,567	$2,212	$2,059	[f]= [d]
Market to Book Value of Common Equity		1.82	1.72	1.66	1.41	1.36	1.23	1.20	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$466	$466	$476	$605	$542	$565	$784	[j]
Current Liabilities	BS_CUR_LIAB	$491	$491	$448	$465	$482	$380	$648	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$100	$100	$0	$0	$70	$50	$200	[l]
Net Working Capital		$75	$75	$28	$140	$130	$235	$336	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_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	BS_LT_BORROW	$2,277	$2,277	$2,325	$2,204	$2,251	$1,761	$1,536	[p]
Book Value of Long-Term Debt		$2,377	$2,377	$2,325	$2,204	$2,321	$1,811	$1,736	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$2,693	$2,693	$2,455	$2,901	$2,074	$1,949	$2,091	
Carrying Amount		$2,350	$2,350	$2,193	$2,501	$1,916	$1,636	$1,735	
Adjustment to Book Value of Long-Term Debt		$343	$343	$262	$400	$158	$313	$356	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$2,720	$2,720	$2,587	$2,604	$2,479	$2,124	$2,092	[s] = [q] + [r].
Market Value of Debt		$2,720	$2,720	$2,587	$2,604	$2,479	$2,124	$2,092	[t] = [s].
MARKET VALUE OF FIRM		$7,085	$6,860	$6,420	$5,759	$5,046	$4,336	$4,151	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		61.61%	60.35%	59.71%	54.79%	50.87%	51.02%	49.60%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		38.39%	39.65%	40.29%	45.21%	49.13%	48.98%	50.40%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel T: PPL Corp.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$10,692	$10,692	$9,975	$10,222	$13,974	$12,344	$11,214	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	688	688	679	672	665	630	581	[b]
Price per Share - Common	15_day_Average	$36	$39	$35	$31	$31	$28	$27	[c]
Market Value of Common Equity		$25,070	$26,705	$23,739	$20,835	$20,387	$17,754	$15,591	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$25,070	$26,705	$23,739	$20,835	$20,387	$17,754	$15,591	[f]= [d]
Market to Book Value of Common Equity		2.34	2.50	2.38	2.04	1.46	1.44	1.39	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$2,331	$2,331	$2,099	$2,990	$5,760	$4,971	$5,227	[j]
Current Liabilities	BS_CUR_LIAB	$4,149	$4,149	$3,412	$4,468	$5,412	$4,948	$4,887	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$448	$448	$443	$1,460	$235	$751	$313	[l]
Net Working Capital		($1,370)	($1,370)	($870)	($18)	$583	$774	$653	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$1,211	$1,211	$636	$557	$1,099	$499	$526	[n]
Adjusted Short-Term Debt		$1,211	$1,211	$636	$18	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$19,110	$19,110	$18,069	$17,745	$20,522	$19,092	$18,711	[p]
Book Value of Long-Term Debt		$20,769	$20,769	$19,148	$19,223	$20,757	$19,843	$19,024	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$21,355	$21,355	$21,218	$32,170	$35,517	$35,217	$32,271	
Carrying Amount		$18,326	$18,326	$19,048	$28,602	$33,756	$31,744	$29,762	
Adjustment to Book Value of Long-Term Debt		$3,029	$3,029	$2,170	$3,568	$1,761	$3,473	$2,509	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$23,798	$23,798	$21,318	$22,791	$22,518	$23,316	$21,533	[s] = [q] + [r].
Market Value of Debt		$23,798	$23,798	$21,318	$22,791	$22,518	$23,316	$21,533	[t] = [s].
MARKET VALUE OF FIRM		$48,868	$50,503	$45,057	$43,626	$42,905	$41,070	$37,124	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		51.30%	52.88%	52.69%	47.76%	47.52%	43.23%	42.00%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		48.70%	47.12%	47.31%	52.24%	52.48%	56.77%	58.00%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel U: Public Serv. Enterprise

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$13,124	$13,124	$13,476	$12,933	$12,083	$11,338	$10,806	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	505	505	505	505	506	506	506	[b]
Price per Share - Common	15_day_Average	$52	$46	$43	$40	$38	$33	$32	[c]
Market Value of Common Equity		$26,016	$23,230	$21,487	$20,317	$18,979	$16,702	$16,052	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$26,016	$23,230	$21,487	$20,317	$18,979	$16,702	$16,052	[f]= [d]
Market to Book Value of Common Equity		1.98	1.77	1.59	1.57	1.57	1.47	1.49	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$3,081	$3,081	$3,209	$3,204	$3,846	$3,741	$3,978	[j]
Current Liabilities	BS_CUR_LIAB	$3,831	$3,831	$2,804	$3,604	$3,136	$3,235	$3,039	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$1,250	$1,250	$0	$1,106	$574	$1,010	$975	[l]
Net Working Capital		$500	$500	$405	$706	$1,284	$1,516	$1,914	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$202	$202	$255	$20	$0	$0	$16	[n]
Adjusted Short-Term Debt		$0	$0	$0	$0	$0	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$11,274	$11,274	$10,697	$8,132	$8,389	$7,476	$7,334	[p]
Book Value of Long-Term Debt		$12,524	$12,524	$10,697	$9,238	$8,963	$8,486	$8,309	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$12,003	$12,003	$10,256	$10,149	$9,061	$9,324	$9,283	
Carrying Amount		$11,395	$11,395	$9,568	$9,144	$8,643	$7,939	$8,094	
Adjustment to Book Value of Long-Term Debt		$608	$608	$688	$1,005	$418	$1,385	$1,189	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$13,132	$13,132	$11,385	$10,243	$9,381	$9,871	$9,498	[s] = [q] + [r].
Market Value of Debt		$13,132	$13,132	$11,385	$10,243	$9,381	$9,871	$9,498	[t] = [s].
MARKET VALUE OF FIRM		$39,148	$36,362	$32,872	$30,560	$28,360	$26,573	$25,550	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		66.46%	63.89%	65.37%	66.48%	66.92%	62.85%	62.83%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		33.54%	36.11%	34.63%	33.52%	33.08%	37.15%	37.17%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-3

Market Value of the U.S. Electric Sample

Panel V: Xcel Energy Inc.

($MM)

		DCF Capital Structure	3rd Quarter, 2017	3rd Quarter, 2016	3rd Quarter, 2015	3rd Quarter, 2014	3rd Quarter, 2013	3rd Quarter, 2012	Notes
MARKET VALUE OF COMMON EQUITY		DCF Capital Structure	09/30/17	09/30/16	09/30/15	09/30/14	09/30/13	09/30/12	
Book Value, Common Shareholder's Equity	TOT_COMMON_EQY	$11,123	$11,123	$10,988	$10,545	$10,155	$9,547	$8,850	[a]
Shares Outstanding (in millions) - Common	BS_SH_OUT	508	508	508	507	505	498	488	[b]
Price per Share - Common	15_day_Average	$51	$48	$42	$34	$31	$28	$28	[c]
Market Value of Common Equity		$25,861	$24,546	$21,223	$17,219	$15,664	$13,799	$13,528	[d] = [b] x [c].
Market Value of GP Equity		n/a	n/a	n/a	n/a	n/a	n/a	n/a	[e]
Total Market Value of Equity		$25,861	$24,546	$21,223	$17,219	$15,664	$13,799	$13,528	[f]= [d]
Market to Book Value of Common Equity		2.32	2.21	1.93	1.63	1.54	1.45	1.53	[g] = [f] / [a].
MARKET VALUE OF PREFERRED EQUITY									
Book Value of Preferred Equity	BS_PFD_EQY	$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	BS_CUR_ASSET_REPORT	$2,899	$2,899	$3,076	$3,344	$3,197	$3,121	$3,371	[j]
Current Liabilities	BS_CUR_LIAB	$3,340	$3,340	$3,454	$3,085	$3,471	$2,839	$3,161	[k]
Current Portion of Long-Term Debt	BS_ST_PORTION_OF_LT_DEBT	$305	$305	$710	$457	$258	$281	$859	[l]
Net Working Capital		($136)	($136)	$332	$717	($17)	$562	$1,070	[m] = [j] - ([k] - [l]).
Notes Payable (Short-Term Debt)	BS_ST_DEBT	$514	$514	$366	$64	$697	$302	$304	[n]
Adjusted Short-Term Debt		$136	$136	$0	$0	$17	$0	$0	[o] = See Sources and Notes.
Long-Term Debt	BS_LT_BORROW	$14,573	$14,573	$13,403	$12,691	$11,502	$10,914	$10,106	[p]
Book Value of Long-Term Debt		$15,014	$15,014	$14,112	$13,148	$11,776	$11,195	$10,965	[q] = [l] + [o] + [p].
Unadjusted Market Value of Long Term Debt		$15,513	$15,513	$14,095	$13,360	$11,879	$12,208	$11,735	
Carrying Amount		$14,450	$14,450	$13,056	$11,757	$11,192	$10,402	$9,908	
Adjustment to Book Value of Long-Term Debt		$1,063	$1,063	$1,039	$1,603	$687	$1,806	$1,826	[r] = See Sources and Notes.
Market Value of Long-Term Debt		$16,077	$16,077	$15,151	$14,751	$12,463	$13,001	$12,792	[s] = [q] + [r].
Market Value of Debt		$16,077	$16,077	$15,151	$14,751	$12,463	$13,001	$12,792	[t] = [s].
MARKET VALUE OF FIRM		$41,939	$40,624	$36,374	$31,970	$28,128	$26,800	$26,319	[u] = [f] + [i] + [t].
DEBT AND EQUITY TO MARKET VALUE RATIOS									
Common Equity - Market Value Ratio		61.66%	60.42%	58.35%	53.86%	55.69%	51.49%	51.40%	[v] = [f] / [u].
Preferred Equity - Market Value Ratio		-	-	-	-	-	-	-	[w] = [i] / [u].
Debt - Market Value Ratio		38.34%	39.58%	41.65%	46.14%	44.31%	48.51%	48.60%	[x] = [t] / [u].

Sources and Notes:
Bloomberg as of November 30, 2017
Capital structure from 3rd Quarter, 2017 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 3rd Quarter, 2017 balance sheet information and a 15-trading day average closing price ending on 11/30/2017.
Prices are reported in Supporting Schedule #1 to Table No. BV-ELEC-6.
[o] =
(1): 0 if [m] > 0.
(2): The absolute value of [m] if [m] < 0 and |[m]| < [n].
(3): [n] if [m] < 0 and |[m]| > [n].
[r]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2016 10-K.

Table No. BV-ELEC-4

Capital Structure Summary

Company	DCF Analysis	CAPM Analysis	DCF Capital Structure: Common Equity - Value Ratio [1]	DCF Capital Structure: Preferred Equity - Value Ratio [2]	DCF Capital Structure: Debt - Value Ratio [3]	5-Year Average Capital Structure: Common Equity - Value Ratio [4]	5-Year Average Capital Structure: Preferred Equity - Value Ratio [5]	5-Year Average Capital Structure: Debt - Value Ratio [6]
ALLETE			71.5%	0.0%	28.5%	61.8%	0.0%	38.2%
Alliant Energy	*	*	65.1%	1.3%	33.7%	59.9%	1.8%	38.3%
Amer. Elec. Power	*	*	61.6%	0.0%	38.4%	55.4%	0.0%	44.6%
Ameren Corp.	*	*	64.6%	0.0%	35.4%	57.4%	0.0%	42.6%
CenterPoint Energy			58.4%	0.0%	41.6%	51.0%	0.0%	49.0%
CMS Energy Corp.	*	*	57.0%	0.0%	43.0%	48.5%	0.0%	51.5%
Consol. Edison	*	*	61.8%	0.0%	38.2%	57.7%	0.0%	42.3%
DTE Energy	*	*	61.9%	0.0%	38.1%	59.2%	0.0%	40.8%
Duke Energy	*	*	54.0%	0.0%	46.0%	52.8%	0.0%	47.2%
Edison Int'l	*	*	61.5%	5.1%	33.4%	55.4%	5.7%	38.9%
El Paso Electric	*	*	62.4%	0.0%	37.6%	56.1%	0.0%	43.9%
Entergy Corp.	*	*	50.5%	0.7%	48.9%	48.0%	1.0%	51.0%
IDACORP Inc.	*	*	72.4%	0.0%	27.6%	62.2%	0.0%	37.8%
MGE Energy			84.0%	0.0%	16.0%	77.0%	0.0%	23.0%
OGE Energy	*	*	67.6%	0.0%	32.4%	68.1%	0.0%	31.9%
Otter Tail Corp.	*	*	76.9%	0.0%	23.1%	66.5%	0.1%	33.4%
Pinnacle West Capital	*	*	66.9%	0.0%	33.1%	62.8%	0.0%	37.2%
PNM Resources	*	*	56.6%	0.2%	43.2%	49.7%	0.3%	50.1%
Portland General	*	*	61.6%	0.0%	38.4%	54.3%	0.0%	45.7%
PPL Corp.	*	*	51.3%	0.0%	48.7%	47.7%	0.0%	52.3%
Public Serv. Enterprise			66.5%	0.0%	33.5%	65.0%	0.0%	35.0%
Xcel Energy Inc.	*	*	61.7%	0.0%	38.3%	55.1%	0.0%	44.9%
Average			63.4%	0.3%	36.2%	57.8%	0.4%	41.8%
Regulated Subsample Average			62.0%	0.4%	37.6%	56.5%	0.5%	43.0%

Sources and Notes:
[1], [4]: Supporting Schedule #1 to Table No. BV-ELEC-4.
[2], [5]: Supporting Schedule #2 to Table No. BV-ELEC-4.
[3], [6]: Supporting Schedule #3 to Table No. BV-ELEC-4.
Values in this table may not add up exactly to 100% because of rounding.

Table No. BV-ELEC-5

Estimated Growth Rates

Company	ThomsonOne IBES Estimate		Value Line			Combined Growth Rate
	Long-Term Growth Rate	Number of Estimates	EPS Year 2017 Estimate	EPS Year 2020-2022 Estimate	Annualized Growth Rate	
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	n/a	n/a	$3.30	$4.00	4.9%	4.9%
Alliant Energy	7.1%	2	$2.00	$2.50	5.7%	6.6%
Amer. Elec. Power	2.8%	3	$3.60	$4.75	7.2%	3.9%
Ameren Corp.	7.0%	1	$2.75	$3.50	6.2%	6.6%
CenterPoint Energy	7.4%	4	$1.35	$1.65	5.1%	6.9%
CMS Energy Corp.	7.4%	4	$2.15	$2.75	6.3%	7.2%
Consol. Edison	3.2%	3	$4.05	$4.50	2.7%	3.1%
DTE Energy	4.9%	3	$5.75	$6.75	4.1%	4.7%
Duke Energy	3.2%	3	$4.60	$5.25	3.4%	3.3%
Edison Int'l	5.8%	2	$4.25	$5.25	5.4%	5.7%
El Paso Electric	5.3%	1	$2.45	$3.00	5.2%	5.2%
Entergy Corp.	-5.4%	2	$4.80	$5.00	1.0%	-3.2%
IDACORP Inc.	n/a	n/a	$4.05	$4.75	4.1%	4.1%
MGE Energy	n/a	n/a	$2.40	$3.25	7.9%	7.9%
OGE Energy	3.9%	1	$1.95	$2.50	6.4%	5.2%
Otter Tail Corp.	n/a	n/a	$1.72	$2.30	7.5%	7.5%
Pinnacle West Capital	5.5%	3	$4.25	$5.25	5.4%	5.5%
PNM Resources	6.0%	2	$1.85	$2.50	7.8%	6.6%
Portland General	4.0%	3	$2.25	$3.00	7.5%	4.9%
PPL Corp.	0.0%	1	$2.05	$2.50	5.1%	2.5%
Public Serv. Enterprise	1.5%	2	$2.95	$3.25	2.5%	1.8%
Xcel Energy Inc.	6.0%	2	$2.30	$2.75	4.6%	5.5%

Sources and Notes:
[1] - [2]: Updated from ThomsonOne as of Nov 30, 2017.
[3] - [4]: From Valueline Investment Analyzer as of Nov 29, 2017.
[5]: ([4]/[3])^(1/4) - 1, where 4 is the number of years between 2021, the middle year of Value Line's 3-5 year forecast, and our study
[6]: Weighted average growth rate. If information is missing from one source, the combined growth rate depends solely on the other sour

Table No. BV-ELEC-6

DCF Cost of Equity of the U.S. Electric Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Most Recent Dividend [2]	Quarterly Dividend Yield (t+1) [3]	Combined Long-Term Growth Rate [4]	Quarterly Growth Rate [5]	DCF Cost of Equity [6]
ALLETE	$78.24	$0.54	0.69%	4.9%	1.2%	7.8%
Alliant Energy	$44.48	$0.32	0.72%	6.6%	1.6%	9.7%
Amer. Elec. Power	$76.55	$0.62	0.82%	3.9%	1.0%	7.3%
Ameren Corp.	$63.42	$0.44	0.70%	6.6%	1.6%	9.6%
CenterPoint Energy	$29.42	$0.27	0.92%	6.9%	1.7%	10.9%
CMS Energy Corp.	$49.69	$0.33	0.68%	7.2%	1.8%	10.1%
Consol. Edison	$87.53	$0.69	0.79%	3.1%	0.8%	6.4%
DTE Energy	$113.67	$0.83	0.73%	4.7%	1.2%	7.8%
Duke Energy	$89.25	$0.89	1.01%	3.3%	0.8%	7.4%
Edison Int'l	$80.97	$0.54	0.68%	5.7%	1.4%	8.5%
El Paso Electric	$59.69	$0.34	0.57%	5.2%	1.3%	7.6%
Entergy Corp.	$86.11	$0.89	1.03%	-3.2%	-0.8%	0.8%
IDACORP Inc.	$97.00	$0.59	0.61%	4.1%	1.0%	6.6%
MGE Energy	$65.30	$0.32	0.50%	7.9%	1.9%	10.0%
OGE Energy	$35.26	$0.33	0.96%	5.2%	1.3%	9.2%
Otter Tail Corp.	$46.59	$0.32	0.70%	7.5%	1.8%	10.5%
Pinnacle West Capital	$90.13	$0.70	0.78%	5.5%	1.3%	8.7%
PNM Resources	$44.63	$0.24	0.55%	6.6%	1.6%	8.9%
Portland General	$49.00	$0.34	0.70%	4.9%	1.2%	7.8%
PPL Corp.	$36.43	$0.40	1.09%	2.5%	0.6%	7.0%
Public Serv. Enterprise	$51.52	$0.43	0.84%	1.8%	0.4%	5.2%
Xcel Energy Inc.	$50.93	$0.36	0.72%	5.5%	1.4%	8.5%

Sources and Notes:
[1]: Supporting Schedule #1 to Table No. BV-ELEC-6.
[2]: Supporting Schedule #2 to Table No. BV-ELEC-6.
[3]: ([2] / [1]) x (1 + [5]).
[4]: Table No. BV-ELEC-5, [6].
[5]: {(1 + [4]) ^ (1/4)} - 1.
[6]: {([3] + [5] + 1) ^ 4} - 1.

Table No. BV-ELEC-6

DCF Cost of Equity of the U.S. Electric Sample

Panel B: Multi-Stage DCF (Using Blue Chip Economic Indicators, October 2017 U.S. 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	$78.24	$0.54	4.93%	4.81%	4.68%	4.56%	4.44%	4.32%	4.20%	7.2%
Alliant Energy	$44.48	$0.32	6.61%	6.21%	5.81%	5.41%	5.00%	4.60%	4.20%	7.7%
Amer. Elec. Power	$76.55	$0.62	3.87%	3.93%	3.98%	4.04%	4.09%	4.15%	4.20%	7.5%
Ameren Corp.	$63.42	$0.44	6.61%	6.21%	5.80%	5.40%	5.00%	4.60%	4.20%	7.6%
CenterPoint Energy	$29.42	$0.27	6.93%	6.48%	6.02%	5.57%	5.11%	4.66%	4.20%	8.8%
CMS Energy Corp.	$49.69	$0.33	7.22%	6.72%	6.21%	5.71%	5.21%	4.70%	4.20%	7.6%
Consol. Edison	$87.53	$0.69	3.09%	3.27%	3.46%	3.64%	3.83%	4.01%	4.20%	7.3%
DTE Energy	$113.67	$0.83	4.70%	4.61%	4.53%	4.45%	4.37%	4.28%	4.20%	7.4%
Duke Energy	$89.25	$0.89	3.26%	3.42%	3.57%	3.73%	3.89%	4.04%	4.20%	8.2%
Edison Int'l	$80.97	$0.54	5.65%	5.41%	5.17%	4.93%	4.68%	4.44%	4.20%	7.3%
El Paso Electric	$59.69	$0.34	5.25%	5.07%	4.90%	4.72%	4.55%	4.37%	4.20%	6.7%
Entergy Corp.	$86.11	$0.89	-3.24%	-2.00%	-0.76%	0.48%	1.72%	2.96%	4.20%	6.8%
IDACORP Inc.	$97.00	$0.59	4.07%	4.09%	4.11%	4.13%	4.16%	4.18%	4.20%	6.7%
MGE Energy	$65.30	$0.32	7.87%	7.26%	6.65%	6.04%	5.42%	4.81%	4.20%	6.8%
OGE Energy	$35.26	$0.33	5.15%	5.00%	4.84%	4.68%	4.52%	4.36%	4.20%	8.4%
Otter Tail Corp.	$46.59	$0.32	7.54%	6.98%	6.42%	5.87%	5.31%	4.76%	4.20%	7.8%
Pinnacle West Capital	$90.13	$0.70	5.45%	5.24%	5.03%	4.83%	4.62%	4.41%	4.20%	7.7%
PNM Resources	$44.63	$0.24	6.61%	6.21%	5.80%	5.40%	5.00%	4.60%	4.20%	6.9%
Portland General	$49.00	$0.34	4.86%	4.75%	4.64%	4.53%	4.42%	4.31%	4.20%	7.3%
PPL Corp.	$36.43	$0.40	2.53%	2.81%	3.09%	3.36%	3.64%	3.92%	4.20%	8.3%
Public Serv. Enterprise	$51.52	$0.43	1.80%	2.20%	2.60%	3.00%	3.40%	3.80%	4.20%	7.2%
Xcel Energy Inc.	$50.93	$0.36	5.52%	5.30%	5.08%	4.86%	4.64%	4.42%	4.20%	7.4%

Sources and Notes:
[1]: Supporting Schedule #1 to Table No. BV-ELEC-6.
[2]: Supporting Schedule #2 to Table No. BV-ELEC-6.
[3]: Table No. BV-ELEC-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]: Blue Chip Economic Indicators, October 2017 U.S. This number is assumed to be the perpetual growth rate.
[10]: Supporting Schedule #3 to Table No. BV-ELEC-6.

Table No. BV-ELEC-7

Overall After-Tax DCF Cost of Capital of the U.S. Electric Sample

Panel A: Simple DCF Method (Quarterly)

Company	Regulated Subsample	3rd Quarter, 2017 Bond Rating [1]	3rd Quarter, 2017 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Utilities Representative Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
ALLETE		BBB	-	7.8%	71.5%	-	0.0%	4.1%	28.5%	27.0%	6.45%
Alliant Energy	*	A	A	9.7%	65.1%	3.8%	1.3%	3.8%	33.7%	27.0%	7.28%
Amer. Elec. Power	*	A	-	7.3%	61.6%	-	0.0%	3.8%	38.4%	27.0%	5.56%
Ameren Corp.	*	BBB	-	9.6%	64.6%	-	0.0%	4.1%	35.4%	27.0%	7.26%
CenterPoint Energy		A	-	10.9%	58.4%	-	0.0%	3.8%	41.6%	27.0%	7.52%
CMS Energy Corp.	*	BBB	-	10.1%	57.0%	-	0.0%	4.1%	43.0%	27.0%	7.06%
Consol. Edison	*	A	-	6.4%	61.8%	-	0.0%	3.8%	38.2%	27.0%	5.01%
DTE Energy	*	BBB									
Duke Energy	*	A	-	7.4%	54.0%	-	0.0%	3.8%	46.0%	27.0%	5.31%
Edison Int'l	*	BBB	BBB	8.5%	61.5%	4.1%	5.1%	4.1%	33.4%	27.0%	6.45%
El Paso Electric	*	BBB	-	7.6%	62.4%	-	0.0%	4.1%	37.6%	27.0%	5.89%
Entergy Corp.	*	BBB	BBB	0.8%	50.5%	4.1%	0.7%	4.1%	48.9%	27.0%	~~1.90%~~
IDACORP Inc.	*	BBB	-	6.6%	72.4%	-	0.0%	4.1%	27.6%	27.0%	5.62%
MGE Energy		AA	-	10.0%	84.0%	-	0.0%	3.7%	16.0%	27.0%	8.85%
OGE Energy	*	A	-	9.2%	67.6%	-	0.0%	3.8%	32.4%	27.0%	7.11%
Otter Tail Corp.	*	BBB	-	10.5%	76.9%	-	0.0%	4.1%	23.1%	27.0%	8.78%
Pinnacle West Capital	*	A	-	8.7%	66.9%	-	0.0%	3.8%	33.1%	27.0%	6.78%
PNM Resources	*	BBB	BBB								
Portland General	*	BBB	-	7.8%	61.6%	-	0.0%	4.1%	38.4%	27.0%	5.96%
PPL Corp.	*	A	-	7.0%	51.3%	-	0.0%	3.8%	48.7%	27.0%	4.98%
Public Serv. Enterprise		BBB	-	5.2%	66.5%	-	0.0%	4.1%	33.5%	27.0%	~~4.49%~~
Xcel Energy Inc.	*	A	-	8.5%	61.7%	-	0.0%	3.8%	38.3%	27.0%	6.34%
Simple Full Sample Average				8.5%	64.5%	4.0%	0.4%	4.0%	35.2%	27.0%	6.57%
Simple Regulated Subsample Average				8.3%	63.1%	4.0%	0.4%	4.0%	36.5%	27.0%	6.36%

Sources and Notes:

[1]: S&P Credit Ratings from Research Insight.

[2]: Preferred ratings were assumed equal to debt ratings.

[3]: Table No. BV-ELEC-6; Panel A, [6].

[4]: Table No. BV-ELEC-4, [1].

[5]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[6]: Table No. BV-ELEC-4, [2].

[7]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel B.

[8]: Table No. BV-ELEC-4, [3].

[9]: Effective US/Oregon Corporate Tax Rate.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points.

Table No. BV-ELEC-7

Overall After-Tax DCF Cost of Capital of the U.S. Electric Sample

Panel B: Multi-Stage DCF (Using Blue Chip Economic Indicators, October 2017 U.S. GDP Growth Forecast as the Perpetual Rate)

Company	Regulated Subsample	3rd Quarter, 2017 Bond Rating [1]	3rd Quarter, 2017 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Utilities Representative Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
ALLETE		BBB	-	7.2%	71.5%	-	0.0%	4.1%	28.5%	27.0%	6.01%
Alliant Energy	*	A	A	7.7%	65.1%	3.8%	1.3%	3.8%	33.7%	27.0%	5.99%
Amer. Elec. Power	*	A	-	7.5%	61.6%	-	0.0%	3.8%	38.4%	27.0%	5.73%
Ameren Corp.	*	BBB	-	7.6%	64.6%	-	0.0%	4.1%	35.4%	27.0%	5.98%
CenterPoint Energy		A	-	8.8%	58.4%	-	0.0%	3.8%	41.6%	27.0%	6.28%
CMS Energy Corp.	*	BBB	-	7.6%	57.0%	-	0.0%	4.1%	43.0%	27.0%	5.63%
Consol. Edison	*	A	-	7.3%	61.8%	-	0.0%	3.8%	38.2%	27.0%	5.58%
DTE Energy	*	BBB	0.00	7.4%	61.9%	NA	0.0%	4.1%	38.1%	27.0%	5.70%
Duke Energy	*	A	-	8.2%	54.0%	-	0.0%	3.8%	46.0%	27.0%	5.70%
Edison Int'l	*	BBB	BBB	7.3%	61.5%	4.1%	5.1%	4.1%	33.4%	27.0%	5.70%
El Paso Electric	*	BBB	-	6.7%	62.4%	-	0.0%	4.1%	37.6%	27.0%	5.33%
Entergy Corp.	*	BBB	BBB	6.8%	50.5%	4.1%	0.7%	4.1%	48.9%	27.0%	4.95%
IDACORP Inc.	*	BBB	-	6.7%	72.4%	-	0.0%	4.1%	27.6%	27.0%	5.71%
MGE Energy		AA	-	6.8%	84.0%	-	0.0%	3.7%	16.0%	27.0%	6.18%
OGE Energy	*	A	-	8.4%	67.6%	-	0.0%	3.8%	32.4%	27.0%	6.61%
Otter Tail Corp.	*	BBB	-	7.8%	76.9%	-	0.0%	4.1%	23.1%	27.0%	6.67%
Pinnacle West Capital	*	A	-	7.7%	66.9%	-	0.0%	3.8%	33.1%	27.0%	6.10%
PNM Resources	*	BBB	BBB	6.9%	56.6%	4.1%	0.2%	4.1%	43.2%	27.0%	5.19%
Portland General	*	BBB	-	7.3%	61.6%	-	0.0%	4.1%	38.4%	27.0%	5.62%
PPL Corp.	*	A	-	8.3%	51.3%	-	0.0%	3.8%	48.7%	27.0%	5.64%
Public Serv. Enterprise		BBB	-	7.2%	66.5%	-	0.0%	4.1%	33.5%	27.0%	5.80%
Xcel Energy Inc.	*	A	-	7.4%	61.7%	-	0.0%	3.8%	38.3%	27.0%	5.67%
Multi Full Sample Average				7.5%	63.4%	4.0%	0.3%	4.0%	36.2%	27.0%	5.8%
Multi Regulated Subsample Average				7.5%	62.0%	4.0%	0.40%	4.0%	37.6%	27.0%	5.7%

Sources and Notes:

[1]: S&P Credit Ratings from Research Insight.

[2]: Preferred ratings were assumed equal to debt ratings.

[3]: Table No. BV-ELEC-6; Panel B, [10].

[4]: Table No. BV-ELEC-4, [1].

[5]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[6]: Table No. BV-ELEC-4, [2].

[7]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel B.

[8]: Table No. BV-ELEC-4, [3].

[9]: Effective US/Oregon Corporate Tax Rate.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points.

Table No. BV-ELEC-8

DCF Cost of Equity at Representative Deemed Capital Structure

	Overall After -Tax Cost of Capital [1]	Utilities Representative Base Deemed % Debt [2]	Representative Cost of BBB Rated Utility Debt [3]	Utilities Representative Income Tax Rate [4]	Utilities Representative Base Deemed % Equity [5]	Estimated Return on Equity [6]
Full Sample						
Simple DCF Quarterly	6.6%	50.0%	4.1%	27.0%	50.0%	10.1%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	5.8%	50.0%	4.1%	27.0%	50.0%	8.6%
Regulated Subsample						
Simple DCF Quarterly	6.4%	50.0%	4.1%	27.0%	50.0%	9.7%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	5.7%	50.0%	4.1%	27.0%	50.0%	8.5%

Sources and Notes:
[1]: Table No. BV-ELEC-7; Panels A-B, [10].
[2]: Utilities' Assumed Capital Structure.
[3]: Based on an BBB rating. Yield from Bloomberg as of November 30, 2017.
[4]: Effective US/Oregon Corporate Tax Rate.
[5]: Utilities' Assumed Capital Structure.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

USING ANALYST FORECASTS FROM IBES AND VALUE LINE AND HISTORICAL GDP GROWTH FROM 1990 TO 2016 AS LONG-TERM GDP GROWTH

Table No. BV-ELEC-6

DCF Cost of Equity of the U.S. Electric Sample

Panel B: Using Analyst Forecasts and Historic GDP Growth for 1990-2016

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	$78.24	$0.54	4.93%	4.86%	4.80%	4.73%	4.67%	4.60%	4.54%	7.5%
Alliant Energy	$44.48	$0.32	6.61%	6.27%	5.92%	5.58%	5.23%	4.89%	4.54%	8.0%
Amer. Elec. Power	$76.55	$0.62	3.87%	3.98%	4.09%	4.21%	4.32%	4.43%	4.54%	7.8%
Ameren Corp.	$63.42	$0.44	6.61%	6.26%	5.92%	5.57%	5.23%	4.88%	4.54%	7.9%
CenterPoint Energy	$29.42	$0.27	6.93%	6.53%	6.14%	5.74%	5.34%	4.94%	4.54%	9.0%
CMS Energy Corp.	$49.69	$0.33	7.22%	6.77%	6.33%	5.88%	5.43%	4.99%	4.54%	7.9%
Consol. Edison	$87.53	$0.69	3.09%	3.33%	3.57%	3.81%	4.06%	4.30%	4.54%	7.6%
DTE Energy	$113.67	$0.83	4.70%	4.67%	4.64%	4.62%	4.59%	4.57%	4.54%	7.6%
Duke Energy	$89.25	$0.89	3.26%	3.48%	3.69%	3.90%	4.11%	4.33%	4.54%	8.4%
Edison Int'l	$80.97	$0.54	5.65%	5.47%	5.28%	5.10%	4.91%	4.73%	4.54%	7.6%
El Paso Electric	$59.69	$0.34	5.25%	5.13%	5.01%	4.89%	4.78%	4.66%	4.54%	7.0%
Entergy Corp.	$86.11	$0.89	-3.24%	-1.95%	-0.65%	0.65%	1.95%	3.24%	4.54%	7.1%
IDACORP Inc.	$97.00	$0.59	4.07%	4.15%	4.22%	4.30%	4.38%	4.46%	4.54%	7.0%
MGE Energy	$65.30	$0.32	7.87%	7.32%	6.76%	6.21%	5.65%	5.10%	4.54%	7.1%
OGE Energy	$35.26	$0.33	5.15%	5.05%	4.95%	4.85%	4.74%	4.64%	4.54%	8.7%
Otter Tail Corp.	$46.59	$0.32	7.54%	7.04%	6.54%	6.04%	5.54%	5.04%	4.54%	8.1%
Pinnacle West Capital	$90.13	$0.70	5.45%	5.30%	5.15%	5.00%	4.84%	4.69%	4.54%	8.0%
PNM Resources	$44.63	$0.24	6.61%	6.26%	5.92%	5.57%	5.23%	4.88%	4.54%	7.2%
Portland General	$49.00	$0.34	4.86%	4.81%	4.76%	4.70%	4.65%	4.59%	4.54%	7.5%
PPL Corp.	$36.43	$0.40	2.53%	2.86%	3.20%	3.53%	3.87%	4.20%	4.54%	8.6%
Public Serv. Enterprise	$51.52	$0.43	1.80%	2.26%	2.72%	3.17%	3.63%	4.08%	4.54%	7.5%
Xcel Energy Inc.	$50.93	$0.36	5.52%	5.35%	5.19%	5.03%	4.87%	4.70%	4.54%	7.7%

Sources and Notes:

[1]: Supporting Schedule #1 to Table No. BV-ELEC-6.

[2]: Supporting Schedule #2 to Table No. BV-ELEC-6.

[3]: Table No. BV-ELEC-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]: Blue Chip Economic Indicators, October 2017 U.S. This number is assumed to be the perpetual growth rate.

[10]: Supporting Schedule #3 to Table No. BV-ELEC-6.

Table No. BV-ELEC-7

Overall After-Tax DCF Cost of Capital of the U.S. Electric Sample

Panel B: Using Analyst Forecasts and Historic GDP Growth for 1990-2016

Company	Regulated Subsample	3rd Quarter, 2017 Bond Rating [1]	3rd Quarter, 2017 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Utilities Representative Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
ALLETE		BBB	-	7.5%	71.5%	-	0.0%	4.1%	28.5%	27.0%	6.22%
Alliant Energy	*	A	A	8.0%	65.1%	3.8%	1.3%	3.8%	33.7%	27.0%	6.17%
Amer. Elec. Power	*	A	-	7.8%	61.6%	-	0.0%	3.8%	38.4%	27.0%	5.90%
Ameren Corp.	*	BBB	-	7.9%	64.6%	-	0.0%	4.1%	35.4%	27.0%	6.16%
CenterPoint Energy		A	-	9.0%	58.4%	-	0.0%	3.8%	41.6%	27.0%	6.43%
CMS Energy Corp.	*	BBB	-	7.9%	57.0%	-	0.0%	4.1%	43.0%	27.0%	5.79%
Consol. Edison	*	A	-	7.6%	61.8%	-	0.0%	3.8%	38.2%	27.0%	5.75%
DTE Energy	*	BBB	0.00	7.6%	61.9%	NA	0.0%	4.1%	38.1%	27.0%	5.87%
Duke Energy	*	A	-	8.4%	54.0%	-	0.0%	3.8%	46.0%	27.0%	5.85%
Edison Int'l	*	BBB	BBB	7.6%	61.5%	4.1%	5.1%	4.1%	33.4%	27.0%	5.87%
El Paso Electric	*	BBB	-	7.0%	62.4%	-	0.0%	4.1%	37.6%	27.0%	5.51%
Entergy Corp.	*	BBB	BBB	7.1%	50.5%	4.1%	0.7%	4.1%	48.9%	27.0%	5.09%
IDACORP Inc.	*	BBB	-	7.0%	72.4%	-	0.0%	4.1%	27.6%	27.0%	5.92%
MGE Energy		AA	-	7.1%	84.0%	-	0.0%	3.7%	16.0%	27.0%	6.42%
OGE Energy	*	A	-	8.7%	67.6%	-	0.0%	3.8%	32.4%	27.0%	6.79%
Otter Tail Corp.	*	BBB	-	8.1%	76.9%	-	0.0%	4.1%	23.1%	27.0%	6.88%
Pinnacle West Capital	*	A	-	8.0%	66.9%	-	0.0%	3.8%	33.1%	27.0%	6.28%
PNM Resources	*	BBB	BBB	7.2%	56.6%	4.1%	0.2%	4.1%	43.2%	27.0%	5.36%
Portland General	*	BBB	-	7.5%	61.6%	-	0.0%	4.1%	38.4%	27.0%	5.79%
PPL Corp.	*	A	-	8.6%	51.3%	-	0.0%	3.8%	48.7%	27.0%	5.78%
Public Serv. Enterprise		BBB	-	7.5%	66.5%	-	0.0%	4.1%	33.5%	27.0%	5.98%
Xcel Energy Inc.	*	A	-	7.7%	61.7%	-	0.0%	3.8%	38.3%	27.0%	5.84%
Multi Full Sample Average				7.8%	63.4%	4.0%	0.3%	4.0%	36.2%	27.0%	6.0%
Multi Regulated Subsample Average				7.8%	62.0%	4.0%	0.40%	4.0%	37.6%	27.0%	5.9%

Sources and Notes:

[1]: S&P Credit Ratings from Research Insight.

[2]: Preferred ratings were assumed equal to debt ratings.

[3]: Table No. BV-ELEC-6; Panel B, [10].

[4]: Table No. BV-ELEC-4, [1].

[5]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[6]: Table No. BV-ELEC-4, [2].

[7]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel B.

[8]: Table No. BV-ELEC-4, [3].

[9]: Effective US/Oregon Corporate Tax Rate.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points.

Table No. BV-ELEC-8

DCF Cost of Equity at Representative Deemed Capital Structure

	Overall After -Tax Cost of Capital [1]	Utilities Representative Base Deemed % Debt [2]	Representative Cost of BBB Rated Utility Debt [3]	Utilities Representative Income Tax Rate [4]	Utilities Representative Base Deemed % Equity [5]	Estimated Return on Equity [6]
Full Sample						
Simple DCF Quarterly	6.6%	50.0%	4.1%	27.0%	50.0%	10.1%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	6.0%	50.0%	4.1%	27.0%	50.0%	9.0%
Regulated Subsample						
Simple DCF Quarterly	6.4%	50.0%	4.1%	27.0%	50.0%	9.7%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	5.9%	50.0%	4.1%	27.0%	50.0%	8.8%

Sources and Notes:
[1]: Table No. BV-ELEC-7; Panels A-B, [10].
[2]: Utilities' Assumed Capital Structure.
[3]: Based on an BBB rating. Yield from Bloomberg as of November 30, 2017.
[4]: Effective US/Oregon Corporate Tax Rate.
[5]: Utilities' Assumed Capital Structure.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

USING ANALYST FORECASTS FROM IBES AND VALUE LINE AND HISTORICAL GDP GROWTH FROM 1947 TO 2016 AS LONG-TERM GDP GROWTH

Table No. BV-ELEC-6

DCF Cost of Equity of the U.S. Electric Sample

Panel B: Using Analysts Forecasts and Historic GDP Growth 1947-2016

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	$78.24	$0.54	4.93%	5.19%	5.45%	5.72%	5.98%	6.25%	6.51%	9.2%
Alliant Energy	$44.48	$0.32	6.61%	6.60%	6.58%	6.56%	6.54%	6.53%	6.51%	9.6%
Amer. Elec. Power	$76.55	$0.62	3.87%	4.31%	4.75%	5.19%	5.63%	6.07%	6.51%	9.5%
Ameren Corp.	$63.42	$0.44	6.61%	6.59%	6.57%	6.56%	6.54%	6.53%	6.51%	9.5%
CenterPoint Energy	$29.42	$0.27	6.93%	6.86%	6.79%	6.72%	6.65%	6.58%	6.51%	10.5%
CMS Energy Corp.	$49.69	$0.33	7.22%	7.10%	6.98%	6.87%	6.75%	6.63%	6.51%	9.5%
Consol. Edison	$87.53	$0.69	3.09%	3.66%	4.23%	4.80%	5.37%	5.94%	6.51%	9.2%
DTE Energy	$113.67	$0.83	4.70%	5.00%	5.30%	5.60%	5.91%	6.21%	6.51%	9.3%
Duke Energy	$89.25	$0.89	3.26%	3.80%	4.34%	4.89%	5.43%	5.97%	6.51%	10.0%
Edison Int'l	$80.97	$0.54	5.65%	5.80%	5.94%	6.08%	6.22%	6.37%	6.51%	9.2%
El Paso Electric	$59.69	$0.34	5.25%	5.46%	5.67%	5.88%	6.09%	6.30%	6.51%	8.7%
Entergy Corp.	$86.11	$0.89	-3.24%	-1.62%	0.01%	1.63%	3.26%	4.88%	6.51%	8.8%
IDACORP Inc.	$97.00	$0.59	4.07%	4.47%	4.88%	5.29%	5.70%	6.10%	6.51%	8.7%
MGE Energy	$65.30	$0.32	7.87%	7.65%	7.42%	7.19%	6.96%	6.74%	6.51%	8.8%
OGE Energy	$35.26	$0.33	5.15%	5.38%	5.61%	5.83%	6.06%	6.28%	6.51%	10.3%
Otter Tail Corp.	$46.59	$0.32	7.54%	7.36%	7.19%	7.02%	6.85%	6.68%	6.51%	9.7%
Pinnacle West Capital	$90.13	$0.70	5.45%	5.63%	5.80%	5.98%	6.16%	6.33%	6.51%	9.6%
PNM Resources	$44.63	$0.24	6.61%	6.59%	6.57%	6.56%	6.54%	6.53%	6.51%	8.9%
Portland General	$49.00	$0.34	4.86%	5.14%	5.41%	5.69%	5.96%	6.24%	6.51%	9.2%
PPL Corp.	$36.43	$0.40	2.53%	3.19%	3.86%	4.52%	5.18%	5.85%	6.51%	10.2%
Public Serv. Enterprise	$51.52	$0.43	1.80%	2.59%	3.37%	4.16%	4.94%	5.73%	6.51%	9.2%
Xcel Energy Inc.	$50.93	$0.36	5.52%	5.68%	5.85%	6.01%	6.18%	6.34%	6.51%	9.4%

Sources and Notes:
[1]: Supporting Schedule #1 to Table No. BV-ELEC-6.
[2]: Supporting Schedule #2 to Table No. BV-ELEC-6.
[3]: Table No. BV-ELEC-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]: Blue Chip Economic Indicators, October 2017 U.S. This number is assumed to be the perpetual growth rate.
[10]: Supporting Schedule #3 to Table No. BV-ELEC-6.

Table No. BV-ELEC-7

Overall After-Tax DCF Cost of Capital of the U.S. Electric Sample

Panel B: Using Analysts Forecasts and Historic GDP Growth 1947-2016

Company	Regulated Subsample	3rd Quarter, 2017 Bond Rating [1]	3rd Quarter, 2017 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	Utilities Representative Income Tax Rate [9]	Overall After-Tax Cost of Capital [10]
ALLETE		BBB	-	9.2%	71.5%	-	0.0%	4.1%	28.5%	27.0%	7.40%
Alliant Energy	*	A	A	9.6%	65.1%	3.8%	1.3%	3.8%	33.7%	27.0%	7.23%
Amer. Elec. Power	*	A	-	9.5%	61.6%	-	0.0%	3.8%	38.4%	27.0%	6.90%
Ameren Corp.	*	BBB	-	9.5%	64.6%	-	0.0%	4.1%	35.4%	27.0%	7.21%
CenterPoint Energy		A	-	10.5%	58.4%	-	0.0%	3.8%	41.6%	27.0%	7.32%
CMS Energy Corp.	*	BBB	-	9.5%	57.0%	-	0.0%	4.1%	43.0%	27.0%	6.72%
Consol. Edison	*	A	-	9.2%	61.8%	-	0.0%	3.8%	38.2%	27.0%	6.77%
DTE Energy	*	BBB	0.00	9.3%	61.9%	NA	0.0%	4.1%	38.1%	27.0%	6.89%
Duke Energy	*	A	-	10.0%	54.0%	-	0.0%	3.8%	46.0%	27.0%	6.70%
Edison Int'l	*	BBB	BBB	9.2%	61.5%	4.1%	5.1%	4.1%	33.4%	27.0%	6.89%
El Paso Electric	*	BBB	-	8.7%	62.4%	-	0.0%	4.1%	37.6%	27.0%	6.58%
Entergy Corp.	*	BBB	BBB	8.8%	50.5%	4.1%	0.7%	4.1%	48.9%	27.0%	5.95%
IDACORP Inc.	*	BBB	-	8.7%	72.4%	-	0.0%	4.1%	27.6%	27.0%	7.15%
MGE Energy		AA	-	8.8%	84.0%	-	0.0%	3.7%	16.0%	27.0%	7.85%
OGE Energy	*	A	-	10.3%	67.6%	-	0.0%	3.8%	32.4%	27.0%	7.84%
Otter Tail Corp.	*	BBB	-	9.7%	76.9%	-	0.0%	4.1%	23.1%	27.0%	8.13%
Pinnacle West Capital	*	A	-	9.6%	66.9%	-	0.0%	3.8%	33.1%	27.0%	7.36%
PNM Resources	*	BBB	BBB	8.9%	56.6%	4.1%	0.2%	4.1%	43.2%	27.0%	6.31%
Portland General	*	BBB	-	9.2%	61.6%	-	0.0%	4.1%	38.4%	27.0%	6.81%
PPL Corp.	*	A	-	10.2%	51.3%	-	0.0%	3.8%	48.7%	27.0%	6.58%
Public Serv. Enterprise		BBB	-	9.2%	66.5%	-	0.0%	4.1%	33.5%	27.0%	7.09%
Xcel Energy Inc.	*	A	-	9.4%	61.7%	-	0.0%	3.8%	38.3%	27.0%	6.85%
Multi Full Sample Average				9.4%	63.4%	4.0%	0.3%	4.0%	36.2%	27.0%	7.0%
Multi Regulated Subsample Average				9.4%	62.0%	4.0%	0.40%	4.0%	37.6%	27.0%	6.9%

Sources and Notes:

[1]: S&P Credit Ratings from Research Insight.

[2]: Preferred ratings were assumed equal to debt ratings.

[3]: Table No. BV-ELEC-6; Panel B, [10].

[4]: Table No. BV-ELEC-4, [1].

[5]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[6]: Table No. BV-ELEC-4, [2].

[7]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel B.

[8]: Table No. BV-ELEC-4, [3].

[9]: Effective US/Oregon Corporate Tax Rate.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}. A strikethrough indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points.

Table No. BV-ELEC-8

DCF Cost of Equity at Representative Deemed Capital Structure

	Overall After -Tax Cost of Capital [1]	Utilities Representative Base Deemed % Debt [2]	Representative Cost of BBB Rated Utility Debt [3]	Utilities Representative Income Tax Rate [4]	Utilities Representative Base Deemed % Equity [5]	Estimated Return on Equity [6]
Full Sample						
Simple DCF Quarterly	6.6%	50.0%	4.1%	27.0%	50.0%	10.1%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	7.0%	50.0%	4.1%	27.0%	50.0%	11.1%
Regulated Subsample						
Simple DCF Quarterly	6.4%	50.0%	4.1%	27.0%	50.0%	9.7%
Multi-Stage DCF - Using Long-Term GDP Growth Forecast as the Perpetual Rate	6.9%	50.0%	4.1%	27.0%	50.0%	10.9%

Sources and Notes:
[1]: Table No. BV-ELEC-7; Panels A-B, [10].
[2]: Utilities' Assumed Capital Structure.
[3]: Based on an BBB rating. Yield from Bloomberg as of November 30, 2017.
[4]: Effective US/Oregon Corporate Tax Rate.
[5]: Utilities' Assumed Capital Structure.
[6]: {[1] - ([2] x [3] x (1 - [4]))} / [5].

RISK PREMIUM MODEL

Risk Premium Model Cost of Equity Inputs

Input	Value
Forecasted 10-Year Government Bond Rate Source: October 2017 Blue Chip Forcast for 2019.	3.4%
Historical Average 10Y to 20Y Maturity Premium Source: Bloomberg.	0.50%
Utility Yield Spread Adjustment	0.20%
Case Type	Vertically Integrated

Risk Premiums Determined by Relationship Between Authorized ROEs[1] and Long-term Treasury Bond Rates During the Period 1990-2017

Formula: Risk Premium = A_0 + (A_1 x Treasury bond Rate)

R Squared	0.8362
Estimate of intercept (A_0)	8.787%
Estimate of slope (A_1)	-0.5810

Equity Cost Estimate for Vertically Integrated Electric		Predicted Risk Premium		Expected Treasury Bond Rate[2]	
10.5%	=	6.40%	+	4.10%	[3]
10.4%	=	6.52%	+	3.90%	[4]

Sources and Notes:

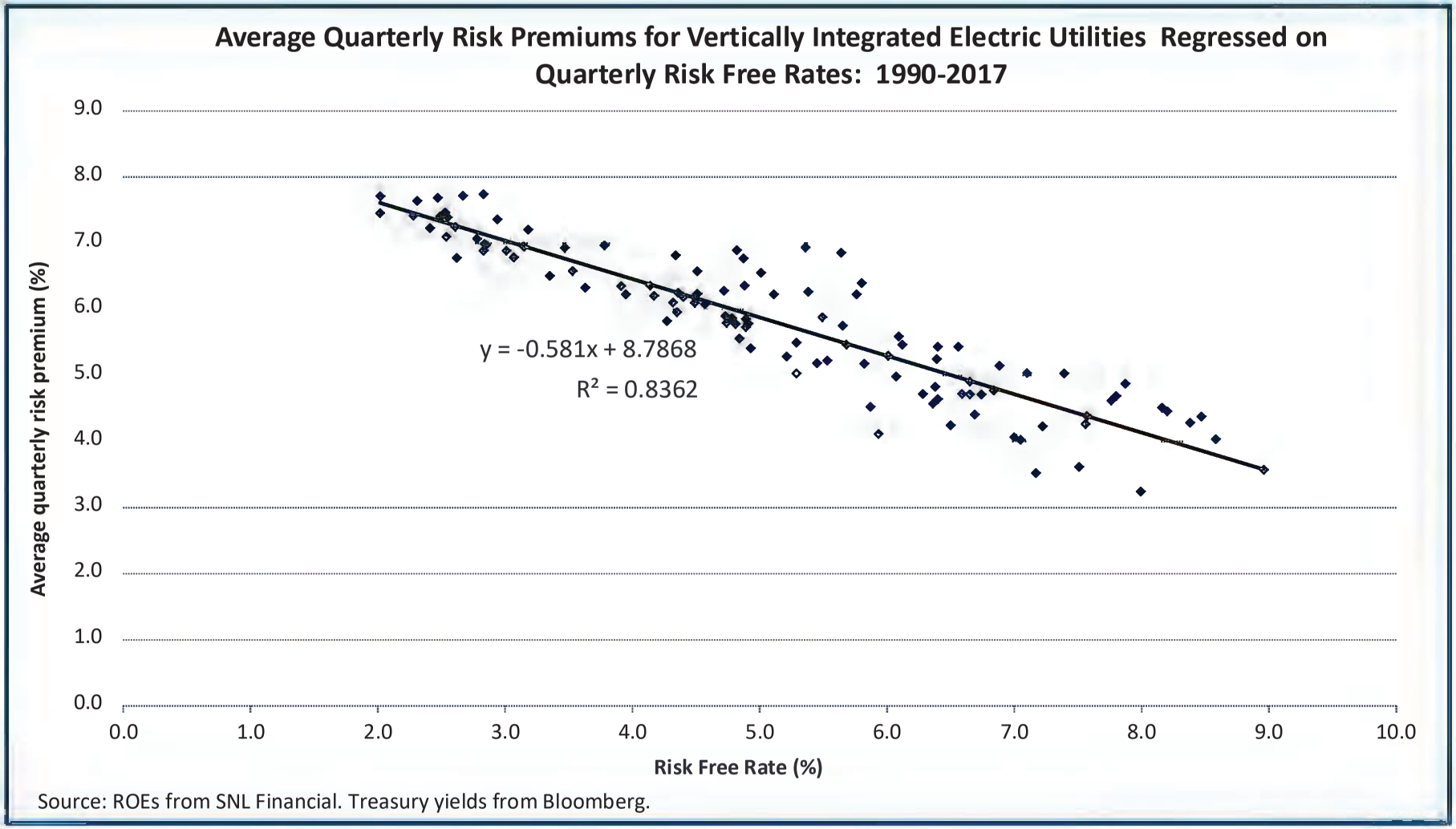
[1]: Authorized ROE Data sourced from SNL Financial.

[2]: Blue Chip consensus forecast 2019 10-yr T-bill Yield plus maturity premium

[3]: Estimate with expected treasury bond rate normalized with 0.20% utility yield spread adjustment

[4]: Estimate without treasury bond rate normalization.

See regression results for derivation of regression coefficients A_0 and A_1.



Source: ROEs from SNL Financial. Treasury yields from Bloomberg.

CAPITAL ASSET PRICING MODEL

Table No. BV-ELEC-9

Risk Free Rate

[1]	Blue Chip 10-Year Forecast	3.40%
	US Government Bond Yields	
[2]	20-year	5.04%
[3]	10-Year	4.52%
[4]	Maturity Premium	0.52%
[5]	Blue Chip 10-Year Forecast Adjusted to 20-year Horizon	3.92%

Sources and Notes:

[1]: Blue Chip Economic Indicators, October 2017 U.S.

[2]-[3]: Supporting Schedule # 1 to Table No. BV-ELEC-9. Averages of monthly bond yields from December 1990 through November 2017.

[4]: [2] - [3].

[5]: [1] + [4].

Table No. BV-ELEC-10

Risk Positioning Cost of Equity of the U.S. Electric Sample

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%

Company	Regulated Subsample	Long-Term Risk-Free Rate [1]	ValueLine Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
ALLETE		4.12%	0.75	6.94%	9.3%	9.7%
Alliant Energy	*	4.12%	0.70	6.94%	9.0%	9.4%
Amer. Elec. Power	*	4.12%	0.65	6.94%	8.6%	9.2%
Ameren Corp.	*	4.12%	0.65	6.94%	8.6%	9.2%
CenterPoint Energy		4.12%	0.90	6.94%	10.4%	10.5%
CMS Energy Corp.	*	4.12%	0.65	6.94%	8.6%	9.2%
Consol. Edison	*	4.12%	0.50	6.94%	7.6%	8.3%
DTE Energy						
Duke Energy	*	4.12%	0.60	6.94%	8.3%	8.9%
Edison Int'l	*	4.12%	0.65	6.94%	8.6%	9.2%
El Paso Electric	*	4.12%	0.80	6.94%	9.7%	10.0%
Entergy Corp.	*	4.12%	0.65	6.94%	8.6%	9.2%
IDACORP Inc.	*	4.12%	0.70	6.94%	9.0%	9.4%
MGE Energy		4.12%	0.75	6.94%	9.3%	9.7%
OGE Energy	*	4.12%	0.95	6.94%	10.7%	10.8%
Otter Tail Corp.	*	4.12%	0.90	6.94%	10.4%	10.5%
Pinnacle West Capital	*	4.12%	0.70	6.94%	9.0%	9.4%
PNM Resources						
Portland General	*	4.12%	0.70	6.94%	9.0%	9.4%
PPL Corp.	*	4.12%	0.70	6.94%	9.0%	9.4%
Public Serv. Enterprise		4.12%	0.70	6.94%	9.0%	9.4%
Xcel Energy Inc.	*	4.12%	0.60	6.94%	8.3%	8.9%
Average					9.0%	9.5%
Regulated Subsample Average					8.9%	9.4%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Bloomberg as of November 30, 2017.
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. BV-ELEC-10

Risk Positioning Cost of Equity of the U.S. Electric Sample

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%

Company	Regulated Subsample	Long-Term Risk-Free Rate [1]	ValueLine Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
ALLETE		3.92%	0.75	7.44%	9.5%	9.9%
Alliant Energy	*	3.92%	0.70	7.44%	9.1%	9.6%
Amer. Elec. Power	*	3.92%	0.65	7.44%	8.8%	9.3%
Ameren Corp.	*	3.92%	0.65	7.44%	8.8%	9.3%
CenterPoint Energy		3.92%	0.90	7.44%	10.6%	10.8%
CMS Energy Corp.	*	3.92%	0.65	7.44%	8.8%	9.3%
Consol. Edison	*	3.92%	0.50	7.44%	7.6%	8.4%
DTE Energy						
Duke Energy	*	3.92%	0.60	7.44%	8.4%	9.0%
Edison Int'l	*	3.92%	0.65	7.44%	8.8%	9.3%
El Paso Electric	*	3.92%	0.80	7.44%	9.9%	10.2%
Entergy Corp.	*	3.92%	0.65	7.44%	8.8%	9.3%
IDACORP Inc.	*	3.92%	0.70	7.44%	9.1%	9.6%
MGE Energy		3.92%	0.75	7.44%	9.5%	9.9%
OGE Energy	*	3.92%	0.95	7.44%	11.0%	11.1%
Otter Tail Corp.	*	3.92%	0.90	7.44%	10.6%	10.8%
Pinnacle West Capital	*	3.92%	0.70	7.44%	9.1%	9.6%
PNM Resources						
Portland General	*	3.92%	0.70	7.44%	9.1%	9.6%
PPL Corp.	*	3.92%	0.70	7.44%	9.1%	9.6%
Public Serv. Enterprise		3.92%	0.70	7.44%	9.1%	9.6%
Xcel Energy Inc.	*	3.92%	0.60	7.44%	8.4%	9.0%
Average					9.2%	9.6%
Regulated Subsample Average					9.1%	9.5%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Bloomberg as of November 30, 2017.
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. BV-ELEC-11

Overall After-Tax Cost of Capital of the U.S. Electric Sample

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%

Company	Regulated Subsample	CAPM Cost of Equity [1]	ECAPM (1.5%) Cost of Equity [2]	5-Year Average Common Equity to Market Value Ratio [3]	Weighted - Average Cost of Preferred Equity [4]	5-Year Average Preferred Equity to Market Value Ratio [5]	Weighted-Average Cost of Debt [6]	5-Year Average Debt to Market Value Ratio [7]	Utilities Representative Income Tax Rate [8]	Overall After-Tax Cost of Capital (CAPM) [9]	Overall After-Tax Cost of Capital (ECAPM 1.5%) [10]
ALLETE		9.3%	9.7%	61.8%	-	0.0%	4.10%	38.2%	27.0%	6.9%	7.1%
Alliant Energy	*	9.0%	9.4%	59.9%	3.85%	1.8%	3.85%	38.3%	27.0%	6.5%	6.8%
Amer. Elec. Power	*	8.6%	9.2%	55.4%	-	0.0%	4.05%	44.6%	27.0%	6.1%	6.4%
Ameren Corp.	*	8.6%	9.2%	57.4%	-	0.0%	4.10%	42.6%	27.0%	6.2%	6.5%
CenterPoint Energy		10.4%	10.5%	51.0%	-	0.0%	3.85%	49.0%	27.0%	6.7%	6.7%
CMS Energy Corp.	*	8.6%	9.2%	48.5%	-	0.0%	4.10%	51.5%	27.0%	5.7%	6.0%
Consol. Edison	*	7.6%	8.3%	57.7%	-	0.0%	3.85%	42.3%	27.0%	5.6%	6.0%
DTE Energy											
Duke Energy	*	8.3%	8.9%	52.8%	-	0.0%	3.95%	47.2%	27.0%	5.7%	6.0%
Edison Int'l	*	8.6%	9.2%	55.4%	4.10%	5.7%	4.10%	38.9%	27.0%	6.2%	6.5%
El Paso Electric	*	9.7%	10.0%	56.1%	-	0.0%	4.10%	43.9%	27.0%	6.7%	6.9%
Entergy Corp.	*	8.6%	9.2%	48.0%	4.10%	1.0%	4.10%	51.0%	27.0%	5.7%	6.0%
IDACORP Inc.	*	9.0%	9.4%	62.2%	-	0.0%	4.10%	37.8%	27.0%	6.7%	7.0%
MGE Energy		9.3%	9.7%	77.0%	-	0.0%	3.72%	23.0%	27.0%	7.8%	8.1%
OGE Energy	*	10.7%	10.8%	68.1%	-	0.0%	3.85%	31.9%	27.0%	8.2%	8.2%
Otter Tail Corp.	*	10.4%	10.5%	66.5%	-	0.1%	4.10%	33.4%	27.0%	7.9%	8.0%
Pinnacle West Capital	*	9.0%	9.4%	62.8%	-	0.0%	3.90%	37.2%	27.0%	6.7%	7.0%
PNM Resources											
Portland General	*	9.0%	9.4%	54.3%	-	0.0%	4.10%	45.7%	27.0%	6.2%	6.5%
PPL Corp.	*	9.0%	9.4%	47.7%	-	0.0%	3.95%	52.3%	27.0%	5.8%	6.0%
Public Serv. Enterprise		9.0%	9.4%	65.0%	-	0.0%	4.10%	35.0%	27.0%	6.9%	7.2%
Xcel Energy Inc.	*	8.3%	8.9%	55.1%	-	0.0%	3.85%	44.9%	27.0%	5.8%	6.2%
Full Sample Average		9.0%	9.5%	58.1%	4.0%	0.4%	4.0%	41.4%	27.0%	6.5%	6.8%
Regulated Subsample Average		8.9%	9.4%	56.7%	4.0%	0.5%	4.0%	42.7%	27.0%	6.4%	6.6%

Sources and Notes:

[1]: Table No. BV-ELEC-10; Panel A, [4].

[2]: Table No. BV-ELEC-10; Panel A, [5].

[3]: Table No. BV-ELEC-4, [4].

[4]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[5]: Table No. BV-ELEC-4, [5].

[6]: Supporting Schedule #2 to Table No. BV-ELEC-11, P

[7]: Table No. BV-ELEC-4, [6].

[8]: Effective US/Oregon Corporate Tax Rate

[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])}.

[9]-[10] A strikethrough indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points

Table No. BV-ELEC-11

Overall After-Tax Cost of Capital of the U.S. Electric Sample

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%

Company	Regulated Subsample	CAPM Cost of Equity [1]	ECAPM (1.5%) Cost of Equity [2]	5-Year Average Common Equity to Market Value Ratio [3]	Weighted - Average Cost of Preferred Equity [4]	5-Year Average Preferred Equity to Market Value Ratio [5]	Weighted-Average Cost of Debt [6]	5-Year Average Debt to Market Value Ratio [7]	Utilities Representative Income Tax Rate [8]	Overall After-Tax Cost of Capital (CAPM) [9]	Overall After-Tax Cost of Capital (ECAPM 1.5%) [10]
ALLETE		9.5%	9.9%	61.8%	-	0.0%	4.10%	38.2%	27.0%	7.0%	7.2%
Alliant Energy	*	9.1%	9.6%	59.9%	3.85%	1.8%	3.85%	38.3%	27.0%	6.6%	6.9%
Amer. Elec. Power	*	8.8%	9.3%	55.4%	-	0.0%	4.05%	44.6%	27.0%	6.2%	6.5%
Ameren Corp.	*	8.8%	9.3%	57.4%	-	0.0%	4.10%	42.6%	27.0%	6.3%	6.6%
CenterPoint Energy		10.6%	10.8%	51.0%	-	0.0%	3.85%	49.0%	27.0%	6.8%	6.9%
CMS Energy Corp.	*	8.8%	9.3%	48.5%	-	0.0%	4.10%	51.5%	27.0%	5.8%	6.0%
Consol. Edison	*	7.6%	8.4%	57.7%	-	0.0%	3.85%	42.3%	27.0%	5.6%	6.0%
DTE Energy											
Duke Energy	*	8.4%	9.0%	52.8%	-	0.0%	3.95%	47.2%	27.0%	5.8%	6.1%
Edison Int'l	*	8.8%	9.3%	55.4%	4.10%	5.7%	4.10%	38.9%	27.0%	6.2%	6.5%
El Paso Electric	*	9.9%	10.2%	56.1%	-	0.0%	4.10%	43.9%	27.0%	6.9%	7.0%
Entergy Corp.	*	8.8%	9.3%	48.0%	4.10%	1.0%	4.10%	51.0%	27.0%	5.8%	6.0%
IDACORP Inc.	*	9.1%	9.6%	62.2%	-	0.0%	4.10%	37.8%	27.0%	6.8%	7.1%
MGE Energy		9.5%	9.9%	77.0%	-	0.0%	3.72%	23.0%	27.0%	7.9%	8.2%
OGE Energy	*	11.0%	11.1%	68.1%	-	0.0%	3.85%	31.9%	27.0%	8.4%	8.4%
Otter Tail Corp.	*	10.6%	10.8%	66.5%	-	0.1%	4.10%	33.4%	27.0%	8.1%	8.2%
Pinnacle West Capital	*	9.1%	9.6%	62.8%	-	0.0%	3.90%	37.2%	27.0%	6.8%	7.1%
PNM Resources											
Portland General	*	9.1%	9.6%	54.3%	-	0.0%	4.10%	45.7%	27.0%	6.3%	6.6%
PPL Corp.	*	9.1%	9.6%	47.7%	-	0.0%	3.95%	52.3%	27.0%	5.9%	6.1%
Public Serv. Enterprise		9.1%	9.6%	65.0%	-	0.0%	4.10%	35.0%	27.0%	7.0%	7.3%
Xcel Energy Inc.	*	8.4%	9.0%	55.1%	-	0.0%	3.85%	44.9%	27.0%	5.9%	6.2%
Full Sample Average		9.2%	9.6%	58.1%	4.0%	0.4%	4.0%	41.4%	27.0%	6.6%	6.8%
Regulated Subsample Average		9.1%	9.5%	56.7%	4.0%	0.5%	4.0%	42.7%	27.0%	6.5%	6.7%

Sources and Notes:

[1]: Table No. BV-ELEC-10; Panel B, [4].

[2]: Table No. BV-ELEC-10; Panel B, [5].

[3]: Table No. BV-ELEC-4, [4].

[4]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[5]: Table No. BV-ELEC-4, [5].

[6]: Supporting Schedule #2 to Table No. BV-ELEC-11, P

[7]: Table No. BV-ELEC-4, [6].

[8]: Effective US/Oregon Corporate Tax Rate

[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])}.

[9]-[10] ~~A strikethrough indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points~~

Table No. BV-ELEC-12

Risk Positioning Cost of Equity at Representative Deemed Capital Structure

	Overall After-Tax Cost of Capital (Scenario 1) [1]	Overall After-Tax Cost of Capital (Scenario 2) [2]	Utilities Representative Base Deemed % Debt [3]	Representative Cost of BBB-Rated Utility Debt [4]	Utilities Representative Income Tax Rate [5]	Utilities Representative Base Deemed % Equity [6]	Estimated Return on Equity (Scenario 1) [7]	Estimated Return on Equity (Scenario 2) [8]
Full Sample:								
CAPM	6.5%	6.6%	50.0%	4.1%	27.0%	50.0%	10.0%	10.2%
ECAPM (1.50%)	6.8%	6.8%	50.0%	4.1%	27.0%	50.0%	10.5%	10.7%
Regulated Subsample:								
CAPM	6.4%	6.5%	50.0%	4.1%	27.0%	50.0%	9.7%	9.9%
ECAPM (1.50%)	6.6%	6.7%	50.0%	4.1%	27.0%	50.0%	10.2%	10.4%

Sources and Notes:

[1]: Table No. BV-ELEC-11; Panel A, [9] - [10]. Scenario 1: Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%.

[2]: Table No. BV-ELEC-11; Panel B, [9] - [10]. Scenario 2: Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%.

[3]: Utilities' Assumed Capital Structure.

[4]: Based on a BBB rating. Yield from Bloomberg as of November 30, 2017.

[5]: Effective US/Oregon Corporate Tax Rate.

[6]: Utilities' Assumed Capital Structure.

[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6].

[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6].

Table No. BV-ELEC-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Regulated Subsample	ValueLine Betas [1]	Debt Beta [2]	5-Year Average Common Equity to Market Value Ratio [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	5-Year Average Debt to Market Value Ratio [5]	Utilities Representative Income Tax Rate [6]	Asset Beta: Without Taxes [7]	Asset Beta: With Taxes [8]
ALLETE		0.75	0.10	61.8%	0.0%	38.2%	27.0%	0.50	0.55
Alliant Energy	*	0.70	0.05	59.9%	1.8%	38.3%	27.0%	0.44	0.48
Amer. Elec. Power	*	0.65	0.09	55.4%	0.0%	44.6%	27.0%	0.40	0.44
Ameren Corp.	*	0.65	0.10	57.4%	0.0%	42.6%	27.0%	0.42	0.46
CenterPoint Energy		0.90	0.05	51.0%	0.0%	49.0%	27.0%	0.48	0.55
CMS Energy Corp.	*	0.65	0.10	48.5%	0.0%	51.5%	27.0%	0.37	0.41
Consol. Edison	*	0.50	0.05	57.7%	0.0%	42.3%	27.0%	0.31	0.34
DTE Energy									
Duke Energy	*	0.60	0.07	52.8%	0.0%	47.2%	27.0%	0.35	0.39
Edison Int'l	*	0.65	0.10	55.4%	5.7%	38.9%	27.0%	0.40	0.44
El Paso Electric	*	0.80	0.10	56.1%	0.0%	43.9%	27.0%	0.49	0.55
Entergy Corp.	*	0.65	0.10	48.0%	1.0%	51.0%	27.0%	0.36	0.41
IDACORP Inc.	*	0.70	0.10	62.2%	0.0%	37.8%	27.0%	0.47	0.52
MGE Energy		0.75	0.05	77.0%	0.0%	23.0%	27.0%	0.59	0.62
OGE Energy	*	0.95	0.05	68.1%	0.0%	31.9%	27.0%	0.66	0.72
Otter Tail Corp.	*	0.90	0.10	66.5%	0.1%	33.4%	27.0%	0.63	0.68
Pinnacle West Capital	*	0.70	0.06	62.8%	0.0%	37.2%	27.0%	0.46	0.51
PNM Resources									
Portland General	*	0.70	0.10	54.3%	0.0%	45.7%	27.0%	0.43	0.47
PPL Corp.	*	0.70	0.10	47.7%	0.0%	52.3%	27.0%	0.39	0.43
Public Serv. Enterprise		0.70	0.07	65.0%	0.0%	35.0%	27.0%	0.48	0.52
Xcel Energy Inc.	*	0.60	0.10	55.1%	0.0%	44.9%	27.0%	0.38	0.41
Full Sample Average		0.71	0.08	58.1%	0.4%	41.4%	27.0%	0.45	0.50
Regulated Subsample Average		0.69	0.09	56.7%	0.5%	42.7%	27.0%	0.43	0.48

Sources and Notes:

[1]: Supporting Schedule # 1 to Table No. BV-ELEC-10, [1].
[2]: Supporting Schedule #1 to Table No. BV-ELEC-13, [7].
[3]: Table No. BV-ELEC-4, [4].
[4]: Table No. BV-ELEC-4, [5].
[5]: Table No. BV-ELEC-4, [6].
[6]: Effective US/Oregon Corporate Tax Rate
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Table No. BV-ELEC-14

Sample Average Asset Beta Relevered at Representative Deemed Capital Structure

	Asset Beta [1]	Assumed Debt Beta [2]	Utilities Representative Base Deemed % Debt [3]	Utilities Representative Income Tax Rate [4]	Utilities Representative Base Deemed % Equity [5]	Estimated Equity Beta [6]
Full Sample:						
Asset Beta Without Taxes	0.45	0.05	50.0%	27.0%	50.0%	0.85
Asset Beta With Taxes	0.50	0.05	50.0%	27.0%	50.0%	0.82
Regulated Subsample:						
Asset Beta Without Taxes	0.43	0.05	50.0%	27.0%	50.0%	0.82
Asset Beta With Taxes	0.48	0.05	50.0%	27.0%	50.0%	0.79

Sources and Notes:

[1]: Table No. BV-ELEC-13, [7] - [8].

[2]: Debt Beta estimate for BBB rated entities. Corporate Finance, Berk and Demarzo, Second Edition, p. 389.

[3]: Utilities' Assumed Capital Structure.

[4]: Effective US/Oregon Corporate Tax Rate.

[5]: Utilities' Assumed Capital Structure.

[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Table No. BV-ELEC-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%

Company	Long-Term Risk-Free Rate [1]	Hamada Adjusted Equity Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
Full Sample:					
Asset Beta Without Taxes	4.12%	0.85	6.94%	10.0%	10.2%
Asset Beta With Taxes	4.12%	0.82	6.94%	9.8%	10.1%
Regulated Subsample:					
Asset Beta Without Taxes	4.12%	0.82	6.94%	9.8%	10.1%
Asset Beta With Taxes	4.12%	0.79	6.94%	9.6%	9.9%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Table No. BV-ELEC-14, [6].
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. BV-ELEC-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%

Company	Long-Term Risk-Free Rate [1]	Hamada Adjusted Equity Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
Full Sample:					
Asset Beta Without Taxes	3.92%	0.85	7.44%	10.3%	10.5%
Asset Beta With Taxes	3.92%	0.82	7.44%	10.0%	10.3%
Regulated Subsample:					
Asset Beta Without Taxes	3.92%	0.82	7.44%	10.0%	10.3%
Asset Beta With Taxes	3.92%	0.79	7.44%	9.8%	10.1%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Table No. BV-ELEC-14, [6].
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

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, she was a Professor of Accounting at the University of Iowa, University of Michigan, and at Washington University in St. Louis where she taught accounting. She has also taught graduate classes in econometrics and quantitative methods. Dr. Villadsen currently serves as the president of the Society of Utility Regulatory Financial Analysts.

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
  - Utility valuation
  - Lost Profit

EXPERIENCE

Regulatory Finance

- 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 in Alberta, Canada, Dr. Villadsen filed evidence and appeared as an expert on the cost of equity and appropriate capital structure for 2015-17. Her evidence was heard by the Alberta Utilities Commission.
- For 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.

PUBLICATIONS AND REPORTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SELECTED PRESENTATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TESTIMONY

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

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

Direct Testimony on wholesale water rates for Petitioner Cities, *Texas Public Utility Commission*, PUC Docket 46662, SOAH Docket 473-17-4964.WS, November 2017.

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

Written Evidence on the Cost of Capital and Capital Structure for the ATCO Utilities and AUI, 2018-2020 Generic Cost of Capital Proceeding, *Alberta Utilities Commission*, October 2017.

Written Evidence on Regulatory Tax Treatment for the ATCO Utilities and AUI, 201802020 Generic Cost of Capital Proceeding, *Alberta Utilities Commission*, October 2017.

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

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

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

Direct and Rebuttal Testimony on Cost of Capital for Portland General Electric Company submitted to the *Oregon Public Utility Commission* on behalf of Portland General Electric Company, Docket No. UE 319, February, July 2017.

Pre-filed Direct and Reply Testimony and Hearing Appearance on Cost of Equity and Capital Structure for Anchorage Municipal Light and Power, *Regulatory Commission of Alaska*, Docket No. TA357-121, December 2016, August and December 2017.

Expert report and Hearing Appearance regarding the Common Equity Ratio for OPG's Regulated Generation for OEB Staff, *Ontario Energy Board*, EB-2016-0152, November 2016, April 2017.

Pre-filed Direct Testimony on Cost of Equity and Capital Structure for Anchorage Municipal Wastewater Utility, *Regulatory Commission of Alaska*, Docket No. 158-126, November 2016.

Expert Report on damages (quantum) in exit arbitration (with Dan Harris), *International Center for the Settlement of Investment Disputes*, October 2016.

Direct Testimony on capital structure, embedded cost of debt, and income taxes for Detroit Thermal, Michigan Public Service Commission, Docket No. UE-18131, July 2016.

Direct Testimony on return on equity for Arizona Public Service Company, Arizona Corporation Commission, Docket E-01345A-16-0036, June 2016.

Written evidence, rebuttal evidence and hearing appearance regarding the cost of equity and capital structure for Alberta-based utilities, the Alberta Utilities Commission, Proceeding No. 20622 on behalf of AltaGas Utilities Inc., ENMAX Power Corporation, FortisAlberta Inc., and The ATCO Utilities, February, May and June 2016.

Verified Statement, Verified Reply Statement, and Hearing Appearance regarding the cost of capital methodology to be applied to freight railroads, the *Surface Transportation Board* on behalf of the Association of American Railroads, Docket No. EP 664 (Sub-No. 2), July 2015, September and November 2015.

Direct Testimony on cost of capital submitted to the Oregon Public Utility Commission on behalf of Portland General Electric, Docket No. UE 294, February 2015.

Supplemental Direct Testimony and Reply Testimony on cost of capital submitted to the *Regulatory Commission of Alaska* on behalf of Anchorage Water and Wastewater utilities, Docket U-13-202, September 2014, March 2015.

Expert Report and hearing appearance on specific accrual and cash flow items in a Sales and Purchase Agreement in international arbitration before the *International Chamber of Commerce*. Case No. 19651/TO, July and November 2014. (*Confidential*)

Rebuttal Testimony regarding Cost of Capital before the *Oregon Public Utility Commission* on behalf of Portland General Electric, Docket No. UE 283, July 2014.

Direct Testimony on the rate impact of the pension re-allocation and other items for Upper Peninsula Power Company in connection with the acquisition by BBIP before the *Michigan Public Service Commission* in Docket No. U-17564, March 2014.

Expert Report on cost of equity, non-recovery of operating cost and asset retirement obligations on behalf of oil pipeline in arbitration, April 2013. (*Confidential*)

Direct Testimony on the treatment of goodwill before the *Federal Energy Regulatory Commission* on behalf of ITC Holdings Corp and ITC Midwest, LLC in Docket No. PA10-13-000, February 2012.

Direct and Rebuttal Testimony on cost of capital before the *Public Utilities Commission of the State of California* on behalf of California-American Water in Application No. 11-05, May 2011.

Direct Testimony, Rebuttal Testimony, and Hearing Appearance on cost of capital before the *New Mexico Public Regulation Commission* on behalf of New Mexico-American Water in Case No. 11-00196-UT, May 2011, November 2011, and December 2011.

Direct Testimony on regulatory assets and FERC accounting before the *Federal Energy Regulatory Commission* on behalf of AWC Companies, EL11-13-000, December 2010.

Expert Report and deposition in Civil Action No. 02-618 (GK/JMF) in the *United States District Court for the District of Columbia*, November 2010, January 2011. (*Confidential*)

Direct Testimony, Rebuttal Testimony, and Rejoinder Testimony on the cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-10-0448, November 2010, July 2011, and August 2011.

Direct Testimony on the cost of capital before *the New Mexico Public Regulation Commission* on behalf of New Mexico-American Water in Docket No. 09-00156-UT, August 2009.

Direct and Rebuttal Testimony and Hearing Appearance on the cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-09-0343, July 2009, March 2010 and April 2010.

Rebuttal Expert Report, Deposition and Oral Testimony re. the impact of alternative discount rate assumptions in tax litigation. *United States Court of Federal Claims*, Case No. 06-628 T, January, February, April 2009. (*Confidential*)

Direct Testimony, Rebuttal Testimony and Hearing Appearance on cost of capital before the *New Mexico Public Regulation Commission* on behalf of New Mexico-American Water in Docket No. 08-00134-UT, June 2008 and January 2009.

Direct Testimony on cost of capital and carrying charge on damages, U.S. Department of Energy, *Bonneville Power Administration*, BPA Docket No. WP-07, March 2008.

Direct Testimony, Rebuttal Testimony, Rejoinder Testimony and Hearing Appearance on cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-08-0227, April 2008, February 2009, March 2009.

Expert Report, Supplemental Expert Report, and Hearing Appearance on the allocation of corporate overhead and damages from lost profit. *The International Centre for the Settlement of Investment Disputes*, Case No. ARB/03/29, February, April, and June 2008 (*Confidential*).

Expert Report on accounting information needed to assess income. *United States District Court* for the District of Maryland (Baltimore Division), Civil No. 1:06cv02046-JFM, June 2007 (*Confidential*)

Expert Report, Rebuttal Expert Report, and Hearing Appearance regarding investing activities, impairment of assets, leases, shareholder' equity under U.S. GAAP and valuation. *International Chamber of Commerce* (ICC), Case No. 14144/CCO, May 2007, August 2007, September 2007. (Joint with Carlos Lapuerta, *Confidential*)

Direct Testimony, Rebuttal Testimony, and Hearing Appearance on cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-06-0491, July 2006, July 2007.

Direct Testimony, Rebuttal Testimony, Rejoinder Testimony, Supplemental Rejoinder Testimony and Hearing Appearance on cost of capital before the *Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-06-0403, June 2006, April 2007, May 2007.

Direct Testimony, Rebuttal Testimony, Rejoinder Testimony, and Hearing Appearance on cost of capital before *the Arizona Corporation Commission* on behalf of Arizona-American Water in Docket No. W-01303A-06-0014, January 2006, October 2006, November 2006.

Expert report, rebuttal expert report, and deposition on behalf of a major oil company regarding the equity method of accounting and classification of debt and equity, *American Arbitration Association*, August 2004 and November 2004. (*Confidential*).

CAPITAL ASSET PRICING MODEL

Table No. BV-ELEC-9

Risk Free Rate

[1]	Blue Chip 10-Year Forecast	3.40%
	US Government Bond Yields	
[2]	20-year	5.04%
[3]	10-Year	4.52%
[4]	Maturity Premium	0.52%
[5]	Blue Chip 10-Year Forecast Adjusted to 20-year Horizon	3.92%

Sources and Notes:

[1]: Blue Chip Economic Indicators, October 2017 U.S.

[2]-[3]: Supporting Schedule # 1 to Table No. BV-ELEC-9. Averages of monthly bond yields from December 1990 through November 2017.

[4]: [2] - [3].

[5]: [1] + [4].

Table No. BV-ELEC-10

Risk Positioning Cost of Equity of the U.S. Electric Sample

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%

Company	Regulated Subsample	Long-Term Risk-Free Rate [1]	ValueLine Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
ALLETE		4.12%	0.75	6.94%	9.3%	9.7%
Alliant Energy	*	4.12%	0.70	6.94%	9.0%	9.4%
Amer. Elec. Power	*	4.12%	0.65	6.94%	8.6%	9.2%
Ameren Corp.	*	4.12%	0.65	6.94%	8.6%	9.2%
CenterPoint Energy		4.12%	0.90	6.94%	10.4%	10.5%
CMS Energy Corp.	*	4.12%	0.65	6.94%	8.6%	9.2%
Consol. Edison	*	4.12%	0.50	6.94%	7.6%	8.3%
DTE Energy						
Duke Energy	*	4.12%	0.60	6.94%	8.3%	8.9%
Edison Int'l	*	4.12%	0.65	6.94%	8.6%	9.2%
El Paso Electric	*	4.12%	0.80	6.94%	9.7%	10.0%
Entergy Corp.	*	4.12%	0.65	6.94%	8.6%	9.2%
IDACORP Inc.	*	4.12%	0.70	6.94%	9.0%	9.4%
MGE Energy		4.12%	0.75	6.94%	9.3%	9.7%
OGE Energy	*	4.12%	0.95	6.94%	10.7%	10.8%
Otter Tail Corp.	*	4.12%	0.90	6.94%	10.4%	10.5%
Pinnacle West Capital	*	4.12%	0.70	6.94%	9.0%	9.4%
PNM Resources						
Portland General	*	4.12%	0.70	6.94%	9.0%	9.4%
PPL Corp.	*	4.12%	0.70	6.94%	9.0%	9.4%
Public Serv. Enterprise		4.12%	0.70	6.94%	9.0%	9.4%
Xcel Energy Inc.	*	4.12%	0.60	6.94%	8.3%	8.9%
Average					9.0%	9.5%
Regulated Subsample Average					8.9%	9.4%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Bloomberg as of November 30, 2017.
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. BV-ELEC-10

Risk Positioning Cost of Equity of the U.S. Electric Sample

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%

Company	Regulated Subsample	Long-Term Risk-Free Rate [1]	ValueLine Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
ALLETE		3.92%	0.75	7.44%	9.5%	9.9%
Alliant Energy	*	3.92%	0.70	7.44%	9.1%	9.6%
Amer. Elec. Power	*	3.92%	0.65	7.44%	8.8%	9.3%
Ameren Corp.	*	3.92%	0.65	7.44%	8.8%	9.3%
CenterPoint Energy		3.92%	0.90	7.44%	10.6%	10.8%
CMS Energy Corp.	*	3.92%	0.65	7.44%	8.8%	9.3%
Consol. Edison	*	3.92%	0.50	7.44%	7.6%	8.4%
DTE Energy						
Duke Energy	*	3.92%	0.60	7.44%	8.4%	9.0%
Edison Int'l	*	3.92%	0.65	7.44%	8.8%	9.3%
El Paso Electric	*	3.92%	0.80	7.44%	9.9%	10.2%
Entergy Corp.	*	3.92%	0.65	7.44%	8.8%	9.3%
IDACORP Inc.	*	3.92%	0.70	7.44%	9.1%	9.6%
MGE Energy		3.92%	0.75	7.44%	9.5%	9.9%
OGE Energy	*	3.92%	0.95	7.44%	11.0%	11.1%
Otter Tail Corp.	*	3.92%	0.90	7.44%	10.6%	10.8%
Pinnacle West Capital	*	3.92%	0.70	7.44%	9.1%	9.6%
PNM Resources						
Portland General	*	3.92%	0.70	7.44%	9.1%	9.6%
PPL Corp.	*	3.92%	0.70	7.44%	9.1%	9.6%
Public Serv. Enterprise		3.92%	0.70	7.44%	9.1%	9.6%
Xcel Energy Inc.	*	3.92%	0.60	7.44%	8.4%	9.0%
Average					9.2%	9.6%
Regulated Subsample Average					9.1%	9.5%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Bloomberg as of November 30, 2017.
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. BV-ELEC-11

Overall After-Tax Cost of Capital of the U.S. Electric Sample

Panel A: CAPM Cost of Equity Scenario 1 - Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%

Company	Regulated Subsample	CAPM Cost of Equity [1]	ECAPM (1.5%) Cost of Equity [2]	5-Year Average Common Equity to Market Value Ratio [3]	Weighted - Average Cost of Preferred Equity [4]	5-Year Average Preferred Equity to Market Value Ratio [5]	Weighted-Average Cost of Debt [6]	5-Year Average Debt to Market Value Ratio [7]	Utilities Representative Income Tax Rate [8]	Overall After-Tax Cost of Capital (CAPM) [9]	Overall After-Tax Cost of Capital (ECAPM 1.5%) [10]
ALLETE		9.3%	9.7%	61.8%	-	0.0%	4.10%	38.2%	27.0%	6.9%	7.1%
Alliant Energy	*	9.0%	9.4%	59.9%	3.85%	1.8%	3.85%	38.3%	27.0%	6.5%	6.8%
Amer. Elec. Power	*	8.6%	9.2%	55.4%	-	0.0%	4.05%	44.6%	27.0%	6.1%	6.4%
Ameren Corp.	*	8.6%	9.2%	57.4%	-	0.0%	4.10%	42.6%	27.0%	6.2%	6.5%
CenterPoint Energy		10.4%	10.5%	51.0%	-	0.0%	3.85%	49.0%	27.0%	6.7%	6.7%
CMS Energy Corp.	*	8.6%	9.2%	48.5%	-	0.0%	4.10%	51.5%	27.0%	5.7%	6.0%
Consol. Edison	*	7.6%	8.3%	57.7%	-	0.0%	3.85%	42.3%	27.0%	5.6%	6.0%
DTE Energy											
Duke Energy	*	8.3%	8.9%	52.8%	-	0.0%	3.95%	47.2%	27.0%	5.7%	6.0%
Edison Int'l	*	8.6%	9.2%	55.4%	4.10%	5.7%	4.10%	38.9%	27.0%	6.2%	6.5%
El Paso Electric	*	9.7%	10.0%	56.1%	-	0.0%	4.10%	43.9%	27.0%	6.7%	6.9%
Entergy Corp.	*	8.6%	9.2%	48.0%	4.10%	1.0%	4.10%	51.0%	27.0%	5.7%	6.0%
IDACORP Inc.	*	9.0%	9.4%	62.2%	-	0.0%	4.10%	37.8%	27.0%	6.7%	7.0%
MGE Energy		9.3%	9.7%	77.0%	-	0.0%	3.72%	23.0%	27.0%	7.8%	8.1%
OGE Energy	*	10.7%	10.8%	68.1%	-	0.0%	3.85%	31.9%	27.0%	8.2%	8.2%
Otter Tail Corp.	*	10.4%	10.5%	66.5%	-	0.1%	4.10%	33.4%	27.0%	7.9%	8.0%
Pinnacle West Capital	*	9.0%	9.4%	62.8%	-	0.0%	3.90%	37.2%	27.0%	6.7%	7.0%
PNM Resources											
Portland General	*	9.0%	9.4%	54.3%	-	0.0%	4.10%	45.7%	27.0%	6.2%	6.5%
PPL Corp.	*	9.0%	9.4%	47.7%	-	0.0%	3.95%	52.3%	27.0%	5.8%	6.0%
Public Serv. Enterprise		9.0%	9.4%	65.0%	-	0.0%	4.10%	35.0%	27.0%	6.9%	7.2%
Xcel Energy Inc.	*	8.3%	8.9%	55.1%	-	0.0%	3.85%	44.9%	27.0%	5.8%	6.2%
Full Sample Average		9.0%	9.5%	58.1%	4.0%	0.4%	4.0%	41.4%	27.0%	6.5%	6.8%
Regulated Subsample Average		8.9%	9.4%	56.7%	4.0%	0.5%	4.0%	42.7%	27.0%	6.4%	6.6%

Sources and Notes:

[1]: Table No. BV-ELEC-10; Panel A, [4].

[2]: Table No. BV-ELEC-10; Panel A, [5].

[3]: Table No. BV-ELEC-4, [4].

[4]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[5]: Table No. BV-ELEC-4, [5].

[6]: Supporting Schedule #2 to Table No. BV-ELEC-11, P

[7]: Table No. BV-ELEC-4, [6].

[8]: Effective US/Oregon Corporate Tax Rate

[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])}.

[9]-[10] ~~A strikethrough~~ indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points

Table No. BV-ELEC-11

Overall After-Tax Cost of Capital of the U.S. Electric Sample

Panel B: CAPM Cost of Equity Scenario 2 - Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%

Company	Regulated Subsample	CAPM Cost of Equity [1]	ECAPM (1.5%) Cost of Equity [2]	5-Year Average Common Equity to Market Value Ratio [3]	Weighted - Average Cost of Preferred Equity [4]	5-Year Average Preferred Equity to Market Value Ratio [5]	Weighted-Average Cost of Debt [6]	5-Year Average Debt to Market Value Ratio [7]	Utilities Representative Income Tax Rate [8]	Overall After-Tax Cost of Capital (CAPM) [9]	Overall After-Tax Cost of Capital (ECAPM 1.5%) [10]
ALLETE		9.5%	9.9%	61.8%	-	0.0%	4.10%	38.2%	27.0%	7.0%	7.2%
Alliant Energy	*	9.1%	9.6%	59.9%	3.85%	1.8%	3.85%	38.3%	27.0%	6.6%	6.9%
Amer. Elec. Power	*	8.8%	9.3%	55.4%	-	0.0%	4.05%	44.6%	27.0%	6.2%	6.5%
Ameren Corp.	*	8.8%	9.3%	57.4%	-	0.0%	4.10%	42.6%	27.0%	6.3%	6.6%
CenterPoint Energy		10.6%	10.8%	51.0%	-	0.0%	3.85%	49.0%	27.0%	6.8%	6.9%
CMS Energy Corp.	*	8.8%	9.3%	48.5%	-	0.0%	4.10%	51.5%	27.0%	5.8%	6.0%
Consol. Edison	*	7.6%	8.4%	57.7%	-	0.0%	3.85%	42.3%	27.0%	5.6%	6.0%
DTE Energy											
Duke Energy	*	8.4%	9.0%	52.8%	-	0.0%	3.95%	47.2%	27.0%	5.8%	6.1%
Edison Int'l	*	8.8%	9.3%	55.4%	4.10%	5.7%	4.10%	38.9%	27.0%	6.2%	6.5%
El Paso Electric	*	9.9%	10.2%	56.1%	-	0.0%	4.10%	43.9%	27.0%	6.9%	7.0%
Entergy Corp.	*	8.8%	9.3%	48.0%	4.10%	1.0%	4.10%	51.0%	27.0%	5.8%	6.0%
IDACORP Inc.	*	9.1%	9.6%	62.2%	-	0.0%	4.10%	37.8%	27.0%	6.8%	7.1%
MGE Energy		9.5%	9.9%	77.0%	-	0.0%	3.72%	23.0%	27.0%	7.9%	8.2%
OGE Energy	*	11.0%	11.1%	68.1%	-	0.0%	3.85%	31.9%	27.0%	8.4%	8.4%
Otter Tail Corp.	*	10.6%	10.8%	66.5%	-	0.1%	4.10%	33.4%	27.0%	8.1%	8.2%
Pinnacle West Capital	*	9.1%	9.6%	62.8%	-	0.0%	3.90%	37.2%	27.0%	6.8%	7.1%
PNM Resources											
Portland General	*	9.1%	9.6%	54.3%	-	0.0%	4.10%	45.7%	27.0%	6.3%	6.6%
PPL Corp.	*	9.1%	9.6%	47.7%	-	0.0%	3.95%	52.3%	27.0%	5.9%	6.1%
Public Serv. Enterprise		9.1%	9.6%	65.0%	-	0.0%	4.10%	35.0%	27.0%	7.0%	7.3%
Xcel Energy Inc.	*	8.4%	9.0%	55.1%	-	0.0%	3.85%	44.9%	27.0%	5.9%	6.2%
Full Sample Average		9.2%	9.6%	58.1%	4.0%	0.4%	4.0%	41.4%	27.0%	6.6%	6.8%
Regulated Subsample Average		9.1%	9.5%	56.7%	4.0%	0.5%	4.0%	42.7%	27.0%	6.5%	6.7%

Sources and Notes:

[1]: Table No. BV-ELEC-10; Panel B, [4].

[2]: Table No. BV-ELEC-10; Panel B, [5].

[3]: Table No. BV-ELEC-4, [4].

[4]: Supporting Schedule #2 to Table No. BV-ELEC-11, Panel C.

[5]: Table No. BV-ELEC-4, [5].

[6]: Supporting Schedule #2 to Table No. BV-ELEC-11, P

[7]: Table No. BV-ELEC-4, [6].

[8]: Effective US/Oregon Corporate Tax Rate

[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])}.

[9]-[10] ~~A strikethrough~~ indicates the observation was excluded from the full sample average calculation as a result of its cost of equity estimate not exceeding its cost of debt by 150 basis points

Table No. BV-ELEC-12

Risk Positioning Cost of Equity at Representative Deemed Capital Structure

	Overall After-Tax Cost of Capital (Scenario 1) [1]	Overall After-Tax Cost of Capital (Scenario 2) [2]	Utilities Representative Base Deemed % Debt [3]	Representative Cost of BBB-Rated Utility Debt [4]	Utilities Representative Income Tax Rate [5]	Utilities Representative Base Deemed % Equity [6]	Estimated Return on Equity (Scenario 1) [7]	Estimated Return on Equity (Scenario 2) [8]
Full Sample:								
CAPM	6.5%	6.6%	50.0%	4.1%	27.0%	50.0%	10.0%	10.2%
ECAPM (1.50%)	6.8%	6.8%	50.0%	4.1%	27.0%	50.0%	10.5%	10.7%
Regulated Subsample:								
CAPM	6.4%	6.5%	50.0%	4.1%	27.0%	50.0%	9.7%	9.9%
ECAPM (1.50%)	6.6%	6.7%	50.0%	4.1%	27.0%	50.0%	10.2%	10.4%

Sources and Notes:

[1]: Table No. BV-ELEC-11; Panel A, [9] - [10]. Scenario 1: Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%.

[2]: Table No. BV-ELEC-11; Panel B, [9] - [10]. Scenario 2: Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%.

[3]: Utilities' Assumed Capital Structure.

[4]: Based on a BBB rating. Yield from Bloomberg as of November 30, 2017.

[5]: Effective US/Oregon Corporate Tax Rate.

[6]: Utilities' Assumed Capital Structure.

[7]: {[1] - ([3] x [4] x (1 - [5])}/ [6].

[8]: {[2] - ([3] x [4] x (1 - [5]))}/ [6].

Table No. BV-ELEC-13

Hamada Adjustment to Obtain Unlevered Asset Beta

Company	Regulated Subsample	ValueLine Betas [1]	Debt Beta [2]	5-Year Average Common Equity to Market Value Ratio [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	5-Year Average Debt to Market Value Ratio [5]	Utilities Representative Income Tax Rate [6]	Asset Beta: Without Taxes [7]	Asset Beta: With Taxes [8]
ALLETE		0.75	0.10	61.8%	0.0%	38.2%	27.0%	0.50	0.55
Alliant Energy	*	0.70	0.05	59.9%	1.8%	38.3%	27.0%	0.44	0.48
Amer. Elec. Power	*	0.65	0.09	55.4%	0.0%	44.6%	27.0%	0.40	0.44
Ameren Corp.	*	0.65	0.10	57.4%	0.0%	42.6%	27.0%	0.42	0.46
CenterPoint Energy		0.90	0.05	51.0%	0.0%	49.0%	27.0%	0.48	0.55
CMS Energy Corp.	*	0.65	0.10	48.5%	0.0%	51.5%	27.0%	0.37	0.41
Consol. Edison	*	0.50	0.05	57.7%	0.0%	42.3%	27.0%	0.31	0.34
DTE Energy									
Duke Energy	*	0.60	0.07	52.8%	0.0%	47.2%	27.0%	0.35	0.39
Edison Int'l	*	0.65	0.10	55.4%	5.7%	38.9%	27.0%	0.40	0.44
El Paso Electric	*	0.80	0.10	56.1%	0.0%	43.9%	27.0%	0.49	0.55
Entergy Corp.	*	0.65	0.10	48.0%	1.0%	51.0%	27.0%	0.36	0.41
IDACORP Inc.	*	0.70	0.10	62.2%	0.0%	37.8%	27.0%	0.47	0.52
MGE Energy		0.75	0.05	77.0%	0.0%	23.0%	27.0%	0.59	0.62
OGE Energy	*	0.95	0.05	68.1%	0.0%	31.9%	27.0%	0.66	0.72
Otter Tail Corp.	*	0.90	0.10	66.5%	0.1%	33.4%	27.0%	0.63	0.68
Pinnacle West Capital	*	0.70	0.06	62.8%	0.0%	37.2%	27.0%	0.46	0.51
PNM Resources									
Portland General	*	0.70	0.10	54.3%	0.0%	45.7%	27.0%	0.43	0.47
PPL Corp.	*	0.70	0.10	47.7%	0.0%	52.3%	27.0%	0.39	0.43
Public Serv. Enterprise		0.70	0.07	65.0%	0.0%	35.0%	27.0%	0.48	0.52
Xcel Energy Inc.	*	0.60	0.10	55.1%	0.0%	44.9%	27.0%	0.38	0.41
Full Sample Average		0.71	0.08	58.1%	0.4%	41.4%	27.0%	0.45	0.50
Regulated Subsample Average		0.69	0.09	56.7%	0.5%	42.7%	27.0%	0.43	0.48

Sources and Notes:

[1]: Supporting Schedule # 1 to Table No. BV-ELEC-10, [1].
[2]: Supporting Schedule #1 to Table No. BV-ELEC-13, [7].
[3]: Table No. BV-ELEC-4, [4].
[4]: Table No. BV-ELEC-4, [5].
[5]: Table No. BV-ELEC-4, [6].
[6]: Effective US/Oregon Corporate Tax Rate
[7]: [1]*[3] + [2]*([4] + [5]).
[8]: {[1]*[3] + [2]*([4]+[5]*(1-[6]))} / {[3] + [4] + [5]*(1 -[6])}.

Table No. BV-ELEC-14

Sample Average Asset Beta Relevered at Representative Deemed Capital Structure

	Asset Beta [1]	Assumed Debt Beta [2]	Utilities Representative Base Deemed % Debt [3]	Utilities Representative Income Tax Rate [4]	Utilities Representative Base Deemed % Equity [5]	Estimated Equity Beta [6]
Full Sample:						
Asset Beta Without Taxes	0.45	0.05	50.0%	27.0%	50.0%	0.85
Asset Beta With Taxes	0.50	0.05	50.0%	27.0%	50.0%	0.82
Regulated Subsample:						
Asset Beta Without Taxes	0.43	0.05	50.0%	27.0%	50.0%	0.82
Asset Beta With Taxes	0.48	0.05	50.0%	27.0%	50.0%	0.79

Sources and Notes:

[1]: Table No. BV-ELEC-13, [7] - [8].

[2]: Debt Beta estimate for BBB rated entities. Corporate Finance, Berk and Demarzo, Second Edition, p. 389.

[3]: Utilities' Assumed Capital Structure.

[4]: Effective US/Oregon Corporate Tax Rate.

[5]: Utilities' Assumed Capital Structure.

[6]: [1] + [3]/[5]*([1] - [2]) without taxes, [1] + [3]*(1 - [4])/[5]*([1] - [2]) with taxes.

Table No. BV-ELEC-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel A: Scenario 1 - Long-Term Risk Free Rate of 4.12%, Long-Term Market Risk Premium of 6.94%

Company	Long-Term Risk-Free Rate [1]	Hamada Adjusted Equity Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
Full Sample:					
Asset Beta Without Taxes	4.12%	0.85	6.94%	10.0%	10.2%
Asset Beta With Taxes	4.12%	0.82	6.94%	9.8%	10.1%
Regulated Subsample:					
Asset Beta Without Taxes	4.12%	0.82	6.94%	9.8%	10.1%
Asset Beta With Taxes	4.12%	0.79	6.94%	9.6%	9.9%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Table No. BV-ELEC-14, [6].
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. BV-ELEC-15

Risk-Positioning Cost of Equity using Hamada-Adjusted Betas

Panel B: Scenario 2 - Long-Term Risk Free Rate of 3.92%, Long-Term Market Risk Premium of 7.44%

Company	Long-Term Risk-Free Rate [1]	Hamada Adjusted Equity Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.5%) Cost of Equity [5]
Full Sample:					
Asset Beta Without Taxes	3.92%	0.85	7.44%	10.3%	10.5%
Asset Beta With Taxes	3.92%	0.82	7.44%	10.0%	10.3%
Regulated Subsample:					
Asset Beta Without Taxes	3.92%	0.82	7.44%	10.0%	10.3%
Asset Beta With Taxes	3.92%	0.79	7.44%	9.8%	10.1%

Sources and Notes:
[1]: Villadsen Direct Evidence.
[2]: Table No. BV-ELEC-14, [6].
[3]: Villadsen Direct Evidence.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.5%) + [2] x ([3] - 1.5%).