

**STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES**

**In the Matter of the Petition of
Public Service Electric and Gas Company
for Approval of an Increase in Electric and Gas
Rates and for Changes in the Tariffs for
Electric and Gas Service, B.P.U.N.J.
No. 16 Electric and B.P.U.N.J. No. 16
Gas, and for Changes in Depreciation Rates,
Pursuant to N.J.S.A. 48:2-18,
N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, and
for Other Appropriate Relief**

BPU Docket Nos. _____

**DIRECT TESTIMONY
OF
ANN E. BULKLEY**

**Submitted on Behalf
of
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
d/b/a PSE&G**

**January 12, 2018
P-5**

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1 **PUBLIC SERVICE ELECTRIC AND GAS COMPANY**
2 **DIRECT TESTIMONY**
3 **OF**
4 **ANN E. BULKLEY**
5 **SENIOR VICE PRESIDENT, CONCENTRIC ENERGY ADVISORS, INC.**

6 **I. INTRODUCTION AND QUALIFICATIONS**

7 **Q. Please state your name and business address.**

8 A. My name is Ann E. Bulkley. I am a Senior Vice President of Concentric Energy
9 Advisors, Inc. (“Concentric”), located at 293 Boston Post Road West, Suite 500,
10 Marlborough, Massachusetts 01752.

11 **Q. On whose behalf are you submitting this testimony?**

12 A. I am submitting this testimony on behalf of Public Service Electric and Gas Company
13 (“Public Service” or the “Company”), a wholly-owned subsidiary of Public Service
14 Enterprise Group, Inc. (“PSEG”).

15 **Q. Please describe your background and professional experience in the energy and**
16 **utility industries.**

17 A. I have more than 20 years of experience consulting to the energy industry. I have
18 advised numerous energy and utility clients on a wide range of financial and economic issues
19 with primary concentrations in valuation and utility rate matters. Many of these assignments
20 have included the determination of the cost of capital for ratemaking and valuation purposes.
21 My resume and a summary of testimony that I have filed in other proceedings is included as
22 Schedule AEB-1.

1 **Q. Please describe Concentric’s activities in energy and utility engagements.**

2 A. Concentric provides regulatory, financial, and economic advisory services to many
3 energy and utility clients across North America. Our regulatory, economic, and market
4 analysis services include: utility ratemaking and regulatory advisory services; energy market
5 assessments; market entry and exit analysis; corporate and business unit strategy
6 development; and energy contract negotiations. Our financial advisory activities include:
7 merger, acquisition, and divestiture assignments; due diligence and valuation assignments;
8 project and corporate finance services; and transaction support services. In addition, we
9 provide litigation support services on a wide range of financial and economic issues for
10 clients throughout North America.

11 **II. PURPOSE AND OVERVIEW OF TESTIMONY**

12 **Q. What is the purpose of your Direct Testimony?**

13 A. The purpose of my Direct Testimony is to present evidence and provide a
14 recommendation regarding Public Service’s return on equity (“ROE” or “cost of equity”) for
15 its electric utility operations and its gas distribution operations and to assess the
16 reasonableness of its proposed capital structure to be used for ratemaking purposes. My
17 analyses and recommendations are supported by the data presented in Schedules AEB-2
18 through AEB-9, which were prepared by me or under my supervision.

19 **Q. Please provide a brief overview of the analysis that led to your ROE and capital**
20 **structure recommendations.**

21 A. In developing my ROE recommendation, I applied the Constant Growth form of the
22 Discounted Cash Flow (“DCF”) model, the Capital Asset Pricing Model (“CAPM”), and the

1 Bond Yield Plus Risk Premium approach. In addition to these analyses, my recommendation
2 also considers the results of the benchmarking analysis showing that the Company's
3 operations have demonstrated a high level of performance as compared to the proxy group of
4 companies on cost, customer satisfaction and reliability. Although I did not make any
5 specific adjustments to my ROE estimates for business and financial risk or for management
6 performance, I considered these factors in aggregate when determining where Public
7 Service's ROE should fall within the range of analytical results. Finally, I compared the
8 Company's proposed capital structure, which is composed of 54.0 percent common equity,
9 45.44 percent long-term debt, and 0.56 customer deposits, with the capital structures of the
10 utility operating company subsidiaries of the proxy group companies.

11 **Q. How is the remainder of your Direct Testimony organized?**

12 A. The remainder of my Direct Testimony is organized in eight sections. Section III
13 provides a summary of my analyses and conclusions. Section IV reviews the regulatory
14 guidelines pertinent to the development of the cost of capital. Section V discusses the current
15 and prospective capital market conditions and the effect of those conditions on Public
16 Service's cost of equity. Section VI explains my selection of a proxy group of combination
17 electric and gas utilities. Section VII describes my analyses and the analytical basis for the
18 recommendation of the appropriate ROE for Public Service. Section VIII provides a
19 discussion of specific management performance and the regulatory environment, both of
20 which should be considered in establishing the authorized ROE for Public Service in this
21 case. Section IX discusses Public Service's capital structure as compared with the capital

1 structures of the utility operating company subsidiaries of the proxy group companies.

2 Section X presents my conclusions and recommendations.

3 **III. SUMMARY OF ANALYSES AND CONCLUSIONS**

4 **Q. Please explain how you estimated the cost of equity for Public Service.**

5 A. I have relied on several analytical approaches to estimate Public Service's cost of
6 equity based on a proxy group of publicly-traded companies. As shown in Table 1, those
7 ROE estimation models produce a wide range of results.

8 **Table 1: Summary of Analytical Results**

| | Mean Low | Mean | Mean High |
|----------------------------------|-----------------|-------------|------------------|
| CAPM ¹ | 10.38% | 10.53% | 10.78% |
| Bond Yield + Risk Premium | 9.77% | 9.98% | 10.33% |
| Constant Growth DCF ² | 9.07% | 9.62% | 10.07% |
| Projected DCF | 10.10% | 10.65% | 10.75% |
| Average | 9.83% | 10.20% | 10.48% |

9

10 The ROE estimation models are relied on to establish the range of returns for the proxy
11 group. However, the appropriate ROE should not be based only on the calculation of the
12 ROE estimation models. Rather, the appropriate return can only be determined by

¹ CAPM and Bond Yield + Risk Premium – The Mean Low utilizes the 180-day average of the risk-free rate (2.84%), the Mean uses the 2018-2019 Projected Risk-Free Rate (3.32%) and the Mean High uses the 2019-2023 Projected Risk-Free Rate (4.10%).

² DCF - The table presents the DCF results based on 180-day average stock prices as of December 29, 2017. Schedule AEB-2 also presents results based on 30-day and 90-day average stock prices which are similar to the 180-day results.

1 considering the factors beyond the calculation, including market conditions and the effect of
2 those conditions on the calculated results and the Company's risk relative to the proxy
3 companies. Finally, I believe it is reasonable and appropriate for the Board of Public
4 Utilities ("Board" or "BPU") to consider the overall operation of the company and to
5 establish an ROE at the upper end of the range of reasonable results where the company's
6 operational performance demonstrates strong cost control, operational performance, service
7 quality and customer satisfaction.

8 **Q. Please summarize the ROE estimation models that you considered to establish**
9 **the range of ROEs for Public Service.**

10 A. First, I considered the results of the Constant Growth DCF model. As discussed in
11 more detail in Section V of my testimony, current and recent historical market conditions
12 have affected the assumptions used in the ROE estimation models. Several regulatory
13 commissions have noted that the results of the DCF model have been affected by current
14 market conditions and have considered the calculated results with some caution, often
15 considering other models.³ Consequently, in addition to the results of the DCF model, I have
16 also considered two risk premium approaches: a forward-looking CAPM analysis and a Bond
17 Yield Plus Risk Premium methodology.

18 As in other jurisdictions, in this particular circumstance, there are reasons to exercise
19 caution with respect to the DCF analysis. For example, the Constant Growth DCF model is

³ FERC Docket No. EL11-66-001, Opinion No. 531, footnote 286. While Opinion No. 531 was recently remanded to the FERC by the D.C. Circuit Court, that decision did not question the finding by the FERC that capital market conditions were anomalous. Pennsylvania Public Utility Commission, PPL Electric Utilities, R-2012-2290597, meeting held December 5, 2012, at 80.

1 producing individual company results as low as 5.03 percent (NorthWestern Corporation),
2 which is self-evidently an inadequate ROE.⁴ Based on prospective market conditions and the
3 inverse relationship between the market risk premium and interest rates, I conclude that the
4 mean low DCF results do not provide a sufficient risk premium to compensate equity
5 investors for the residual risks of ownership, including the risk that they have the lowest
6 claim on the assets and income of Public Service. Furthermore, the mean high Constant
7 Growth DCF results of 10.12 percent are materially different than the upper end of recent
8 allowed returns for gas distributors (e.g., 10.55 percent for Atlanta Gas Light)⁵ and electric
9 utilities (e.g., 10.55 percent for Florida Power and Light as part of a four-year rate plan).⁶

10 Although I have concerns about the reliability of the results produced by the DCF
11 model, my ROE recommendation considers the range between the mean and mean-high
12 results of the DCF models, a forward-looking CAPM analysis, and a Bond Yield Plus Risk
13 Premium analysis. I also consider company-specific risk factors, and current and prospective
14 capital market conditions.

15 **Q. How has management performance been measured in the Company's filing?**

16 A. Company witness Michael Adams performed a benchmarking analysis, comparing
17 Public Service to the proxy group that I relied on and an additional regional proxy group. The

⁴ See Schedule AEB-2, using 180-day average stock price.

⁵ Georgia Public Service Commission, Docket No. 40828, Atlanta Gas Light Company's Georgia Rate Adjustment Mechanism ("GRAM") and Joint-Stipulation between the Staff and Atlanta Gas Light Company, Final Order Approving an Alternative Form of Regulation for Atlanta Gas Light Company and the 2017 AGL GRAM Filing, February 21, 2017.

⁶ Florida Public Service Commission, Docket No. 160021-EI, Petition for rate increase by Florida Power & Light Company, December 15, 2016.

1 factors considered in this benchmarking analysis included customer satisfaction, operating
2 costs and reliability metrics.

3 **Q. What were the conclusions from that analysis?**

4 A. Mr. Adams found that both Public Service’s electric and gas businesses performed
5 very well when compared to that of the peer groups, which indicates a well-managed
6 company that is focused on controlling costs and providing high levels of reliability and
7 customer satisfaction.

8 **Q. Are there other factors that should be considered regarding Public Service’s**
9 **performance that are not addressed by Mr. Adams?**

10 A. Yes. As discussed in the testimony of Scott Jennings, Public Service has had a long-
11 standing commitment to the state of New Jersey’s environmental and energy policy goals. In
12 this case, Public Service is also proposing a Green Enabling Mechanism (“GEM”), which is a
13 revenue decoupling mechanism that adjusts Public Service’s rate design to eliminate
14 disincentives to pursue energy efficiency, renewables, or other green initiatives that would
15 provide benefits to customers.

16 **Q. What is your conclusion regarding the appropriate authorized ROE for Public**
17 **Service in this proceeding?**

18 A. A reasonable range of ROE estimates for Public Service is from 9.80 percent to 10.50
19 percent. Taking into consideration management performance, and current and prospective
20 market conditions, I believe that an ROE of 10.30 percent is reasonable and appropriate. The
21 required ROE should be a forward-looking estimate; therefore, the analyses supporting my
22 recommendation rely on forward-looking inputs and assumptions (e.g., projected growth

1 rates in the DCF model, forecasted risk-free rate and Market Risk Premium in the CAPM
2 analysis) and take into consideration capital market conditions, including the effect of the
3 current low interest rate environment on utility stock valuations and dividend yields, the
4 uncertainty associated with global economic events, and the rising interest rate environment.

5 **IV. REGULATORY GUIDELINES**

6 **Q. Please describe the principles that guide the establishment of the cost of capital**
7 **for a regulated utility.**

8 A. The U.S. Supreme Court's *Hope* and *Bluefield* cases established the standards for
9 determining the fairness or reasonableness of a utility's authorized ROE. Among the
10 standards established by the Court in those cases are: (1) consistency with other businesses
11 having similar or comparable risks; (2) adequacy of the return to support credit quality and
12 access to capital; and (3) the principle that the specific means of arriving at a fair return are
13 not important, only that the end result leads to just and reasonable rates.⁷

14 **Q. Has the Board provided similar guidance in establishing the appropriate return**
15 **on common equity?**

16 A. Yes. The BPU follows the precedents of the *Hope* and *Bluefield* cases and
17 acknowledges that utility investors are entitled to a fair and reasonable return. In a recent
18 Order, the BPU cited a New Jersey Supreme Court decision which stated:

19 As the New Jersey Supreme Court has recognized, a privately owned
20 public utility is a complex mechanism that exists to serve a public need
21 but to do so it must have investor appeal. It must be allowed a

⁷ Bluefield, 262 U.S. at 692-93; Hope, 320 U.S., at 603.

1 reasonable return on its investment so that it may have borrowing
2 power at normal business rates to finance its day-to-day operations.
3 See *Daaleman v. Elizabethtown Gas Co.*, 77 N.J. 267, 272 (1978).⁸

4 **Q. Why is it important for a utility to be allowed the opportunity to earn a return**
5 **that is adequate to attract capital at reasonable terms?**

6 A. A return that is adequate to attract capital at reasonable terms enables Public Service
7 to provide safe, reliable electric utility and gas distribution service while maintaining its
8 financial integrity. That return should be commensurate with returns required by investors
9 elsewhere in the market for investments of equivalent risk. If it is lower, debt and equity
10 investors will seek alternative investment opportunities for which the expected return reflects
11 the perceived risks, thereby impairing Public Service's ability to attract capital at reasonable
12 cost.

13 **Q. What are your conclusions regarding regulatory guidelines?**

14 A. The ratemaking process is premised on the principle that, for investors and companies
15 to commit the capital needed to provide safe and reliable utility services, a utility must have
16 the opportunity to recover the return of, and the market-required return on, its invested
17 capital. In addition, the Board has the responsibility to establish rates to encourage good
18 management and to enable the utility to maintain its credit.⁹ Because utility operations are
19 capital-intensive, regulatory decisions should enable the utility to attract capital at reasonable
20 terms; doing so balances the long-term interests of the utility and its ratepayers.

⁸ BPU Docket No. ER12111052, OAL Docket No. PUC16310-12, Agenda Date March 12, 2015, at 71.

⁹ 11 N.J.A.R. 303, 1984 WL 981081 (N.J.B.P.U.), 62 P.U.R.4th 613.

1 The financial community carefully monitors the current and expected financial condition
2 of utility companies, and the regulatory framework in which they operate. In that respect, the
3 regulatory framework is one of the most important factors in both debt and equity investors'
4 assessments of risk. The BPU's order in this proceeding, therefore, should establish rates
5 that provide Public Service with the opportunity to earn an ROE that is: (1) adequate to
6 attract capital at reasonable terms; (2) sufficient to ensure good management and its financial
7 integrity; and (3) commensurate with returns on investments in enterprises with similar risk.
8 To the extent Public Service is authorized the opportunity to earn its market-based cost of
9 capital, the proper balance is achieved between customers' and shareholders' interests.

10 **V. CAPITAL MARKET CONDITIONS**

11 **Q. Why is it important to analyze capital market conditions?**

12 A. The ROE estimation models rely on market data that are either specific to the proxy
13 group, in the case of the DCF model, or the expectations of market risk, in the case of the
14 CAPM. The results of the ROE estimation models can be affected by prevailing market
15 conditions at the time the analysis is performed. While the ROE that is established in a rate
16 proceeding is intended to be forward-looking, current and projected market data, specifically
17 stock prices, dividends, growth rates and interest rates are used in the ROE estimation models
18 to estimate the required return for the subject company. It is important to consider whether
19 the assumptions relied on in the current market or the projected data are sustainable over the
20 period that the recommended ROE would be in effect. If investors do not expect current

1 market conditions to be sustained in the future, it is possible that the ROE estimation models
2 will not provide an accurate estimate of investors' required return during that rate period.

3 **Q. What factors affect the cost of equity for regulated utilities in the current and**
4 **prospective capital markets?**

5 A. The cost of equity for regulated utility companies is being affected by several factors
6 in the current and prospective capital markets, including: (1) the current low interest rate
7 environment and the corresponding effect on valuations and dividend yields of utility stocks
8 relative to historical levels; and (2) the market's expectation for higher interest rates. In this
9 section, I discuss each of these factors and how it affects the models used to estimate the cost
10 of equity for regulated utilities.

11 **Q. How has the Federal Reserve's monetary policy affected capital markets in**
12 **recent years?**

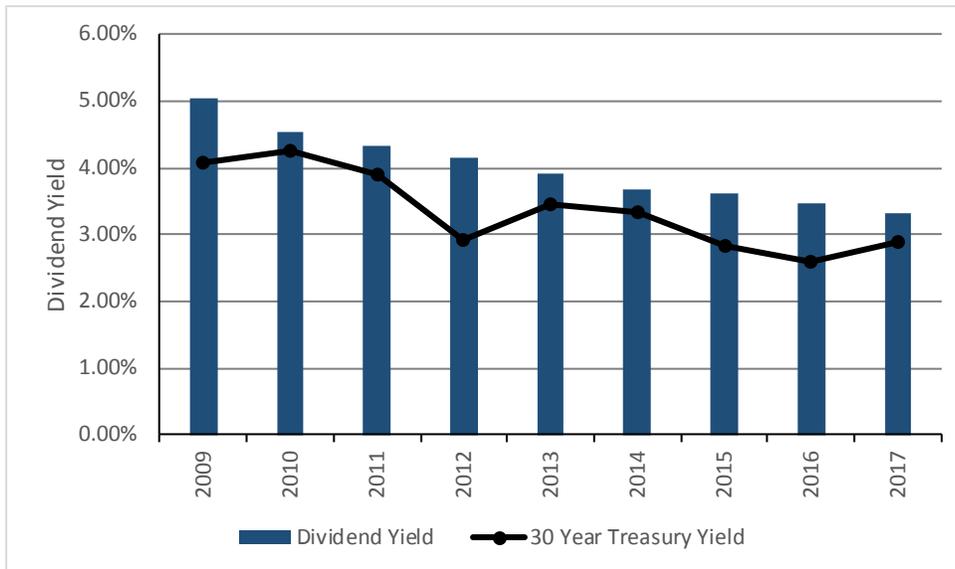
13 A. Extraordinary and persistent federal intervention in capital markets lowered
14 government bond yields after the Great Recession of 2008-09, as the Federal Open Market
15 Committee ("FOMC") used monetary policy (both reductions in short-term interest rates and
16 purchases of Treasury bonds and mortgage-backed securities) to stimulate the U.S. economy.
17 The low returns on short-term government bonds resulted in yield-seeking investors selecting
18 longer-term instruments, bidding up prices and reducing yields on those investments. As
19 investors have moved along the risk spectrum in search of yields that meet their return
20 requirements, there has been increased demand for dividend-paying equities, such as electric
21 and gas utility stocks.

1 **Q. How has the period of abnormally low interest rates affected the valuations and**
2 **dividend yields of utility shares?**

3 A. The Federal Reserve's accommodative monetary policy has caused investors to seek
4 alternatives to the historically low interest rates available on Treasury bonds. As a result of
5 this search for higher yield, the share prices for many common stocks, especially dividend-
6 paying stocks such as utilities, have been driven higher while the dividend yields have
7 decreased to levels well below the historical average. As shown in Chart 1, since the Federal
8 Reserve intervened to stabilize financial markets and support the economic recovery after the
9 Great Recession of 2008-09, Treasury bond yields and utility dividend yields have both
10 declined. Specifically, Treasury bond yields have decreased by approximately 118 basis
11 points since 2009, and utility dividend yields have decreased by approximately 172 basis
12 points over this same period.

13

Chart 1: Dividend Yields for Utility Stocks



14

1 **Q. How are higher stock valuations and lower dividend yields for utility companies**
2 **affecting the results of the DCF model?**

3 A. In the current market environment, the DCF model results are distorted by the
4 historically low level of interest rates and the higher valuation of utility stocks. Value Line
5 recently commented on the historically low dividend yields and high valuations of stocks in
6 the Electric Utility Industry and observed that the majority of electric utility equities are
7 trading within their 3- to 5-year Target Price Range.¹⁰

8 In 2017, most electric utility equities have risen sharply in price.
9 Those that have advanced at a mere single-digit pace are the exception,
10 not the rule. There are some exceptions. SCANA (covered in Issue 1)
11 has plummeted due to the severe problems with its utility's nuclear
12 construction project, which was canceled. The equities of two
13 California companies, PG&E Corp. and Edison International (covered
14 in Issue 11), have been weak due to the market's worries about
15 liability for wildfires in the Golden State this year. Otherwise, steep
16 price increases have been the norm. Takeover speculation has buoyed
17 some stocks, and investors continue to reach for yield in a low interest-
18 rate environment.¹¹

19 ***

20 The average dividend yield of stocks in the Electric Utility Industry is
21 just 3.3%. Seeing yields below 3% is no longer unusual, and one
22 equity, *MGE Energy*, has a yield of just 2%. Seeing a recent quotation
23 above the upper end of our 2020-2022 Target Price Range is also no
24 longer unusual. Although many of these stocks might well continue to
25 perform well in the near term, we advise long-term investors to
26 exercise caution here.¹²

27 To assess how low interest rates are affecting the dividend yields for utility stocks, I
28 compared the Standard & Poor's ("S&P") Utilities index to the yield on the 30-year Treasury

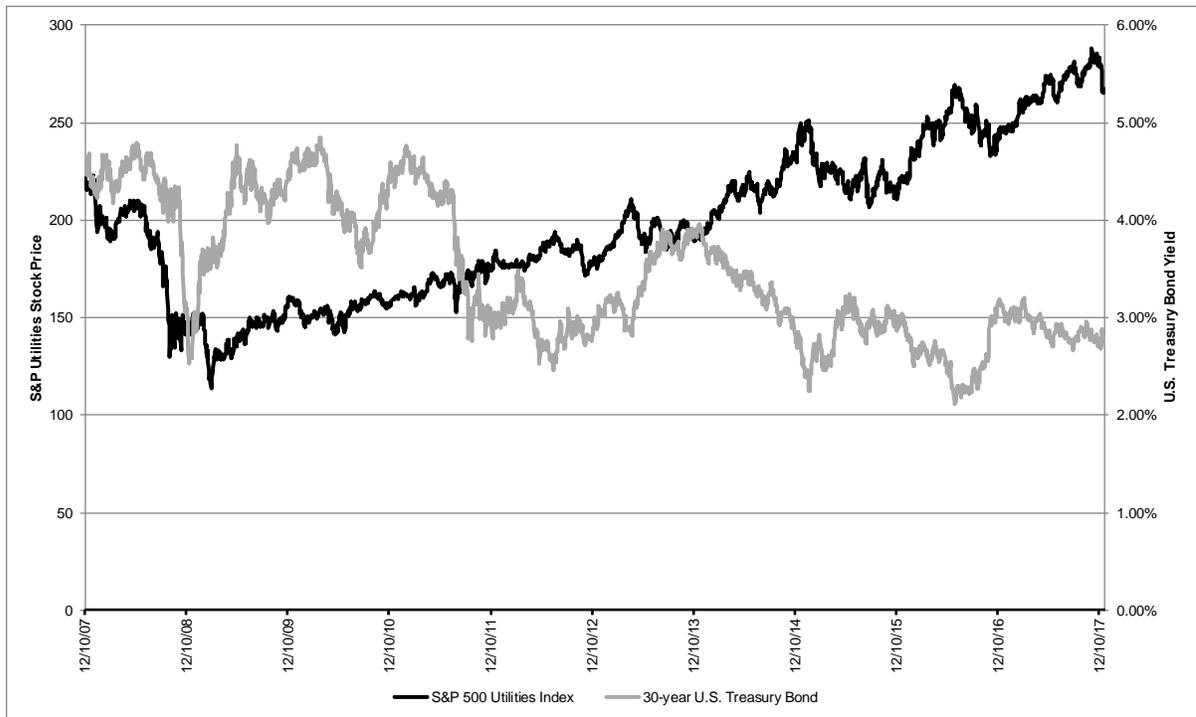
¹⁰ Value Line Investment Survey, Electric Utility (Central) Industry, December 15, 2017, at 901.

¹¹ *Ibid.*

¹² *Ibid.*

1 bond since 2007. As shown in Chart 2, the S&P Utilities index has increased steadily as
2 yields on 30-year Treasury bonds have declined in response to federal monetary policy.

3 **Chart 2: S&P Utilities Index and U.S. Treasury Bond Yields - 2007 – December 2017**



4

5

6 **Q. What evidence is there that the Federal Reserve’s accommodative monetary**
7 **policy has created and continues to create anomalous conditions in capital**
8 **markets?**

9 A. Members of the Federal Reserve have acknowledged that monetary policy has created

10 abnormal capital market conditions. In September 2014, the Federal Reserve announced its

11 plan to “normalize” monetary policy by, among other things, reducing its portfolio to

12 minimize the effect of its holdings on “the allocation of credit across sectors of the

1 economy.”¹³ In March 2015, Dr. Stanley Fischer, Vice Chair of the Federal Reserve, further
2 acknowledged the abnormal economic conditions created by the actions of the Federal
3 Reserve and recognized the intentions of the Federal Reserve to return to normal market
4 dynamics:

5 Beginning the normalization of policy will be a significant step toward
6 the restoration of the economy’s normal dynamics, allowing monetary
7 policy to respond to shocks without recourse to unconventional tools.¹⁴

8 **Q. Has there been a regulatory response to the historically low dividend yields for**
9 **utility companies and the corresponding effect on the DCF model?**

10 A. Yes. Understanding the important role that dividend yields play in the DCF model,
11 the FERC has determined that anomalous capital market conditions have caused the DCF
12 model to understate equity costs for regulated utilities at this time. In Opinion No. 531,
13 issued in June 2014, the FERC noted:

14 There is ‘model risk’ associated with the excessive reliance or
15 mechanical application of a model when the surrounding conditions
16 are outside of the normal range. ‘Model risk’ is the risk that a
17 theoretical model that is used to value real world transactions fails to
18 predict or represent the real phenomenon that is being modeled.¹⁵

19 In that same Opinion, the FERC noted that the low interest rates and bond yields that
20 persisted throughout the March 2012 - October 2012 analytical period used in that case
21 (“study period”) resulted in anomalous market conditions and recognized the need to move
22 away from the midpoint of the DCF analysis. In that case, the FERC relied on the CAPM

¹³ Federal Open Market Committee, Policy Normalization Principles and Plans, September 16, 2014.

¹⁴ Remarks by Stanley Fischer, Vice Chairman of the Board of Governors of the Federal Reserve at the Economics Club of New York, March 23, 2015.

¹⁵ FERC Docket No. EL11-66-001, Opinion No. 531, footnote 286. While Opinion No. 531 was recently remanded to the FERC by the D.C. Circuit Court, that decision did not question the finding by the FERC that capital market conditions were anomalous.

1 and other risk premium methodologies to inform its judgment to set the return above the
2 midpoint of the DCF results.

3 In Opinion No. 551, issued in September 2016, the FERC recognized that those
4 anomalous market conditions continued into the July 2015 - December 2015 study period
5 and again concluded that it was necessary to rely on ROE estimation methodologies other
6 than the DCF model to set the appropriate ROE:

7 Though the Commission noted certain economic conditions in Opinion
8 No. 531, the principle argument was based on low interest rates and
9 bond yields, conditions that persisted throughout the [2015] study
10 period. Consequently, we find that capital market conditions are still
11 anomalous as described above...¹⁶

12 Because the evidence in this proceeding indicates that capital markets
13 continue to reflect the type of unusual conditions that the Commission
14 identified in Opinion No. 531, we remain concerned that a mechanical
15 application of the DCF methodology would result in a return
16 inconsistent with *Hope* and *Bluefield*.¹⁷

17 As the Commission found in Opinion No. 531, under these
18 circumstances, we have less confidence that the midpoint of the zone
19 of reasonableness in this proceeding accurately reflects the equity
20 returns necessary to meet the *Hope* and *Bluefield* capital attraction
21 standards. We therefore find it necessary and reasonable to consider
22 additional record evidence, including evidence of alternative
23 methodologies...¹⁸

¹⁶ FERC Docket No. EL14-12-002, Opinion No. 551, at para. 121.

¹⁷ *Id.*, at para. 122.

¹⁸ *Id.*

1 Specifically, the FERC recognized that the inputs to the DCF model have been
2 affected by anomalous market conditions and, therefore also considered the results of other
3 ROE estimation models.

4 [W]e also understand that any DCF analysis may be affected by
5 potentially unrepresentative financial inputs to the DCF formula,
6 including those produced by historically anomalous capital market
7 conditions. Therefore, while the DCF model remains the
8 Commission’s preferred approach to determining allowed ROR, the
9 Commission may consider the extent to which economic anomalies
10 may have affected the reliability of DCF analyses in determining
11 where to set a public utility’s ROE within the range of reasonable
12 returns established by the two-step constant growth DCF
13 methodology.¹⁹

14 **Q. Have state regulatory commissions commented on the effect of recent market**
15 **conditions on the results of the DCF model?**

16 A. Yes. Both the Pennsylvania Public Utilities Commission (“PPUC”) and the Illinois
17 Commerce Commission (“ICC”) have noted that the DCF results have been affected by
18 market conditions. In a 2012 decision for PPL Electric Utilities, while noting that the
19 Commission has traditionally relied primarily on the DCF method to estimate the cost of
20 equity for regulated utilities, the PPUC recognized that market conditions were causing the
21 DCF model to produce results that were much lower than other models such as the CAPM
22 and Risk Premium. The PPUC’s Order explained:

23 Sole reliance on one methodology without checking the validity of the
24 results of that methodology with other cost of equity analyses does not
25 always lend itself to responsible ratemaking. We conclude that

¹⁹ Coakley v. Bangor Hydro-Electric Co., 147 FERC ¶ 61,234, at 41 (2014).

1 methodologies other than the DCF can be used as a check upon the
2 reasonableness of the DCF derived equity return calculation.²⁰

3 The PPUC ultimately concluded:

4 As such, where evidence based on the CAPM and RP methods suggest
5 that the DCF-only results may understate the utility's current cost of
6 equity capital, we will give consideration to those other methods, to
7 some degree, in determining the appropriate range of reasonableness
8 for our equity return determination.²¹

9 The PPUC authorized a return of 10.4 percent based on the results of the DCF
10 models, informed by the results of other ROE estimation models.

11 **Q. What evidence is there that the interest rate environment is shifting?**

12 A. Based on stronger conditions in employment markets, a relatively stable inflation
13 rate, steady economic growth, and increased household spending, the Federal Reserve raised
14 the short-term borrowing rate by 25 basis points at the March, June, and December 2017
15 meetings. Since December 2015, the Federal Reserve has increased interest rates five times,
16 bringing the federal funds rate to the range of 1.25 percent to 1.50 percent. As the economy
17 continues to expand, the Federal Reserve is expected to continue increasing short-term
18 interest rates to sustain the desired balance between unemployment and consumer price
19 inflation.²² The Federal Reserve has indicated that it intends to raise short-term rates again
20 three times in 2018.²³ Furthermore, in October 2017, the Federal Open Market Committee

²⁰ Pennsylvania Public Utility Commission, PPL Electric Utilities, R-2012-2290597, meeting held December 5, 2012, at 80.

²¹ *Id.*, at 81.

²² FOMC, Federal Reserve press release, September 20, 2017.

²³ Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents under their individual assessments of projected appropriate monetary policy, December 2017.

1 (“FOMC”) started reducing the size of the Fed’s \$4.5 trillion bond portfolio by no longer
2 reinvesting the proceeds of the bonds it holds. In response to the Great Recession, the Fed
3 pursued a policy known as “Quantitative Easing,” in which it systematically purchased
4 mortgage-backed securities and long-term Treasury bonds to provide liquidity in financial
5 markets and drive down yields on long-term government bonds. Although the Federal
6 Reserve discontinued the Quantitative Easing program in October 2014, it continued to
7 reinvest the proceeds from the bonds it holds. Under the new policy, the FOMC intends to
8 gradually reduce the Federal Reserve’s securities holdings by \$10 billion per month.²⁴

9 The Federal Reserve’s announced unwinding plan provides additional support for
10 investors’ view that long-term interest rates will increase, as the Federal Reserve gradually
11 reverses the Quantitative Easing program that reduced those long-term rates. Furthermore,
12 several analysts have recently suggested that the Federal Reserve’s plan could cause sector
13 rotation, as investors shift from utilities and telecom stocks to shares of banks and other
14 sectors that benefit from rising interest rates.²⁵

15 **Q. What is the financial market’s perspective on the future path of interest rates?**

16 A. Chart 2 (below) summarizes the Federal Funds probabilities developed by CME
17 group. The probability of a rate hike is calculated by adding the probabilities of all target
18 rate levels above the current target rate. The current target Federal Funds rate is 150 bps after
19 the rate increase set at the December 2017 meeting. The market expects that there will be

²⁴ Federal Reserve press release, Addendum to the Policy Normalization Principles and Plans, June 14, 2017, implemented at FOMC meeting September 20, 2017.

²⁵ Reuters Business News, “Fed meeting could trigger stock sector rotation,” September 15, 2017.

1 further rate increases in 2018, shown by high expectations for target Federal Funds rates
 2 above the 125-150 bps range beginning in March of 2018 through November 2018.

3 **Chart 2: Investor Expectations of Future Federal Funds Rate Increases²⁶**

| Target Federal Funds Rate(bps) | FOMC Meeting Dates | | | | | | | |
|--------------------------------|--------------------|-----------|----------|-----------|----------|-----------|-----------|--|
| | 1/31/2018 | 3/21/2018 | 5/2/2018 | 6/13/2018 | 8/1/2018 | 9/26/2018 | 11/8/2018 | |
| 125-150 | 91.5% | 47.7% | 45.2% | 24.9% | 23.9% | 16.4% | 15.6% | |
| 150-175 | 8.5% | 48.3% | 48.2% | 46.9% | 46.0% | 39.1% | 37.9% | |
| 175-200 | | 4.1% | 6.4% | 25.2% | 26.1% | 32.3% | 32.6% | |
| 200-225 | | 0.0% | 0.2% | 3.0% | 3.9% | 10.8% | 11.9% | |
| 225-250 | | | | 0.1% | 0.2% | 1.4% | 1.8% | |
| > 150 | | 52.4% | 54.8% | 75.2% | 76.2% | 83.6% | 84.2% | |
| >175 | | 4.1% | 6.6% | 28.2% | 30.0% | 43.1% | 44.5% | |

4

5 **Q. What effect do rising interest rates have on the cost of equity?**

6 A. With all other considerations remaining the same, higher interest rates will lead to
 7 higher required returns on equity. As such, rising interest rates support the selection of a
 8 return toward the upper end of a reasonable range of ROE estimates that are based on current
 9 market data. Alternatively, my CAPM analysis and Bond Yield Plus Risk Premium analysis
 10 includes estimated returns based on both current and near-term projected interest rates.

²⁶ CME Group; FedWatch tool as of November 16, 2017.

1 **Q. What conclusions do you draw from your analysis of capital market conditions?**

2 A. My main conclusion is that the currently low interest rate environment has driven
3 dividend yields to historically low levels for utility shares. The effect of accommodative
4 monetary policy by the Federal Reserve is that the DCF model, which reflects unsustainably
5 low dividend yields, is understating the forward-looking equity return requirements.²⁷
6 Therefore, it is important to also consider alternative financial models, such as the CAPM
7 and Risk Premium analyses, together with the DCF results. In addition, the Federal Reserve
8 increased short-term interest rates again in December 2017 and has indicated its intention to
9 continue tightening monetary policy in 2018 and 2019. In summary, market participants and
10 analysts are expecting a change from the recent low interest rate environment. As interest
11 rates increase, it is reasonable to believe that the cost of equity for utilities such as Public
12 Service is also increasing, and it is appropriate to use forward-looking interest rates to
13 estimate the cost of equity over the period that rates will be in effect.

14 **VI. PROXY GROUP SELECTION**

15 **Q. Why have you used a group of proxy companies to estimate the cost of equity for**
16 **Public Service?**

17 A. In this proceeding, I am estimating the cost of equity for Public Service, a
18 rate-regulated subsidiary of PSEG. Since the ROE is a market-based concept, and given the
19 fact that Public Service's operations do not make up the entirety of a publicly-traded entity, it

²⁷ As the Federal Reserve tightens monetary policy and increases interest rates, it is likely utility dividend yields will increase.

1 is necessary to establish a group of companies that is both publicly-traded and comparable to
2 Public Service in certain fundamental business and financial respects to serve as its “proxy”
3 for purposes of the ROE estimation process.

4 Even if Public Service’s regulated electric and gas utility operations made up the
5 entirety of a publicly-traded entity, it is possible that transitory events could bias its market
6 value in one way or another over a given period. A significant benefit of using a proxy group
7 is that it mitigates the effects of anomalous events that may be associated with any one
8 company. The proxy companies used in my analyses all possess a set of operating and
9 financial risk characteristics that are substantially comparable to Public Service, and,
10 therefore, provide a reasonable basis for deriving the appropriate ROE for the Company.

11 **Q. Please provide a brief profile of Public Service.**

12 A. Public Service is a wholly-owned subsidiary of PSEG that provides electric
13 transmission and distribution services to approximately 2.2 million retail customers and gas
14 distribution service to approximately 1.8 million retail customers in New Jersey, including
15 the six largest cities.²⁸ Public Service accounted for approximately 68 percent of PSEG’s net
16 income on average over the period from 2014-2016.²⁹ Public Service’s current long-term
17 issuer ratings are: (1) S&P BBB+ (Outlook: Stable); and (2) Moody’s Investor’s Service
18 Baa1 (Outlook: Stable).³⁰

²⁸ Source: Public Service Enterprise Group, Inc., 2016 SEC Form 10-K, at 3.

²⁹ *Id.*, at 172. This percentage varies significantly from year to year depending on the income derived from the Power segment.

³⁰ Source: SNL Financial, accessed January 2, 2018.

1 **Q. How did you select the companies included in your proxy group?**

2 A. I began with the group of 40 domestic U.S. utilities that Value Line classifies as
3 Electric Utilities, and I simultaneously applied the following screening criteria to select a
4 group of combination electric and gas utility companies that:

- 5 • Are covered by at least two utility industry analysts;
- 6 • Have positive long-term earnings growth forecasts from at least two sources;
- 7 • Pay quarterly cash dividends that have not been reduced in the last three years,
8 because companies that do not pay dividends cannot be analyzed using the DCF
9 model;
- 10 • Have investment grade long-term issuer ratings from S&P and/or Moody's;
- 11 • Derive more than 70 percent of total operating income from regulated utility
12 operations;
- 13 • Derive more than 50 percent of regulated operating income from electric utility
14 operations;
- 15 • Derive more than 10 percent of regulated operating income from gas distribution
16 operations, or have dedicated more than 10 percent of assets to regulated gas
17 distribution operations; and
- 18 • Are not engaged in mergers or other transformative transactions during the
19 analytical period.
- 20 • Are not engaged in mergers or other transformative transactions during the
21 analytical period.
- 22 • Are not engaged in mergers or other transformative transactions during the
23 analytical period.

24 **Q. Did you include PSEG in your analysis?**

25 A. No. Avoiding the circular logic that otherwise would occur, it is my general practice
26 to exclude the subject company, or its parent holding company, from the proxy group.

27 **Q. What is the composition of your initial proxy group?**

28 A. The screening criteria discussed above result in a proxy group consisting of the
29 combination electric and gas companies shown in Table 2:

1

Table 2: Initial Proxy Group

| Company | Ticker |
|---------------------------|---------------|
| Ameren Corporation | AEE |
| Avangrid Inc. | AGR |
| Black Hills Corporation | BKH |
| CenterPoint Energy, Inc. | CNP |
| CMS Energy | CMS |
| Consolidated Edison, Inc. | ED |
| DTE Energy | DTE |
| Eversource Energy | ES |
| NorthWestern Corporation | NWE |
| Southern Company | SO |
| WEC Energy Group | WEC |
| Xcel Energy Inc. | XEL |

2 Similar to Public Service, each of the companies in my proxy group has an
3 investment grade credit rating between A- and BBB from S&P, which indicates that the
4 proxy company has similar business and financial risk characteristics as Public Service. In
5 addition, the proxy group companies derive the majority of their operating earnings from
6 regulated utility operations, making them comparable to Public Service (i.e., approximately
7 60 percent on average) on that risk factor.

8 **Q. Did you exclude any other companies from the final proxy group for Public**
9 **Service?**

10 A. Yes. I also excluded companies that are constructing nuclear generation projects
11 because the risk associated with those assets is much higher under current market conditions
12 due to the size of those projects relative to the companies, the cost overruns and delays and

1 the uncertainty created by the bankruptcy filing of Westinghouse. This screen resulted in the
2 exclusion the Southern Company. My final proxy group is shown in Table 3.

3 **Table 3: Final Proxy Group**

| Company | Ticker |
|---------------------------|---------------|
| Ameren Corporation | AEE |
| Avangrid Inc. | AGR |
| Black Hills Corporation | BKH |
| CenterPoint Energy, Inc. | CNP |
| CMS Energy | CMS |
| Consolidated Edison, Inc. | ED |
| DTE Energy | DTE |
| Eversource Energy | ES |
| NorthWestern Corporation | NWE |
| WEC Energy Group | WEC |
| Xcel Energy Inc. | XEL |

4 **Q. Why have you selected combination electric and gas utilities in your proxy**
5 **group?**

6 A. Public Service operates as a combination electric and gas utility and is viewed by
7 investors as a combination company. Public Service raises capital as a combination
8 company, and does not issue separate debt or equity for the electric and gas operations. In
9 addition, the business and financial risks of Public Service are comparable to those of a
10 combination electric and gas utility. As shown in Table 4, the proxy group companies derive
11 a similar percentage of regulated operating income from electric utility and gas distribution
12 operations as Public Service, making them risk comparable to the Company in terms of
13 business operations.

1

Table 4: Proxy Group 2016 Operating Income³¹

| Company | Electric | Natural Gas |
|---------------------------|-----------------|--------------------|
| Ameren Corporation | 89% | 11% |
| Avangrid, Inc. | 85% | 15% |
| Black Hills Corporation | 60% | 40% |
| CenterPoint Energy, Inc. | 68% | 32% |
| CMS Energy | 73% | 27% |
| Consolidated Edison, Inc. | 81% | 16% |
| DTE Energy | 80% | 20% |
| Eversource Energy | 91% | 9% |
| NorthWestern Corp | 84% | 16% |
| WEC Energy Group | 63% | 36% |
| Xcel Energy Inc. | 88% | 12% |
| Proxy Group Avg. | 78% | 21% |
| Public Service Company | 77% | 23% |

2 For these reasons, a proxy group consisting of combination electric and gas utilities is
3 most risk comparable to Public Service and is what investors use to establish their return
4 requirements for the Company.

5 **VII. COST OF EQUITY ESTIMATION**

6 **Q. Please briefly discuss the ROE in the context of the regulated Rate of Return**
7 **(“ROR”).**

8 A. The overall ROR for a regulated utility is based on its weighted average cost of
9 capital, in which the costs of the individual sources of capital are weighted by their respective
10 book values. While the costs of debt and preferred stock can be directly observed, the cost of
11 equity is market-based and, therefore, must be estimated based on observable market data.

³¹ Source: United States Securities and Exchange Commission, 2016 Form 10-K for each company.

1 **Q. How is the required ROE estimated?**

2 A. The required ROE is estimated by using multiple analytical techniques that rely on
3 market data to quantify investors' return requirements, adjusted for certain incremental costs
4 and risks. Quantitative models produce a range of reasonable results from which the market-
5 required ROE is selected. That selection must be based on a comprehensive review of
6 relevant data and information, and does not necessarily lend itself to a strict mathematical
7 solution. The key consideration in determining the cost of equity is to ensure that the
8 methodologies employed reasonably reflect investors' views of the financial markets in
9 general and (in particular, of the subject company) in the context of the proxy group.

10 **Q. What methods did you use to estimate Public Service's cost of equity?**

11 A. I considered the results of two forms of the DCF model, the CAPM analysis, and a
12 Bond Yield Plus Risk Premium methodology. A reasonable ROE estimate considers
13 alternative methodologies, observable market data, and the reasonableness of their individual
14 and collective results.

15 **Q. Why is it important to use more than one analytical approach?**

16 A. The cost of equity is not directly observable, and, therefore, it must be estimated
17 based on both quantitative and qualitative information. When estimating the cost of equity,
18 analysts and investors are inclined to gather and evaluate as much relevant data as can be
19 reasonably analyzed. Several models have been developed to estimate the cost of equity.
20 Analysts and academics understand that ROE models are tools to be used in the ROE
21 estimation process, and that strict adherence to any single approach, or the results of any
22 single approach, can lead to flawed or irrelevant conclusions. Consistent with the *Hope*

1 finding, it is the analytical result, not the methodology, which is controlling in arriving at
2 ROE determinations.

3 **A. Constant Growth DCF Model**

4 **Q. Are DCF models widely used to estimate the cost of equity for regulated**
5 **utilities?**

6 A. Yes. DCF models are widely used in regulatory proceedings and have sound
7 theoretical bases, although neither the DCF model nor any other model can be applied
8 without considerable judgment in the selection of data and the interpretation of results. As
9 discussed in Section V of my Direct Testimony, the currently high valuations and low
10 dividend yields for utility companies and the expectation that those high valuations and low
11 dividend yields are not sustainable are creating concerns among analysts and regulators that
12 the DCF model is understating the cost of equity at this time.

13 **Q. Please describe the DCF approach.**

14 A. The DCF approach is based on the theory that a stock's current price represents the
15 present value of all expected future cash flows. In its most general form, the DCF model is
16 expressed as follows:

17
$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_\infty}{(1+k)^\infty} \quad [1]$$

18 Where P_0 represents the current stock price, $D_1 \dots D_\infty$ are all expected future
19 dividends, and k is the discount rate, or required ROE. Equation [1] is a standard present
20 value calculation that can be simplified and rearranged into the following form:

$$k = \frac{D_0(1+g)}{P_0} + g \quad [2]$$

1

2

3

4

Equation [2] is often referred to as the Constant Growth DCF model in which the first term is the expected dividend yield and the second term is the expected long-term growth rate.

5

Q. What assumptions are required for the Constant Growth DCF model?

6

A. The Constant Growth DCF model requires the following assumptions: (1) a constant growth rate for earnings and dividends; (2) a stable dividend payout ratio; (3) a constant price-to-earnings (“P/E”) ratio; and (4) a discount rate greater than the expected growth rate.³² To the extent any of these assumptions is violated, considered judgment and/or specific adjustments should be applied to the results.

11

Q. What market data did you use to calculate the dividend yield in your constant growth DCF model?

12

13

A. As shown in Schedule AEB-2, the dividend yield in my Constant Growth DCF model is based on the proxy companies’ current annual dividend and average closing stock prices over the 30-, 90-, and 180-trading days ended December 29, 2017. In my summary tables, I have presented the DCF results using 180-day average stock prices as representative of the investor-required return.

14

15

16

17

³² Morin, Roger A., New Regulatory Finance, Public Utility Reports, Inc., 2006, at 255.

1 **Q. Did you make any adjustments to the dividend yield to account for periodic**
2 **growth in dividends?**

3 A. Yes. It is my understanding that the Board's convention has typically been to use a
4 full-year growth rate to calculate the expected dividend yield. Therefore, the DCF results
5 presented in the tables in my testimony reflect that convention.³³

6 **Q. Why is it important to select appropriate measures of long-term growth in**
7 **applying the DCF model?**

8 A. In its Constant Growth form, the DCF model (i.e., Equation [2]) assumes a single
9 long-term growth rate in perpetuity. To reduce the long-term growth rate to a single
10 measure, one must assume that the dividend payout ratio remains constant and that earnings
11 per share, dividends per share, and book value per share all grow at the same constant rate.
12 Over the long run, dividend growth can only be sustained by earnings growth. Earnings
13 growth rates tend to be least influenced by capital allocation decisions that companies may
14 make in response to near-term changes in the business environment. Since such decisions
15 may directly affect near-term dividend payout ratios, estimates of earnings growth are more
16 indicative of long-term investor expectations than are dividend or book value growth
17 estimates.

³³ Because utility companies tend to increase their quarterly dividends at different times throughout the year, it is reasonable to assume that dividend increases will be evenly distributed over calendar quarters. Therefore, my normal practice is to apply one-half of the growth rate to calculate the expected dividend yield to reflect the timing of dividend payments. However, in this case, I have adopted the Staff's preference for a full year's growth. See the Initial Decision of the State of New Jersey Office of Administrative Law, OAL DKT. No. PUC 09261-16, p. 8.

1 **Q. What sources of long-term growth rates did you rely on in your Constant**
2 **Growth DCF model?**

3 A. My Constant Growth DCF model incorporates three sources of long-term growth
4 rates: (1) consensus long-term earnings growth estimates from Zacks Investment Research;
5 (2) consensus long-term earnings growth estimates from Thomson First Call (provided by
6 Yahoo! Finance); and (3) long-term earnings growth estimates from Value Line.

7 **B. Projected Constant Growth DCF Model**

8 **Q. Have you considered the results of any other DCF analyses?**

9 A. Yes, because of analysts' views that utility stocks may currently be at unsustainably
10 high prices due to market conditions, I have also considered the results of a projected
11 Constant Growth DCF model. Rather than using historical prices, this DCF analysis relies on
12 Value Line's projected average stock prices and projected dividends for the period from 2020
13 - 2022 and the five-year projected EPS growth rates. This DCF scenario is developed to
14 demonstrate the expected cost of capital over the projected period, if stock prices were to be
15 at levels expected by analysts as investors respond to changes in market conditions and
16 investment options.

17 As shown in Schedule AEB-3, the Projected Constant Growth DCF analysis produces
18 mean results of 10.65 percent and a mean high result of 10.75 percent. The mean results of
19 the Projected Constant Growth DCF analysis are approximately 103 basis points above the
20 results of the Constant Growth DCF model using the 180-day historical average price. This
21 analysis confirms my concern that under current market conditions the Constant Growth
22 DCF analysis understates the true cost of equity.

1 **C. Discounted Cash Flow Results**

2 **Q. Please summarize the results of your DCF analyses.**

3 A. The results of my Constant Growth and Projected Constant Growth DCF analyses
4 using 180-day average stock prices are summarized in Table 5.

5 **Table 5: Summary of DCF Results³⁴**

| | Mean Low | Mean | Mean High |
|---------------------|-----------------|-------------|------------------|
| Constant Growth DCF | 9.07% | 9.62% | 10.07% |
| Projected DCF | 10.10% | 10.65% | 10.75% |

6 As shown in Table 5, the Constant Growth DCF analysis using the 180-day average dividend
7 yield produces a range of results from 9.07 percent to 10.07 percent. The Projected Constant
8 Growth DCF produces a range of results from 10.10 percent to 10.75 percent.

9 **Q. How did you calculate the range of results for the DCF models?**

10 A. I calculated the mean low result for both DCF models using the lowest growth rate
11 (i.e., the lowest of the Thomson First Call, Zacks, and Value Line earnings growth rates) for
12 each of the proxy group companies. Thus, the mean low result reflects the lowest expected
13 DCF result for the proxy group. I used a similar approach to calculate the mean high results,
14 using the highest growth rate for each proxy group company. The mean results were
15 calculated using the average growth rates from all sources.

³⁴ DCF results in the table are based on 180-day average stock prices. Schedule AEB-2 and AEB-3 also present results based on 30-day and 90-day average stock prices which rely on the same methodology as the 180-day results. All results exclude ROEs below 7.00 percent.

1 **Q. Have you excluded any of the Constant Growth DCF results for individual**
2 **companies in your proxy group?**

3 A. Yes. It is appropriate to exclude Constant Growth DCF results below a specified
4 threshold at which equity investors would consider such returns to provide an insufficient
5 risk premium above long-term debt costs. The average credit rating for the companies in the
6 proxy group is BBB/Baa2. The average yield on Moody's Baa-rated utility bonds for the 90
7 trading days ending December 29, 2017 was 4.10 percent.³⁵ As shown in Schedule AEB-2, I
8 have eliminated Constant Growth DCF results lower than 7.00 percent because such returns
9 would provide equity investors a risk premium of only 290 basis points above Baa-rated
10 utility bonds. While there has not been an authorized ROE as low as 7.00 percent, and such a
11 return would not meet the *Hope* and *Bluefield* standards for a risk comparable return for any
12 utility, this return is applied to the individual company ROE results to establish a floor on
13 individual proxy company observations. This approach has been used by other regulators to
14 adjust the anomalous results of the DCF model.³⁶ This resulted in the elimination of DCF
15 results for Consolidated Edison, Inc.³⁷ and NorthWestern Corporation.³⁸

³⁵ Source: Bloomberg.

³⁶ In a recent Minnesota Case, the Minnesota Public Utilities Commission relied on a 7.00 percent floor. In Connecticut, the Public Utilities Regulation Authority has recently relied on a floor of 325 basis points above the cost of debt, which would be 7.69 percent in this case. See Public Utilities Regulatory Authority, Docket No. 16-06-04, 84. See also Minnesota Public Utilities Commission, Docket No. E017/GR-15-1033, In the Matter of the Application of Otter Tail Power Company for Authority to Increase Rates for Electric Service in the State of Minnesota (August 16, 2016) at 11.

³⁷ Relying on 180-day average prices, the mean DCF result for Consolidated Edison was 5.97 percent. The low and high results were 5.37 percent and 6.65 percent respectively

³⁸ Relying on 180-day average prices, the mean DCF result for NorthWestern Corp was 6.32 percent. The low and high results were 5.03 percent and 8.14 percent, respectively.

1 **Q. What are your conclusions about the results of the DCF models?**

2 A. As discussed previously, one primary assumption of the DCF models is a constant
3 P/E ratio. That assumption is heavily influenced by the market price of utility stocks. To the
4 extent that utility valuations are high and may not be sustainable, it is important to consider
5 the results of the DCF models with caution. The average dividend yield for the proxy group
6 companies has declined from 5.04 percent in 2009 to 3.31 percent in 2017 due to the stock
7 price appreciation. This average dividend yield is significantly below the average dividend
8 yield for combined electric and gas utilities over the last 15 years.

9 The recent decisions of the PPUC and the FERC support my conclusion that, because
10 the assumptions of the DCF models are being affected by anomalous market conditions, it is
11 important to view the results of this model with caution and give weight to the results of
12 other ROE estimation models.

13 **D. CAPM Analysis**

14 **Q. Please briefly describe the Capital Asset Pricing Model.**

15 A. The CAPM is a risk premium approach that estimates the cost of equity for a given
16 security as a function of a risk-free return plus a risk premium to compensate investors for
17 the non-diversifiable or “systematic” risk of that security. Systematic risk is the risk inherent
18 in the entire market or market segment. This form of risk cannot be diversified away using a
19 portfolio of assets. Non-systematic risk is the risk of a specific company that can be
20 mitigated through portfolio optimization.

1 The CAPM is defined by four components, each of which must theoretically be a
2 forward-looking estimate:

$$3 \qquad K_e = r_f + \beta(r_m - r_f) \quad [3]$$

4 Where:

5 K_e = the required market ROE;

6 β = the Beta coefficient of an individual security;

7 r_f = the risk-free rate; and

8 r_m = the required return on the market as a whole.

9

10 In this specification, the term $(r_m - r_f)$ represents the Market Risk Premium.

11 According to the theory underlying the CAPM, since unsystematic risk can be diversified
12 away, investors should only be concerned with systematic risk. Systematic risk is measured
13 by Beta, which measures the volatility of a security as compared to the overall market. Beta
14 is defined as:

$$\beta = \frac{\text{Covariance}(r_e, r_m)}{\text{Variance}(r_m)} \quad [4]$$

15

16 The variance of the market return (i.e., Variance (r_m)) is a measure of the uncertainty
17 of the general market. The covariance between the return on a specific security and the
18 general market (i.e., Covariance (r_e, r_m)) reflects the extent to which the return on that
19 security will respond to a given change in the general market return. Thus, Beta represents
20 the risk of the security relative to the general market.

1 **Q. What risk-free rate did you use in your CAPM analysis?**

2 A. I relied on three sources for my estimate of the risk-free rate: (1) the current 180-day
3 average yield on 30-year U.S. Treasury bonds (i.e., 2.84 percent);³⁹ (2) the projected 30-year
4 U.S. Treasury bond yield for Q1 2018 through Q2 2019 (i.e., 3.32 percent);⁴⁰ and (3) the
5 projected 30-year U.S. Treasury bond yield for 2019 through 2023 (i.e., 4.10 percent).⁴¹

6 **Q. What Beta coefficients did you use in your CAPM analysis?**

7 A. As shown in Schedule AEB-4, I used the average Beta coefficients for the proxy
8 group companies as reported by Value Line. Value Line's calculation is based on five years
9 of weekly returns relative to the New York Stock Exchange Composite Index.

10 **Q. How did you estimate the market risk premium in the CAPM?**

11 A. I estimated the Market Risk Premium based on the expected total return on the S&P
12 500 Index less the 30-year Treasury bond yield. The expected total return on the S&P 500
13 Index is calculated using the Constant Growth DCF model for the companies in the S&P 500
14 Index. As shown in Schedule AEB-5, based on an estimated dividend yield of 1.87 percent
15 and a long-term earnings growth rate of 11.76 percent, the estimated total market return for
16 the S&P 500 Index is 13.85 percent. The implied Market Risk Premiums over the current
17 and projected yields on the 30-year U.S. Treasury bond range from 9.75 percent to 11.01
18 percent.

³⁹ Bloomberg Professional, as of December 29, 2017.

⁴⁰ Blue Chip Financial Forecasts, Vol. 37, No. 1, January 1, 2018, at 2.

⁴¹ Blue Chip Financial Forecasts, Vol. 36, No. 12, December 1, 2017, at 14.

1 **Q. What are the results of your CAPM analysis?**

2 A. As shown in Table 6 (see also Schedule AEB-6), my CAPM analysis produces a
3 range of returns from 10.38 percent to 10.78 percent, depending on the risk-free rate, with an
4 average CAPM estimate of 10.56 percent.

5 **Table 6: Forward-Looking CAPM Results**

| | |
|--|---------------|
| Current Risk-Free Rate (2.84%) | 10.38% |
| 2018-2019 Projected Risk-Free Rate (3.34%) | 10.53% |
| 2019-2023 Projected Risk-Free Rate (4.10%) | 10.78% |
| Mean Result | 10.56% |

6 **E. Bond Yield Plus Risk Premium Analysis**

7 **Q. Please describe the bond yield plus risk premium approach you employed.**

8 A. In general terms, this approach is based on the fundamental principle that equity
9 investors bear the residual risk associated with ownership and, therefore, require a premium
10 over the return they would have earned as a bondholder. That is, since returns to equity
11 holders have greater risk than returns to bondholders, equity investors must be compensated
12 to bear that risk. Risk premium approaches estimate the cost of equity as the sum of the
13 equity risk premium and the yield on a specific class of bonds. In my analysis, I used actual
14 authorized returns for electric utility companies as the historical measure of the cost of equity
15 to determine the risk premium.

1 **Q. Are there other considerations that should be addressed in conducting this**
2 **analysis?**

3 A. Yes. Both academic literature and market evidence indicate that the equity risk
4 premium (as used in this approach) is inversely related to the level of interest rates. That is,
5 as interest rates increase (decrease), the equity risk premium decreases (increases).
6 Consequently, the analysis should: (1) reflect the inverse relationship between interest rates
7 and the equity risk premium; and (2) be based on current and expected market conditions.
8 Such an analysis can be developed based on a regression of the risk premium as a function of
9 U.S. Treasury bond yields. If we let authorized ROEs for regulated electric utilities serve as
10 the measure of required equity returns and define the yield on the long-term U.S. Treasury
11 bond as the relevant measure of interest rates, the risk premium is simply the difference
12 between those two points.⁴²

13 **Q. What did your bond yield plus risk premium analysis reveal?**

14 A. As shown in Chart 3, from 1992 through December 2017, there was a strong negative
15 relationship between risk premia and interest rates. To estimate that relationship, I conducted
16 a regression analysis using the following equation:

17
$$RP = a + b(T) \quad [5]$$

⁴² See e.g., S. Keith Berry, Interest Rate Risk and Utility Risk Premia during 1982-93, *Managerial and Decision Economics*, Vol. 19, No. 2 (March, 1998), in which the author used a methodology similar to the regression approach described below, including using allowed ROEs as the relevant data source, and came to similar conclusions regarding the inverse relationship between risk premia and interest rates. See also Robert S. Harris, *Using Analysts' Growth Forecasts to Estimate Shareholders Required Rates of Return*, *Financial Management*, Spring 1986, at 66.

1

Where:

2

RP = Risk Premium (difference between allowed ROEs and the yield on 30-year U.S. Treasury bonds)

3

4

a = intercept term

5

b = slope term

6

T = 30-year U.S. Treasury bond yield

7

Data regarding allowed ROEs were derived from the electric utility rate case decisions from 1992 through December 2017 as reported by Regulatory Research Associates.

8

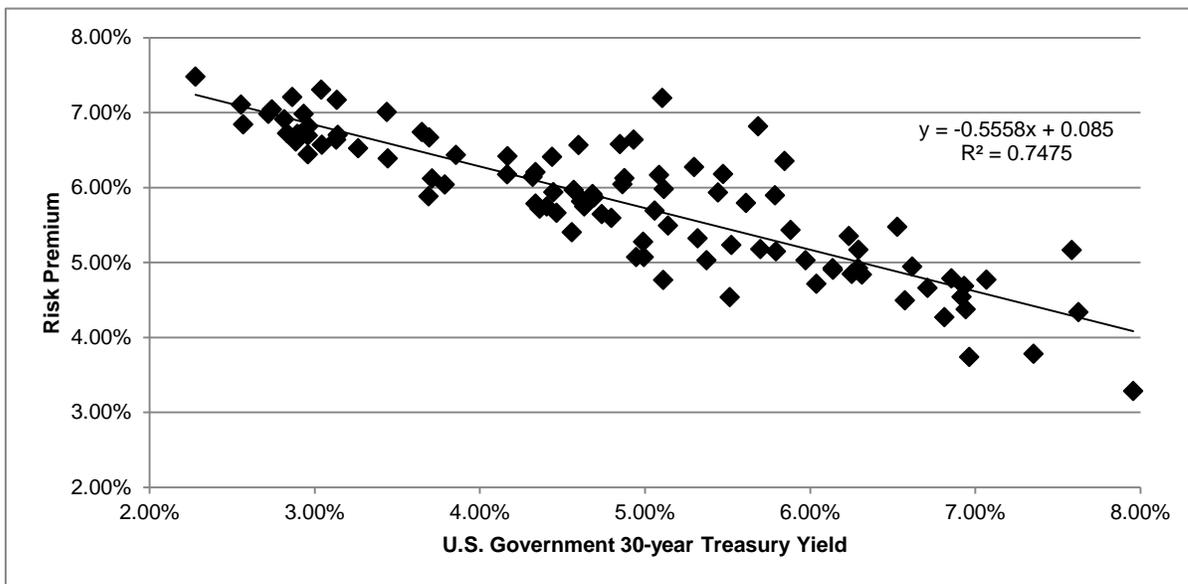
9

This equation's coefficients were statistically significant at the 99.0 percent confidence interval.

10

11

Chart 3: Risk Premium Results



12

As shown in Schedule AEB-7, based on the 180-day average of the 30-year U.S. Treasury bond yield as of December 29, 2017 (i.e., 2.84 percent), the risk premium would be 6.93 percent, resulting in an estimated ROE of 9.77 percent. Based on the near-term (Q1

13

14

1 2018-Q2 2019) projections of the 30-year U.S. Treasury bond yield (i.e., 3.32 percent), the
2 risk premium would be 6.66 percent, resulting in an estimated ROE of 9.98 percent. Based
3 on longer-term (2019-2023) projections of the 30-year U.S. Treasury bond yield (i.e., 4.10
4 percent), the risk premium would be 6.23 percent, resulting in an estimated ROE of 10.33
5 percent.

6 **Q. How do the results of the bond yield risk premium analysis inform your**
7 **recommended ROE for Public Service?**

8 A. As with the results for the CAPM, the results of the Bond Yield Risk Premium
9 analysis confirm my view that the DCF model results are depressed and that under current
10 market conditions the mean DCF result is understating investors' return requirements and a
11 reasonable ROE. For that reason, I believe the results of the Bond Yield Risk Premium
12 analysis and the CAPM more accurately portray Public Service's real cost of common equity
13 and support selection of an authorized ROE higher than the mean DCF results.

14 **VIII. BUSINESS OPERATIONS**

15 **Q. Is it appropriate to consider only the mean DCF, CAPM, and risk premium**
16 **results to establish an appropriate estimate of the cost of equity for Public**
17 **Service?**

18 A. No. In addition to my observation about the resulting range being unduly lowered by
19 the substandard DCF results, these results provide only a possible range of the appropriate
20 estimate of Public Service's cost of equity. Additional factors must be considered when
21 determining where the Company's cost of equity falls within the range of results.
22 Specifically, I have considered Public Service's management performance and its regulatory
23 environment relative to the proxy group.

1 **A. Management Performance Recognition**

2 **Q. Why is management performance important to consider in determining the**
3 **ROE of a company?**

4 A. Regulatory commission decisions can influence the overall operations of the utilities
5 that are under its regulation. In rate proceedings, the regulatory commissions review all costs
6 to determine the reasonableness of the overall operating cost of the Company for the benefits
7 of customers. In addition to the actual costs incurred, it is important that the regulatory
8 commission consider the overall management performance and service quality that is derived
9 from those costs. Regulation that is constructive and supportive of management's ability to
10 achieve low costs and high overall service quality plays an important role in utility regulation
11 and the continued success of top performing companies.

12 **Q. Has Public Service conducted any analysis of its management performance as**
13 **compared with a benchmark group?**

14 A. Yes. The Direct Testimony of Public Service witness Mr. Adams describes in detail
15 the performance benchmarking analysis that was undertaken and summarizes the results for
16 Public Service as compared with national, regional, as well as a New Jersey specific regional
17 benchmarking group and the proxy group that I relied on in setting the ROE. Mr. Adams
18 benchmarks Public Service's performance on the basis of electric and natural gas distribution
19 operating and administrative costs as well as reliability and customer satisfaction.

20 **Q. Please summarize the results of that analysis.**

21 A. Mr. Adams's analysis demonstrates that that Public Service's electric and gas
22 operating costs are significantly lower than the peer group. In addition, Public Service's

1 reliability and customer satisfaction ratings are consistently higher than the peer group.⁴³
2 The combination of these metrics indicates a well-managed company that is focused on
3 controlling costs and providing high levels of reliability and customer satisfaction.

4 **Q. How does the benchmarking analysis affect your view of the authorized ROE for**
5 **Public Service?**

6 A. Based on the results of the benchmarking analysis, Public Service's electric and gas
7 distribution customers have benefitted significantly from the Company's efficiency and cost
8 containment efforts. In addition, while providing service at a lower cost than the peer group,
9 Public Service's reliability metrics are stronger than the peer group average. Finally, the
10 Company's customer service is strong and continually improving over the analytical period
11 relied on by Mr. Adams. This high level of management performance places Public
12 Service's electric utility operations in the top quartile on many performance metrics relative
13 to the peer group used by Mr. Adams, and the Company's gas distribution operations in the
14 second quartile for cost performance. In my view, the benchmarking analysis demonstrates
15 that Public Service's management performance has provided its customers with significantly
16 lower cost and more reliable service than other similar electric and gas utilities. Continued
17 demonstrated management excellence that provides tangible benefits to customers such as
18 lower overall costs and higher reliability metrics should be considered by the BPU and
19 supported through constructive regulation and the determination of an ROE that is above the
20 mean of the proxy group results.

⁴³ Reliability metrics measure the number and duration of interruptions. Therefore, lower metrics in these areas, as discussed by Mr. Adams, reflect stronger performance.

1 **B. Regulatory Environment**

2 **Q. Please explain how the regulatory framework affects investors' risk assessments.**

3 A. The ratemaking process is premised on the principle that, for investors and companies
4 to commit the capital needed to provide safe and reliable utility services, the utility must have
5 the opportunity to recover invested capital and the market-required return on such capital.
6 Regulatory commissions recognize that because utility operations are capital intensive,
7 regulatory decisions should enable the utility to attract capital at reasonable terms, thereby
8 balancing the long-term interests of investors and customers. In that respect, the regulatory
9 framework in which a utility operates is one of the most important factors in both debt and
10 equity investors' risk assessments.

11 Because investors have many investment alternatives, even within a given market
12 sector, the Company's authorized return must be adequate on a relative basis to ensure its
13 ability to attract capital under a variety of economic and financial market conditions. From
14 the perspective of debt investors, the authorized return should enable the Company to
15 generate the cash flow needed to meet its near-term financial obligations, make the capital
16 investments needed to maintain and expand its systems, and maintain sufficient levels of
17 liquidity to fund unexpected events. This financial liquidity must be derived not only from
18 internally-generated funds, but also from efficient access to capital markets.

19 From the perspective of equity investors, the authorized return must be adequate to
20 provide a risk-comparable return on the equity portion of the Company's capital investments.
21 Because equity investors are the residual claimants on the Company's cash flows (i.e., debt
22 interest must be paid prior to any equity dividends), they are particularly concerned with the

1 regulatory framework in which a utility operates and its effect on future earnings and cash
2 flows.

3 **Q. Have you performed an analysis of the level of regulatory protection that Public**
4 **Service receives as compared to the proxy group companies?**

5 A. Yes. I have conducted an analysis of the regulatory protections that are in place for
6 Public Service compared with those for the operating utility companies held by the proxy
7 group companies. The results of my analysis are presented in Schedule AEB-8. Specifically,
8 I examined the following factors that affect the business risk of Public Service and the proxy
9 group companies: (1) test year convention; (2) revenue decoupling; and (3) capital cost
10 recovery.

11 As shown in Schedule AEB-8, 64 percent of the operating companies (i.e., 43 out of
12 67) in the proxy group provide service in jurisdictions that allow the use of a fully or partially
13 forecast test year. New Jersey law and practice allows for the use of a partially forecast test
14 year, which is fully historical by the time a rate decision is issued. Further, 50 percent of the
15 operating utilities (both gas and electric) held by the proxy group have revenue decoupling
16 mechanisms or weather normalization adjustment clauses that allow them to break the link
17 between customer usage and revenues. The Company currently has a weather normalization
18 clause for its gas distribution business, and is requesting in this proceeding, but has not
19 implemented any form of revenue stabilization for its electric distribution operations.
20 Finally, like Public Service, 70 percent of the operating utilities held by the proxy group have
21 capital cost tracking mechanisms that allow them to recover capital investments that are
22 placed into service between rate cases.

1 **Q. How would you characterize Public Service’s risk relative to the proxy group**
2 **companies?**

3 A. On certain of these factors, Public Service is comparable to the proxy group, in
4 particular with respect to recovering capital investments on a timely basis. Regarding
5 decoupling and the use of projected test year data to reduce regulatory lag, Public Service is
6 currently at higher risk than the proxy group. In the event that the Commission were to
7 approve the requested decoupling mechanism and rely on a forecasted test year, Public
8 Service would be more comparable to the proxy companies.

9 **Q. If the Commission were to approve a decoupling mechanism, is it appropriate to**
10 **reflect this stabilization mechanism in a reduction to the ROE?**

11 A. No, it is not. As discussed previously, the majority of the proxy companies have
12 decoupling mechanisms and rely on projected test years. The comparison of the subject
13 company to the proxy group is the basis for determining the appropriate ROE. Because the
14 proxy companies have already implemented these more progressive regulatory mechanisms,
15 authorizing these mechanisms for Public Service makes the Company more risk-comparable
16 to the proxy group. Absent decoupling or a projected test year, Public Service has higher
17 overall risk than the proxy companies, which would suggest a higher ROE within the range
18 established by the proxy group.

19 **IX. CAPITAL STRUCTURE**

20 **Q. What is Public Service’s proposed capital structure?**

21 A. Public Service is proposing to establish a rate-making capital structure comprised of
22 54.0 percent common equity, 45.44 percent long-term debt and 0.56 customer deposits.

1 **Q. Have you analyzed the capital structures of the proxy group companies?**

2 A. Yes. I calculated the mean and median proportions of common equity and long-term
3 debt over the most recent eight quarters for each of the proxy group companies at the utility
4 operating company level. My analysis of the proxy group's utility operating company capital
5 structures is provided in Schedule AEB-9. In the third quarter of 2017, the weighted average
6 equity ratios for the proxy group are approximately 51.7 percent, up to the high end of the
7 range of 55.7 percent. Public Service's proposed equity ratio of 54.0 percent is within the
8 range established by the proxy group capital structures.

9 **Q. What is the relationship between the authorized equity ratio and the authorized**
10 **ROE?**

11 A. There is a direct relationship between the authorized equity ratio and the authorized
12 ROE. In particular, the authorized equity ratio is a major indicator of financial risk for a
13 regulated utility such as Public Service. To the extent the authorized equity ratio is reduced,
14 a corresponding increase is necessary in the authorized ROE to compensate investors for the
15 greater financial risk associated with a lower equity ratio.

16 **Q. What is your conclusion regarding Public Service's proposed capital structure?**

17 A. The proposed equity ratio for Public Service is within the range established by the
18 proxy group. As such, my conclusion is that the Company's proposed capital structure is
19 reasonable and should be adopted.

1 **X. CONCLUSIONS AND RECOMMENDATION**

2 **Q. What is your conclusion regarding a fair ROE for Public Service?**

3 A. Based on the various quantitative and qualitative analyses presented in my Direct
4 Testimony, a reasonable range of ROE results for Public Service is from 9.80 percent to
5 10.50 percent. As discussed throughout my Direct Testimony, the required ROE should be a
6 forward-looking estimate; therefore, the analyses supporting my recommendation rely on
7 forward-looking inputs and assumptions (e.g., projected earnings growth rates in the DCF
8 model, forecasted risk-free rate and Market Risk Premium in the CAPM analysis, etc.) and
9 take into consideration capital market conditions, including the effect of the current low
10 interest rate environment on utility stock valuations and dividend yields, and the rising
11 interest rate environment. In addition, I believe it is appropriate to recognize the high level
12 of performance of Public Service's management in controlling operating costs over time
13 while meeting safety and reliability metrics as demonstrated in the benchmarking analysis
14 presented by Mr. Adams. Based on these factors, I believe that an ROE of 10.30 percent is
15 just and reasonable.

16 **Q. What is your conclusion with respect to Public Service's proposed capital**
17 **structure?**

18 A. My conclusion is that Public Service's proposed capital structure consisting of 54.0
19 percent common equity, 45.44 percent long-term debt and 0.56 percent customer deposits is
20 within the range established by the proxy group companies and therefore is reasonable.

21 **Q. Does this conclude your Direct Testimony?**

22 A. Yes.

Ann E. Bulkley
Senior Vice President

Ms. Bulkley more than two decades of management and economic consulting experience in the energy industry. Ms. Bulkley has extensive state and federal regulatory experience on both electric and natural gas issues including rate of return, cost of equity and capital structure issues. Ms. Bulkley has advised clients seeking to acquire utility assets, providing valuation services including an understanding of regulation, market expected returns, and the assessment of utility risk factors. Ms. Bulkley has assisted clients with valuations of public utility and industrial properties for ratemaking, purchase and sale considerations, ad valorem tax assessments, and accounting and financial purposes. In addition, Ms. Bulkley has experience in the areas of contract and business unit valuation, strategic alliances, market restructuring and regulatory and litigation support.

REPRESENTATIVE PROJECT EXPERIENCE

Regulatory Analysis and Ratemaking

Ms. Bulkley has provided a range of advisory services relating to regulatory policy analysis and many aspects of utility ratemaking. Specific services have included: cost of capital and return on equity testimony, cost of service and rate design analysis and testimony, development of ratemaking strategies; development of merchant function exit strategies; analysis and program development to address residual energy supply and/or provider of last resort obligations; stranded costs assessment and recovery; performance-based ratemaking analysis and design; and many aspects of traditional utility ratemaking (e.g., rate design, rate base valuation).

Cost of Capital

Ms. Bulkley has provided expert testimony on the cost of capital testimony before several state regulatory commissions. In addition, Ms. Bulkley has prepared and provided supporting analysis for at least forty Federal and State regulatory proceedings over the past seven years. Ms. Bulkley's expert testimony experience includes:

- Northern States Power Company: Before the North Dakota Public Service Commission, provided expert testimony on the cost of capital for the company's North Dakota electric utility operations.
- WE Energies: Before the Michigan Public Service Commission, provided expert testimony in support of the company's cost of capital for its electric utility operations.
- Atmos Energy: Provided expert testimony in support of the company's return on equity and capital structure before the Public Utilities Commission for the State of Colorado.
- UNS Electric: Provided expert testimony in support of the company's return on equity and capital structure before the Arizona Corporation Commission.
- Portland Natural Gas Transmission: Provided testimony strategy as well as analytical support for cost of capital testimony before the Federal Energy Regulatory Commission.



- In addition to the specific cases listed above, Ms. Bulkley has provided testimony strategy as well as analytical support on cost of capital in several cases in the following states: Arizona, Colorado, Connecticut, Massachusetts, Minnesota, New Mexico, New York, North Carolina, South Carolina, South Dakota, Virginia, and Utah.

Valuation

Ms. Bulkley has provided valuation services to utility clients, unregulated generators and private equity clients for a variety of purposes including ratemaking, fair value, ad valorem tax, litigation and damages, and acquisition. Ms. Bulkley's appraisal practices are consistent with the national standards established by the Uniform Standards of Professional Appraisal Practice. In addition, Ms. Bulkley has relied on other simulation based valuation methodologies.

Representative projects/clients have included:

- Northern Indiana Fuel and Light: Provided expert testimony regarding the fair value of the company's natural gas distribution system assets. Valuation relied on cost approach.
- Kokomo Gas: Provided expert testimony regarding the fair value of the company's natural gas distribution system assets. Valuation relied on cost approach.
- Prepared fair value rate base analyses for Northern Indiana Public Service Company for several electric rate proceedings. Valuation approaches used in this project included income, cost and comparable sales approaches.
- Confidential Utility Client: Prepared valuation of fossil and nuclear generation assets for financing purposes for regulated utility client.
- Prepared a valuation of a portfolio of generation assets for a large energy utility to be used for strategic planning purposes. Valuation approach included an income approach, a real options analysis and a risk analysis.
- Assisted clients in the restructuring of NUG contracts through the valuation of the underlying assets. Performed analysis to determine the option value of a plant in a competitively priced electricity market following the settlement of the NUG contract.
- Prepared market valuations of several purchase power contracts for large electric utilities in the sale of purchase power contracts. Assignment included an assessment of the regional power market, analysis of the underlying purchase power contracts, a traditional discounted cash flow valuation approach, as well as a risk analysis. Analyzed bids from potential acquirers using income and risk analysis approached. Prepared an assessment of the credit issues and value at risk for the selling utility.
- Prepared appraisal of a portfolio of generating facilities for a large electric utility to be used for financing purposes.
- Prepared an appraisal of a fleet of fossil generating assets for a large electric utility to establish the value of assets transferred from utility property.
- Conducted due diligence on an electric transmission and distribution system as part of a buy-side due diligence team.
- Provided analytical support for and prepared appraisal reports of generation assets to be used in ad valorem tax disputes.



- Provided analytical support and prepared testimony regarding the valuation of electric distribution system assets in five communities in a condemnation proceeding.
- Valued purchase power agreements in the transfer of assets to a deregulated electric market.

Ratemaking

Ms. Bulkley has assisted several clients with analysis to support investor-owned and municipal utility clients in the preparation of rate cases. Sample engagements include:

- Assisted several investor-owned and municipal clients on cost allocation and rate design issues including the development of expert testimony supporting recommended rate alternatives.
- Worked with Canadian regulatory staff to establish filing requirements for a rate review of a newly regulated electric utility. Analyzed and evaluated rate application. Attended hearings and conducted investigation of rate application for regulatory staff. Prepared, supported and defended recommendations for revenue requirements and rates for the company. Developed rates for gas utility for transportation program and ancillary services.

Strategic and Financial Advisory Services

Ms. Bulkley has assisted several clients across North America with analytically based strategic planning, due diligence and financial advisory services.

Representative projects include:

- Preparation of feasibility studies for bond issuances for municipal and district steam clients.
- Assisted in the development of a generation strategy for an electric utility. Analyzed various NERC regions to identify potential market entry points. Evaluated potential competitors and alliance partners. Assisted in the development of gas and electric price forecasts. Developed a framework for the implementation of a risk management program.
- Assisted clients in identifying potential joint venture opportunities and alliance partners. Contacted interviewed, and evaluated potential alliance candidates based on company-established criteria for several LDCs and marketing companies. Worked with several LDCs and unregulated marketing companies to establish alliances to enter into the retail energy market. Prepared testimony in support of several merger cases and participated in the regulatory process to obtain approval for these mergers.
- Assisted clients in several buy-side due diligence efforts, providing regulatory insight and developing valuation recommendations for acquisitions of both electric and gas properties.

PROFESSIONAL HISTORY

Concentric Energy Advisors, Inc. (2002 – Present)

Senior Vice President

Vice President

Assistant Vice President



Project Manager

Navigant Consulting, Inc. (1995 - 2002)

Project Manager

Cahners Publishing Company (1995)

Economist

EDUCATION

M.A., Economics, Boston University, 1995

B.A., Economics and Finance, Simmons College, 1991

Certified General Appraiser licensed in the Commonwealth of Massachusetts



| SPONSOR | DATE | CASE/APPLICANT | DOCKET /CASE NO. | SUBJECT |
|--|-------|---------------------------------------|-----------------------------|------------------|
| Arizona Corporation Commission | | | | |
| Tucson Electric Power Company | 11/15 | Tucson Electric Power Company | Docket No. E-01933A-15-0322 | Return on Equity |
| UNS Electric | 12/12 | UNS Electric | Docket No. E-04204A-12-0504 | Return on Equity |
| UNS Electric | 05/15 | UNS Electric | Docket No. E-04204A-15-0142 | Return on Equity |
| Arkansas Public Service Commission | | | | |
| Arkansas Oklahoma Gas Corporation | 10/13 | Arkansas Oklahoma Gas Corporation | Docket No. 13-078-U | Return on Equity |
| Colorado Public Utilities Commission | | | | |
| Atmos Energy Corporation | 05/13 | Atmos Energy Corporation | Docket No. 13AL-0496G | Return on Equity |
| Atmos Energy Corporation | 04/14 | Atmos Energy Corporation | Docket No. 14AL-0300G | Return on Equity |
| Atmos Energy Corporation | 05/15 | Atmos Energy Corporation | Docket No. 15AL-0299G | Return on Equity |
| Connecticut Public Utilities Regulatory Authority | | | | |
| The United Illuminating Company | 07/16 | The United Illuminating Company | Docket No. 16-06-04 | Return on Equity |
| Federal Energy Regulatory Commission | | | | |
| Tallgrass Interstate Gas Transmission | 10/15 | Tallgrass Interstate Gas Transmission | RP16-137 | Return on Equity |



| SPONSOR | DATE | CASE/APPLICANT | DOCKET /CASE NO. | SUBJECT |
|---|-------|---|------------------------------------|---|
| Indiana Utility Regulatory Commission | | | | |
| Indianapolis Power and Light Company | 09/15 | Indianapolis Power and Light Company | Cause No. 44576 Cause No. 44602 | Fair Value |
| Indianapolis Power and Light Company | 12/16 | Indianapolis Power and Light Company | Cause No.44893 | Fair Value |
| Kokomo Gas and Fuel Company | 09/10 | Kokomo Gas and Fuel Company | Cause No. 43942 | Fair Value |
| Northern Indiana Fuel and Light Company, Inc. | 09/10 | Northern Indiana Fuel and Light Company, Inc. | Cause No. 43943 | Fair Value |
| Northern Indiana Public Service Company | 10/15 | Northern Indiana Public Service Company | Cause No. 44688 | Fair Value |
| Kansas Corporation Commission | | | | |
| Atmos Energy Corporation | 08/15 | Atmos Energy Corporation | Docket No. 16-ATMG-079-RTS | Return on Equity |
| Massachusetts Department of Public Utilities | | | | |
| Unitil Corporation | 01/04 | Fitchburg Gas and Electric | DTE 03-52 | Integrated Resource Plan; Gas Demand Forecast |
| Michigan Public Service Commission | | | | |
| Wisconsin Electric Power Company | 12/11 | Wisconsin Electric Power Company | Case No. U-16830 | Return on Equity |
| Michigan Tax Tribunal | | | | |
| Covert Township | 07/14 | New Covert Generating Co., LLC. | Docket No. 399578 | Valuation of Electric Generation Assets |



| SPONSOR | DATE | CASE/APPLICANT | DOCKET /CASE NO. | SUBJECT |
|--|-------|---|-------------------------------------|------------------|
| New Mexico Public Regulation Commission | | | | |
| Southwestern Public Service Company | 06/15 | Southwestern Public Service Company | Case No. -15-001398-UT | Return on Equity |
| Southwestern Public Service Company | 10/15 | Southwestern Public Service Company | Case No. -15-00296-UT | Return on Equity |
| Southwestern Public Service Company | 12/16 | Southwestern Public Service Company | Case No. - 16-00269-UT | Return on Equity |
| New York State Department of Public Service | | | | |
| New York State Electric and Gas Company | 05/15 | New York State Electric and Gas Company | Case No. 15-G-0284 | Return on Equity |
| Corning Natural Gas Corporation | 06/16 | Corning Natural Gas Corporation | Case No. 16-G-0369 | Return on Equity |
| KeySpan Energy Delivery | 01/16 | KeySpan Energy Delivery | Case No. 15-G-0059 | Return on Equity |
| National Fuel Gas Company | 04/16 | National Fuel Gas Company | Case No. 16-G-0257 | Return on Equity |
| Niagara Mohawk Power Corporation | 04/17 | National Grid USA | Case No. C-17-E-0238 | Return on Equity |
| Central Hudson Gas and Electric Corporation | 07/17 | Central Hudson Gas and Electric Corporation | Gas 17-G-0460 Electric 17-E-0459 | Return on Equity |
| North Dakota Public Service Commission | | | | |
| Northern States Power Company | 12/10 | Northern States Power Company | C-PU-10-657 | Return on Equity |



| SPONSOR | DATE | CASE/APPLICANT | DOCKET /CASE NO. | SUBJECT |
|--|-------|-------------------------------------|---------------------------|------------------|
| Northern States Power Company | 12/12 | Northern States Power Company | C-PU-12-813 | Return on Equity |
| Oklahoma Corporation Commission | | | | |
| Arkansas Oklahoma Gas Corporation | 01/13 | Arkansas Oklahoma Gas Corporation | Cause No. PUD 201200236 | Return on Equity |
| Public Utility Commission of Pennsylvania | | | | |
| American Water Works Company Inc. | 04/17 | Pennsylvania-American Water Company | Docket No. R-2017-2595853 | Return on Equity |
| Public Utility Commission of Texas | | | | |
| Southwestern Public Service Company | 01/14 | Southwestern Public Service Company | Docket No. 42004 | Return on Equity |
| South Dakota Public Utilities Commission | | | | |
| Northern States Power Company | 06/14 | Northern States Power Company | Docket No. EL14-058 | Return on Equity |

30-DAY CONSTANT GROWTH DCF

| | | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] |
|------------------------------|--------|---------------------|-------------|----------------|-------------------------|----------------------------|--------------------------------|-----------------------|-------------------------|--------------|--------------|--------------|
| Company | Ticker | Annualized Dividend | Stock Price | Dividend Yield | Expected Dividend Yield | Value Line Earnings Growth | Yahoo! Finance Earnings Growth | Zacks Earnings Growth | Average Earnings Growth | Low ROE | Mean ROE | High ROE |
| Ameren Corporation | AEE | \$1.83 | \$61.69 | 2.97% | 3.16% | 6.00% | 7.00% | 7.00% | 6.67% | 9.14% | 9.83% | 10.17% |
| Avangrid Inc | AGR | \$1.73 | \$51.71 | 3.34% | 3.62% | n/a | 8.40% | 8.30% | 8.35% | 11.92% | 11.97% | 12.02% |
| Black Hills Corporation | BKH | \$1.90 | \$58.88 | 3.23% | 3.41% | 7.50% | 4.26% | 4.90% | 5.55% | 7.62% | 8.96% | 10.97% |
| CenterPoint Energy, Inc. | CNP | \$1.07 | \$28.80 | 3.71% | 3.95% | 6.00% | 7.58% | 5.70% | 6.43% | 9.63% | 10.38% | 11.58% |
| CMS Energy Corporation | CMS | \$1.33 | \$48.93 | 2.72% | 2.90% | 6.50% | 7.44% | 6.50% | 6.81% | 9.40% | 9.72% | 10.36% |
| Consolidated Edison, Inc. | ED | \$2.76 | \$87.06 | 3.17% | 3.25% | 2.50% | 3.23% | 2.00% | 2.58% | 5.23% | 5.83% | 6.50% |
| DTE Energy Company | DTE | \$3.53 | \$112.59 | 3.14% | 3.31% | 6.00% | 4.91% | 6.00% | 5.64% | 8.20% | 8.95% | 9.32% |
| Eversource Energy | ES | \$1.90 | \$64.09 | 2.96% | 3.15% | 6.50% | 5.92% | 5.90% | 6.11% | 9.04% | 9.25% | 9.66% |
| NorthWestern Corporation | NWE | \$2.10 | \$61.63 | 3.41% | 3.50% | 4.50% | 2.25% | 1.50% | 2.75% | 4.96% | 6.25% | 8.06% |
| Wisconsin Energy Corporation | WEC | \$2.08 | \$67.80 | 3.07% | 3.24% | 6.00% | 5.27% | 5.40% | 5.56% | 8.50% | 8.79% | 9.25% |
| Xcel Energy Inc. | XEL | \$1.44 | \$50.21 | 2.87% | 3.01% | 4.50% | n/a | 5.50% | 5.00% | 7.50% | 8.01% | 8.53% |
| MEAN [12] | | | | 3.14% | 3.32% | 5.60% | 5.63% | 5.34% | 5.59% | 8.99% | 9.54% | 9.99% |

Notes:

- [1] Source: Bloomberg Professional
- [2] Source: Bloomberg Professional, equals 30-day average as of December 29, 2017
- [3] Equals [1] / [2]
- [4] Equals [3] x (1 + [8])
- [5] Source: Value Line
- [6] Source: Yahoo! Finance
- [7] Source: Zacks
- [8] Equals Average ([5], [6], [7])
- [9] Equals [3] x (1 + Minimum ([5], [6], [7]) + Minimum ([5], [6], [7]))
- [10] Equals [4] + [8]
- [11] Equals [3] x (1 + Maximum ([5], [6], [7]) + Maximum ([5], [6], [7]))
- [12] ROE results are average of all proxy companies with an ROE result greater than 7%

90-DAY CONSTANT GROWTH DCF

| | | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] |
|------------------------------|--------|---------------------|-------------|----------------|-------------------------|----------------------------|--------------------------------|-----------------------|-------------------------|--------------|--------------|---------------|
| Company | Ticker | Annualized Dividend | Stock Price | Dividend Yield | Expected Dividend Yield | Value Line Earnings Growth | Yahoo! Finance Earnings Growth | Zacks Earnings Growth | Average Earnings Growth | Low ROE | Mean ROE | High ROE |
| Ameren Corporation | AEE | \$ 1.83 | \$60.87 | 3.01% | 3.21% | 6.00% | 7.00% | 7.00% | 6.67% | 9.19% | 9.87% | 10.22% |
| Avangrid Inc | AGR | \$ 1.73 | \$49.72 | 3.48% | 3.77% | n/a | 8.40% | 8.30% | 8.35% | 12.06% | 12.12% | 12.17% |
| Black Hills Corporation | BKH | \$ 1.90 | \$64.26 | 2.96% | 3.12% | 7.50% | 4.26% | 4.90% | 5.55% | 7.34% | 8.67% | 10.68% |
| CenterPoint Energy, Inc. | CNP | \$ 1.07 | \$29.33 | 3.65% | 3.88% | 6.00% | 7.58% | 5.70% | 6.43% | 9.56% | 10.31% | 11.51% |
| CMS Energy Corporation | CMS | \$ 1.33 | \$48.25 | 2.76% | 2.94% | 6.50% | 7.44% | 6.50% | 6.81% | 9.44% | 9.76% | 10.40% |
| Consolidated Edison, Inc. | ED | \$ 2.76 | \$85.21 | 3.24% | 3.32% | 2.50% | 3.23% | 2.00% | 2.58% | 5.30% | 5.90% | 6.57% |
| DTE Energy Company | DTE | \$ 3.53 | \$111.40 | 3.17% | 3.35% | 6.00% | 4.91% | 6.00% | 5.64% | 8.23% | 8.98% | 9.36% |
| Eversource Energy | ES | \$ 1.90 | \$62.96 | 3.02% | 3.20% | 6.50% | 5.92% | 5.90% | 6.11% | 9.10% | 9.31% | 9.71% |
| NorthWestern Corporation | NWE | \$ 2.10 | \$59.96 | 3.50% | 3.60% | 4.50% | 2.25% | 1.50% | 2.75% | 5.05% | 6.35% | 8.16% |
| Wisconsin Energy Corporation | WEC | \$ 2.08 | \$66.46 | 3.13% | 3.30% | 6.00% | 5.27% | 5.40% | 5.56% | 8.56% | 8.86% | 9.32% |
| Xcel Energy Inc. | XEL | \$ 1.44 | \$49.41 | 2.91% | 3.06% | 4.50% | n/a | 5.50% | 5.00% | 7.55% | 8.06% | 8.57% |
| MEAN [12] | | | | 3.17% | 3.34% | 5.60% | 5.63% | 5.34% | 5.59% | 9.00% | 9.55% | 10.01% |

Notes:

- [1] Source: Bloomberg Professional
- [2] Source: Bloomberg Professional, equals 90-day average as of December 29, 2017
- [3] Equals [1] / [2]
- [4] Equals [3] x (1 + [8])
- [5] Source: Value Line
- [6] Source: Yahoo! Finance
- [7] Source: Zacks
- [8] Equals Average ([5], [6], [7])
- [9] Equals [3] x (1 + Minimum ([5], [6], [7]) + Minimum ([5], [6], [7]))
- [10] Equals [4] + [8]
- [11] Equals [3] x (1 + Maximum ([5], [6], [7]) + Maximum ([5], [6], [7]))
- [12] ROE results are average of all proxy companies with an ROE result greater than 7%

180-DAY CONSTANT GROWTH DCF

| | | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] |
|------------------------------|--------|---------------------|-------------|----------------|-------------------------|----------------------------|--------------------------------|-----------------------|-------------------------|--------------|--------------|---------------|
| Company | Ticker | Annualized Dividend | Stock Price | Dividend Yield | Expected Dividend Yield | Value Line Earnings Growth | Yahoo! Finance Earnings Growth | Zacks Earnings Growth | Average Earnings Growth | Low ROE | Mean ROE | High ROE |
| Ameren Corporation | AEE | \$ 1.83 | \$58.43 | 3.13% | 3.34% | 6.00% | 7.00% | 7.00% | 6.67% | 9.32% | 10.01% | 10.35% |
| Avangrid Inc | AGR | \$ 1.73 | \$47.33 | 3.65% | 3.96% | n/a | 8.40% | 8.30% | 8.35% | 12.25% | 12.31% | 12.36% |
| Black Hills Corporation | BKH | \$ 1.90 | \$66.70 | 2.85% | 3.01% | 7.50% | 4.26% | 4.90% | 5.55% | 7.23% | 8.56% | 10.56% |
| CenterPoint Energy, Inc. | CNP | \$ 1.07 | \$28.73 | 3.72% | 3.96% | 6.00% | 7.58% | 5.70% | 6.43% | 9.64% | 10.39% | 11.59% |
| CMS Energy Corporation | CMS | \$ 1.33 | \$47.39 | 2.81% | 3.00% | 6.50% | 7.44% | 6.50% | 6.81% | 9.49% | 9.81% | 10.46% |
| Consolidated Edison, Inc. | ED | \$ 2.76 | \$83.43 | 3.31% | 3.39% | 2.50% | 3.23% | 2.00% | 2.58% | 5.37% | 5.97% | 6.65% |
| DTE Energy Company | DTE | \$ 3.53 | \$109.30 | 3.23% | 3.41% | 6.00% | 4.91% | 6.00% | 5.64% | 8.30% | 9.05% | 9.42% |
| Eversource Energy | ES | \$ 1.90 | \$62.01 | 3.06% | 3.25% | 6.50% | 5.92% | 5.90% | 6.11% | 9.14% | 9.36% | 9.76% |
| NorthWestern Corporation | NWE | \$ 2.10 | \$60.36 | 3.48% | 3.57% | 4.50% | 2.25% | 1.50% | 2.75% | 5.03% | 6.32% | 8.14% |
| Wisconsin Energy Corporation | WEC | \$ 2.08 | \$64.40 | 3.23% | 3.41% | 6.00% | 5.27% | 5.40% | 5.56% | 8.67% | 8.97% | 9.42% |
| Xcel Energy Inc. | XEL | \$ 1.44 | \$48.05 | 3.00% | 3.15% | 4.50% | n/a | 5.50% | 5.00% | 7.63% | 8.15% | 8.66% |
| MEAN [12] | | | | 3.22% | 3.40% | 5.60% | 5.63% | 5.34% | 5.59% | 9.07% | 9.62% | 10.07% |

Notes:

- [1] Source: Bloomberg Professional
- [2] Source: Bloomberg Professional, equals 180-day average as of December 29, 2017
- [3] Equals [1] / [2]
- [4] Equals [3] x (1 + [8])
- [5] Source: Value Line
- [6] Source: Yahoo! Finance
- [7] Source: Zacks
- [8] Equals Average ([5], [6], [7])
- [9] Equals [3] x (1 + Minimum ([5], [6], [7]) + Minimum ([5], [6], [7]))
- [10] Equals [4] + [8]
- [11] Equals [3] x (1 + Maximum ([5], [6], [7]) + Maximum ([5], [6], [7]))
- [12] ROE results are average of all proxy companies with an ROE result greater than 7%

PROJECTED CONSTANT GROWTH DCF -- PSEG PROXY GROUP

| Company | Ticker | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | All Proxy Group | | |
|------------------------------|--------|-----------------------------------|---------------------------|---------|----------|----------------|-------------------------|----------------------------|--------------------------------|-----------------------|---------------------|-----------------|----------|----------|
| | | Annualized Dividend (2020 - 2022) | Stock Price (2020 - 2022) | | | Dividend Yield | Expected Dividend Yield | Value Line Earnings Growth | Yahoo! Finance Earnings Growth | Zacks Earnings Growth | Average Growth Rate | Low ROE | Mean ROE | High ROE |
| Ameren Corporation | AEE | \$2.15 | \$60.00 | \$45.00 | \$52.50 | 4.10% | 4.37% | 6.00% | 7.00% | 7.00% | 6.67% | 10.34% | 11.03% | 11.38% |
| Avangrid Inc | AGR | \$1.90 | \$45.00 | \$35.00 | \$40.00 | 4.75% | 5.15% | n/a | 8.40% | 8.30% | 8.35% | 13.44% | 13.50% | 13.55% |
| Black Hills Corporation | BKH | \$2.20 | \$70.00 | \$55.00 | \$62.50 | 3.52% | 3.72% | 7.50% | 4.26% | 4.90% | 5.55% | 7.93% | 9.27% | 11.28% |
| CenterPoint Energy, Inc. | CNP | \$1.23 | \$30.00 | \$20.00 | \$25.00 | 4.92% | 5.24% | 6.00% | 7.58% | 5.70% | 6.43% | 10.90% | 11.66% | 12.87% |
| CMS Energy Corporation | CMS | \$1.70 | \$45.00 | \$35.00 | \$40.00 | 4.25% | 4.54% | 6.50% | 7.44% | 6.50% | 6.81% | 11.03% | 11.35% | 12.01% |
| Consolidated Edison, Inc. | ED | \$3.08 | \$80.00 | \$65.00 | \$72.50 | 4.25% | 4.36% | 2.50% | 3.23% | 2.00% | 2.58% | 6.33% | 6.93% | 7.62% |
| DTE Energy Company | DTE | \$4.30 | \$120.00 | \$85.00 | \$102.50 | 4.20% | 4.43% | 6.00% | 4.91% | 6.00% | 5.64% | 9.31% | 10.07% | 10.45% |
| Eversource Energy | ES | \$2.40 | \$70.00 | \$60.00 | \$65.00 | 3.69% | 3.92% | 6.50% | 5.92% | 5.90% | 6.11% | 9.81% | 10.02% | 10.43% |
| NorthWestern Corporation | NWE | \$2.50 | \$75.00 | \$50.00 | \$62.50 | 4.00% | 4.11% | 4.50% | 2.25% | 1.50% | 2.75% | 5.56% | 6.86% | 8.68% |
| Wisconsin Energy Corporation | WEC | \$2.50 | \$70.00 | \$55.00 | \$62.50 | 4.00% | 4.22% | 6.00% | 5.27% | 5.40% | 5.56% | 9.48% | 9.78% | 10.24% |
| Xcel Energy Inc. | XEL | \$1.80 | \$50.00 | \$40.00 | \$45.00 | 4.00% | 4.20% | 4.50% | n/a | 5.50% | 5.00% | 8.68% | 9.20% | 9.72% |
| Mean[14] | | | | | | 4.15% | 4.39% | 5.60% | 5.63% | 5.34% | 5.59% | 10.10% | 10.65% | 10.75% |

Notes:

- [1] Source: Value Line dated October 27, 2017, November 17, 2017, and December 15, 2017, 2020 projections
- [2] Source: Value Line dated October 27, 2017, November 17, 2017, and December 15, 2017, 2020 projections
- [3] Source: Value Line dated October 27, 2017, November 17, 2017, and December 15, 2017, 2020 projections
- [4] Equals Average ([2], [3])
- [5] Equals [1] / [4]
- [6] Equals [5] x (1 + [10])
- [7] Source: Value Line
- [8] Source: Yahoo! Finance
- [9] Source: Zacks
- [10] Equals Average ([7], [8], [9])
- [11] Equals [5] x (1 + Minimum ([7], [8], [9]) + Minimum ([7], [8], [9]))
- [12] Equals [6] + [10]
- [13] Equals [5] x (1 + Maximum ([7], [8], [9]) + Maximum ([7], [8], [9]))
- [14] ROE results are average of all proxy companies with an ROE result greater than 7%

Beta
as of December 29, 2017

| | | Value Line |
|------------------------------|-----|------------|
| Ameren Corporation | AEE | 0.70 |
| Avangrid Inc | AGR | n/a |
| Black Hills Corporation | BKH | 0.90 |
| CenterPoint Energy, Inc. | CNP | 0.90 |
| CMS Energy Corporation | CMS | 0.65 |
| Consolidated Edison, Inc. | ED | 0.50 |
| DTE Energy Company | DTE | 0.65 |
| Eversource Energy | ES | 0.65 |
| NorthWestern Corporation | NWE | 0.70 |
| Wisconsin Energy Corporation | WEC | 0.60 |
| Xcel Energy Inc. | XEL | 0.60 |
| Mean | | 0.685 |

Notes:

Sources: Value Line Investment Survey

MARKET RISK PREMIUM DERIVED FROM ANALYSTS LONG-TERM GROWTH ESTIMATES

| | | | |
|--|--------|--------|-------|
| [8] Estimated Weighted Average Dividend Yield | 1.87% | | |
| [9] Estimated Weighted Average Long-Term Growth Rate | 11.76% | | |
| [10] S&P 500 Estimated Required Market Return | 13.85% | | |
| [11] Risk-Free Rate | 2.84% | 3.32% | 4.10% |
| [12] Implied Market Risk Premium | 11.01% | 10.53% | 9.75% |

STANDARD AND POOR'S 500 INDEX

| Name | Ticker | [13] | [14] | [15] | [16] | [17] |
|--------------------------------------|--------|--------------------|--------------------------|-----------------------------|-----------------------|------------------------------------|
| | | % Total Market Cap | Estimated Dividend Yield | Cap-Weighted Dividend Yield | Long-Term Growth Est. | Cap-Weighted Long-Term Growth Est. |
| LyondellBasell Industries NV | LYB | 0.18% | 3.26% | 0.01% | 8.00% | 0.01% |
| American Express Co | AXP | 0.36% | 1.41% | 0.01% | 10.167% | 0.04% |
| Verizon Communications Inc | VZ | 0.91% | 4.46% | 0.04% | 2.208% | 0.02% |
| Broadcom Ltd | AVGO | 0.44% | 2.72% | 0.01% | 15.00% | 0.07% |
| Boeing Co/The | BA | 0.74% | 2.32% | 0.02% | 16.267% | 0.12% |
| Caterpillar Inc | CAT | 0.40% | 1.98% | 0.01% | 10.00% | 0.04% |
| JPMorgan Chase & Co | JPM | 1.57% | 2.09% | 0.03% | 8.867% | 0.14% |
| Chevron Corp | CVX | 1.00% | 3.45% | 0.03% | 42.60% | 0.43% |
| Coca-Cola Co/The | KO | 0.82% | 3.23% | 0.03% | 5.58% | 0.05% |
| AbbVie Inc | ABBV | 0.65% | 2.94% | 0.02% | 11.70% | 0.08% |
| Walt Disney Co/The | DIS | 0.68% | 1.56% | 0.01% | 8.733% | 0.06% |
| Extra Space Storage Inc | EXR | 0.05% | 3.57% | 0.00% | 6.82% | 0.00% |
| Exxon Mobil Corp | XOM | 1.49% | 3.68% | 0.06% | 16.27% | 0.24% |
| Phillips 66 | PSX | 0.22% | 2.77% | 0.01% | -18.865% | -0.04% |
| General Electric Co | GE | 0.64% | 2.75% | 0.02% | 8.167% | 0.05% |
| HP Inc | HPQ | 0.15% | 2.65% | 0.00% | 5.933% | 0.01% |
| Home Depot Inc/The | HD | 0.93% | 1.88% | 0.02% | 14.013% | 0.13% |
| International Business Machines Corp | IBM | 0.60% | 3.91% | 0.02% | 3.767% | 0.02% |
| Concho Resources Inc | CXO | 0.09% | n/a | n/a | n/a | n/a |
| Johnson & Johnson | JNJ | 1.58% | 2.40% | 0.04% | 7.10% | 0.11% |
| McDonald's Corp | MCD | 0.58% | 2.35% | 0.01% | 9.857% | 0.06% |
| Merck & Co Inc | MRK | 0.65% | 3.41% | 0.02% | 5.193% | 0.03% |
| 3M Co | MMM | 0.59% | 2.00% | 0.01% | 8.667% | 0.05% |
| American Water Works Co Inc | AWK | 0.07% | 1.81% | 0.00% | 8.53% | 0.01% |
| Bank of America Corp | BAC | 1.30% | 1.63% | 0.02% | 12.65% | 0.16% |
| CSRA Inc | CSRA | 0.02% | 1.34% | 0.00% | 7.30% | 0.00% |
| Brighthouse Financial Inc | BHF | 0.03% | n/a | n/a | 8.00% | 0.00% |
| Baker Hughes a GE Co | BHGE | 0.06% | 2.28% | 0.00% | 7.92% | 0.00% |
| Pfizer Inc | PFE | 0.91% | 3.75% | 0.03% | 7.024% | 0.06% |
| Procter & Gamble Co/The | PG | 0.98% | 3.00% | 0.03% | 7.313% | 0.07% |
| AT&T Inc | T | 1.01% | 5.14% | 0.05% | 5.10% | 0.05% |
| Travelers Cos Inc/The | TRV | 0.16% | 2.12% | 0.00% | 6.947% | 0.01% |
| United Technologies Corp | UTX | 0.43% | 2.19% | 0.01% | 8.823% | 0.04% |
| Analog Devices Inc | ADI | 0.14% | 2.02% | 0.00% | 9.75% | 0.01% |
| Wal-Mart Stores Inc | WMT | 1.23% | 2.07% | 0.03% | 5.45% | 0.07% |
| Cisco Systems Inc | CSCO | 0.80% | 3.03% | 0.02% | 4.80% | 0.04% |
| Intel Corp | INTC | 0.91% | 2.36% | 0.02% | 8.56% | 0.08% |
| General Motors Co | GM | 0.25% | 3.71% | 0.01% | 8.943% | 0.02% |
| Microsoft Corp | MSFT | 2.78% | 1.96% | 0.05% | 10.317% | 0.29% |
| Dollar General Corp | DG | 0.11% | 1.12% | 0.00% | 8.275% | 0.01% |
| Kinder Morgan Inc/DE | KMI | 0.17% | 2.77% | 0.00% | 15.75% | 0.03% |
| Citigroup Inc | C | 0.83% | 1.72% | 0.01% | 12.397% | 0.10% |
| American International Group Inc | AIG | 0.23% | 2.15% | 0.00% | 11.00% | 0.02% |
| Honeywell International Inc | HON | 0.49% | 1.94% | 0.01% | 8.823% | 0.04% |
| Altria Group Inc | MO | 0.57% | 3.70% | 0.02% | 8.06% | 0.05% |
| HCA Healthcare Inc | HCA | 0.13% | n/a | n/a | 11.075% | 0.01% |
| Under Armour Inc | UA | 0.01% | n/a | n/a | 10.435% | 0.00% |
| International Paper Co | IP | 0.10% | 3.28% | 0.00% | 7.175% | 0.01% |
| Hewlett Packard Enterprise Co | HPE | 0.10% | 2.09% | 0.00% | 3.178% | 0.00% |
| Abbott Laboratories | ABT | 0.42% | 1.96% | 0.01% | 11.775% | 0.05% |
| Aflac Inc | AFL | 0.15% | 2.05% | 0.00% | 2.85% | 0.00% |
| Air Products & Chemicals Inc | APD | 0.15% | 2.32% | 0.00% | 10.303% | 0.02% |
| Royal Caribbean Cruises Ltd | RCL | 0.11% | 2.01% | 0.00% | 20.397% | 0.02% |
| American Electric Power Co Inc | AEP | 0.15% | 3.37% | 0.01% | 4.337% | 0.01% |
| Hess Corp | HES | 0.06% | 2.11% | 0.00% | -14.90% | -0.01% |
| Anadarko Petroleum Corp | APC | 0.12% | 0.37% | 0.00% | -1.907% | 0.00% |
| Aon PLC | AON | 0.14% | 1.07% | 0.00% | 11.06% | 0.02% |
| Apache Corp | APA | 0.07% | 2.37% | 0.00% | -17.48% | -0.01% |
| Archer-Daniels-Midland Co | ADM | 0.09% | 3.19% | 0.00% | 8.50% | 0.01% |
| Automatic Data Processing Inc | ADP | 0.22% | 2.15% | 0.00% | 10.85% | 0.02% |
| Verisk Analytics Inc | VRSK | 0.07% | n/a | n/a | 8.58% | 0.01% |
| AutoZone Inc | AZO | 0.08% | n/a | n/a | 12.90% | 0.01% |
| Avery Dennison Corp | AVY | 0.04% | 1.57% | 0.00% | 7.80% | 0.00% |
| Ball Corp | BLL | 0.06% | 1.06% | 0.00% | 1.267% | 0.00% |
| Bank of New York Mellon Corp/The | BK | 0.23% | 1.78% | 0.00% | 9.067% | 0.02% |
| CR Bard Inc | BCR | 0.10% | n/a | n/a | 8.733% | 0.01% |
| Baxter International Inc | BAX | 0.15% | 0.99% | 0.00% | 13.45% | 0.02% |
| Becton Dickinson and Co | BDX | 0.24% | 1.40% | 0.00% | 12.795% | 0.03% |
| Berkshire Hathaway Inc | BRK/B | 1.12% | n/a | n/a | 6.60% | 0.07% |
| Best Buy Co Inc | BBY | 0.08% | 1.99% | 0.00% | 12.647% | 0.01% |
| H&R Block Inc | HRB | 0.02% | 3.66% | 0.00% | 11.00% | 0.00% |
| Boston Scientific Corp | BSX | 0.14% | n/a | n/a | 10.367% | 0.01% |
| Bristol-Myers Squibb Co | BMY | 0.42% | 2.61% | 0.01% | 8.067% | 0.03% |
| Fortune Brands Home & Security Inc | FBHS | 0.04% | 1.17% | 0.00% | 11.605% | 0.01% |
| Brown-Forman Corp | BF/B | 0.06% | 1.15% | 0.00% | 10.73% | 0.01% |

STANDARD AND POOR'S 500 INDEX

| Name | Ticker | [13] | [14] | [15] | [16] | [17] |
|--|--------|--------------------|--------------------------|-----------------------------|-----------------------|------------------------------------|
| | | % Total Market Cap | Estimated Dividend Yield | Cap-Weighted Dividend Yield | Long-Term Growth Est. | Cap-Weighted Long-Term Growth Est. |
| Cabot Oil & Gas Corp | COG | 0.06% | 0.70% | 0.00% | 41.215% | 0.02% |
| Campbell Soup Co | CPB | 0.06% | 2.91% | 0.00% | 4.488% | 0.00% |
| Kansas City Southern | KSU | 0.05% | 1.37% | 0.00% | 14.85% | 0.01% |
| Advanced Micro Devices Inc | AMD | 0.04% | n/a | n/a | 8.00% | 0.00% |
| Hilton Worldwide Holdings Inc | HLT | 0.11% | 0.75% | 0.00% | 16.876% | 0.02% |
| Carnival Corp | CCL | 0.15% | 2.71% | 0.00% | 12.485% | 0.02% |
| Qorvo Inc | QRVO | 0.04% | n/a | n/a | 14.022% | 0.01% |
| CenturyLink Inc | CTL | 0.08% | 12.95% | 0.01% | -14.57% | -0.01% |
| Cigna Corp | CI | 0.21% | 0.02% | 0.00% | 12.095% | 0.03% |
| UDR Inc | UDR | 0.04% | 3.22% | 0.00% | 5.953% | 0.00% |
| Clorox Co/The | CLX | 0.08% | 2.26% | 0.00% | 6.345% | 0.01% |
| CMS Energy Corp | CMS | 0.06% | 2.81% | 0.00% | 6.277% | 0.00% |
| Colgate-Palmolive Co | CL | 0.28% | 2.12% | 0.01% | 7.525% | 0.02% |
| Comerica Inc | CMA | 0.06% | 1.38% | 0.00% | 29.00% | 0.02% |
| CA Inc | CA | 0.06% | 3.06% | 0.00% | 2.967% | 0.00% |
| Conagra Brands Inc | CAG | 0.06% | 2.26% | 0.00% | 8.80% | 0.01% |
| Consolidated Edison Inc | ED | 0.11% | 3.25% | 0.00% | 2.00% | 0.00% |
| SL Green Realty Corp | SLG | 0.04% | 3.22% | 0.00% | 0.35% | 0.00% |
| Corning Inc | GLW | 0.12% | 1.94% | 0.00% | 9.65% | 0.01% |
| Cummins Inc | CMI | 0.12% | 2.45% | 0.00% | 10.92% | 0.01% |
| Danaher Corp | DHR | 0.27% | 0.60% | 0.00% | 7.975% | 0.02% |
| Target Corp | TGT | 0.15% | 3.80% | 0.01% | -0.053% | 0.00% |
| Deere & Co | DE | 0.21% | 1.53% | 0.00% | 9.00% | 0.02% |
| Dominion Energy Inc | D | 0.22% | 4.12% | 0.01% | 5.98% | 0.01% |
| Dover Corp | DOV | 0.07% | 1.86% | 0.00% | 14.733% | 0.01% |
| Choe Global Markets Inc | CBOE | 0.06% | 0.87% | 0.00% | 22.16% | 0.01% |
| Duke Energy Corp | DUK | 0.25% | 4.23% | 0.01% | 5.017% | 0.01% |
| Eaton Corp PLC | ETN | 0.15% | 3.04% | 0.00% | 9.82% | 0.01% |
| Ecolab Inc | ECL | 0.16% | 1.22% | 0.00% | 12.95% | 0.02% |
| PerkinElmer Inc | PKI | 0.03% | 0.38% | 0.00% | 54.39% | 0.02% |
| Emerson Electric Co | EMR | 0.19% | 2.78% | 0.01% | 8.588% | 0.02% |
| EOG Resources Inc | EOG | 0.26% | 0.62% | 0.00% | -10.855% | -0.03% |
| Entergy Corp | ETR | 0.06% | 4.37% | 0.00% | 0.14% | 0.00% |
| Equifax Inc | EFX | 0.06% | 1.32% | 0.00% | 10.00% | 0.01% |
| EQT Corp | EQT | 0.06% | 0.21% | 0.00% | 17.50% | 0.01% |
| IQVIA Holdings Inc | IQV | 0.09% | n/a | n/a | 14.643% | 0.01% |
| XL Group Ltd | XL | 0.04% | 2.50% | 0.00% | 20.45% | 0.01% |
| Gartner Inc | IT | 0.05% | n/a | n/a | 17.50% | 0.01% |
| FedEx Corp | FDX | 0.28% | 0.80% | 0.00% | 13.65% | 0.04% |
| Macy's Inc | M | 0.03% | 5.99% | 0.00% | 2.967% | 0.00% |
| FMC Corp | FMC | 0.05% | 0.70% | 0.00% | 12.80% | 0.01% |
| Ford Motor Co | F | 0.21% | 4.80% | 0.01% | -7.573% | -0.02% |
| NextEra Energy Inc | NEE | 0.31% | 2.52% | 0.01% | 7.105% | 0.02% |
| Franklin Resources Inc | BEN | 0.10% | 2.12% | 0.00% | 10.00% | 0.01% |
| Freport-McMoRan Inc | FCX | 0.12% | n/a | n/a | 26.805% | 0.03% |
| Gap Inc/The | GPS | 0.06% | 2.70% | 0.00% | 6.833% | 0.00% |
| General Dynamics Corp | GD | 0.26% | 1.65% | 0.00% | 8.48% | 0.02% |
| General Mills Inc | GIS | 0.14% | 3.31% | 0.00% | 7.933% | 0.01% |
| Genuine Parts Co | GPC | 0.06% | 2.84% | 0.00% | 9.47% | 0.01% |
| WW Grainger Inc | GWV | 0.06% | 2.17% | 0.00% | 11.80% | 0.01% |
| Halliburton Co | HAL | 0.18% | 1.47% | 0.00% | 74.00% | 0.13% |
| Harley-Davidson Inc | HOG | 0.04% | 2.87% | 0.00% | 7.95% | 0.00% |
| Harris Corp | HRS | 0.07% | 1.61% | 0.00% | n/a | n/a |
| HCP Inc | HCP | 0.05% | 5.67% | 0.00% | -3.913% | 0.00% |
| Helmerich & Payne Inc | HP | 0.03% | 4.33% | 0.00% | n/a | n/a |
| Fortive Corp | FTV | 0.11% | 0.39% | 0.00% | 10.24% | 0.01% |
| Hershey Co/The | HSY | 0.07% | 2.31% | 0.00% | 9.733% | 0.01% |
| Synchrony Financial | SYF | 0.13% | 1.55% | 0.00% | 5.60% | 0.01% |
| Hormel Foods Corp | HLR | 0.08% | 2.06% | 0.00% | 6.15% | 0.00% |
| Arthur J Gallagher & Co | AJG | 0.05% | 2.47% | 0.00% | 9.95% | 0.00% |
| Mondelez International Inc | MDLZ | 0.27% | 2.06% | 0.01% | 11.64% | 0.03% |
| CenterPoint Energy Inc | CNP | 0.05% | 3.91% | 0.00% | 7.36% | 0.00% |
| Humana Inc | HUM | 0.15% | 0.65% | 0.00% | 11.713% | 0.02% |
| Willis Towers Watson PLC | WLTW | 0.08% | 1.41% | 0.00% | 13.15% | 0.01% |
| Illinois Tool Works Inc | ITW | 0.24% | 1.87% | 0.00% | 9.793% | 0.02% |
| Ingersoll-Rand PLC | IR | 0.09% | 2.02% | 0.00% | 9.895% | 0.01% |
| Foot Locker Inc | FL | 0.02% | 2.65% | 0.00% | 0.897% | 0.00% |
| Interpublic Group of Cos Inc/The | IPG | 0.03% | 3.57% | 0.00% | 4.567% | 0.00% |
| International Flavors & Fragrances Inc | IFF | 0.05% | 1.81% | 0.00% | 5.10% | 0.00% |
| Jacobs Engineering Group Inc | JEC | 0.03% | 0.91% | 0.00% | 10.70% | 0.00% |
| Hanesbrands Inc | HBI | 0.03% | 2.87% | 0.00% | 8.56% | 0.00% |
| Kellogg Co | K | 0.10% | 3.18% | 0.00% | 6.307% | 0.01% |
| Perrigo Co PLC | PRGO | 0.05% | 0.73% | 0.00% | 6.433% | 0.00% |
| Kimberly-Clark Corp | KMB | 0.18% | 3.22% | 0.01% | 6.025% | 0.01% |
| Kimco Realty Corp | KIM | 0.03% | 6.17% | 0.00% | 17.148% | 0.01% |
| Kohl's Corp | KSS | 0.04% | 4.06% | 0.00% | 4.90% | 0.00% |
| Oracle Corp | ORCL | 0.83% | 1.61% | 0.01% | 8.275% | 0.07% |
| Kroger Co/The | KR | 0.10% | 1.82% | 0.00% | 3.092% | 0.00% |
| Leggett & Platt Inc | LEG | 0.03% | 3.02% | 0.00% | 17.40% | 0.00% |
| Lennar Corp | LEN | 0.05% | 0.25% | 0.00% | 12.457% | 0.01% |
| Leucadia National Corp | LUK | 0.04% | 1.51% | 0.00% | 18.00% | 0.01% |
| Eli Lilly & Co | LLY | 0.39% | 2.66% | 0.01% | 10.847% | 0.04% |
| L Brands Inc | LB | 0.07% | 3.99% | 0.00% | 9.20% | 0.01% |
| Charter Communications Inc | CHTR | 0.35% | n/a | n/a | 22.443% | 0.08% |
| Lincoln National Corp | LNC | 0.07% | 1.72% | 0.00% | 9.25% | 0.01% |
| Loews Corp | L | 0.07% | 0.50% | 0.00% | n/a | n/a |
| Lowe's Cos Inc | LOW | 0.33% | 1.76% | 0.01% | 15.523% | 0.05% |
| Host Hotels & Resorts Inc | HST | 0.06% | 4.03% | 0.00% | 3.80% | 0.00% |
| Marsh & McLennan Cos Inc | MMC | 0.18% | 1.84% | 0.00% | 12.393% | 0.02% |

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| Name | Ticker | [13] % Total Market Cap | [14] Estimated Dividend Yield | [15] Cap-Weighted Dividend Yield | [16] Long-Term Growth Est. | [17] Cap-Weighted Long-Term Growth Est. |
|--------------------------------------|--------|-------------------------------|-------------------------------------|--|----------------------------------|--|
| Masco Corp | MAS | 0.06% | 0.96% | 0.00% | 15.44% | 0.01% |
| Mattel Inc | MAT | 0.02% | n/a | n/a | 9.733% | 0.00% |
| S&P Global Inc | SPGI | 0.18% | 0.97% | 0.00% | 10.00% | 0.02% |
| Medtronic PLC | MDT | 0.46% | 2.28% | 0.01% | 5.956% | 0.03% |
| CVS Health Corp | CVS | 0.31% | 2.76% | 0.01% | 12.033% | 0.04% |
| DowDuPont Inc | DWDP | 0.70% | 2.13% | 0.02% | 7.425% | 0.05% |
| Micron Technology Inc | MU | 0.20% | n/a | n/a | 1.60% | 0.00% |
| Motorola Solutions Inc | MSI | 0.06% | 2.30% | 0.00% | 4.35% | 0.00% |
| Mylan NV | MYL | 0.10% | n/a | n/a | 2.945% | 0.00% |
| Laboratory Corp of America Holdings | LH | 0.07% | n/a | n/a | 10.50% | 0.01% |
| Newell Brands Inc | NWL | 0.06% | 2.98% | 0.00% | 4.417% | 0.00% |
| Newmont Mining Corp | NEM | 0.08% | 0.80% | 0.00% | -11.20% | -0.01% |
| Twenty-First Century Fox Inc | FOXA | 0.15% | 1.04% | 0.00% | 8.527% | 0.01% |
| NIKE Inc | NKE | 0.34% | 1.28% | 0.00% | 9.646% | 0.03% |
| NiSource Inc | NI | 0.04% | 2.73% | 0.00% | 7.63% | 0.00% |
| Noble Energy Inc | NBL | 0.06% | 1.37% | 0.00% | 3.715% | 0.00% |
| Norfolk Southern Corp | NSC | 0.17% | 1.68% | 0.00% | 14.233% | 0.02% |
| Principal Financial Group Inc | PFJ | 0.09% | 2.78% | 0.00% | 10.40% | 0.01% |
| Eversource Energy | ES | 0.08% | 3.01% | 0.00% | 6.10% | 0.01% |
| Northrop Grumman Corp | NOC | 0.23% | 1.30% | 0.00% | 7.807% | 0.02% |
| Wells Fargo & Co | WFC | 1.26% | 2.57% | 0.03% | 22.22% | 0.28% |
| Nucor Corp | NUE | 0.09% | 2.39% | 0.00% | 12.00% | 0.01% |
| PVH Corp | PVH | 0.04% | 0.11% | 0.00% | 10.69% | 0.00% |
| Occidental Petroleum Corp | OXY | 0.24% | 4.18% | 0.01% | -3.12% | -0.01% |
| Omnicom Group Inc | OMC | 0.07% | 3.30% | 0.00% | 4.80% | 0.00% |
| ONEOK Inc | OKE | 0.09% | 5.58% | 0.00% | 12.75% | 0.01% |
| Raymond James Financial Inc | RJF | 0.05% | 1.12% | 0.00% | 14.50% | 0.01% |
| PG&E Corp | PCG | 0.10% | n/a | n/a | 5.15% | 0.01% |
| Parker-Hannifin Corp | PH | 0.11% | 1.32% | 0.00% | 11.487% | 0.01% |
| PPL Corp | PPL | 0.09% | 5.11% | 0.00% | -1.00% | 0.00% |
| Exelon Corp | EXC | 0.16% | 3.32% | 0.01% | 1.125% | 0.00% |
| ConocoPhillips | COP | 0.28% | 1.93% | 0.01% | 6.00% | 0.02% |
| PulteGroup Inc | PHM | 0.04% | 1.08% | 0.00% | 20.04% | 0.01% |
| Pinnacle West Capital Corp | PNW | 0.04% | 3.26% | 0.00% | 4.06% | 0.00% |
| PNC Financial Services Group Inc/The | PNC | 0.29% | 2.08% | 0.01% | 10.088% | 0.03% |
| PPG Industries Inc | PPG | 0.13% | 1.54% | 0.00% | 7.645% | 0.01% |
| Praxair Inc | PX | 0.19% | 2.04% | 0.00% | 12.80% | 0.02% |
| Progressive Corp/The | PGR | 0.14% | 1.21% | 0.00% | 11.933% | 0.02% |
| Public Service Enterprise Group Inc | PEG | 0.11% | 3.34% | 0.00% | 2.31% | 0.00% |
| Raytheon Co | RTN | 0.23% | 1.70% | 0.00% | 8.713% | 0.02% |
| Robert Half International Inc | RHI | 0.03% | 1.73% | 0.00% | 8.90% | 0.00% |
| SCANA Corp | SCG | 0.02% | 6.16% | 0.00% | -1.392% | 0.00% |
| Edison International | EIX | 0.09% | 3.83% | 0.00% | 6.163% | 0.01% |
| Schlumberger Ltd | SLB | 0.39% | 2.97% | 0.01% | 44.173% | 0.17% |
| Charles Schwab Corp/The | SCHW | 0.29% | 0.62% | 0.00% | 18.82% | 0.05% |
| Sherwin-Williams Co/The | SHW | 0.16% | 0.83% | 0.00% | 11.24% | 0.02% |
| JM Smucker Co/The | SJM | 0.06% | 2.51% | 0.00% | 5.05% | 0.00% |
| Snap-on Inc | SNA | 0.04% | 1.88% | 0.00% | 10.75% | 0.00% |
| AMETEK Inc | AME | 0.07% | 0.50% | 0.00% | 11.748% | 0.01% |
| Southern Co/The | SO | 0.20% | 4.82% | 0.01% | 4.10% | 0.01% |
| BB&T Corp | BBT | 0.17% | 2.65% | 0.00% | 8.647% | 0.01% |
| Southwest Airlines Co | LUV | 0.16% | 0.76% | 0.00% | 6.983% | 0.01% |
| Stanley Black & Decker Inc | SWK | 0.11% | 1.49% | 0.00% | 11.00% | 0.01% |
| Public Storage | PSA | 0.15% | 3.83% | 0.01% | 4.868% | 0.01% |
| SunTrust Banks Inc | STI | 0.13% | 2.48% | 0.00% | 8.51% | 0.01% |
| Sysco Corp | SYF | 0.13% | 2.37% | 0.00% | 10.988% | 0.01% |
| Andeavor | ANDV | 0.08% | 2.06% | 0.00% | 18.80% | 0.01% |
| Texas Instruments Inc | TXN | 0.43% | 2.37% | 0.01% | 10.74% | 0.05% |
| Textron Inc | TXT | 0.06% | 0.14% | 0.00% | 8.813% | 0.01% |
| Thermo Fisher Scientific Inc | TMO | 0.32% | 0.32% | 0.00% | 12.50% | 0.04% |
| Tiffany & Co | TIF | 0.05% | 1.92% | 0.00% | 10.48% | 0.01% |
| TJX Cos Inc/The | TJX | 0.20% | 1.63% | 0.00% | 12.667% | 0.03% |
| Torchmark Corp | TMK | 0.04% | 0.66% | 0.00% | 8.00% | 0.00% |
| Total System Services Inc | TSS | 0.06% | 0.66% | 0.00% | 12.747% | 0.01% |
| Johnson Controls International plc | JCI | 0.15% | 2.73% | 0.00% | 11.933% | 0.02% |
| Ulta Beauty Inc | ULTA | 0.06% | n/a | n/a | 17.00% | 0.01% |
| Union Pacific Corp | UNP | 0.45% | 1.98% | 0.01% | 12.10% | 0.05% |
| UnitedHealth Group Inc | UNH | 0.90% | 1.36% | 0.01% | 12.403% | 0.11% |
| Unum Group | UNM | 0.05% | 1.68% | 0.00% | 5.00% | 0.00% |
| Marathon Oil Corp | MRO | 0.06% | 1.18% | 0.00% | 5.00% | 0.00% |
| Varian Medical Systems Inc | VAR | 0.04% | n/a | n/a | 6.40% | 0.00% |
| Ventas Inc | VTR | 0.09% | 5.27% | 0.00% | 2.747% | 0.00% |
| VF Corp | VFC | 0.12% | 2.49% | 0.00% | 8.502% | 0.01% |
| Vornado Realty Trust | VNO | 0.06% | 3.07% | 0.00% | -0.715% | 0.00% |
| Vulcan Materials Co | VMC | 0.07% | 0.78% | 0.00% | 23.303% | 0.02% |
| Weyerhaeuser Co | WY | 0.11% | 3.63% | 0.00% | 9.50% | 0.01% |
| Whirlpool Corp | WHR | 0.05% | 2.61% | 0.00% | 7.23% | 0.00% |
| Williams Cos Inc/The | WMB | 0.11% | 3.94% | 0.00% | 2.30% | 0.00% |
| WEC Energy Group Inc | WEC | 0.09% | 3.33% | 0.00% | 5.68% | 0.01% |
| Xerox Corp | XRJ | 0.03% | 3.43% | 0.00% | 2.90% | 0.00% |
| Adobe Systems Inc | ADBE | 0.36% | n/a | n/a | 16.767% | 0.06% |
| AES Corp/VA | AES | 0.03% | 4.80% | 0.00% | 8.725% | 0.00% |
| Amgen Inc | AMGN | 0.53% | 3.04% | 0.02% | 4.795% | 0.03% |
| Apple Inc | AAPL | 3.63% | 1.49% | 0.05% | 10.17% | 0.37% |
| Autodesk Inc | ADSK | 0.10% | n/a | n/a | 38.00% | 0.04% |
| Cintas Corp | CTAS | 0.07% | 1.04% | 0.00% | 13.175% | 0.01% |
| Comcast Corp | CMCSA | 0.79% | 1.57% | 0.01% | 11.348% | 0.09% |
| Molson Coors Brewing Co | TAP | 0.07% | 2.00% | 0.00% | 6.955% | 0.00% |
| KLA-Tencor Corp | KLAC | 0.07% | 2.25% | 0.00% | 8.05% | 0.01% |

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| Name | Ticker | [13] % Total Market Cap | [14] Estimated Dividend Yield | [15] Cap-Weighted Dividend Yield | [16] Long-Term Growth Est. | [17] Cap-Weighted Long-Term Growth Est. |
|--|--------|-------------------------------|-------------------------------------|--|----------------------------------|--|
| Marriott International Inc/MD | MAR | 0.21% | 0.97% | 0.00% | 14.162% | 0.03% |
| McCormick & Co Inc/MD | MKC | 0.05% | 2.04% | 0.00% | 9.70% | 0.00% |
| Nordstrom Inc | JWN | 0.03% | 3.12% | 0.00% | 9.667% | 0.00% |
| PACCAR Inc | PCAR | 0.11% | 1.41% | 0.00% | 7.50% | 0.01% |
| Costco Wholesale Corp | COST | 0.34% | 1.07% | 0.00% | 10.028% | 0.03% |
| Stryker Corp | SYK | 0.24% | 1.21% | 0.00% | 9.367% | 0.02% |
| Tyson Foods Inc | TSN | 0.10% | 1.48% | 0.00% | 9.60% | 0.01% |
| Applied Materials Inc | AMAT | 0.23% | 0.78% | 0.00% | 11.35% | 0.03% |
| Time Warner Inc | TWX | 0.30% | 1.76% | 0.01% | 8.30% | 0.02% |
| American Airlines Group Inc | AAL | 0.11% | 0.77% | 0.00% | -1.14% | 0.00% |
| Cardinal Health Inc | CAH | 0.08% | 3.02% | 0.00% | 12.30% | 0.01% |
| Celgene Corp | CELG | 0.35% | n/a | n/a | 18.954% | 0.07% |
| Cerner Corp | CERN | 0.09% | n/a | n/a | 13.40% | 0.01% |
| Cincinnati Financial Corp | CINF | 0.05% | 2.67% | 0.00% | n/a | n/a |
| DR Horton Inc | DHI | 0.08% | 0.98% | 0.00% | 17.20% | 0.01% |
| Flowerserve Corp | FLS | 0.02% | 1.80% | 0.00% | 8.987% | 0.00% |
| Electronic Arts Inc | EA | 0.14% | n/a | n/a | 13.775% | 0.02% |
| Express Scripts Holding Co | ESRX | 0.18% | n/a | n/a | 11.325% | 0.02% |
| Expeditors International of Washington Inc | EXPD | 0.05% | 1.30% | 0.00% | 8.50% | 0.00% |
| Fastenal Co | FAST | 0.07% | 2.34% | 0.00% | 15.75% | 0.01% |
| M&T Bank Corp | MTB | 0.11% | 1.75% | 0.00% | 9.02% | 0.01% |
| Fiserv Inc | FISV | 0.12% | n/a | n/a | 10.80% | 0.01% |
| Fifth Third Bancorp | FITB | 0.09% | 2.11% | 0.00% | 6.20% | 0.01% |
| Gilead Sciences Inc | GILD | 0.39% | 2.90% | 0.01% | 3.00% | 0.01% |
| Hasbro Inc | HAS | 0.05% | 2.51% | 0.00% | 9.70% | 0.00% |
| Huntington Bancshares Inc/OH | HBAN | 0.07% | 3.02% | 0.00% | 10.27% | 0.01% |
| Welltower Inc | HCN | 0.10% | 5.46% | 0.01% | 2.207% | 0.00% |
| Biogen Inc | BIIB | 0.28% | n/a | n/a | 5.207% | 0.01% |
| Range Resources Corp | RRC | 0.02% | 0.47% | 0.00% | 29.16% | 0.01% |
| Northern Trust Corp | NTRS | 0.10% | 1.68% | 0.00% | 11.68% | 0.01% |
| Packaging Corp of America | PKG | 0.05% | 2.09% | 0.00% | 8.50% | 0.00% |
| Paychex Inc | PAYX | 0.10% | 2.94% | 0.00% | 8.50% | 0.01% |
| People's United Financial Inc | PBCT | 0.03% | 3.69% | 0.00% | 2.00% | 0.00% |
| Patterson Cos Inc | PDCO | 0.01% | 2.88% | 0.00% | 5.567% | 0.00% |
| QUALCOMM Inc | QCOM | 0.40% | 3.56% | 0.01% | 10.467% | 0.04% |
| Roper Technologies Inc | ROP | 0.11% | 0.64% | 0.00% | 12.833% | 0.01% |
| Ross Stores Inc | ROST | 0.13% | 0.80% | 0.00% | 13.00% | 0.02% |
| IDEXX Laboratories Inc | IDXX | 0.06% | n/a | n/a | 11.155% | 0.01% |
| Starbucks Corp | SBUX | 0.34% | 2.09% | 0.01% | 15.90% | 0.05% |
| KeyCorp | KEY | 0.09% | 2.08% | 0.00% | 12.32% | 0.01% |
| State Street Corp | STT | 0.15% | 1.72% | 0.00% | 13.713% | 0.02% |
| Norwegian Cruise Line Holdings Ltd | NCLH | 0.05% | n/a | n/a | 14.33% | 0.01% |
| US Bancorp | USB | 0.38% | 2.24% | 0.01% | 7.933% | 0.03% |
| AO Smith Corp | AOS | 0.04% | 0.91% | 0.00% | 15.00% | 0.01% |
| Symantec Corp | SYMC | 0.07% | 1.07% | 0.00% | 10.30% | 0.01% |
| T Rowe Price Group Inc | TROW | 0.11% | 2.17% | 0.00% | 12.935% | 0.01% |
| Waste Management Inc | WM | 0.16% | 1.97% | 0.00% | 10.35% | 0.02% |
| CBS Corp | CBS | 0.09% | 1.22% | 0.00% | 14.98% | 0.01% |
| Allergan PLC | AGN | 0.23% | 1.71% | 0.00% | 8.50% | 0.02% |
| Constellation Brands Inc | STZ | 0.17% | 0.91% | 0.00% | 16.51% | 0.03% |
| Xilinx Inc | XLNX | 0.07% | 2.08% | 0.00% | 8.30% | 0.01% |
| DENTSPLY SIRONA Inc | XRAY | 0.06% | 0.53% | 0.00% | 10.15% | 0.01% |
| Zions Bancorporation | ZION | 0.04% | 1.26% | 0.00% | 9.00% | 0.00% |
| Alaska Air Group Inc | ALK | 0.04% | 1.63% | 0.00% | -0.18% | 0.00% |
| Invesco Ltd | IVZ | 0.06% | 3.17% | 0.00% | 13.387% | 0.01% |
| Intuit Inc | INTU | 0.17% | 0.99% | 0.00% | 14.82% | 0.03% |
| Morgan Stanley | MS | 0.40% | 1.91% | 0.01% | 15.84% | 0.06% |
| Microchip Technology Inc | MCHP | 0.09% | 1.65% | 0.00% | 14.175% | 0.01% |
| Chubb Ltd | CB | 0.29% | 1.94% | 0.01% | 8.725% | 0.02% |
| Hologic Inc | HOLX | 0.05% | n/a | n/a | 8.82% | 0.00% |
| Chesapeake Energy Corp | CHK | 0.02% | n/a | n/a | -13.30% | 0.00% |
| Citizens Financial Group Inc | CFG | 0.09% | 1.72% | 0.00% | 15.14% | 0.01% |
| O'Reilly Automotive Inc | ORLY | 0.09% | n/a | n/a | 15.333% | 0.01% |
| Allstate Corp/The | ALL | 0.16% | 1.41% | 0.00% | 16.267% | 0.03% |
| FLIR Systems Inc | FLIR | 0.03% | 1.29% | 0.00% | n/a | n/a |
| Equity Residential | EQR | 0.10% | 3.16% | 0.00% | 5.30% | 0.01% |
| BorgWarner Inc | BWA | 0.05% | 1.33% | 0.00% | 7.198% | 0.00% |
| Newfield Exploration Co | NFX | 0.03% | n/a | n/a | 12.355% | 0.00% |
| Incyte Corp | INCY | 0.08% | n/a | n/a | 40.423% | 0.03% |
| Simon Property Group Inc | SPG | 0.23% | 4.31% | 0.01% | 6.67% | 0.02% |
| Eastman Chemical Co | EMN | 0.06% | 2.42% | 0.00% | 7.30% | 0.00% |
| AvalonBay Communities Inc | AVB | 0.10% | 3.18% | 0.00% | 6.447% | 0.01% |
| Prudential Financial Inc | PRU | 0.21% | 2.61% | 0.01% | 11.45% | 0.02% |
| United Parcel Service Inc | UPS | 0.35% | 2.79% | 0.01% | 9.175% | 0.03% |
| Apartment Investment & Management Co | AIV | 0.03% | 3.29% | 0.00% | 6.80% | 0.00% |
| Walgreens Boots Alliance Inc | WBA | 0.30% | 2.20% | 0.01% | 10.965% | 0.03% |
| McKesson Corp | MCK | 0.14% | 0.87% | 0.00% | 10.30% | 0.01% |
| Lockheed Martin Corp | LMT | 0.39% | 2.49% | 0.01% | 10.625% | 0.04% |
| AmerisourceBergen Corp | ABC | 0.08% | 1.66% | 0.00% | 7.53% | 0.01% |
| Capital One Financial Corp | COF | 0.20% | 1.61% | 0.00% | 7.253% | 0.01% |
| Waters Corp | WAT | 0.06% | n/a | n/a | 8.365% | 0.01% |
| Dollar Tree Inc | DLTR | 0.11% | n/a | n/a | 13.977% | 0.02% |
| Darden Restaurants Inc | DRI | 0.05% | 2.62% | 0.00% | 9.498% | 0.00% |
| NetApp Inc | NTAP | 0.06% | 1.45% | 0.00% | 12.15% | 0.01% |
| Citrix Systems Inc | CTXS | 0.06% | n/a | n/a | 4.85% | 0.00% |
| Goodyear Tire & Rubber Co/The | GT | 0.03% | 1.73% | 0.00% | n/a | n/a |
| DXC Technology Co | DXC | 0.11% | 0.76% | 0.00% | 15.00% | 0.02% |
| DaVita Inc | DVA | 0.06% | n/a | n/a | 1.45% | 0.00% |
| Hartford Financial Services Group Inc/The | HIG | 0.08% | 1.78% | 0.00% | 9.50% | 0.01% |

STANDARD AND POOR'S 500 INDEX

| Name | Ticker | [13] | [14] | [15] | [16] | [17] |
|--|--------|--------------------|--------------------------|-----------------------------|-----------------------|------------------------------------|
| | | % Total Market Cap | Estimated Dividend Yield | Cap-Weighted Dividend Yield | Long-Term Growth Est. | Cap-Weighted Long-Term Growth Est. |
| Iron Mountain Inc | IRM | 0.04% | 6.23% | 0.00% | n/a | n/a |
| Estee Lauder Cos Inc/The | EL | 0.12% | 1.19% | 0.00% | 11.998% | 0.01% |
| Cadence Design Systems Inc | CDNS | 0.05% | n/a | n/a | 12.00% | 0.01% |
| Stericycle Inc | SRCL | 0.02% | n/a | n/a | 8.833% | 0.00% |
| Universal Health Services Inc | UHS | 0.04% | 0.35% | 0.00% | 7.97% | 0.00% |
| E*TRADE Financial Corp | ETFC | 0.06% | n/a | n/a | 17.57% | 0.01% |
| Skyworks Solutions Inc | SWKS | 0.07% | 1.35% | 0.00% | 13.075% | 0.01% |
| National Oilwell Varco Inc | NOV | 0.06% | 0.56% | 0.00% | n/a | n/a |
| Quest Diagnostics Inc | DGXI | 0.06% | 1.83% | 0.00% | 7.867% | 0.00% |
| Activision Blizzard Inc | ATVI | 0.20% | 0.47% | 0.00% | 13.928% | 0.03% |
| Rockwell Automation Inc | ROK | 0.11% | 1.70% | 0.00% | 10.85% | 0.01% |
| Kraft Heinz Co/The | KHC | 0.40% | 3.22% | 0.01% | 7.008% | 0.03% |
| American Tower Corp | AMT | 0.26% | 1.96% | 0.01% | 19.71% | 0.05% |
| Regeneron Pharmaceuticals Inc | REGN | 0.17% | n/a | n/a | 16.948% | 0.03% |
| Amazon.com Inc | AMZN | 2.38% | n/a | n/a | 25.642% | 0.61% |
| Ralph Lauren Corp | RL | 0.02% | 1.93% | 0.00% | 1.58% | 0.00% |
| Boston Properties Inc | BXP | 0.08% | 2.46% | 0.00% | 5.56% | 0.00% |
| Amphenol Corp | APH | 0.11% | 0.87% | 0.00% | 12.22% | 0.01% |
| Arconic Inc | ARNC | 0.06% | 0.88% | 0.00% | 17.50% | 0.01% |
| Pioneer Natural Resources Co | PXD | 0.12% | 0.05% | 0.00% | 20.00% | 0.02% |
| Valero Energy Corp | VLO | 0.17% | 3.05% | 0.01% | 9.86% | 0.02% |
| Synopsys Inc | SNPS | 0.05% | n/a | n/a | 10.00% | 0.01% |
| L3 Technologies Inc | LLL | 0.07% | 1.52% | 0.00% | 6.785% | 0.00% |
| Western Union Co/The | WU | 0.04% | 3.68% | 0.00% | 8.00% | 0.00% |
| CH Robinson Worldwide Inc | CHRW | 0.05% | 2.07% | 0.00% | 9.275% | 0.00% |
| Accenture PLC | ACN | 0.40% | 1.74% | 0.01% | 10.567% | 0.04% |
| TransDigm Group Inc | TDG | 0.06% | n/a | n/a | 9.76% | 0.01% |
| Yum! Brands Inc | YUM | 0.12% | 1.47% | 0.00% | 12.98% | 0.02% |
| Prologis Inc | PLD | 0.14% | 2.73% | 0.00% | 7.493% | 0.01% |
| FirstEnergy Corp | FE | 0.06% | 4.70% | 0.00% | -1.253% | 0.00% |
| VeriSign Inc | VRSN | 0.05% | n/a | n/a | 10.50% | 0.00% |
| Quanta Services Inc | PWR | 0.03% | n/a | n/a | n/a | n/a |
| Henry Schein Inc | HSIC | 0.05% | n/a | n/a | 9.65% | 0.00% |
| Ameren Corp | AEE | 0.06% | 3.10% | 0.00% | 7.00% | 0.00% |
| ANSYS Inc | ANSS | 0.05% | n/a | n/a | 10.375% | 0.01% |
| Scripps Networks Interactive Inc | SNI | 0.03% | 1.41% | 0.00% | 5.75% | 0.00% |
| NVIDIA Corp | NVDA | 0.49% | 0.31% | 0.00% | 12.00% | 0.06% |
| Sealed Air Corp | SEE | 0.04% | 1.30% | 0.00% | 6.123% | 0.00% |
| Cognizant Technology Solutions Corp | CTSH | 0.18% | 0.84% | 0.00% | 14.20% | 0.03% |
| Intuitive Surgical Inc | ISRG | 0.17% | n/a | n/a | 11.833% | 0.02% |
| Affiliated Managers Group Inc | AMG | 0.05% | 0.39% | 0.00% | 14.893% | 0.01% |
| Aetna Inc | AET | 0.25% | 1.11% | 0.00% | 11.997% | 0.03% |
| Republic Services Inc | RSG | 0.10% | 2.04% | 0.00% | 10.78% | 0.01% |
| eBay Inc | EBAY | 0.17% | n/a | n/a | 8.934% | 0.01% |
| Goldman Sachs Group Inc/The | GS | 0.41% | 1.18% | 0.00% | 9.933% | 0.04% |
| Sempra Energy | SRE | 0.11% | 3.08% | 0.00% | 12.34% | 0.01% |
| SBA Communications Corp | SBAC | 0.08% | n/a | n/a | 22.70% | 0.02% |
| Moody's Corp | MCO | 0.12% | 1.03% | 0.00% | 8.00% | 0.01% |
| Priceline Group Inc/The | PCLN | 0.36% | n/a | n/a | 16.96% | 0.06% |
| F5 Networks Inc | FFIV | 0.03% | n/a | n/a | 8.928% | 0.00% |
| Akamai Technologies Inc | AKAM | 0.05% | n/a | n/a | 12.533% | 0.01% |
| Devon Energy Corp | DVN | 0.09% | 0.58% | 0.00% | 16.95% | 0.02% |
| Alphabet Inc | GOOGL | 1.33% | n/a | n/a | 17.972% | 0.24% |
| Red Hat Inc | RHT | 0.09% | n/a | n/a | 17.25% | 0.02% |
| Netflix Inc | NFLX | 0.35% | n/a | n/a | 39.74% | 0.14% |
| Allegion PLC | ALLE | 0.03% | 0.80% | 0.00% | 12.987% | 0.00% |
| Agilent Technologies Inc | A | 0.09% | 0.89% | 0.00% | 4.925% | 0.00% |
| Anthem Inc | ANTM | 0.24% | 1.24% | 0.00% | 11.245% | 0.03% |
| CME Group Inc | CME | 0.21% | 1.81% | 0.00% | 12.29% | 0.03% |
| Juniper Networks Inc | JNPR | 0.05% | 1.40% | 0.00% | 5.602% | 0.00% |
| BlackRock Inc | BLK | 0.35% | 1.95% | 0.01% | 14.027% | 0.05% |
| DTE Energy Co | DTE | 0.08% | 3.22% | 0.00% | 5.775% | 0.00% |
| Nasdaq Inc | NDAQ | 0.05% | 1.98% | 0.00% | 9.82% | 0.01% |
| Philip Morris International Inc | PM | 0.69% | 4.05% | 0.03% | 9.387% | 0.06% |
| salesforce.com Inc | CRM | 0.31% | n/a | n/a | 28.30% | 0.09% |
| MetLife Inc | MET | 0.22% | 3.16% | 0.01% | 9.00% | 0.02% |
| Monsanto Co | MON | 0.22% | 1.85% | 0.00% | 8.10% | 0.02% |
| Under Armour Inc | UA | 0.01% | n/a | n/a | 5.87% | 0.00% |
| Tapestry Inc | TPR | 0.05% | 3.05% | 0.00% | 11.629% | 0.01% |
| Fluor Corp | FLR | 0.03% | 1.63% | 0.00% | 8.457% | 0.00% |
| CSX Corp | CSX | 0.21% | 1.45% | 0.00% | 13.042% | 0.03% |
| Edwards Lifesciences Corp | EW | 0.10% | n/a | n/a | 16.68% | 0.02% |
| Ameriprise Financial Inc | AMP | 0.11% | 1.96% | 0.00% | 8.80% | 0.01% |
| Xcel Energy Inc | XEL | 0.10% | 2.99% | 0.00% | 5.97% | 0.01% |
| Rockwell Collins Inc | COL | 0.09% | 0.97% | 0.00% | 10.55% | 0.01% |
| TechnipFMC PLC | FTI | 0.06% | 1.66% | 0.00% | 4.56% | 0.00% |
| Zimmer Biomet Holdings Inc | ZBH | 0.10% | 0.80% | 0.00% | 6.967% | 0.01% |
| CBRE Group Inc | CBG | 0.06% | n/a | n/a | 9.35% | 0.01% |
| Signet Jewelers Ltd | SIG | 0.01% | 2.19% | 0.00% | 4.167% | 0.00% |
| Mastercard Inc | MA | 0.67% | 0.66% | 0.00% | 17.846% | 0.12% |
| CarMax Inc | KMX | 0.05% | n/a | n/a | 12.367% | 0.01% |
| Intercontinental Exchange Inc | ICE | 0.17% | 1.13% | 0.00% | 11.49% | 0.02% |
| Fidelity National Information Services Inc | FIS | 0.13% | 1.23% | 0.00% | 12.00% | 0.02% |
| Chipotle Mexican Grill Inc | CMG | 0.03% | n/a | n/a | 46.975% | 0.02% |
| Wynn Resorts Ltd | WYNN | 0.07% | 1.19% | 0.00% | 32.40% | 0.02% |
| Assurant Inc | AIZ | 0.02% | 2.22% | 0.00% | n/a | n/a |
| NRG Energy Inc | NRG | 0.04% | 0.42% | 0.00% | 23.53% | 0.01% |
| Regions Financial Corp | RF | 0.08% | 2.08% | 0.00% | 11.88% | 0.01% |
| Monster Beverage Corp | MNST | 0.15% | n/a | n/a | 20.30% | 0.03% |

STANDARD AND POOR'S 500 INDEX

| Name | Ticker | [13] | [14] | [15] | [16] | [17] |
|---------------------------------------|--------|--------------------|--------------------------|-----------------------------|-----------------------|------------------------------------|
| | | % Total Market Cap | Estimated Dividend Yield | Cap-Weighted Dividend Yield | Long-Term Growth Est. | Cap-Weighted Long-Term Growth Est. |
| Mosaic Co/The | MOS | 0.04% | 0.39% | 0.00% | 13.45% | 0.01% |
| Expedia Inc | EXPE | 0.07% | 1.00% | 0.00% | 14.60% | 0.01% |
| Discovery Communications Inc | DISCA | 0.01% | n/a | n/a | 5.05% | 0.00% |
| CF Industries Holdings Inc | CF | 0.04% | 2.82% | 0.00% | 6.00% | 0.00% |
| Viacom Inc | VIAB | 0.05% | 2.60% | 0.00% | 3.02% | 0.00% |
| Alphabet Inc | GOOG | 1.54% | n/a | n/a | 17.972% | 0.28% |
| Wyndham Worldwide Corp | WYN | 0.05% | 2.00% | 0.00% | 13.65% | 0.01% |
| Cooper Cos Inc/The | COO | 0.04% | 0.03% | 0.00% | 9.75% | 0.00% |
| TE Connectivity Ltd | TEL | 0.14% | 1.68% | 0.00% | 7.01% | 0.01% |
| Discover Financial Services | DFS | 0.12% | 1.82% | 0.00% | 6.395% | 0.01% |
| TripAdvisor Inc | TRIP | 0.02% | n/a | n/a | 12.818% | 0.00% |
| Dr Pepper Snapple Group Inc | DPS | 0.07% | 2.39% | 0.00% | 8.583% | 0.01% |
| Visa Inc | V | 0.87% | 0.68% | 0.01% | 16.33% | 0.14% |
| Mid-America Apartment Communities Inc | MAA | 0.05% | 3.67% | 0.00% | n/a | n/a |
| Xylem Inc/NY | XYL | 0.05% | 1.06% | 0.00% | 15.35% | 0.01% |
| Marathon Petroleum Corp | MPC | 0.14% | 2.43% | 0.00% | 13.277% | 0.02% |
| Tractor Supply Co | TSCO | 0.04% | 1.44% | 0.00% | 12.403% | 0.00% |
| ResMed Inc | RMD | 0.05% | 1.65% | 0.00% | 13.40% | 0.01% |
| Mettler-Toledo International Inc | MTD | 0.07% | n/a | n/a | 12.16% | 0.01% |
| Albemarle Corp | ALB | 0.06% | 1.00% | 0.00% | 12.40% | 0.01% |
| Essex Property Trust Inc | ESS | 0.07% | 2.90% | 0.00% | 6.23% | 0.00% |
| GGP Inc | GGP | 0.09% | 3.76% | 0.00% | 4.575% | 0.00% |
| Realty Income Corp | O | 0.07% | 4.47% | 0.00% | 4.943% | 0.00% |
| Seagate Technology PLC | STX | 0.05% | 6.02% | 0.00% | 10.40% | 0.01% |
| WestRock Co | WRK | 0.07% | 2.72% | 0.00% | 9.033% | 0.01% |
| IHS Markit Ltd | INFO | 0.08% | n/a | n/a | 13.06% | 0.01% |
| Western Digital Corp | WDC | 0.10% | 2.51% | 0.00% | 14.08% | 0.01% |
| PepsiCo Inc | PEP | 0.72% | 2.69% | 0.02% | 6.21% | 0.04% |
| Church & Dwight Co Inc | CHD | 0.05% | 1.51% | 0.00% | 9.013% | 0.00% |
| Duke Realty Corp | DRE | 0.04% | 2.94% | 0.00% | 3.71% | 0.00% |
| Federal Realty Investment Trust | FRT | 0.04% | 3.01% | 0.00% | 6.167% | 0.00% |
| MGM Resorts International | MGM | 0.08% | 1.32% | 0.00% | 7.465% | 0.01% |
| Twenty-First Century Fox Inc | FOX | 0.11% | 1.06% | 0.00% | 8.527% | 0.01% |
| Alliant Energy Corp | LNT | 0.04% | 2.96% | 0.00% | 6.097% | 0.00% |
| JB Hunt Transport Services Inc | JBHT | 0.05% | 0.80% | 0.00% | 13.40% | 0.01% |
| Lam Research Corp | LRCX | 0.13% | 1.09% | 0.00% | 2.50% | 0.00% |
| Mohawk Industries Inc | MHK | 0.09% | n/a | n/a | 7.95% | 0.01% |
| Pentair PLC | PNR | 0.05% | 1.98% | 0.00% | 8.18% | 0.00% |
| Vertex Pharmaceuticals Inc | VRTX | 0.16% | n/a | n/a | 70.84% | 0.11% |
| Facebook Inc | FB | 1.78% | n/a | n/a | 28.808% | 0.51% |
| United Rentals Inc | URI | 0.06% | n/a | n/a | 14.173% | 0.01% |
| Alexandria Real Estate Equities Inc | ARE | 0.05% | 2.76% | 0.00% | 7.30% | 0.00% |
| United Continental Holdings Inc | UAL | 0.09% | n/a | n/a | -0.385% | 0.00% |
| Delta Air Lines Inc | DAL | 0.17% | 2.18% | 0.00% | 4.75% | 0.01% |
| Navient Corp | NAVI | 0.01% | 4.80% | 0.00% | n/a | n/a |
| News Corp | NWS | 0.01% | 1.20% | 0.00% | 19.033% | 0.00% |
| Centene Corp | CNC | 0.07% | n/a | n/a | 13.274% | 0.01% |
| Regency Centers Corp | REG | 0.05% | 3.06% | 0.00% | 9.27% | 0.00% |
| Macerich Co/The | MAC | 0.04% | 4.51% | 0.00% | 7.355% | 0.00% |
| Martin Marietta Materials Inc | MLM | 0.06% | 0.80% | 0.00% | 20.665% | 0.01% |
| Envision Healthcare Corp | EVHC | 0.02% | n/a | n/a | 2.74% | 0.00% |
| PayPal Holdings Inc | PYPL | 0.37% | n/a | n/a | 20.772% | 0.08% |
| Coty Inc | COTY | 0.06% | 2.51% | 0.00% | 17.13% | 0.01% |
| DISH Network Corp | DISH | 0.05% | n/a | n/a | -5.745% | 0.00% |
| Alexion Pharmaceuticals Inc | ALXN | 0.11% | n/a | n/a | 19.892% | 0.02% |
| Everest Re Group Ltd | RE | 0.04% | 2.35% | 0.00% | 10.00% | 0.00% |
| News Corp | NWSA | 0.03% | 1.23% | 0.00% | 19.033% | 0.00% |
| Global Payments Inc | GPN | 0.07% | 0.04% | 0.00% | 14.50% | 0.01% |
| Crown Castle International Corp | CCI | 0.19% | 3.78% | 0.01% | 21.033% | 0.04% |
| Aptiv PLC | APTIV | 0.10% | 1.04% | 0.00% | 10.425% | 0.01% |
| Advance Auto Parts Inc | AAP | 0.03% | 0.24% | 0.00% | 13.05% | 0.00% |
| Michael Kors Holdings Ltd | KORS | 0.04% | n/a | n/a | 14.385% | 0.01% |
| Align Technology Inc | ALGN | 0.08% | n/a | n/a | n/a | n/a |
| Illumina Inc | ILMN | 0.13% | n/a | n/a | 14.70% | 0.02% |
| Acuity Brands Inc | AYI | 0.03% | 0.30% | 0.00% | 11.00% | 0.00% |
| Alliance Data Systems Corp | ADS | 0.06% | 0.82% | 0.00% | 14.00% | 0.01% |
| LKQ Corp | LKQ | 0.05% | n/a | n/a | 15.70% | 0.01% |
| Nielsen Holdings PLC | NLSN | 0.05% | 3.74% | 0.00% | 9.50% | 0.01% |
| Garmin Ltd | GRMN | 0.05% | 3.42% | 0.00% | 5.775% | 0.00% |
| Cimarex Energy Co | XEC | 0.05% | 0.26% | 0.00% | 63.22% | 0.03% |
| Zoetis Inc | ZTS | 0.15% | 0.70% | 0.00% | 15.137% | 0.02% |
| Equinix Inc | EQIX | 0.15% | 1.77% | 0.00% | 25.52% | 0.04% |
| Digital Realty Trust Inc | DLR | 0.10% | 3.27% | 0.00% | 7.26% | 0.01% |
| Discovery Communications Inc | DISCK | 0.02% | n/a | n/a | 5.05% | 0.00% |

Notes:
[8] Equals sum of Col. [15]
[9] Equals sum of Col. [17]
[10] Equals ([8] x (1 + [9])) + [9]
[11] Source: Exhibit AEB-6, at 4
[12] Equals [10] - [11]
[13] Equals weight in S&P 500 based on market capitalization
[14] Source: Bloomberg Professional
[15] Equals [13] x [14]
[16] Source: Bloomberg Professional
[17] Equals [13] x [16]

CAPITAL ASSET PRICING MODEL

| | [4] | [5] | [6] | [7] |
|--|-----------|------------|---------|--------|
| | Risk-Free | Value Line | Market | |
| | Rate | Beta | Risk | ROE |
| | | | Premium | |
| [1] Current 180-day average of 30-year U.S. Treasury bond yield | 2.84% | 0.685 | 11.01% | 10.38% |
| [2] Near-term projected 30-year U.S. Treasury bond yield (Q1 2018 - Q2 2019) | 3.32% | 0.685 | 10.53% | 10.53% |
| [3] Projected 30-year U.S. Treasury bond yield (2019 - 2023) | 4.10% | 0.685 | 9.75% | 10.78% |
| Mean | | | | 10.56% |

[1] Source: Bloomberg Professional

[2] Source: Blue Chip Financial Forecasts, Vol. 37, No. 1, January 1, 2018, at 2

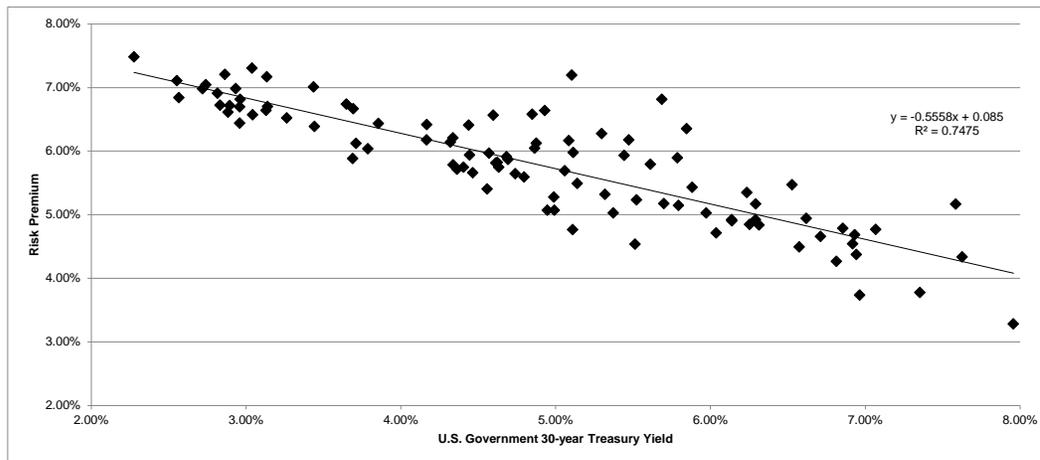
[3] Source: Blue Chip Financial Forecasts, Vol. 36, No. 12, December 1, 2017, at 14

[4] See Notes [1], [2], and [3]

[5] Source: Exhibit AEB-5

[6] Source: Exhibit AEB-6

[7] Equals [4] + ([5] x [6])



SUMMARY OUTPUT

| Regression Statistics | |
|-----------------------|-------------|
| Multiple R | 0.864557067 |
| R Square | 0.747458921 |
| Adjusted R Square | 0.744855405 |
| Standard Error | 0.004537322 |
| Observations | 99 |

ANOVA

| | df | SS | MS | F | Significance F |
|------------|----|-------------|-------------|-------------|----------------|
| Regression | 1 | 0.005910527 | 0.005910527 | 287.0959282 | 9.60008E-31 |
| Residual | 97 | 0.001996967 | 2.05873E-05 | | |
| Total | 98 | 0.007907494 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|--------------|--------------|----------------|--------------|-------------|--------------|------------|--------------|--------------|
| Intercept | 0.085044155 | 0.001658914 | 51.26496865 | 4.54514E-72 | 0.081751671 | 0.08833664 | 0.081751671 | 0.088336639 |
| X Variable 1 | -0.555818309 | 0.032803436 | -16.94390534 | 9.60008E-31 | -0.620924048 | -0.4907126 | -0.620924048 | -0.490712569 |

| | [7] | [8] | [9] |
|--|-----------------------------------|-----------------|--------|
| | U.S. Govt. 30-year Treasury | Risk Premium | ROE |
| Current 180-Day Average [4] | 2.84% | 6.93% | 9.77% |
| Blue Chip Consensus Forecast (Q1 2018-Q2 2019) [5] | 3.32% | 6.66% | 9.98% |
| Blue Chip Consensus Forecast (2019-2023) [6] | 4.10% | 6.23% | 10.33% |
| AVERAGE | | | 10.02% |

Notes:

- [1] Source: Regulatory Research Associates, accessed January 3, 2018
- [2] Source: Bloomberg Professional, quarterly bond yields are an average of the trading days in each quarter
- [3] Equals Column [1] – Column [2]
- [4] Source: Bloomberg Professional
- [5] Source: Blue Chip Financial Forecasts, Vol. 37, No. 1, January 1, 2018, at 2
- [6] Source: Blue Chip Financial Forecasts, Vol. 36, No. 12, December 1, 2017, at 14
- [7] See notes [4], [5] & [6]
- [8] Equals 0.085044 + (-0.555818 x Column [7])
- [9] Equals Column [7] + Column [8]

COMPARISON OF PUBLIC SERVICE ELECTRIC AND GAS AND PROXY GROUP COMPANIES
RISK ASSESSMENT

| | [1] | [2] | [3] | [4] | | | | |
|-------------------------------|--------------------------|--------------------|----------------|--------------------|---------------------------------|-----------------------|-----|----|
| Company | Jurisdiction/Service | Test Year | Authorized ROE | Revenue Decoupling | Capital Cost Recovery Mechanism | | | |
| Ameren Corporation | Illinois - Electric | Fully Forecast | 8.64 | No | Yes | | | |
| | Illinois - Gas | Fully Forecast | 9.60 | Full | Yes | | | |
| | Missouri - Electric | Partially Forecast | N/A | Partial | Yes | | | |
| Avangrid | Missouri - Gas | Partially Forecast | N/A | No | Yes | | | |
| | Connecticut - Electric | Fully Forecast | 9.10 | Full | No | | | |
| | Connecticut - Gas | Fully Forecast | 9.18 | Full | Yes | | | |
| | Connecticut - Gas | Fully Forecast | 9.26 | No | Yes | | | |
| | Maine - Electric | Fully Forecast | 9.45 | Full | No | | | |
| | Maine - Gas | Fully Forecast | 9.55 | No | No | | | |
| | New York - Electric | Fully Forecast | 9.00 | Full | No | | | |
| | New York - Gas | Fully Forecast | 9.00 | Full | Yes | | | |
| | New York - Electric | Fully Forecast | 9.00 | Full | No | | | |
| | New York - Gas | Fully Forecast | 9.00 | Full | Yes | | | |
| Black Hills Corp | Arkansas - Gas | Partially Forecast | 9.40 | Full | Yes | | | |
| | Colorado - Electric | Historic | 9.37 | No | Yes | | | |
| | Colorado - Gas | Historic | 10.00 | No | No | | | |
| | Iowa - Gas | Historic | N/A | No | Yes | | | |
| | Kansas - Gas | Historic | N/A | Partial | Yes | | | |
| | Nebraska - Gas | Historic | 9.60 | No | Yes | | | |
| | South Dakota - Electric | Historic | N/A | Partial | Yes | | | |
| | Wyoming - Electric | Historic | 9.90 | Partial | No | | | |
| | Wyoming - Gas | Historic | 9.90 | Partial | No | | | |
| | Wyoming - Gas | Partially Forecast | N/A | Full | Yes | | | |
| CenterPoint Energy, Inc. | Louisiana - Gas | Fully Forecast | 10.25 | Partial | No | | | |
| | Minnesota - Gas | Fully Forecast | 9.49 | Full | No | | | |
| | Oklahoma - Gas | Historic | N/A | Partial | Yes | | | |
| | Texas - Electric | Historic | 10.00 | No | Yes | | | |
| | Texas - Gas | Historic | 9.60 | No | Yes | | | |
| | Michigan - Electric | Fully Forecast | 10.10 | No | No | | | |
| CMS Energy Corporation | Michigan - Gas | Fully Forecast | 10.10 | No | Yes | | | |
| | New Jersey - Electric | Partially Forecast | 9.60 | No | Yes | | | |
| | New York - Electric | Fully Forecast | 9.00 | Full | Yes | | | |
| | New York - Gas | Fully Forecast | 9.00 | Full | Yes | | | |
| | O&R - Electric | Fully Forecast | 9.00 | Full | Yes | | | |
| | O&R - Gas | Fully Forecast | 9.00 | Full | Yes | | | |
| DTE Energy Company | Michigan - Electric | Fully Forecast | 10.10 | No | Yes | | | |
| | Michigan - Gas | Fully Forecast | 10.10 | Partial | Yes | | | |
| Eversource Energy | Connecticut - Electric | Fully Forecast | 9.17 | Full | Yes | | | |
| | Connecticut - Gas | Fully Forecast | 8.83 | Pending | Yes | | | |
| | Massachusetts - Electric | Historic | N/A | No | Yes | | | |
| | Massachusetts - Electric | Historic | 9.60 | Full | Yes | | | |
| | Massachusetts - Gas | Historic | 9.80 | Full | Yes | | | |
| | New Hampshire - Electric | Historic | 9.67 | Partial | Yes | | | |
| NorthWestern Corporation | Montana - Electric | Historic | 9.80 | No | No | | | |
| | Montana - Gas | Historic | 9.55 | No | No | | | |
| | Nebraska - Gas | Historic | 10.40 | No | No | | | |
| | South Dakota - Electric | Historic | N/A | No | No | | | |
| | South Dakota - Gas | Historic | N/A | No | No | | | |
| | Illinois - Gas | Fully Forecast | 9.05 | Full | Yes | | | |
| WEC Energy Group | Illinois - Gas | Fully Forecast | 9.05 | Full | Yes | | | |
| | Michigan - Electric | Fully Forecast | 10.20 | No | Yes | | | |
| | Michigan - Gas | Fully Forecast | 9.90 | No | No | | | |
| | Minnesota - Gas | Fully Forecast | 9.11 | Full | No | | | |
| | Wisconsin - Electric | Fully Forecast | N/A | No | Yes | | | |
| | Wisconsin - Gas | Fully Forecast | N/A | No | Yes | | | |
| | Wisconsin - Gas | Fully Forecast | N/A | No | Yes | | | |
| | Colorado - Electric | Historic | 9.83 | No | Yes | | | |
| | Colorado - gas | Historic | 9.50 | Partial | Yes | | | |
| | Minnesota - electric | Fully Forecast | 9.20 | Full | Yes | | | |
| Xcel Energy Inc. | Minnesota - gas | Fully Forecast | 10.09 | No | Yes | | | |
| | New Mexico | Fully Forecast | N/A | No | No | | | |
| | North Dakota - electric | Fully Forecast | 9.75 | No | Yes | | | |
| | North Dakota - gas | Fully Forecast | 10.75 | No | No | | | |
| | South Dakota - electric | Historic | N/A | Partial | Yes | | | |
| | Texas - electric | Historic | N/A | No | Yes | | | |
| | Wisconsin - electric | Fully Forecast | N/A | No | Yes | | | |
| | Wisconsin - gas | Fully Forecast | N/A | No | Yes | | | |
| | | | | ROE Range | Revenue Decoupling | Capital Cost Recovery | | |
| | Proxy Group Average | Fully Forecast | 38 | Mean | | | | |
| Partially Forecast | | 5 | 9.44% | Low | | | | |
| Historic | | 24 | 9.50% | High | | | | |
| | | | 8.64% | 10.75% | Full | 22 | Yes | 47 |
| | | | 9.40% | 9.60% | Partial | 11 | No | 20 |
| | | | 9.77% | 10.40% | No | 33 | | |
| Public Service Electric & Gas | New Jersey - electric | Partially Forecast | 10.30 | No | Yes | | | |
| | New Jersey - gas | Partially Forecast | 10.30 | Partial | Yes | | | |
| | | 64% | | 50% | 70% | | | |

Notes

[1] Source: "Alternative Regulation for Evolving Utility Challenges," Prepared by Pacific Economics Group Research for Edison Electric Institute, Table 6, November 2015

[2] Source: Regulatory Research Associates, effective as of September 29, 2017.

[3] - [4] Source: "Adjustment Clauses: A State-by-state Overview," Regulatory Research Associates, September 12, 2016

| | | COMMON EQUITY RATIO [1] | | | | | | | | |
|------------------------------|--------|-------------------------|--------|--------|--------|--------|--------|--------|--------|---------|
| Electric Proxy Group Company | Ticker | 2017Q3 | 2017Q2 | 2017Q1 | 2016Q4 | 2016Q3 | 2016Q2 | 2016Q1 | 2015Q4 | Average |
| Ameren Corporation | AEE | 52.80% | 52.35% | 52.01% | 51.93% | 53.06% | 52.15% | 52.10% | 51.44% | 52.23% |
| Avista Corporation | AGR | 54.67% | 54.38% | 56.04% | 55.36% | 56.63% | 55.80% | 55.46% | 55.07% | 55.43% |
| Black Hills Corporation | BKH | 55.34% | 53.96% | 53.19% | 52.72% | 52.66% | 52.47% | 52.45% | 52.39% | 53.15% |
| CenterPoint Energy, Inc. | CNP | 40.69% | 40.48% | 40.77% | 41.04% | 39.52% | 41.47% | 40.36% | 40.27% | 40.58% |
| CMS Energy Corporation | CMS | 53.09% | 52.81% | 51.93% | 51.07% | 51.13% | 52.14% | 51.25% | 50.46% | 51.74% |
| Consolidated Edison, Inc. | ED | 49.51% | 48.64% | 49.67% | 49.32% | 50.24% | 48.95% | 50.02% | 49.68% | 49.50% |
| DTE Energy Company | DTE | 50.50% | 50.63% | 50.50% | 50.50% | 50.13% | 49.35% | 50.53% | 50.39% | 50.31% |
| Eversource Energy | ES | 53.78% | 53.90% | 54.83% | 55.12% | 54.61% | 53.88% | 54.15% | 53.56% | 54.23% |
| NorthWestern Corporation | NWE | 48.86% | 48.61% | 48.61% | 48.13% | 47.72% | 47.66% | 47.54% | 47.31% | 48.05% |
| Wisconsin Energy Corporation | WEC | 55.69% | 55.39% | 54.89% | 56.24% | 56.41% | 56.16% | 56.03% | 55.91% | 55.84% |
| Xcel Energy Inc. | XEL | 53.76% | 54.01% | 54.75% | 54.22% | 53.62% | 53.92% | 54.87% | 54.59% | 54.22% |
| MEAN | | 51.70% | 51.38% | 51.56% | 51.42% | 51.43% | 51.27% | 51.34% | 51.01% | 51.39% |
| LOW | | 40.69% | 40.48% | 40.77% | 41.04% | 39.52% | 41.47% | 40.36% | 40.27% | 40.58% |
| HIGH | | 55.69% | 55.39% | 56.04% | 56.24% | 56.63% | 56.16% | 56.03% | 55.91% | 55.84% |

| | | COMMON EQUITY RATIO - UTILITY OPERATING COMPANIES [2] | | | | | | | | |
|---|--------|---|--------|--------|--------|--------|--------|--------|--------|---------|
| Company Name | Ticker | 2017Q3 | 2017Q2 | 2017Q1 | 2016Q4 | 2016Q3 | 2016Q2 | 2016Q1 | 2015Q4 | Average |
| Ameren Illinois Company | AEE | 54.40% | 53.96% | 53.50% | 52.85% | 55.18% | 54.47% | 53.06% | 52.81% | 53.78% |
| Union Electric Company | AEE | 51.61% | 51.14% | 50.92% | 51.27% | 51.62% | 50.56% | 51.42% | 50.51% | 51.13% |
| Central Maine Power Company | AGR | 63.96% | 63.26% | 62.82% | 62.38% | 61.02% | 60.39% | 60.09% | 60.26% | 61.77% |
| New York State Electric & Gas Corporation | AGR | 48.27% | 50.24% | 49.68% | 48.84% | 56.35% | 56.05% | 55.72% | 54.82% | 52.50% |
| Rochester Gas and Electric Corporation | AGR | 48.94% | 48.46% | 55.25% | 54.30% | 54.88% | 52.91% | 52.59% | 51.72% | 52.38% |
| United Illuminating Company | AGR | 54.35% | 52.17% | 54.88% | 54.26% | 51.90% | 51.14% | 50.71% | 50.03% | 52.43% |
| Black Hills Colorado Electric Utility Company, LP | BKH | 54.96% | 55.01% | 53.08% | 52.20% | 51.85% | 51.39% | 51.06% | 50.85% | 52.55% |
| Black Hills Power, Inc. | BKH | 56.14% | 53.26% | 53.24% | 52.88% | 53.13% | 53.13% | 53.27% | 53.35% | 53.55% |
| Cheyenne Light, Fuel and Power Company | BKH | 53.16% | 53.27% | 53.29% | 53.35% | 53.22% | 53.14% | 53.36% | 53.32% | 53.26% |
| CenterPoint Energy Houston Electric, LLC | CNP | 31.86% | 30.48% | 29.58% | 30.32% | 26.45% | 26.10% | 25.55% | 24.78% | 28.14% |
| CenterPoint Energy Resources Corp. | CNP | 52.05% | 53.55% | 55.48% | 55.16% | 56.39% | 60.96% | 58.63% | 58.16% | 56.30% |
| Consumers Energy Company | CMS | 53.09% | 52.81% | 51.93% | 51.07% | 51.13% | 52.14% | 51.25% | 50.46% | 51.74% |
| Consolidated Edison Company of New York, Inc. | ED | 49.47% | 48.58% | 49.65% | 49.31% | 50.27% | 48.94% | 50.10% | 49.78% | 49.51% |
| Orange and Rockland Utilities, Inc. | ED | 50.27% | 49.81% | 50.00% | 49.46% | 49.63% | 48.98% | 48.47% | 47.85% | 49.31% |
| DTE Electric Company | DTE | 50.50% | 50.63% | 50.50% | 50.50% | 50.13% | 49.35% | 50.53% | 50.39% | 50.31% |
| Connecticut Light and Power Company | ES | 52.57% | 53.82% | 53.54% | 54.51% | 53.92% | 53.66% | 53.43% | 52.03% | 53.44% |
| NSTAR Electric Company | ES | 52.44% | 52.30% | 55.77% | 55.60% | 54.87% | 53.48% | 55.24% | 55.59% | 54.41% |
| Public Service Company of New Hampshire | ES | 59.26% | 57.05% | 56.60% | 56.31% | 56.19% | 55.63% | 54.04% | 53.48% | 56.07% |
| Western Massachusetts Electric Company | ES | 55.02% | 54.71% | 54.40% | 54.11% | 54.00% | 53.06% | 53.78% | 53.46% | 54.07% |
| NorthWestern Corporation | NWE | 48.86% | 48.61% | 48.61% | 48.13% | 47.72% | 47.66% | 47.54% | 47.31% | 48.05% |
| Wisconsin Electric Power Company | WEC | 55.69% | 55.48% | 55.30% | 56.46% | 56.99% | 56.87% | 56.67% | 56.97% | 56.30% |
| Wisconsin Public Service Corporation | WEC | 55.68% | 55.21% | 54.02% | 55.78% | 55.15% | 54.61% | 54.65% | 53.53% | 54.83% |
| Northern States Power Company - MN | XEL | 52.22% | 52.78% | 52.62% | 52.31% | 52.08% | 51.86% | 53.68% | 53.26% | 52.60% |
| Northern States Power Company - WI | XEL | 55.57% | 55.22% | 55.66% | 54.93% | 54.89% | 54.57% | 54.43% | 54.27% | 54.94% |
| Public Service Company of Colorado | XEL | 55.64% | 54.88% | 57.00% | 56.32% | 56.37% | 55.93% | 56.49% | 56.34% | 56.12% |
| Southwestern Public Service Company | XEL | 52.29% | 54.61% | 54.48% | 53.93% | 50.45% | 54.30% | 54.13% | 53.83% | 53.50% |

Notes:

[1] Ratios are weighted by actual common capital and long-term debt of Operating Subsidiaries

[2] Natural Gas and Electric Operating Subsidiaries with data listed as N/A from SNL Financial have been excluded from the analysis.

| | | LONG-TERM DEBT RATIO [1] | | | | | | | | |
|------------------------------|--------|--------------------------|--------|--------|--------|--------|--------|--------|--------|---------|
| Electric Proxy Group Company | Ticker | 2017Q3 | 2017Q2 | 2017Q1 | 2016Q4 | 2016Q3 | 2016Q2 | 2016Q1 | 2015Q4 | Average |
| Ameren Corporation | AEE | 46.16% | 46.60% | 46.93% | 47.01% | 45.87% | 46.75% | 46.80% | 47.49% | 46.70% |
| Avista Corporation | AGR | 45.32% | 45.61% | 43.96% | 44.63% | 43.36% | 44.19% | 44.53% | 44.93% | 44.57% |
| Black Hills Corporation | BKH | 44.66% | 46.04% | 46.81% | 47.28% | 47.34% | 47.53% | 47.55% | 47.61% | 46.85% |
| CenterPoint Energy, Inc. | CNP | 59.31% | 59.52% | 59.23% | 58.96% | 60.48% | 58.53% | 59.64% | 59.73% | 59.42% |
| CMS Energy Corporation | CMS | 46.60% | 46.88% | 47.75% | 48.61% | 48.54% | 47.53% | 48.41% | 49.20% | 47.94% |
| Consolidated Edison, Inc. | ED | 50.49% | 51.36% | 50.33% | 50.68% | 49.76% | 51.05% | 49.98% | 50.32% | 50.50% |
| DTE Energy Company | DTE | 49.50% | 49.37% | 49.50% | 49.50% | 49.87% | 50.65% | 49.47% | 49.61% | 49.69% |
| Eversource Energy | ES | 45.21% | 45.07% | 44.12% | 43.81% | 44.31% | 45.02% | 44.74% | 45.32% | 44.70% |
| NorthWestern Corporation | NWE | 51.14% | 51.39% | 51.39% | 51.87% | 52.28% | 52.34% | 52.46% | 52.69% | 51.95% |
| Wisconsin Energy Corporation | WEC | 43.98% | 44.27% | 44.77% | 43.42% | 43.26% | 43.51% | 43.63% | 43.76% | 43.82% |
| Xcel Energy Inc. | XEL | 46.24% | 45.99% | 45.25% | 45.78% | 46.38% | 46.08% | 45.13% | 45.41% | 45.78% |
| MEAN | | 48.05% | 48.37% | 48.19% | 48.32% | 48.31% | 48.47% | 48.40% | 48.73% | 48.36% |
| LOW | | 43.98% | 44.27% | 43.96% | 43.42% | 43.26% | 43.51% | 43.63% | 43.76% | 43.82% |
| HIGH | | 59.31% | 59.52% | 59.23% | 58.96% | 60.48% | 58.53% | 59.64% | 59.73% | 59.42% |

| | | LONG-TERM DEBT RATIO - UTILITY OPERATING COMPANIES [2] | | | | | | | | |
|---|--------|--|--------|--------|--------|--------|--------|--------|--------|---------|
| Company Name | Ticker | 2017Q3 | 2017Q2 | 2017Q1 | 2016Q4 | 2016Q3 | 2016Q2 | 2016Q1 | 2015Q4 | Average |
| Ameren Illinois Company | AEE | 44.54% | 44.97% | 45.41% | 46.05% | 43.67% | 44.36% | 45.80% | 46.04% | 45.11% |
| Union Electric Company | AEE | 47.36% | 47.81% | 48.04% | 47.70% | 47.36% | 48.39% | 47.51% | 48.47% | 47.83% |
| Central Maine Power Company | AGR | 36.02% | 36.72% | 37.16% | 37.60% | 38.96% | 39.59% | 39.89% | 39.72% | 38.21% |
| New York State Electric & Gas Corporation | AGR | 51.73% | 49.76% | 50.32% | 51.16% | 43.65% | 43.95% | 44.28% | 45.18% | 47.50% |
| Rochester Gas and Electric Corporation | AGR | 51.06% | 51.54% | 44.75% | 45.70% | 45.12% | 47.09% | 47.41% | 48.28% | 47.62% |
| United Illuminating Company | AGR | 45.65% | 47.83% | 45.12% | 45.74% | 48.10% | 48.86% | 49.29% | 49.97% | 47.57% |
| Black Hills Colorado Electric Utility Company, LP | BKH | 45.04% | 44.99% | 46.92% | 47.80% | 48.15% | 48.61% | 48.94% | 49.15% | 47.45% |
| Black Hills Power, Inc. | BKH | 43.86% | 46.74% | 46.76% | 47.12% | 46.87% | 46.87% | 46.73% | 46.65% | 46.45% |
| Cheyenne Light, Fuel and Power Company | BKH | 46.84% | 46.73% | 46.71% | 46.65% | 46.78% | 46.86% | 46.64% | 46.68% | 46.74% |
| CenterPoint Energy Houston Electric, LLC | CNP | 68.14% | 69.52% | 70.42% | 69.68% | 73.55% | 73.90% | 74.45% | 75.22% | 71.86% |
| CenterPoint Energy Resources Corp. | CNP | 47.95% | 46.45% | 44.52% | 44.84% | 43.61% | 39.04% | 41.37% | 41.84% | 43.70% |
| Consumers Energy Company | CMS | 46.60% | 46.88% | 47.75% | 48.61% | 48.54% | 47.53% | 48.41% | 49.20% | 47.94% |
| Consolidated Edison Company of New York, Inc. | ED | 50.53% | 51.42% | 50.35% | 50.69% | 49.73% | 51.06% | 49.90% | 50.22% | 50.49% |
| Orange and Rockland Utilities, Inc. | ED | 49.73% | 50.19% | 50.00% | 50.54% | 50.37% | 51.02% | 51.53% | 52.15% | 50.69% |
| DTE Electric Company | DTE | 49.50% | 49.37% | 49.50% | 49.50% | 49.87% | 50.65% | 49.47% | 49.61% | 49.69% |
| Connecticut Light and Power Company | ES | 45.70% | 44.42% | 44.69% | 43.67% | 44.23% | 44.48% | 44.70% | 46.05% | 44.74% |
| NSTAR Electric Company | ES | 46.74% | 46.88% | 43.34% | 43.51% | 44.22% | 45.58% | 43.83% | 43.49% | 44.70% |
| Public Service Company of New Hampshire | ES | 40.74% | 42.95% | 43.40% | 43.69% | 43.81% | 44.37% | 45.96% | 46.52% | 43.93% |
| Western Massachusetts Electric Company | ES | 44.98% | 45.29% | 45.60% | 45.89% | 46.00% | 46.94% | 46.22% | 46.54% | 45.93% |
| NorthWestern Corporation | NWE | 51.14% | 51.39% | 51.39% | 51.87% | 52.28% | 52.34% | 52.46% | 52.69% | 51.95% |
| Wisconsin Electric Power Company | WEC | 43.81% | 44.02% | 44.19% | 43.05% | 42.53% | 42.64% | 42.84% | 42.55% | 43.20% |
| Wisconsin Public Service Corporation | WEC | 44.32% | 44.79% | 45.98% | 44.22% | 44.85% | 45.39% | 45.35% | 46.47% | 45.17% |
| Northern States Power Company - MN | XEL | 47.78% | 47.22% | 47.38% | 47.69% | 47.92% | 48.14% | 46.32% | 46.74% | 47.40% |
| Northern States Power Company - WI | XEL | 44.43% | 44.78% | 44.34% | 45.07% | 45.11% | 45.43% | 45.79% | 45.73% | 45.06% |
| Public Service Company of Colorado | XEL | 44.36% | 45.12% | 43.00% | 43.68% | 43.63% | 44.07% | 43.51% | 43.66% | 43.88% |
| Southwestern Public Service Company | XEL | 47.71% | 45.39% | 45.52% | 46.07% | 49.55% | 45.70% | 45.87% | 46.17% | 46.50% |

Notes:

[1] Ratios are weighted by actual common capital and long-term debt of Operating Subsidiaries

[2] Natural Gas and Electric Operating Subsidiaries with data listed as N/A from SNL Financial have been excluded from the analysis.